NATIONAL ANTARCTIC EXPEDITION

1901-1904.

METEOROLOGY

PART II

COMPRISING DAILY SYNCHRONOUS CHARTS

1ST OCTOBER, 1901, TO 31ST MARCH, 1904.

PREPARED IN THE METEOROLOGICAL OFFICE,

UNDER THE SUPERINTENDENCE OF

M. W. CAMPBELL HEPWORTH, C.B., R.D., COMMANDER R.N.R.

MARINE SUPERINTENDENT.

LONDON:

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1913.

Meteorological Office,
South Kensington,
London, S.W.

17th February, 1913.

To Sir Archibald Geikie, K.C.B.,
President of the Royal Society.

Sir,

I have now the honour to forward the corrected proof of the "Remarks," introductory to the Daily Synchronous Charts of the Southern Quarter of the Globe, which were prepared, under my direction, to represent the results of the international co-operation in meteorological work for the National Antarctic Expedition, 1901–1904.

These form the last instalment in discharge of the obligation which was undertaken for the Office by the Meteorological Council, in response to a request of the Royal Society, dated 30th September, 1904, and which devolved upon me in 1905. It would serve no useful purpose now to enter into detailed explanations of the length of time that has been found necessary to complete the work. Of the members of the directing body, under whose guidance it was originally planned, all except myself have passed away—Sir William Wharton, Sir Richard Strachey, Dr. Alexander Buchan, Sir George Darwin—and by a coincidence as tragic as it is deplorable, the final touches of the work, designed by international co-operation to elucidate the problems which the discoveries of the Antarctic explorers of 1901–1904 suggest, are delayed by the melancholy news of the loss of their leader, Captain Robert Falcon Scott, and of his four companions on their return from his second and successful attempt to reach the South Pole.

I am, Sir,

Your obedient servant,

W. N. SHAW,
Director.

PREFACE.

THE present volume completes the publication of all the Physical results of the National Antarctic Expedition of which the supervision was undertaken by the Royal Society. It comprises Part II. of the Meteorology, of which Part I. was issued in 1908. The delay in the appearance of the volume has arisen chiefly from the labour attending the preparation of the Charts, a task which has been carried through under the superintendence of Commander HEPWORTH, C.B., Marine Superintendent on the staff of the Meteorological Office, who has supplied the Introductory Text. It will be seen that the volume presents not only the detailed results of the daily observations of the Expedition, but combines also a large number of contemporary observations obtained by other Antarctic explorers, by observatories in various parts of the Southern Hemisphere, and by the Captains of vessels traversing the Antarctic seas. It thus offers a continuous daily picture of the changing meteorological conditions in the whole Antarctic region south of the 30th parallel of latitude.

An opportunity is afforded here to refer to certain objections made by Captain SCOTT to some of the statements contained in Part I. of the Meteorology, which was issued in the summer of the year 1908. Shortly before this distinguished polar explorer was about to sail on the Antarctic Expedition which he is now conducting, in letters addressed to me, he called attention to these statements containing criticisms of the work of his Expedition of 1901–1904. Some of these criticisms, in his opinion, showed a want of appreciation of the practical difficulties of observation in high latitudes, while others involved errors of statement which he wished to correct.

As regards the latter, he maintained, in the first place, that the observations of the directions of wind taken on the land were "true" and not, as was suggested, "magnetic." He pointed out that in a region like that around the Magnetic Pole, where the horizontal magnetic force is very slight and magnetic directions are constantly changing, and where, therefore, it is impracticable to travel by compass, it was necessary that constant attention should be given to keep the course true, and that this necessity was fully realised by himself and his staff. He therefore dissented from the suggestion (text, pp. 489, 490; Preface, p. xii.) that the observations recorded in Lieutenant ROYDS' important traverse across the ice-barrier in the months of November and December, 1903, were probably made by compass. That suggestion occurs in connection with the contention that if a mean correction of 145° E., which is the deviation at the Winter Quarters, be applied to these observations, the winds recorded as coming from the S.W. to the extent of 68 per cent. are found to be from E. by N. and are thus brought into harmony with those registered at the Winter Quarters. While protesting against this introduction of a magnetic correction, Captain SCOTT pointed out that the correction will not give the desired result, for it has been put in the wrong direction, viz., westerly instead of easterly, and that even when it is correctly applied, the direction of the 68 per cent. of wind would be N. by E. and not E. by N., as stated in the Table on p. 490.

Captain SCOTT maintained that, apart from all explanatory theory, the wind observations taken on the sledge-journey in question were perfectly trustworthy, and were in harmony with those made during other sledge-journeys of the Expedition, which combine to indicate a preponderance of southerly and westerly winds in the region under observation, and as he conceives, lend no support to the generalisation that the dominant direction of the surface winds is there from the east.

Another complaint of Captain SCOTT had reference to the insertion of a column (No. 3, pp. 284–363) purporting to give the positions of the sledge-parties at noon each day of their journeys. He remarked that it is difficult to see how the figures in this column were obtained, and that they are constantly in error. Citing in illustration his own sledge-journey of October to December, 1903, he pointed out that

whereas in the printed table he is stated to have been, on October 30, 26 miles from the ship on sea-ice, he was really 80 miles from the ship, climbing the Ferrar glacier; and, on December 16, when he is represented as being 95 miles from the ship, it is plain from the column of "Remarks," that he had returned to Winter Quarters and was comparing his aneroid with the ship's barometer. Captain SCOTT intended to have adjusted these Tables before he sailed on his recent Expedition, but, in the hurry of his departure, seems to have found it impossible to do so.

It should be understood that when the Tables of the various sledge-journeys were in course of compilation at the Meteorological Office from the records made by the observers, great difficulty was experienced in obtaining information as to the daily positions. Two of the journeys are actually printed without positions, but for the other journeys the positions are printed as supplied to the Meteorological Office by Captain SCOTT's instruction, in reply to a request addressed to the Royal Geographical Society. It is matter for regret, however, that after the return of the Expedition, when the staff of observers was dispersed, closer touch with them should not have been maintained.

With regard to the statement that "the explorers brought back no certain information about the amount of slope of the barrier-surface towards the sea" (Preface, p. xii.), Captain SCOTT contended that the staff possessed no means of discriminating between the influence on the barometer of the varying conditions of atmospheric pressure, on the one hand, and of differences in altitude, on the other. While fully realising the importance of distinguishing between these two causes, he knew of no practical means of discriminating them on sledge-journeys over the Antarctic ice-field, and he desired that proper allowance should be made for the apparently insuperable difficulties which have to be encountered. Nevertheless, it must be recognised that the separation of the influence of varying atmospheric pressure from that dependent on height above sea-level, is of such fundamental importance that no polar expedition can now be regarded as completely equipped for meteorological and physiographical research unless it is provided with the means of conducting levelling operations, independently of barometric variations. The accurate measurement of the slope of the inland ice is required for the determination not only of the atmospheric pressure gradient towards the pole, but also of the flow of the ice-cap.

ARCH. GEIKIE,

President of the Royal Society.

24th January, 1913.

Since the foregoing paragraphs were in type and ready to be printed off, tidings have come of the appalling tragedy of the death of Captain SCOTT and his companions on their return journey from the South Pole. It is not possible to allow this last contribution from the voyage of the "Discovery" to be published without the addition of a few words expressive of the profound sorrow with which the loss of these brave men has filled the hearts of all those who were associated with them in connection with Antarctic exploration and its problems. We had learnt to appreciate the remarkable gifts of Captain SCOTT and Dr. E. A. WILSON as explorers, and their charm as personal friends. We looked forward to their return home, bringing with them another and still ampler harvest of results. They have lost their lives in the cause of science, but their names are now imperishably graven on the bede-roll of the heroes of polar discovery.

A. G.

14th February, 1913.

REMARKS ON THE CHARTS.

BY

M. W. CAMPBELL HEPWORTH, C.B., R.D., COMMANDER R.N.R.

The Collection of the Data.

In connexion with the scheme of International Antarctic Exploration, inaugurated at the beginning of this century, which attained its fulfilment during the years 1901–04, arrangements were made by the British Meteorological Office and the Deutsche Seewarte conjointly, prior to the departure for the Far South of the British and German Expeditions, with a view to obtaining synchronous observations at Noon G.M.T. of barometric pressure, air temperature, and wind frequency, during the period October, 1901, to March, 1903, for Latitudes South of the 30th parallel of South Latitude.

For this country special registers, in a form agreed upon by the British and German Antarctic Committees, were issued to the Ships of H.M. Navy through the Office of the Hydrographer (the late Rear-Admiral Sir W. J. L. Wharton, K.C.B.). A circular letter, issued by the Meteorological Council to marine observers in correspondence with the Office and others engaged on Southern voyages, soliciting their co-operation in this work, met with a ready response, and a large number of registers were distributed among the Commanders of Ships visiting the Southern Ocean, and numerous contributions resulted. Subsequently the period originally specified was extended to 31st March, 1904, in consequence of the detention of the "Discovery" in McMurdo Sound, South Victoria Land.

The Observatories of the Colonies in the Southern Hemisphere contributed valuable records and observations in response to an invitation by the Royal Society.

By an arrangement between the Meteorological Office and the Deutsche Seewarte, an exchange of observations, recorded on board ships from which contributions on the special Registers were received by the respective Bureaux, was effected. In addition to the data thus collected by the Office a large number of observations at noon G.M.T. were obtained from the "Discovery," "Morning," "Terra Nova," and "Scotia," relating to the passages of these vessels to and from the Antarctic and while cruising in Antarctic Seas; also from many stations in Cape Colony, Australasia, South America, Tierra del Fuego, and Kerguelen Island.

As regards information from stations in, and in the neighbourhood of, Antarctica, in addition to the meteorological records kept at Winter Quarters of the "Discovery" in McMurdo Sound, observations were obtained relating to the "Gauss" station of the German Expedition, near Kaiser Wilhelm II. Land, Laurie Island—South Orkneys, and Snow Hill Island—Palmer Land, through the courtesy of the leaders of the German, Scottish, and Swedish Antarctic Expeditions, Professor von Drygalski, Dr. W. S. Bruce, and Dr. Otto Nordenskjöld, respectively.

Upon the information thus obtained are based the Daily Synchronous Charts of Sea-Level Pressure for Noon G.M.T., with winds and air temperature, as well as the Charts of mean monthly pressure and air temperature, and the Tables of average wind and gale frequency.

The list of contributors is as follows:—

Ships of the Royal Navy (H.M.S.), Exploring Vessels (E.S.), Steamships (S.S.), and Sailing Vessels (S.) of the Mercantile Marine, from which Observations were Received.

Adolf . . . . . S.	Alauda . . . . . S.	Alnwick Castle . . . . S.S.
Aberdeen . . . . . S.S.	Alcinous . . . . . S.	Alsterdamm . . . . . S.
Adolphe . . . . . S.	Alexandre . . . . . S.	Altair . . . . . S.
Afric . . . . . S.S.	Alliance . . . . . S.	Amphion . . . . . H.M.S.

Anaconda	S.
Antoinette	S.
Aotea	S.S.
Arcadia	S.S.
Archer	H.M.S.
Armadale Castle	S.S.
Artemis	S.
Arthur Fitger	S.
Assaye	S.S.
Asuncion de Larrinaga	S.S.
Aster	S.
Atlantique	S.
Austral	S.S.
Australasian	S.S.
Australia	S.S.
Austrian	S.S.
Barracouta	H.M.S.
Barrosa	H.M.S.
Basilisk	H.M.S.
Biessard	S.
Blanche	H.M.S.
Bremen	S.
Britanniea	S.S.
Britannie	S.S.
Caithness	S.S.
Cambrian	H.M.S.
Campinas	S.
Cap Horn	S.
Carisbrook Castle	S.S.
Carl	S.
Chemnitz	S.
Chile	S.
China	S.S.
Christel	S.
Chubut	S.
Clan Ferguson	S.S.
Clan Grant	S.S.
Clan Mackinnon	S.S.
Clan Maclachlan	S.S.
Clan Ronald	S.S.
Clan Urquhart	S.S.
County of Kinross	S.
Courtfield	S.S.
Craigisla	S.S.
Damascus	S.S.
Danube	S.S.
Dart	H.M.S.
D. H. Wätjen	S.
Discovery	E.S.
Dominion	S.S.
Don	S.
Dorade	S.
Duisburg	S.
Dunkerque	S.
Dwarf	H.M.S.
Earl Derby	S.
Ecuador	S.
Egyptian Prince	S.S.
Elstree Grange	S.S.
Emilie Siegfried	S.
Ems	S.
Erne	S.
European	S.S.
Falls of Halladale	S.
Forte	H.M.S.
Gauss	S.S.
Général de Sonis	S.
General Foy	S.
Gibraltar	H.M S.
Goorkha	S.S.
Gothic	S.S.
Greta Holme	S.S.
Harlech Castle	S.S.
Harold	S.
Heliades	S.S.
Hera	S.
Heraclides	S.S.
Hermione	S.
Herzogin Cecilie	S.
Hibernian	S.S.
Hilarius	S.S.
Himalaya	S.S.
Icarus	H.M.S.
India	S.S.
Indralema	S.S.
Jacqueline	S.
Jason	S.S.
Jules Gommes	S.
Kaikoura	S.S.
Kaipara	S.S.
Kalliope	S.
Karamea	S.S.
Karnak	S.
Karrakatta	H.M.S.
Kilbride	S.S.
Kinfauns Castle	S.S.
Knight of St. George	S.S.
Königin Luise	S.
Knmara	S.S.
Ladye Doris	S.
L'Amiral Jauréguiberry	S.
Large Law	S.
Lisbeth	S.
Lismore Castle	S.S.
Lizard	H.M.S.
Loch Katrine	S.
Loch Tay	S.
Loch Torridon	S.
Lutterworth	S.
Lynton	S.
Macquarie	S.
Madeleine	S.
Magdalena	S.S.
Magpie	H.M.S.
Mamari	S.S.
Maori	S.S.
Marthe	S.
Matatua	S.S.
Medic	S.S.
Menelaus	S.S.
Metis	S.
Mildura	H.M.S.
Mombassa	S.S.
Monarch	H.M.S.
Montrose	S.S.
Moravian	S.S.
Morning	E.S.
Mount Stewart	S.
Naiad	S.S.
Nauarchos	S.
Nereide	S.
Netherby	S.
Niagara	S.
Nineveh	S.S.
Niobe	S.
Norman	S.S.
Nymphe	H.M.S.
Odin	H.M.S.
Omega	S.
Omrah	S.S.
Ophir	S.S.
Orient	S.S.
Ormuz	S.S.
Oro	S.S.
Orontes	S.S.
Otarama	S.S.
Pakeha	S.S.
Palmyra	S.
Papanui	S.S.
Paparoa	S.S.
Paposo	S.
Partridge	H.M.S.
Pearl	H.M.S.
Penguin	H.M.S.
Pera	S.
Persévérance	S.
Persic	S.S.
Persimmon	S.
Peru	S.
Pfalz	S.
Phaeton	H.M.S.
Philomel	H.M.S.
Phoebe	H.M.S.
Pitlochry	S.
Posen	S.
Potomac	S.S.
Président Felix Faure	S.
Pylades	H.M.S.
Rakaia	S.S.
Ramsay	S.S.
Rangatira	S.S.
Rattler	H.M.S.
Reinbek	S.
René	S.
Reynolds	S.S.
Rhine	S.
Rhone	S.

Rimutaka	S.S.	Suevic	S.S.	Verajean	S.
Ringarooma	H.M.S.	Terpsichore	H.M.S.	Versailles	S.
Rodenbek	S.	Terpsichore	S.	Victoria	S.S.
Romney	S.S.	Terra Nova	E.S.	Vidette	S.
Romney (*a*)	S.S.	Thekla	S.	Ville de Dijon	S.
Royal Arthur	H.M.S.	Thistle	H.M.S.	Waikato	S.S.
Ruapehu	S.S.	Tijuca	S.	Waimate	S.S.
Runic	S.S.	Tinto Hill	S.	Wanwera	S.S.
Salamis	S.S.	Tokomaru	S.S.	Wakanui	S.S.
Schiffbek	S.	Tongariro	S.S.	Wallaroo	H.M.S.
Scotia	E.S.	Torch	H.M.S.	Walmer Castle	S.S.
Sierra Lucena	S.	Turakina	S.S.	Wappaus	S.
Solingen	S.	Urmston Grange	S.S.	Warspite	H.M.S.
Sophocles	S.S.	Valentine	S.	Whakatane	S.S.
South America	S.S.	Valparaiso	S.		

Observations were Received from Observatories and Meteorological Stations at the following places:—

Port Nolloth.
Hondeklip Bay.
Ookiep.
Saldanha Bay.
St. Helena Bay.
Lambert's Bay.
Cape Town.
Simon's Bay.
Clanwilliam.
Cape Agulhas.
Amalienstein.
Mossel Bay.
Wagenaar's Kraal.
Cape St. Francis.
Algoa Bay.
Grahamstown.
Stutterheim.
East London.
Umtata.
Durban.
Crozet Island.
Kerguelen Island.
Kaiser Wilhelm Land ("Gauss" Winter Quarters).
Port Augusta.
Cape Leeuwin.
Bunbury.
Fremantle.
Perth.
Albany.
Breaksea Island.
Port Lincoln.
Port Pirie.
Adelaide.
Port Victor.
Portland.
Port Fairy.
Melbourne.
Port Davey.
Launceston.
Hobart.
Jervis Bay.
Sydney.
Newcastle.
Port Stephen.
Victoria Land ("Discovery" Winter Quarters).
The Bluff.
Invercargill.
Nugget Point.
Cape Adare.
Dunedin.
Port Chalmers.
Timaru.
Westport.
Christchurch.
Lyttelton.
Cape Maria van Diemen.
Farewell Spit.
Akaroa.
Nelson.
Cape Egmont.
New Plymouth.
Picton.
Bay of Islands.
Waitara.
Cape Campbell.
The Brothers.
Auckland.
Wellington.
Wanganui.
Tauranga.
Napier.
Gisborne.
Juan Fernandez.
Evangelists.
Ancud.
Talcahuano.
Valdivia.
Concepcion.
Valparaiso.
Coquimbo.
Punta Arenas.
Cape Virgins (Dungeness).
Port Madryn.
Bahia Blanca.
Rosario.
Buenos Aires.
Ensenada.
Cape Pembroke.
Snow Hill.
Monte Video.
Maldonado.
Laurie Island.
Coat's Land.

The total number of observations charted amounts to 44,893, of which 29,354 are marine and 15,539 land observations. The total number charted for 1902 is 11,063, and for 1903, 10,851; of these 7,600, in 1902, and 5,703, in 1903, refer to land stations. The largest number of marine observations charted for any one month is 1,425 relating to January, 1903; the largest number of observations from land stations is 744 relating to May, 1902. The smallest number of marine observations for any one month is 697 for September, 1903; the smallest for land stations, 310 for October, 1901. The largest number for a single day is 52 marine for 22nd January, 1903, and 25 land for 27th May, 1902; but for all other days in that

month 24 land observations have been charted. The smallest number of observations for a single day is 19 marine for 9th October, 1903, 10 land throughout October, 1901, and 10 to 11 throughout March, 1904.

In the Registers issued by the Meteorological Office, observers were requested to give a few readings of their barometer in ports visited in order that the error of the instrument might be estimated. Facilities were given for recording these readings in the Register by the introduction of a special form.

Some of the observations received from British ships were recorded by trained observers with properly verified instruments provided by the Office; the errors of these instruments were known; but the majority of instrumental observations were derived from barometers and thermometers supplied by the owners of the vessels in which the observers were serving. The errors of these instruments were ascertained, when possible, by comparison with standards at various ports, and the corrections registered, verified or otherwise, by the comparison of readings noted in the special form of the Register with the corresponding values published in the Daily Weather Reports of the country in which the observations were taken.

Entries in the Registers of doubtful accuracy have been discarded, and it must be admitted that a small percentage of the wind observations charted are not in good agreement with the distribution of barometric pressure to which they are related, particularly as regards direction. The discrepancies may, in most cases, be attributed to the failure of the observer to realise, or to make sufficient allowance for, the effects of aberration caused by the vessel's own motion.

The Daily and Monthly Charts.

The result of the work is represented by daily charts for Noon Greenwich Mean Time with charts for monthly pressure and air temperature.

In some respects the Daily Synchronous Charts are unique. The conditions which they are intended to represent at a given time each day, for a period of thirty months, refer to an area that is far larger than that embraced by any similar set of charts hitherto published. They include localities in the Antarctic, and furnish daily a link between the conditions existing simultaneously in frigid zones and in sub-tropical latitudes, represented on the one hand by three widely separated localities in Antarctica, and on the other by the southern segments of the tropical anticyclones of the Southern Hemisphere. They establish, as a fact, the permanence of these high-pressure areas of the great oceans, and show the gradual seasonal migrations of the South Atlantic, South Pacific, and Indian Ocean anticyclones by the slow oscillations of their southern edges.

Notwithstanding the large number of observations collated, the localities for which data are available for each daily chart are comparatively few, and frequently isolated, owing to the vastness of the area to which collectively they are related. Despite the sparseness of the observations charted, and the obvious incompleteness in sequence of the conditions which the charts are designed to represent, the information they afford is considerable, for not only are the positions of many high- and low-pressure systems over various parts of the regions under notice indicated, but these "Highs" and "Lows" can, for the most part, be identified day after day, the means being thus afforded for tracing the directions in which their centres moved during more or less prolonged periods.

The limits of areas over which cyclonic depressions exercised an influence can, moreover, in a few instances be defined and occasionally the places of their origin or extinction roughly determined.

As regards the charts of monthly pressure and air temperature at sea-level for each of the thirty months under notice, although the number of observations upon which they are based is comparatively small, even for those months in which the more ample data are available, it may nevertheless be claimed that they exhibit broadly the more salient features in the distribution of the respective elements they represent during the periods to which they refer. In addition, the charts of mean monthly pressure and air temperature side by side with those of normal pressure and air temperature supply the means for comparing the distribution of these elements, in the several months, with the average distribution.

The tables of monthly average wind and gale frequency introduced assist in the interpretation of the mean monthly chart.

DISCUSSION OF CERTAIN CONCLUSIONS DRAWN FROM THE STUDY OF THE SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T. WITH WIND AND AIR TEMPERATURE.

The Paths of the Cyclonic Depressions of the Southern Ocean.

Hitherto adequate information has been wanting for the purpose of defining the average paths of cyclonic depressions which visit the Southern Ocean and Southern Continents during the several seasons of the year, and this information these circumpolar charts to some extent supply.

An attempt was made by the present writer in the year 1890 to determine, by the aid of observations extracted from a large number of logs relating to voyages between the Cape of Good Hope and Australasia during the three years 1887–9, the mean paths of the centres of cyclonic systems moving eastward South of the 38th parallel of latitude,* and subsequently to trace the centres of high- and low-pressure systems in transit eastward over Australasia,† by reference principally to synoptic charts prepared at the Sydney Observatory under the direction of the late Mr. H. C. Russell, then Government Astronomer for New South Wales.

From the information obtained by means of the data contained in the logs referred to it was inferred that East of the 30th meridian of East longitude the centres of atmospheric disturbances appeared to travel to the eastward usually on paths lying South of the 43rd parallel of latitude during winter months and South of the 46th parallel during summer months. The evidence afforded by the daily synoptic charts of Australasia also appeared to favour this assumption, which is now confirmed by the testimony of the daily charts under notice.

In a memoir by the writer upon the Climatology of South Victoria Land and the Neighbouring Seas,‡ which is included in the published results of meteorological observations of the "Discovery" Expedition, during the years 1901 to 1904, attention is directed to the exceptionally favourable position, regarded as a meteorological station in the Southern Ocean, in which the Winter Quarters of the Exploring Ship "Gauss," of the German Antarctic Expedition, was situated. The value of the data obtained at this station, on the fringe of Antarctica, is, moreover, considerably enhanced by observations recorded at the German station on Kerguelen Island, because together they throw light upon points in connexion with the surface distribution of pressure and wind in cyclonic systems of the Southern Ocean, in regard to which little has hitherto been known.

The following remarks in this connexion, which appear in the memoir referred to, are based upon the data incorporated in the daily charts; it is, therefore, considered admissible to repeat them in these pages.

Lying to the South of the westerly winds of the Southern Ocean, and at the limits of the southern segment of those low-pressure areas which move from West to East with the westerly air current of the Southern Hemisphere, the Winter Quarters of the German Antarctic Expedition were exceptionally well situated as an observing station from a meteorological point of view.

It has been thought by meteorologists, who have attacked the problem, that, associated with the depressions which traverse the Southern Oceans, depressions which are usually elliptical in shape and have their major axes extended in a northerly and southerly direction, the easterly winds in the southern segment of the system are almost always light or moderate in force. Ships running down the easting in

* "Wind Systems and Trade Routes between the Cape of Good Hope and Australia," 'Quarterly Journal, Royal Meteorological Society,' Vol. XVII. (1891), pp. 21–27.

† "The Tracks of Ocean Wind Systems in Transit across Australasia," 'Quarterly Journal, Royal Meteorological Society,' Vol. XIX. (1893), pp. 34–38.

‡ "Climatology of Victoria Land and the Neighbouring Seas," 'National Antarctic Expedition, Meteorology,' Part I.

high southern latitudes seldom experience strong winds or gales from Eastward, even when there appears to be evidence to show that they are situated well to the south of the central "low" of a cyclonic wind system. It has, therefore, been assumed that in these systems the gradient polewards is normally slight, and that on its southern side the low pressure dominates but a small area.

The results of observations obtained by the German Expedition at Kerguelen Island and at Kaiser Wilhelm II. Land go far to prove that depressions which traverse the Southern Ocean cover a much larger area on their southern side than was hitherto supposed, and that although Easterly gales are seldom met with on the trade routes referred to, nevertheless they occur, considerably further south, it is true, but still within the limits of the system and forming part of their circulation.

The rise of temperature which was associated with gales from Eastward at the "Gauss" Winter Station and which, as a rule, continued until the wind began to moderate, may be attributed to the circulation of warm air drawn from lower and warmer latitudes about a minimum pressure far north of the station.

Frequently the daily observations at noon G.M.T. of barometer and wind recorded by the German Antarctic Expedition at Kerguelen Island and at the "Gauss" Winter Quarters respectively—the former supplemented and confirmed by similar observations made on board ships situated in the neighbourhood of the island—indicate a connexion between the strong winds and gales from Northward and Westward associated with diminishing pressure at Kerguelen and the strong winds and gales from eastward experienced at the "Gauss" station. The distance between the meridians of these two stations respectively, on a middle latitude of 57° 43′ S., is about 630 miles. As instances in which the common origin of these increases in wind force, experienced at the two stations, is shown, the following cases are cited. Doubtless the fuller data in the possession of the German meteorologists bring into greater prominence the connexion referred to. It should be understood that noon G.M.T. observations only are cited.

18th to 20th February, 1902.

At Kerguelen Island on the 18th February, 1902, at noon G.M.T., the barometer stood at 29·75 inches, the thermometer at 45° F.; the wind was from West, force 5. Next day the mercury had fallen to 29·43 inches, the temperature had risen 1°; and the wind, still from West, had increased to a fresh gale, indicating a gradient to the South. On the 20th the barometer had risen to 29·80 inches, the thermometer showed a drop in the temperature to 42° F., and the wind had backed to West-south-west. The depression was passing away to the eastward.

By this time, at noon G.M.T., on the 20th, on board the "Gauss," in latitude 65° 55′ S., longitude 90° 20′ E., the barometer indicated a pressure of 29·55 inches, which was diminishing, the thermometer marked 28° F., and a fresh breeze was blowing from East. The mercury had fallen to 29·28 inches on the 21st in latitude 66° 17′ S., longitude 90° 43′ E.; temperature had risen to 31° F., and the direction and force of the wind were the same as on the previous day. On the 22nd, the "Gauss" being then in her Winter Quarters, the mercury had fallen but slightly, to 29·25 inches; the temperature had dropped to 25° F., and a strong gale was blowing from East-by-south. The gale had not abated at noon G.M.T. on the day following, when the direction of the wind had changed to East. The barometer then stood at 29·23 inches, the thermometer at 24° F. The mercury had fallen to 29·14 inches on the 24th; temperature had risen to 29° F., but the gale was abating.

23rd to 28th April, 1902.

On the 23rd April of the same year, at noon G.M.T., pressure at Kerguelen Island had fallen 0·71 inch and temperature had risen 8° F. during the preceding 24 hours. The barometer then read 29·20 inches and the thermometer 48° F.; the breeze blew freshly from West-north-west. At the same G.M.T. a barometer reading of 29·58 inches was recorded at the "Gauss" station; the temperature was 9° F., and the wind gentle from East-south-east. On the 24th the mercury had risen to 29·33 inches at Kerguelen Island, the temperature had dropped to 34° F., and the wind had backed to South-west-by-west and moderated. The disturbance, with which the diminution of pressure at the island had been associated, was then passing away to the eastward. At the "Gauss" station the mercury had by this time fallen to

29·35 inches, the thermometer had risen to 17° F., and a strong gale from East-by-north had set in. The mercury continued to fall, on the 25th it had fallen to 29·11 inches, and the thermometer marked 16° F.; the direction of the wind had not changed, but the force had increased to 10.

Ths barometer was down to 28·49 inches on the 26th; the thermometer had risen to 17° F., and the wind still blew with the force of a whole gale from East-by-north. On the day following the mercury had risen to 28·72 inches and was still rising; temperature had dropped to 16° F., and the gale continued, unabated, from the same point. The wind moderated on the 28th, when the mercury had risen to 29·23 inches.

2nd to 6th May, 1902.

Between the 2nd and 6th May, 1902, pressure at Kerguelen Island diminished from 29·92 inches to 28·84 inches, and fresh winds were experienced from North-westward, backing to Westward. The temperature between the 4th and 5th had risen from 34° F. to 42° F. From the 4th to the 7th of the month, inclusive, the "Gauss" station was visited by a strong to whole gale from East-by-north, pressure having diminished from 29·24 inches, on the 3rd, to 28·52 inches on the 6th, and temperature risen during that period from −4° F. to 21° F.

15th to 19th May, 1902.

Again, between the 15th and 17th of the same month, pressure at Kerguelen Island declined from 29·33 inches to 28·90 inches, and temperature rose from 30° F. to 42° F. Strong winds from between West-north-west and West-south-west were recorded at this time and also on the 18th at the island, and strong winds and gales on board ships in the neighbourhood of the island.

At the German station in the Antarctic the barometer showed a fall from 29·23 inches to 29·09 inches between the 17th and 18th, the thermometer a rise from 9° F. to 13° F., and the wind, from East-by-north, increased in force to a fresh gale. On the 19th the barometer had risen to 29·24 inches, and the wind increased from the same point to a whole gale. Next day the mercury had risen to 29·43 inches, temperature had dropped to 8° F., and the gale was over.

4th to 7th June, 1902.

A rapid diminution of pressure, rise of temperature, and increase of wind to gale force, which occurred from the 4th to the 6th June at the Antarctic station, was evidently associated with a diminution of pressure and increase of wind to gale force previously recorded (between the 3rd and 5th of the month) at Kerguelen Island and on board the S.S. "Waimate," in a position, on the 4th, rather more than 100 miles south of the island.

Subsequently, between the 6th and 7th of June, the "Waimate," passing the meridian of the "Gauss" station in latitude 50½° S., experienced a fresh to strong gale from West-south-west, veering to North-west, while pressure increased at the Antarctic station, and the wind moderated from a whole gale to a strong breeze.

5th to 8th July, 1902.

On the 5th July a rapid fall of the mercury recorded at Kerguelen Island and on board ships approaching the neighbourhood of the island resulted in an increase of wind on the 6th, which had backed from North-west to West, and blew a fresh gale from the latter direction. During these two days the mercury at the "Gauss" station fell 0·58 inch, and the thermometer rose 11°, and on the 7th an increasing wind attained the force of a fresh gale. The barometer then commenced to rise; the temperature had risen 5° since the preceding day, and marked 21° F. Next day the gale was over.

11th to 18th July, 1902.

From the 12th to the 13th of the same month barometric pressure at Kerguelen Island declined from 29·82 inches to 28·84 inches, the wind at the same time backing from North-west to West, and freshening. Between the 11th and 12th the thermometer had risen 4°.

On the 13th a light South-west breeze obtained at the Antarctic station, pressure increasing, the temperature −11° F. On the 14th the barometer there read as high as 29·58 inches; the temperature had risen to −4° F., but the wind had backed to East-by-south, and was entered in the record as a fresh breeze. On the 15th the mercury had fallen half an inch, the thermometer risen 19°, and the wind was blowing with storm force from East-by-north. With a slight recovery of pressure on the 16th, it moderated to a fresh gale, but subsequently increased to a strong gale, still from the same point, and this continued, pressure the while declining, until the 18th, when the barometer had fallen to 28·61 inches, and the thermometer marked 17° F. Pressure recovered next day and the wind moderated, but the temperature had risen to 20° F.; it fell, however, on the 20th to 1° F.

30th July to 8th August, 1902.

A rapid fall in the barometer from 30·37 inches to 29·62 inches occurred at Kerguelen Island between the 30th and 31st July, occasioning an increase of wind, and associated with a slight rise of temperature. On these days the mercury fell 0·4 inch at the "Gauss" station, and the direction of the wind changed from West-north-west on the 30th to East-by-south on the 31st, increasing in force at the same time. On the 1st August the mercury had fallen as low as 27·82 inches, and a whole gale was blowing from East-by-north. The temperature had risen 10° since noon G.M.T. of the preceding day.

A diminution of pressure and decrease in wind force recorded at Kerguelen Island and on board ships in the neighbourhood of the island, on the 6th and 7th August, appear to have been associated with a diminution of pressure, rise of temperature, and increase of wind from East-by-north to gale force, recorded on board the "Gauss" on the 7th and 8th of the month.

15th to 17th August, 1902.

Reduction of pressure at the island, again, on the 15th to the 17th of the same month, was followed at the "Gauss" station by a rise of temperature between the 16th and 17th of 25°, and a fall in the barometer of 0·74 inch between the 17th and 18th, together with an increase of wind from East-by-north on the 18th to storm force.

11th and 12th, 20th and 21st October, 1902.

Diminishing pressure, accompanied by increase of wind, recorded at Kerguelen Island and by ships in the neighbourhood of the island on the 11th and 12th October, and again on the 20th and 21st of that month, was followed at the German Antarctic station by decline of pressure, rise of temperature, and increase of wind to whole gale force.

11th to 14th December, 1902.

On the 11th December a fall in the barometer of more than half an inch had been recorded at Kerguelen Island for the previous 24 hours, and the ship "Niagara," some 250 miles north-eastward of the island, was experiencing a strong gale from North-north-west. On the following day the centre of disturbance, progressing eastward, had passed the meridian of the station at Kerguelen, and the S.S. "Salamis," in the immediate neighbourhood of the island, had a strong wind from South-by-west. At the German station in the Antarctic pressure was then giving way, but the wind, from East-north-east, was light. About 1300 miles due north of the "Gauss" the "Loch Torridon" recorded a strong wind from North-by-west and a barometer reading of 29·56 inches, which was 0·28 inch higher than the reading recorded at the same time on board the "Gauss."

The "Niagara," then in about 45° S. latitude, 81¼° E. longitude, still had the wind from Northward, and was therefore in front of the trough of the depression. On the 13th the "Loch Torridon" and the "Niagara" carried a Westerly wind, and the latter, in about 45° S. latitude, 86½° E. longitude, was running before a fresh gale, with the central low to the southward of her.

The Antarctic station, where pressure had continued to give way, was now under the full influence of the disturbance, and a fresh Easterly gale was blowing there, but the wind moderated next day. During this gale temperature appears to have changed very little.

6th to 8th February, 1903.

A diminution of pressure recorded at Kerguelen Island and on board ships in the neighbourhood of the island between the 6th and 8th February, 1903, which was accompanied by an increase of wind, was followed on the 9th by a diminution of pressure and a strong gale from East, in 65° 53′ S., 89° 21′ E., the position in which the "Gauss" was situated.

Other instances furnished by synchronous G.M.T. observations could be cited to show how the gales experienced at Kaiser Wilhelm II. Land, during the sojourn there of the German Exploring Expedition, frequently owed their origin to systems of low pressure travelling eastward, which had previously affected the weather conditions of Kerguelen and ships in the neighbourhood of the island, giving rise to strong winds and gales in those localities.

Studied in connexion with the more ample information in reference to the meteorology of the Antarctic during the same period, which is given in Part I. of this work, considerable light is thrown by these Charts upon problems relating to pressure distribution and wind circulation in, and in the neighbourhood of, those localities in which the Winter Quarters of the British, German, Scottish, and Swedish Expeditions were situated. They afford additional examples which may be explained by the supposition that the strong winds and gales from polar directions experienced by the "Discovery" Expedition in South Victoria Land were accompanied by a decided rise of temperature, because they had their origin in lower latitudes over the ocean.

The train of low-pressure areas during their passage eastward in this part of the Southern Ocean frequently follows a more southerly path after passing Cape Adair, the centres of the depressions striking south-eastward and the areas of disturbance spreading over the Ross Sea.

With a cyclonic depression dominating air circulation over, and in the vicinity of, the Ross Sea, winds are Northerly to North-easterly in the eastern segment of the system, seaward; Easterly to South-easterly in the southern segment, over and immediately to the south of the ice barrier; and Southerly to South-westerly in the western segment, following the trend of the mountain ranges. It is contended, therefore, that the relative warmth of the winds having a southerly component in South Victoria Land may reasonably be attributed to the place of origin in lower latitudes over the ocean, though the cold of higher polar regions makes itself felt in the south-westerly segment of the cyclonic depression of that region.

The Weddell Sea Region.

McMurdo Sound is situated nearly 400 miles south of North Cape, and west of the easternmost spur of the Admiralty Range. It is, in consequence, sheltered to some extent from northerly winds by this range, and by the east coast ranges, including Prince Albert Mountains, which afford shelter from north-westerly winds also.

Snow Hill, sheltered for the most part from between North-north-east and West by the heights of Joinville Island, which include Mount Percy, by those of Louis Philippe Land, and of Palmer Land, from which rises Mount Haddington, is somewhat similarly situated as regards exposure to winds, so that strong winds and gales from an equatorial quarter are rarely experienced there, while Southerly and South-westerly winds prevail, and frequently attain to gale force.

Because the depressions which exercise the most influence upon the weather conditions of the South Orkneys are those which move to the south-eastward after passing the 60th meridian, the average air circulation in, and in the neighbourhood of, the Weddell Sea, accruing from a procession of these cyclones, approximates to that which would obtain were an area of low pressure situated over that sea, occasioning Northerly and North-westerly winds over the eastern side of the sea, Easterly on the southern side; Southerly and South-westerly on the western, and Westerly on the northern side.

The prevailing winds at Laurie Island, South Orkneys, the station of the Scottish Antarctic Expedition, during the year 1903 were North-westerly, but Northerly and Westerly winds were rather frequent. At Snow Hill, the Swedish station, the average direction of the wind, from March, 1902, to October, 1903, inclusive, was about South-south-west, the prevailing winds being from South or South-west. When gales occurred they blew almost exclusively from Southward and South-westward. On board the "Scotia," near the ice barrier bordering the land discovered by the Scottish Expedition in latitude 74° 1′ S., longitude 22° W., and named by the leader, Mr. BRUCE, "Coats Land," the prevailing direction of the wind from the 7th to the 12th of March, 1904, the period of the "Scotia's" stay there, was Easterly; and from the 7th to the 10th the wind blew with gale force.

It seems probable that between sea and ice barrier in the southern extremity of the Weddell Sea, under normal conditions, there exists a slight pressure gradient for Easterly winds, and that the gales from Eastward which occur there are the result of a steepening of this gradient associated with depressions centred to the north of the barrier, and moving eastward or south-eastward.

The Region of Kaiser Wilhelm II. Land.

At the Winter Quarters of the German Expedition, in latitude 66° 2′ S., longitude 89° 48′ W., where the "Gauss" lay frozen in during the period March, 1902, to February, 1903, nearly 53 per cent. of all wind observations were of winds from East-by-north, East, and East-by-south; 73 per cent. being from directions in the eastern half of the horizon; 16 per cent. from directions in the western half; and 11 per cent. being noted as calms.* The Easterly winds were stronger than those from any other direction; out of 793 hours of strong winds, recorded in the course of twelve months, no less than 90 per cent. were from East-by-north, East, or East-by-south.

From the 28th April to the 10th May, and again from the 28th September to the 9th October, periods of 13 and 15 days respectively, meteorological observations were obtained at the foot of the Gaussberg, a mountain situated in latitude 66° 48′ S., longitude 89° 30′ E., on the verge of the inland ice barrier, 53 miles south from the "Gauss." By comparing the observations of barometric pressure taken at this station with those obtained on board the "Gauss," it was found that pressure was slightly higher at the foot of the mountain than it was on board the ship. During the earlier period the difference amounted to 1·7 mm. (0·067 inch), and during the latter to 0·8 mm. (0·031 inch).

This slight increase of pressure landward was thought to be confirmatory of an inference that had been drawn from the direction of the prevailing wind that pressure increased with latitude southward.

Whether this be the case or not, the frequency of winds from Eastward is doubtless due to the existence of a pressure gradient between land and sea, and to the general east and west trend of the coast line.

The steepness of this pressure gradient is increased, and Easterly gales occasioned, by the incursion of eastward moving low-pressure wind systems. The Easterly gales experienced by the German Expedition at the "Gauss" station were always attended with a steady rise of air temperature, the thermometer continuing to rise until the wind had attained its maximum force. This increase of temperature associated with gales from Eastward may be regarded as a proof that the winds have their origin in lower, warmer, and possibly in tropical latitudes over the ocean, and that they form part of the circulation of eastward moving cyclonic systems, flowing in front of their centres; for during gales from Westward at this station there was always a fall of temperature. The remaining part of the air from the Northward, which, by circulating in rear of these central "lows," had parted with its heat during its passage over the Antarctic, is reinforced by air from polar regions, and occasions a fall of temperature.

The Westerly winds that are shown by the charts to occur occasionally at Kaiser Wilhelm II. Land immediately after a cyclonic depression has passed eastward to the north of the "Gauss" station, may belong to the wind system of a secondary depression, and the fall of temperature with which it is attended may be due to the introduction of air of polar origin into the circulation of this secondary.

It will be seen from the foregoing that, as a result of the wind circulation set up during the passage

* "Wind Conditions at the 'Gauss' Winter Quarters," by Dr. WILH. MEINARDUS, Berlin, 'The Proceedings of the Fifteenth German Assembly of Geographers at Danzig in 1905.'

eastward of successive low-pressure systems over the Southern Ocean, relatively warm air is constantly being drawn from lower latitudes in front of central areas of depression, which, after parting with heat in the frigid zone and being still further chilled by the mixing of air of polar origin, leave the Antarctic as a cold wind.

This exposition of surface wind circulation in high latitudes, which is based on a close examination of the results of observations represented on the daily charts, was offered by the writer in the memoir on the Climatology of South Victoria Land in Part I. of this work. The proposition has since been elaborated and extended to equatorial regions by Dr. W. J. Lockyer,* who suggests that the warm air currents circulating in front of the baric minima of eastward moving depressions are of equatorial origin, and that after they have traversed the southern and western segments of their circuit they rejoin the westerly air current, and so return by the trade wind circulation to the equator on the eastern side of anticyclones.

This, as the writer understands it, is in effect the suggestion put forward, and it is a proposition with which, in the main, he is in accord.

Anticyclones of the Sub-tropical Belt.

In regard to this subject Dr. Lockyer, in the work already quoted, favours the views held by the late Mr. H. C. Russell, F.R.S., C.M.G., in regard to these ocean anticyclones and the high-pressure belt. He believes that in latitudes north of the zone of travelling depressions in the Southern Ocean a train of anticyclones moves eastward, following one another in quick succession, and that in charting the mean results of barometer readings recorded in those latitudes the effect is produced on charts relating to average pressure of permanent areas of maximum barometer within a permanent belt where barometer readings are relatively high. Dr. Lockyer thinks that anticyclones make the circuit of the globe, forming, dispersing, and reforming during their passage, and that it is in this manner that the temperate zone is bridged, and the union between tropical and polar air circulation established. He supposes, moreover, that between each of the anticyclones the northern segments of extensive cyclonic depressions, travelling eastward, obtrude, while the anticyclones move with them.

Mr. Russell assumed the rate of translation of these hypothetical systems of high pressure over the Southern Ocean to be about 460 miles per day; were his theory correct, however, a vessel of average speed running eastward between the 30th and 40th or even the 45th parallels of latitude would be overtaken by a succession of anticyclones. On the approach of each the wind would commence to freshen from some point between South and West with a rising barometer, subsequently veering to Northward with a falling barometer and moderating; and a vessel making the passage homeward from Australia *viâ* the Cape of Good Hope in about the 30th parallel would meet these high-pressure systems, moving in the opposite direction, and experience a similar sequence of changes repeated in rapid succession.

Now it is well known that the reverse obtains; winds experienced by vessels running eastward commence to freshen from a northerly or north-westerly direction with a falling barometer; back to the south-westward or southward with a rising barometer and moderate.

To the navigator making the passage between the meridian of Cape Point and that of Cape Leeuwin or of Stewart Island the overtaking depressions are of so marked a character, and the influence they exert upon the progress of his vessel so considerable, that there can be in his mind at least no doubt as to their dominance over the weather.

The evidence afforded by the synchronous daily charts under notice, as well as by charts of average barometrical pressure, is, moreover, in direct contradiction to Mr. Russell's theory, while, on the other hand, it can be proved conclusively by reference to such charts that the anticyclones of the great oceans are permanent systems of high pressure.

It must be admitted, nevertheless, that the appearance over the extreme west of Australia, on the daily weather charts that are drafted, of these anticyclones, month after month, and their regular progress across the island continent conveys the impression that they are visitors from the Indian Ocean and might have formed, as Mr. Russell supposed, thousands of miles to the westward.

* 'Southern Hemisphere Surface Air Circulation,' by William J. S. Lockyer, M.A. (Cantab.), Ph.D. (Göttingen), F.R.A.S., Chief Assistant, Solar Physics Observatory.

The interchange of air between equatorial and polar regions may be effected through the intermediary of anticyclonic circulations, albeit these high-pressure systems are permanent; and, in the opinion of the writer, the temperate zones are bridged in this manner. The heat thus transmitted from low to high latitudes, while mitigating in some measure the severity of the climate of northern Antarctica, may also contribute towards the disruption of ice from outlying ice barriers. Similarly the introduction of cool air from high to low latitudes doubtless exercises an ameliorating effect upon tropical regions through the agency of the trade winds.

The Rate of Travel of Cyclonic Depressions.

To revert to the cyclonic depressions experienced in far southern seas; it has been ascertained* that in the Southern Ocean, between the meridians of 10° and 140° E., the strongest gales experienced near the centre of a cyclonic depression blow in its front, from between North-east and North-west, and that the wind moderates when it backs to Westward, as pressure increases; whereas gales that occur within the northern segment of a cyclonic depression remote from its centre attain their highest velocity in rear of the line of lowest barometer readings, from some point to the South of West, usually from about South-west, while pressure is rapidly recovering, the wind having been comparatively moderate from North-westward while pressure was diminishing.

The high velocity of the wind on the outskirts of a depression in rear of its centre may be attributed partly to the proximity of the high-pressure belt situated to the north of the Westerly air current, and partly to the rapid recovery of pressure that takes place by replenishment of air from a polar quarter.

The paths followed by centres of cyclonic depressions vary with the season; the parallels along which they move to the eastward depending mainly upon the position of the tropical high-pressure belt which consists, for the most part, of the southern anticyclones of the great oceans; which, in addition to their annual east and west expansion and contraction, have a motion North and South. The amplitude of these seasonal oscillations appears to vary in different years; and it has been suggested that the tropical anticyclones may have a cycle of long period as well as a seasonal movement. This point will be referred to later.

The average paths of the centres of cyclonic depressions depicted on the daily charts under notice have been estimated and grouped. The method employed in their construction was as follows:—The probable positions of the centres of all depressions, that can be identified day after day on four or more consecutive daily charts, were plotted on skeleton charts. Four charts were used for this purpose, one for each season of the year; and the several positions allotted to the centre of each identical system was joined by a line. Parallel to, and bisecting as nearly as possible the areas covered by the paths indicated, a line was drawn to represent the average path.

In grouping the paths in seasons, the months of September, October, November are selected to represent Spring; December, January, February: Summer; March, April, May: Autumn; and June, July, August: Winter.

The results obtained are as follow:—The average path of all central areas of depression charted for the entire period, October, 1901, to March, 1904, is found to have been in about the 52nd parallel. Between the meridians of 20° E. and 150° E., that is to say, over the South Indian division of the Southern Ocean, it was between the 49th and 50th parallels; and between 150° E. and 70° W., the South Pacific division, in about the 55th.

The South Atlantic division of the ocean, embraced by the meridians 70° W. and 20° E., is rarely visited by ships, except on the western side; the observations relating to that portion of the Southern Ocean are, therefore, limited almost exclusively to that side, and to that side only the average paths estimated for this division of the ocean refer.

During each of the seasons the centres of depression after passing the meridian of Joinville Island, about 56° W., either struck eastward or south-eastward; or moved east-north-eastward or north-eastward.

In the Spring of the year the average path taken by centres of depression is found to have been between

* 'The Tracks of Ocean Wind Systems in Transit across Australasia,' quoted on p. 9.

the 49th and 50th parallels in the Indian division, and between the 54th and the 55th in the Pacific. The centres entered the Atlantic division on or near the 58th parallel, thence about one-third of them moved north-eastward, and the remainder passed between Danco Land and the South Orkneys. During the Summer months the 53rd was the average parallel along which the centres travelled eastward in the Indian division, and they followed a path between the 56th and 57th in that of the Pacific. After passing the 56th meridian of W. longitude, about half the central areas of depression travelled East-south-east between Palmer Land and Danco Land and the South Orkneys, and the other half passed away to the north-eastward. During Autumn and Winter the paths were confined to zones between 48° S. and 49° S. in the South Indian division, and between 55° S. and 56° S. in the Pacific. After entering the Atlantic division, rather less than one-third of the centres moved east-south-eastward or eastward across Danco Land, or between Danco Land and the South Orkneys, the remainder passing east-north-eastward or north-eastward into the Atlantic. A few crossed Tierra del Fuego or the southern extremity of Patagonia.

The paths of cyclonic centres are found to have been more scattered during the Autumn and Winter months than in Spring and Summer in all parts of the Southern Ocean.

Cyclonic storms, presumably of tropical origin, are represented on each of the charts on which the central positions of Summer and Autumn depressions were plotted, but they are confined to the western portion of the Pacific division of the Southern Ocean. These appear to have moved into the Tasman Sea from the north-westward, one in the Summer of 1901 and one in each of the Autumns of 1902 and 1903.

The centre of the 1902 storm moved south-eastward to the north-west coast of New Zealand, thence south, passing through Cook Strait, and subsequently zigzagged to the eastward. It can be identified on the daily charts from a position in about 34° S., 169½° E., on the 12th December to a position in about 54½° S., 148½° W., on the 19th of that month, representing a travel of 2187 nautical miles, at an average rate of translation of 312 nautical miles per day.

The cyclones of the Autumns of 1901 and 1903 moved east-south-eastward after crossing the 30th parallel, but cannot be traced to the eastward of the 180th meridian.

The tropical disturbance of December, 1901, above mentioned, is not the only cyclonic depression that can be traced on the daily charts for a number of days consecutively. Similar instances of identification, day after day, of such systems after their initial location can be cited as follows:—

March 7–15, 1902. From 56° S., 146° W. to 55° S., 80° W. = 2243 miles; 280 miles per day.
May 2–10, 1902. From 53° S., 102° E. to 47° S., 175° E. = 2840 miles; 355 miles per day.
May 29–June 5, 1902. From 47½° S., 17° E. to 60° S., 83° E. = 2433 miles; 348 miles per day.
September 2–9, 1902. From 57° S., 80° E. to 47° S., 131½° E. = 2510 miles; 359 miles per day.
May 16–23, 1903. From 54° S., 131° W. to 58° S., 72° W. = 1995 miles; 285 miles per day.
September 21–29, 1903. From 47½° S., 89° E. to 50½° S., 130° E. = 1625 miles; 203 miles per day.
December 10–17, 1903. From 40° S., 130° E. to 55° S., 171° E. = 1890 miles; 270 miles per day.
February 8–15, 1904. From 40° S., 154° E. to 52½° S., 166° W. = 1890 miles; 270 miles per day.

