METEOROLOGICAL CHARTS

OF THE

SOUTHERN OCEAN

BETWEEN THE

CAPE OF GOOD HOPE & NEW ZEALAND

SECOND EDITION

PREFACE.

The original issue of the Meteorological Charts of the Southern Ocean published in 1899, was exhausted in 1904, and in view of the continued demand for copies it was decided to republish them.

In this Edition the scale of the Wind, Barometer, Air Temperature and Fog charts has been reduced, as well as that of the charts of the Sea Temperature Isothermals, to make the publication more handy. On the other hand, the scale of the current charts has been slightly increased, and charts have been added to show the distribution of ice.

The work has been carried out under the superintendence of Commander M. W. Campbell Hepworth, C.B., R.N.R., Marine Superintendent.

W. N. SHAW,
Director.

Meteorological Office, London,
18th December, 1906.

600 Wt 12848 4/07 D & S 23 22480

PREFACE TO THE ORIGINAL EDITION.

In the preparation of these Charts observations relating to the prescribed district have been used, for each four hours, from about 2,000 logs kept for the Meteorological Office between the years 1855 and 1895, as well as from about 450 logs of Her Majesty's Ships, which were all that were available, and also from numerous logs of private Shipping Companies.

The Charts are bounded in Latitude by the parallels of 30° and 60° S, and in Longitude by the meridians of 10° and 180° E.

The Charts show for each month of the year the Wind, in direction and force, for areas of 3° of Latitude by 10° of Longitude; also the Barometrical Pressure by isobars, and the Temperature of the Air and Sea Surface by isotherms. The regions of excessive range of Sea Surface Temperature are indicated by shading.

The amount of Fog is shown by percentages of the total number of weather observations, and also, graphically, by curves.

The Currents are given in separate monthly charts.

No use has been made in these Charts of the readings of the Wet Bulb Thermometer, or of any of the following elements: Sea Surface Direction and Disturbance, Clouds, and Specific Gravity of the sea water.

It is hoped that the publication now issued, which adds considerably to the information hitherto available for this part of the ocean, may be found useful to navigators.

ROBERT H. SCOTT,

Secretary to the Council.

Meteorological Office, May 1899.

REMARKS ON THE CHARTS.

Barometer.—The broad features of the barometric systems exhibited on the series of Monthly Charts in this volume are the following:—

1. An area of high barometer lies over the sea, between the African Continent and Australia, throughout the year. It alters its position, slightly, from month to month, and, generally, the central portion of the system, which is sometimes divided into two parts, is situated more to the East and South during the six months November to April than in any of the other months.

2. Over the relatively small region of the Great Australian Bight, there is also evidence of a seasonal variation in the distribution of pressure, but the changes are not so regular as over the open sea. In the summer months, December to March, the barometer is lower over the land than over the sea, but during the winter the contrary is generally the case.

3. In the Tasman Sea, the changes from month to month are of a much less defined and regular character than those to the westward. Usually, the barometer is highest over the northern parts of the region, anticyclonic systems appearing in February and March.

4. In the far South the barometer is comparatively low throughout the year.

Winds.—The winds of the Southern Indian Ocean are subject to very similar seasonal movements as the areas of high and low barometer.

South of the parallel of about 35° S. the winds are mainly the result of cyclonic systems travelling to the eastward. As the centres of the depressions are generally far to the southward the resulting winds in the portion of the ocean shown on these charts are principally from the Western quarter.

As in similar latitudes in the North Atlantic and Pacific, the actual track of the depression may be considerably to the North or South of East, their rates of progression will vary, and the shape of the depression will greatly affect the veering of the wind, so that while one vessel may carry a wind from the West for great distances, another may experience constant shifts as comparatively small depressions moving in different tracks pass her in her course.

The high pressure areas being farthest North during the winter months, winds from points in the western half of the compass generally prevail from May to November. Off the African coast, however, North-easterly winds are experienced in nearly all months, but they are least marked in June and July.

As the high pressure areas move southward, the winds over the northern part of the sea, in the neighbourhood of about lat. 30°, become more variable in direction. By December, however, North-easterly and South-easterly winds are increasing in frequency, and in the first three months of the year they are the prevailing winds between the 30th and 36th parallels of latitude.

This is therefore the best period for attempting a homeward voyage round the Cape of Good Hope. The winds off Cape Leeuwin are also, usually, favourable at this time.

In April the Easterly winds, although still experienced, are not so prevalent, and they do not extend so far South as in the preceding months. In May they are North of latitude 30°.

In the Tasman Sea, during the summer months, January to March, winds blow from every quarter of the compass, but off the Australian coast the prevailing winds are Northerly to North-easterly and off Bass Strait and Tasmania, South-westerly. On the New Zealand side of the sea Southerly to Easterly winds prevail. During the remaining nine months of the year the winds over this region are very variable in direction.

In all months, and practically all over the ocean, by far the greater proportion of winds are those ranging in force from 4 to 7 of Beaufort's Scale, and calms are comparatively rare. During the summer months light winds are common over the northern parts of the sea.

Gales are not of frequent occurrence in January, and those encountered are mainly confined to the southern parts of the sea, South of about lat. 42°. As the year advances, however, they become more frequent, and they are experienced further North, until in June and July they are met with up to the 30th parallel. They then recede about as regularly southward to the end of the year.

Wind Observations South of Latitude 60°.

(The number of observations is given in ordinary type, the percentages underneath in italics.)

DECEMBER.

Areas.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calms.	Total No. of Obs.
Latitude 60° to 63° S.	1	6	2	10	...	11	2	12	1	45
Longitude 170° „ 180° E.	*2*	*13*	*4*	*22*	...	*25*	*5*	*27*	*2*	...
Latitude 60° „ 66° S.	25	5	5	...	...	17	11	43	14	120
Longitude 160° „ 170° E.	*21*	*4*	*4*	...	...	*14*	*9*	*36*	*12*	...
Latitude 66° „ 67° S.	...	...	...	6	...	...	22	20	...	48
Longitude 170° „ 180° E.	...	...	...	*12*	...	...	*46*	*42*	...	...

JANUARY.

Latitude 63° to 72° S.	12	30	11	35	7	44	25	50	20	234
Longitude 170° „ 180° E.	*5*	*13*	*5*	*15*	*3*	*19*	*11*	*21*	*8*	...
Latitude 72° „ 78° S.	1	5	4	16	31	39	1	1	8	106
Longitude 170° „ 180° E.	*1*	*5*	*4*	*15*	*29*	*37*	*1*	*1*	*7*	...
Latitude 75° „ 78° S.	1	...	...	2	...	2	3	5	...	13
Longitude 160° „ 170° E.	*8*	...	...	*15*	...	*15*	*23*	*39*	...	...

FEBRUARY.

Areas.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calms.	Total. No. of Obs.
Latitude 60° to 66° S.	10	16	3	10	3	3	1	9	3	58
Longitude 40° „ 60° E.	*17*	*28*	*5*	*17*	*5*	*5*	*2*	*16*	*5*	...
Latitude 60° „ 63° S.	...	...	...	...	5	7	1	...	...	13
Longitude 60° „ 70° E.	...	...	...	...	*38*	*54*	*8*	...	...	...

MARCH.

Latitude 60° to 63° S.	2	7	3	13	3	13	...	3	3	47
Longitude 70° „ 100° E.	*4*	*15*	*7*	*28*	*6*	*28*	...	*6*	*6*	...
Latitude 60° „ 63° S.	2	9	5	2	...	...	...	1	2	21
Longitude 130° „ 140° E.	*9*	*43*	*24*	*10*	...	...	...	*5*	*9*	...
Latitude 63° „ 66° S.	1	5	2	12	4	13	2	5	3	47
Longitude 140° „ 160° E.	*2*	*11*	*4*	*25*	*9*	*28*	*4*	*11*	*6*	...
Latitude 63° „ 69° S.	5	6	5	12	2	12	7	18	2	69
Longitude 160° „ 170° E.	*7*	*9*	*7*	*18*	*3*	*17*	*10*	*26*	*3*	...

Air Temperature.—The general distribution of air temperature is very similar to that of the sea water, being fairly uniform throughout the year in the neighbourhood of Kerguelen, while in the more northern latitudes there is a difference of about 10° between the summer and winter mean temperatures. Over these northern localities, however, the temperature of the air is generally lower than that of the sea to the extent of a few degrees.

Fog.—Only the most northern parts of the sea are free from fog. South of about Lat. 40°, over the western part of the sea, in the neighbourhood of the areas where the range of sea surface temperature is great (coloured blue on the charts), fog is of frequent occurrence, amounting to as much as 10 per cent. of the weather observation. South of New Zealand, from November to April, and also in August, fog is often experienced.

Ice.—No attempt has been made to construct an ice chart. The Admiralty have for many years published an Ice Chart of the Southern Hemisphere (No. 1241), and for some years information has been collected by the Hydrographical Department relative to the condition of the ice in the tracks of vessels, from which the following remarks have been compiled.

1. Between the Cape of Good Hope and Tasmania ice is seldom met with North of the parallel of 40° S. and then only scattered bergs. During the last 50 years only three bergs have been reported North of this parallel and they were in the immediate vicinity of the Cape.

2. Between the parallels of 40° and 45° South latitude, icebergs are most frequently met with between the meridians of 40° and 60° East longitude. They have also, though rarely, been seen between the meridians of 85° and 100° East longitude and the meridians of 120° and 135° East longitude.

3. Between the parallels of 45° and 50° South latitude, ice may be met with anywhere West of the meridian of 90° E. Eastward of this meridian it is much rarer.

4. The amount of ice reported in different years varies considerably. Thus, in 1891 no ice was seen between the Cape and Tasmania. In 1892 a few scattered bergs were met, but in 1893 a large number of bergs were met North of the parallel of 45° and between the meridians of Greenwich and Cape Agulhas. In 1894 these bergs appeared between the parallels of 43° and 52° S. latitude and the meridians of 10° and 70° East longitude. In 1895 they were reported between the same meridians and the parallels of 42° and 47° S., but few vessels went South of 47° S.

In 1896 icebergs were reported between the parallels of 42° and 50° South latitude and the meridians of 35° and 90° East longitude. In 1897 these bergs appear in much the same position, though a little further eastward.

In 1898 comparatively few were reported, but the records have not yet been all plotted.

From the fact that many icebergs, some of very large dimensions, were reported North-east of the Falkland Islands before 1892, and that as ice was reported in increasing quantities, first West of the meridian of the Cape and then East of it, so the ice North-East of the Falklands became less and finally disappeared, it seems not improbable that most of the ice reported in the last nine years in the Southern Indian Ocean had drifted East from the area near the Falklands. If this was so, some idea of the life of a berg in temperate climates may be formed. It certainly cannot be considered as less than 10 years, and its destruction is probably due more to wave action than increased warmth.

The foregoing remarks will show that the liability to encounter ice is much increased the further the ship goes South of the parallel of 40° S., and while the length of the summer days, in high latitudes, decreases the chances of running into danger in the dark, still the prevalence of fog, snow, and thick weather, makes it quite possible for a ship to get foul of an iceberg even in the day time and mariners are cautioned accordingly.

Currents.—The currents are reproduced from the Current Charts of the Indian and Pacific Oceans, published by the Hydrographical Department of the Admiralty, from material collected and collated by the Meteorological Office.

Sea Temperature.—The mean temperature of the sea surface, in the more southern latitudes, does not undergo any very important change during the year, the temperature near Kerguelen being approximately 40° in all months, but further North there is greater variation, depending on the season.

From January to March, the temperature of the sea surface off the West Coast of Australia, is about 5° lower than on the East Coast, and the difference ranges from 5° to 10° in October, November, and December, but there is little or no difference during the six months, April to September.

The difference in the temperature on the western and eastern sides of New Zealand is less marked, but there is a general tendency for a somewhat higher temperature down the East Coast of North Island, and lower up the East Coast of Middle Island.

Throughout the year the temperature off Cape Colony is about 10° lower on the West Coast than it is on the East Coast.

The regions of greatest range of temperature, 20° and upwards, are situated West of the 70th meridian between the latitudes of about 39° and 45° S.

In January, February, and March, areas of great range are also found along the South Coast of Cape Colony, and in May there is a similar small area off Sydney, New South Wales.

C. W. BAILLIE,
Marine Superintendent.

Meteorological Office,
May, 1899.

Additional Remarks; December, 1906.

The information relating to ice is given by graphic representation. It shows the extreme limits at which ice had been seen since the beginning of the last century, and exhibits for each month of the year the general distribution of ice, as reported during the past twenty years.

These Charts of the Southern Ocean are intended to enable the navigator to determine the parallels, normally most favourable, for running down the easting, according to the season of the year.

Since the publication of the Atlas, in 1899, the route homeward from Australia via the Cape of Good Hope has been largely adopted, as an alternative to the route via the Suez Canal.

It will be seen by examining the wind roses on these Charts that, in all months of the year, a track may be found between Cape Leeuwin and the Cape of Good Hope on which conditions are favourable for making the passage to the westward, under steam, without unduly lengthening the distance to be traversed from point to point. But, during the months December to March, inclusive, winds will be found favourable on a track lying, for the most part, south of the 30th parallel of south latitude; and in these months the passage homeward via the Cape of Good Hope may be used with advantage by sailing vessels as well as steamships.

Throughout the four years 1892-1895 numerous icebergs were observed in the Southern Ocean, some of them in latitudes unusually far north. In June 1892 the remnant of a berg was observed, from the deck of a steamer, when only twenty miles south of Cape Leeuwin. In August 1895, seven bergs, estimated as ranging from 70 to 200 feet in height, were seen fifty-five miles south-east of Cape Agulhas.

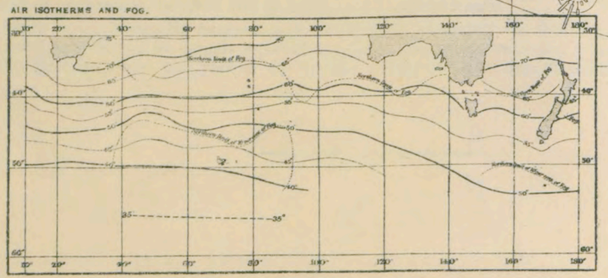
During the decade 1896-1905 comparatively few bergs were met with on the trade routes between the Cape of Good Hope and Australasia. Since the close of 1905, however, reports of ice observed in the neighbourhood of Cape Horn, and between that Cape and the Falkland Islands, have been increasingly frequent; and in recent months a large number of bergs have been seen as far as three hundred miles north of the Falklands.