If the centres of the respective cyclonic depressions have been correctly located, the average daily rate at which they progressed was nearly 300 miles.

While the number of cyclonic systems that can be identified for four or more days in succession, during their passage over the ocean, is large, the only moving anticyclonic systems that can be traced for more than three consecutive days are:—(1) Those that appear to have their origin to the west of Australia, the centres of which travel eastward, join the Australian "high," and subsequently move across or to the south of Australia, over the Tasman Sea and New Zealand or immediately north or south of those islands, and then disappear over the Pacific. (2) Those that move eastwards from the South American Continent, over the sea, and soon after disappear over the Atlantic.

The former appear to originate as secondary high-pressure systems thrown off the South Indian anticyclone; the latter appear to form over the land.

As regards the paths of anticyclones, shown on the charts, the instances are rare in which areas of high barometer, other than those that obviously form part of the permanent anticyclones of the great oceans,

can be traced over the ocean for more than three consecutive days; and when such areas can be identified for as many as three days, their movements are shown to be erratic and slow.

Over the continents it is otherwise, and in connexion with an investigation, already referred to, the writer found that from November to March inclusive the centres of moving anticyclones that appear over Australia follow paths lying chiefly over the ocean, not far from but to the South of the island Continent, thence over the Tasman Sea, and across or just South of the Middle and South Island of New Zealand; but from May to September inclusive, chiefly over the southern part of Australia, over the Tasman Sea and New Zealand.

He expressed the opinion that these anticyclones form over the cool plains of Western Australia during the winter months, and over the relatively cool sea immediately South-west of the land during the summer, spreading subsequently from the sea northward over the land.

Evidence is not wanting, moreover, to prove that small areas of high pressure, breaking off the Indian Ocean anticyclone, drift eastward and reinforce these high pressure areas that have formed; and that the relatively high-pressure ridges which follow in rear of depressions also are merged in these "highs."

CHARTS OF MEAN PRESSURE AND AIR TEMPERATURE.

By a close examination of the data exhibited on the charts of mean pressure for Noon G.M.T., month by month, it is found possible to follow the seasonal oscillations of the tropical high-pressure belt, as represented by the southern margins of the ocean anticyclones: and, by comparing each chart with the accompanying chart illustrating normal pressure distribution, to detect displacements of the belt from its average southern limit in any month or series of months to which the charts refer. The evidence thus afforded by the pressure charts is in a measure supplemented by a similar comparison of the charted observations of air temperature with average results on the charts accompanying them. Thus it is found that during the last three months of 1901 the southern margins of the South Atlantic, Indian Ocean, and South-eastern Pacific permanent high-pressure areas were North and West of their average positions; that of the South-western Pacific was South of the average, and exhibited no departure from the average as regards longitude. In these months the mean air temperature appears to have been above the normal in the Atlantic and Indian Ocean divisions of the Southern Ocean; but about the normal in the South-eastern and South-western Pacific divisions.

During the greater part of 1902 the ocean anticyclones were again North of their average southern limits and the Atlantic anticyclone was West of its average position. The Indian Ocean and South Pacific anticyclones, however, appear in their average positions as regards longitude.

Air temperature over the Southern Ocean, as indicated by the charts, was in each month of this year either about the normal or above it, except in the South-western Pacific division of the ocean, where it seems to have been below the normal.

During the year 1903 the southern margin of the high-pressure belt is charted in or near its average parallels; and, while the South Atlantic and Indian Ocean areas of maximum pressure are shown to have been West of their average positions, the two South Pacific areas are located slightly to the East of the average.

As regards mean air temperature during that year, this appears from the position of the isotherms to have been higher than the normal over the South Atlantic and the South-eastern Pacific divisions of the Southern Ocean, slightly above the normal over the Indian Ocean division, and slightly below the normal over the South-western Pacific division.

In the first three months of 1904 the southern margin of the belt is charted in about its average parallels. The air temperature indicated by the isotherms for those months is above normal, except in the South-Western Pacific division, where a slight defect in temperature is indicated.

In a paper contributed to the Royal Meteorological Society in 1908 by Colonel H. E. Rawson, C.B., R.E.,* it was pointed out that when isobaric charts of the Southern Hemisphere relating to any month or months which had been prepared in different years were compared with one another, the *action-centre* of the South

* "The Anticyclonic Belt of the Southern Hemisphere," 'Quarterly Journal, Roy. Met. Soc.,' July, 1908.

Atlantic anticyclone was found to occupy different positions in the corresponding month or months on the charts of each of these years. He found that if BUCHAN'S charts, published in 1869, are compared with those prepared by the same authority for 1870–84, or if MOHN'S charts published in 1879, 1883 and 1903 are compared with those prepared by the Meteorological Office, which are based on observations recorded in nearly 3300 logs extending over the period 1855-99, the mean monthly position of the *action-centres* will be found to vary very considerably both in latitude and longitude. Colonel RAWSON concluded that in addition to the seasonal migration of the high-pressure belt, which has so long been recognised, there is a progressive displacement going on from year to year, in consequence of which the belt is in some years nearer to the Equator than in others. He believed he had found strong evidence of cyclical changes having taken place in the belt's latitude, and of the existence of an interval of 9½ years between the times of its passing from its extreme northern to its extreme southern positions, and *vice versâ*. If Colonel RAWSON'S theory be correct, the belt should have reached the southern limit of its oscillation in 1903. Now although the southern margin of the high-pressure belt in the several divisions of the ocean, as shown on the monthly charts for that year, appears to be in about its average position as regards latitude, it must be admitted that the monthly charts for both 1901 and 1902 place the margin of the belt in lower parallels.

SUMMARY OF THE OBSERVATIONS OF WIND.

On Tables I. to IV. are set forth the number of observations of wind from each of eight cardinal and inter-cardinal points of the compass, and of variable winds and calms recorded in the Southern Ocean during the thirty-months period, October 1901 to March 1904; inclusive also of the number of instances on which these winds attained to gale force.

For the purposes of comparison the observations are arranged according to (1) the respective seasons, (2) the divisions of the Ocean, and (3) the zones to which they relate.

In the classification adopted (p. 16), the months of September, October, November are regarded as representing Spring; December, January, February as representing Summer; March, April, May, Autumn; and June, July, August, Winter. The following are the meridional boundaries selected for representing the three divisions of the Southern Ocean, 150° E. to 70° W., Pacific; 70° W. to 20° E., Atlantic; 20° E. to 150° E., Indian. The grouping of ocean wind and gale frequency into zones of ten degrees of latitude is adopted for convenience.

Tables V. to IX. state the directions from which the largest and smallest percentages of winds of all forces, and of gales only, were recorded in each of the zones and divisions of the Southern Ocean referred to, in the respective seasons of the year and in all seasons, during the thirty months period.

Table X. furnishes similar information relating to the Southern Ocean as a whole.

Table I.—Wind.

Direction referred to Eight Points of the Compass. Number of Observations under each Point.

Spring: September, October, November.

Wind direction . .		150° E. Pacific.										70° W. Atlantic.										20° E. Indian.									
		N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.
Parallels.	Years.																														
30° S. to 40° S.	1901	17	14	4	7	14	11	4	7	10	88	16	20	10	22	26	22	20	23	11	170	33	22	22	27	52	69	55	39	13	332
	1902	13	10	6	7	23	15	15	19	9	117	30	24	17	37	31	21	24	34	3	221	18	26	18	33	49	79	66	45	20	354
	1903	7	13	16	14	11	6	1	4	1	73	9	8	7	21	9	14	8	10	—	86	20	24	12	20	32	38	30	26	4	206
	1901–3	37	37	26	28	48	32	20	30	20	278	55	52	34	80	66	57	52	67	14	477	71	72	52	80	133	186	151	110	37	892
40° S. to 50° S.	1901	26	10	1	3	7	14	15	16	3	95	15	3	—	1	—	8	9	9	—	45	36	10	2	7	31	63	61	52	5	267
	1902	20	17	11	10	19	32	24	23	3	159	7	4	2	1	3	6	8	12	2	45	42	18	12	20	63	79	75	71	7	387
	1903	20	20	11	10	19	17	13	13	10	133	3	—	1	1	1	2	2	4	1	15	42	15	5	23	46	42	41	50	9	273
	1901–3	66	47	23	23	45	63	52	52	16	387	25	7	3	3	4	16	19	25	3	105	120	43	19	50	140	184	177	173	21	927
50° S. to 60° S.	1901	9	1	2	—	5	17	13	13	2	62	6	—	—	—	1	1	7	5	—	20	6	—	4	—	—	4	2	4	—	20
	1902	15	7	4	2	6	14	14	13	3	78	1	—	—	—	—	6	5	5	—	17	2	1	—	—	—	—	1	1	—	5
	1903	8	3	—	—	5	11	6	20	1	54	5	1	—	—	—	1	—	4	—	11	3	—	—	—	—	—	—	—	—	3
	1901–3	32	11	6	2	16	42	33	46	6	194	12	1	—	—	1	8	12	14	—	48	11	1	4	—	—	4	3	5	—	28

Gale Frequency.

Number of Instances on which the Winds Recorded were of Gale Force (8 to 12).

30° S. to 40° S.	1901	—	1	—	—	—	1	1	—	—	3	—	3	—	1	—	1	—	—	—	5	1	1	1	1	1	2	4	1	—	12
	1902	—	—	—	—	—	—	1	—	—	1	—	—	—	1	5	2	3	2	—	13	—	1	—	—	4	7	6	4	—	22
	1903	1	—	—	—	3	1	—	—	—	5	—	—	—	1	—	1	1	1	—	4	—	1	1	1	1	—	1	1	—	6
	1901–3	1	1	—	—	3	2	2	—	—	9	—	3	—	3	5	4	4	3	—	22	1	3	2	2	6	9	11	6	—	40
40° S. to 50° S.	1901	1	—	—	—	—	—	—	1	—	2	1	—	—	—	—	2	—	—	—	3	1	2	—	—	2	5	3	2	—	15
	1902	—	1	—	—	1	7	2	1	—	12	—	—	—	—	—	—	2	1	—	3	4	—	—	—	2	5	3	4	—	18
	1903	1	1	—	—	2	2	—	—	—	6	—	—	—	—	—	—	—	—	—	0	—	—	—	1	3	—	—	—	—	4
	1901–3	2	2	—	—	3	9	2	2	—	20	1	—	—	—	—	2	2	1	—	6	5	2	—	1	7	10	6	6	—	37
50° S. to 60° S.	1901	—	—	—	—	—	—	—	—	—	0	1	—	—	—	—	—	2	—	—	3	—	—	—	—	—	—	—	—	—	0
	1902	1	—	—	—	1	3	1	—	—	6	—	—	—	—	—	3	—	1	—	4	—	—	—	—	—	—	—	—	—	0
	1903	1	—	—	—	1	—	—	2	—	4	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—	—	—	—	0
	1901–3	2	—	—	—	2	3	1	2	—	10	1	—	—	—	—	3	2	1	—	7	—	—	—	—	—	—	—	—	—	0

Table II.—Wind.

Direction referred to Eight Points of the Compass. Number of Observations under each Point.

Summer: December, January, February.

Wind direction. .		150° E. Pacific.										70° W. Atlantic.										20° E. Indian.									
		N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.
Parallels.	Years.																														
30° S. to 40° S.	1901-2	26	26	13	22	31	27	18	22	15	203	41	25	15	38	35	20	11	37	11	233	32	35	28	66	102	118	56	26	26	489
	1902-3	17	17	13	15	18	12	7	11	10	120	40	20	11	14	19	8	13	13	4	142	17	18	18	9	32	39	18	9	14	174
	1903-4	13	9	5	13	16	6	8	11	7	88	11	11	9	14	16	5	6	7	3	82	15	13	21	29	36	23	14	11	5	167
	1901-4	56	52	31	50	68	45	33	44	32	411	92	56	35	66	70	33	30	57	18	457	64	66	67	104	170	180	88	46	45	830
40° S. to 50° S.	1901-2	31	38	21	26	22	43	28	32	11	252	26	10	7	7	7	20	18	18	5	118	40	19	6	18	68	99	89	93	10	442
	1902-3	21	19	10	11	20	18	25	30	5	159	20	4	3	1	6	7	12	20	1	74	21	4	2	3	20	28	29	18	5	130
	1903-4	19	21	9	12	21	23	13	13	2	133	5	2	2	2	1	11	5	4	1	33	24	7	5	7	16	28	21	32	3	143
	1901-4	71	78	40	49	63	84	66	75	18	544	51	16	12	10	14	38	35	42	7	225	85	30	13	28	104	155	139	143	18	715
50° S. to 60° S.	1901-2	44	25	10	11	23	33	42	41	2	231	15	11	3	3	5	9	11	18	—	75	1	—	2	—	2	1	1	3	—	10
	1902-3	35	17	3	4	14	35	40	40	2	190	16	5	3	4	5	8	7	18	—	66	1	—	—	—	—	—	—	2	—	3
	1903-4	33	9	5	3	9	20	28	49	1	157	8	2	1	—	—	2	3	5	—	21	3	—	—	—	1	2	1	2	—	9
	1901-4	112	51	18	18	46	88	110	130	5	578	39	18	7	7	10	19	21	41	—	162	5	—	2	—	3	3	2	7	—	22

Gale Frequency.

Number of Instances on which the Winds Recorded were of Gale Force (8 to 12).

30° S. to 40° S.	1901-2	—	—	—	—	1	—	—	1	—	2	—	—	—	—	—	—	—	—	—	0	1	—	1	—	—	4	1	—	—	7
	1902-3	—	—	—	—	—	—	—	—	—	0	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	1	1	—	—	2
	1903-4	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—	1	—	—	1
	1901-4	—	—	—	—	1	—	—	1	—	2	—	—	—	—	1	—	—	—	—	1	1	—	1	—	—	5	3	—	—	10
40° S. to 50° S.	1901-2	2	1	—	—	—	1	2	2	—	8	—	—	—	1	—	—	—	—	—	1	3	1	—	—	1	5	8	6	—	24
	1902-3	1	—	—	—	—	—	1	2	—	4	—	—	—	—	—	—	1	2	—	3	1	—	—	—	—	2	1	—	—	4
	1903-4	2	—	—	1	—	—	—	3	—	6	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	1	1	—	—	2
	1901-4	5	1	—	1	—	1	3	7	—	18	—	—	—	1	—	1	1	2	—	5	4	1	—	—	1	8	10	6	—	30
50° S. to 60° S.	1901-2	3	1	—	1	1	—	1	4	—	11	2	—	—	—	—	—	2	2	—	6	—	—	—	—	—	—	—	—	—	0
	1902-3	—	—	1	—	—	2	5	4	—	12	1	—	—	—	—	1	1	—	—	3	—	—	—	—	—	—	—	—	—	0
	1903-4	3	—	—	—	—	2	2	3	—	10	1	—	—	—	—	1	—	1	—	3	—	—	—	—	—	—	—	—	—	0
	1901-4	6	1	1	1	1	4	8	11	—	33	4	—	—	—	—	2	3	3	—	12	—	—	—	—	—	—	—	—	—	0

Table III.—Wind.

Direction referred to Eight Points of the Compass. Number of Observations under each Point.

Autumn: March, April, May.

Wind direction . .		150° E. Pacific.										70° W. Atlantic.										20° E. Indian.									
		N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.
Parallels.	Years.																														
30° S. to 40° S.	1902	28	28	23	28	42	28	32	15	14	238	41	19	21	56	44	26	27	47	10	291	43	39	35	47	59	95	61	44	31	457
	1903	20	14	2	16	24	14	5	4	12	111	15	7	7	14	14	6	9	7	2	81	8	14	9	11	15	30	12	9	7	115
	1904	—	1	—	2	2	2	—	—	2	9	7	11	3	4	3	1	—	4	4	37	2	9	10	9	15	5	2	5	3	60
	1902–4	48	43	25	46	68	44	37	19	28	358	63	37	31	74	61	33	36	58	16	409	53	62	54	67	89	130	78	58	41	632
40° S. to 50° S.	1902	39	28	9	13	28	48	40	39	8	252	21	5	—	3	8	11	16	16	2	82	56	21	14	24	51	63	66	73	9	377
	1903	24	20	11	13	18	23	12	9	6	136	12	1	1	1	3	5	5	4	4	36	11	6	5	9	38	49	39	34	3	194
	1904	9	5	3	2	4	4	4	5	2	38	5	1	1	2	—	2	2	6	—	19	9	4	—	5	15	19	13	9	4	78
	1902–4	72	53	23	28	50	75	56	53	16	426	38	7	2	6	11	18	23	26	8	137	76	31	19	38	104	131	118	116	16	649
50° S. to 60° S.	1902	35	16	6	15	16	26	31	37	2	181	8	6	5	3	5	5	6	13	—	51					No	data.				
	1903	16	5	—	3	3	16	18	19	5	83	5	2	—	—	—	2	1	10	1	21	5	1	—	—	1	4	6	2	—	19
	1904	9	3	2	—	5	8	10	19	—	56	3	1	1	—	—	1	2	3	—	11	—	—	—	—	1	1	2	2	—	6
	1902–4	60	24	8	18	24	50	57	75	7	323	16	9	6	3	5	8	9	20	1	83	5	1	—	—	2	5	8	4	—	25

Gale Frequency.

Number of Instances on which the Winds Recorded were of Gale Force (8 to 12).

30° S. to 40° S.	1902	3	1	1	3	4	2	1	2	—	17	2	1	—	—	2	2	1	2	—	10	1	1	—	1	3	3	2	—	—	11
	1903	1	—	—	—	1	—	—	—	—	2	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	2	2	—	—	4
	1904	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—	—	—	—	0
	1902–4	4	1	1	3	5	2	1	2	—	19	2	1	—	—	2	2	1	2	—	10	1	1	—	1	3	5	4	—	—	15
40° S. to 50° S.	1902	—	3	2	2	5	7	4	2	—	25	1	—	—	—	—	3	3	1	—	8	2	3	2	2	4	5	4	1	—	23
	1903	—	—	—	1	1	1	1	—	—	4	—	—	—	—	—	—	—	—	—	0	1	1	—	—	1	2	1	—	—	6
	1904	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—	—	—	—	0
	1902–4	—	3	2	3	6	8	5	2	—	29	1	—	—	—	—	3	3	1	—	8	3	4	2	2	5	7	5	1	—	29
50° S. to 60° S.	1902	6	3	—	2	2	3	7	8	—	31	2	1	1	—	—	—	3	1	—	8					No	data.				
	1903	3	—	—	—	—	4	2	3	—	12	—	—	—	—	—	—	—	—	—	0	1	—	—	—	—	2	1	—	—	4
	1904	—	—	—	—	—	—	1	1	—	2	—	—	—	—	—	—	—	—	—	0	—	—	—	—	—	—	—	—	—	0
	1902–4	9	3	—	2	2	7	10	12	—	45	2		1	—	—	—	3	1	—	8	1	—	—	—	—	2	1	—	—	4

Table IV.—Wind.

Direction referred to Eight Points of the Compass. Number of Observations under each Point.

Winter: June, July, August.

Wind direction . .		150° E. Pacific.										70° W. Atlantic.										20° E. Indian.									
		N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable and calm.	Total.
Parallels.	Years.																														
30° S. to 40° S.	1902	32	27	19	26	50	33	18	21	10	236	34	21	18	36	36	34	31	38	13	261	48	27	37	39	65	98	78	70	36	498
	1903	8	5	3	1	8	9	5	7	4	50	15	8	9	14	13	13	7	15	3	97	27	13	8	7	25	29	19	21	2	151
	1902–3	40	32	22	27	58	42	23	28	14	286	49	29	27	50	49	47	38	53	16	358	75	40	45	46	90	127	97	91	38	649
40° S. to 50° S.	1902	27	20	13	21	36	41	20	20	2	200	13	3	1	2	5	8	10	14	—	56	32	11	11	25	50	71	56	67	9	332
	1903	17	10	3	6	19	25	15	24	6	125	6	—	1	2	8	6	4	5	—	32	20	5	5	12	38	51	28	28	4	191
	1902–3	44	30	16	27	55	66	35	44	8	325	19	3	2	4	13	14	14	19	—	88	52	16	16	37	88	122	84	95	13	523
50° S. to 60° S.	1902	22	32	18	24	33	28	17	17	1	192	9	3	3	3	6	11	5	6	2	48	—	—	—	—	—	—	2	3	—	5
	1903	22	8	3	2	10	22	29	30	2	128	6	1	1	2	2	8	5	5	1	31	1	—	—	1	1	—	1	1	—	5
	1902–3	44	40	21	26	43	50	46	47	3	320	15	4	4	5	8	19	10	11	3	79	1	—	—	1	1	—	3	4	—	10

Gale Frequency.

Number of Instances on which the Winds Recorded were of Gale Force (8 to 12).

30° S. to 40° S.	1902	—	—	2	2	4	1	1	1	—	11	1	—	—	—	—	2	1	3	—	7	2	—	1	—	4	7	5	4	—	23
	1903	—	—	—	—	—	—	—	—	—	0	1	—	—	—	—	—	—	—	—	1	—	2	—	1	3	2	3	1	—	12
	1902–3	—	—	2	2	4	1	1	1	—	11	2	—	—	—	—	2	1	3	—	8	2	2	1	1	7	9	8	5	—	35
40° S. to 50° S.	1902	—	1	2	2	2	7	1	3	—	18	1	—	—	1	—	2	1	3	—	8	3	—	—	2	1	10	8	8	—	32
	1903	—	1	—	—	—	—	3	4	—	8	1	—	—	—	2	—	—	—	—	3	3	—	—	1	6	7	4	2	—	23
	1902–3	—	2	2	2	2	7	4	7	—	26	2	—	—	1	2	2	1	3	—	11	6	—	—	3	7	17	12	10	—	55
50° S. to 60° S.	1902	2	3	—	2	5	3	3	—	—	18	2	—	—	—	1	1	2	—	—	6	—	—	—	—	—	—	—	3	—	3
	1903	5	—	—	—	2	2	6	4	—	19	1	—	1	—	—	1	—	1	—	4	—	—	—	—	—	—	—	—	—	0
	1902–3	7	3	—	2	7	5	9	4	—	37	3	—	1	—	1	3	2	1	—	10	—	—	—	—	—	—	—	3	—	3

TABLE V.—Directions from which the Largest and Smallest Percentages of Winds were recorded in each of the Zones, 30°–40° S., 40°–50° S., 50°–60° S., in the Three Divisions of the Southern Ocean, viz., Pacific, Atlantic, and Indian.

SPRING: September, 1902–3; October, 1901–3; November, 1901–3.

Zone.	Pacific.		Atlantic.		Indian.	
	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.
30°–40° S.	17·3 S.	7·2 W.	16·8 S.E.	7·1 E.	20·9 S.W.	5·8 E.
40°–50° S.	17·1 N.; 16·3 S.W.	5·9 E. and S.E.	23·8 N. and N.W.	2·9 E. and S.E.; 3·8 S.	19·8 S.W.; 19·1 W.; 18·7 N.W.	2·0 E.
50°–60° S.	23·7 N.W.; 21·6 S.W.	1·0 S.E.	29·2 N.W.	0·0 E. and S.E.; 2·1 N.E. and S.	39·3 N.	0·0 S.E. and S.
			GALES.			
30°–40° S.	1·1 S.	0·0 E., S.E., N.W.	1·0 S.	0·0 N. and E.	1·2 W.; 1·0 S.W.	0·1 N.
40°–50° S.	2·3 S.W.	0·0 E. and S.E.	1·9 S.W. and W.	0·0 N.E.–S.	1·1 S.W.	0·0 E.; 0·1 S.E.; 0·2 N.E.
50°–60° S.	1·5 S.W.	0·0 N.E.–S.E.	6·3 S.W.	0·0 N.E.–S.	No gales recorded.	

TABLE VI.—Directions from which the Largest and Smallest Percentages of Winds were recorded in each of the Zones, 30°–40° S., 40°–50° S., 50°–60° S., in the Three Divisions of the Southern Ocean, viz., Pacific, Atlantic, and Indian.

SUMMER: December, January, February, 1901–2, 1902–3, 1903–4.

Zone.	Pacific.		Atlantic.		Indian.	
	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.
30°–40° S.	16·5 S.	7·5 E.; 8·0 W.	20·1 N.	6·6 W.; 7·2 S.W.; 7·7 E.	21·7 S.W.; 20·5 S.	5·5 N.W.
40°–50° S.	15·4 S.W.; 14·3 N.E.	7·4 E.	22·7 N.	4·4 S.E.	21·7 S.W.; 20·0 N.W.; 19·4 W.	1·8 E.
50°–60° S.	22·5 N.W.; 19·4 N.; 19·0 W.	3·1 E. and S.E.	25·3 N.W.; 24·1 N.	4·3 E. and S.E.; 6·1 S.	31·8 N.W.	0·0 N.E. and S.E.
			GALES.			
30°–40° S.	0·2 S. and N.W.	0·0 N.–S.E.; S.W.; W.	0·2 S.	0·0 on every other point.	0·6 S.W.	0·0 N.E.; S.E.; S.; N.W.
40°–50° S.	1·3 N.W.	0·0 E. and S.	0·9 N.W.	0·0 N.–E.; S.	1·4 W.	0·0 E. and S.E.
50°–60° S.	1·9 N.W.	0·2 N.E.–S.	2·5 N.	0·0 N.E.–S.	No gales recorded.	

TABLE VII.—Directions from which the Largest and Smallest Percentages of Winds were recorded in each of the Zones, 30°–40° S., 40°–50° S., 50°–60° S., in the Three Divisions of the Southern Ocean, viz., Pacific, Atlantic, and Indian.

AUTUMN: March, 1902, 1903, 1904; April, 1902, 1903; May, 1902, 1903.

Zone.	Pacific.		Atlantic.		Indian.	
	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.
30°–40° S.	19·0 S.	5·3 N.W.; 7·0 E.	18·1 S.E.	7·6 E.; 8·1 S.W.	20·6 S.W.	8·4 N.; 8·5 E.
40°–50° S.	16·9 N.; 16·4 S.W.	5·4 E; 6·6 S.E.	27·7 N.	1·5 E.	20·2 S.W.; 18·2 W.; 17·9 N.W.	2·6 E.
50°–60° S.	23·2 N.W.	2·5 E.	31·3 N.W.; 19·3 N.	3·6 S.E.	32·0 W.	0·0 E. and S.E.
			GALES.			
30°–40° S.	1·4 S.	0·3 N.E.; E.; W.	0·5 N.; S.; S.W.; N.W.	0·0 E. and S.E.	0·8 S.W.	0·0 E. and N.W.
40°–50° S.	1·9 S.W.	0·0 N.	2·2 S.W. and W.	0·0 N.E.–S.	1·1 S.W.	0·2 N.W.
50°–60° S.	3·7 N.W.	0·0 E.	3·6 W.	0·0 S.E.–S.W.	8·0 S.W.	0·0 N.E.–S.; N.W.

TABLE VIII.—Directions from which the Largest and Smallest Percentages of Winds were recorded in each of the Zones, 30°–40° S., 40°–50° S., 50°–60° S., in the Three Divisions of the Southern Ocean, viz., Pacific, Atlantic, and Indian.

WINTER: June, July, August, 1902, 1903.

Zone.	Pacific.		Atlantic.		Indian.	
	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.
30°–40° S.	20·3 S.	7·7 E.; 8·0 W.	14·8 N.W.; 14·0 S.E.	7·5 E.; 8·1 N.E.	19·6 S.W.	6·2 N.E.
40°–50° S.	20·3 S.W.	4·9 E.	21·6 N. and N.W.	2·3 E.	23·3 S.W.	3·1 N.E. and E.
50°–60° S.	15·6 S.W.; 14·7 N.W.	6·6 E.	21·5 S.W.	5·1 N.E. and E.; 6·3 S.E.	40·0 N.W.	0·0 N.E.; E.; S.W.
			GALES.			
30°–40° S.	1·4 S.	0·0 N. and N.E.	0·8 N.W.	0·0 N.E.–S.	1·4 S.W.	0·2 E. and S.E.
40°–50° S.	2·2 S.W. and N.W.	0·0 N.	3·4 N.W.	0·0 N.E. and E.	3·3 S.W.	0·0 N.E. and E.
50°–60° S.	2·8 W.	0·0 E.	3·8 N.	0·0 N.E. and S.E.	30·0 N.W.	0·0 N.–W.

TABLE IX.—Directions from which the Largest and Smallest Percentages of Winds were recorded in each of the Zones, 30°–40° S., 40°–50° S., 50°–60° S., in the Three Divisions of the Southern Ocean, viz., Pacific, Atlantic, and Indian.

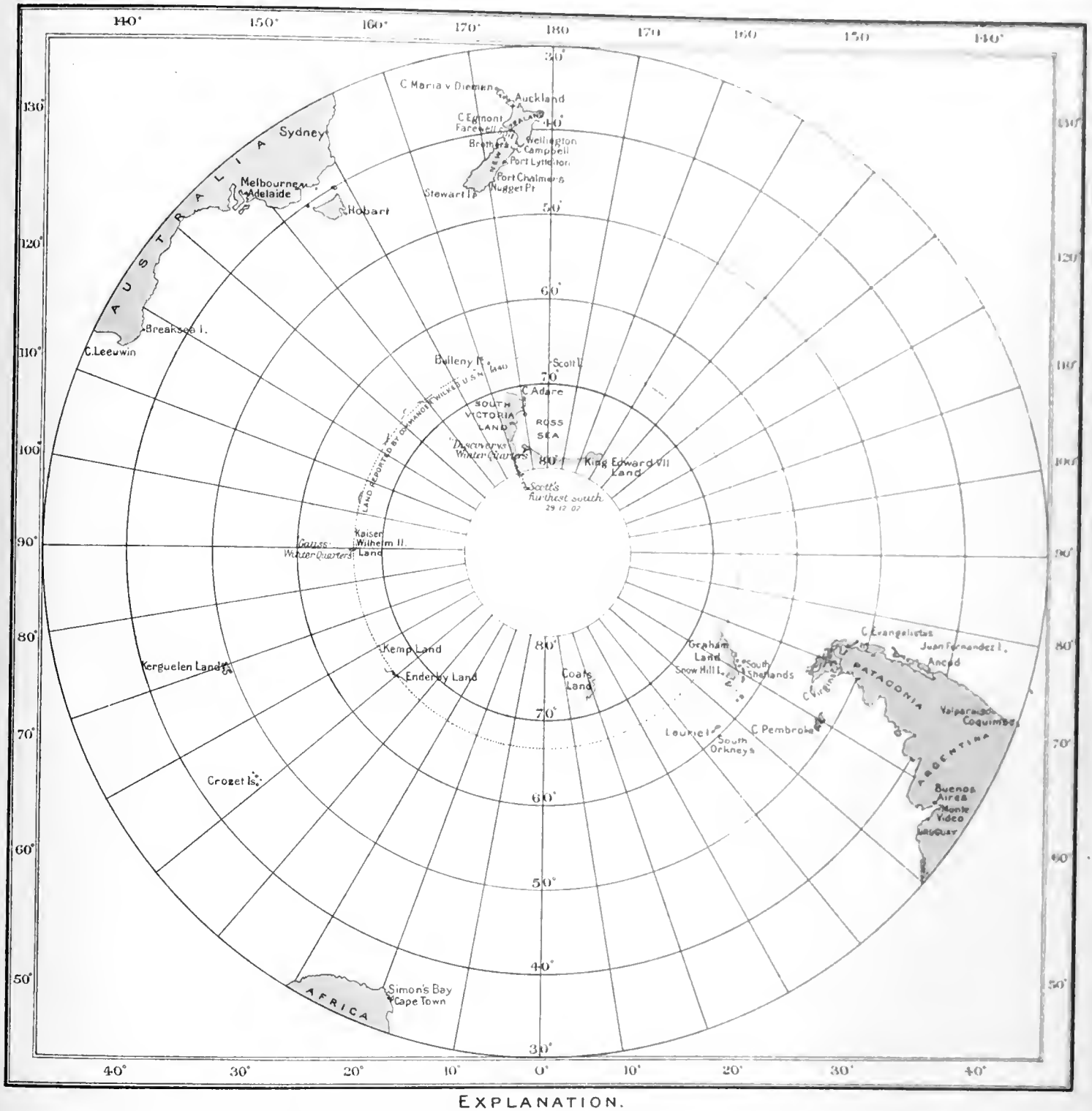
ALL SEASONS: October, 1901, to March, 1904.

Zone.	Pacific.		Atlantic.		Indian.	
	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.	Largest percentage.	Smallest percentage.
30°–40° S.	18·2 S.	7·8 E.; 8·5 W.; 9·1 N.W.	15·9 S.E.	7·5 E.	20·7 S.W.	7·3 E.; 7·7 N.E.
40°–50° S.	17·1 S.W.	6·1 E.; 7·5 S.E.	24·0 N.	3·4 E.; 4·1 S.E.	21·0 S.W.; 18·1 W.; 18·0 N.W.	2·4 E.
50°–60° S.	21·1 N.W.	4·8 S.E.; 4·0 E.	24·7 N.W.; 22·0 N.	4·0 S.E.; 4·3 E.	25·9 N.; 23·5 W.	1·2 S.E.
			GALES.			
30°–40° S.	1·0 S.	0·2 E.	0·5 S.W. and N.W.	0·0 E.	0·9 S.W. and W.	0·1 E. and S.E.
40°–50° S.	1·5 S.W.	0·2 E.	1·4 S.W.; 1·3 W. and N.W.	0·0 N.E. and E.	1·5 S.W.	0·1 E.
50°–60° S.	2·0 W. and N.W.	0·1 E.	2·7 N. and W.	0·0 S.E.	3·5 N.W.	0·0 N.E.–S.; W.

TABLE X.—Directions from which the Largest and Smallest Percentages of Winds were recorded in the Southern Ocean in the Respective Seasons during the Years 1901 to 1904; also in All Seasons during that Period.

	Largest percentage.	Smallest percentage.
(1) Spring	15·9 S.W.; 15·5 W.; 15·3 N.W.	5·0 E.
(2) Summer	19·4 S.W.; 14·7 N.W.	5·7 E.
(3) Autumn	16·2 S.W.; 14·2 N.W. and N.	5·5 E.
(4) Winter	21·5 S.W.; 15·4 S.; 15·0 N.W.	5·8 E.
(5) All seasons	18·1 S.W.; 14·7 N.W.	5·5 E.
	GALES.	
(1) Spring	1·3 S.W.	0·1 E.
(2) Summer	0·8 N.W. and W.	0·1 N.E.–S.
(3) Autumn	1·2 S.W.; 1·1 W.	0·1 E.
(4) Winter	1·8 W.; 1·7 S.W.	0·2 E.
(5) All seasons	1·1 S.W. and W.; 0·9 N.W.	0·1 E.

KEY MAP.



EXPLANATION.

The Daily and Mean Monthly charts in this volume are based on daily observations recorded at places indicated on the above chart, in addition to those received from Ships of the Royal Navy and Mercantile Marine.

The red and blue lines on the charts of Mean Monthly, and Normal Air Temperature are Isotherms or lines of Equal Air Temperature. The lines in red relate to thermometer readings of 35° Fahr. or above: those in blue to readings of 30° Fahr. and below.

The red and blue lines on the Daily, Mean Monthly, and Normal charts of Pressure are Isobars or lines of Equal Barometric Pressure. The lines in red relate to barometer readings of 29·7 ins. or above, those in blue to readings of 29·6 ins. and below. The words "High" and "Low" on the Daily charts are introduced where pressure is highest or lowest in anticyclones and depressions respectively. Figures in black refer to Air Temperature: the arrows to Wind. The latter fly with the wind, the force of which, given in numbers of the Beaufort Scale, is shown as follows:-
⊙ Calm, → 1 to 3, ⟶ 4 to 6, ⟹ 7 & 8, ➡ 9 & 10, ➡ 11 & 12.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

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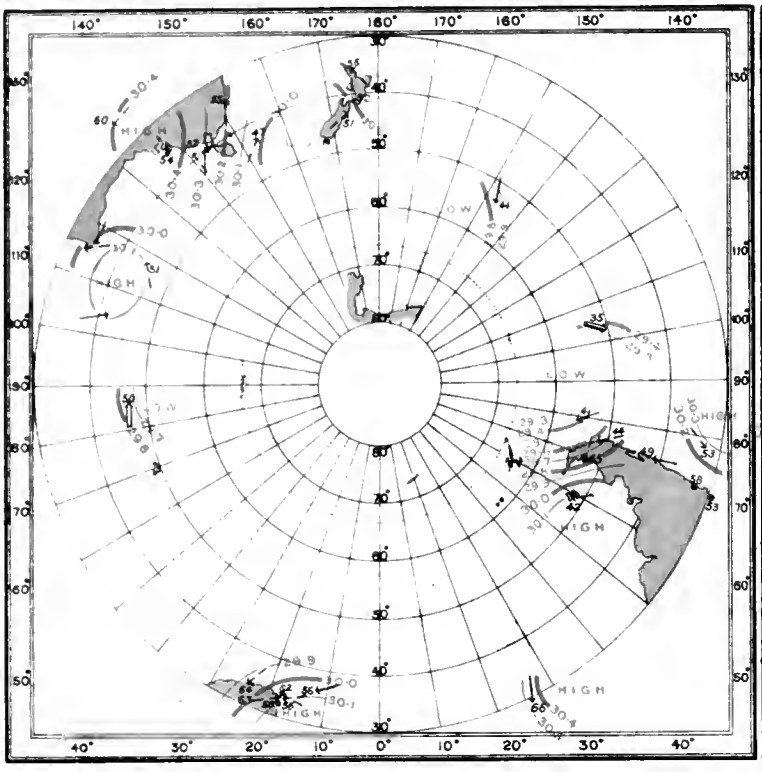

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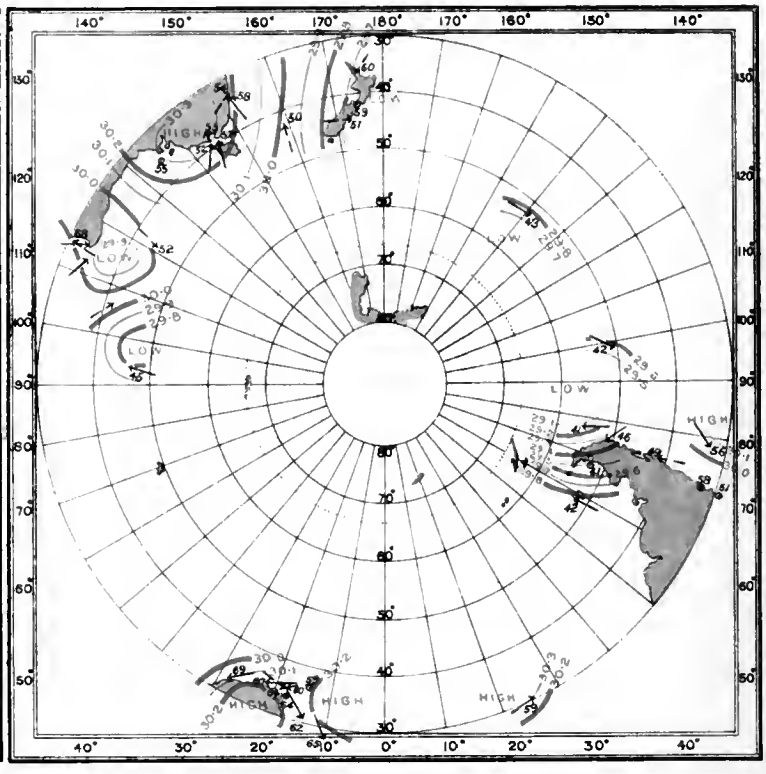

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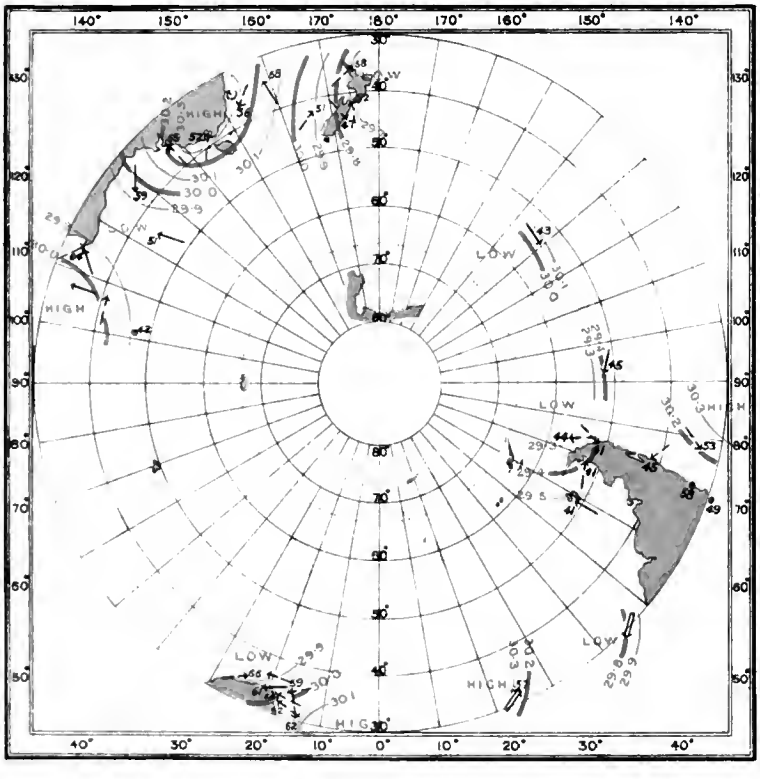

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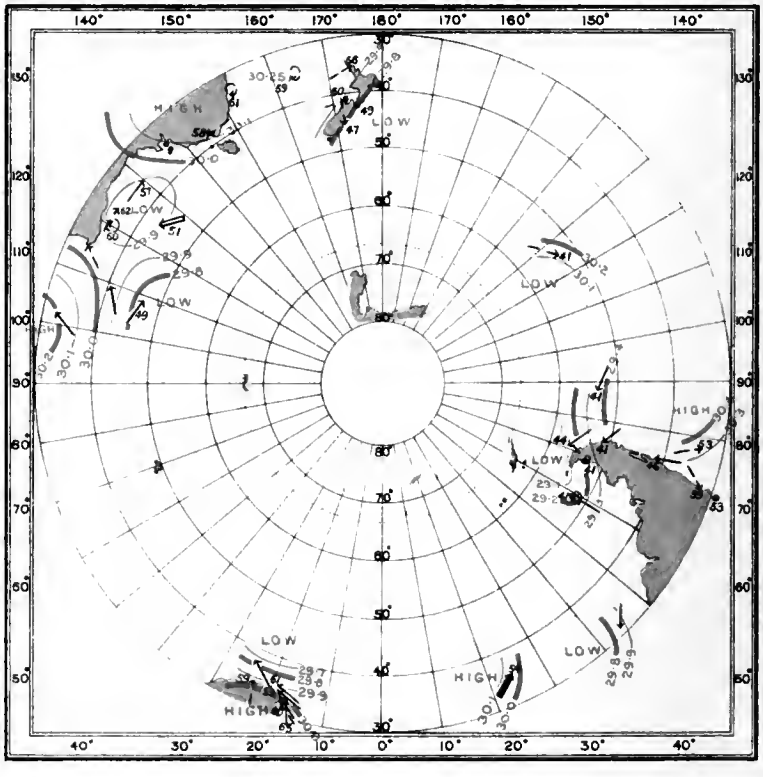


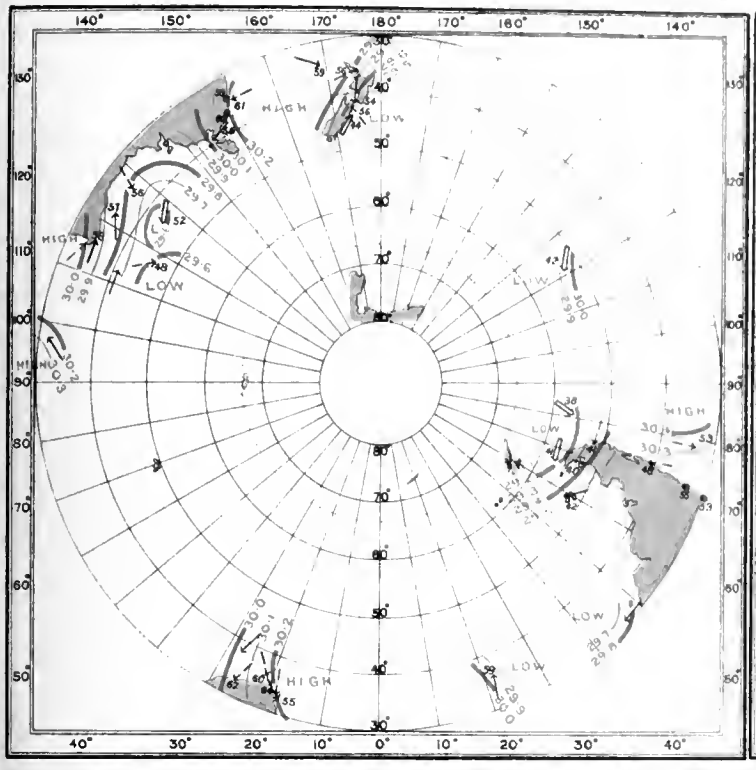
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1901 OCTOBER 5



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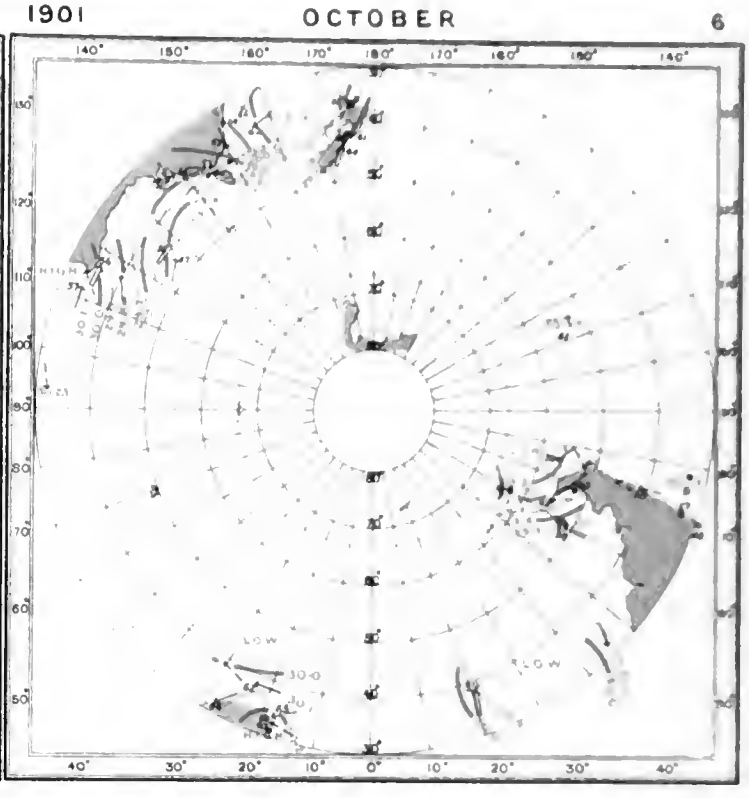

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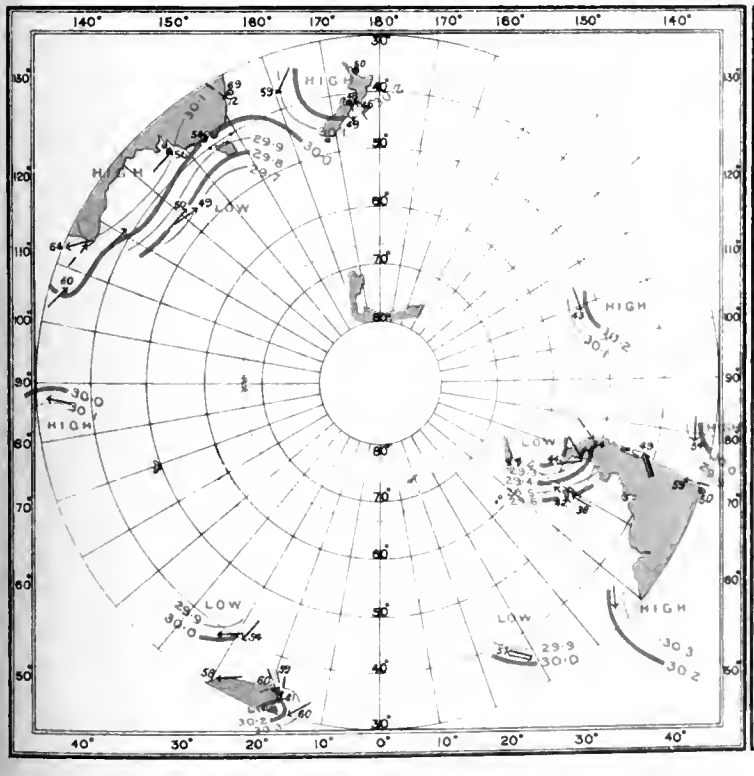

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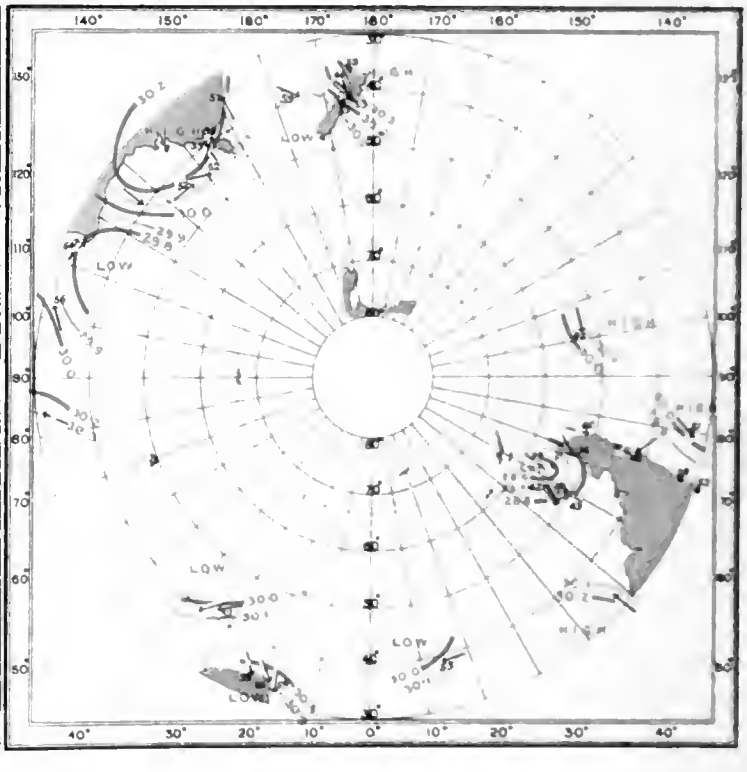


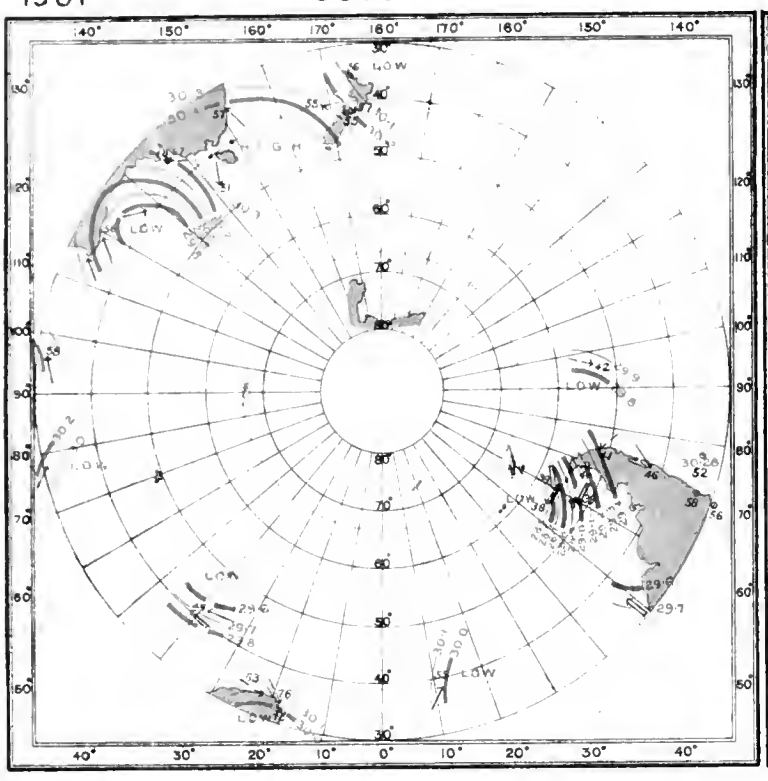
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1901 OCTOBER 9