It is, therefore, not improbable that, at no distant date, ice, in large quantities will again make its appearance in the South Indian Ocean, and seamen are cautioned accordingly.

A number of the bergs which have been seen in the vicinity of Cape Horn and in the South Atlantic Ocean, have been remarkable for their great size; many of them being estimated at from 300 to 700 feet high, and from 1 to 10 miles long. A berg observed near Cape Horn in July last was reported to be 1,000 feet in height, and 1 mile in length.

It is difficult, even under favourable circumstances, to estimate accurately the dimensions of a passing berg; and therefore the height and extent of some of the ice islands reported may have been over estimated. It is, nevertheless, an undoubted fact that the icebergs, which have been seen this year in the localities referred to, have been abnormally large, even for southern bergs.

CAMPBELL HEPWORTH.



WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 ($\frac{\text{Light}}{\text{Moderate}}$ $\frac{\text{Moderate}}{\text{Gales}}$). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Fahr. and to sea level. No correction for gravity has been applied.

FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

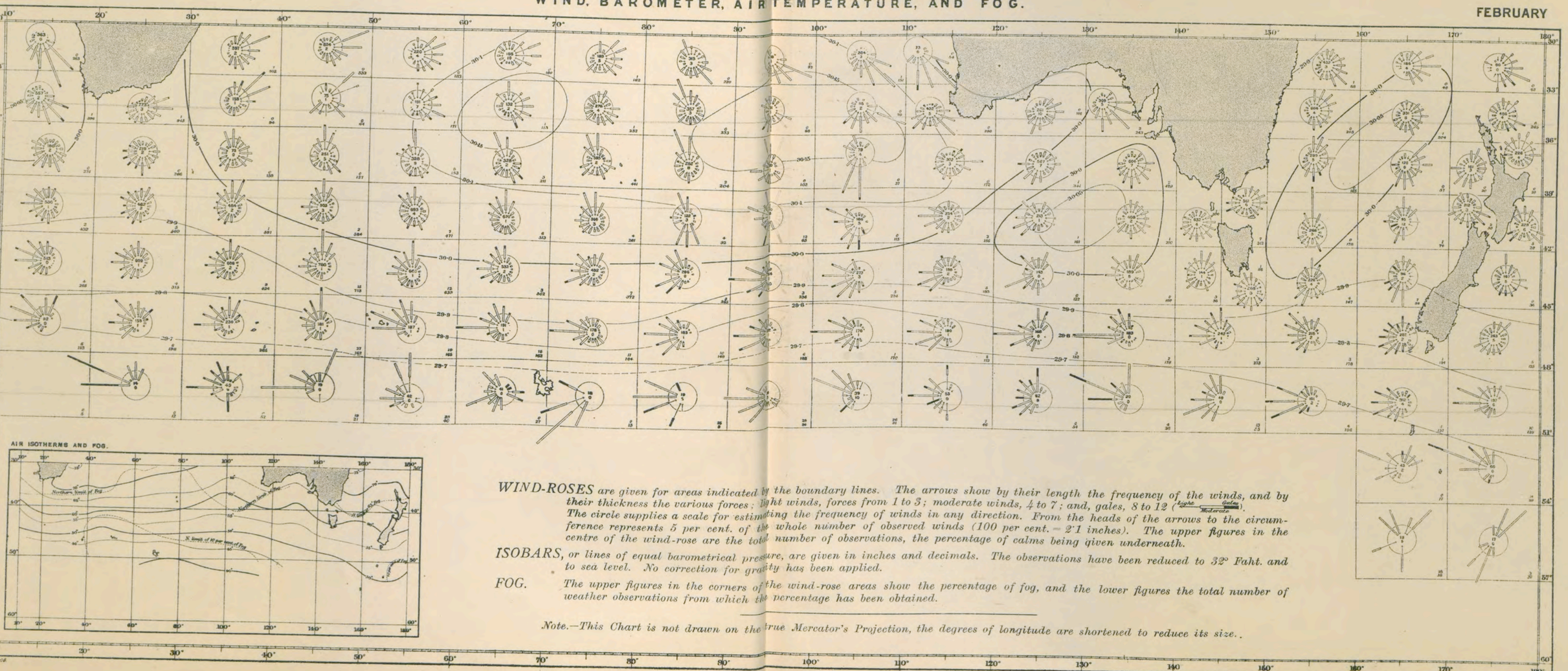
Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size..

Walker & Graham Ltd Litho London

WINDS.
FEBRUARY.

WIND, BAROMETER, AIR TEMPERATURE, AND FOG.

FEBRUARY



WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces: light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 ($\frac{\text{Light}}{\text{Moderate}}$ $\frac{\text{Gales}}{\text{Moderate}}$). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for gravity has been applied.

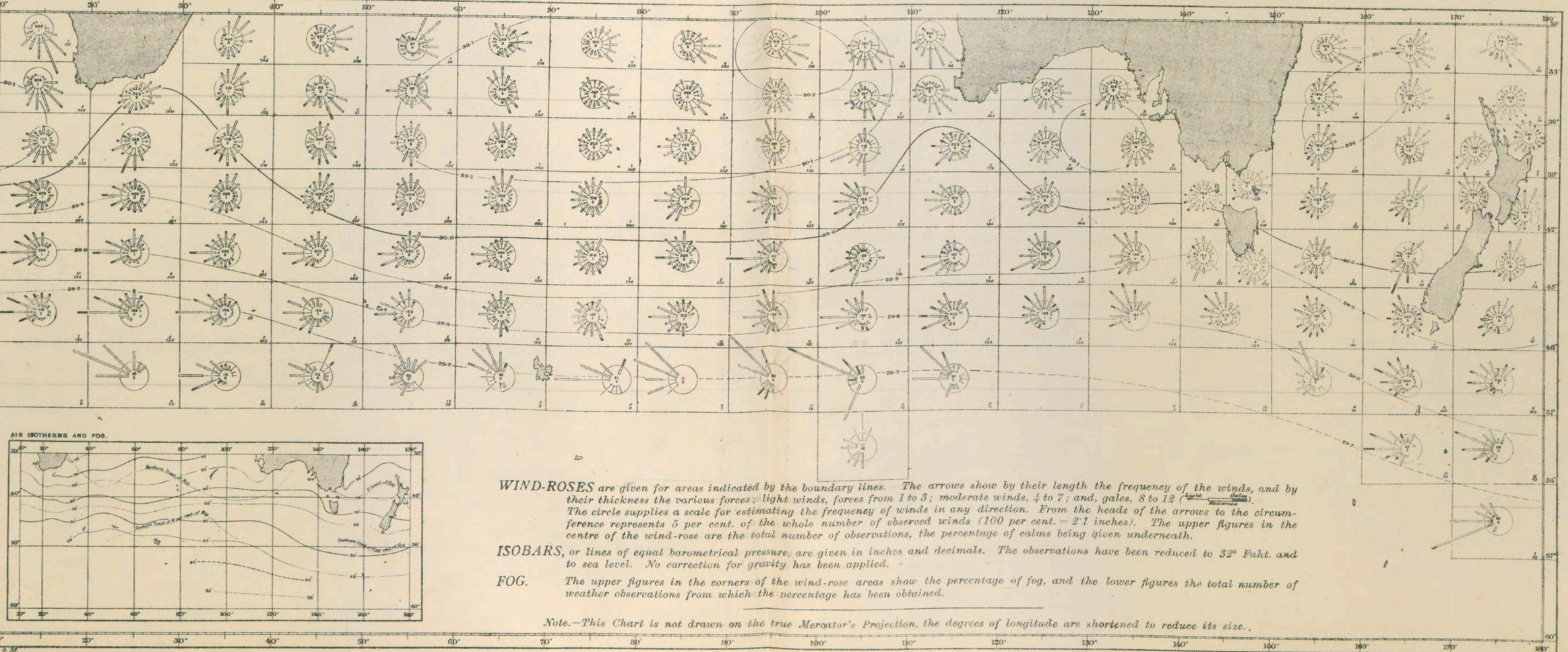
FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham, Ltd. Litho. London.

WIND, BAROMETER, AIR TEMPERATURE, AND FOG.

MARCH



AIR ISOTHERMS AND FOG.

WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light Moderate Hard gales). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for gravity has been applied.

FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

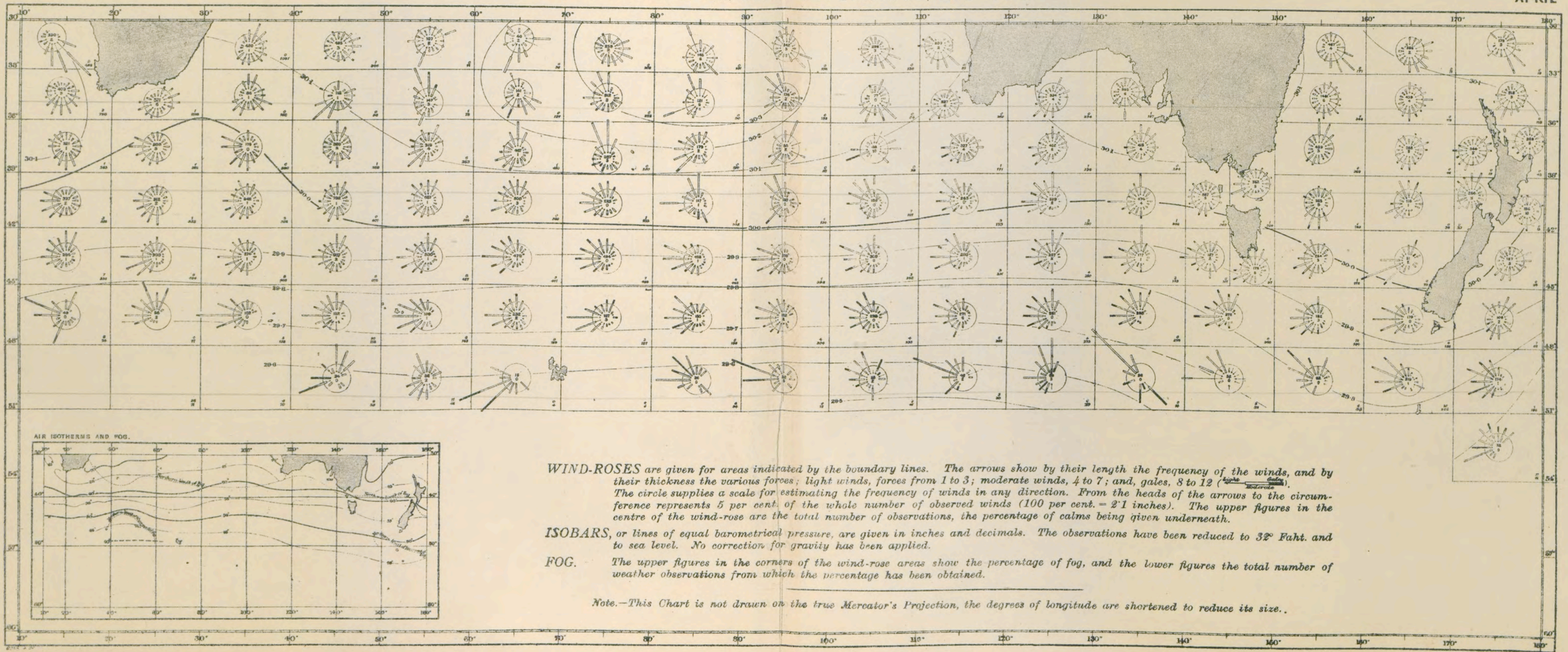
Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size.

6050. 3. 32.

Weller & Graham, Ltd Litho. London.

WIND, BAROMETER, AIR TEMPERATURE, AND FOG.

APRIL



WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light, Gales, Moderate). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for gravity has been applied.

FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size..

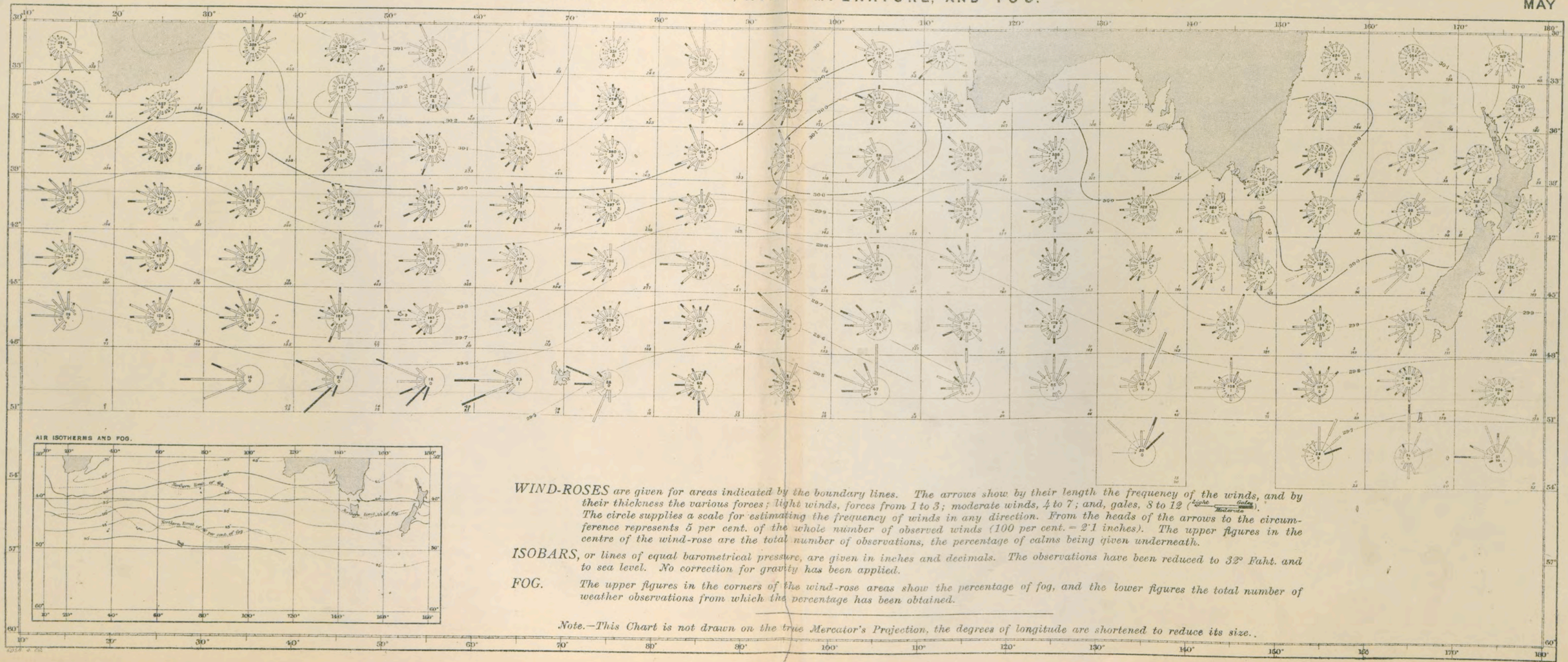
Weller & Graham, Ltd Litho. London.

WINDS.

MAY.

WIND, BAROMETER, AIR TEMPERATURE, AND FOG.

MAY



AIR ISOTHERMS AND FOG.

WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light, Gales, Moderate). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for gravity has been applied.

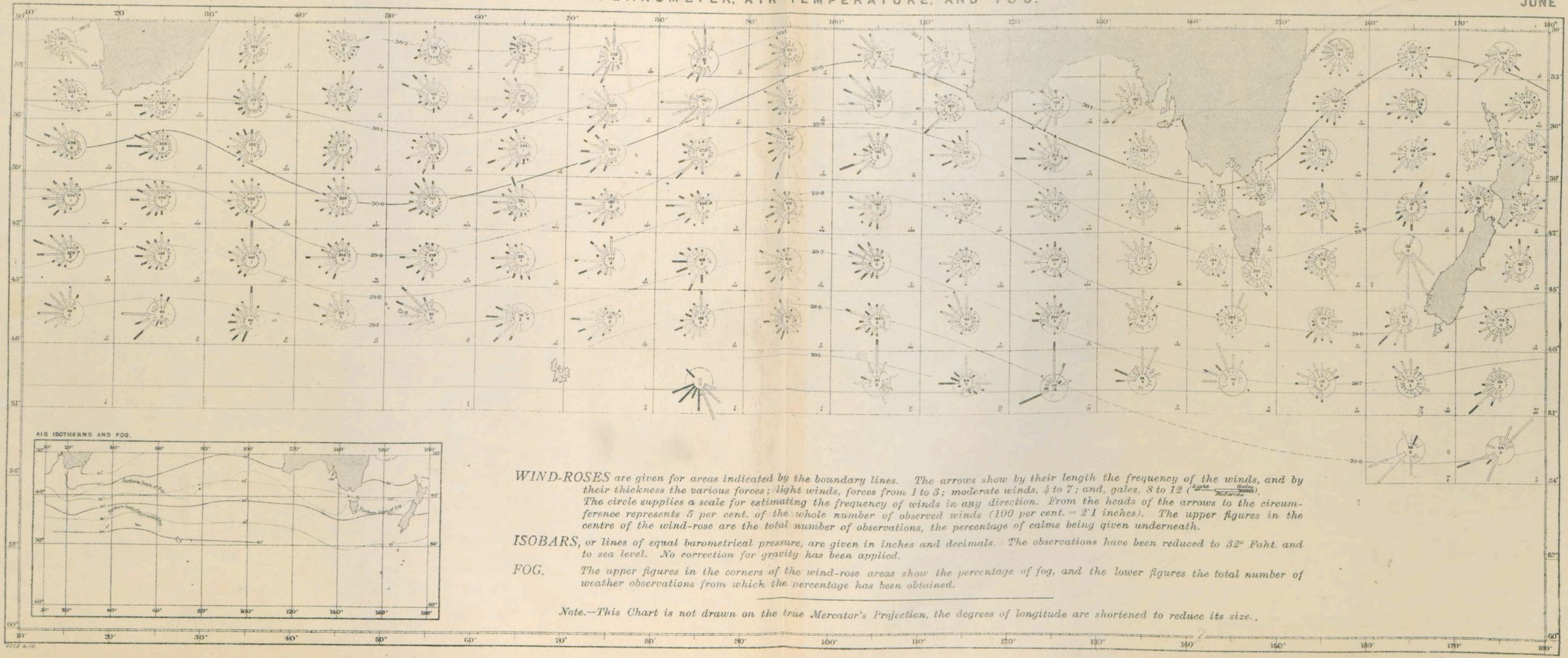
FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham, Ltd. Litho. London.

WIND, BAROMETER, AIR TEMPERATURE, AND FOG.

JUNE



AIR ISOTHERMS AND FOG.

WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light / Moderate / Gales). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Fahr. and to sea level. No correction for gravity has been applied.

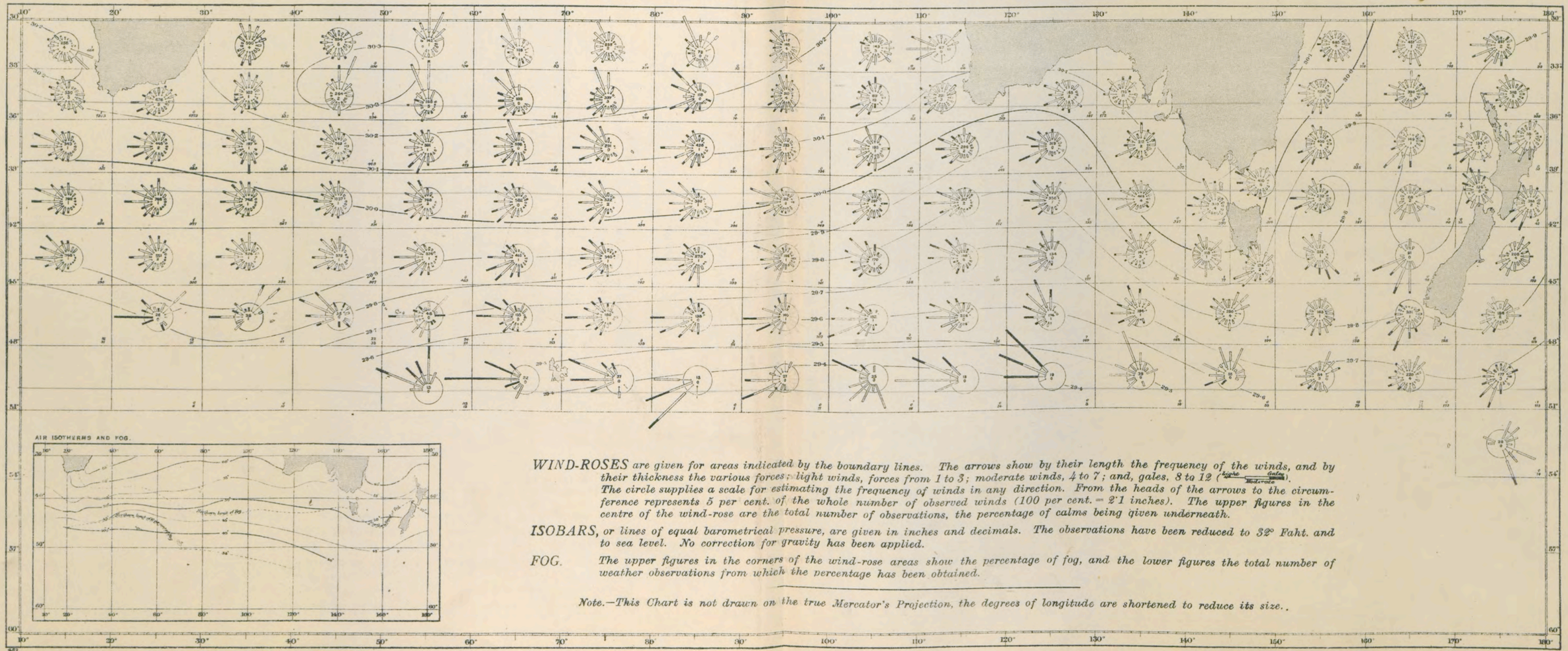
FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham, Ltd. Litho. London.

WIND, BAROMETER, AIR TEMPERATURE, AND FOG.

JULY



AIR ISOTHERMS AND FOG.

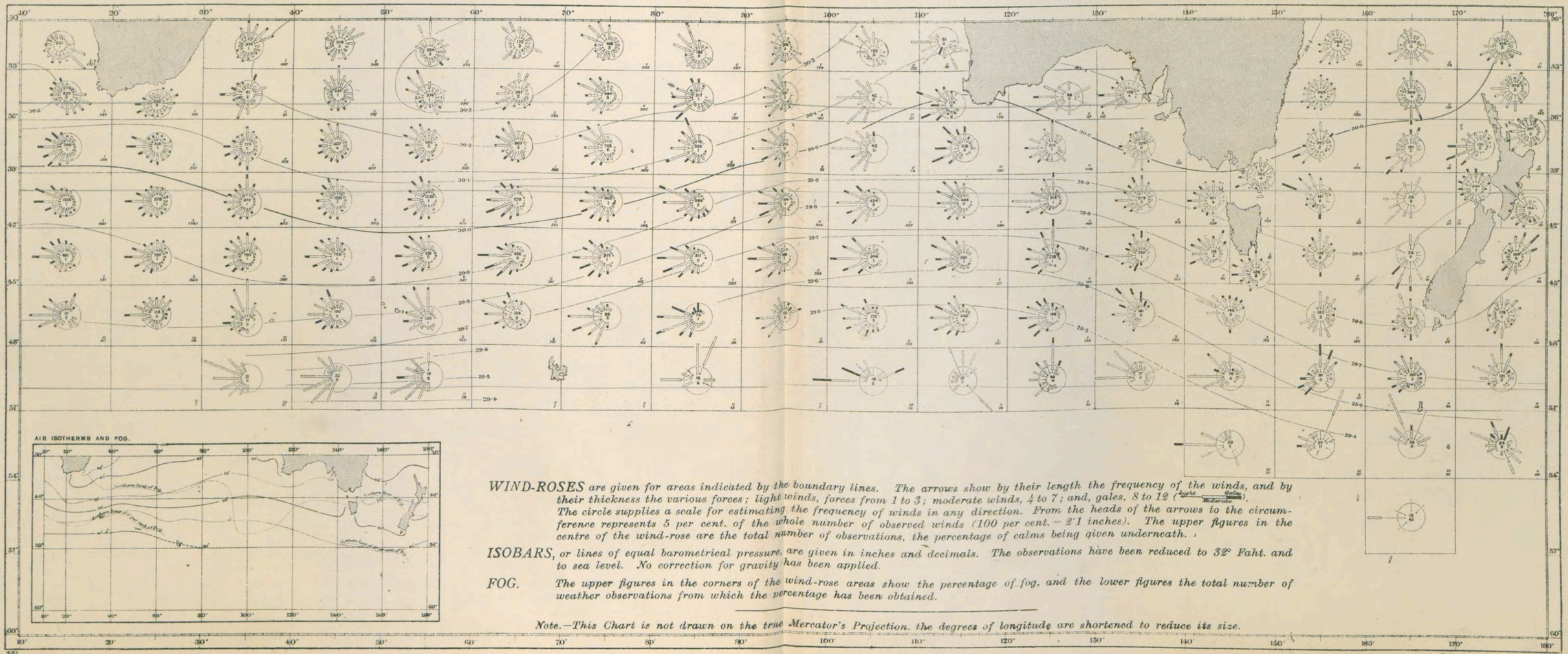
WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light, Moderate, Gales). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for gravity has been applied.

FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham Ltd Litho London.



AIR ISOTHERMS AND FOG.

WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light, Moderate, Gales). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

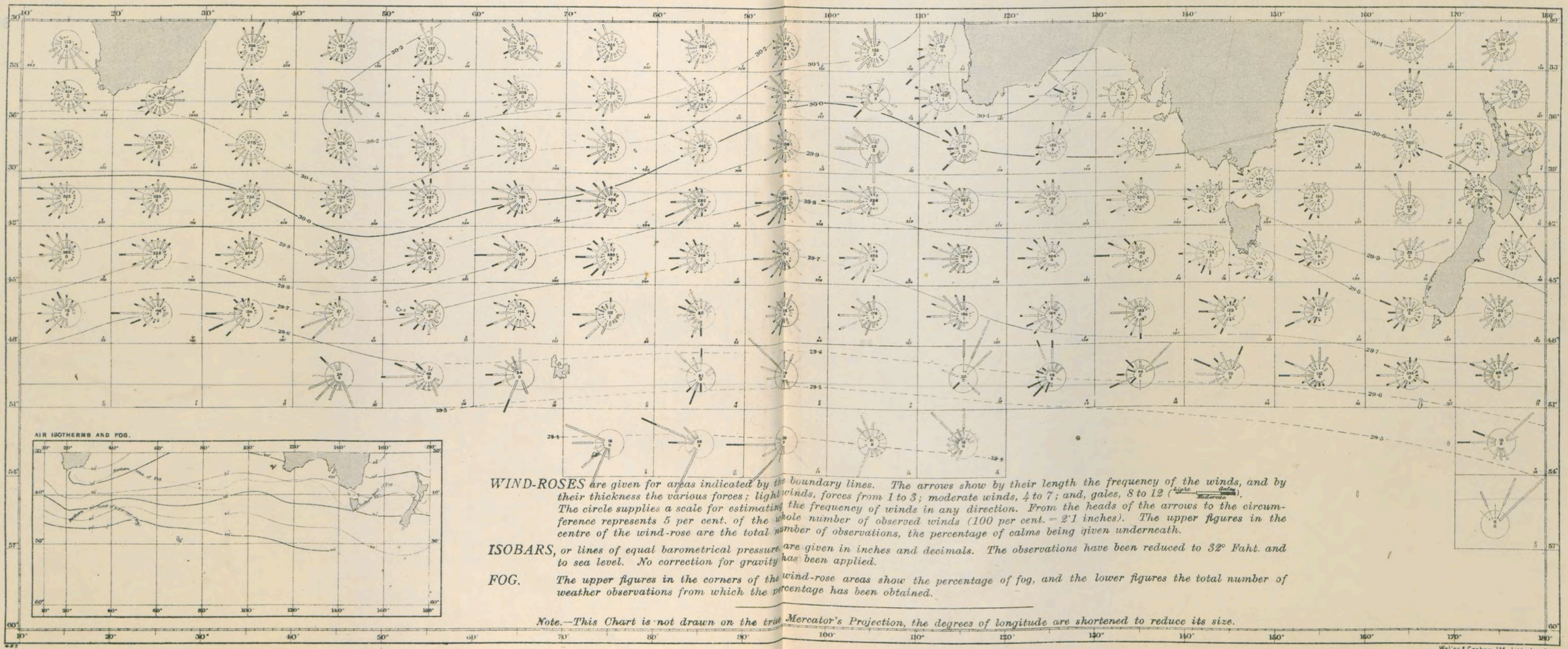
ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for gravity has been applied.

FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham Lith. London

WINDS.
SEPTEMBER.



WIND-ROSES are given for areas indicated by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light, Gales, Moderate). The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total number of observations, the percentage of calms being given underneath.

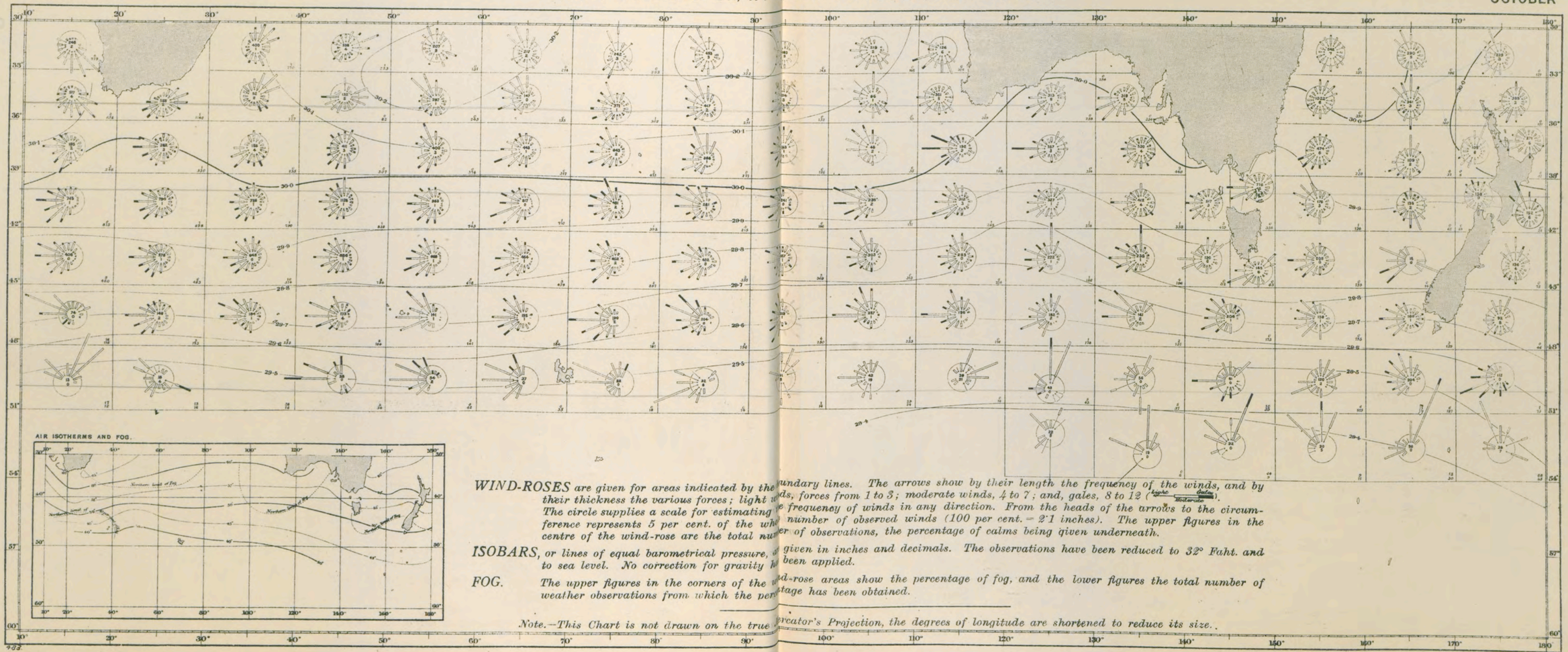
ISOBARS, or lines of equal barometrical pressure, are given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for gravity has been applied.

FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham, Ltd Litho. London.

WINDS.
OCTOBER.



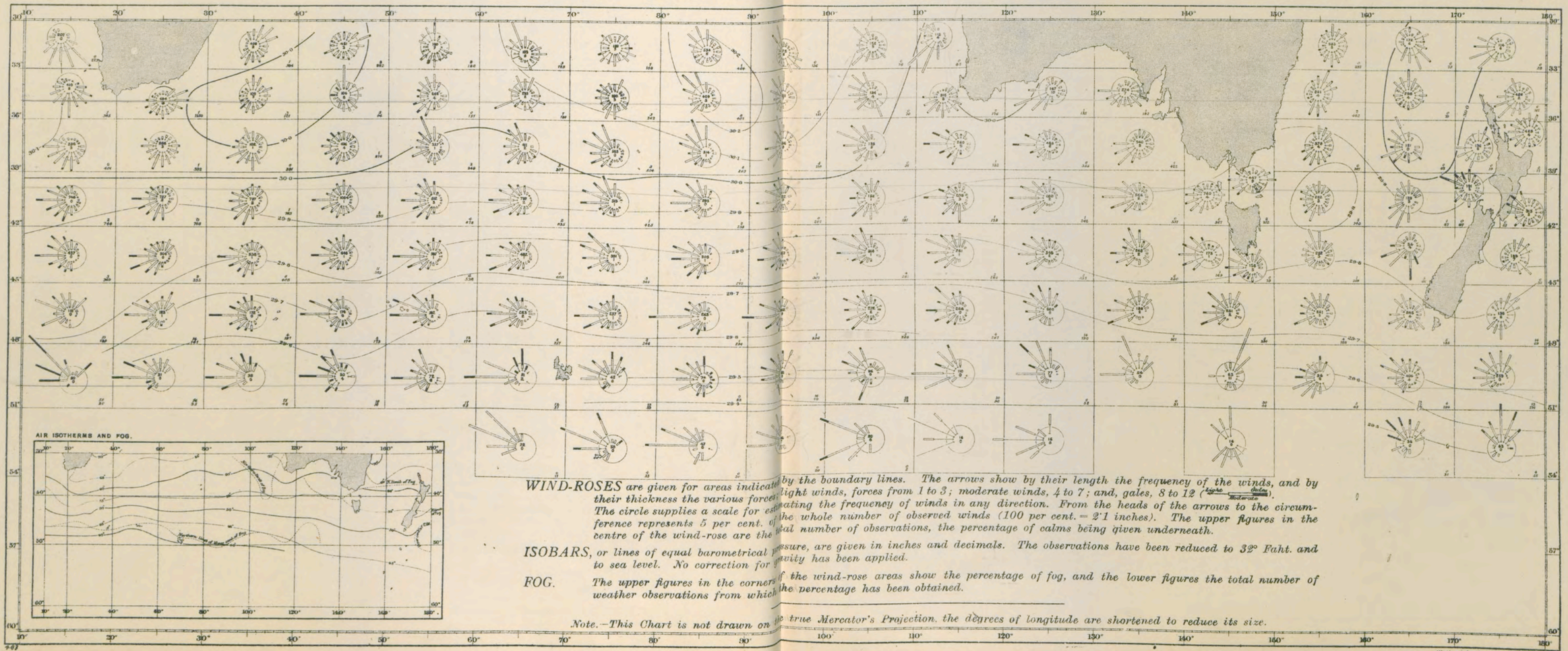
WIND-ROSES are given for areas indicated by the ... undary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces; light ... ds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light, Gales, Moderate). The circle supplies a scale for estimating ... e frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whi... number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the total nu... er of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical pressure, a... given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for gravity h... been applied.

FOG. The upper figures in the corners of the w... d-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the perc... tage has been obtained.

Note.—This Chart is not drawn on the true ... reator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham, Ltd Litho. London.



WIND-ROSES are given for areas indicat by the boundary lines. The arrows show by their length the frequency of the winds, and by their thickness the various forces light winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light, Moderate, Gales). The circle supplies a scale for est ating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. o the whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the centre of the wind-rose are the tal number of observations, the percentage of calms being given underneath.

ISOBARS, or lines of equal barometrical p ssure, are given in inches and decimals. The observations have been reduced to 32° Faht. and to sea level. No correction for g vity has been applied.

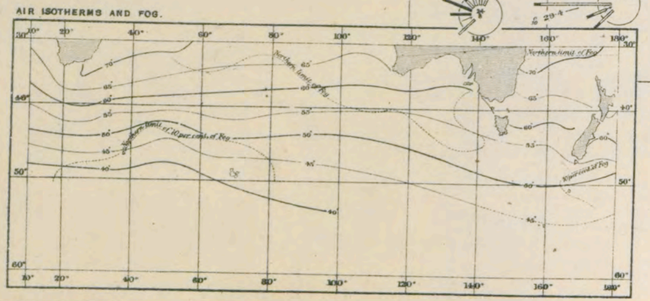
FOG. The upper figures in the corners of the wind-rose areas show the percentage of fog, and the lower figures the total number of weather observations from which the percentage has been obtained.

Note.—This Chart is not drawn on the true Mercator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham, Ltd. Litho. London.

WIND, BAROMETER, AIR TEMPERATURE, AND FOG.

DECEMBER



WIND-ROSES are given for areas indicated
their thickness the various forces;
The circle supplies a scale for estim
ference represents 5 per cent. of t
centre of the wind-rose are the to

ISOBARS, or lines of equal barometrical pres
to sea level. No correction for gra

FOG. The upper figures in the corners of
weather observations from which th

Note.—This Chart is not drawn on the

the boundary lines. The arrows show by their length the frequency of the winds, and by
ht winds, forces from 1 to 3; moderate winds, 4 to 7; and, gales, 8 to 12 (Light, Moderate, Gales).
ing the frequency of winds in any direction. From the heads of the arrows to the circum-
whole number of observed winds (100 per cent. = 2·1 inches). The upper figures in the
number of observations, the percentage of calms being given underneath.

re, are given in inches and decimals. The observations have been reduced to 32° Faht. and
y has been applied.

he wind-rose areas show the percentage of fog, and the lower figures the total number of
percentage has been obtained.

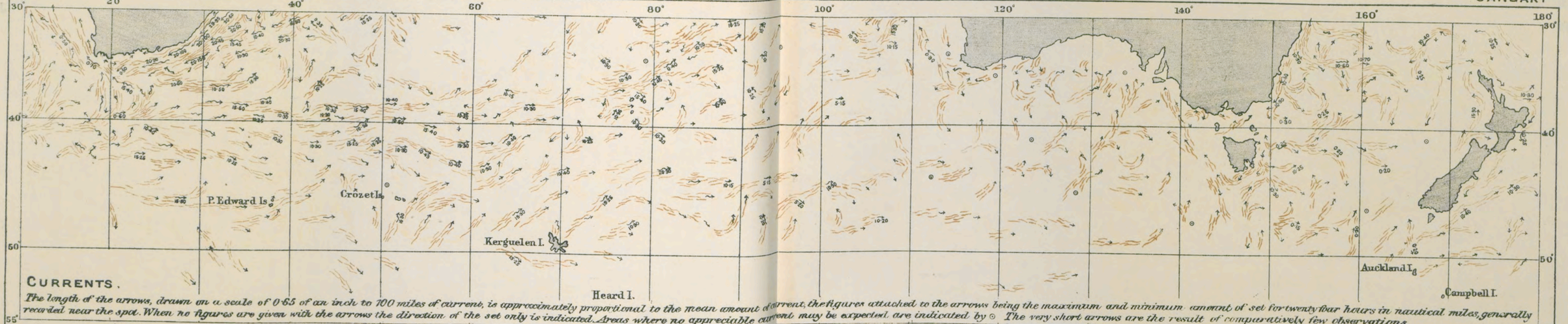
ue Mercator's Projection, the degrees of longitude are shortened to reduce its size.

Weller & Graham, Ltd Litho. London.

JANUARY

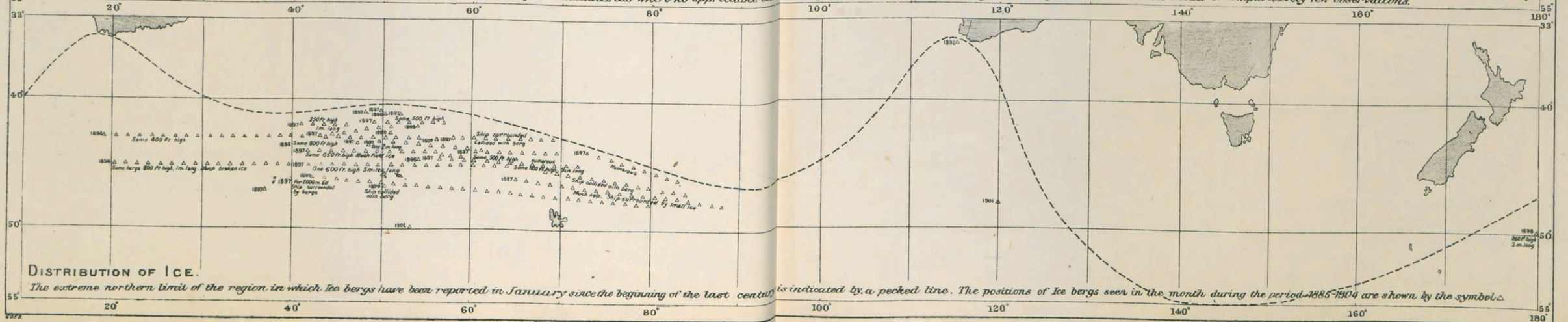
SURFACE CURRENTS AND DISTRIBUTION OF ICE.

JANUARY



CURRENTS.