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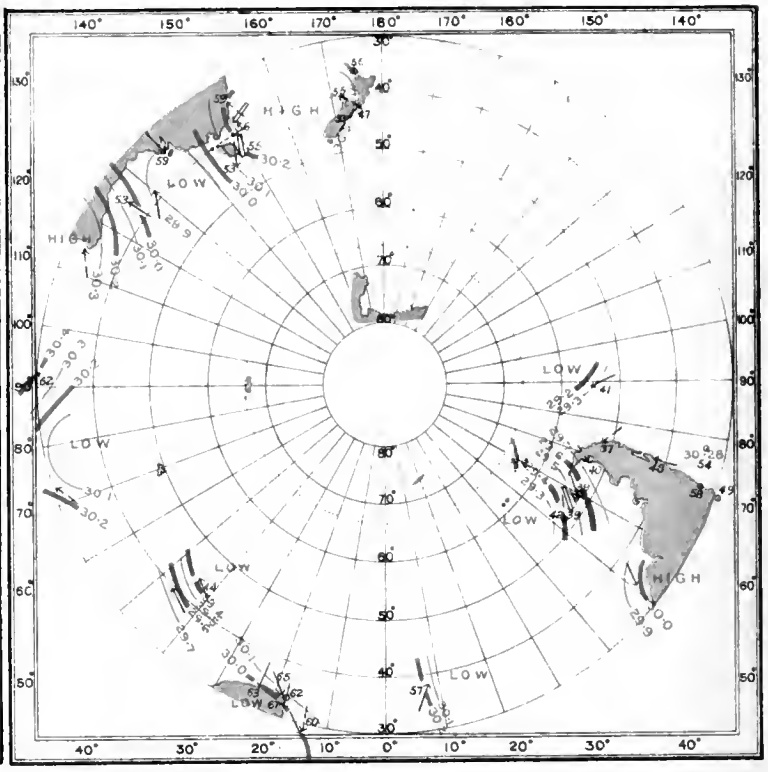

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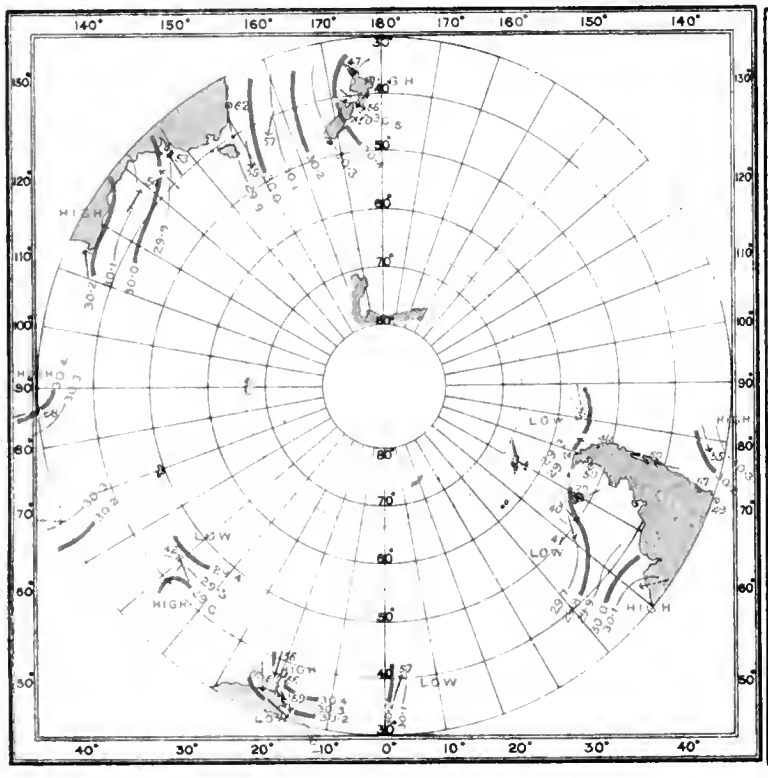

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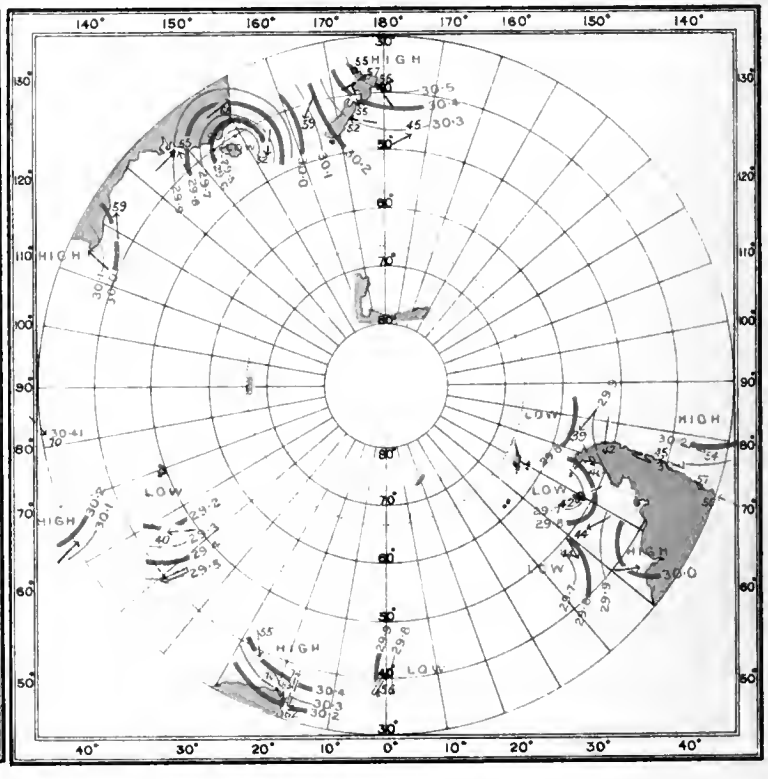


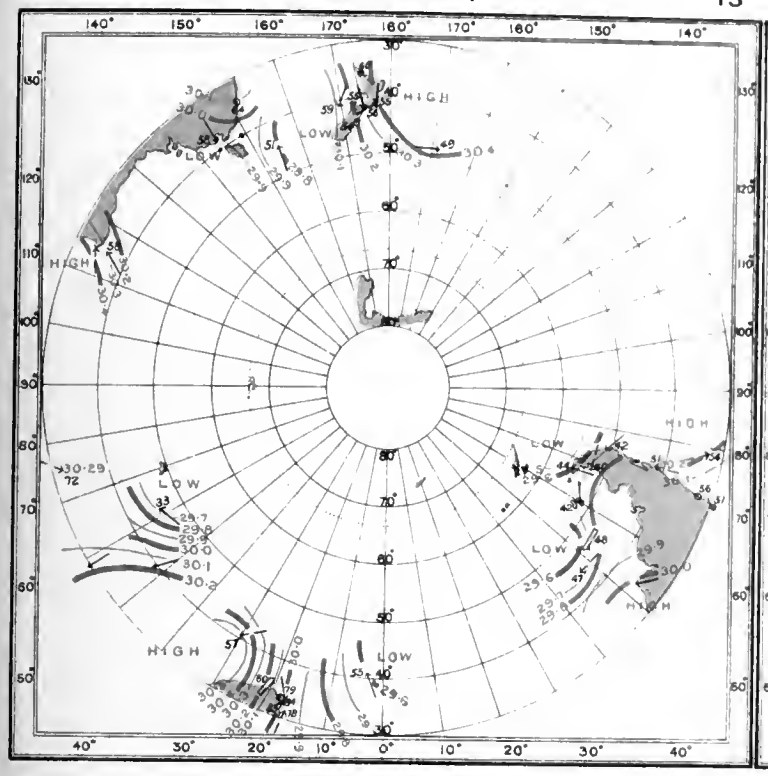
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1901 OCTOBER 13



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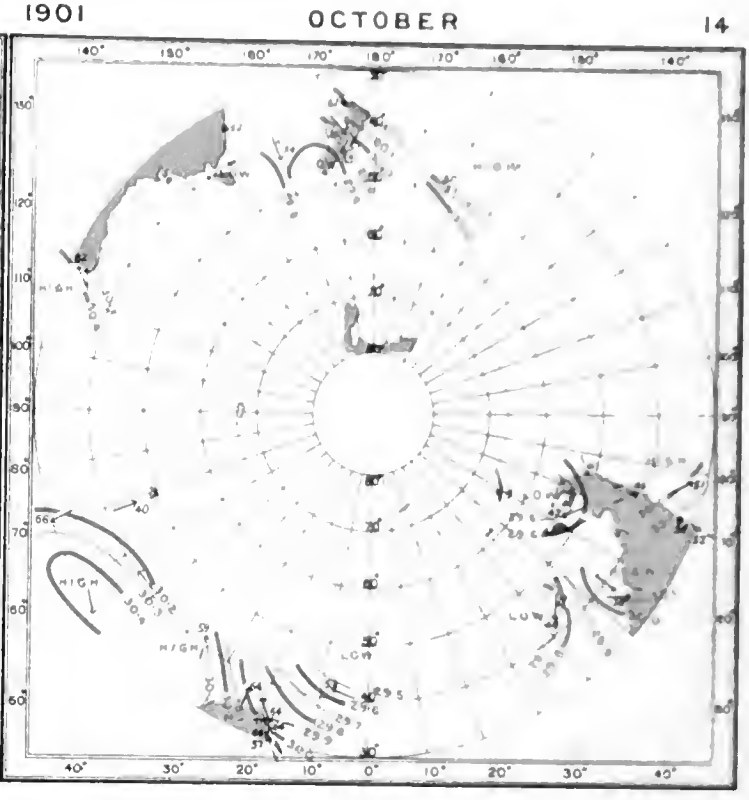

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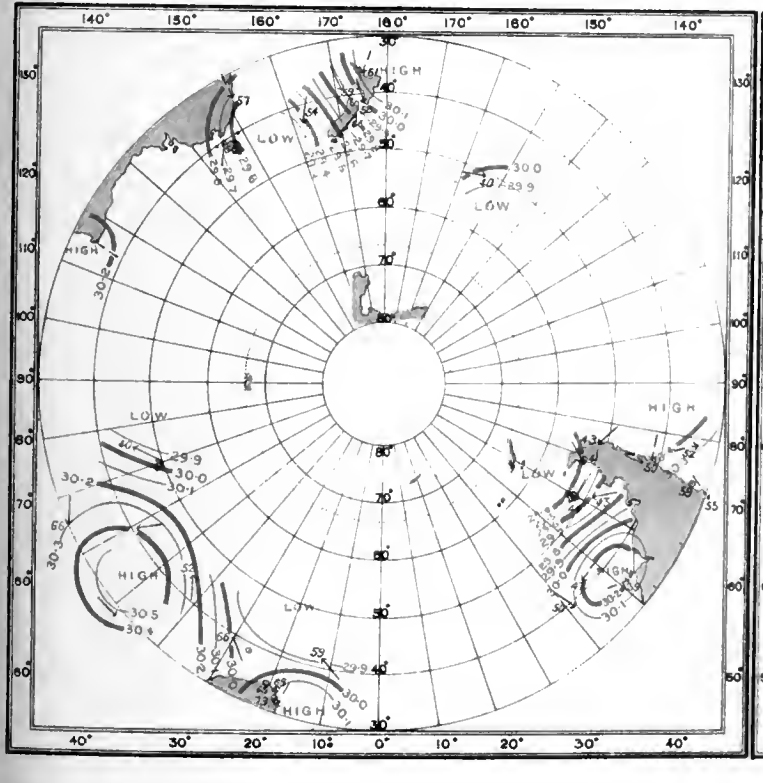

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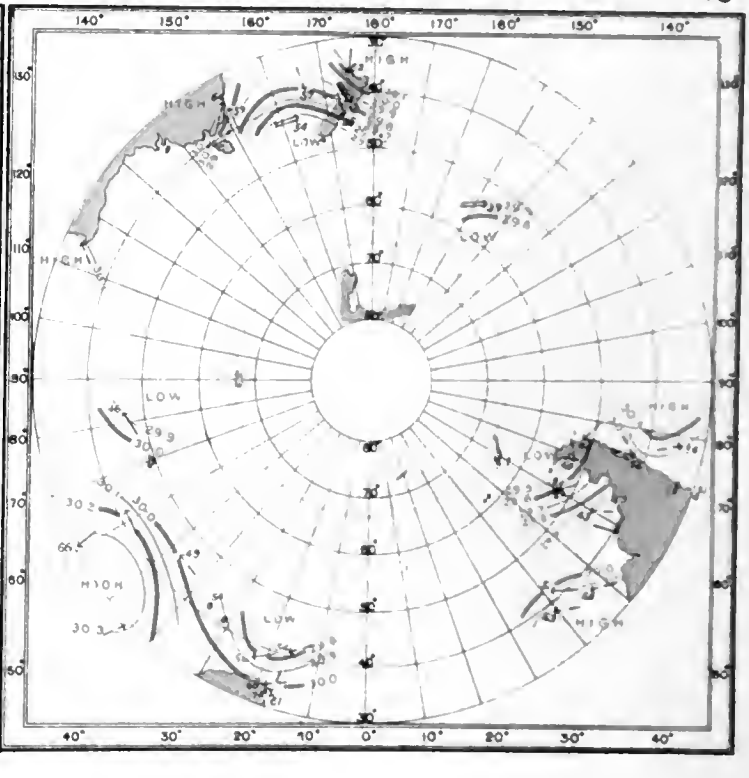


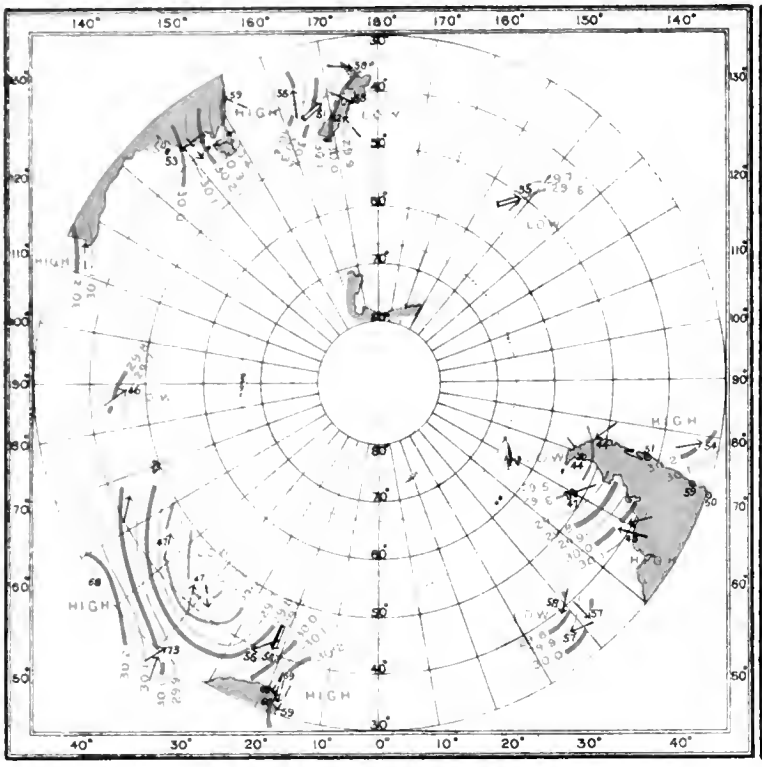
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1901 OCTOBER 17



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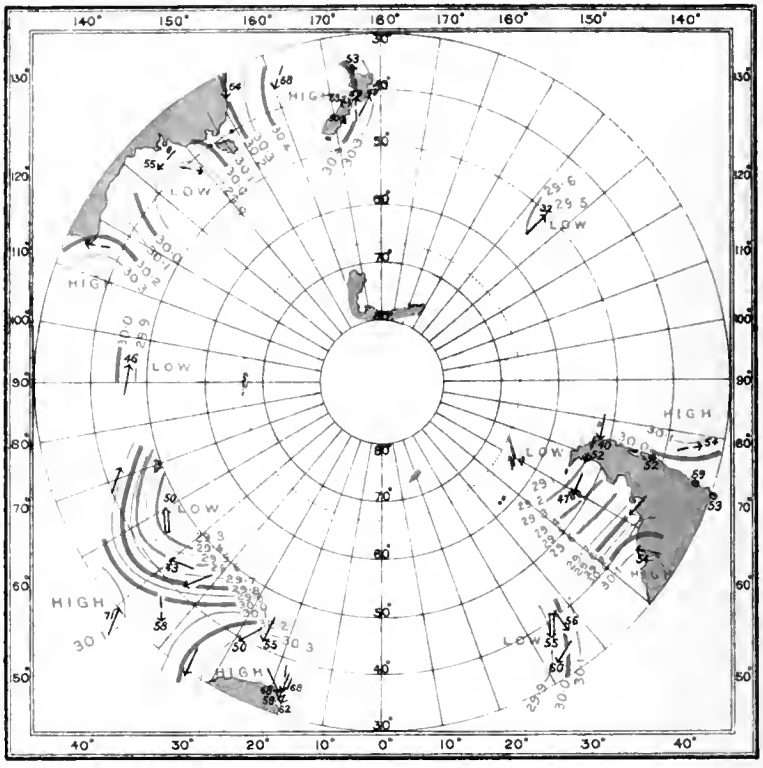

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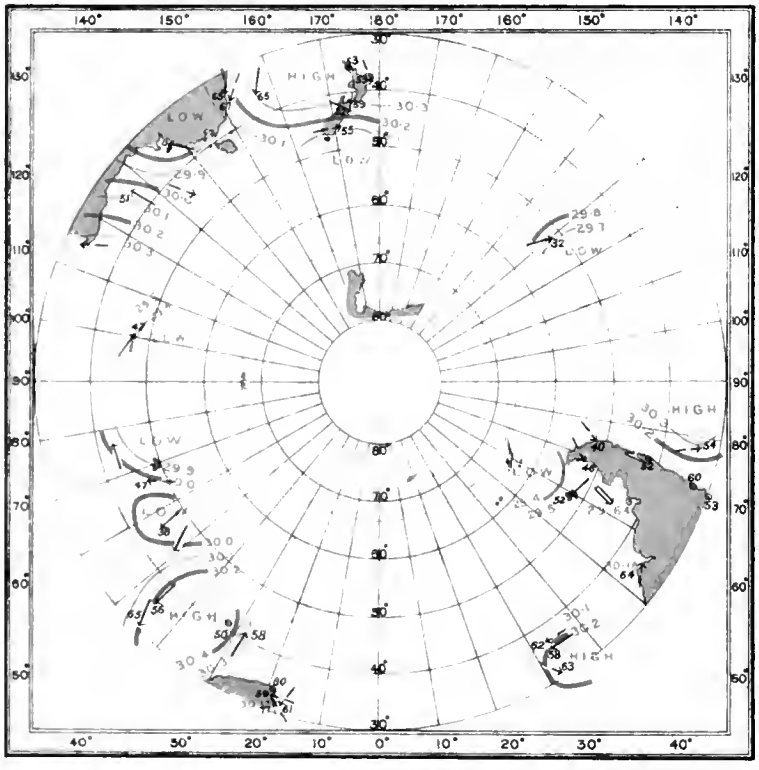

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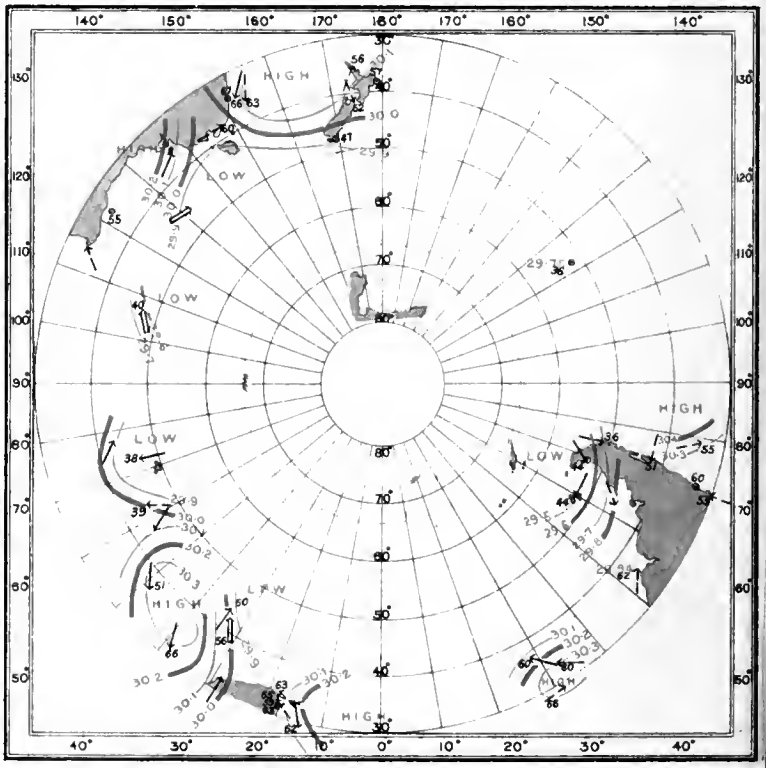


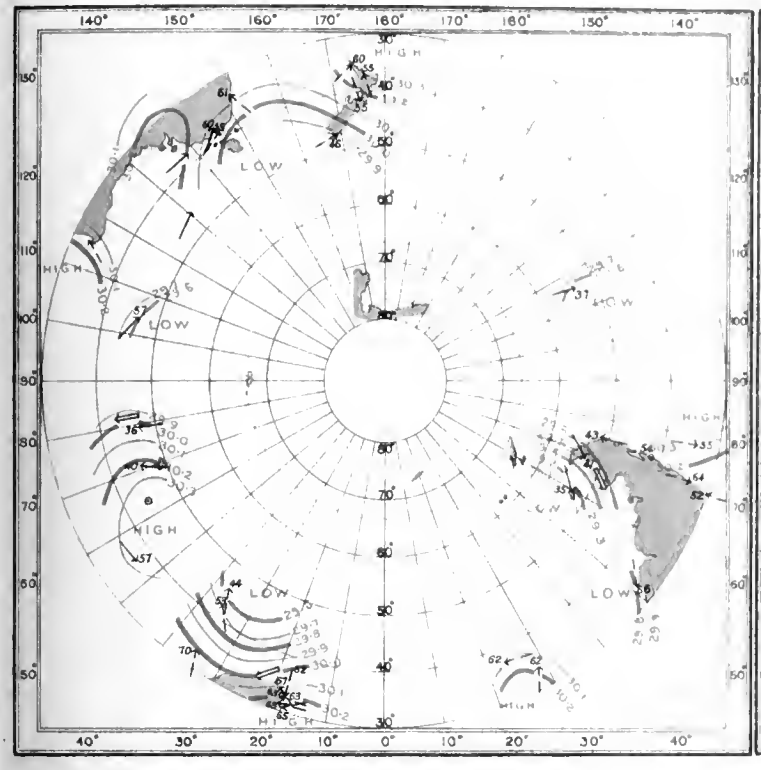
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1901 OCTOBER 21



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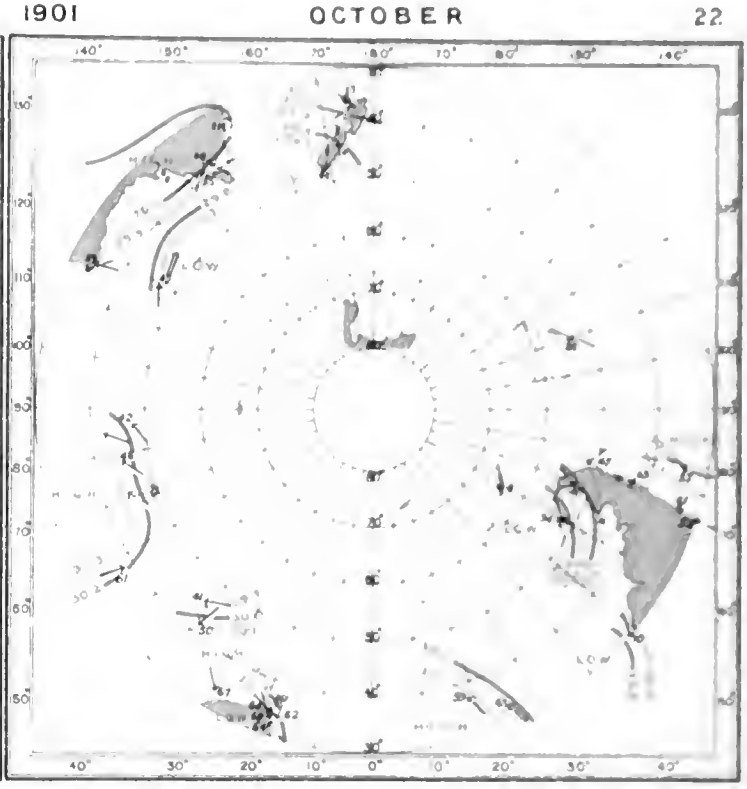

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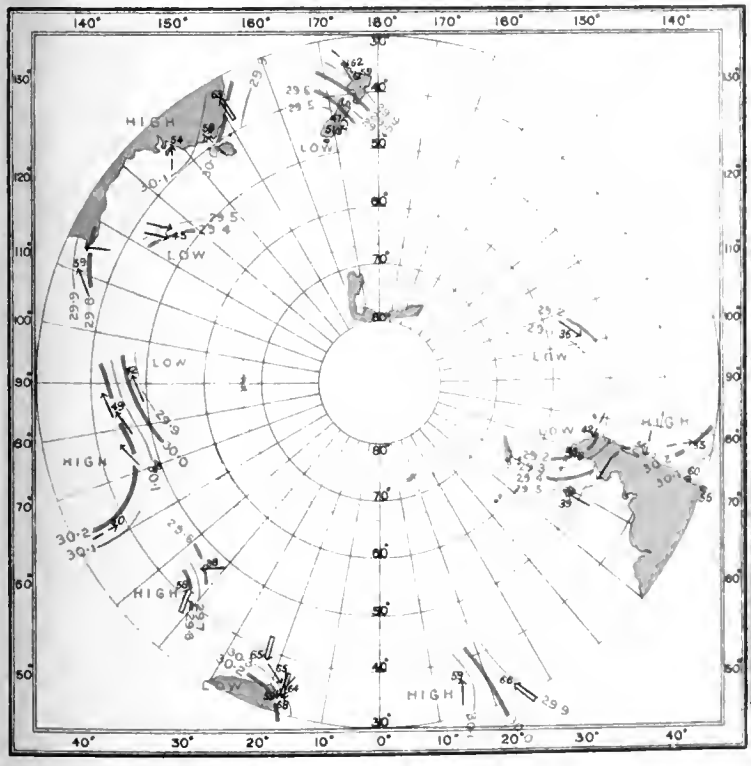

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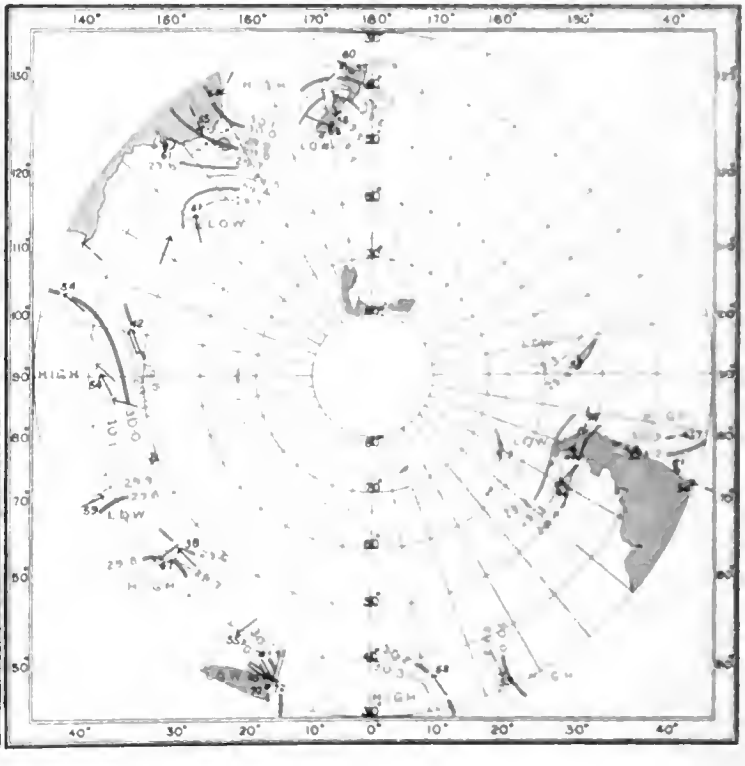
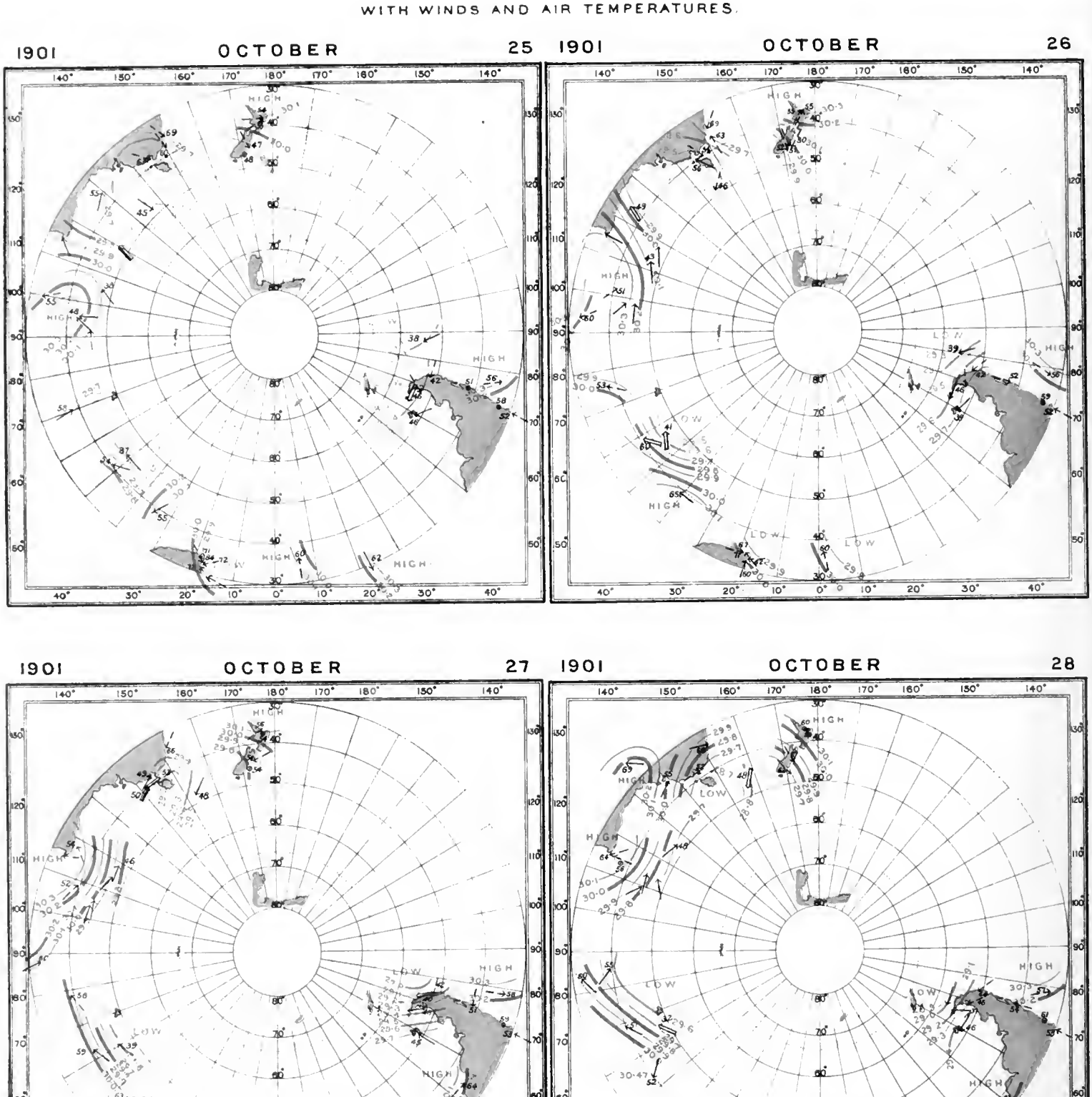


For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.



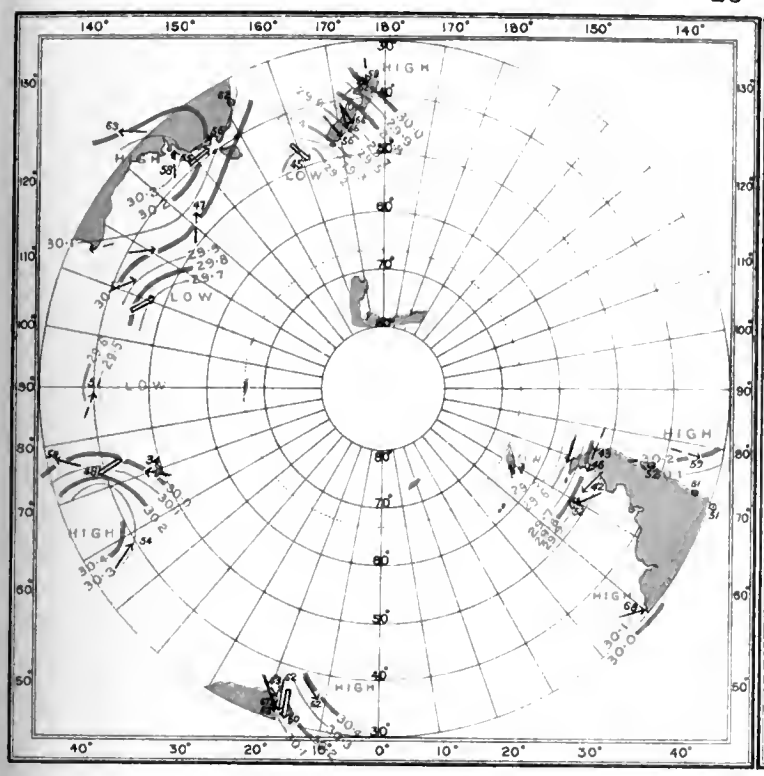
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

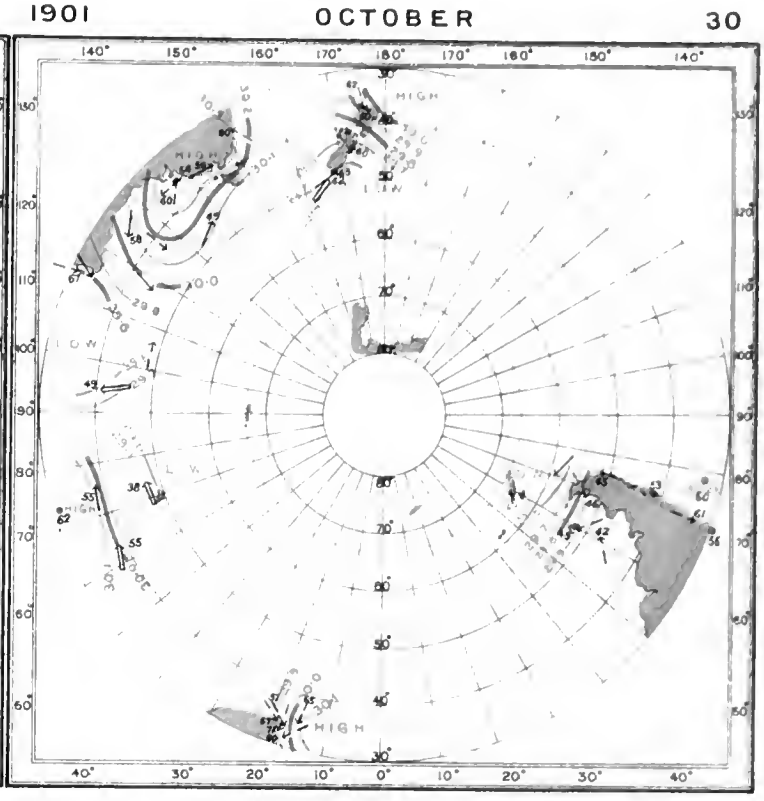
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

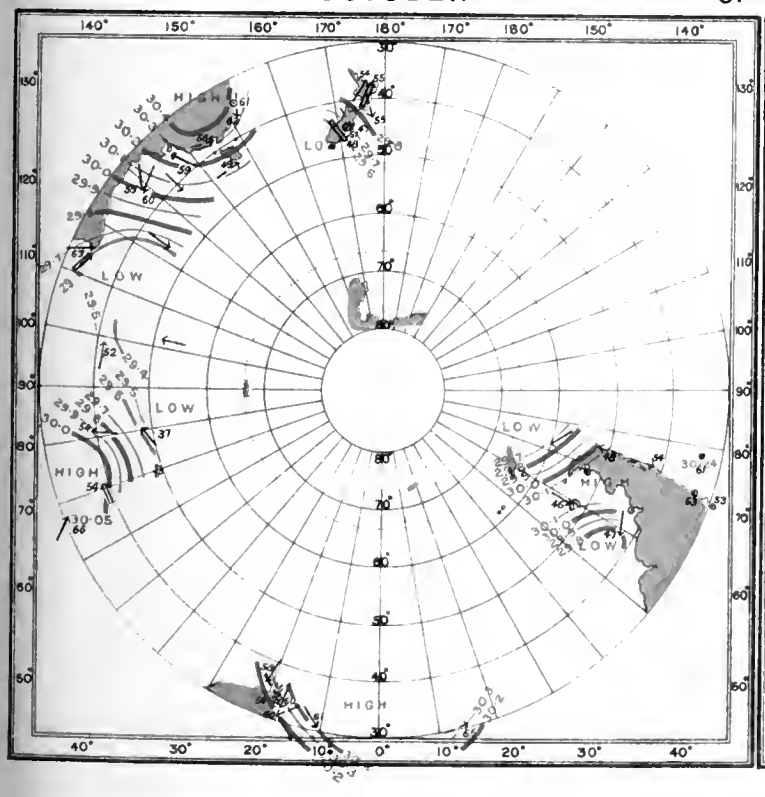
1901 OCTOBER 29



1901 OCTOBER 30



1901 OCTOBER 31



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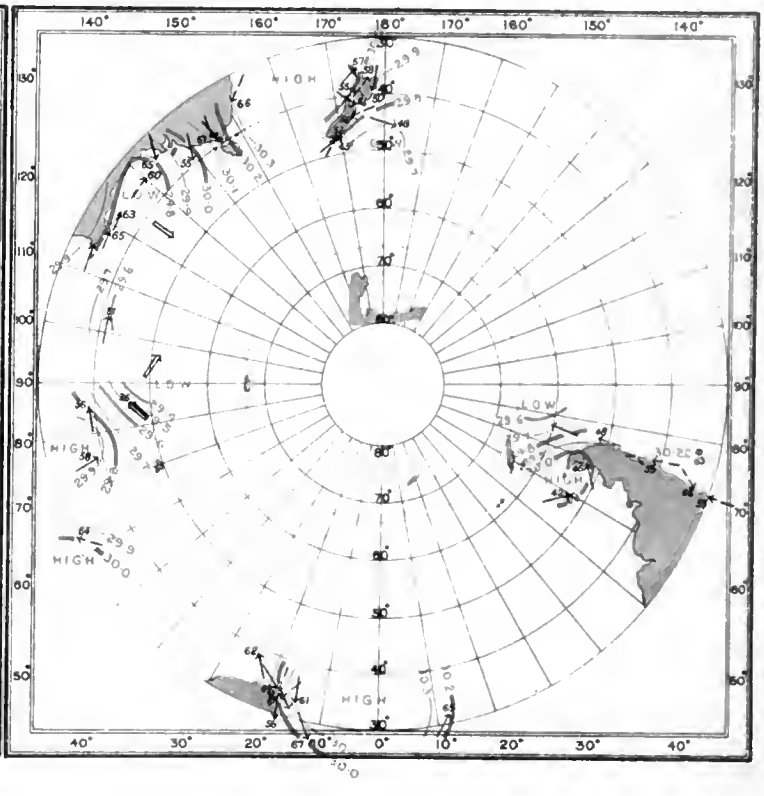


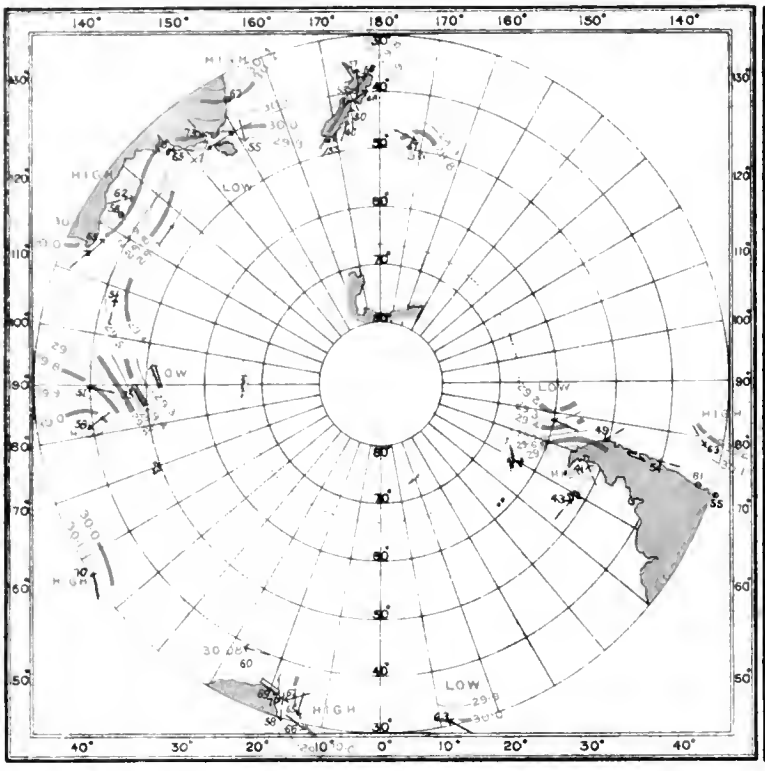
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1901 NOVEMBER 2



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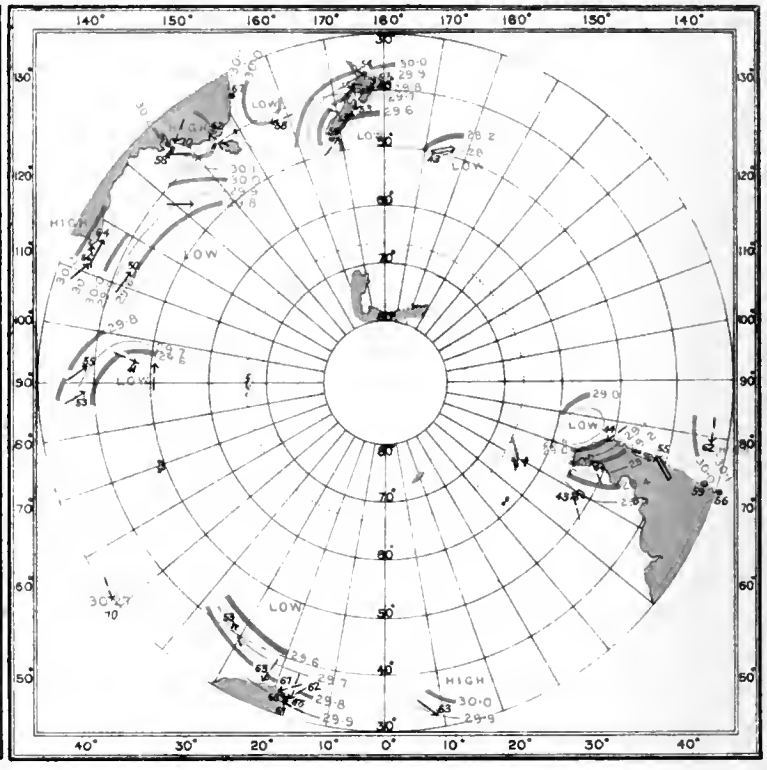

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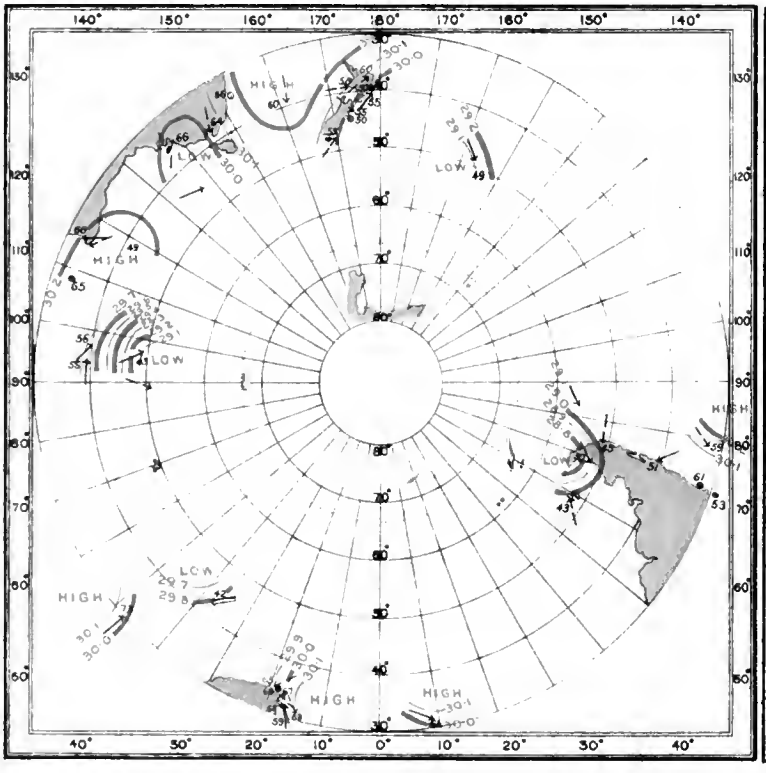

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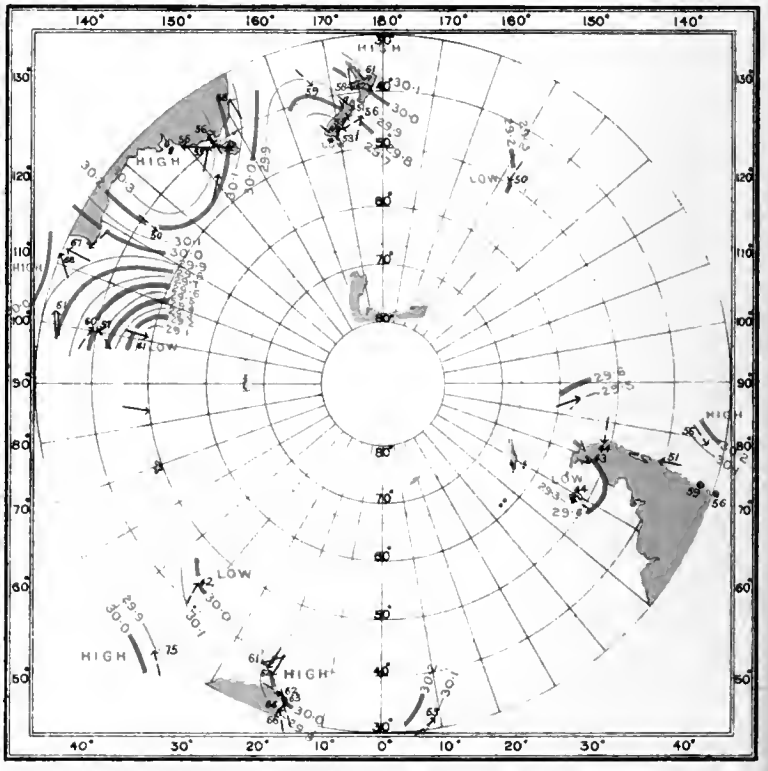


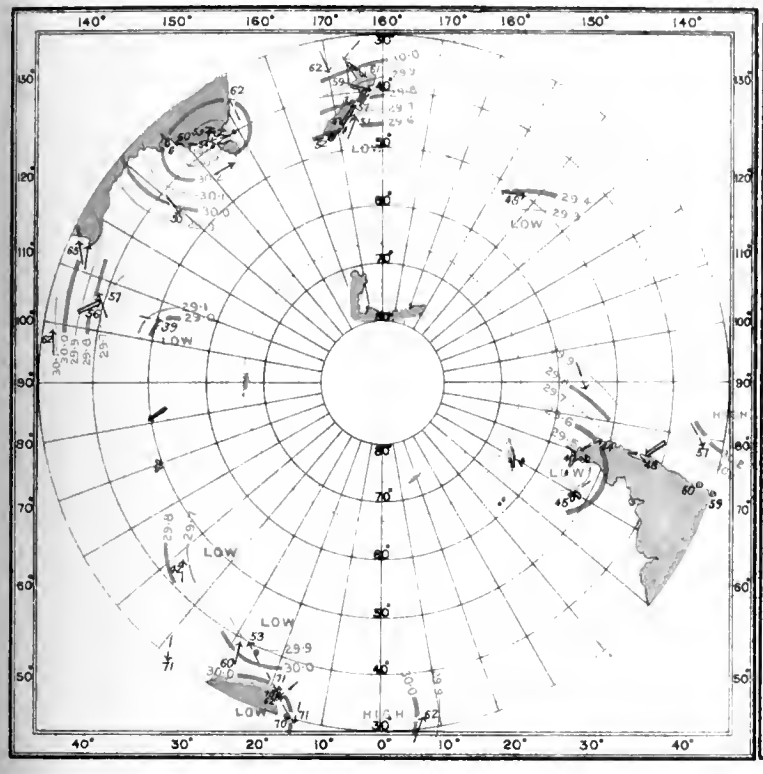
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1901 NOVEMBER 6



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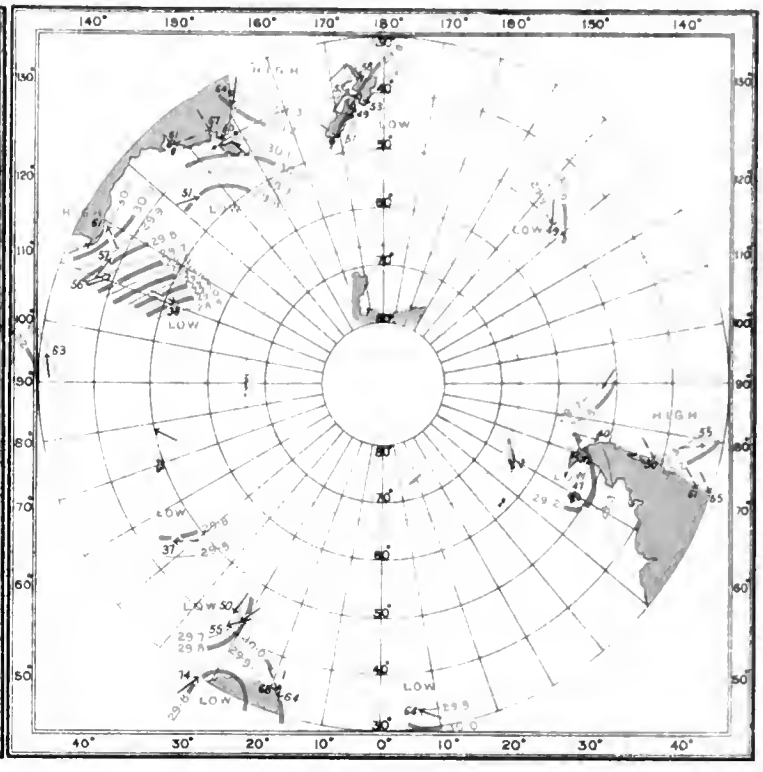

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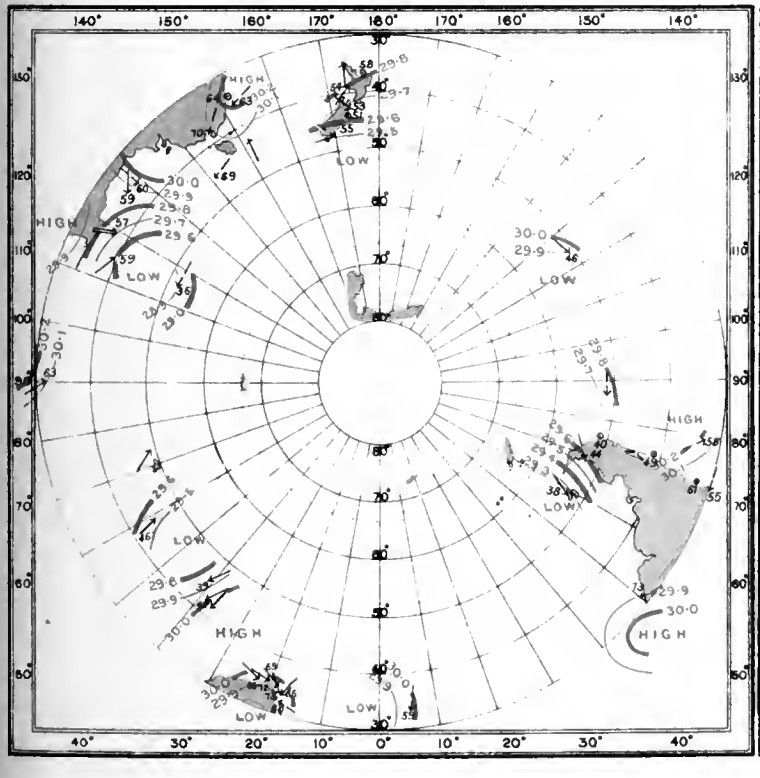

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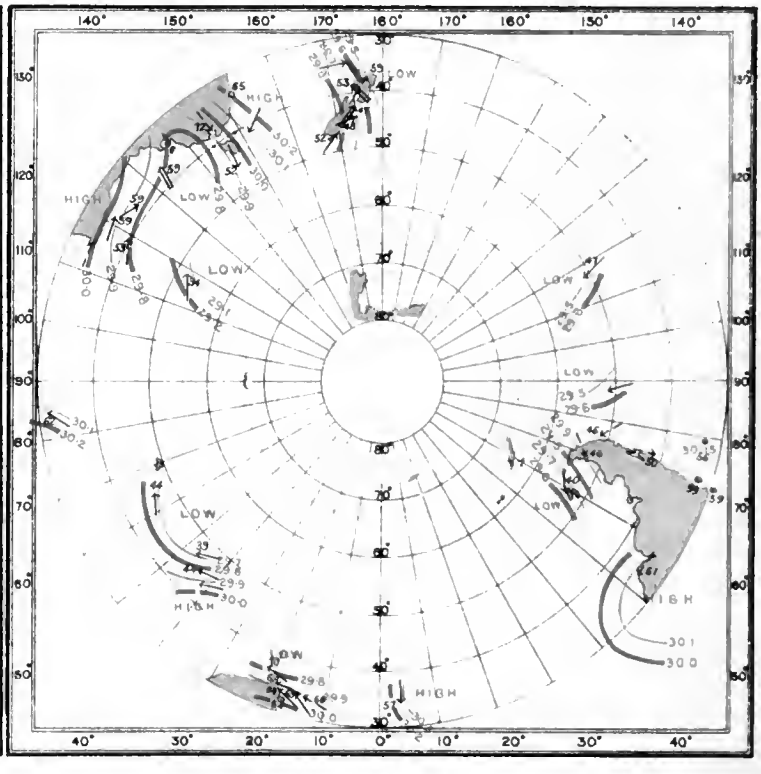


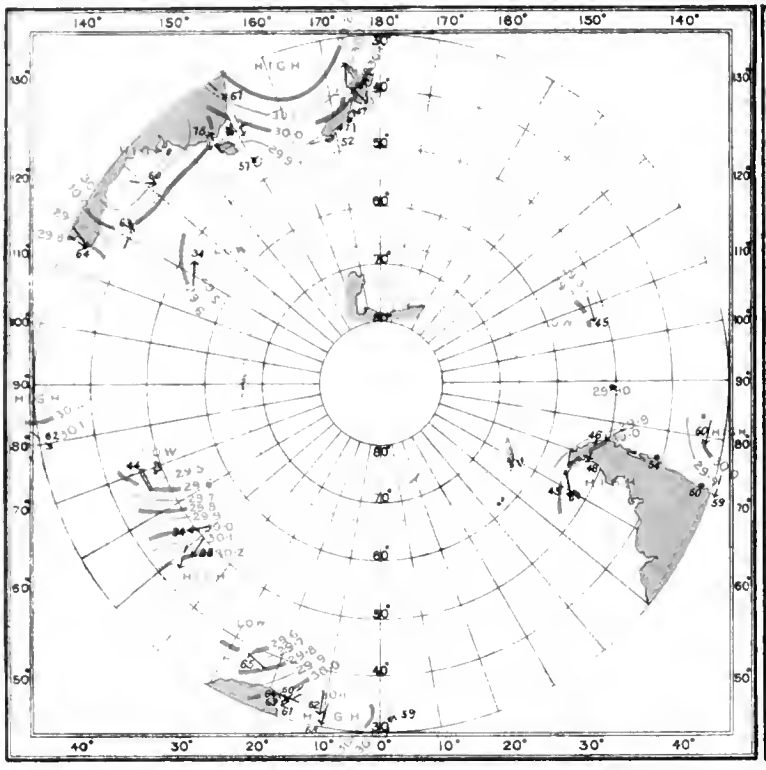
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1901 NOVEMBER 10



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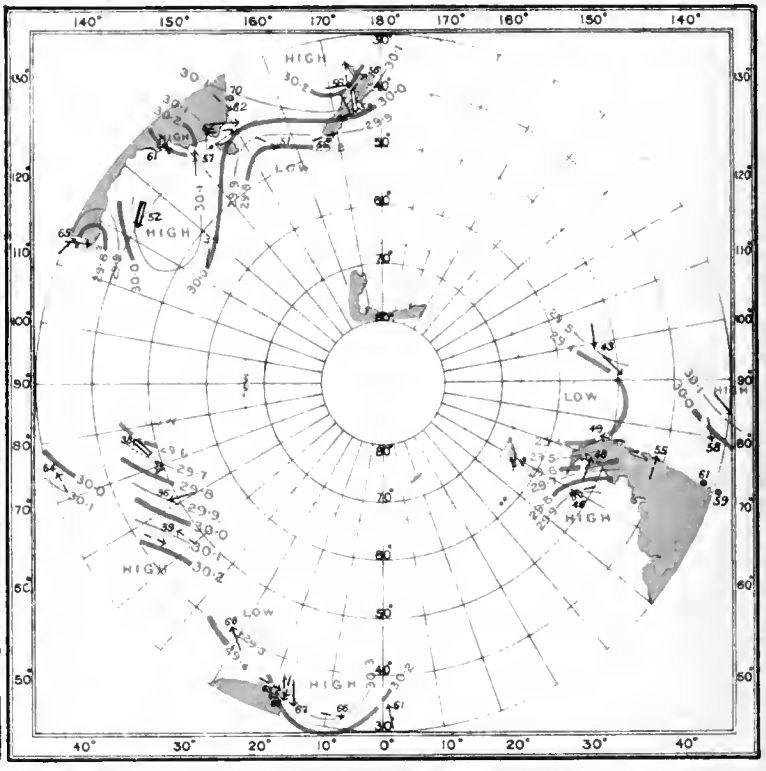

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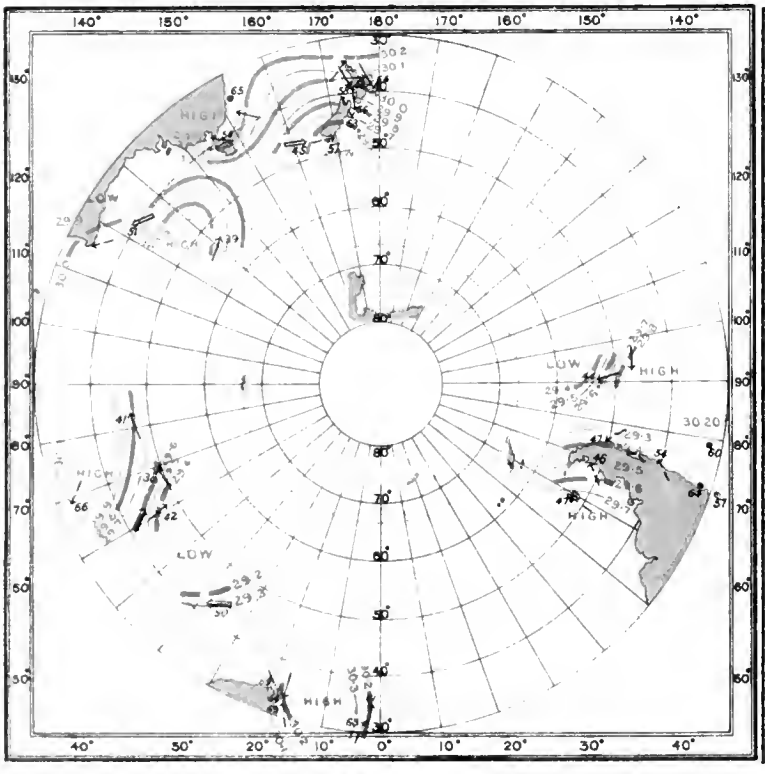

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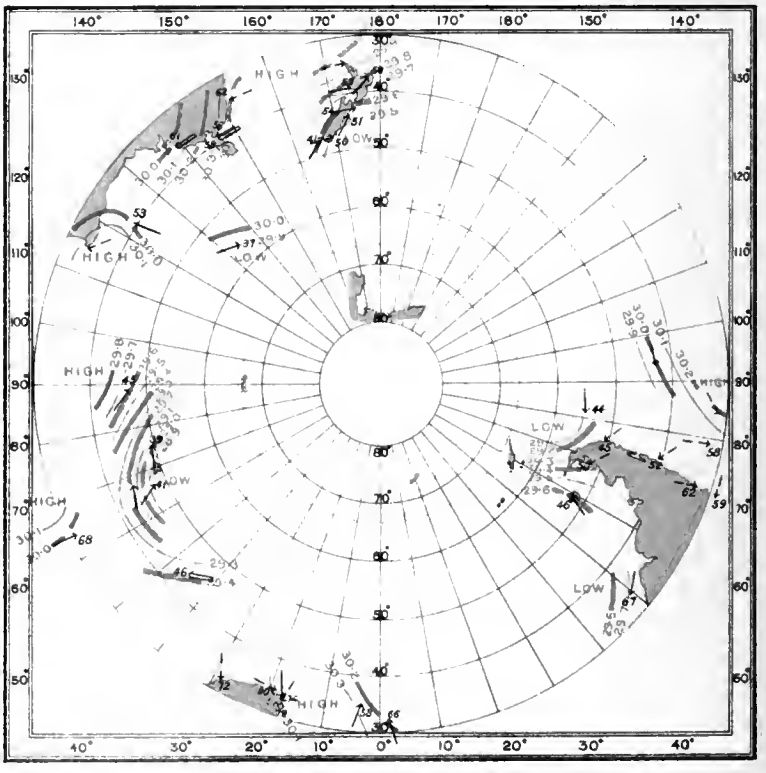


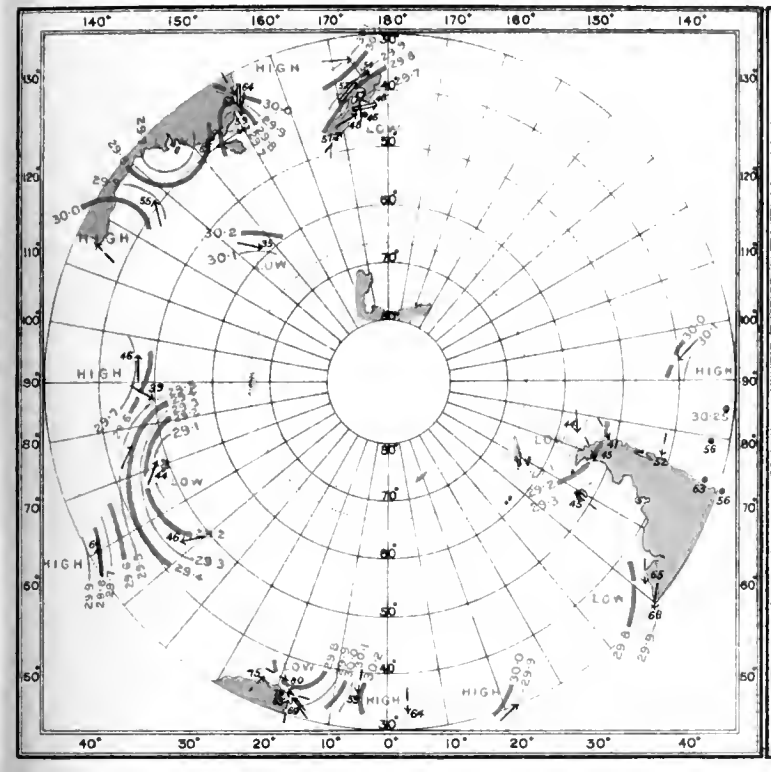
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1901 NOVEMBER 14



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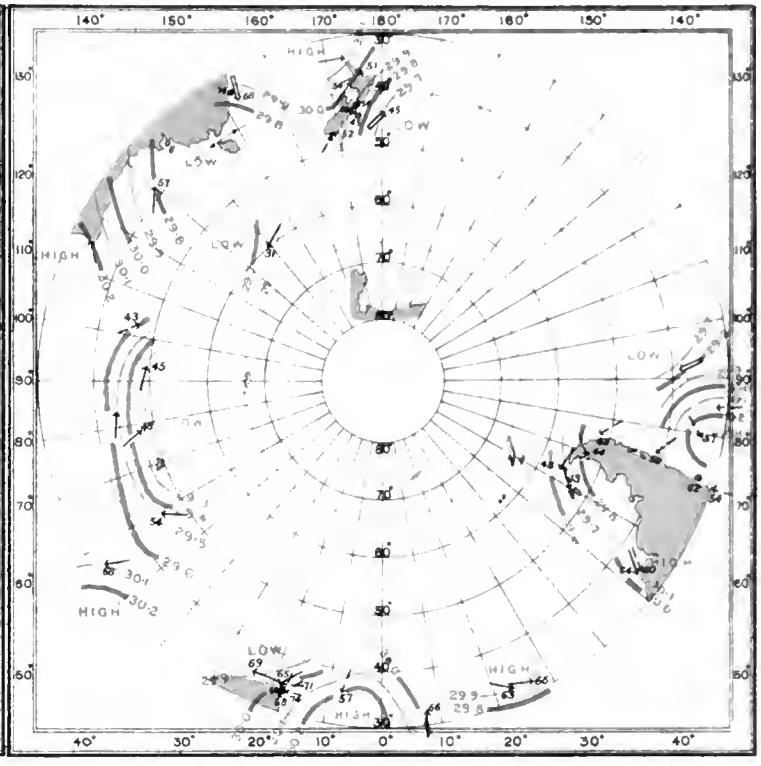

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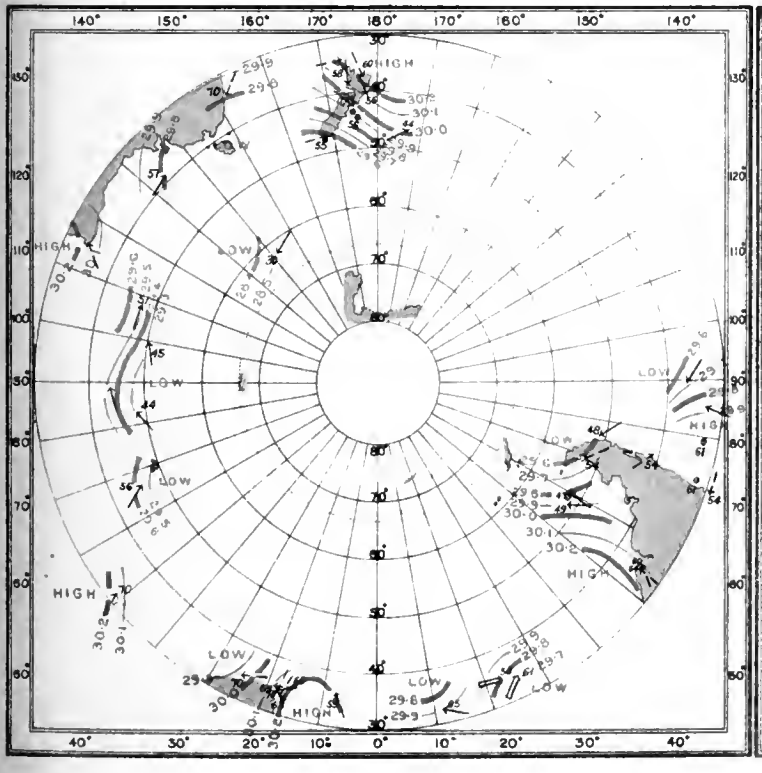

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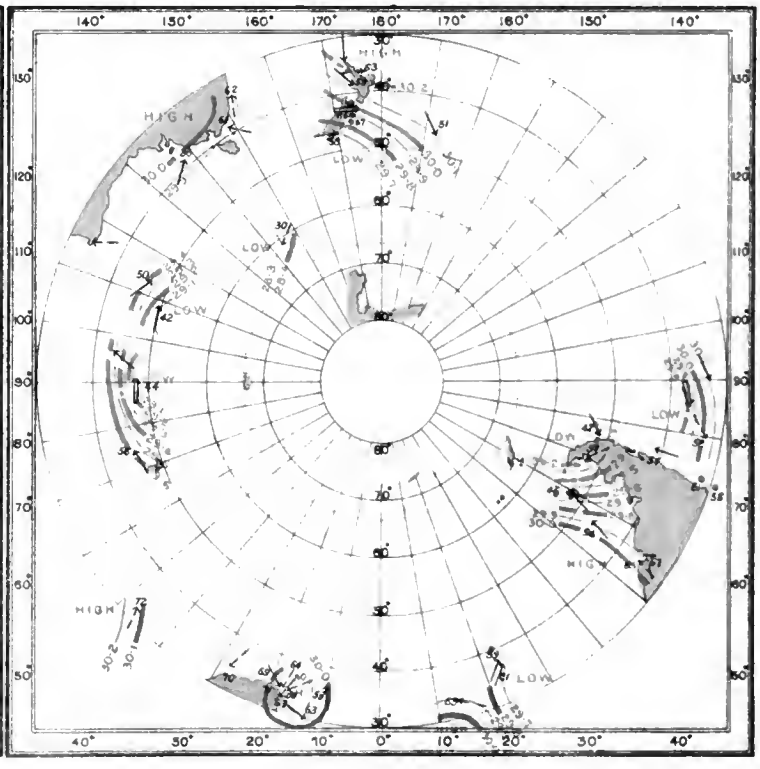


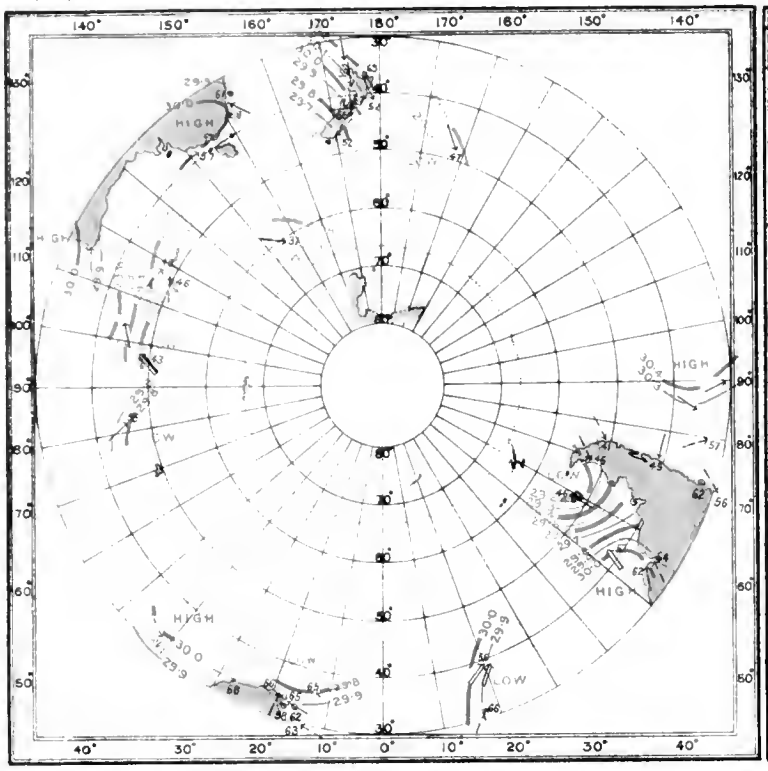
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1901 NOVEMBER 18



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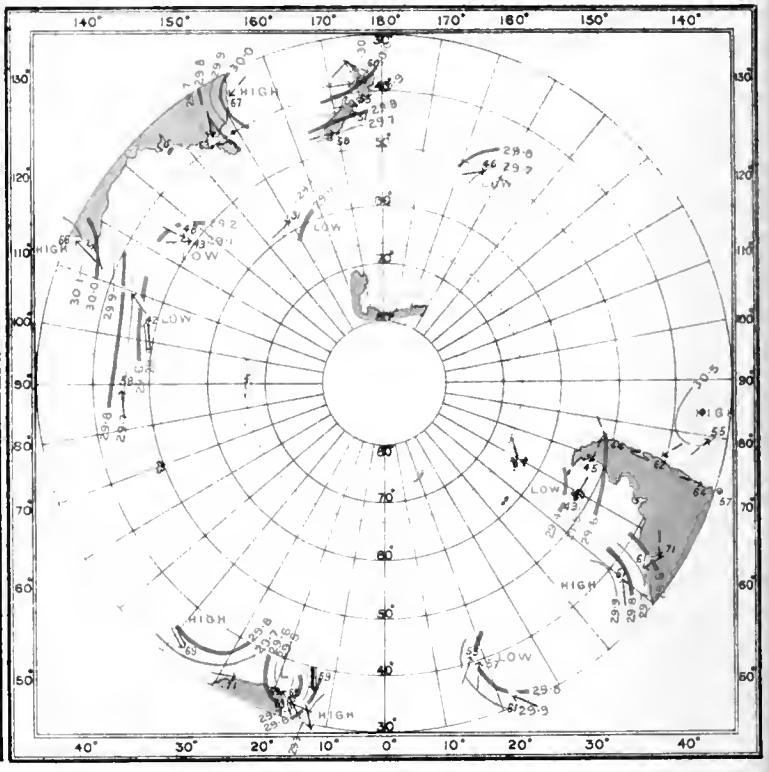

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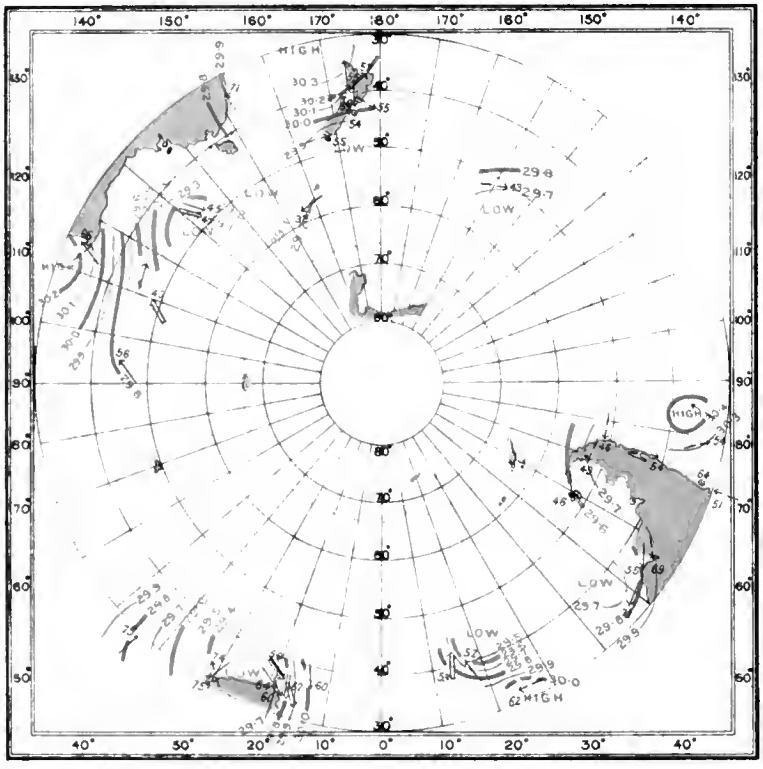

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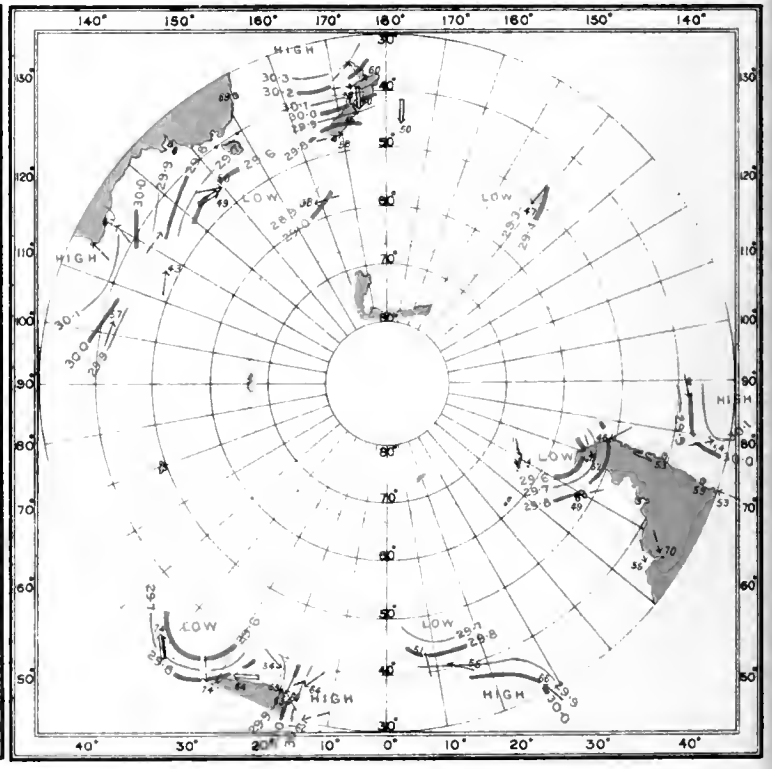


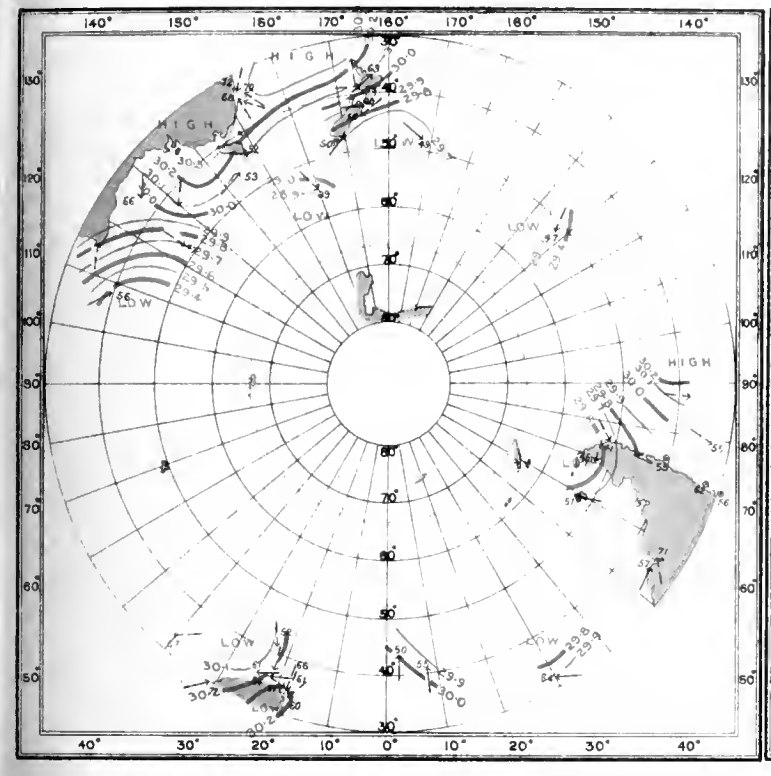
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1901 NOVEMBER 22



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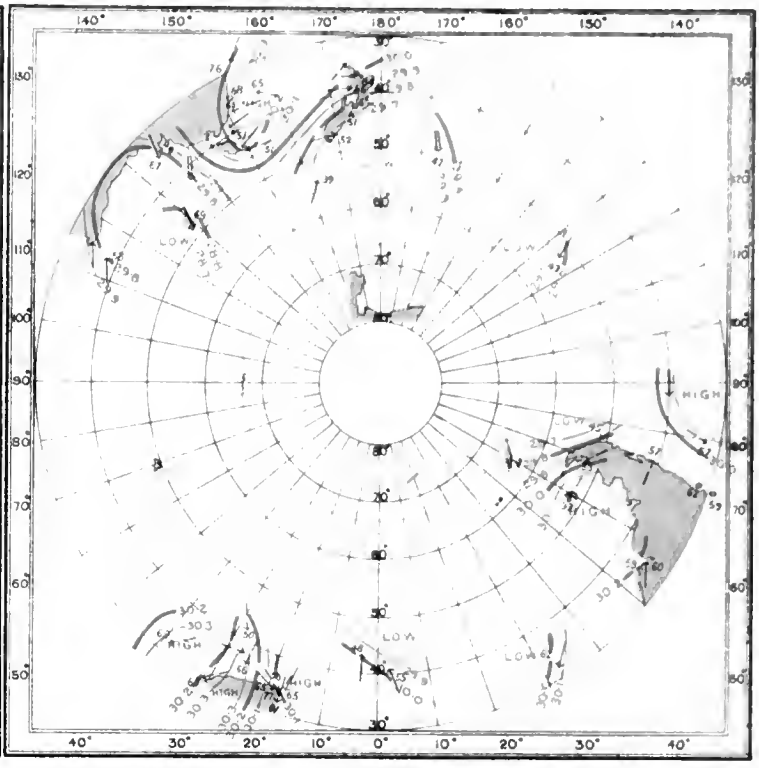

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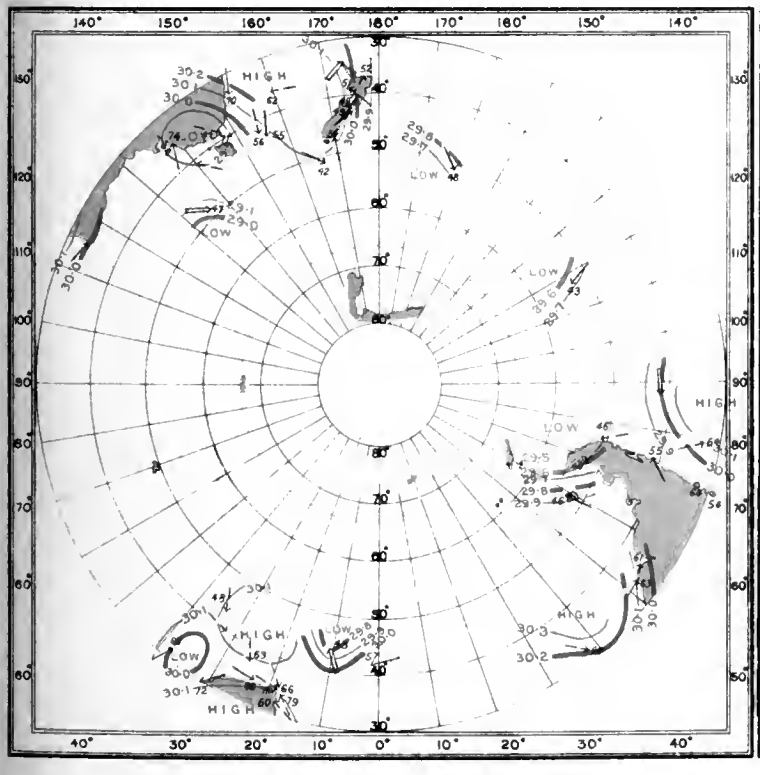

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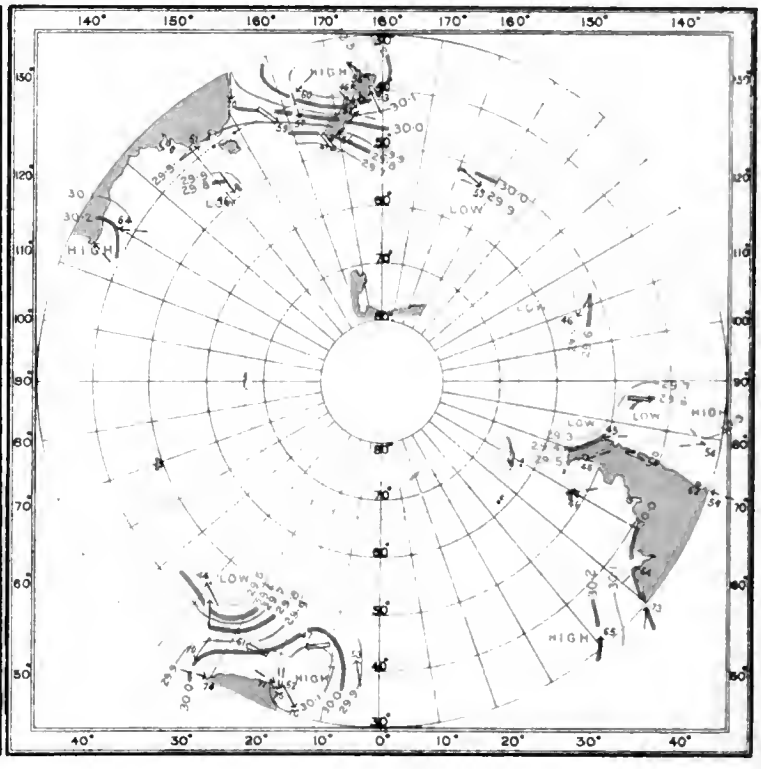


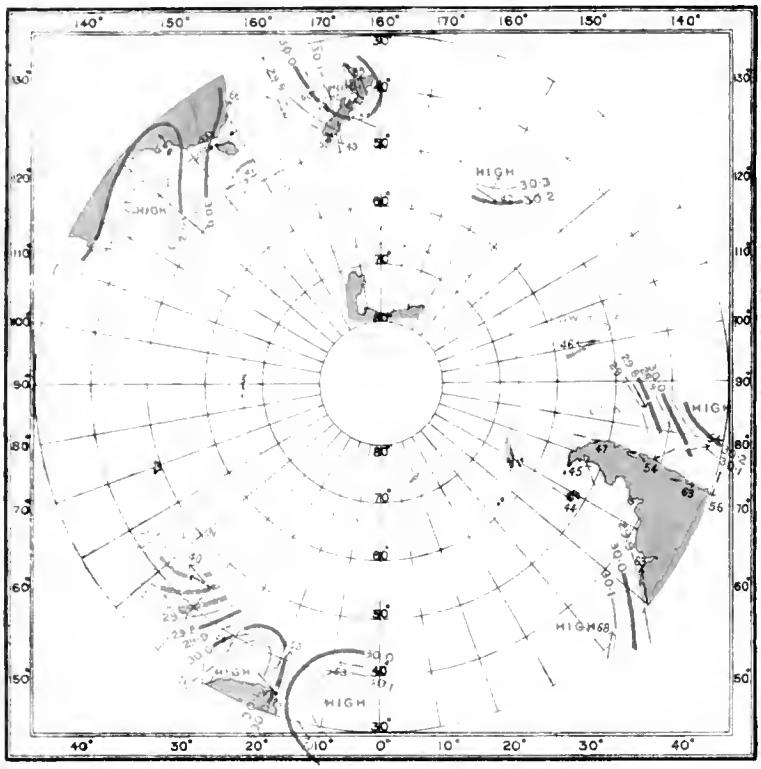
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1901 NOVEMBER 26



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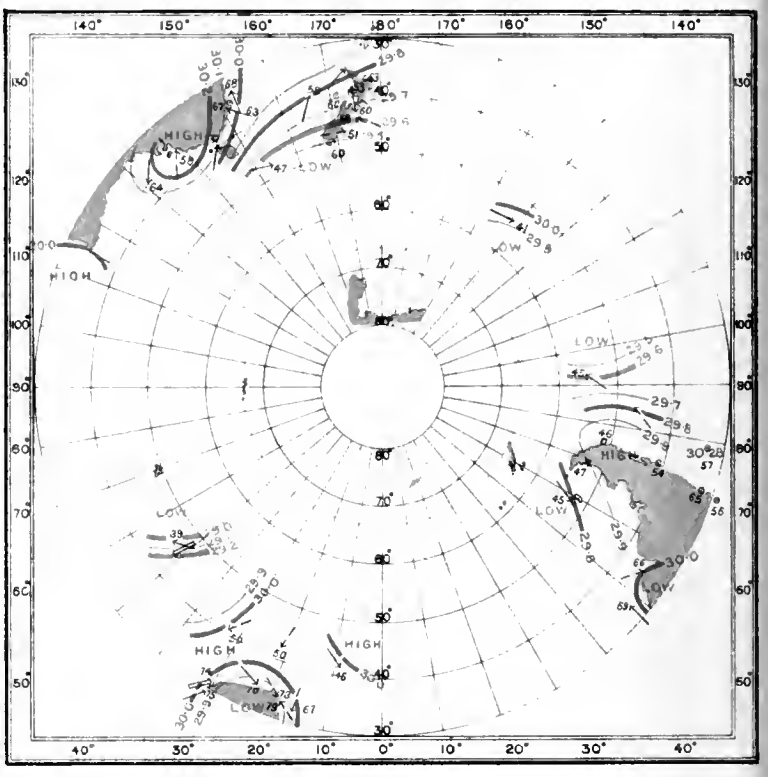

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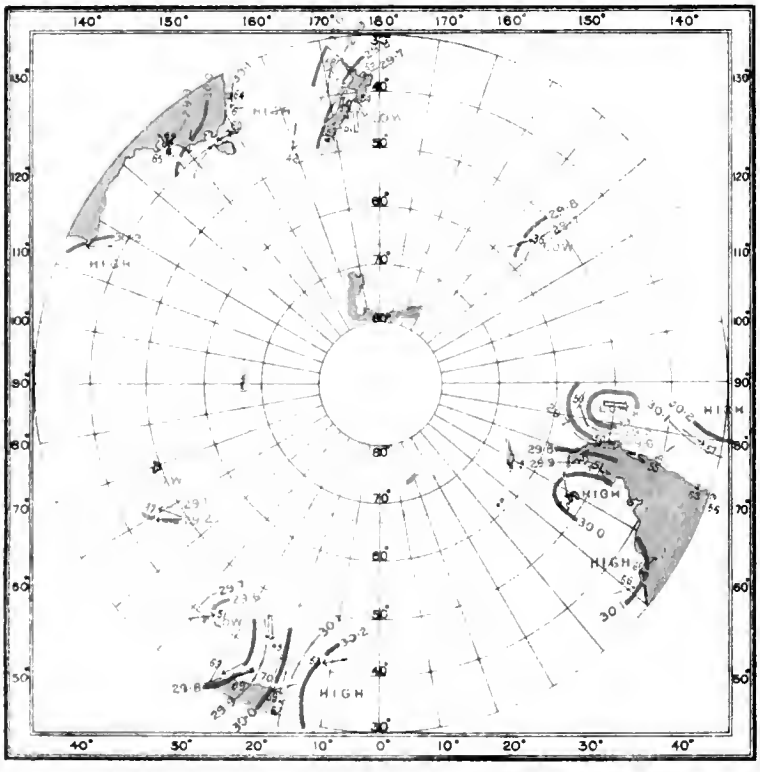

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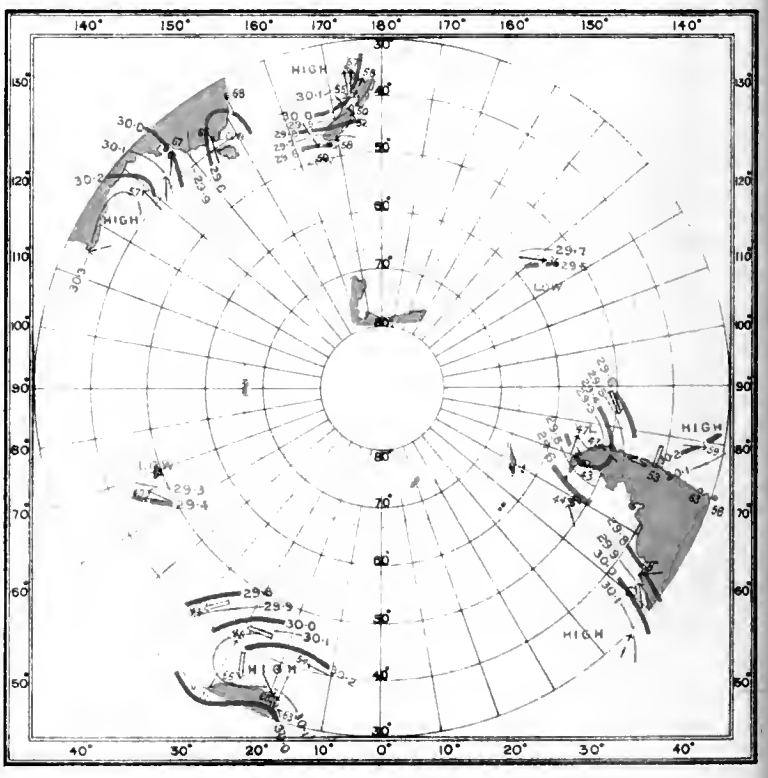


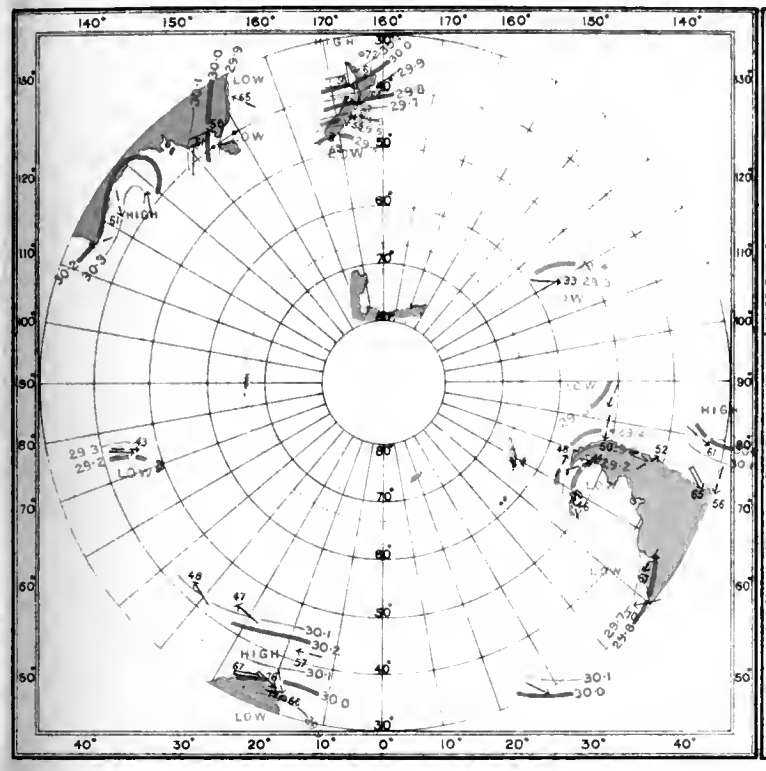
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

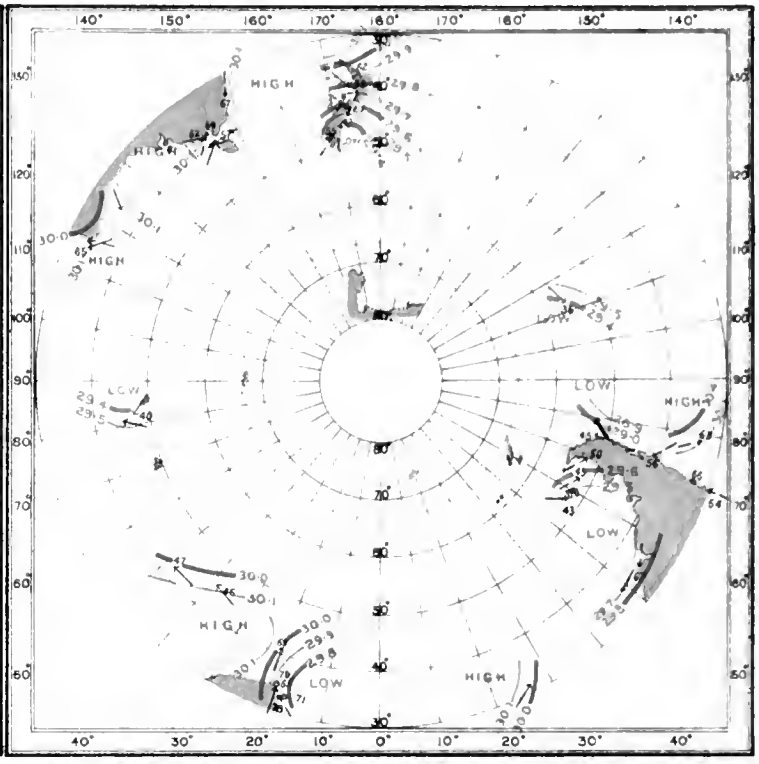
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1901 NOVEMBER 30



1901 DECEMBER 1



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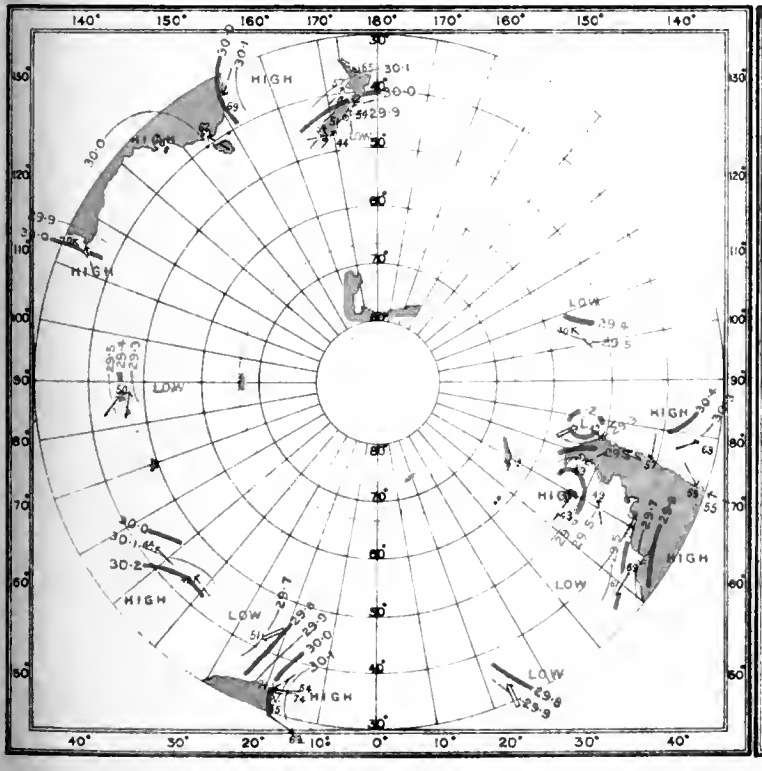

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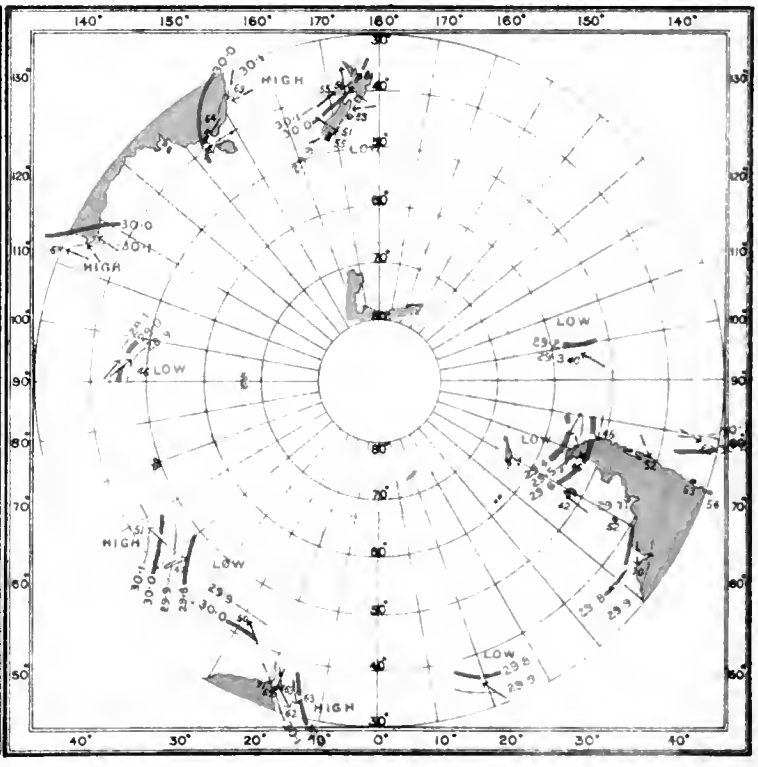
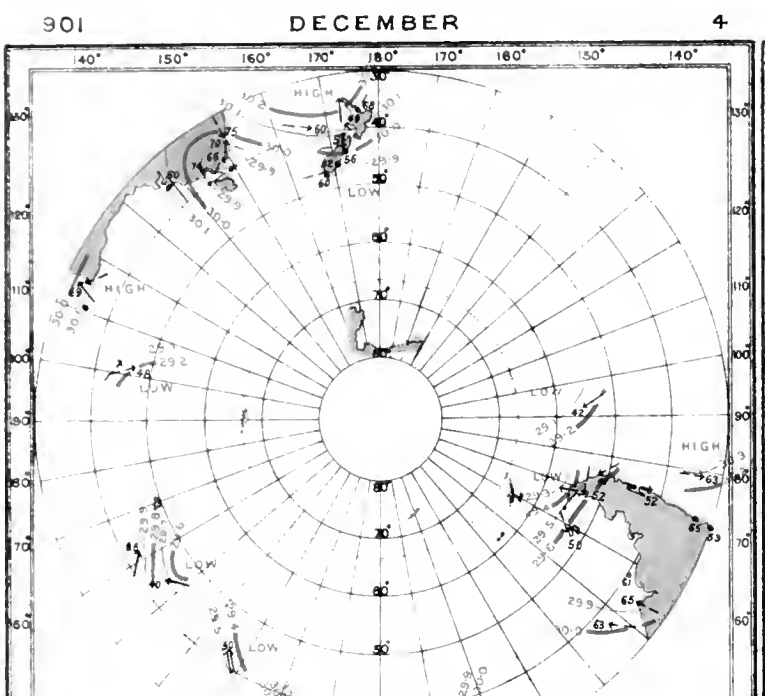


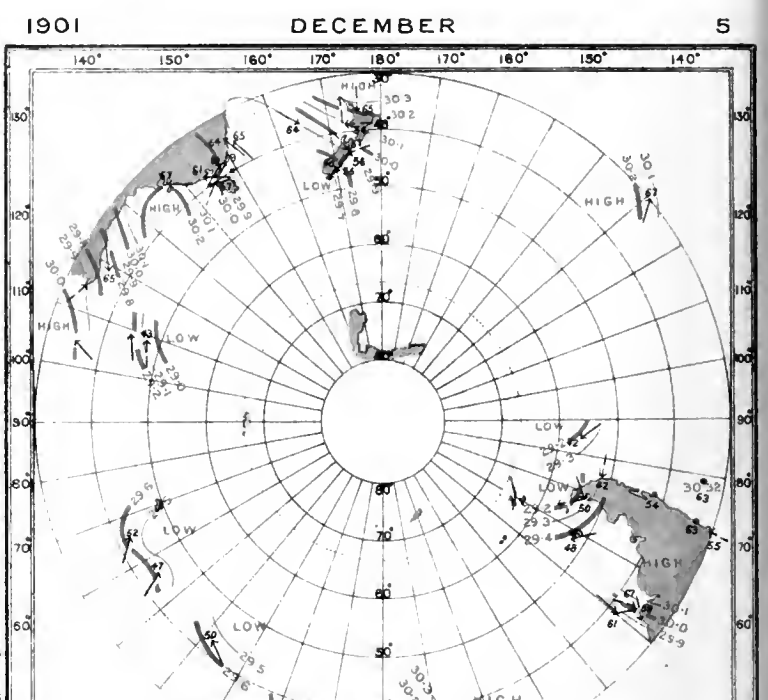
For explanation see Key map.