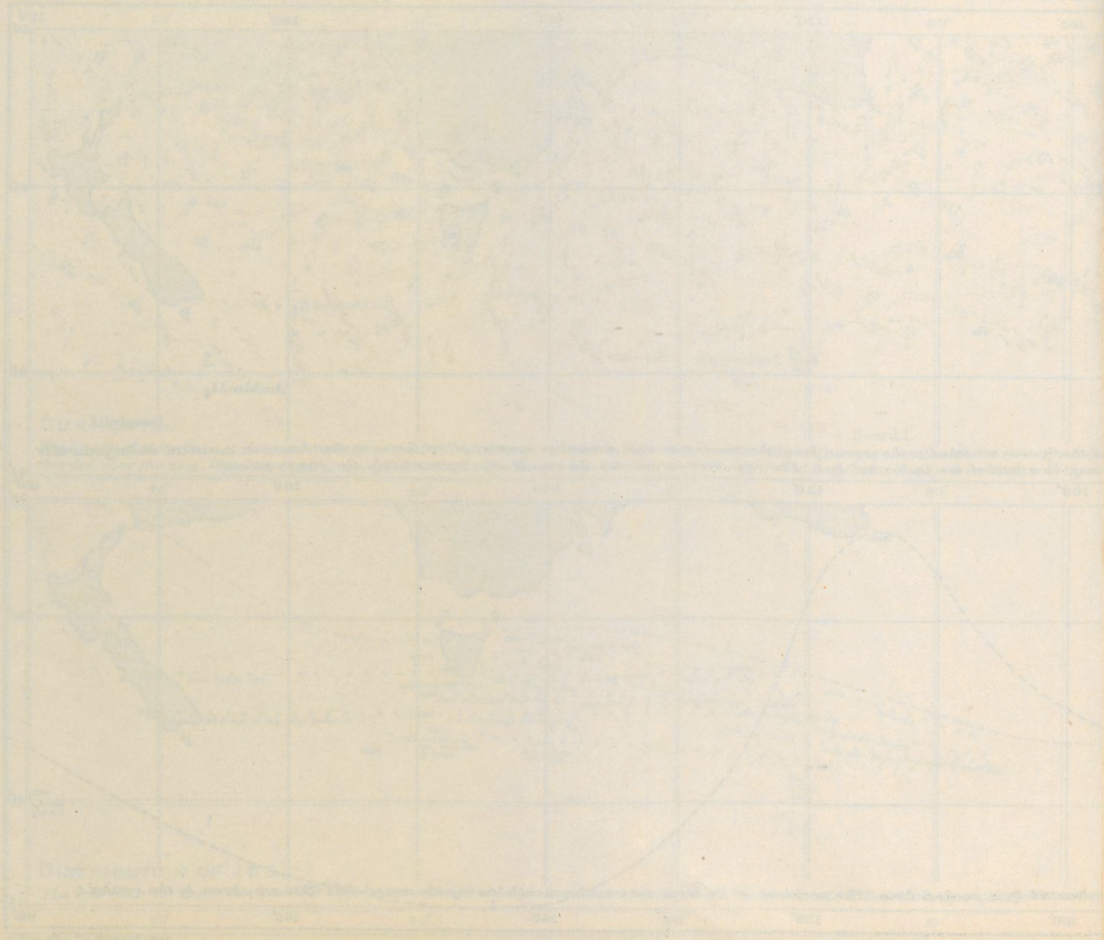
The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.



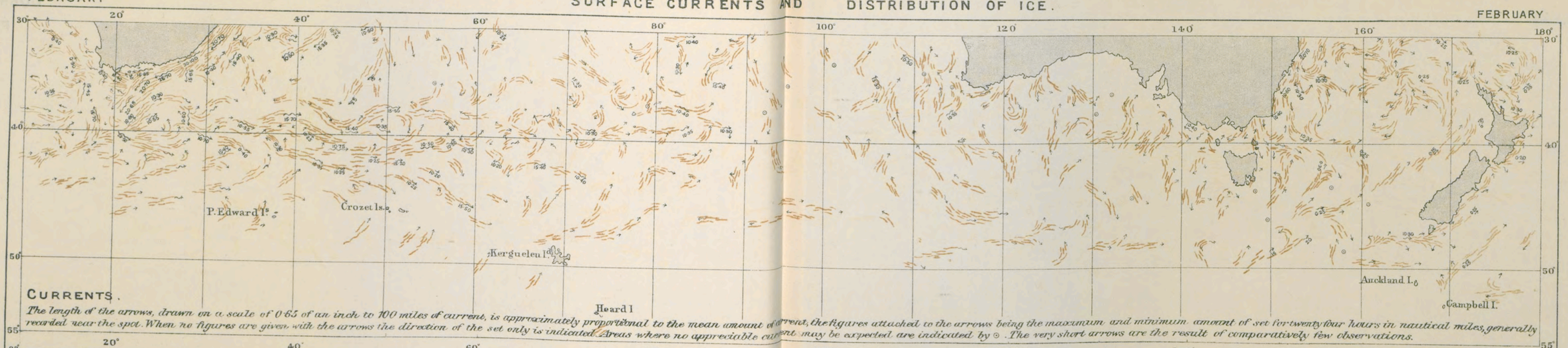
DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in January since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

Weller & Graham, Ltd Litho. London.

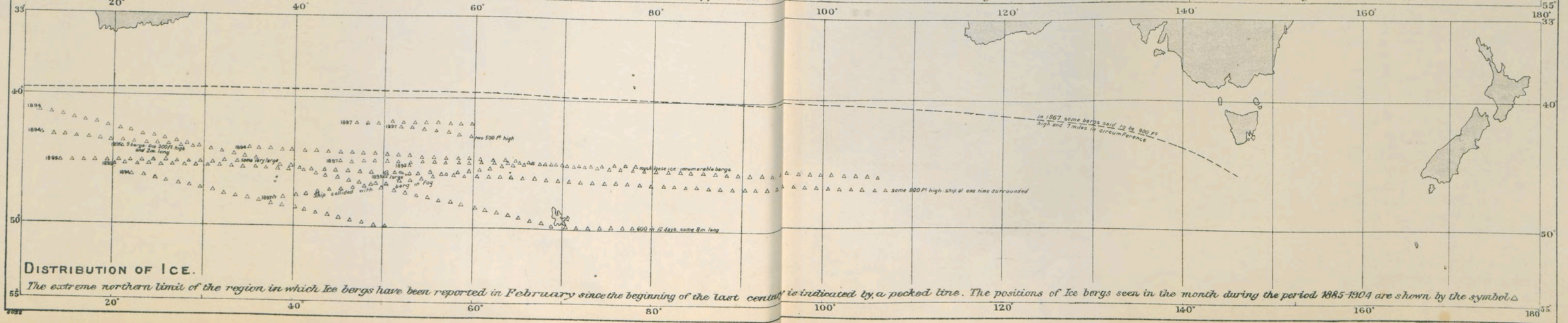


SURFACE CURRENTS AND DISTRIBUTION OF ICE.



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty-four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.



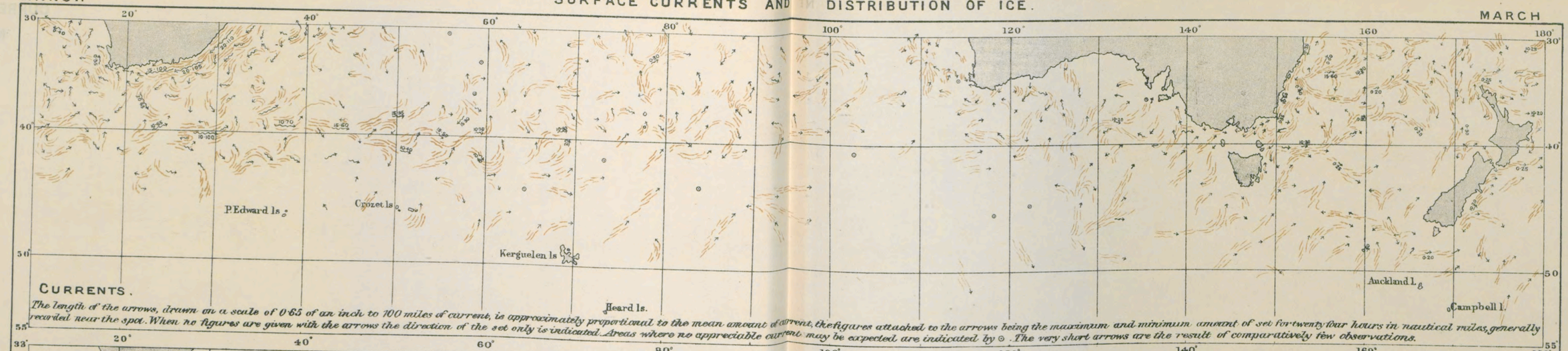
DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in February since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

Weller & Graham, Ltd. Litho London.

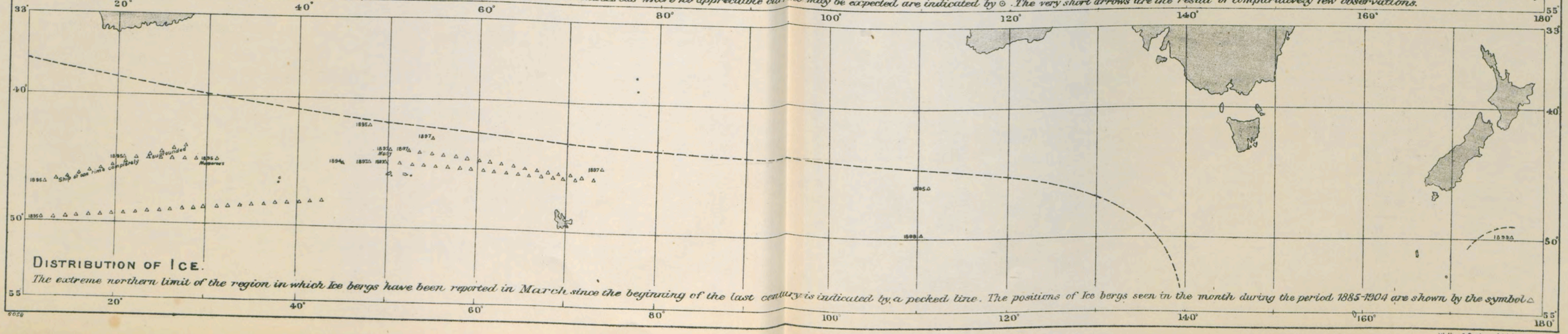
SURFACE CURRENTS AND DISTRIBUTION OF ICE.

MARCH



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.

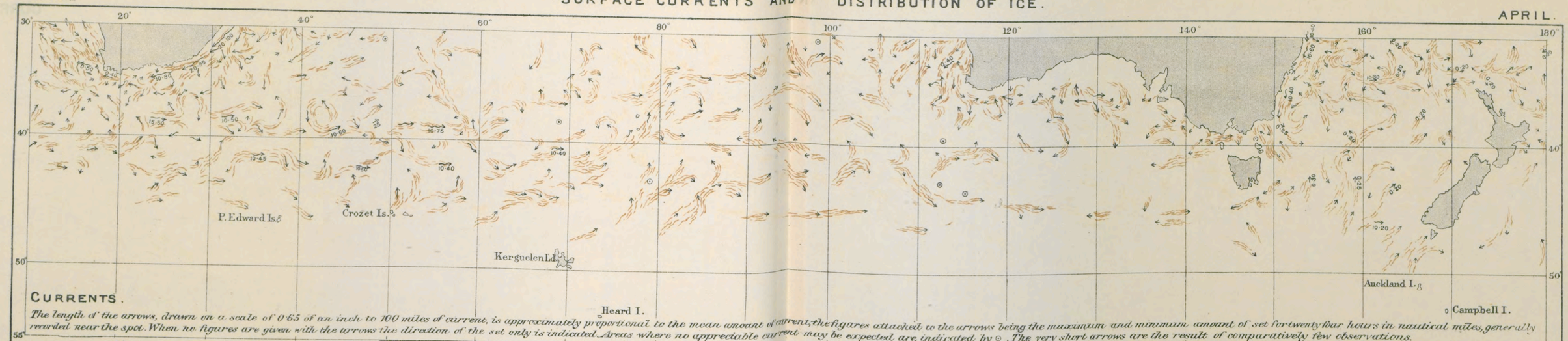


DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in March since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

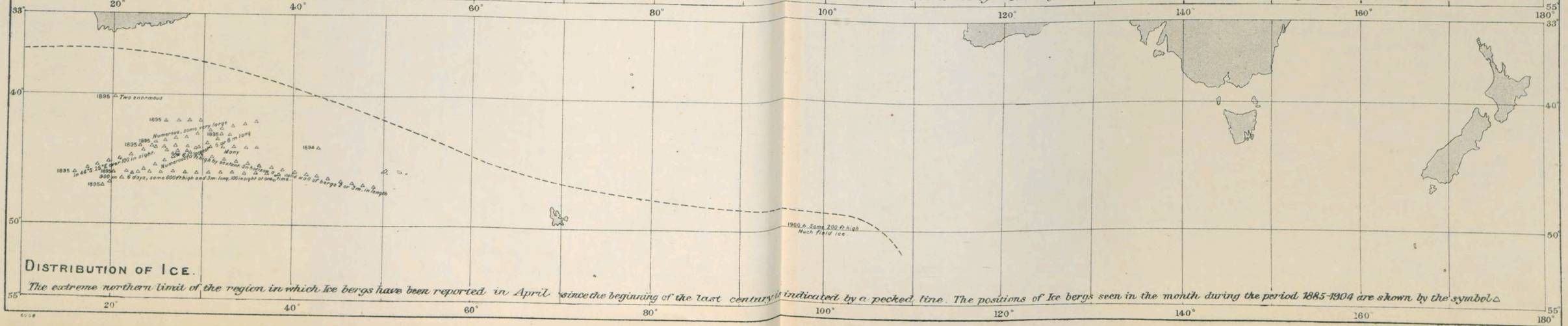
Weller & Graham, Ltd Litho London.

SURFACE CURRENTS AND DISTRIBUTION OF ICE.



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.