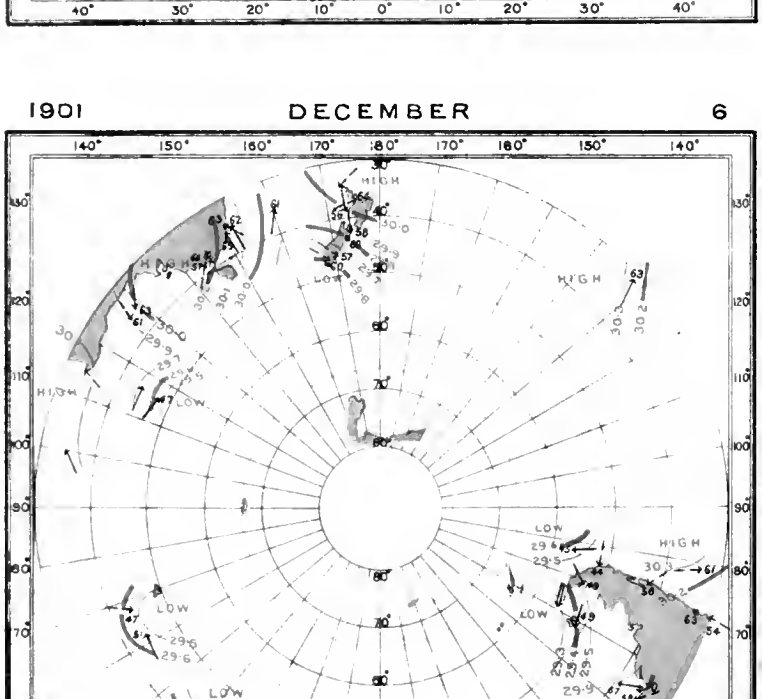
INTERNATIONAL ANTARCTIC CO-OPERATION.

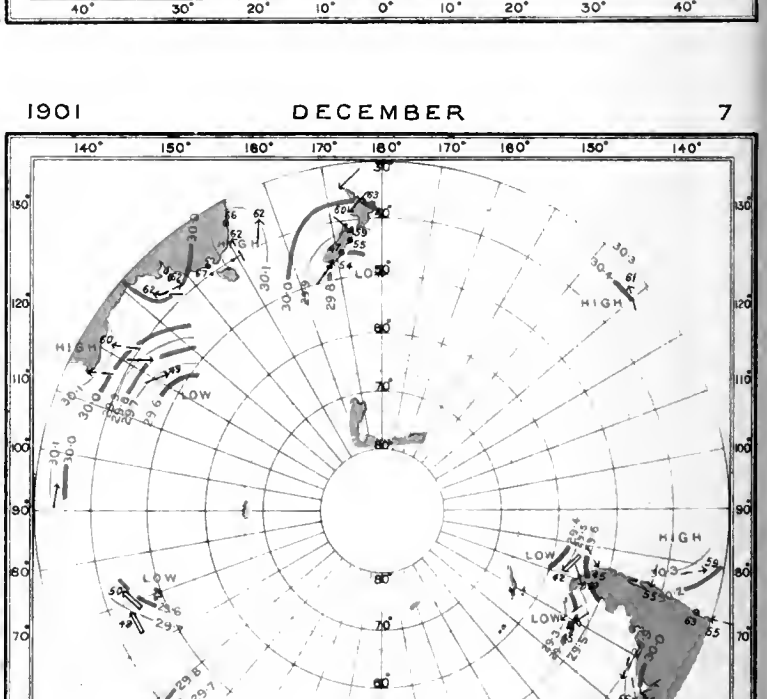
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES









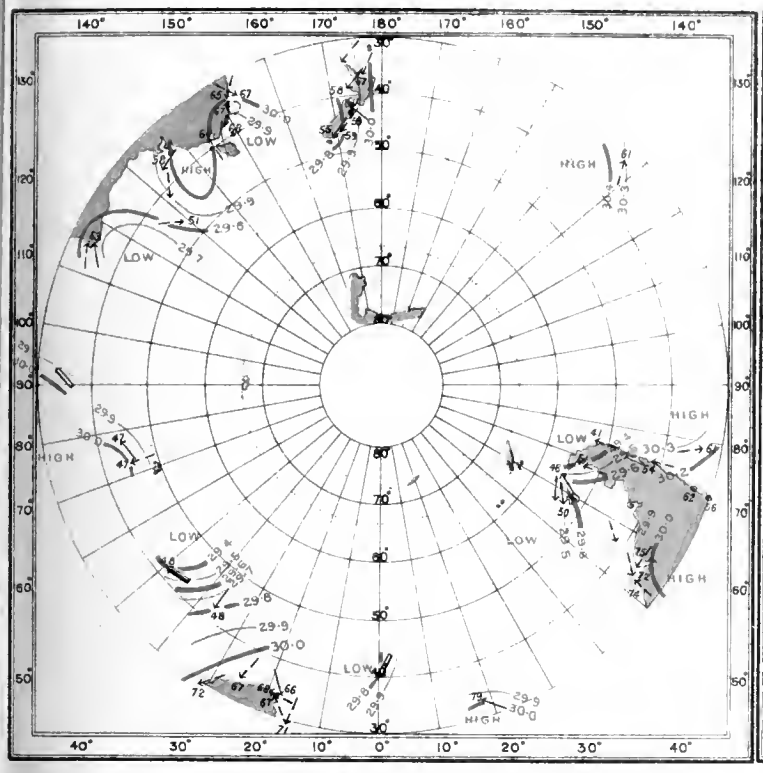
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1901 DECEMBER 8



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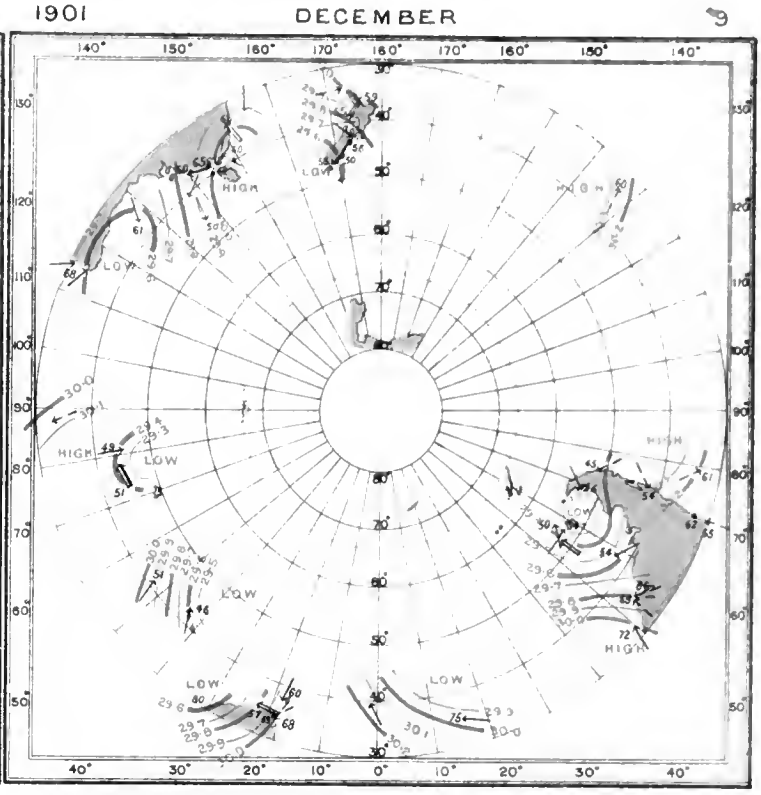

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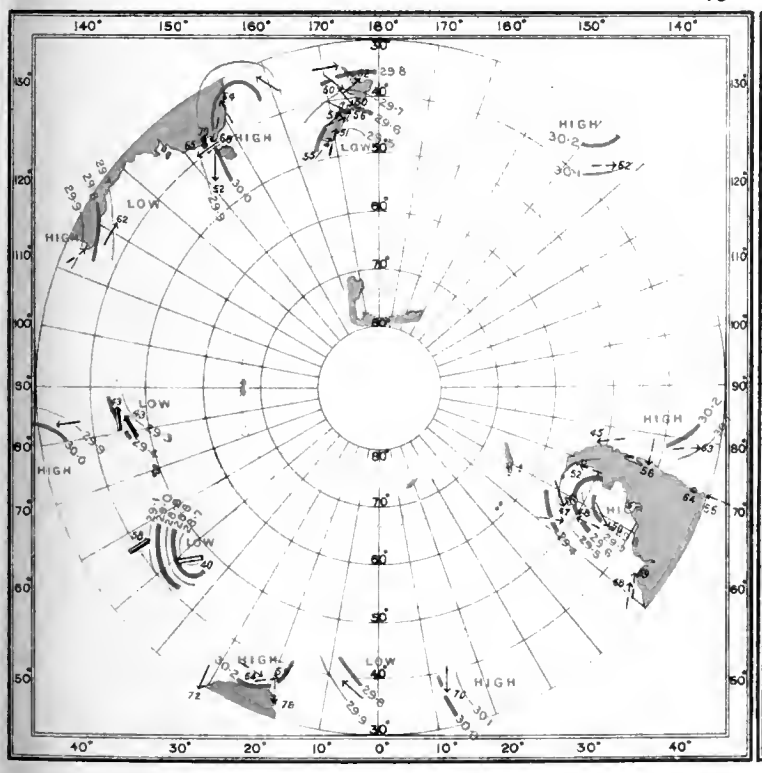

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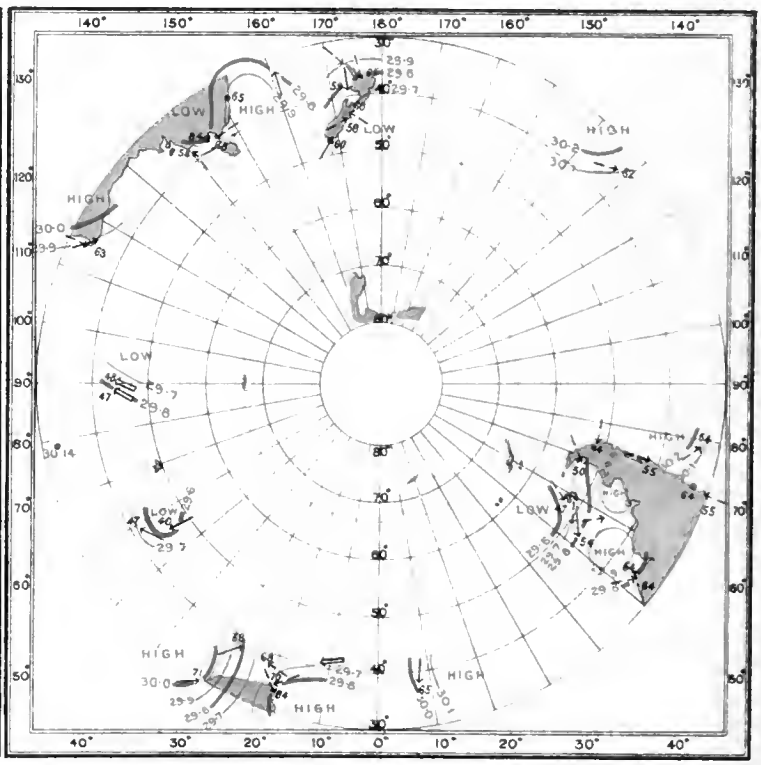


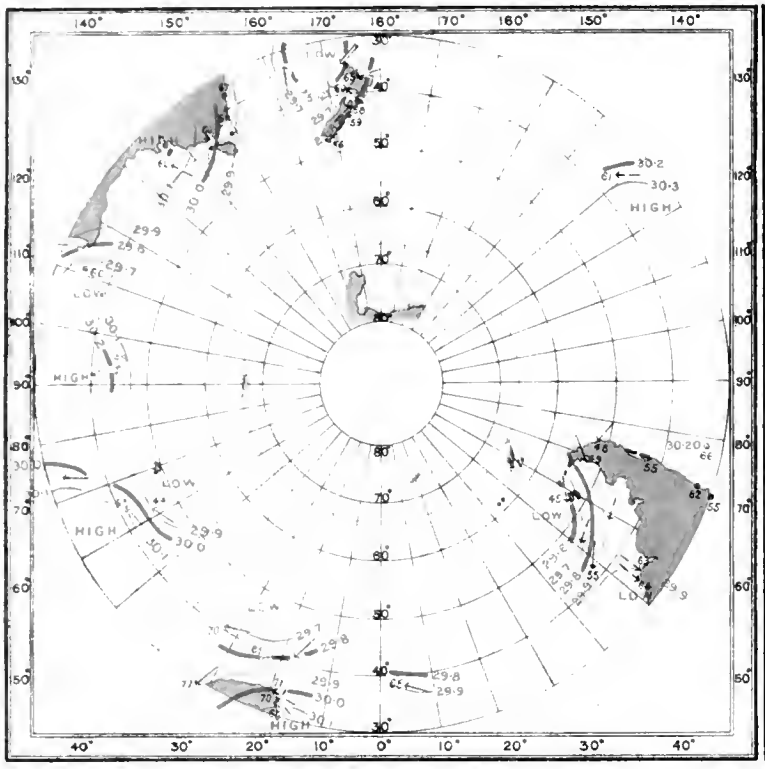
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1901 DECEMBER 12



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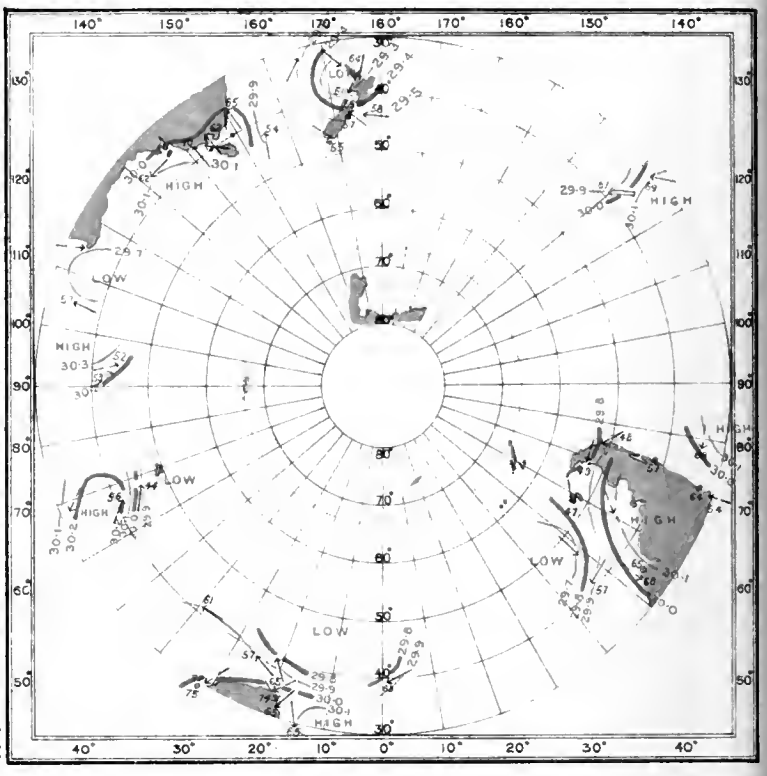

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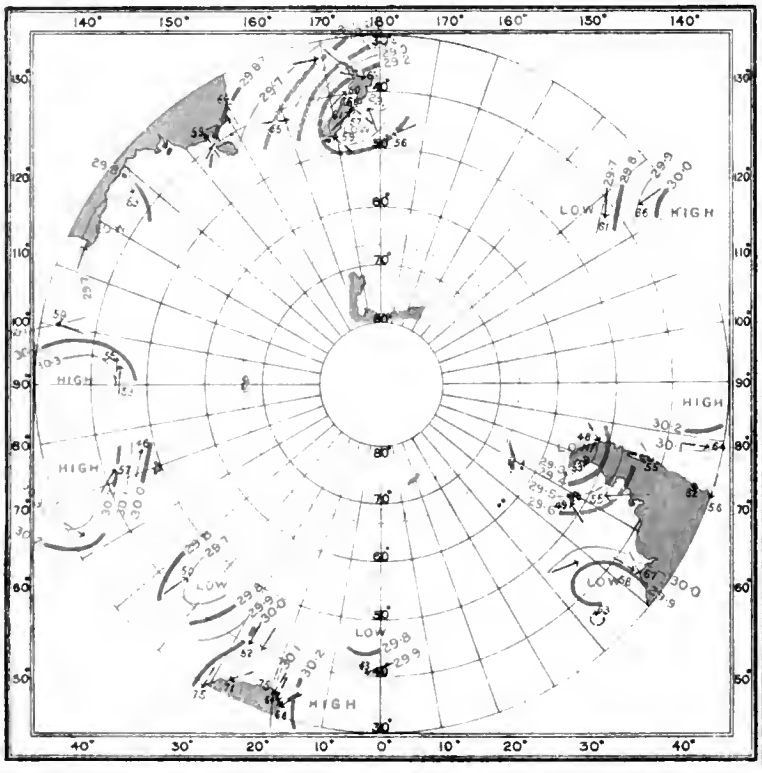

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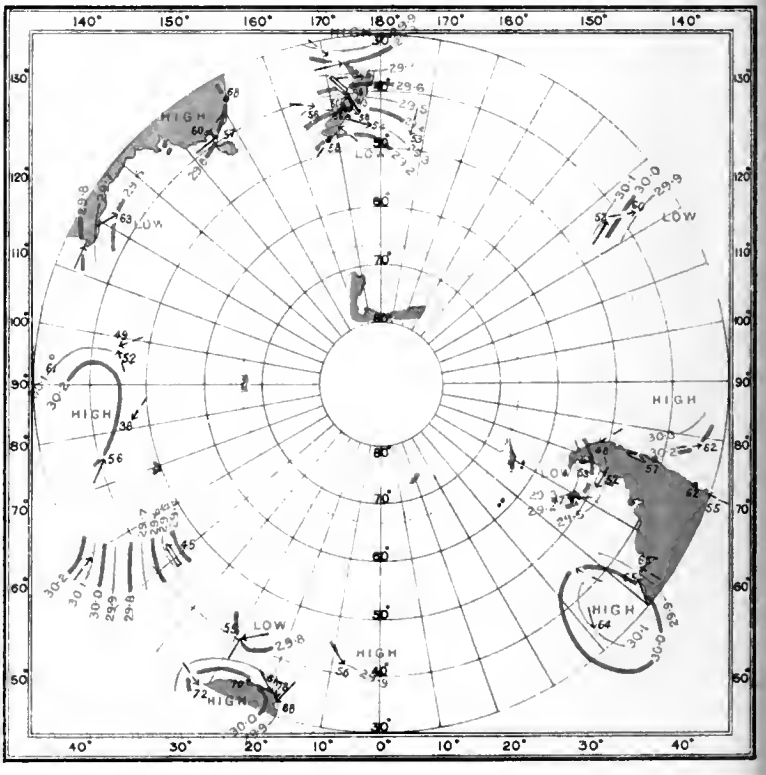


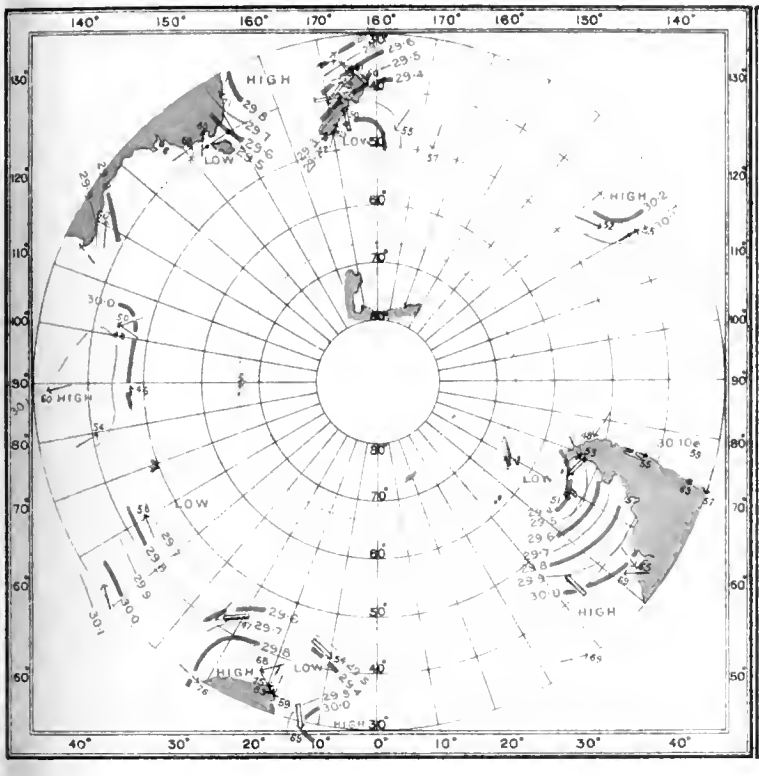
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1901 DECEMBER 16



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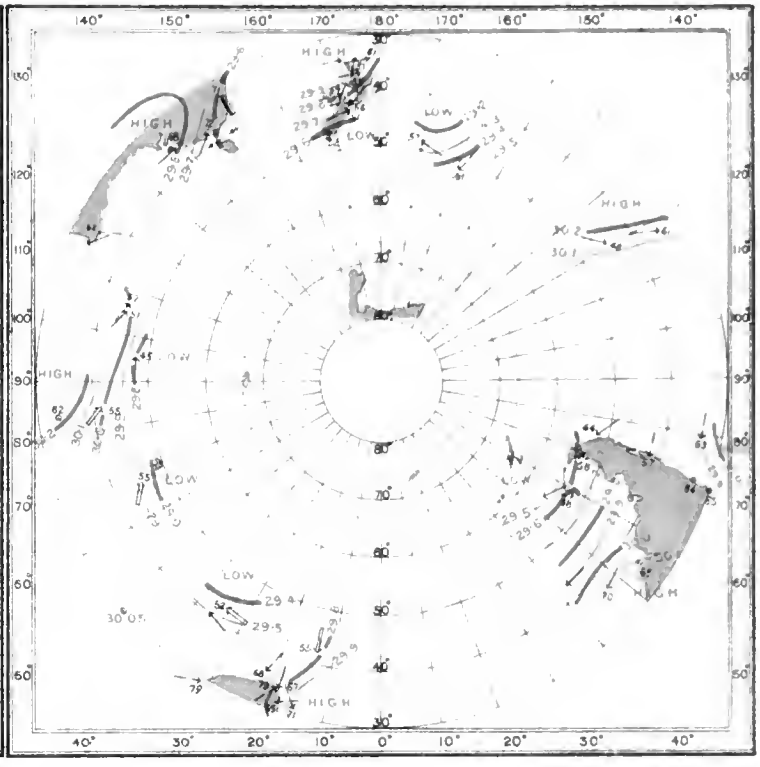

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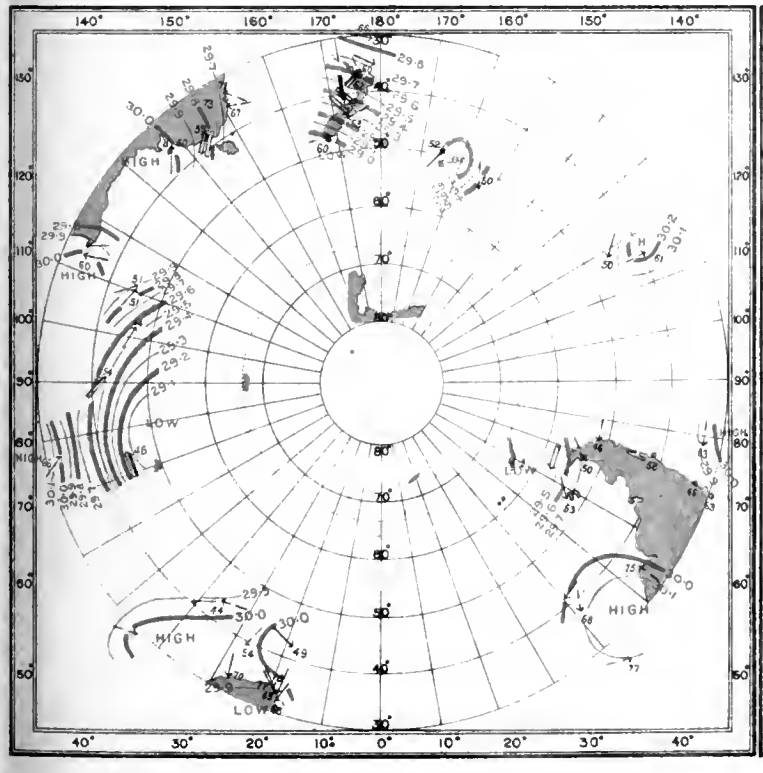

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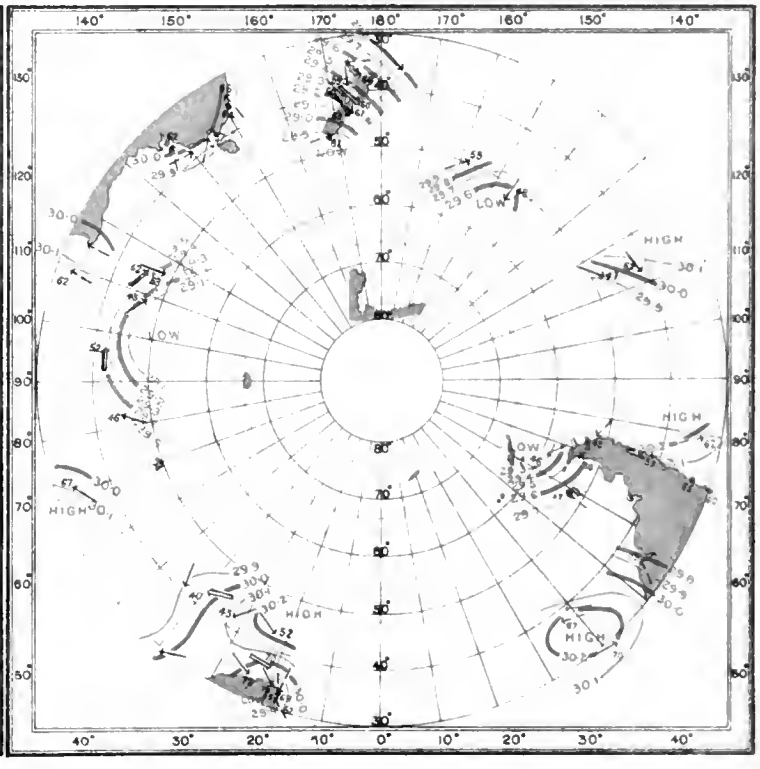


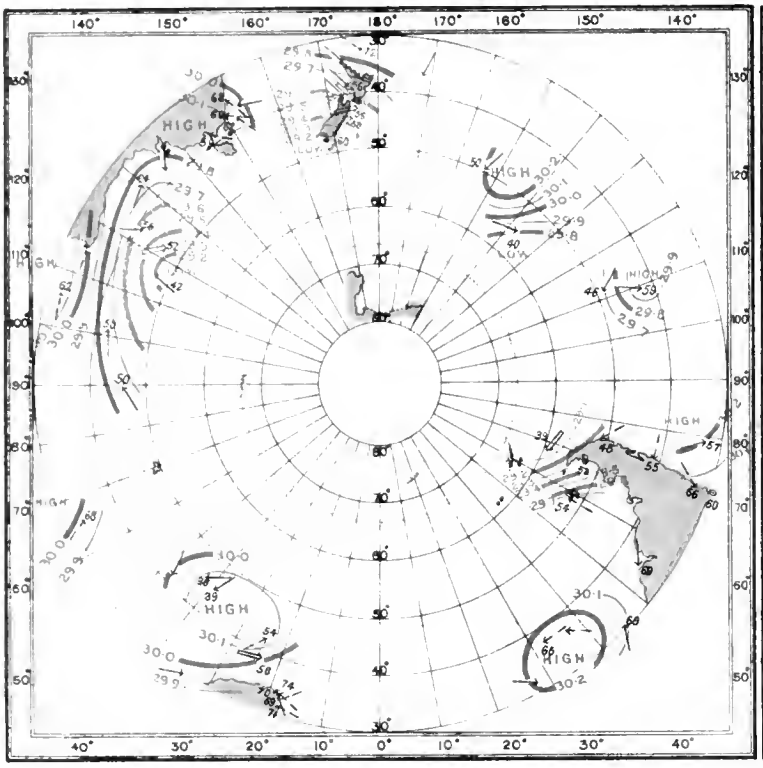
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

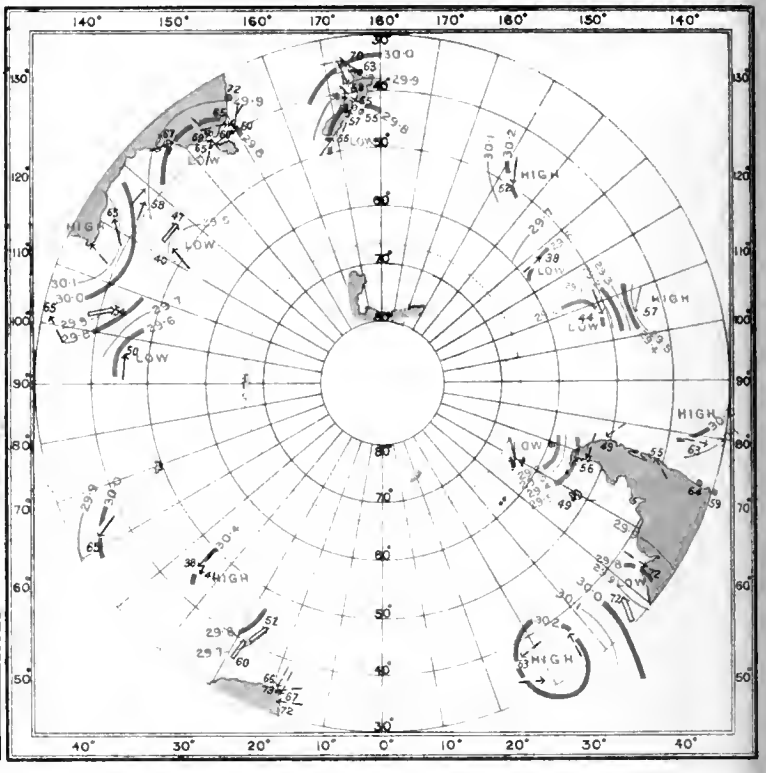
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1901 DECEMBER 20



1901 DECEMBER 21



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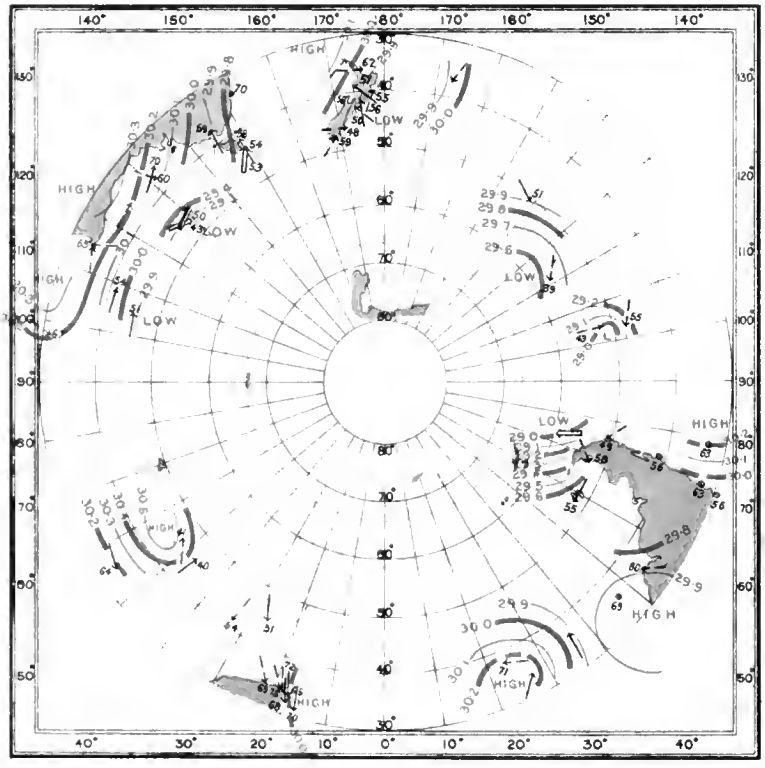

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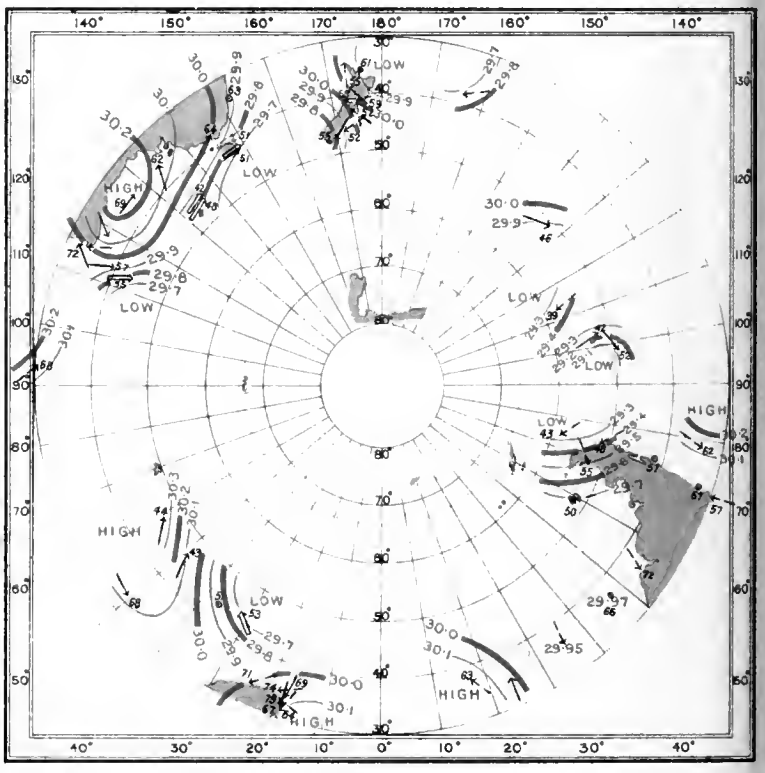


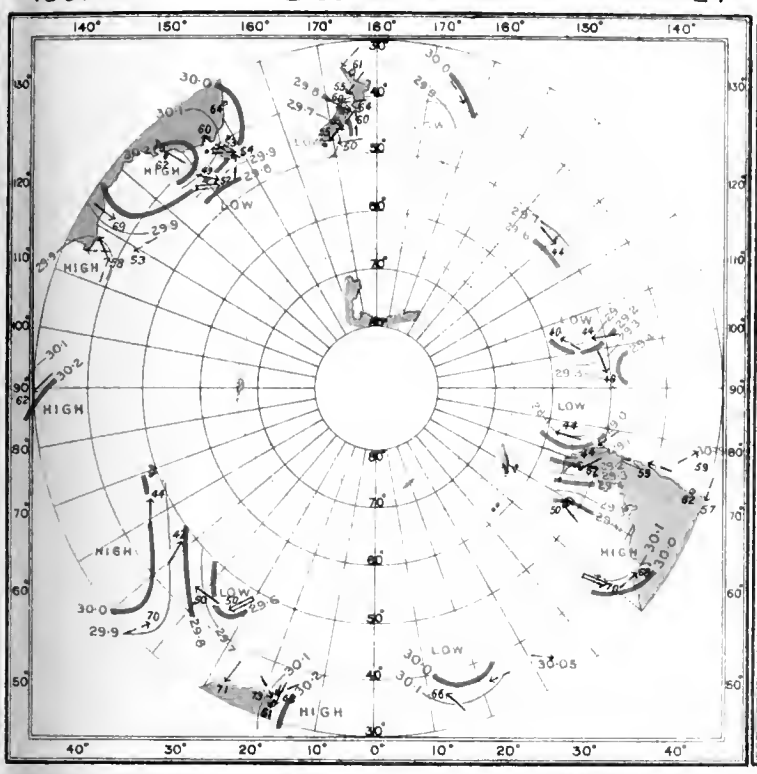
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1901 DECEMBER 24



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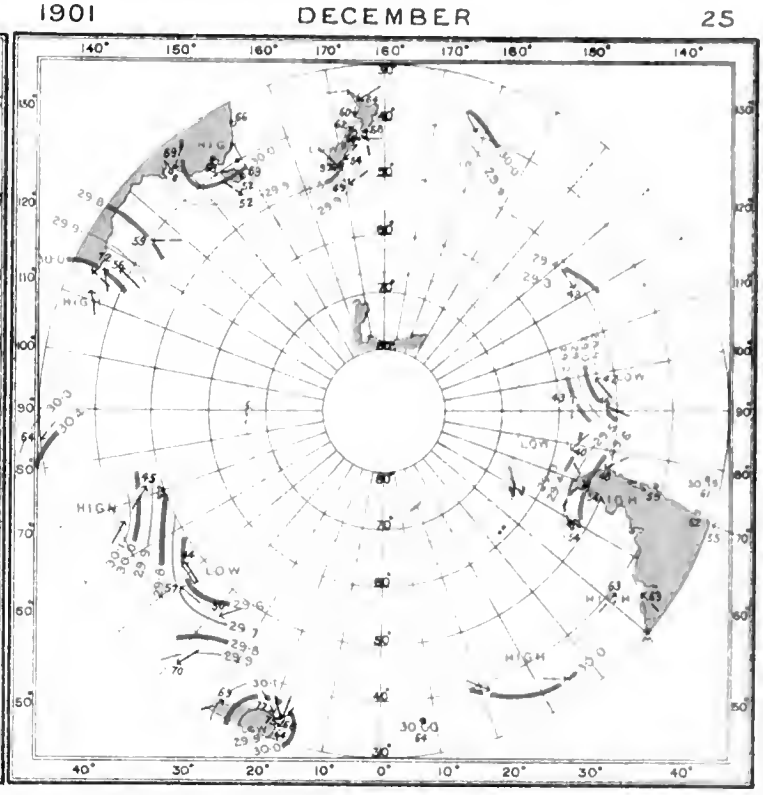

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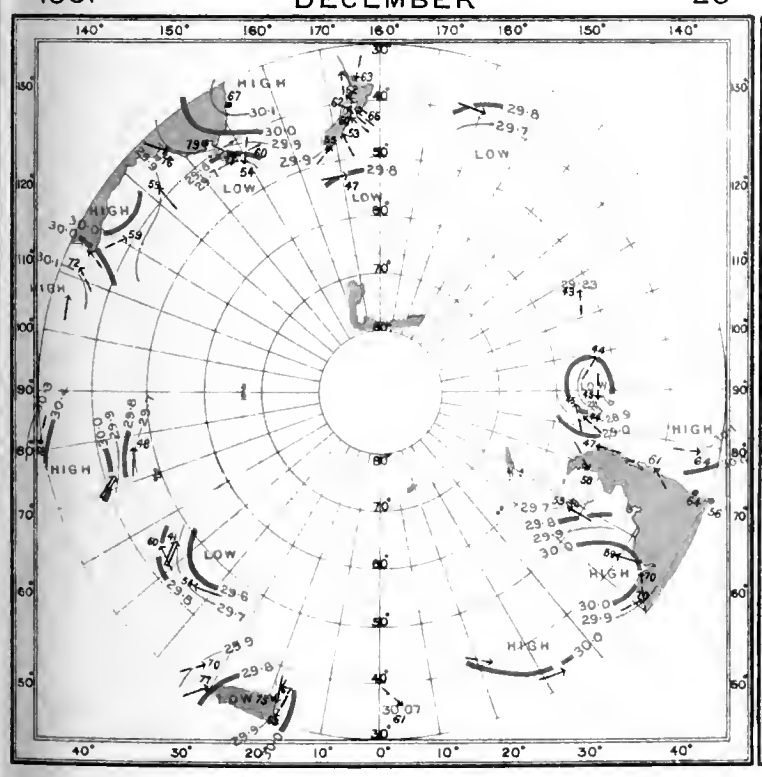

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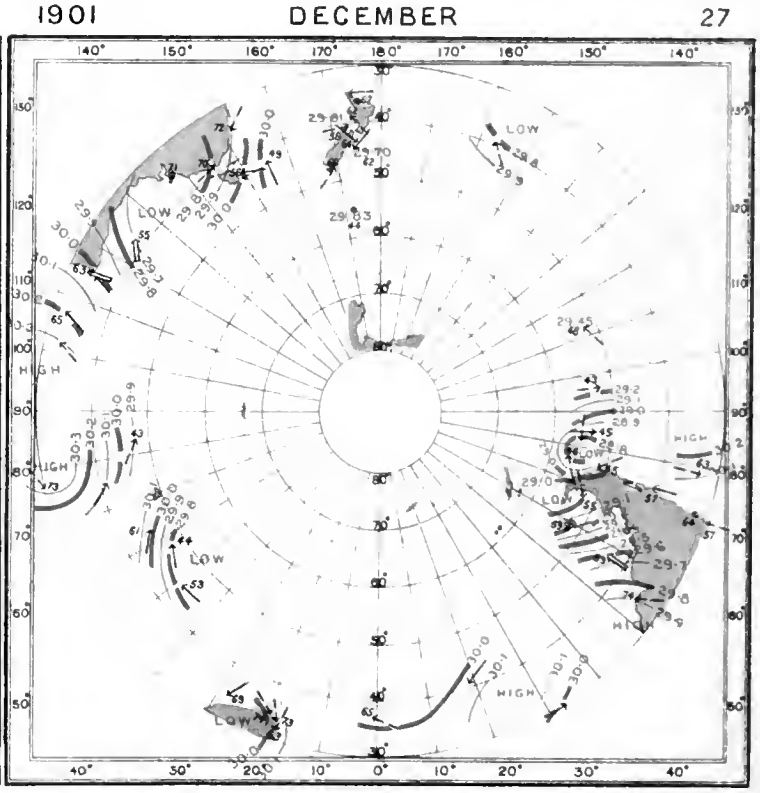


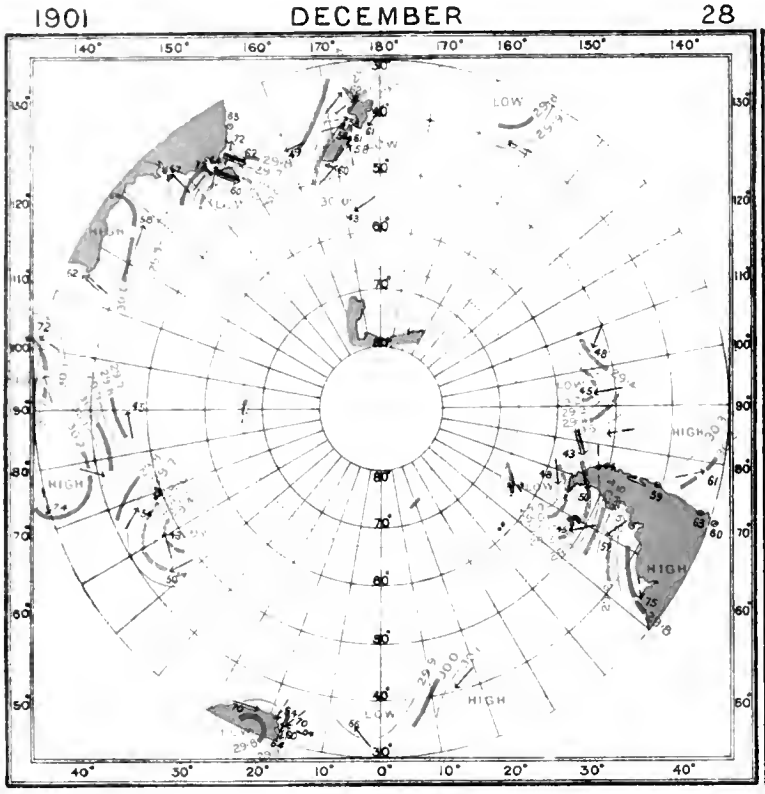
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1901 DECEMBER 28



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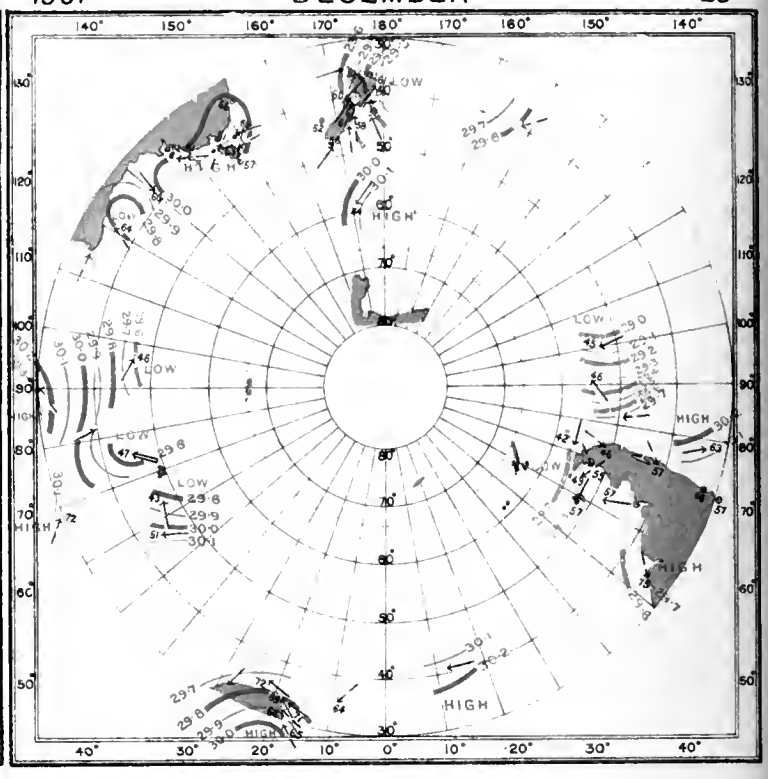

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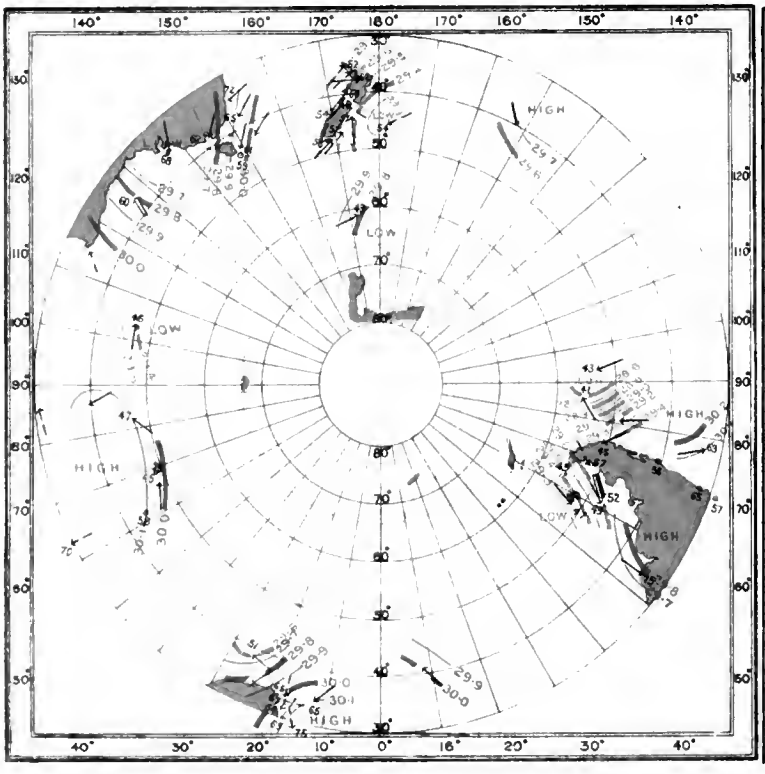

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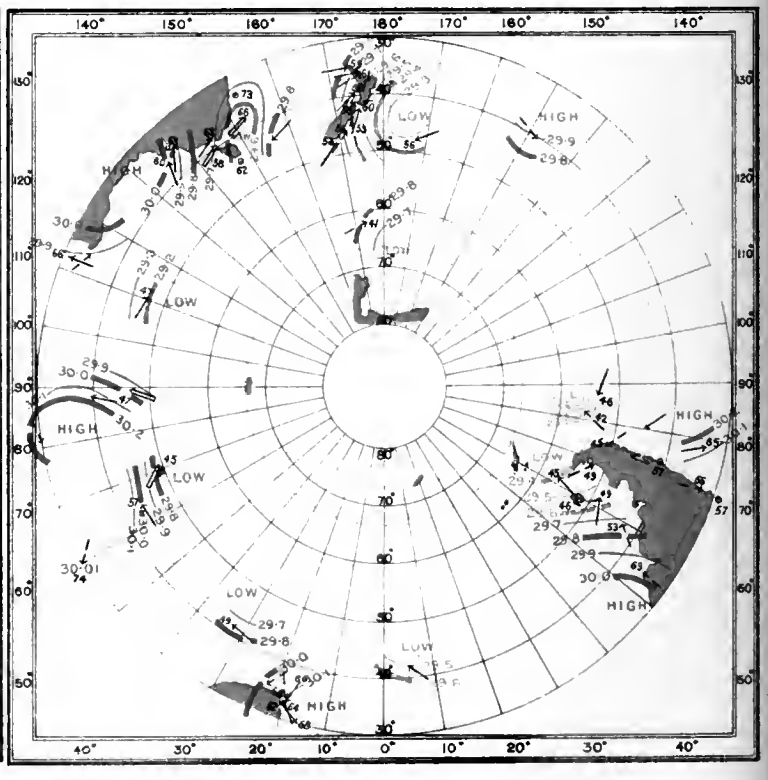

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

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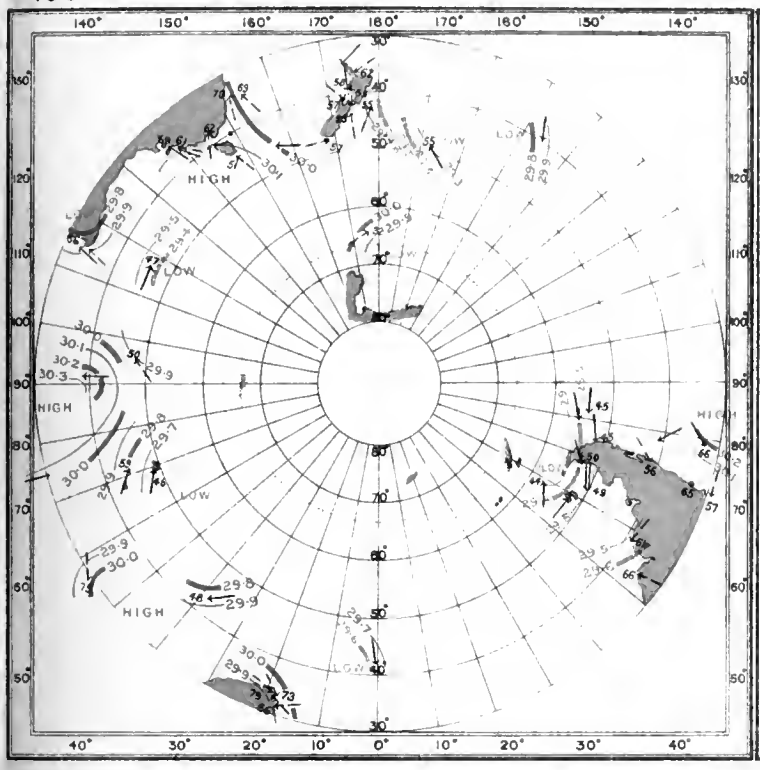

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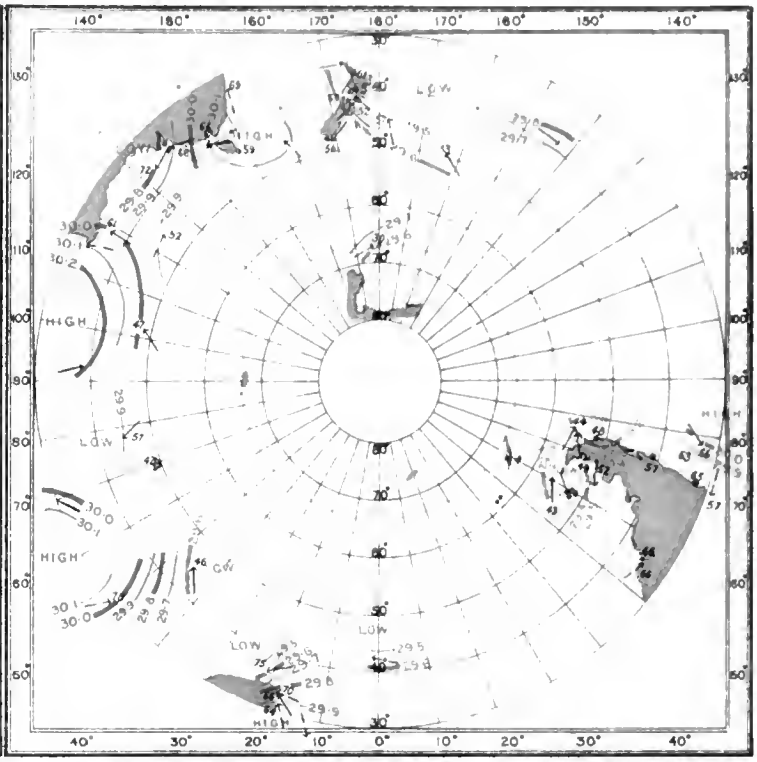

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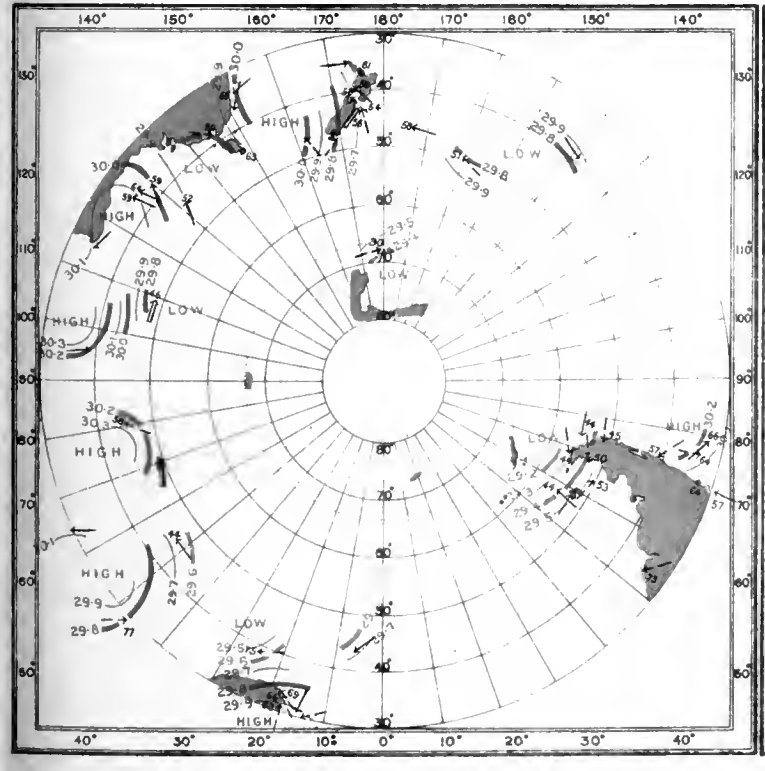

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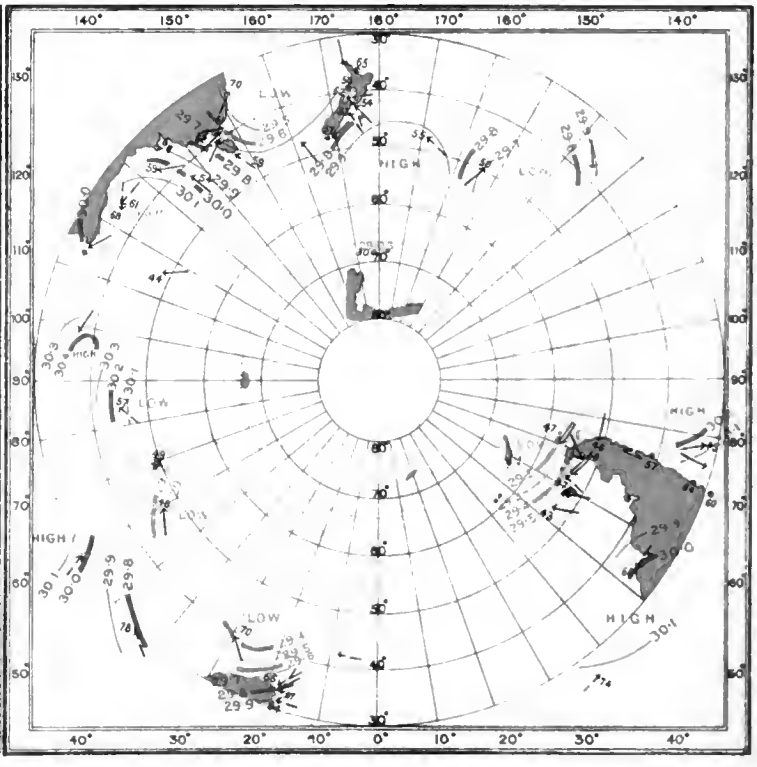
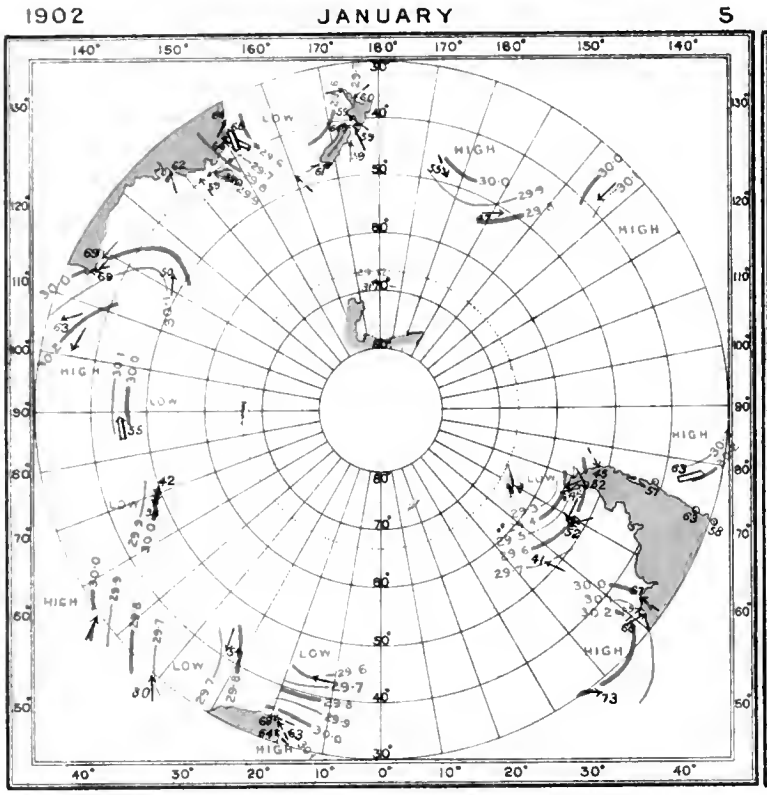


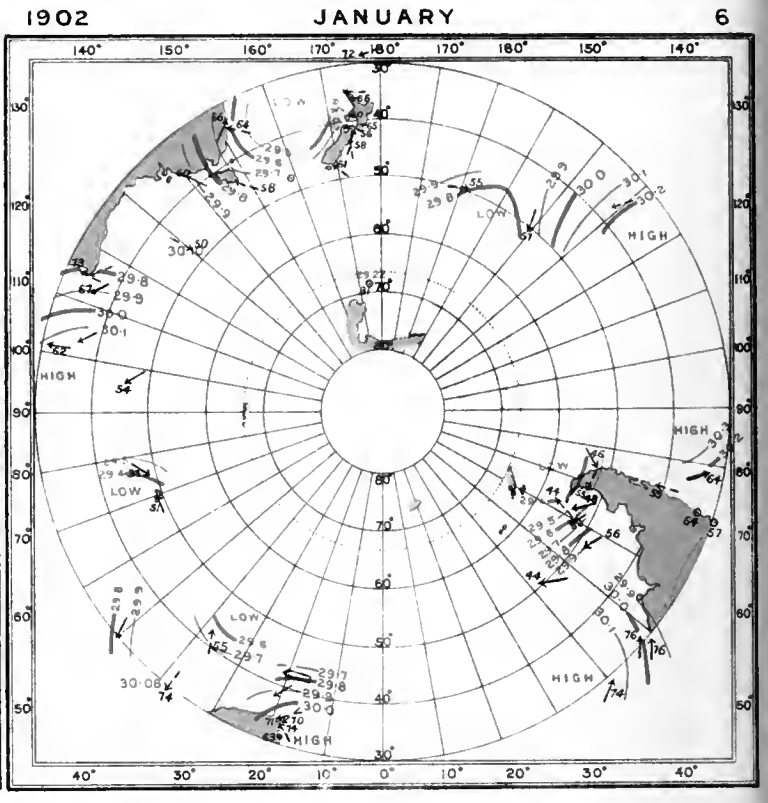
For explanation see Key map

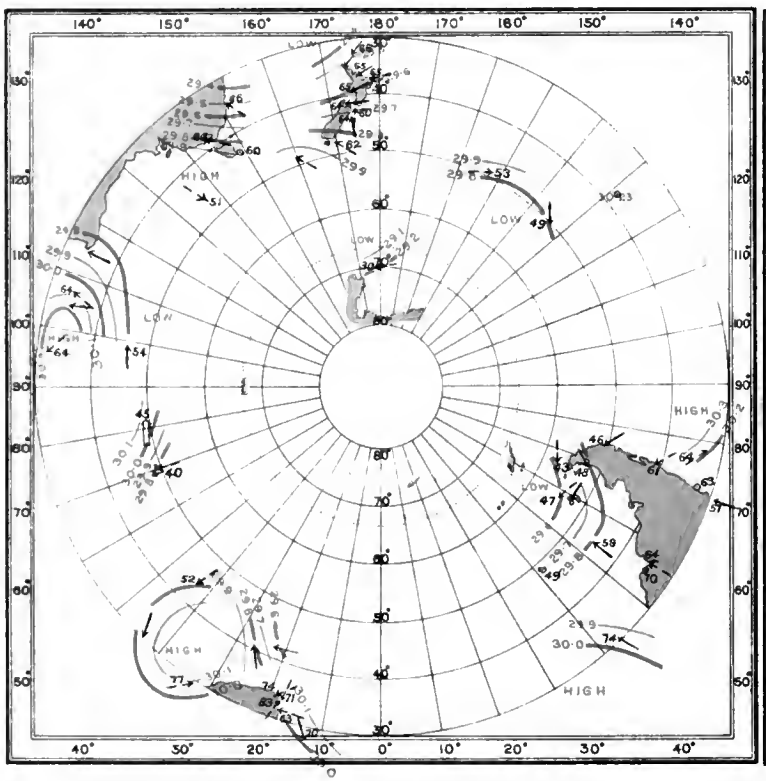
INTERNATIONAL ANTARCTIC CO-OPERATION.

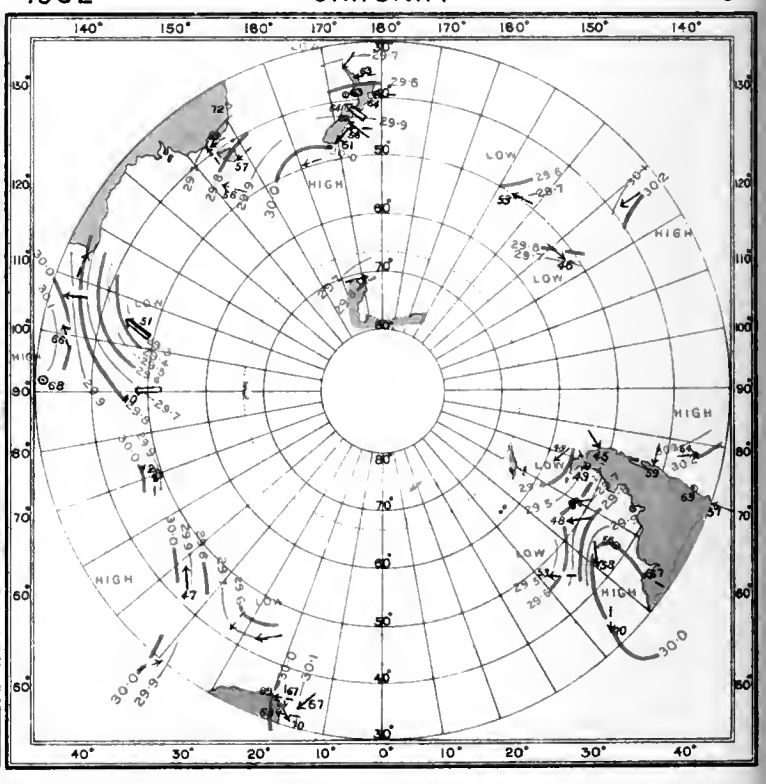
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.









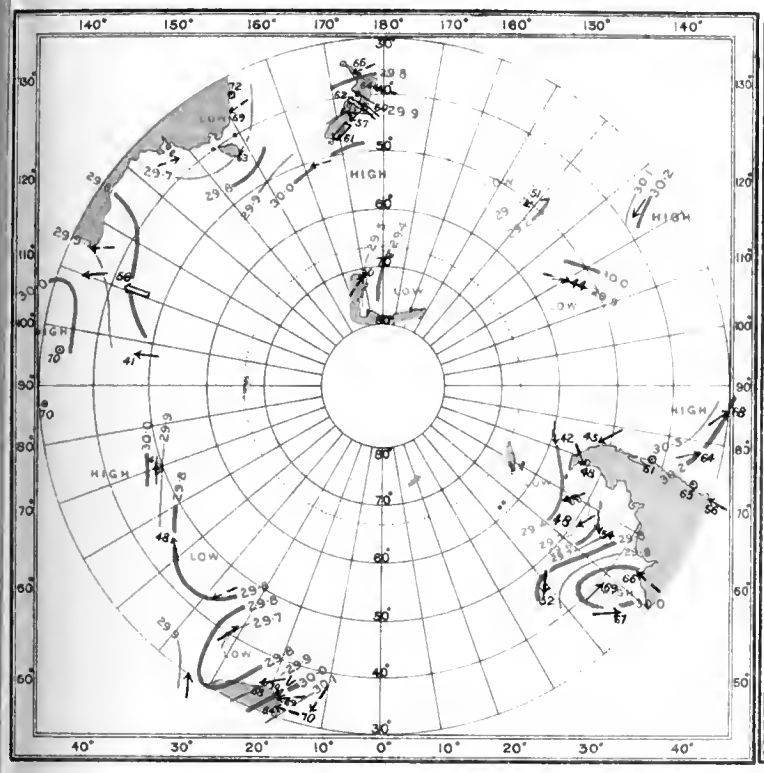
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 JANUARY 9



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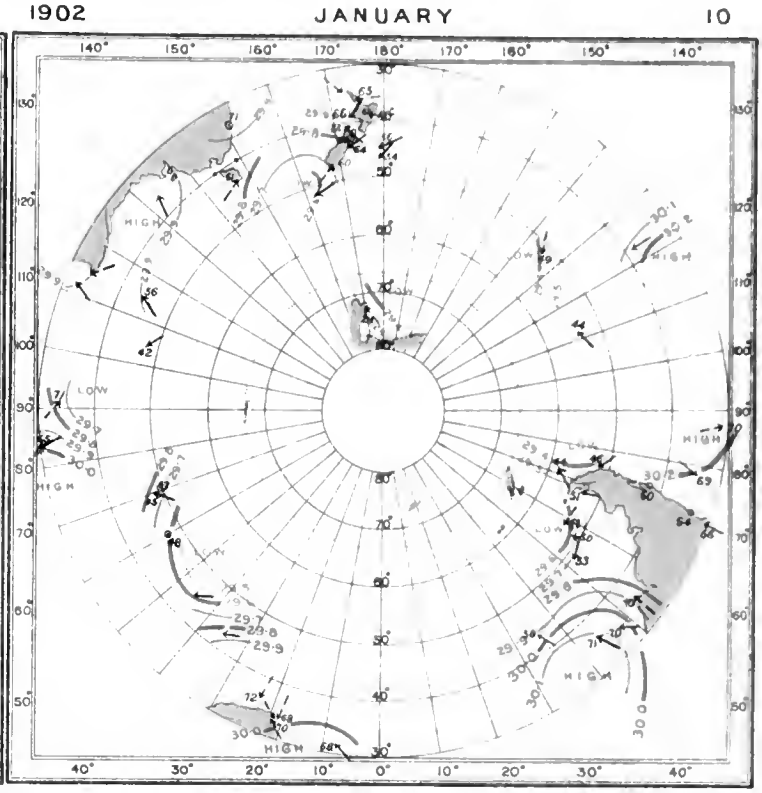

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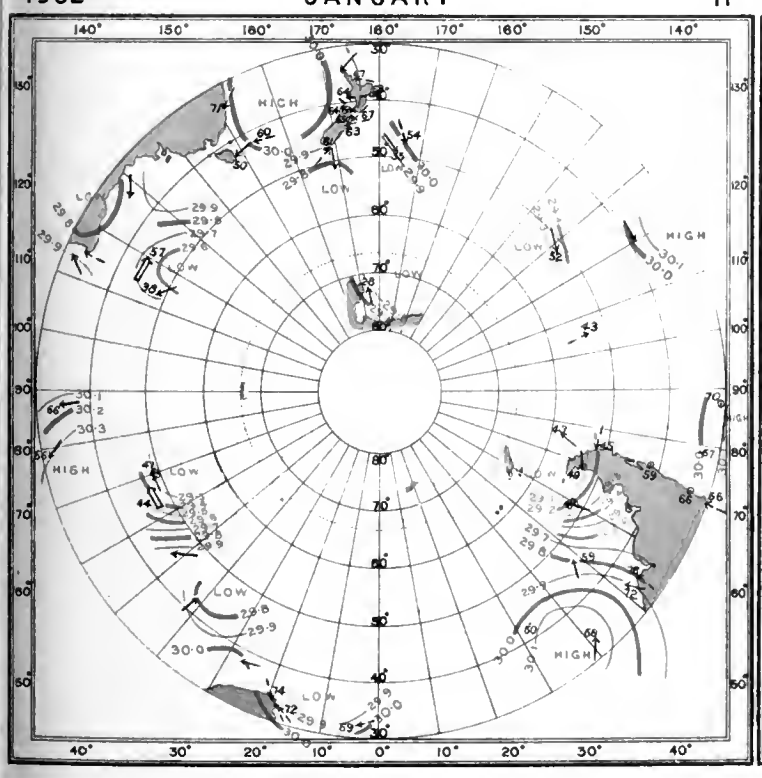

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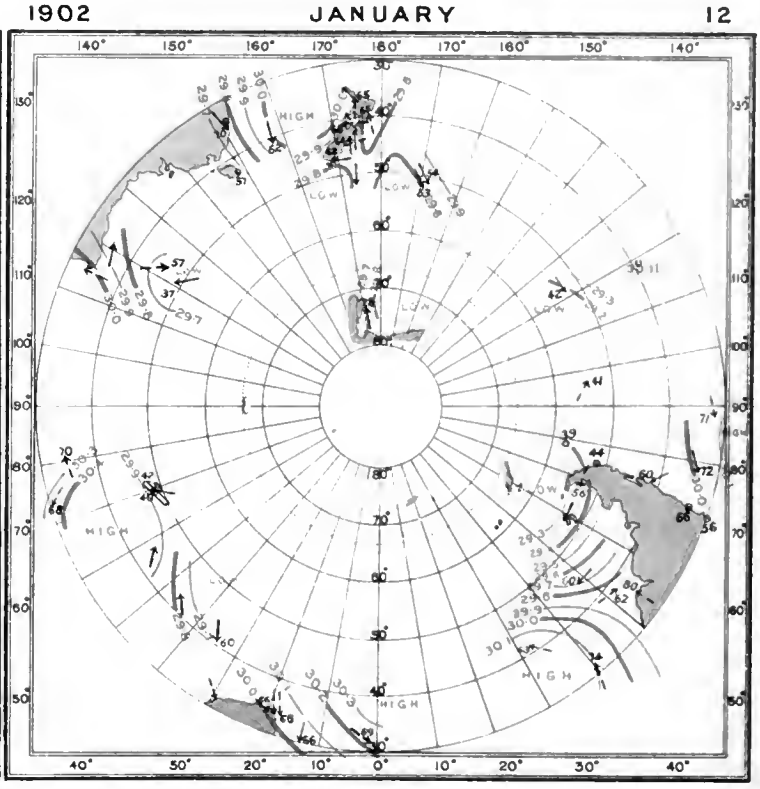


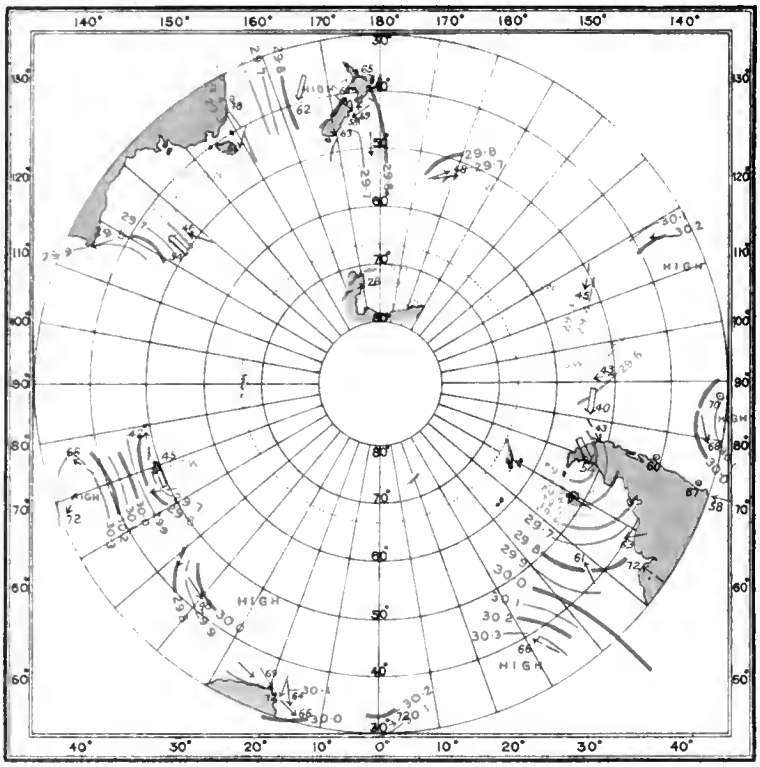
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 JANUARY 13



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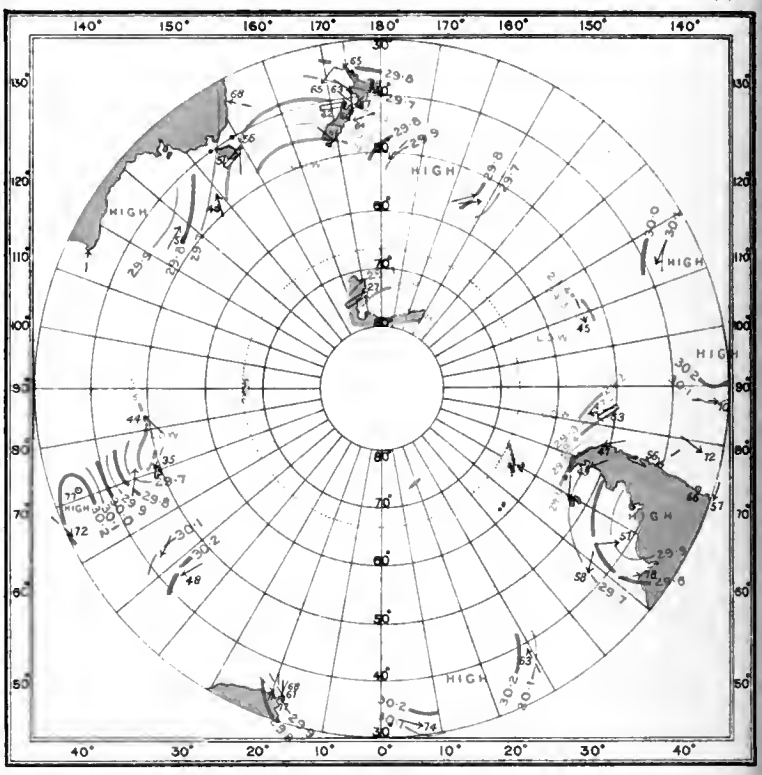

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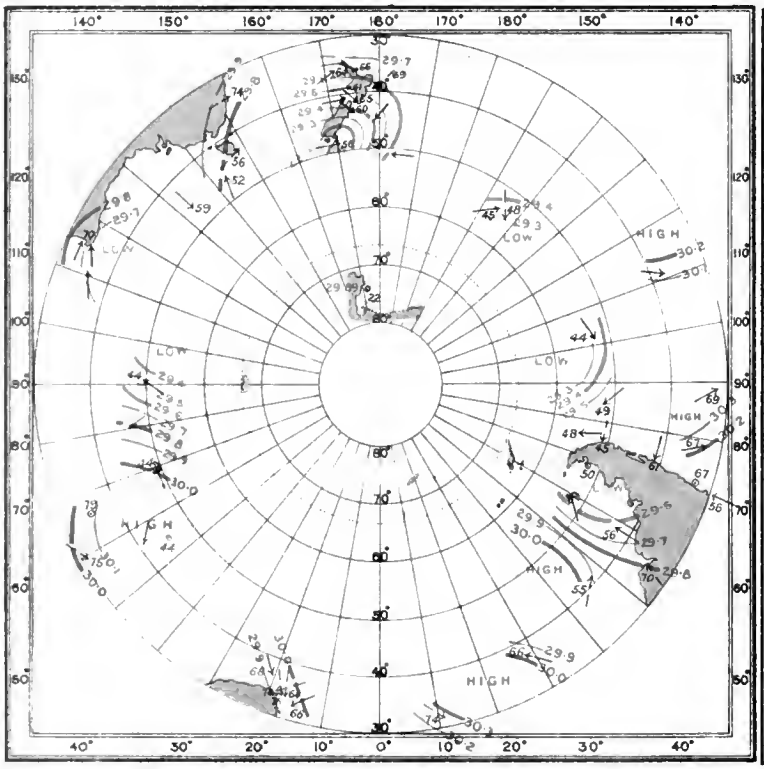

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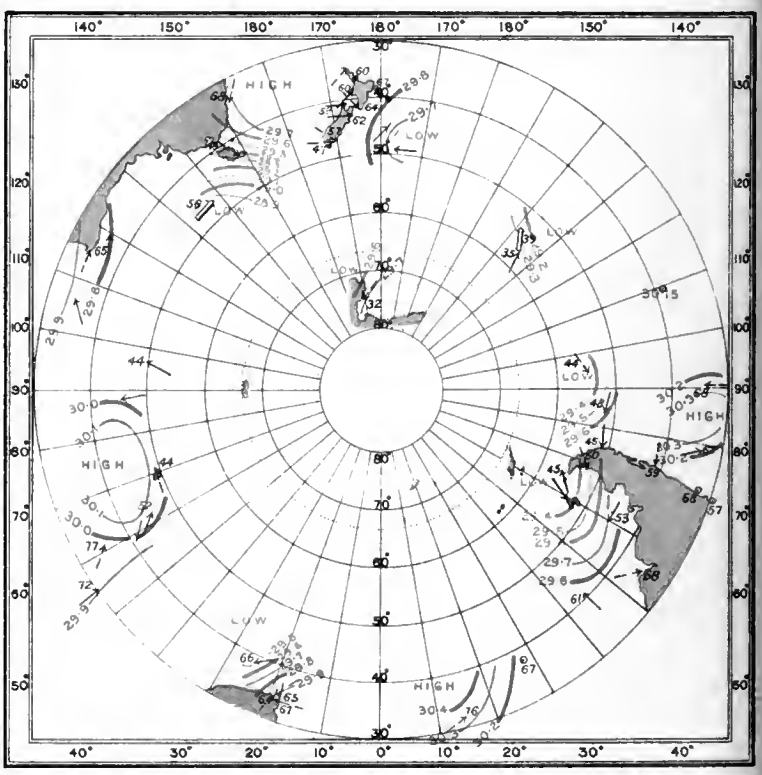


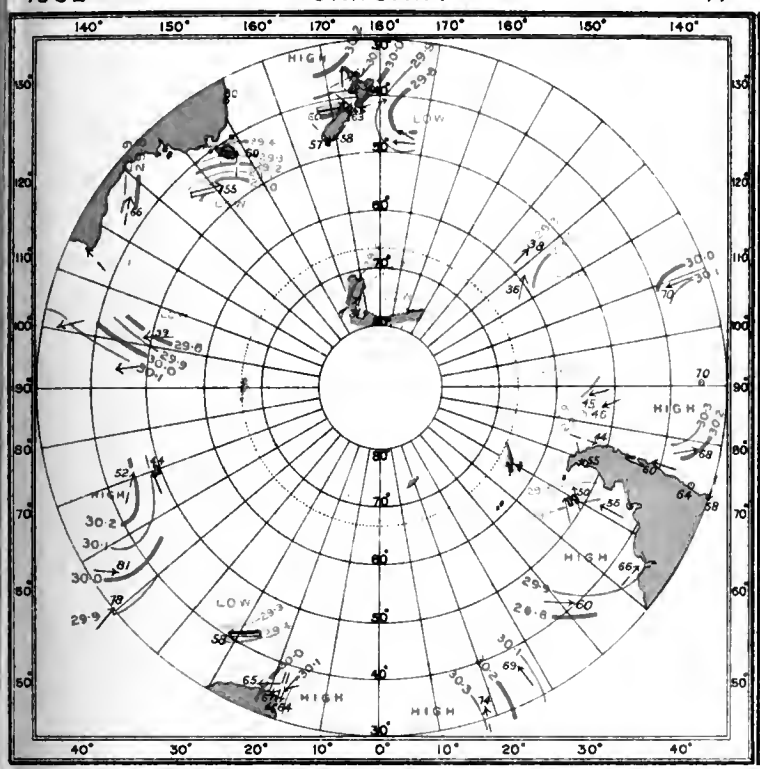
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 JANUARY 17



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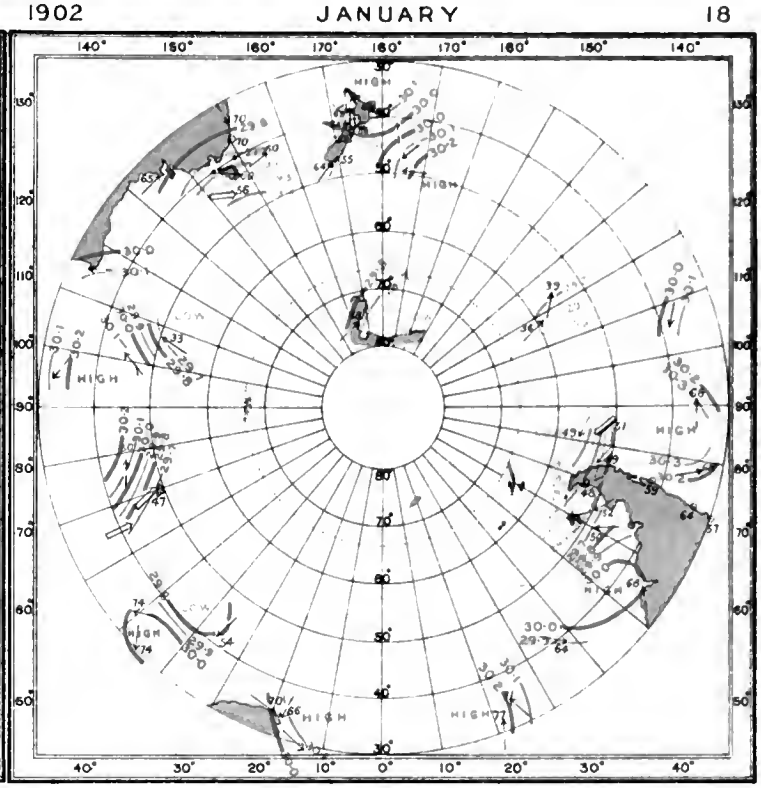

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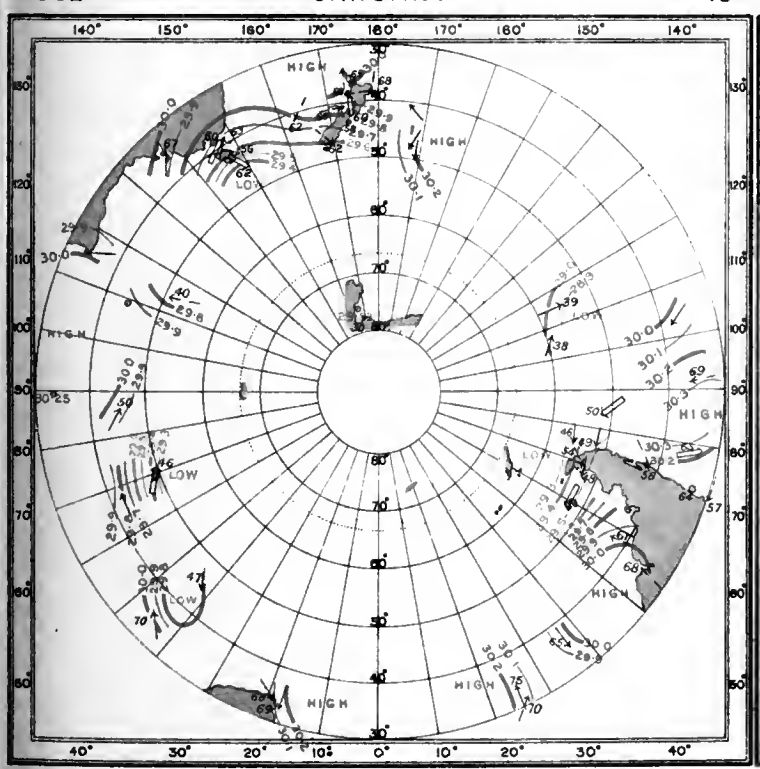

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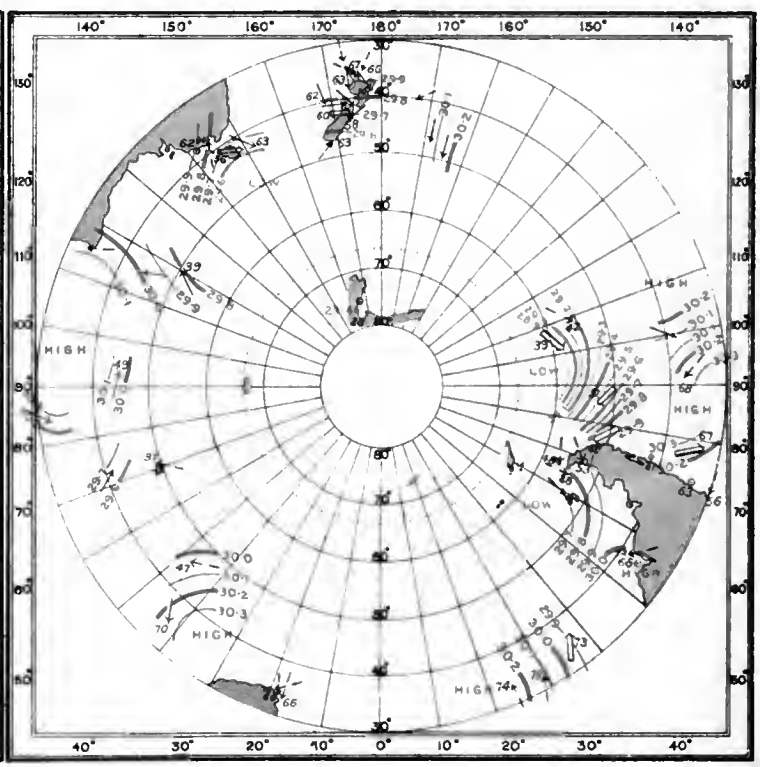


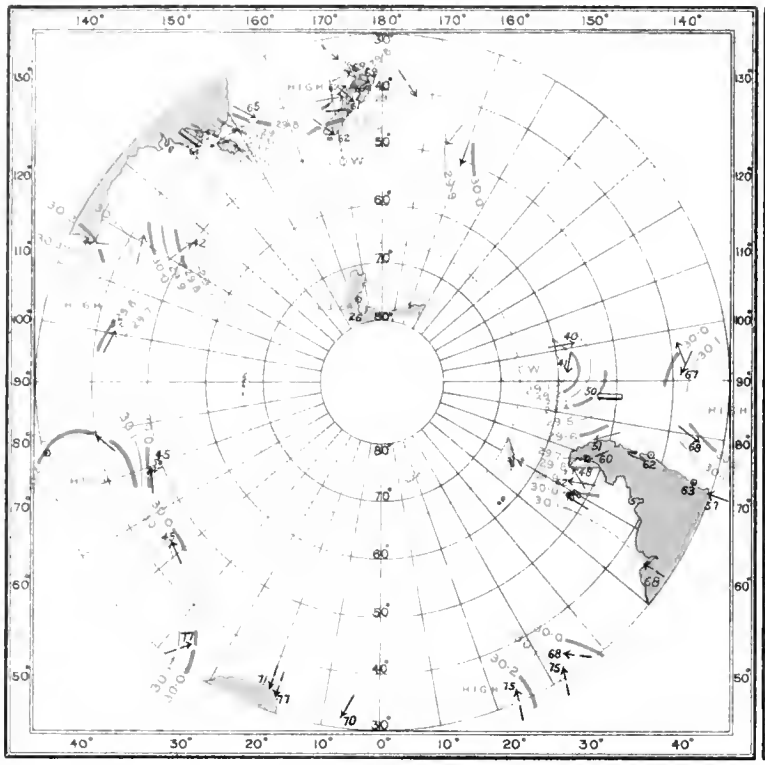
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1902 JANUARY 21



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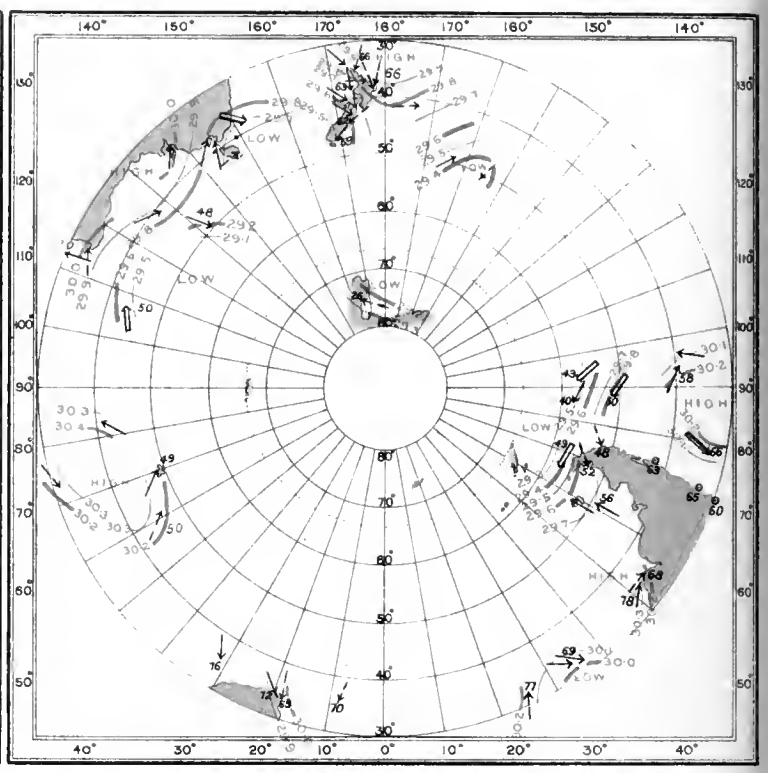

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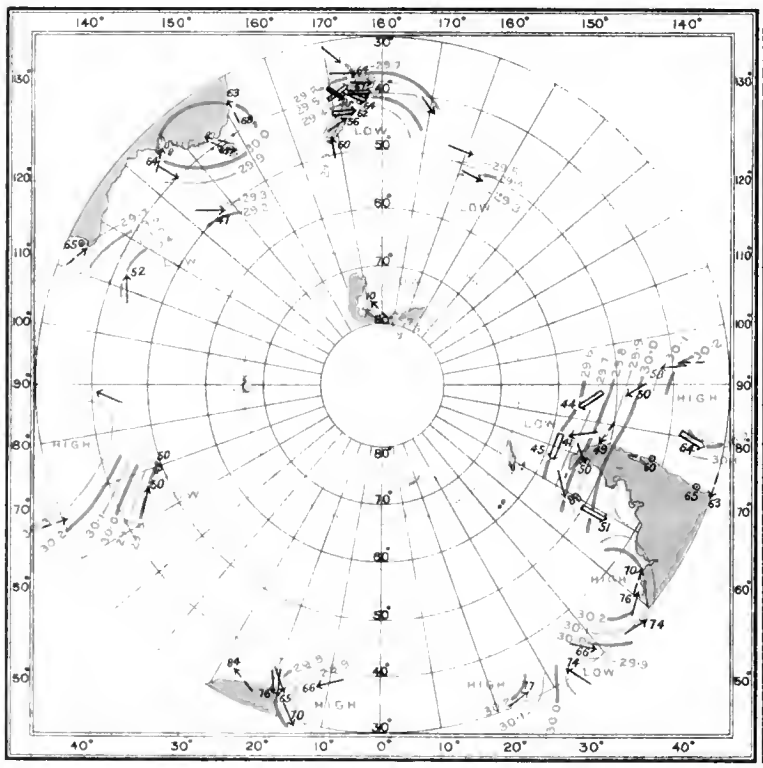

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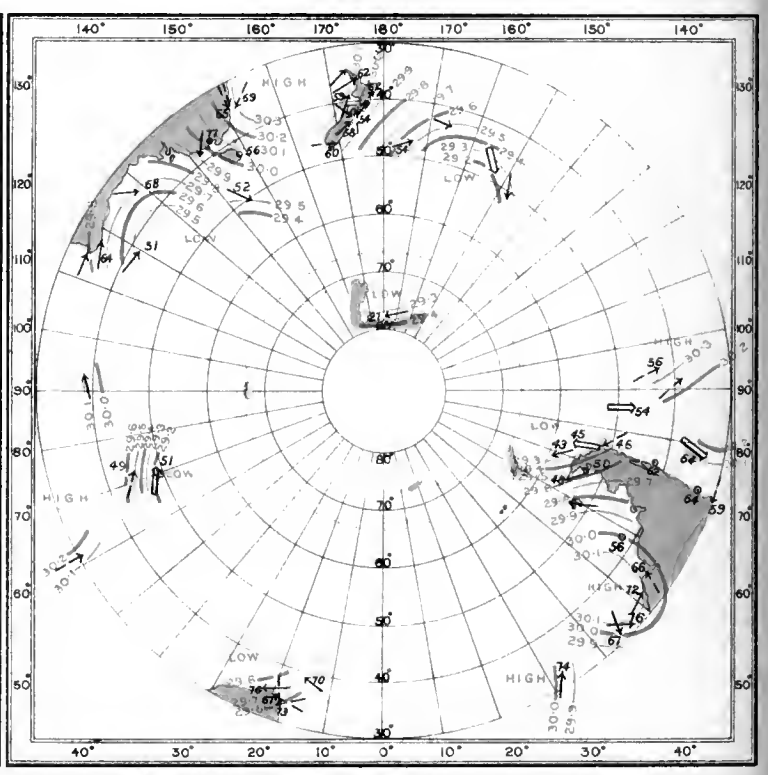

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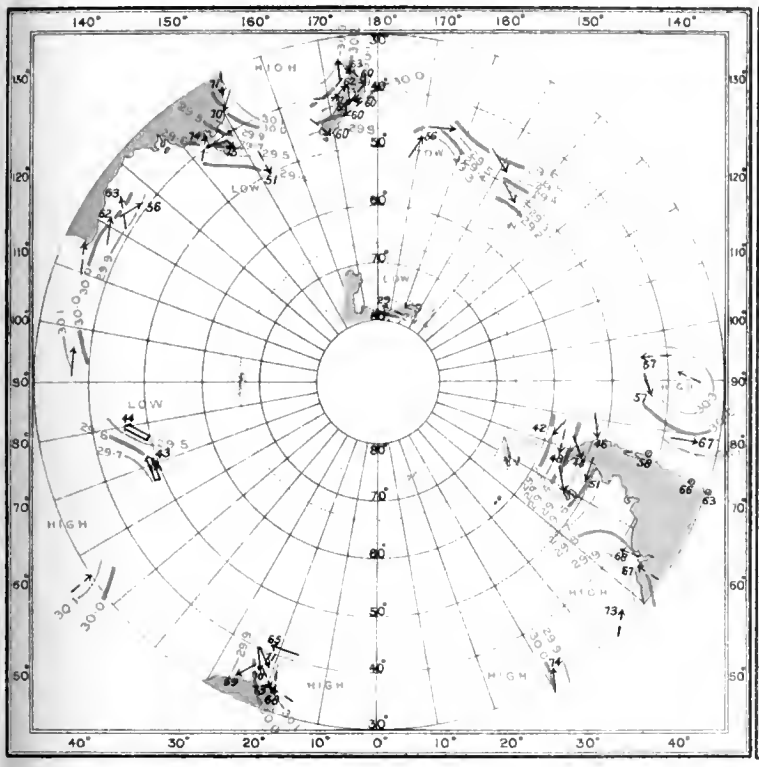
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 JANUARY 25



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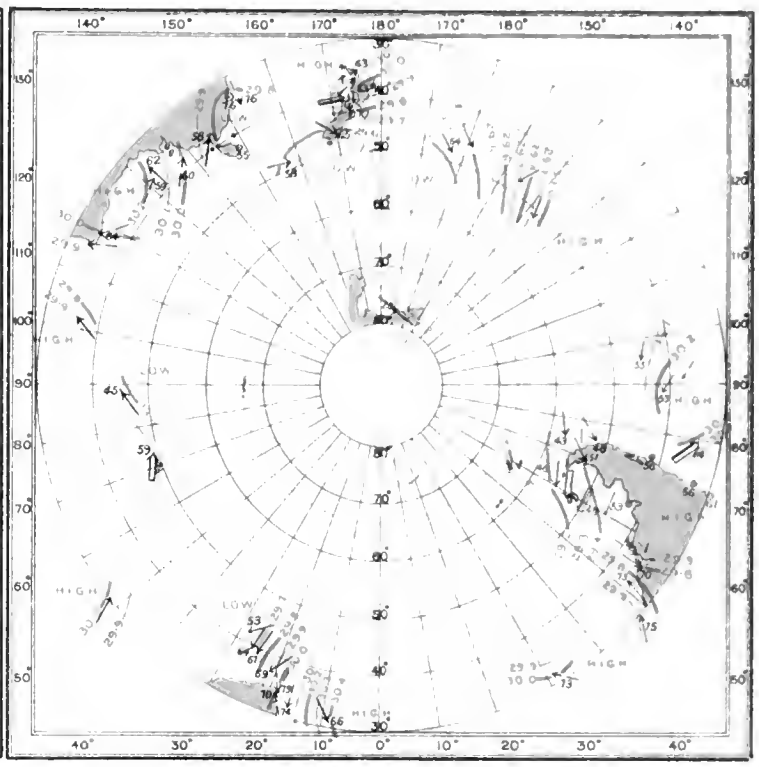

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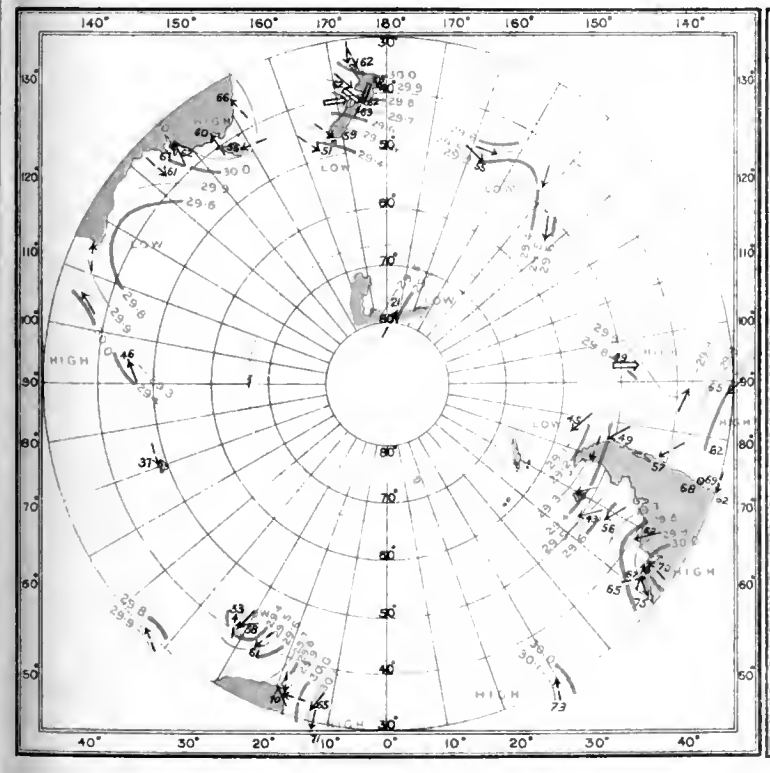

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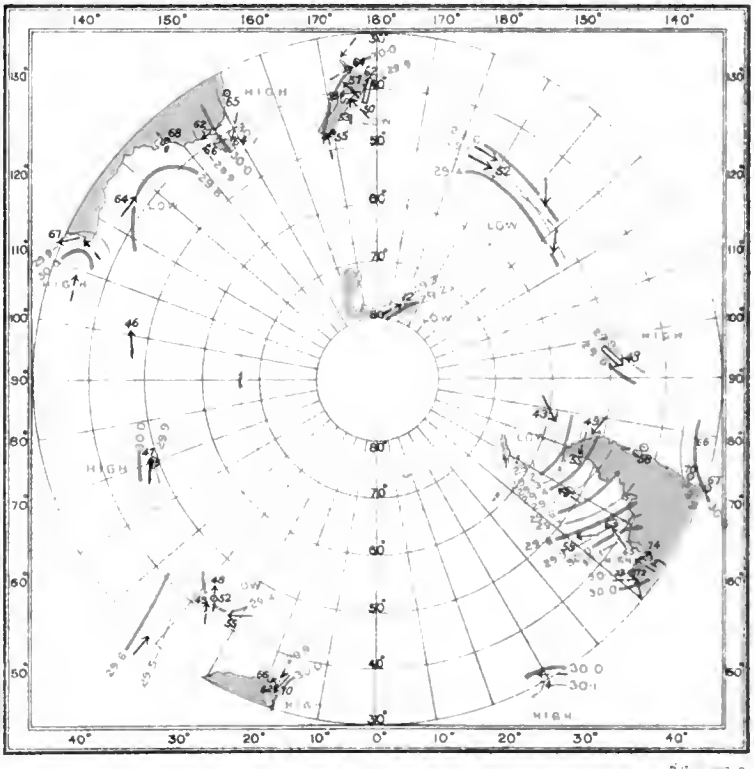


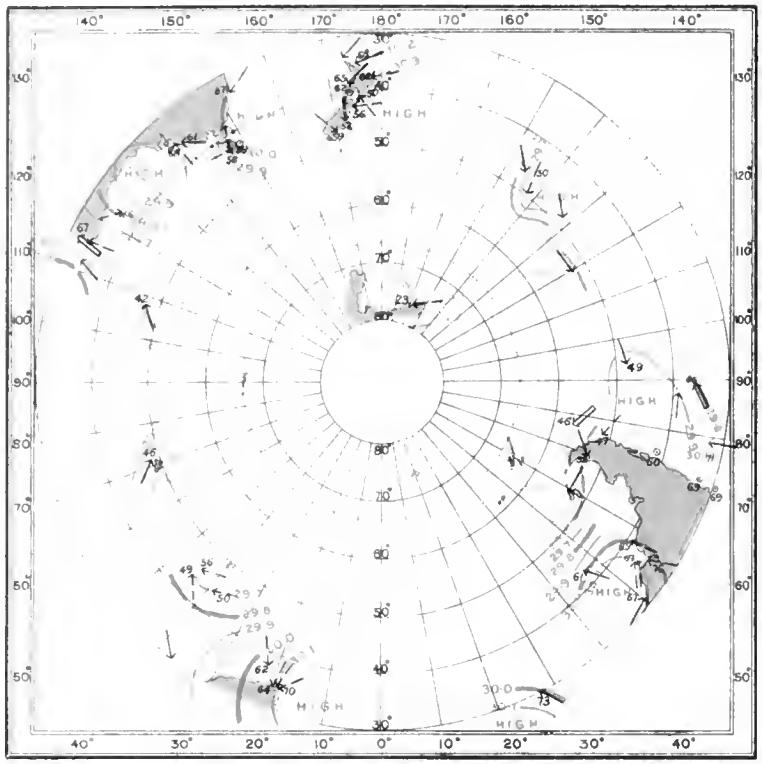
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1902 JANUARY 29