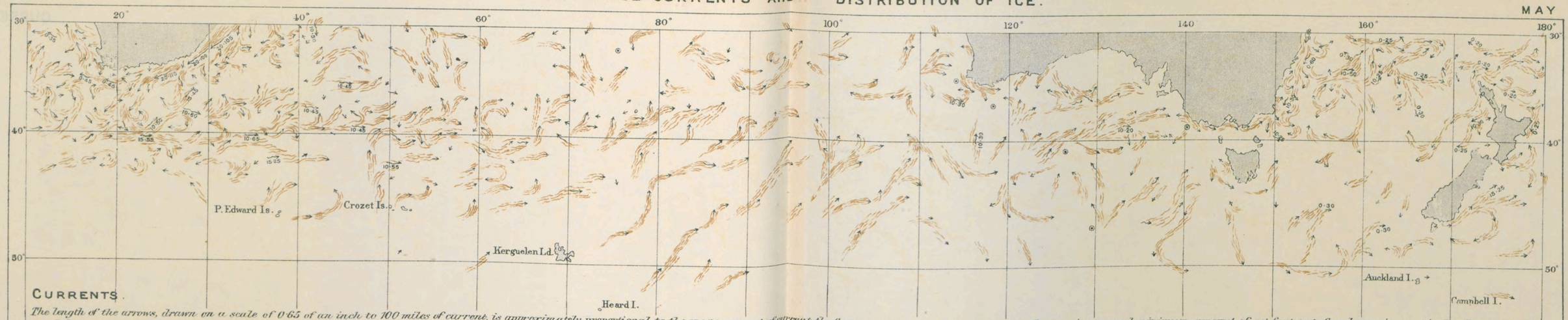


DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in April since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

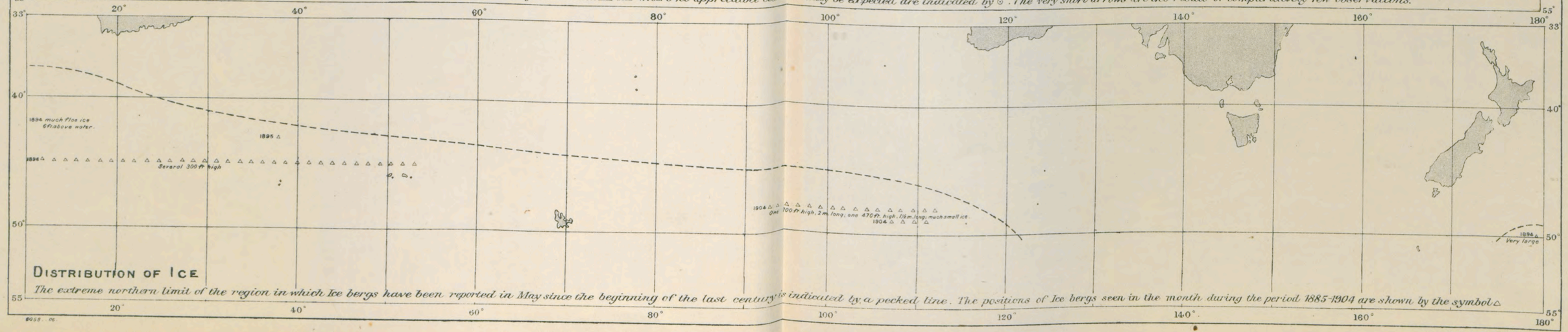
Weller & Graham, Ltd. Litho London.

SURFACE CURRENTS AND DISTRIBUTION OF ICE.



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty-four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.



DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in May since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

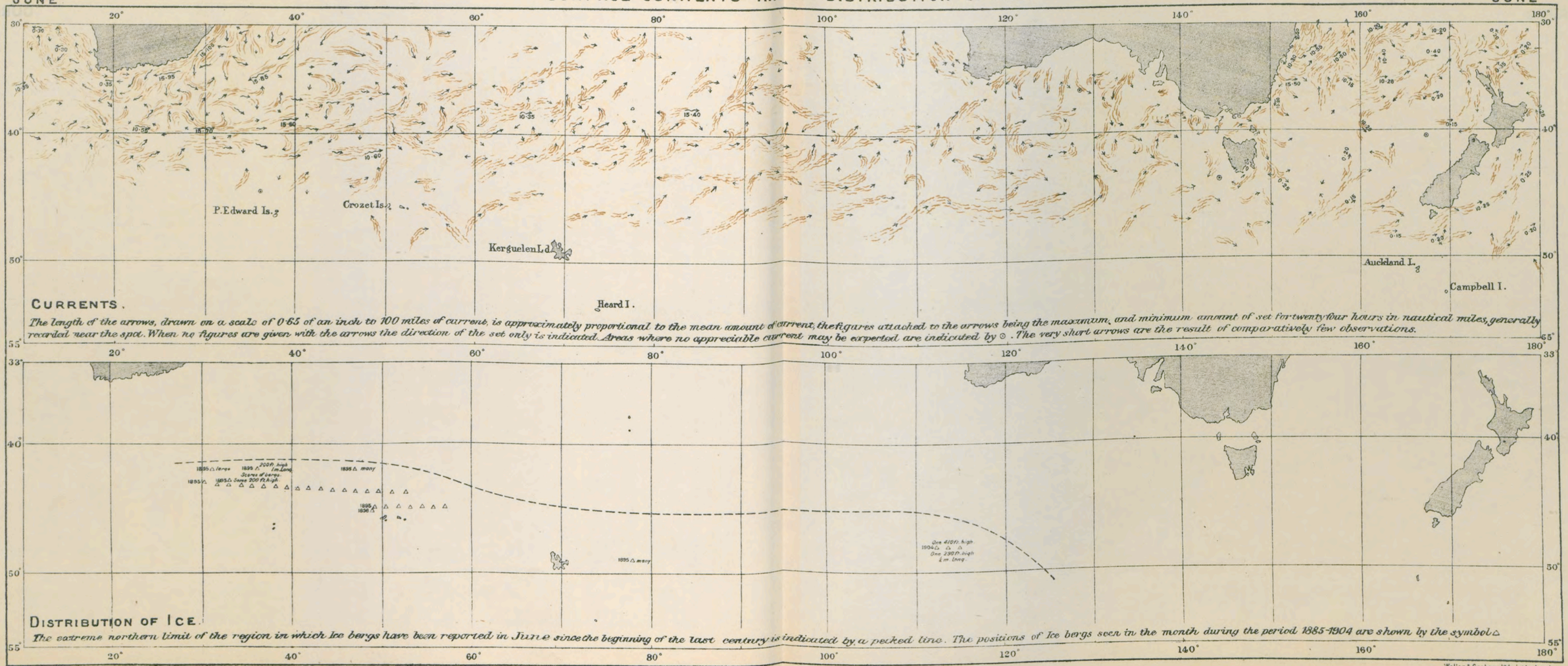
6958. 06

Weller & Graham, Ltd Litho London.

JUNE

SURFACE CURRENTS AND DISTRIBUTION OF ICE.

JUNE



CURRENTS.

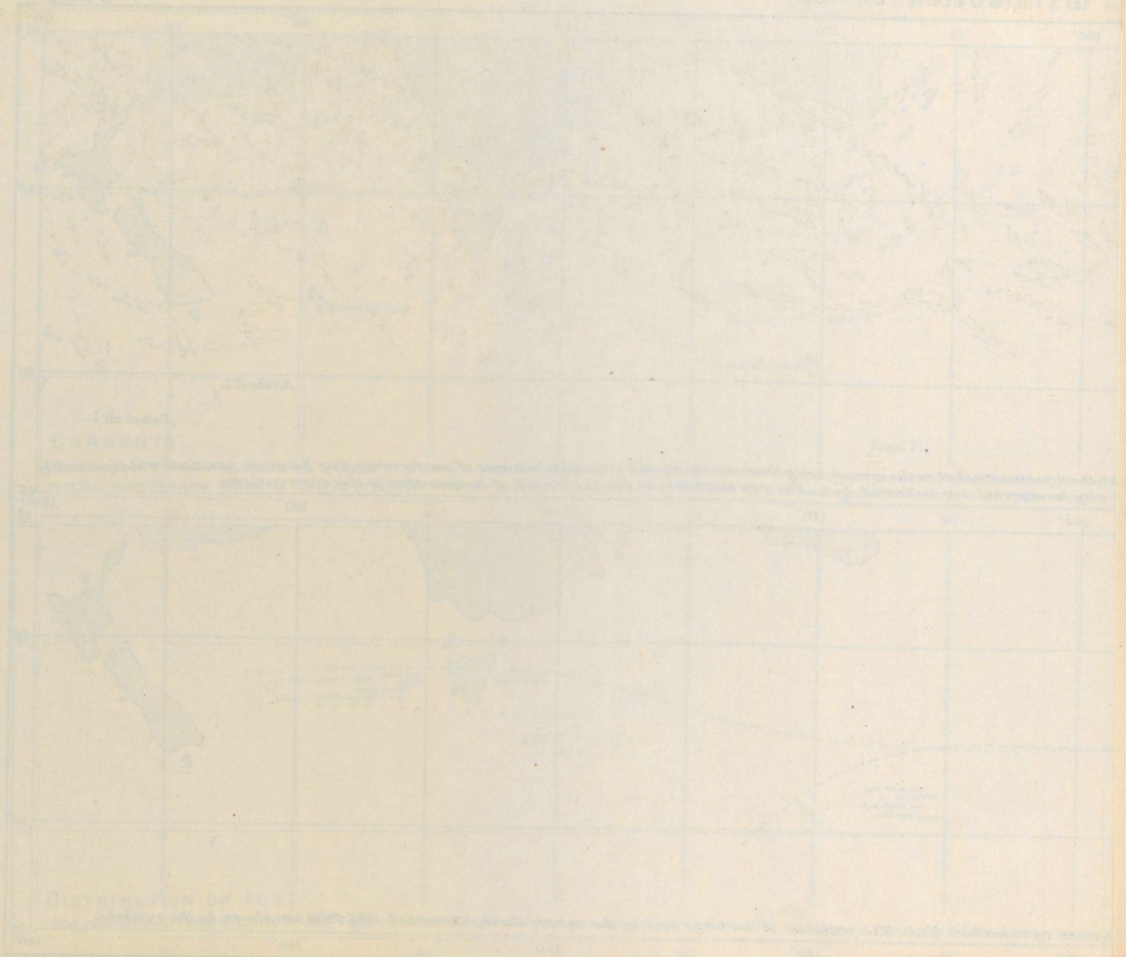
The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty-four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.

DISTRIBUTION OF ICE.

The extreme northern limit of the region in which ice bergs have been reported in June since the beginning of the last century is indicated by a pecked line. The positions of ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

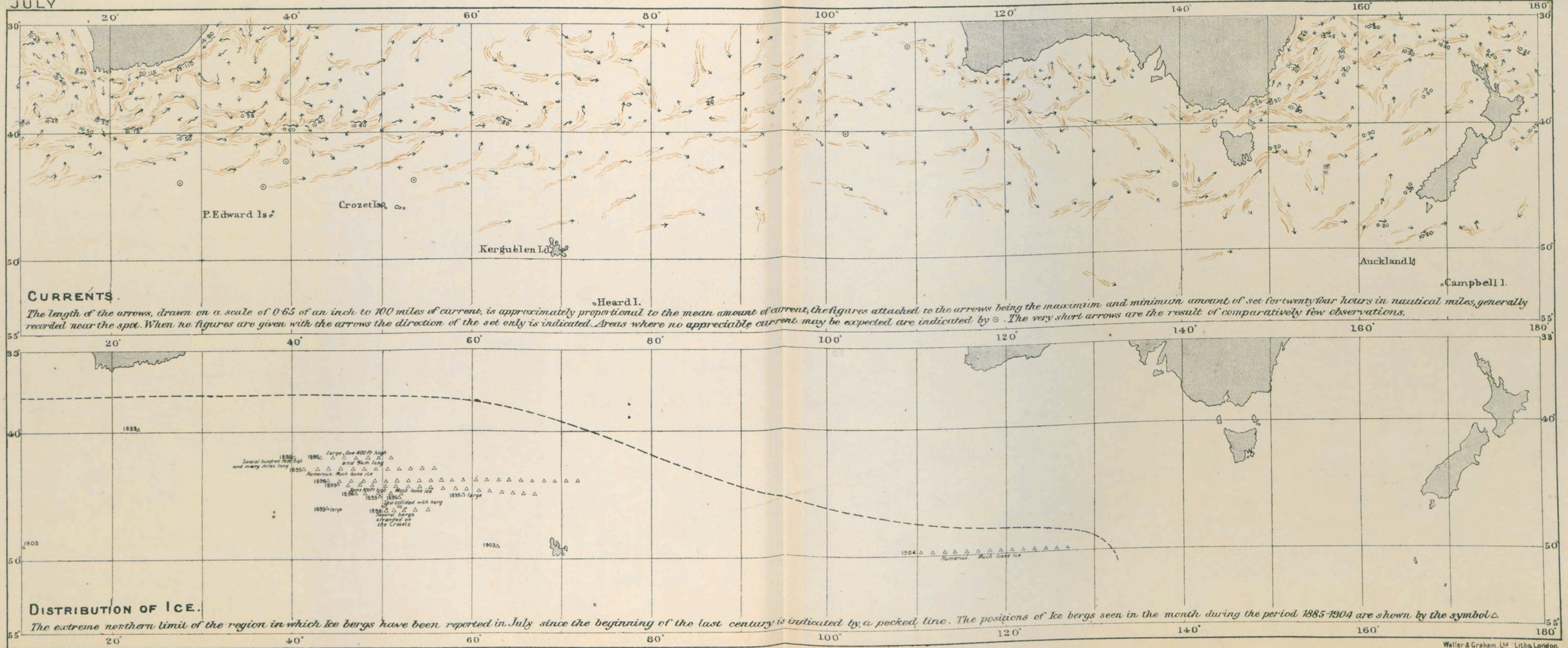
6058

Weller & Graham Ltd Litho London


Ireland
CURRENTS
DISTRIBUTION OF ICE

SURFACE CURRENTS AND DISTRIBUTION OF ICE.

JULY



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty-four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.

DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in July since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

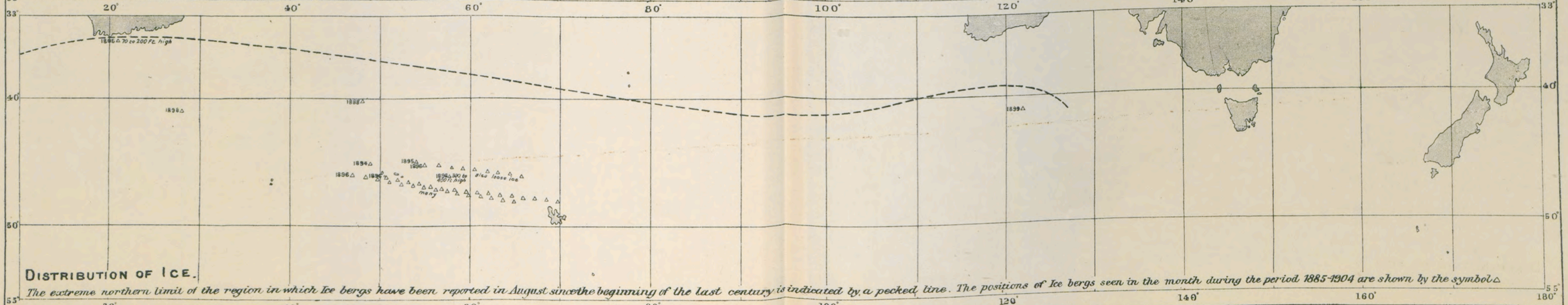
Weller & Graham, Ltd. Litho. London.

SURFACE CURRENTS AND DISTRIBUTION OF ICE.

AUGUST

CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty-four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.



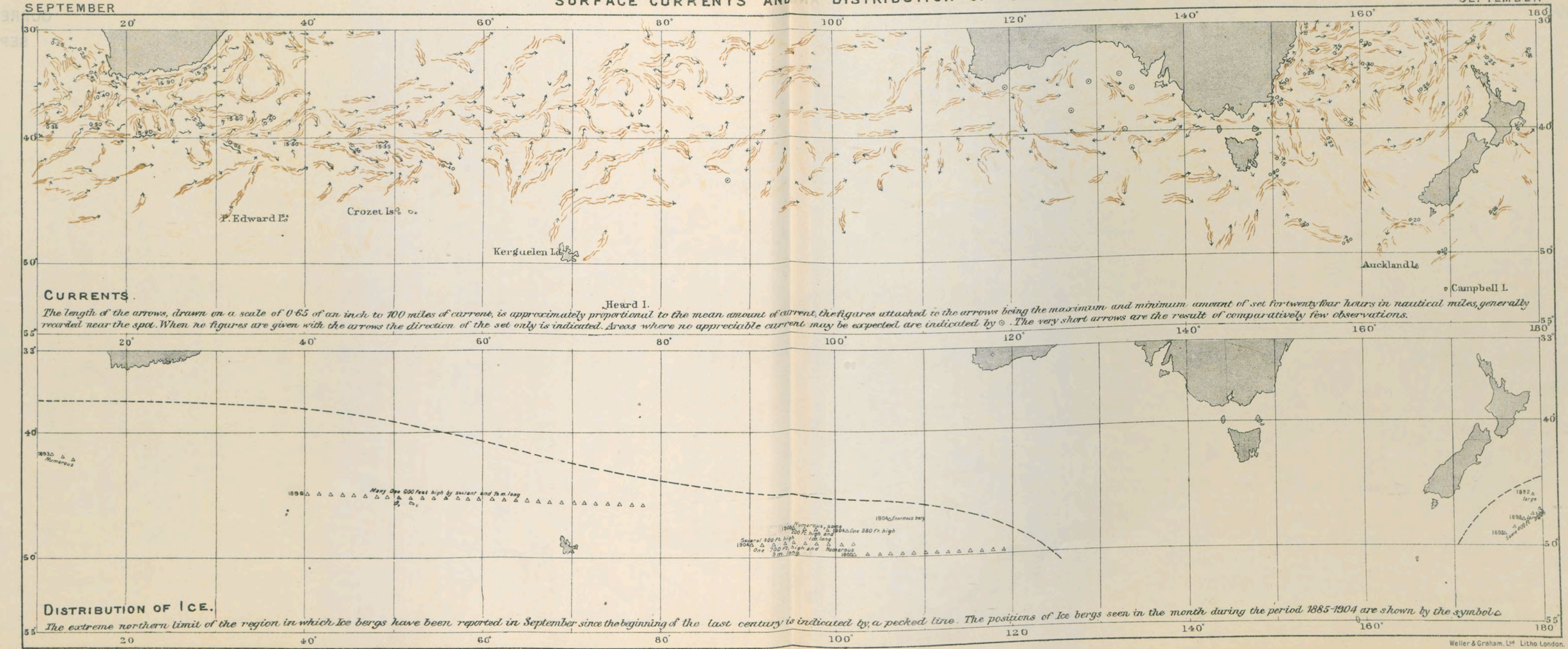
DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in August since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

Weller & Graham, Ltd Litho. London.

SURFACE CURRENTS AND DISTRIBUTION OF ICE.

SEPTEMBER



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty-four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.

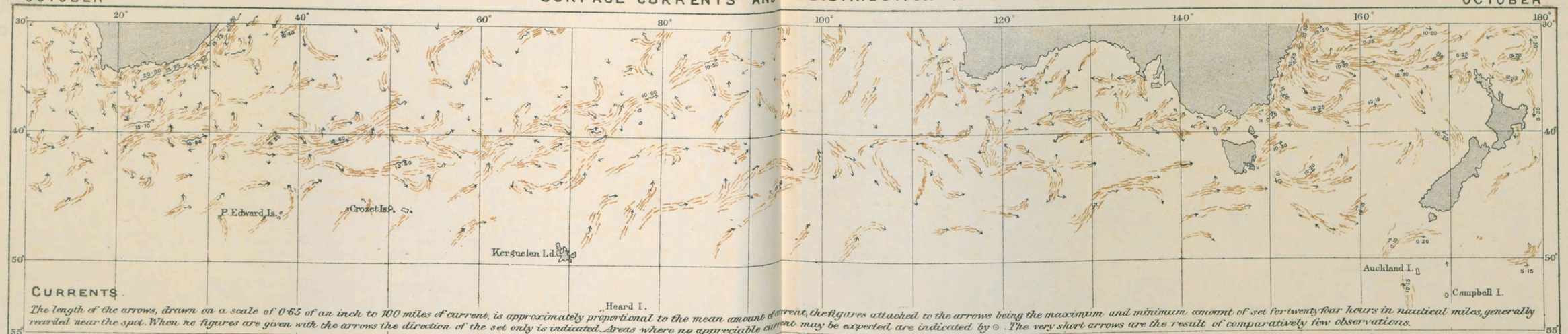
DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in September since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

Weller & Graham, Ltd Litho London.

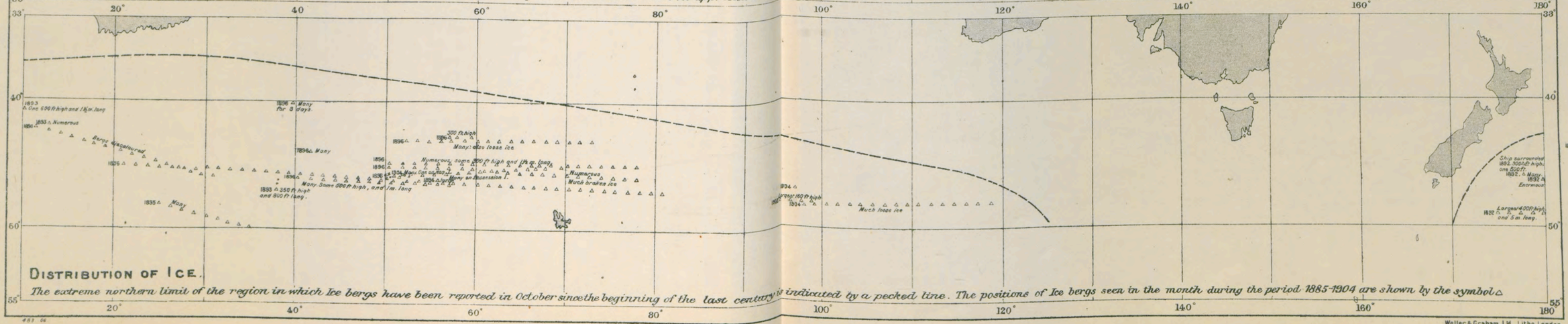
SURFACE CURRENTS AND DISTRIBUTION OF ICE.

OCTOBER



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty-four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.

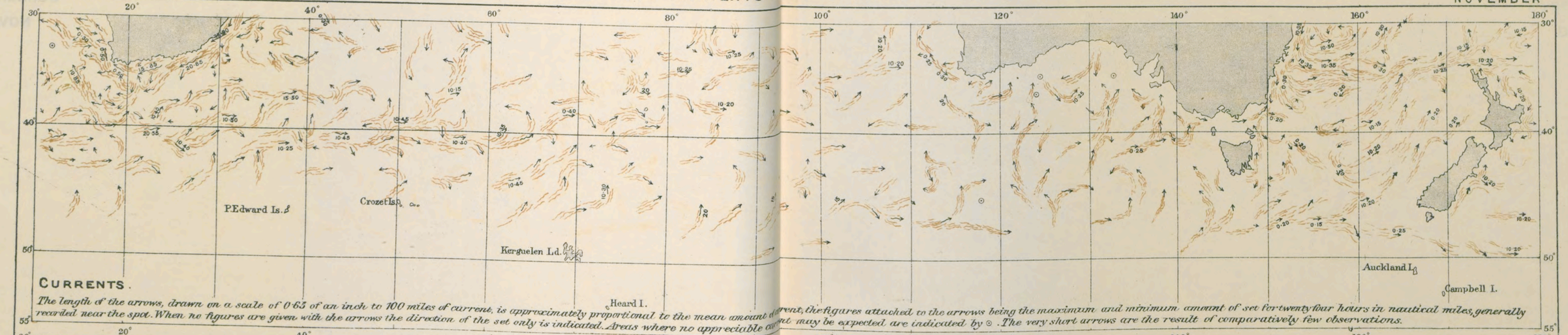


DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in October since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

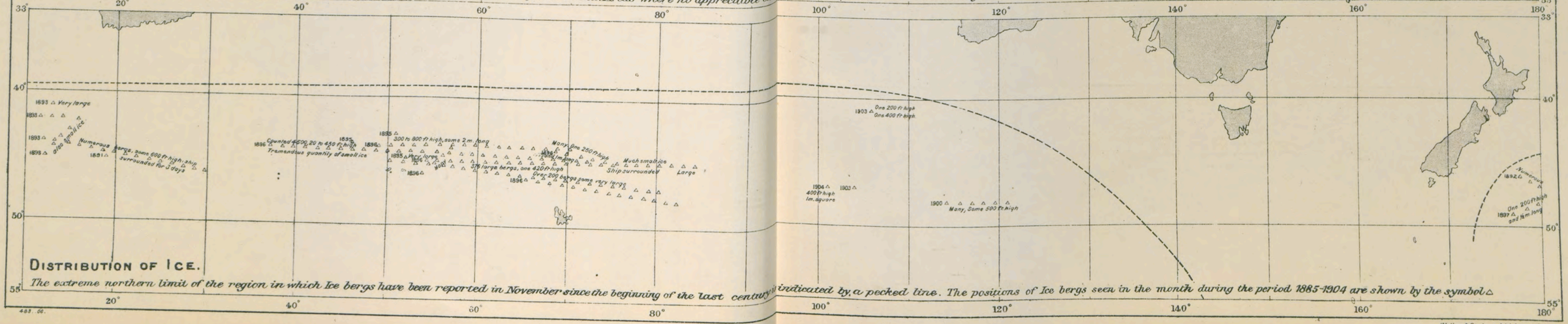
483 06

Weller & Graham, Ltd Litho. London.



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.

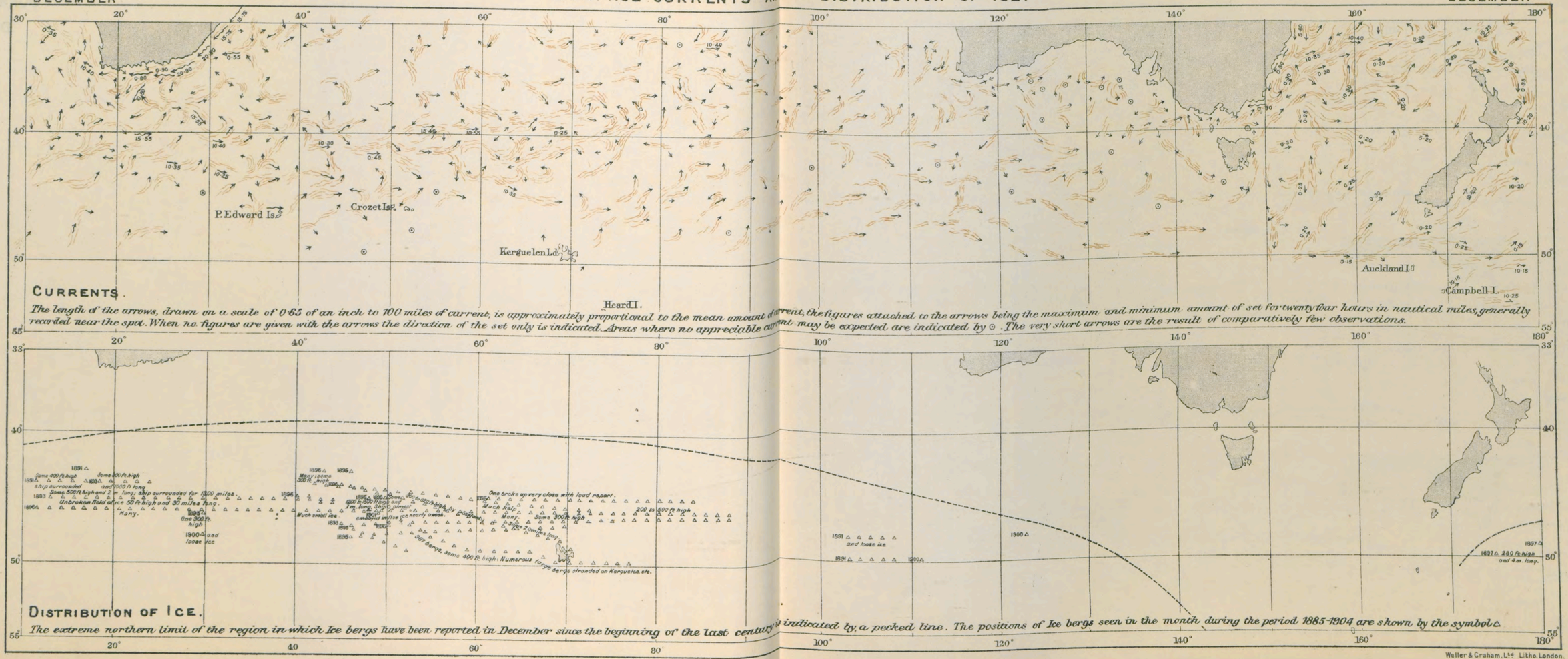


DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in November since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

483. 06.