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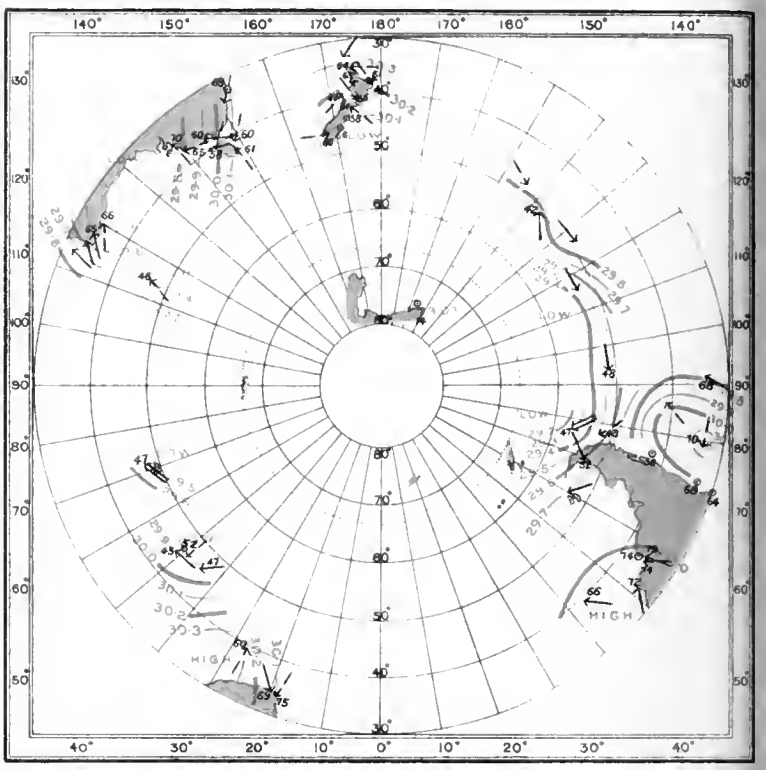

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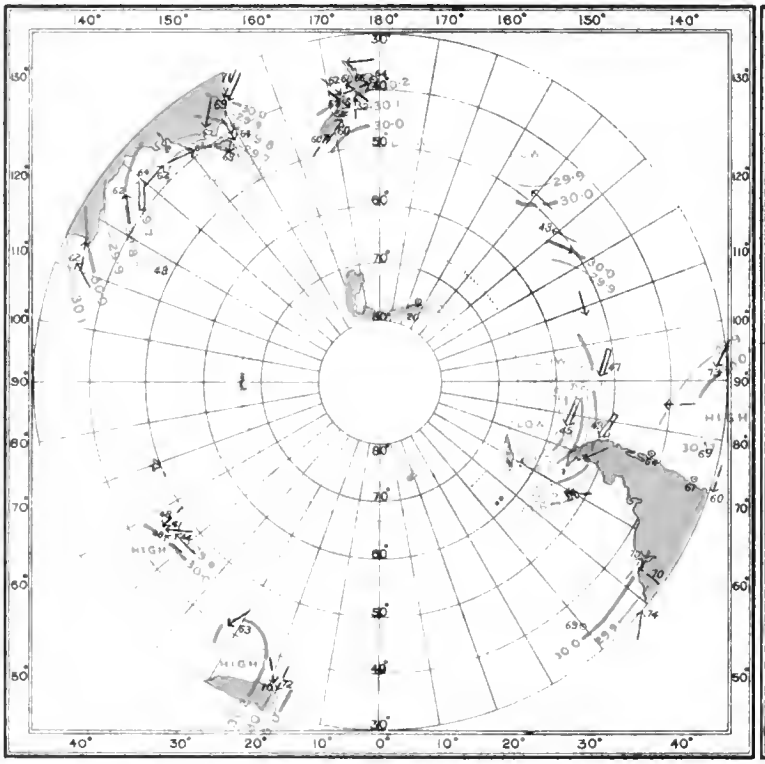

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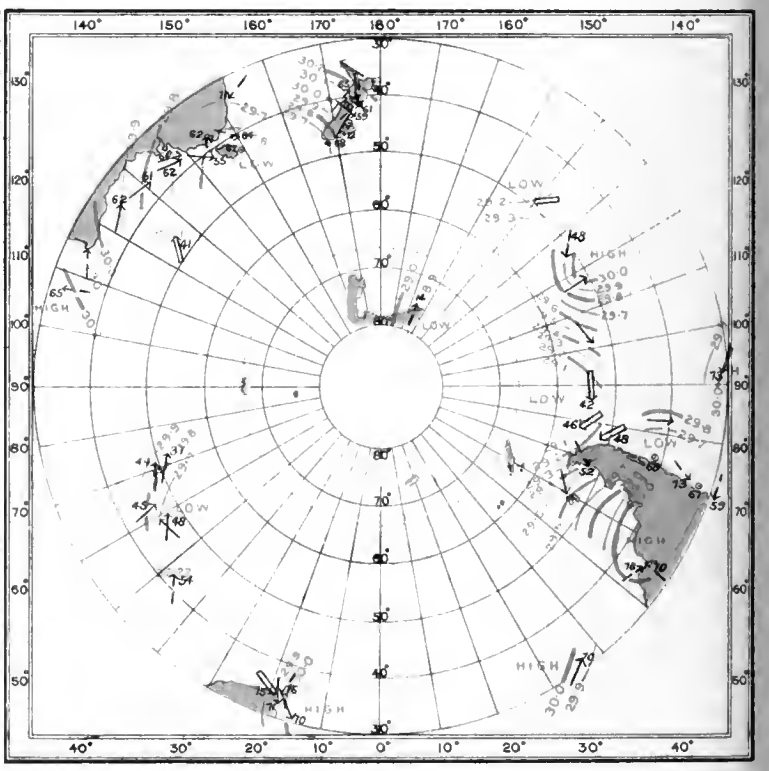

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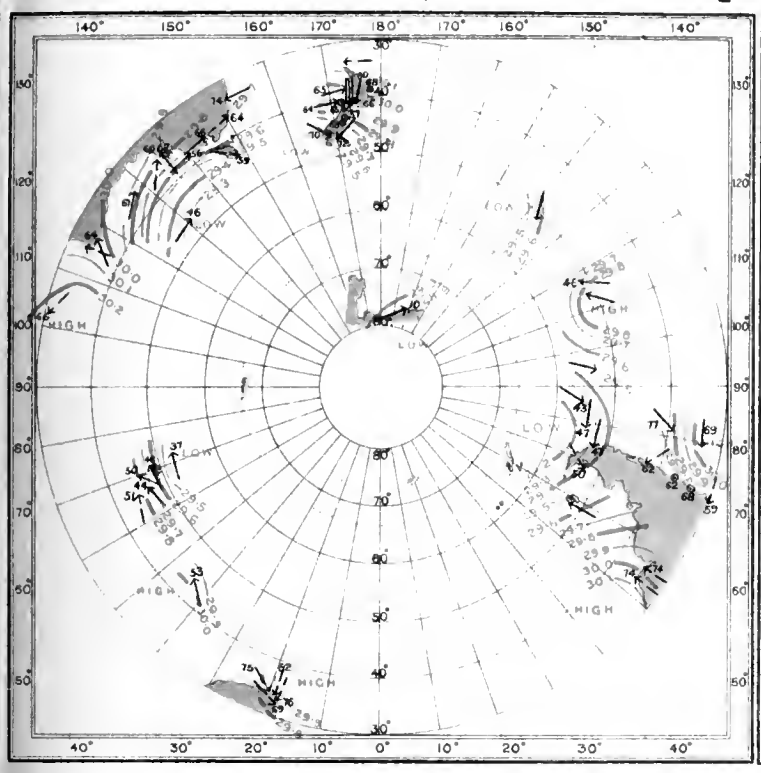
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 FEBRUARY 2



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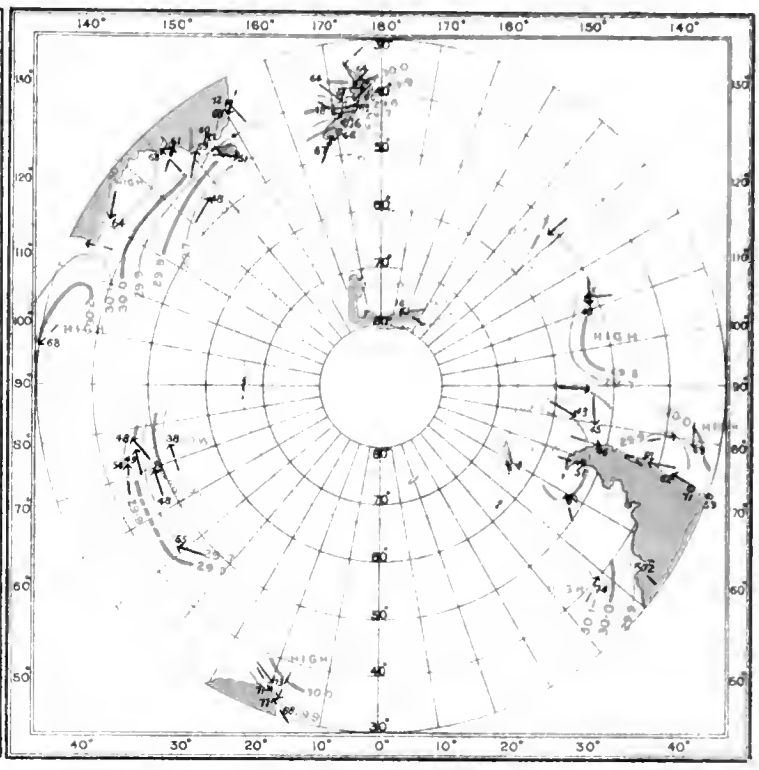

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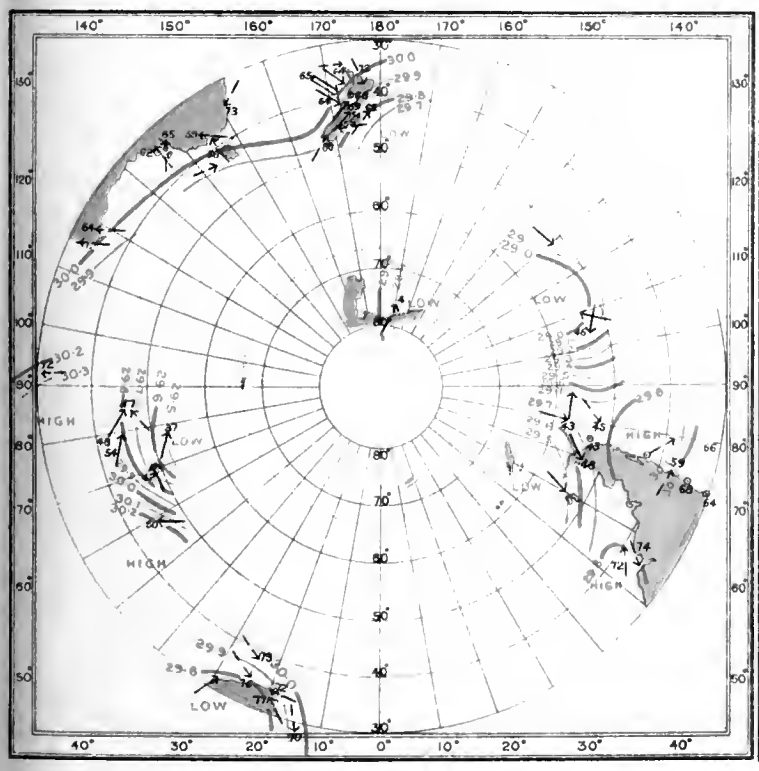

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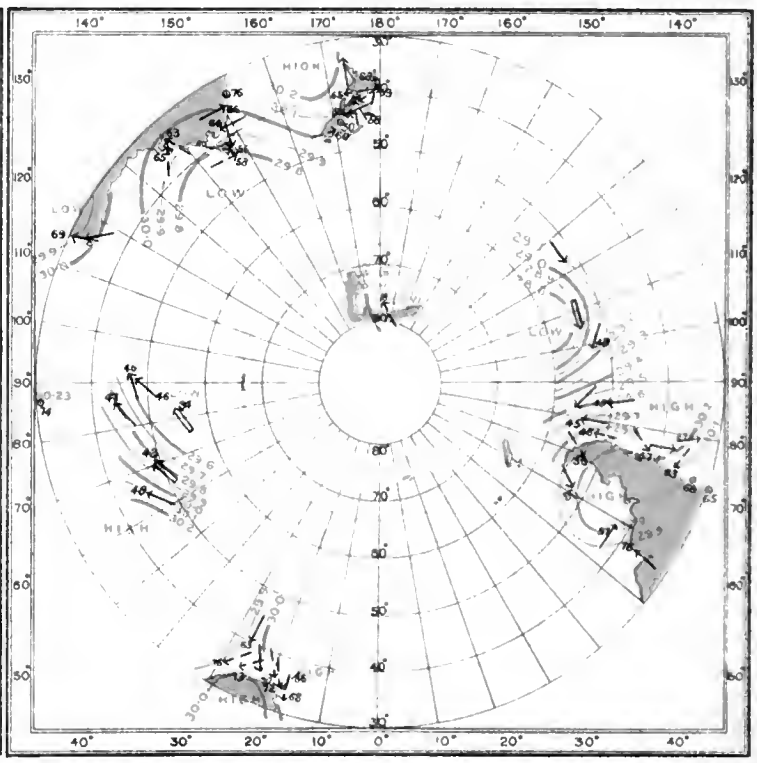
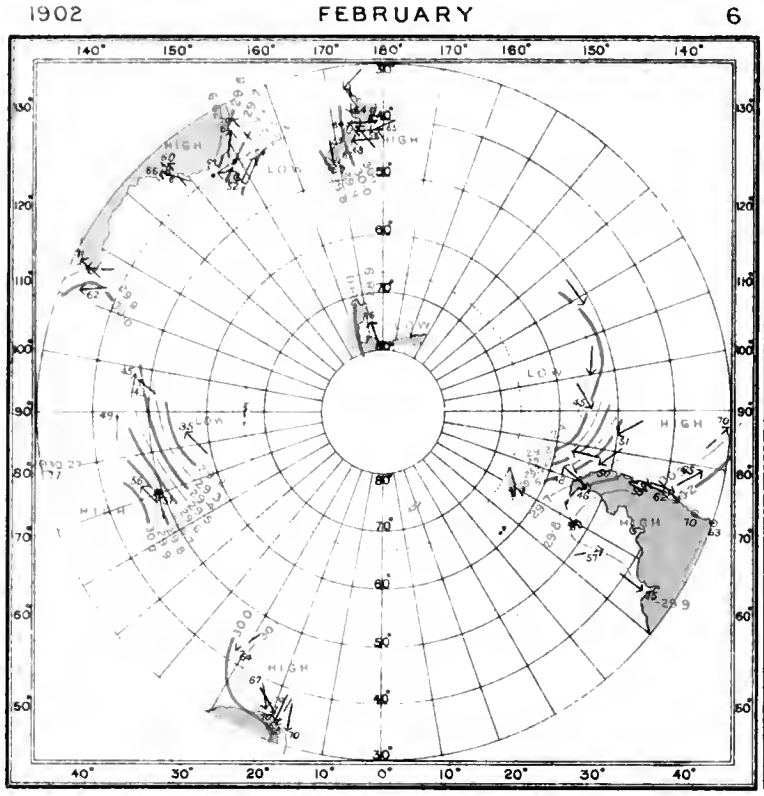


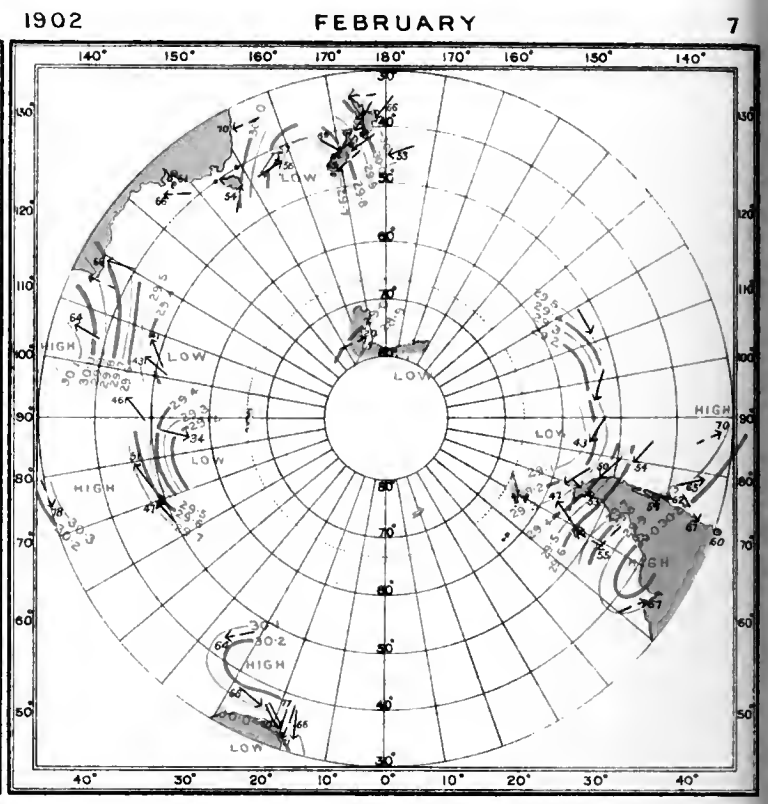
For explanation see Key map

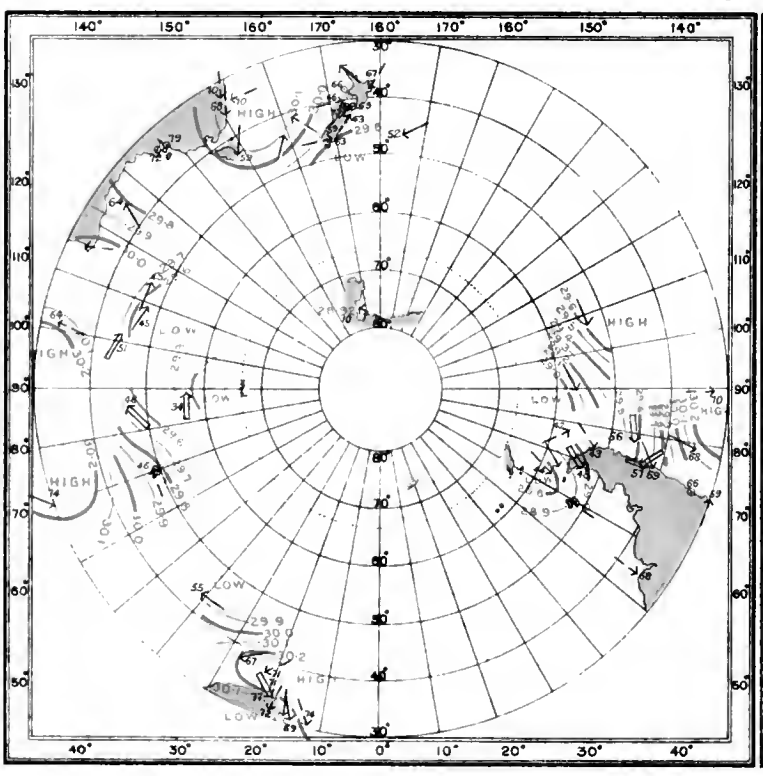
INTERNATIONAL ANTARCTIC CO-OPERATION.

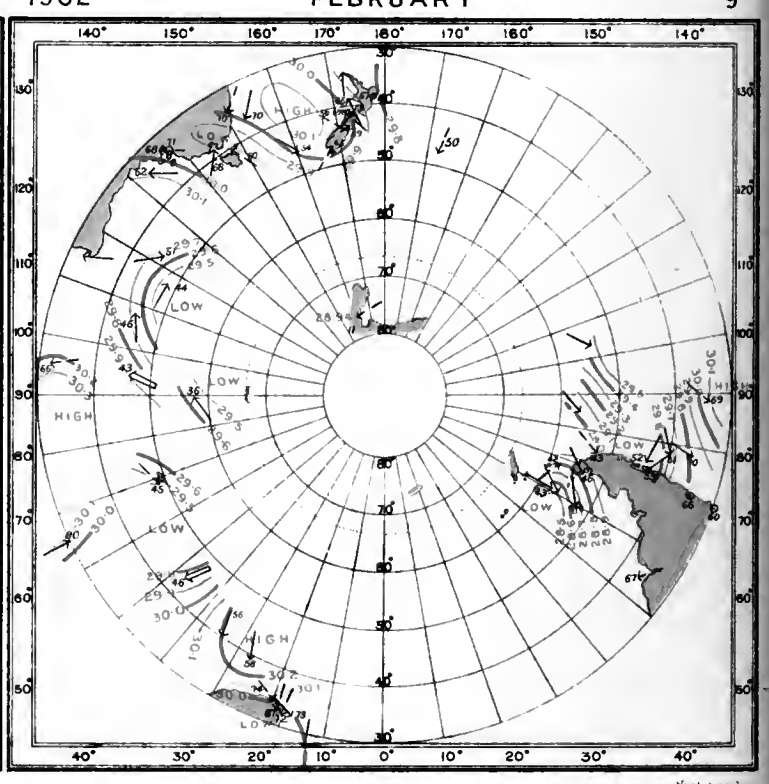
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.









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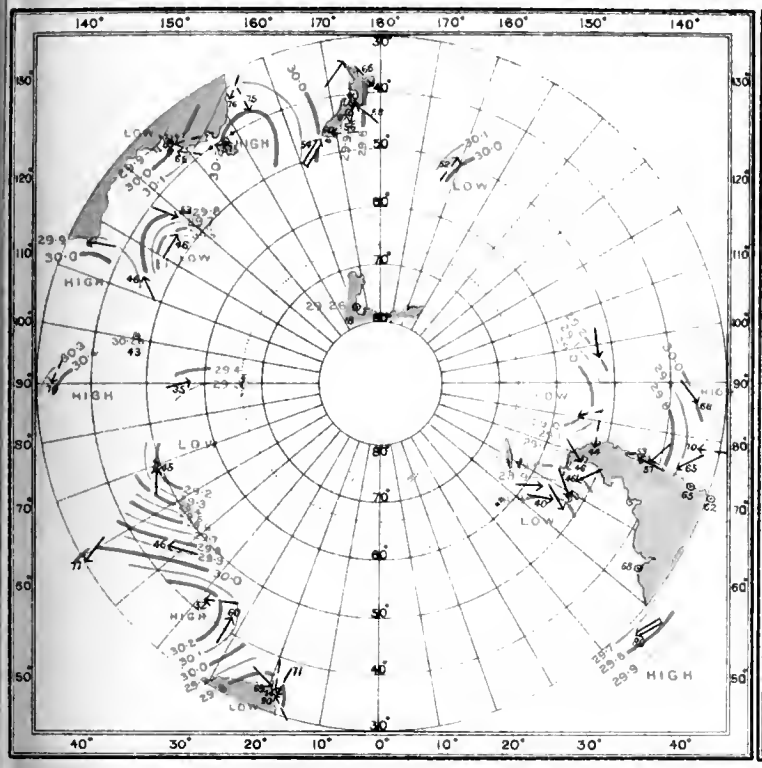
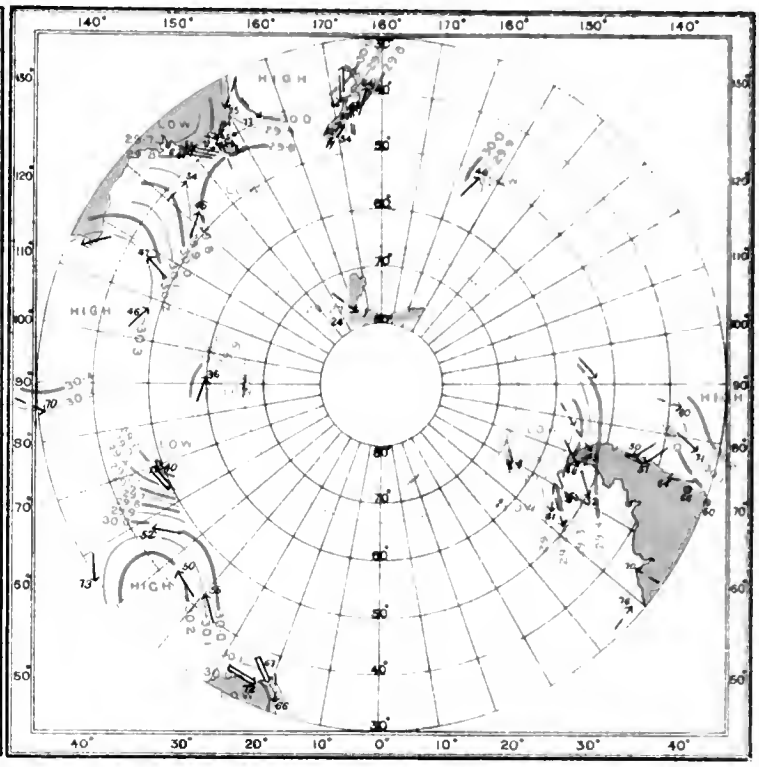
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1902 FEBRUARY 10



1902 FEBRUARY 11



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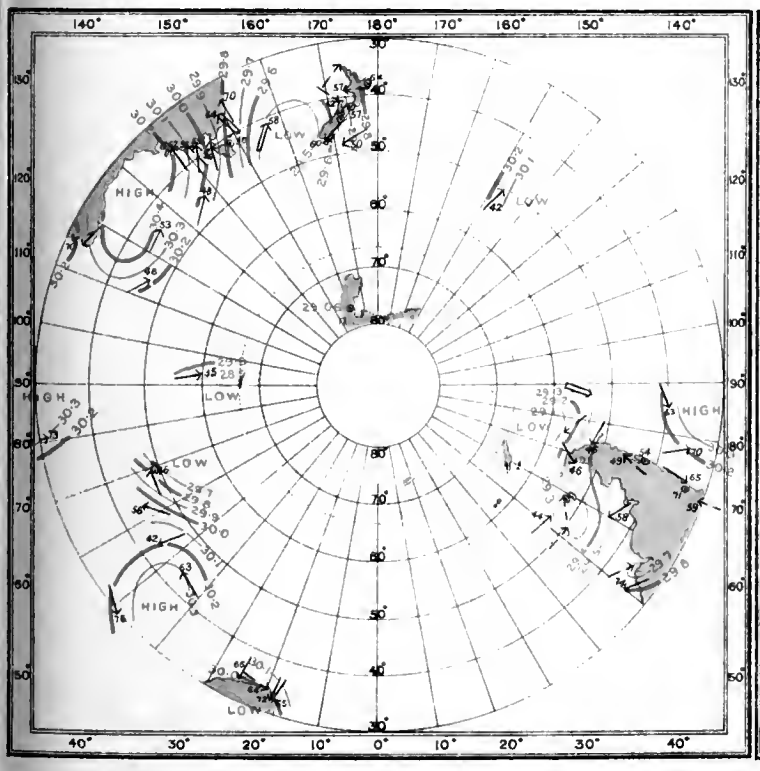

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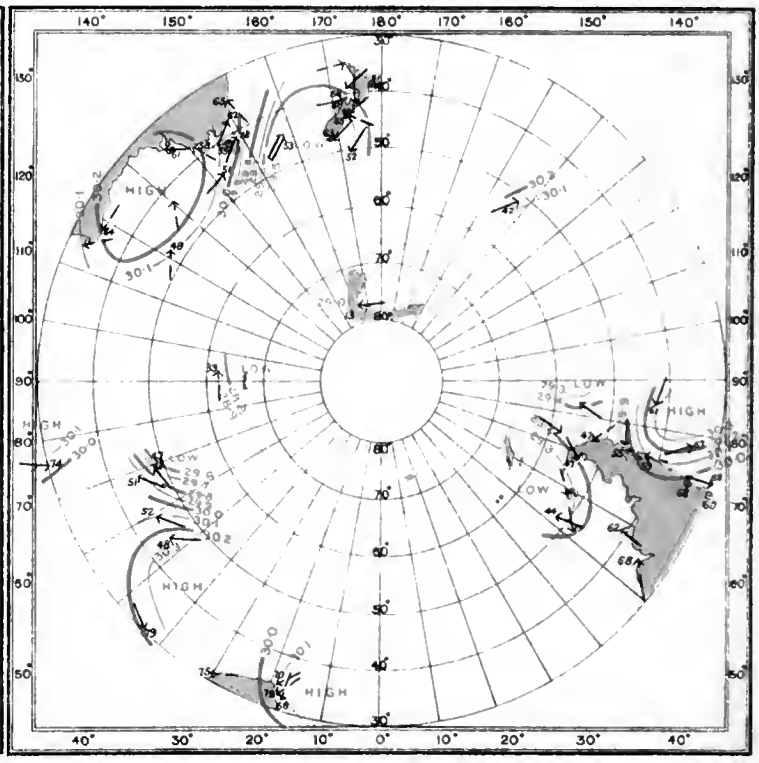


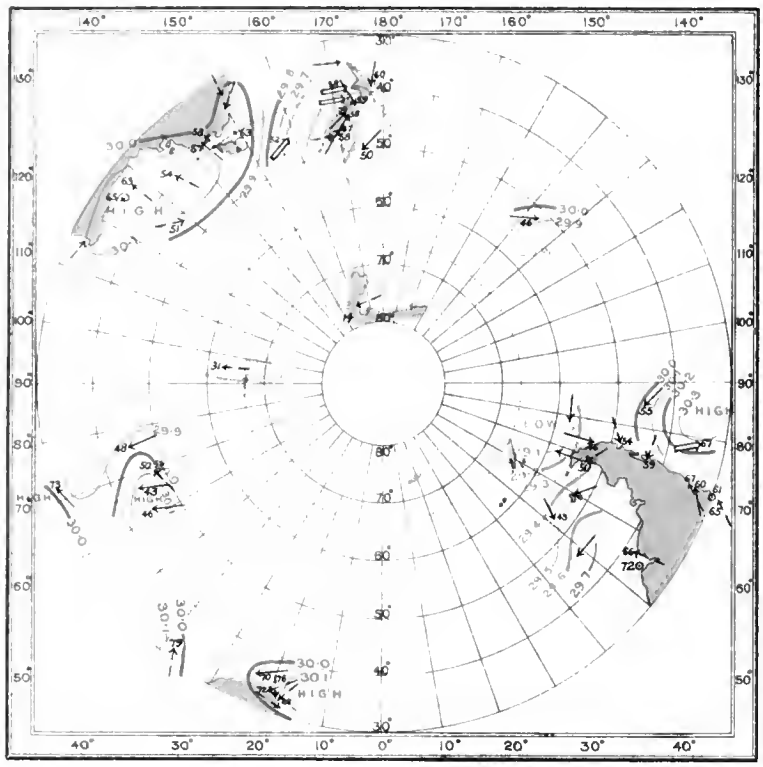
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1902 FEBRUARY 14



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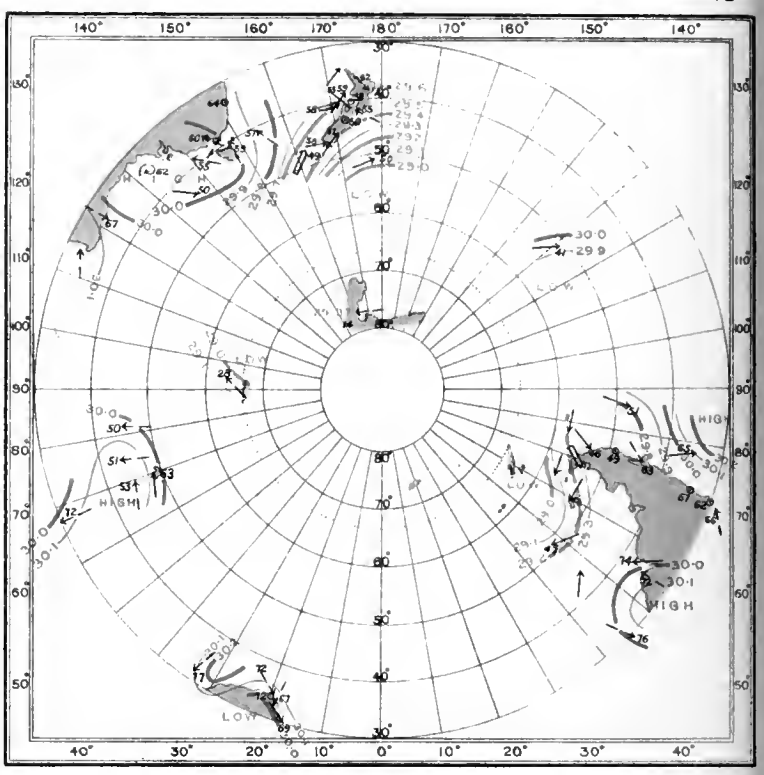

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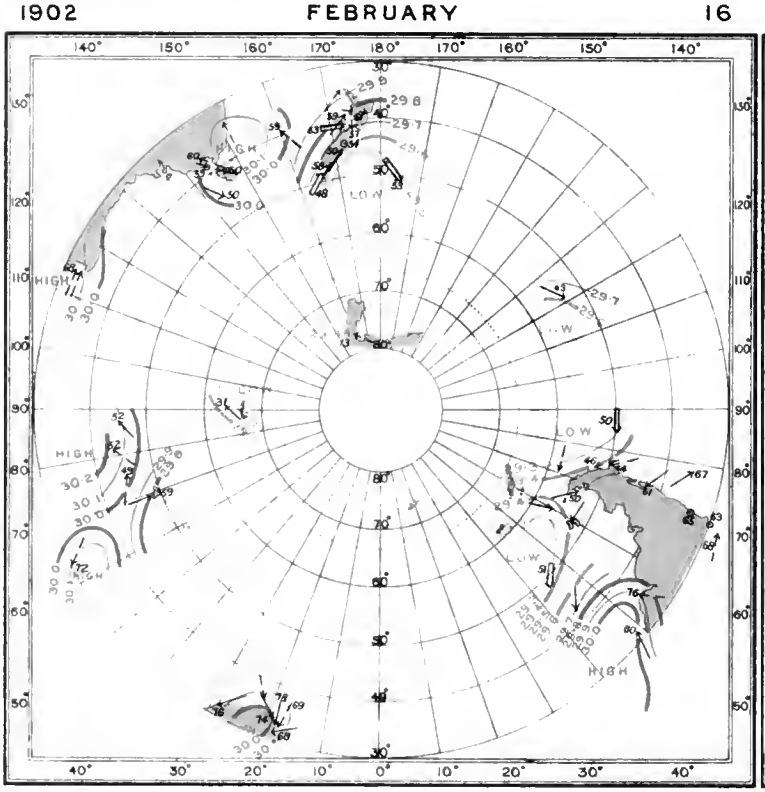

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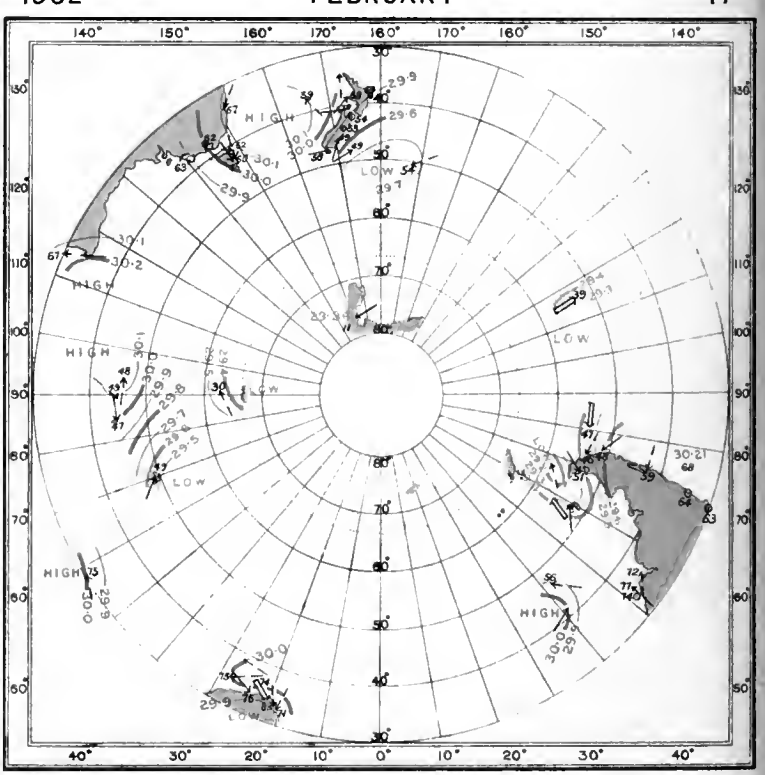


Ruth London

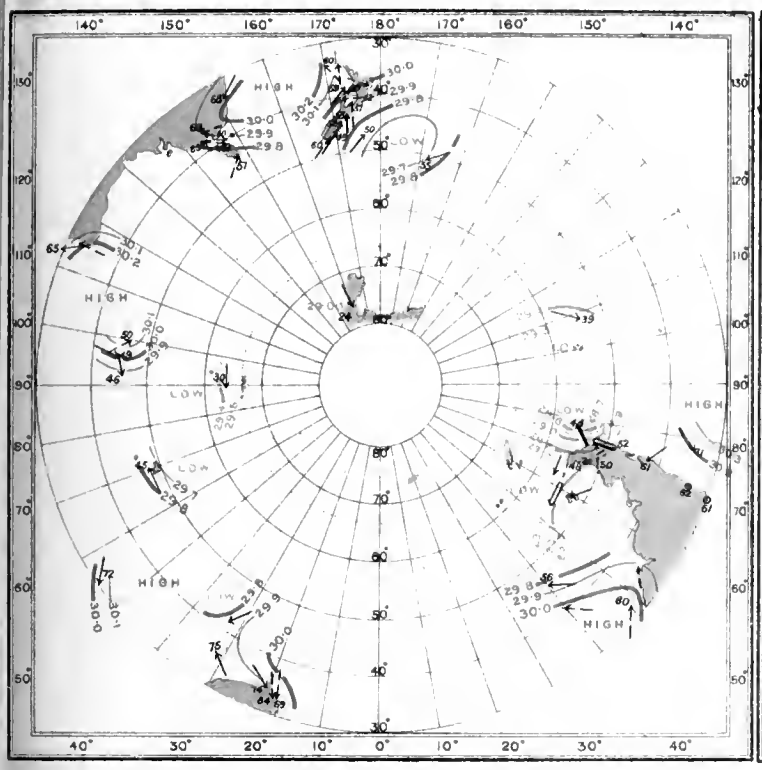
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 FEBRUARY 18



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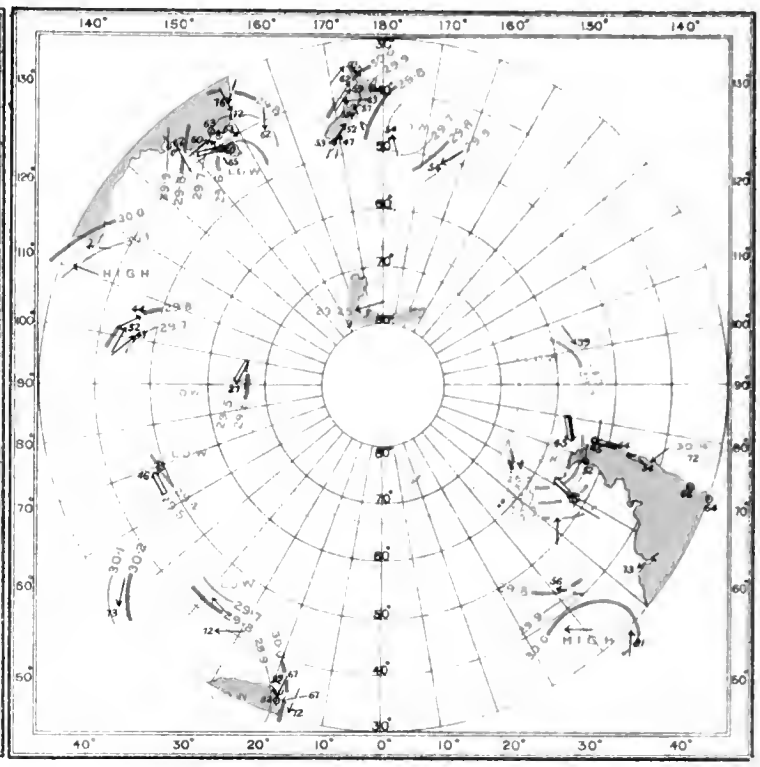

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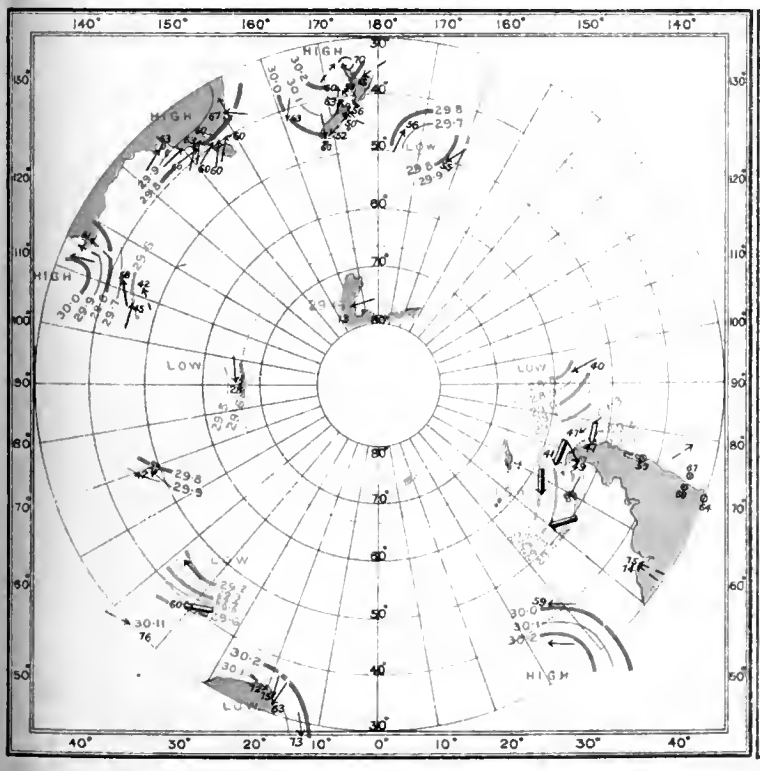

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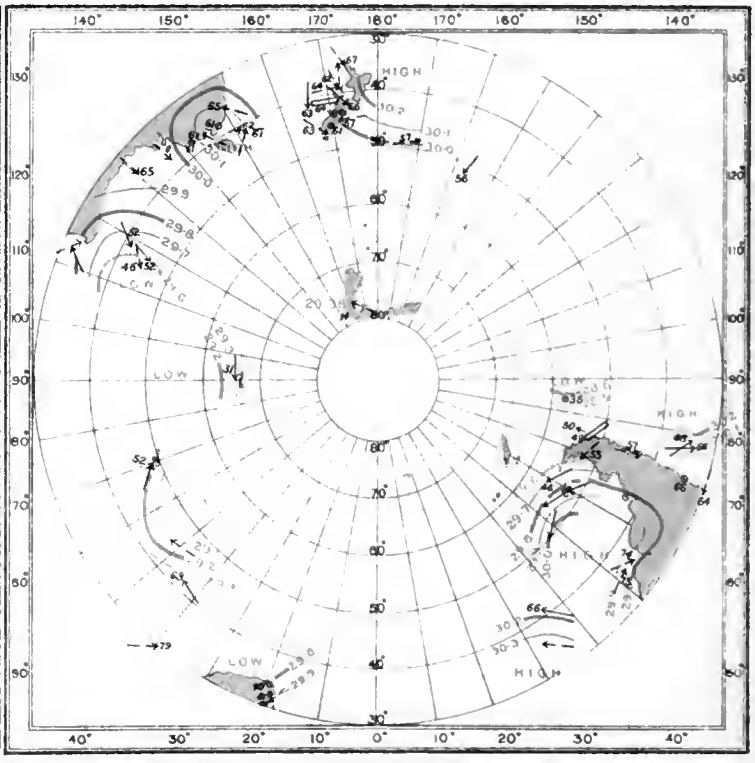


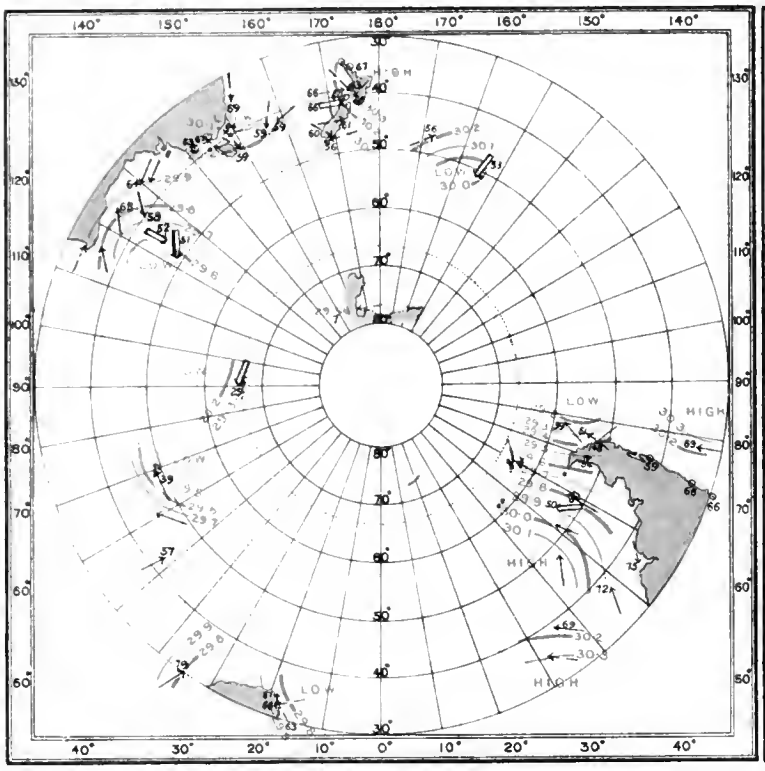
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 FEBRUARY 22



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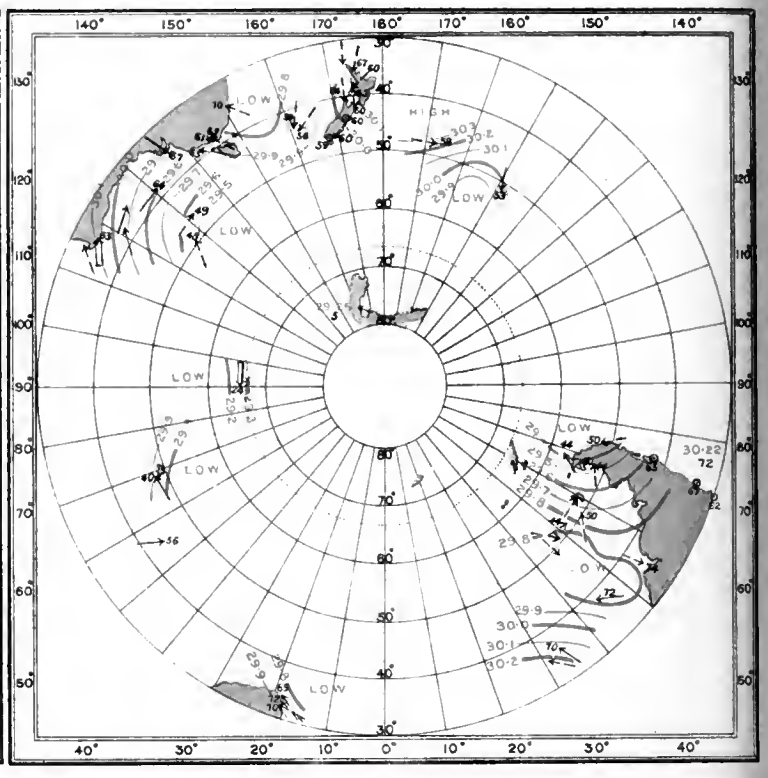

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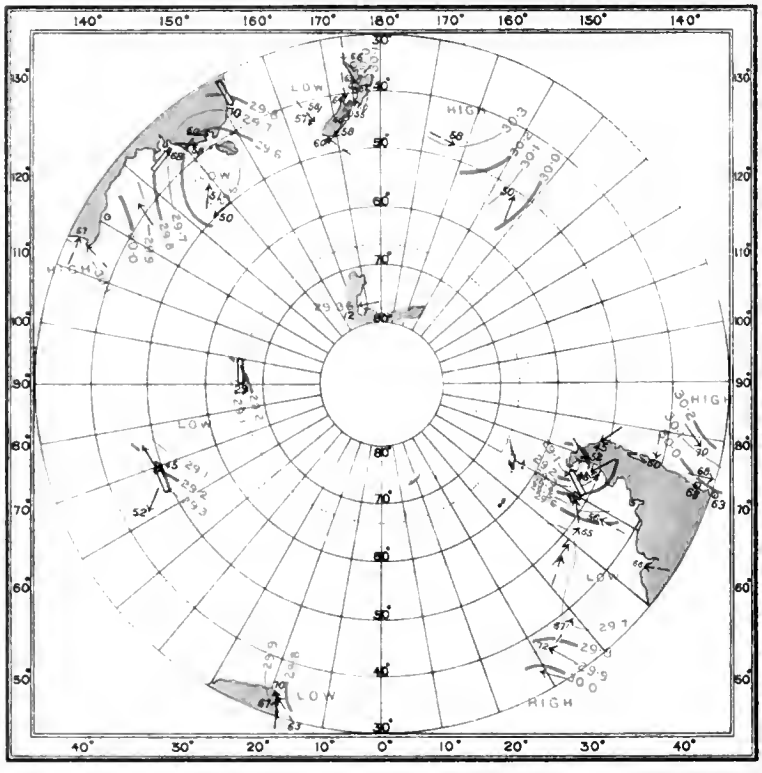

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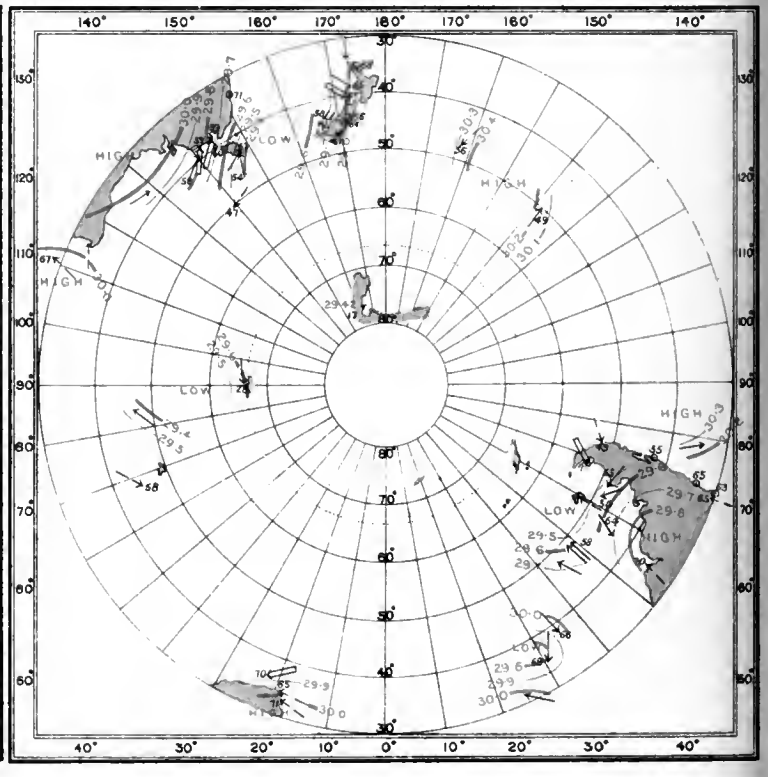