Weller & Graham, Ltd Litho. London.



CURRENTS.

The length of the arrows, drawn on a scale of 0·65 of an inch to 100 miles of current, is approximately proportional to the mean amount of current, the figures attached to the arrows being the maximum and minimum amount of set for twenty four hours in nautical miles, generally recorded near the spot. When no figures are given with the arrows the direction of the set only is indicated. Areas where no appreciable current may be expected are indicated by ⊙. The very short arrows are the result of comparatively few observations.

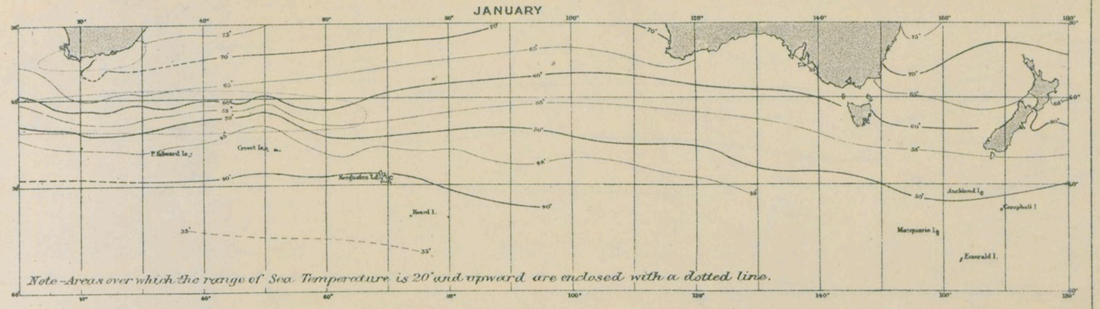
DISTRIBUTION OF ICE.

The extreme northern limit of the region in which Ice bergs have been reported in December since the beginning of the last century is indicated by a pecked line. The positions of Ice bergs seen in the month during the period 1885-1904 are shown by the symbol △

Weller & Graham, Ltd Litho. London.

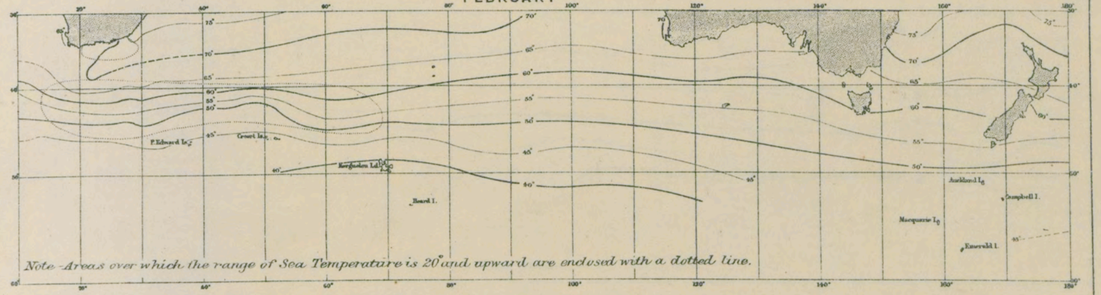
SEA SURFACE ISOTHERMS — JANUARY, FEBRUARY, AND MARCH.

JANUARY



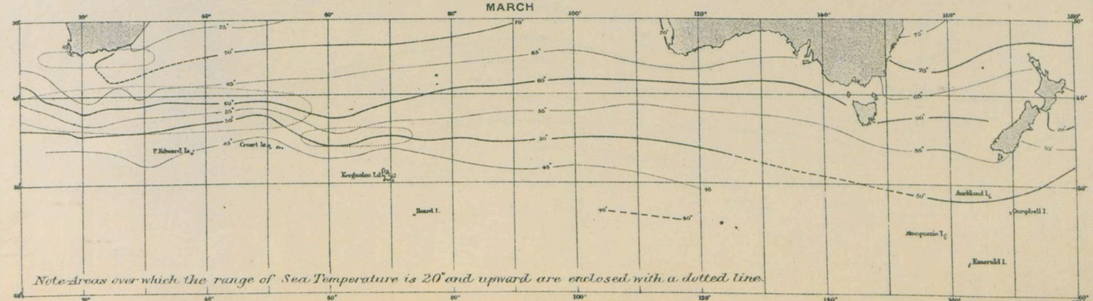
Note-Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

FEBRUARY



Note-Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

MARCH



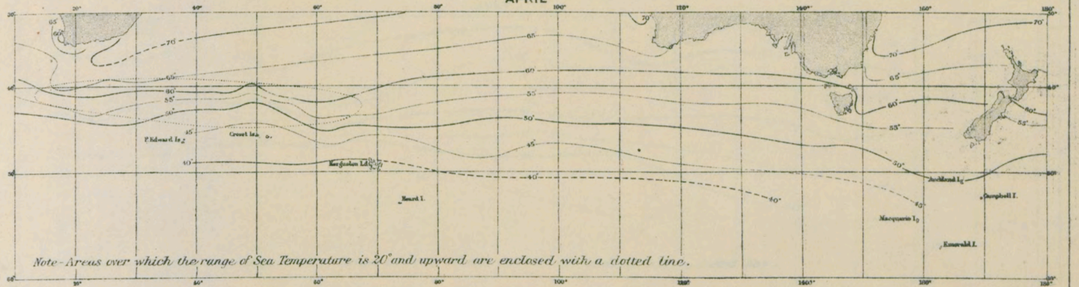
Note-Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

5058. 4. 06

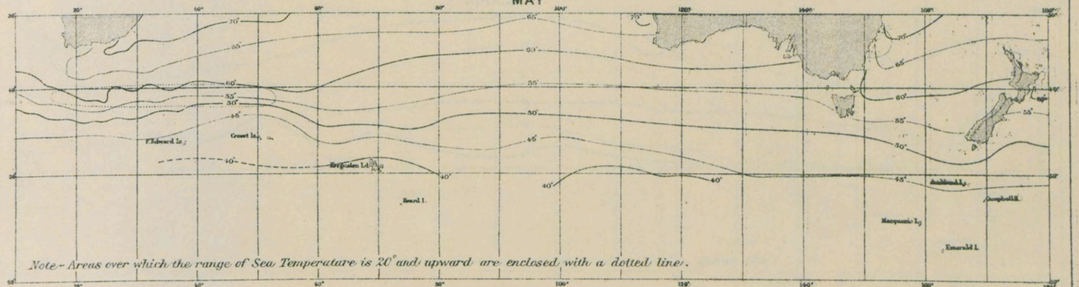
Weller & Graham, Ltd. Litho London.

SEA SURFACE ISOTHERMS — APRIL, MAY, AND JUNE.

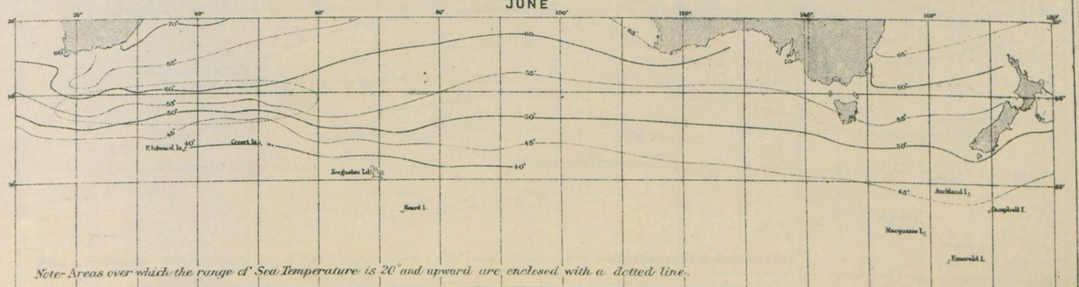
APRIL



MAY



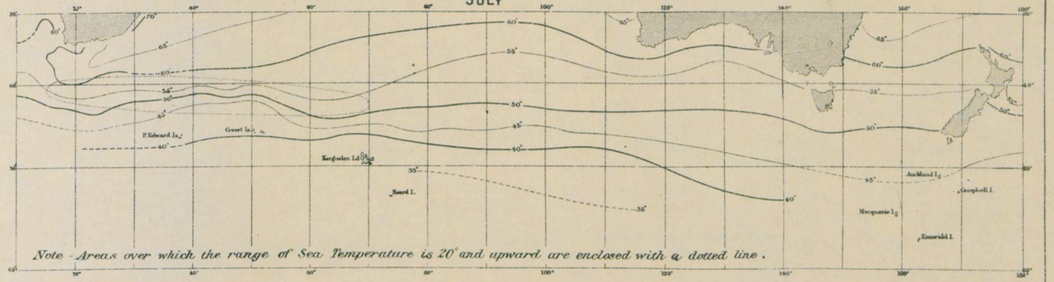
JUNE



Weller & Graham, Ltd Litho London.

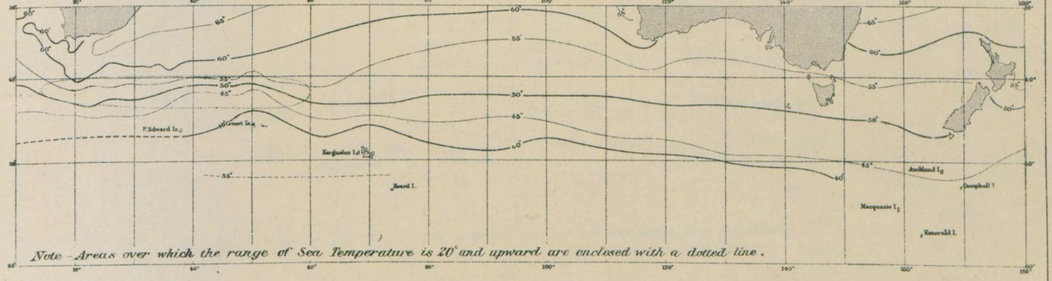
SEA SURFACE ISOTHERMS — JULY, AUGUST, AND SEPTEMBER.

JULY



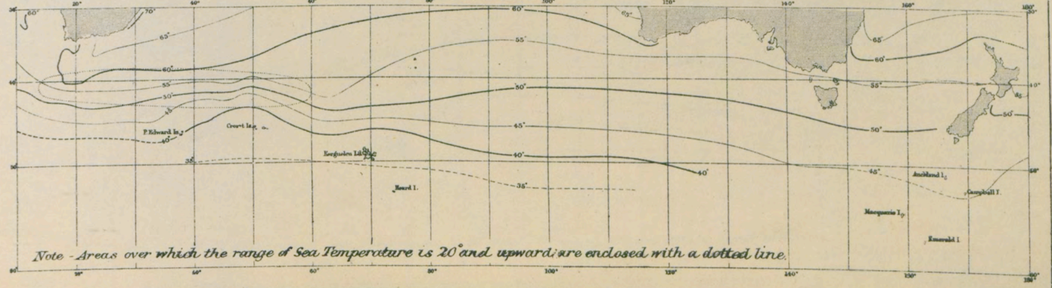
Note - Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

AUGUST



Note - Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

SEPTEMBER

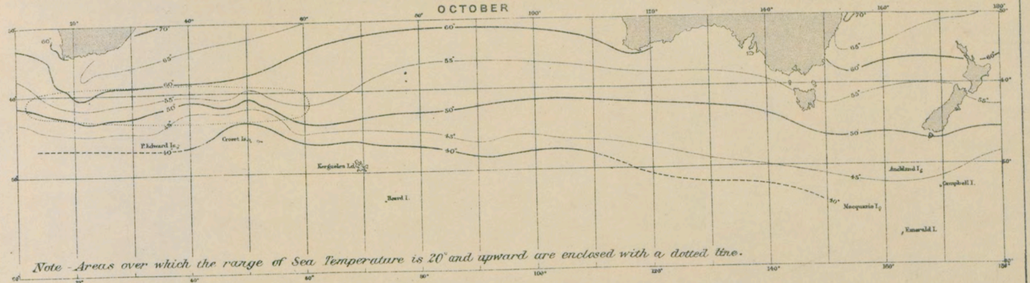


Note - Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

Weller & Graham, Ltd Litho. London.

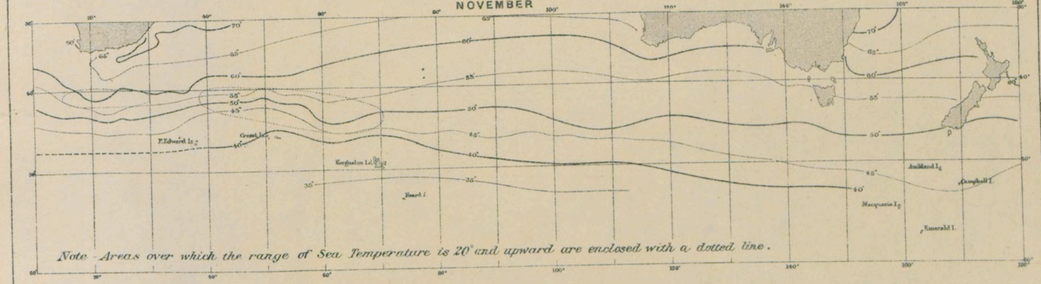
SEA SURFACE ISOTHERMS — OCTOBER, NOVEMBER, AND DECEMBER.

OCTOBER



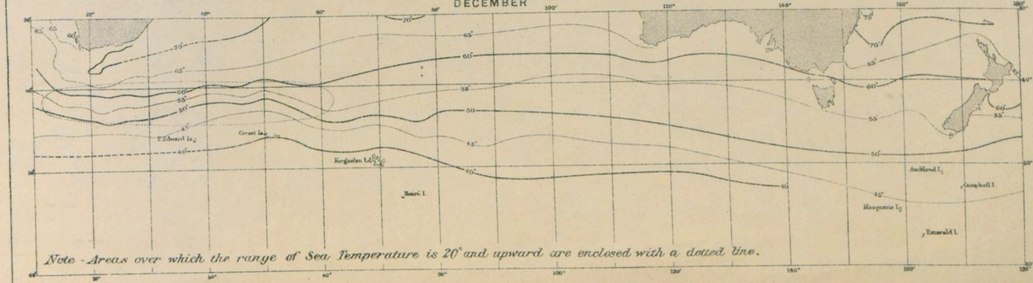
Note - Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

NOVEMBER



Note - Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

DECEMBER



Note - Areas over which the range of Sea Temperature is 20° and upward are enclosed with a dotted line.

Weller & Graham, Ltd Litho. London.