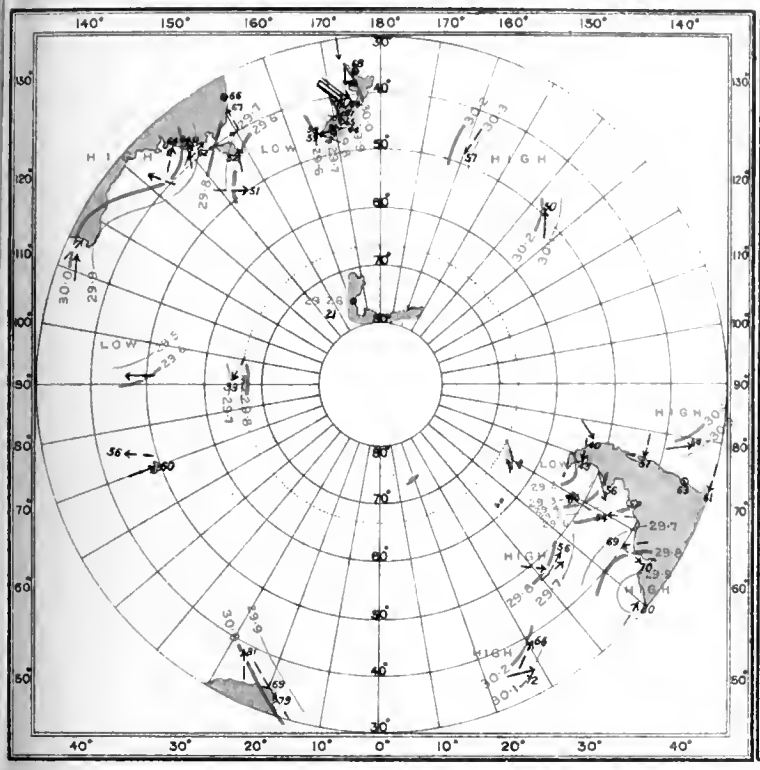
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1902 FEBRUARY 26



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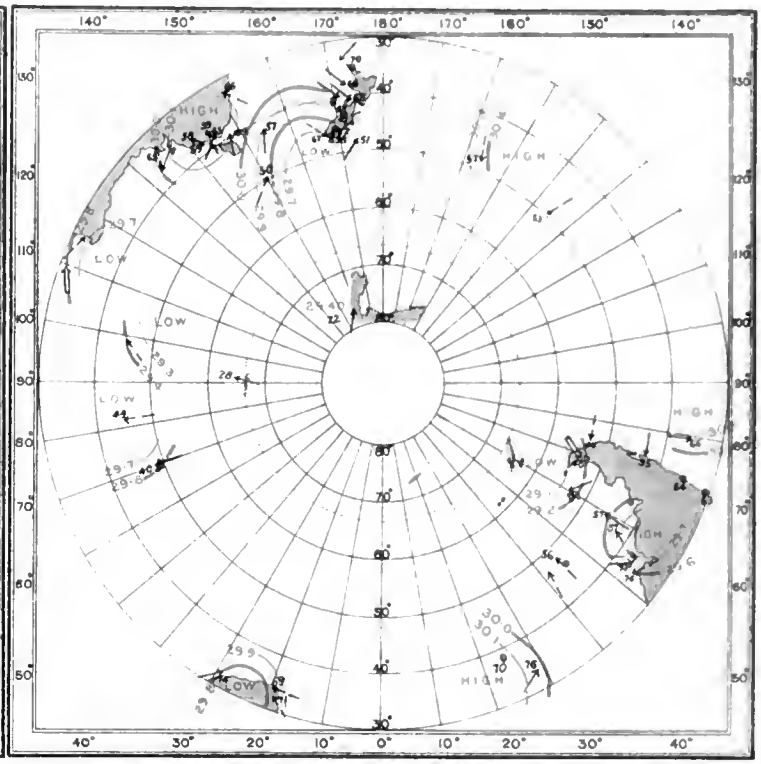

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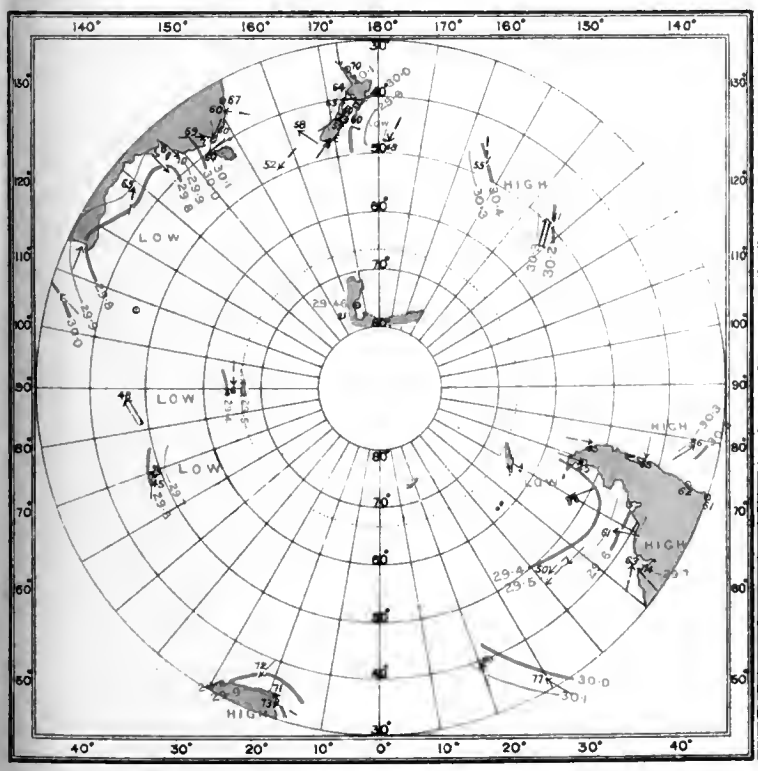

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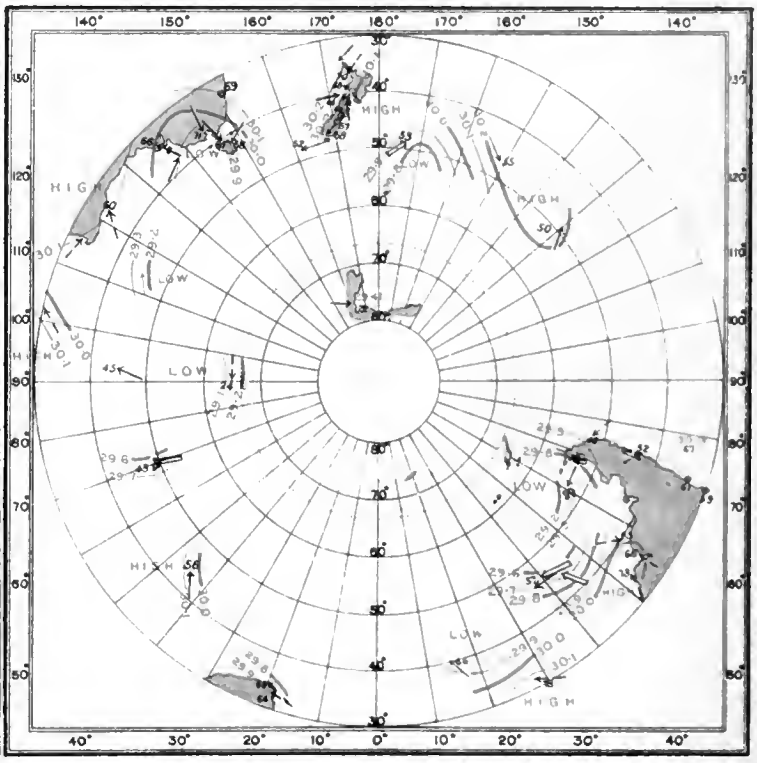


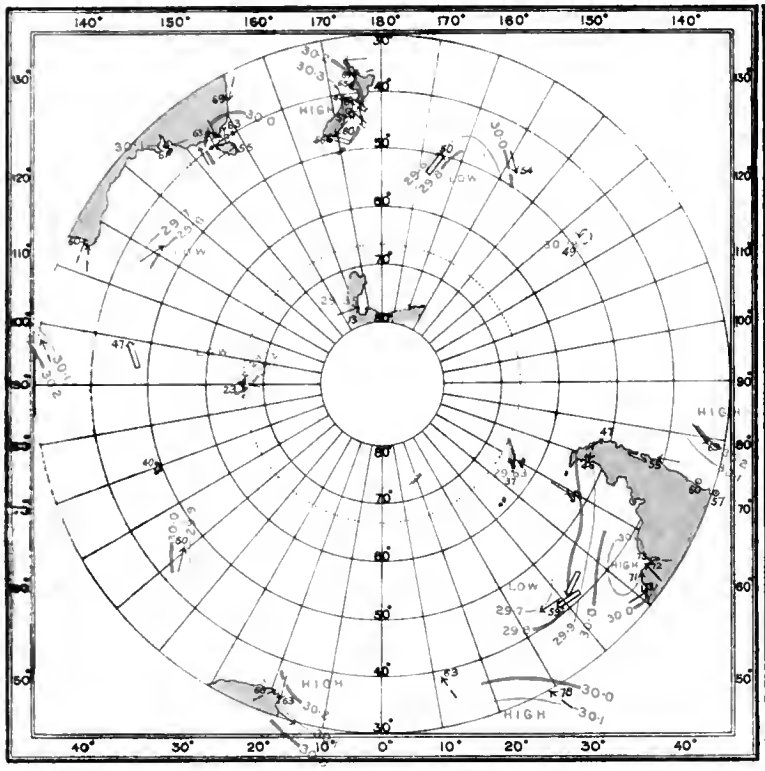
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 MARCH 2



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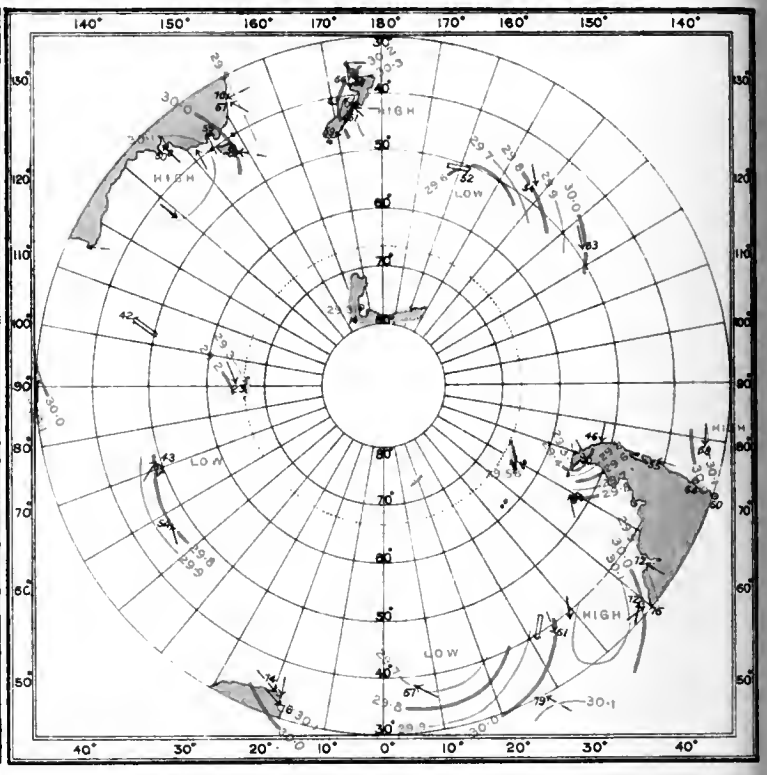

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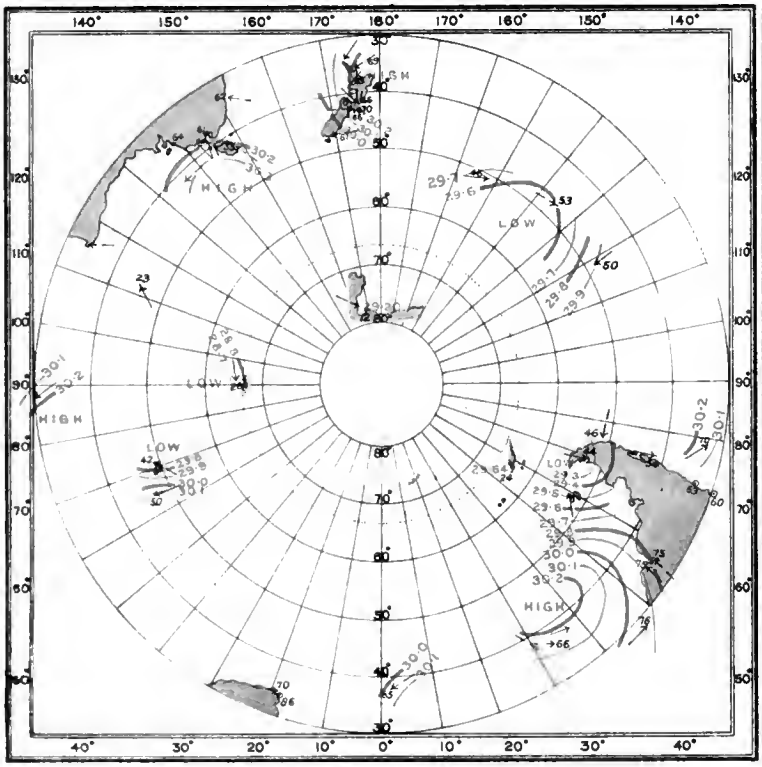

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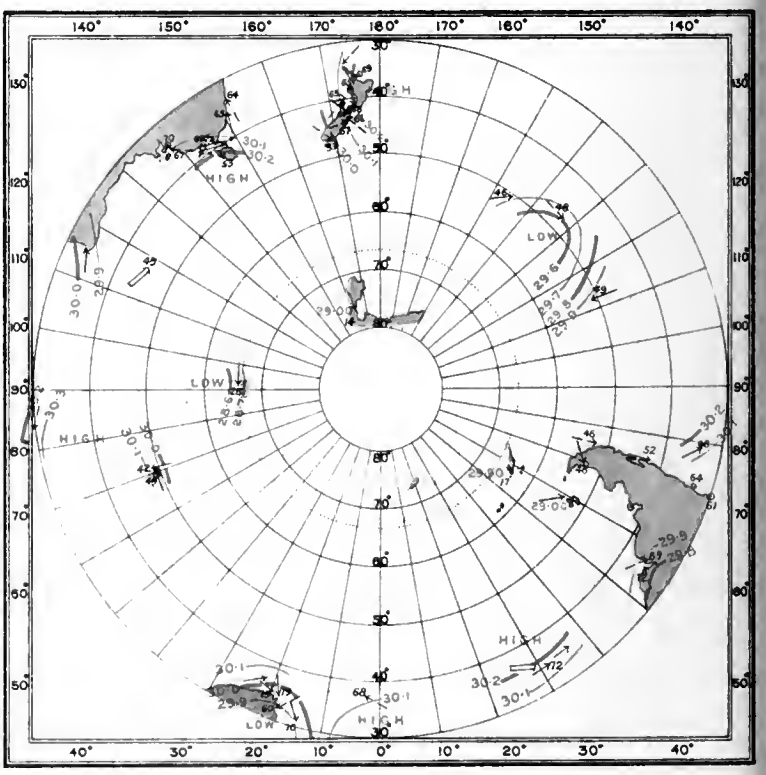


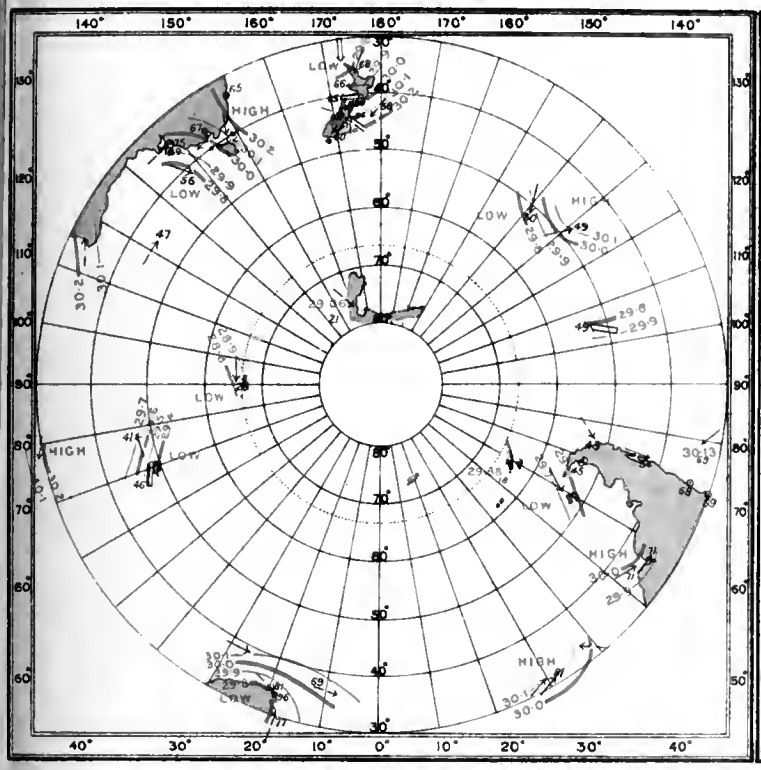
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 MARCH 6



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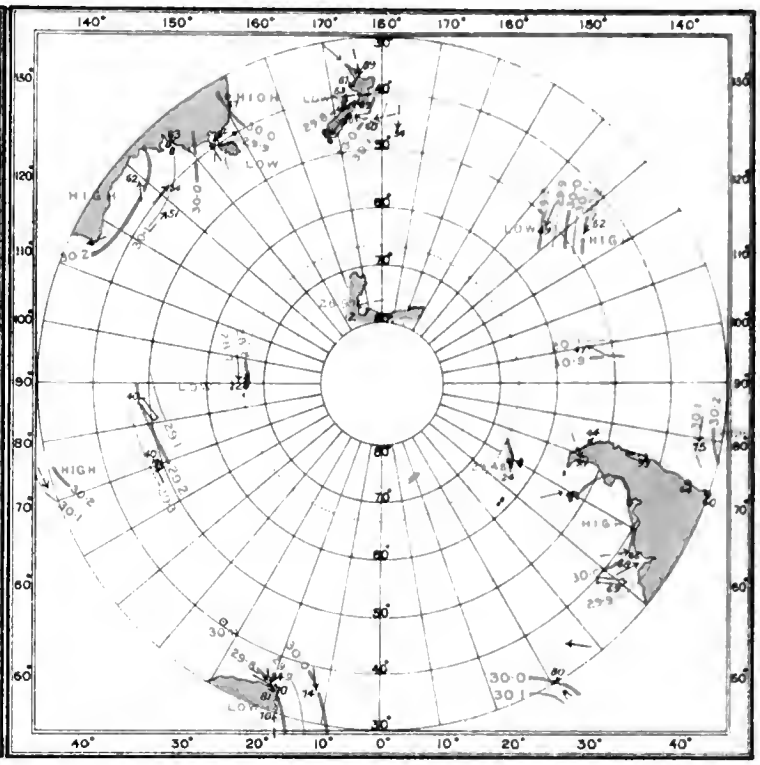

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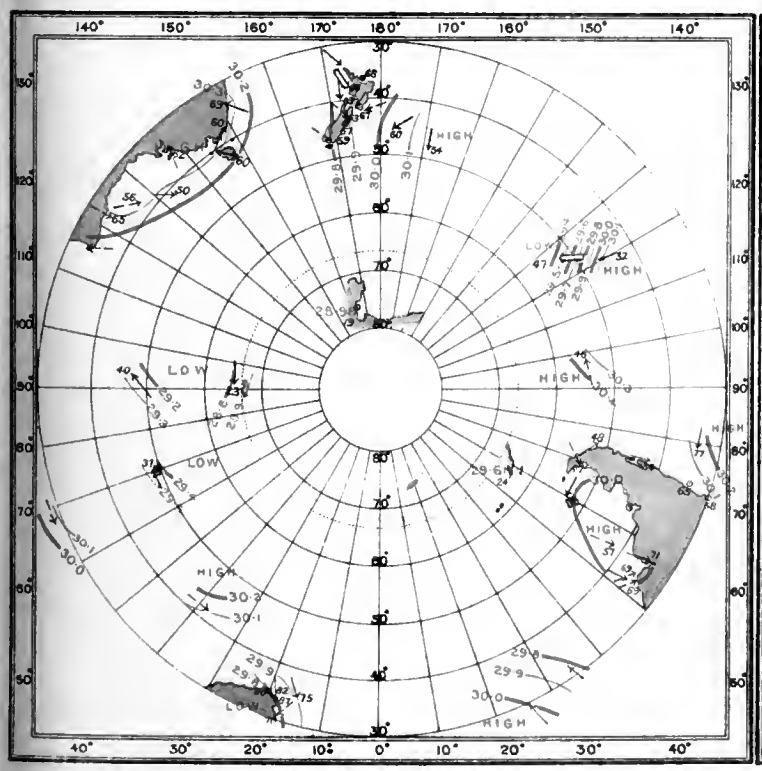

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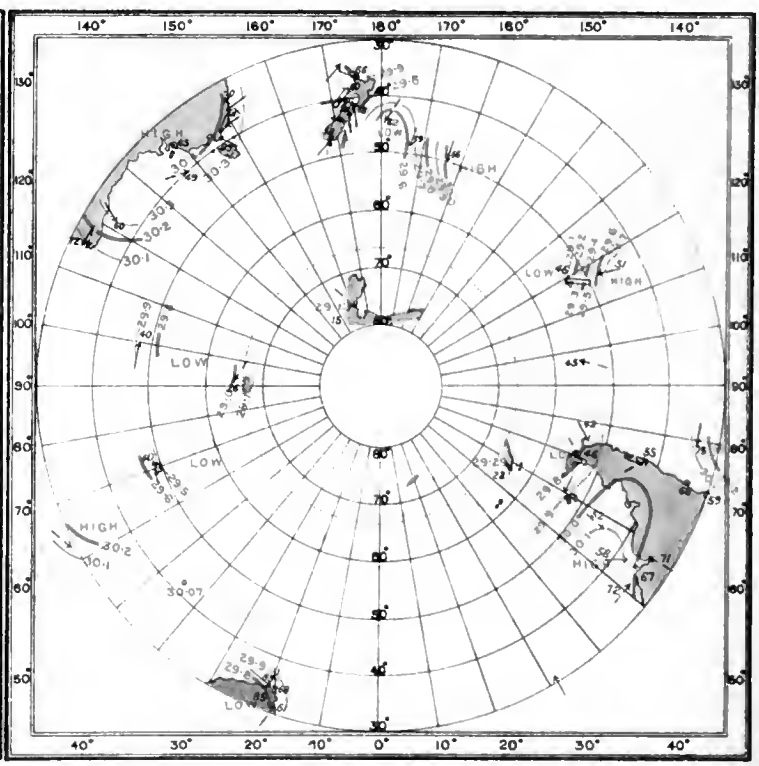


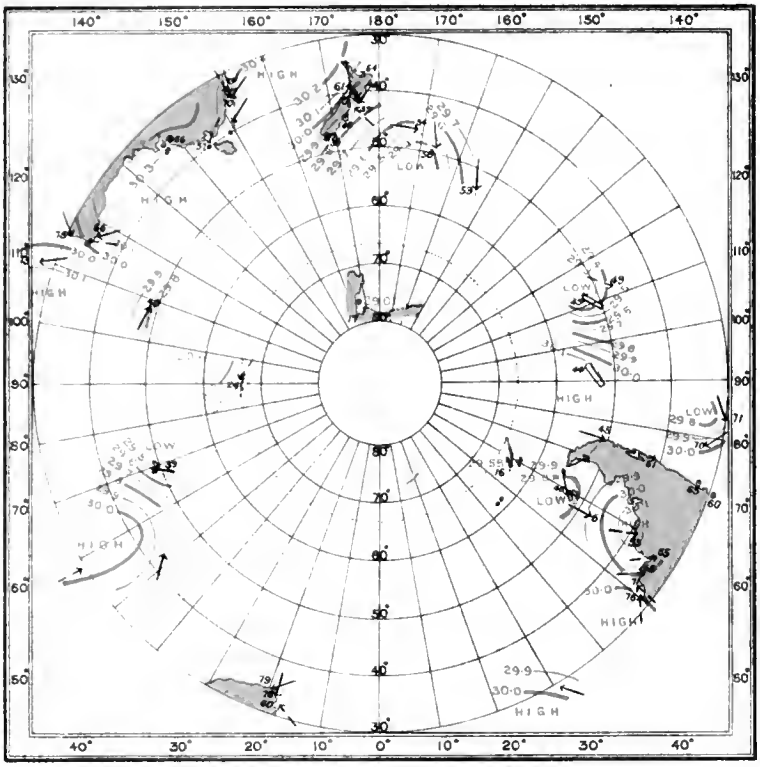
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 MARCH 10



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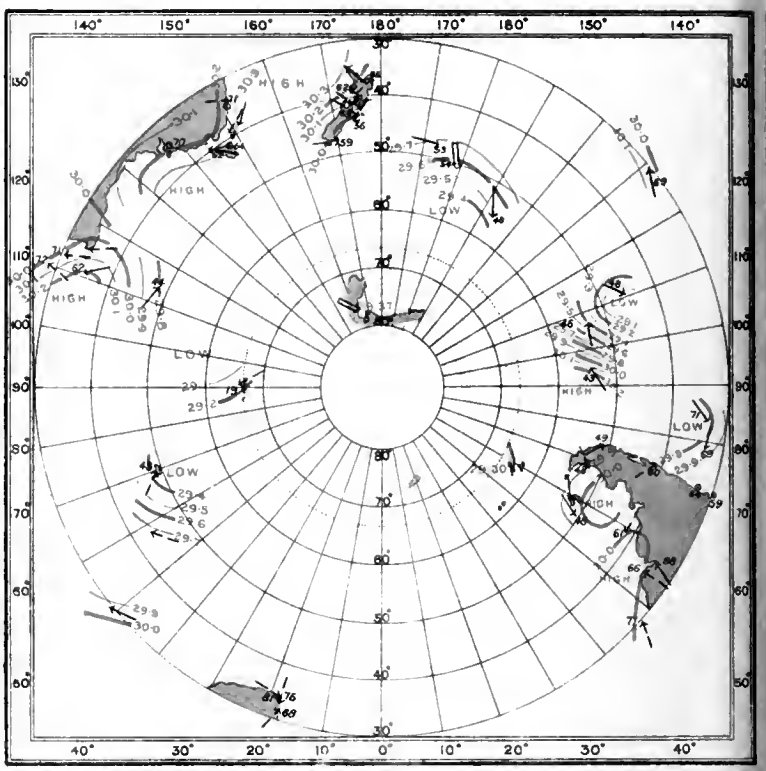

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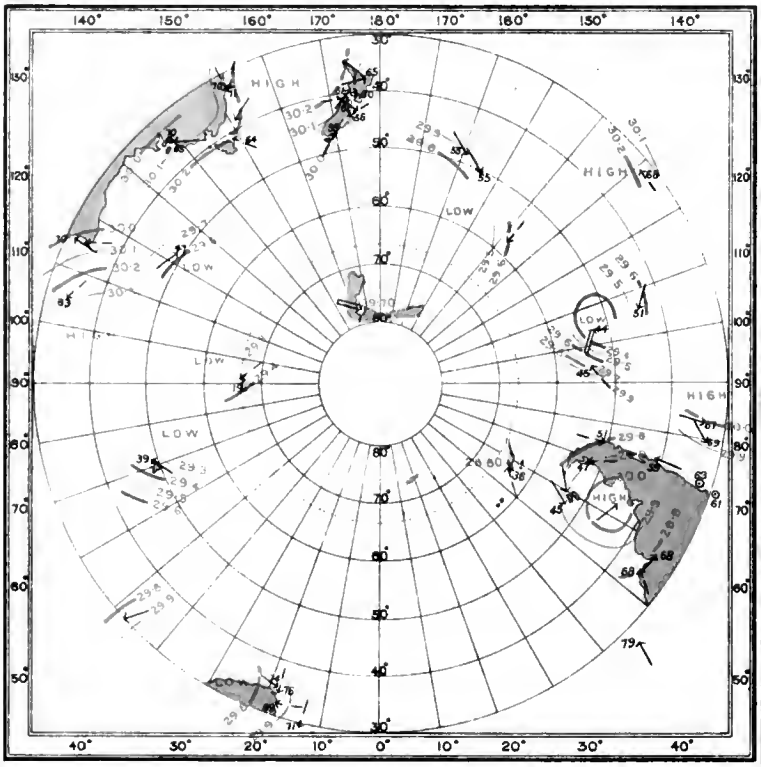

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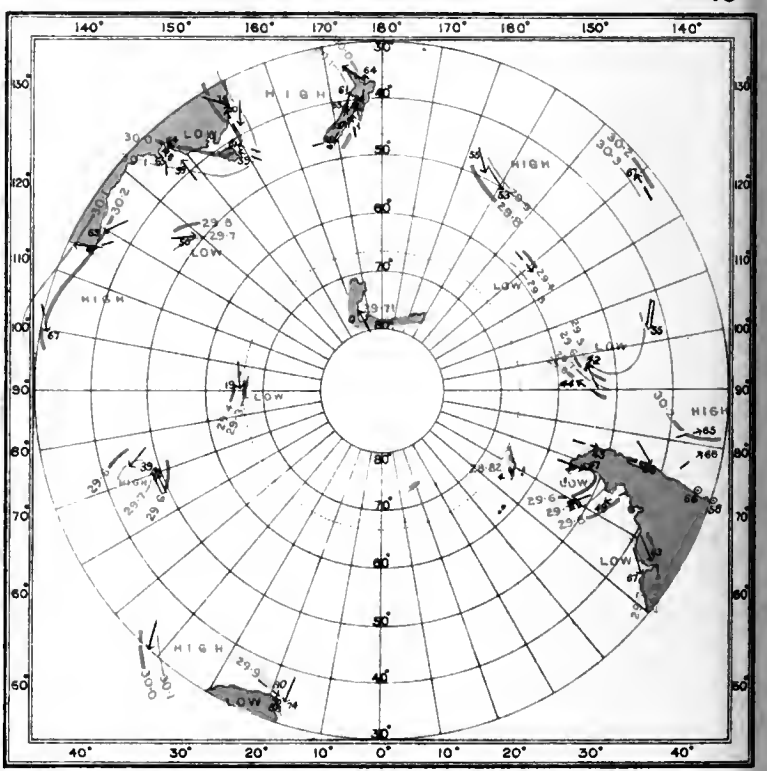


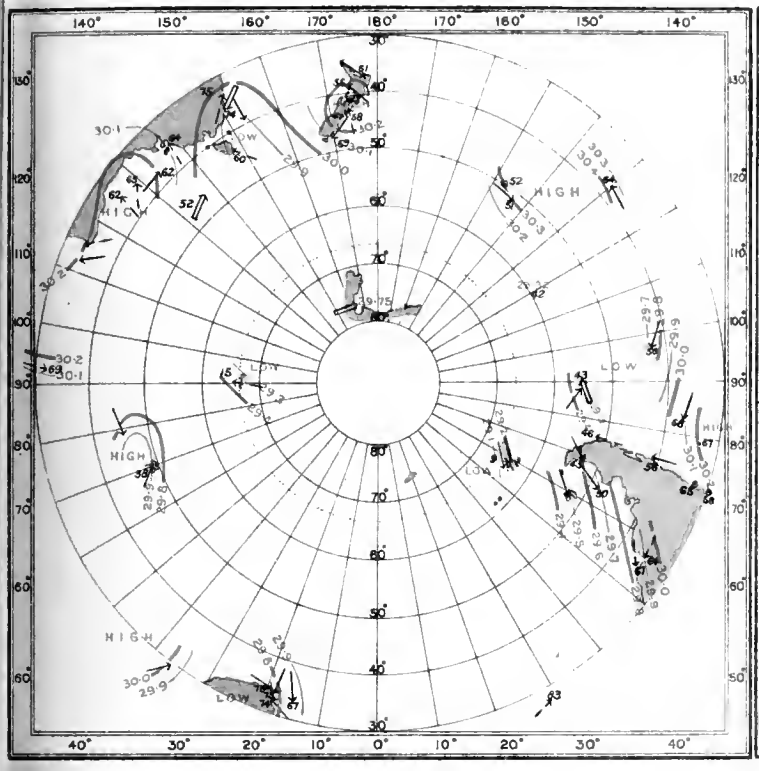
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 MARCH 14



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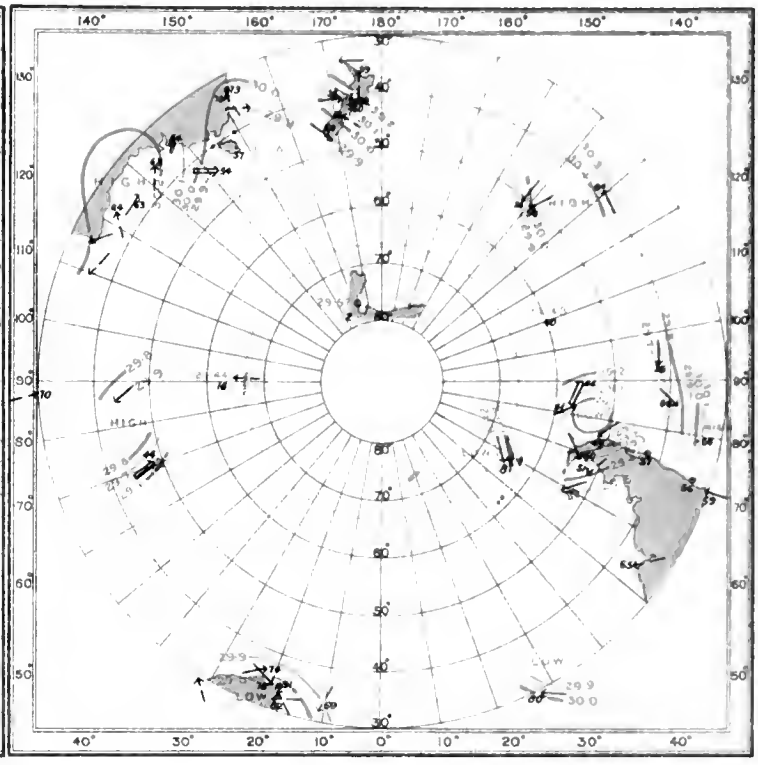

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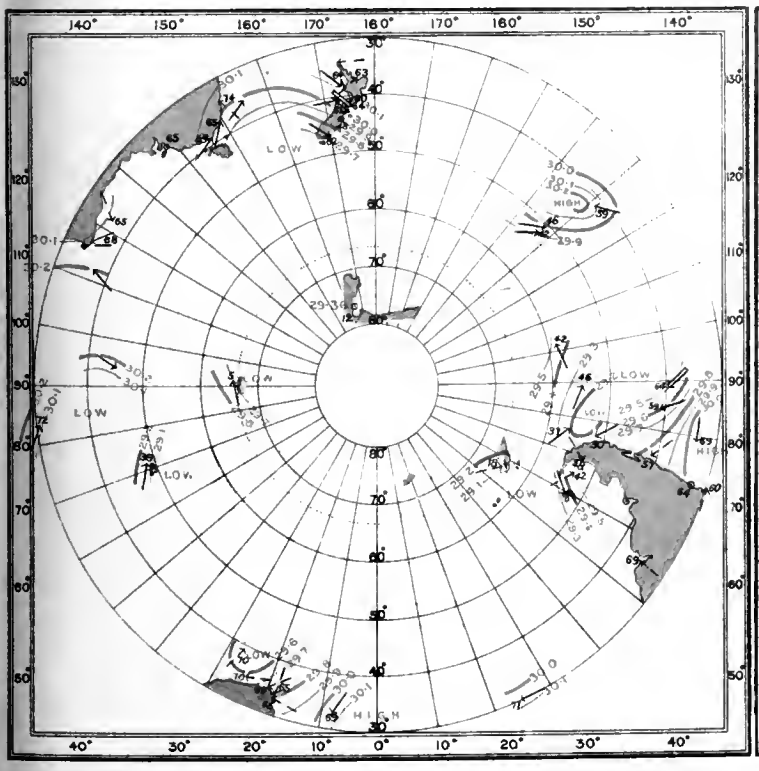

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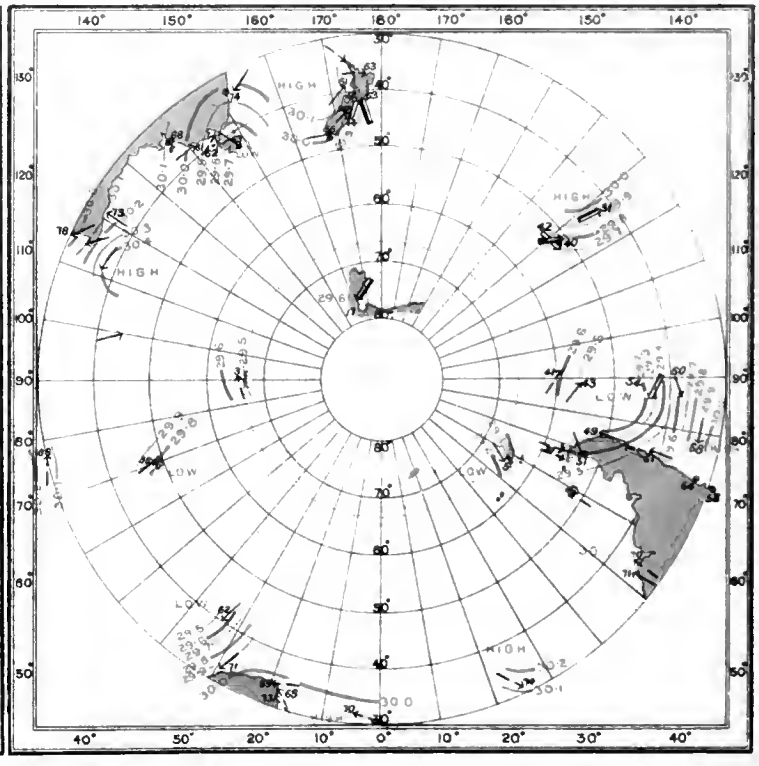


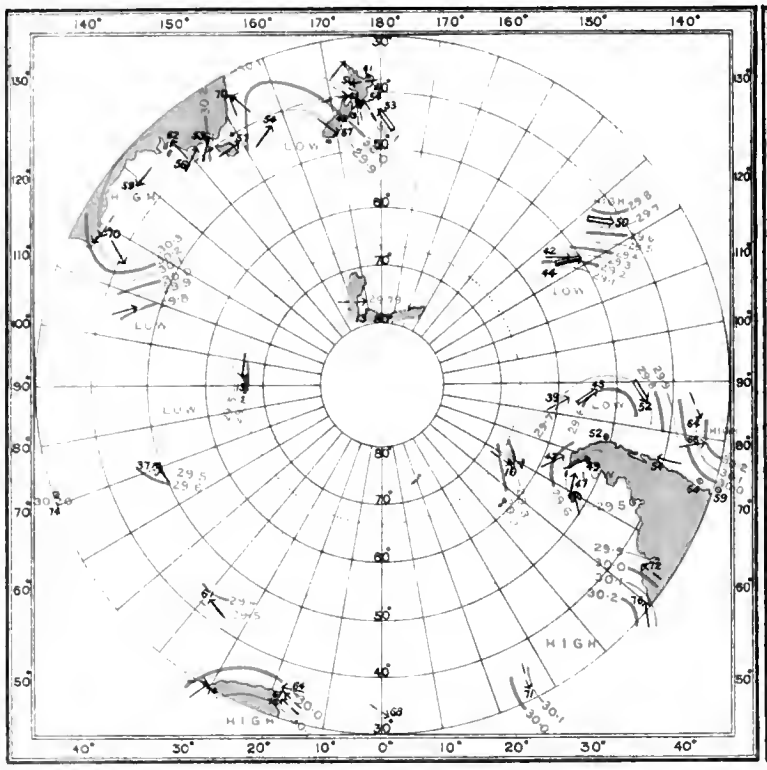
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 MARCH 18



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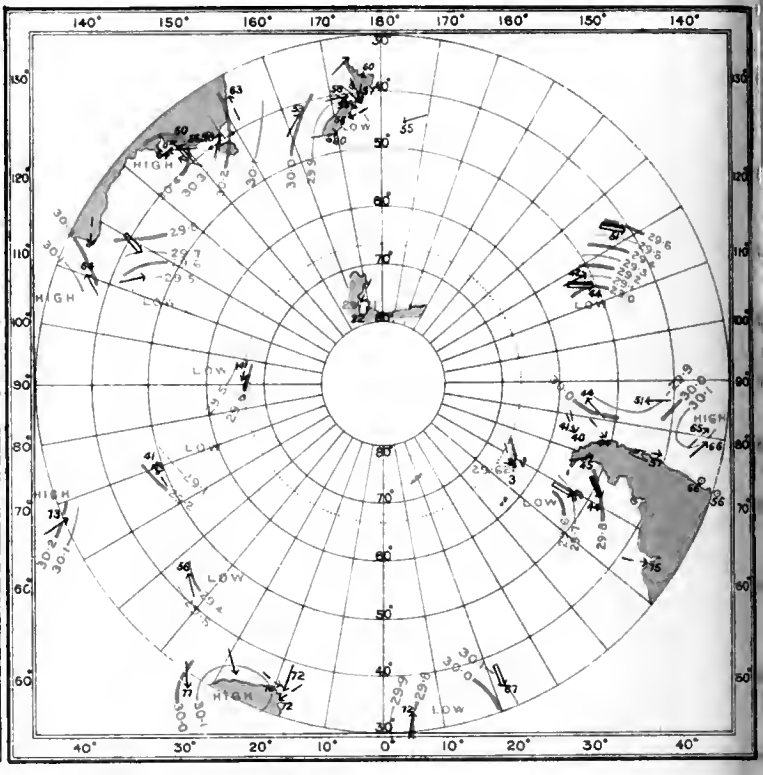

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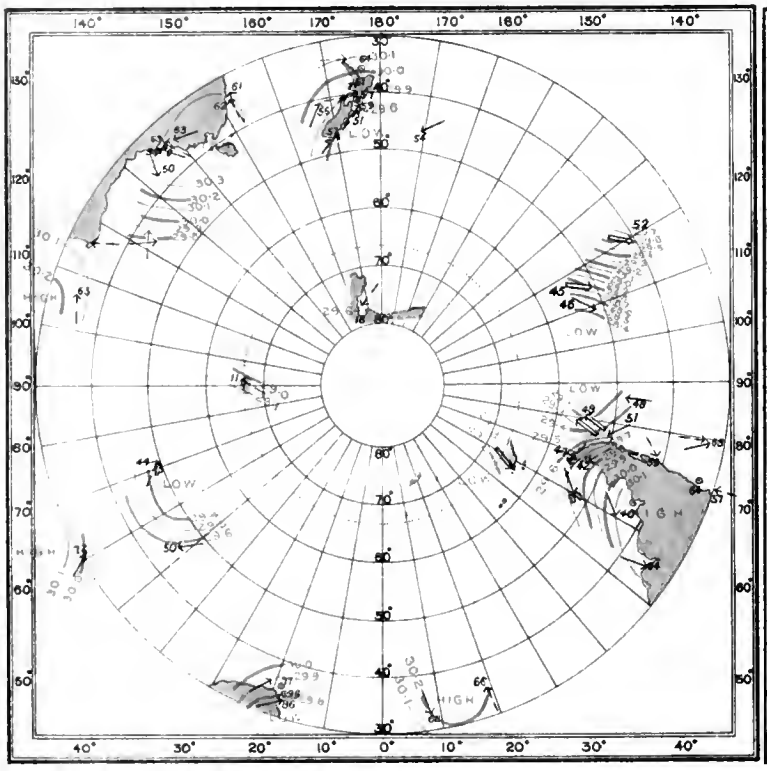

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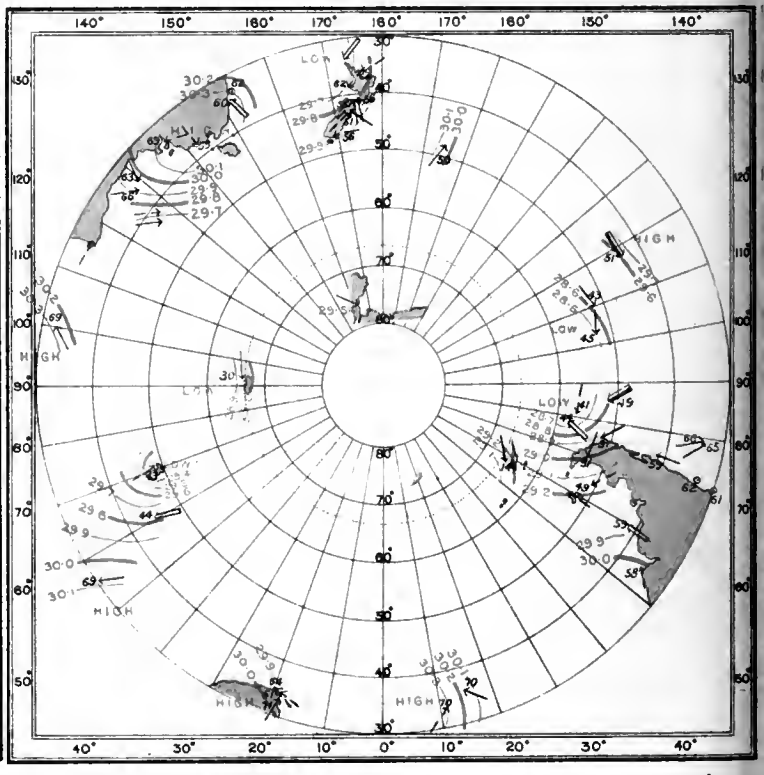


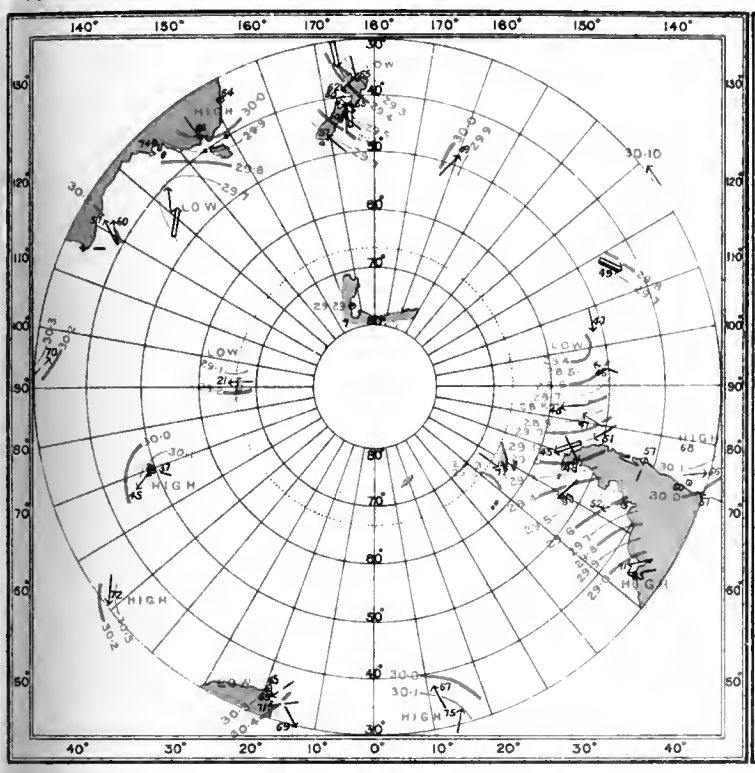
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 MARCH 22



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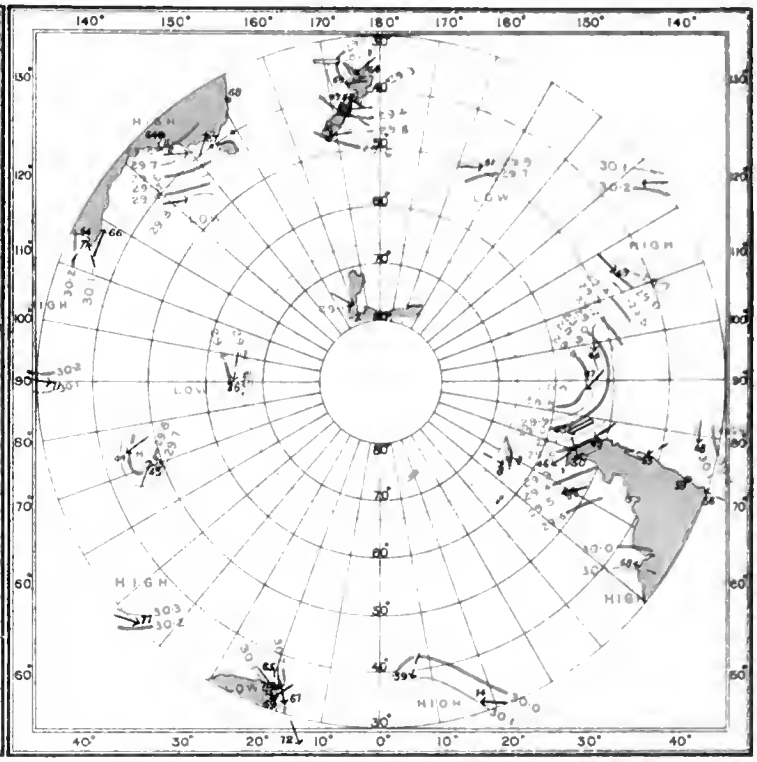

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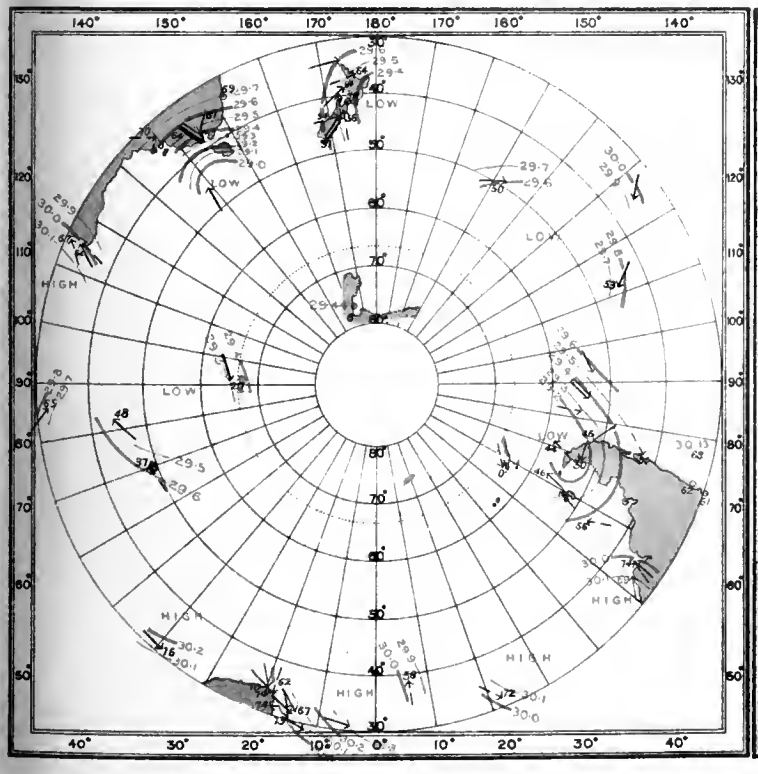

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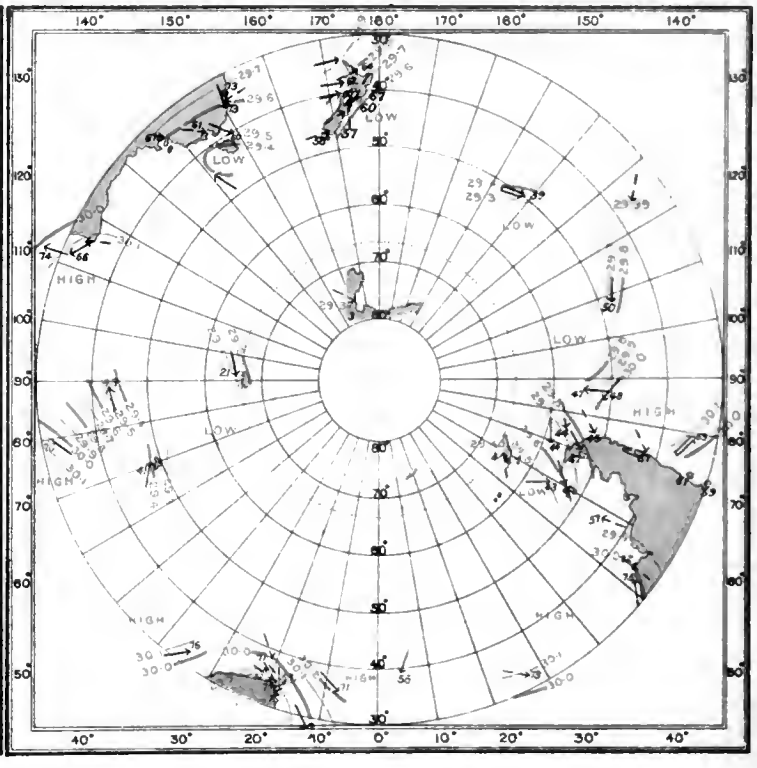


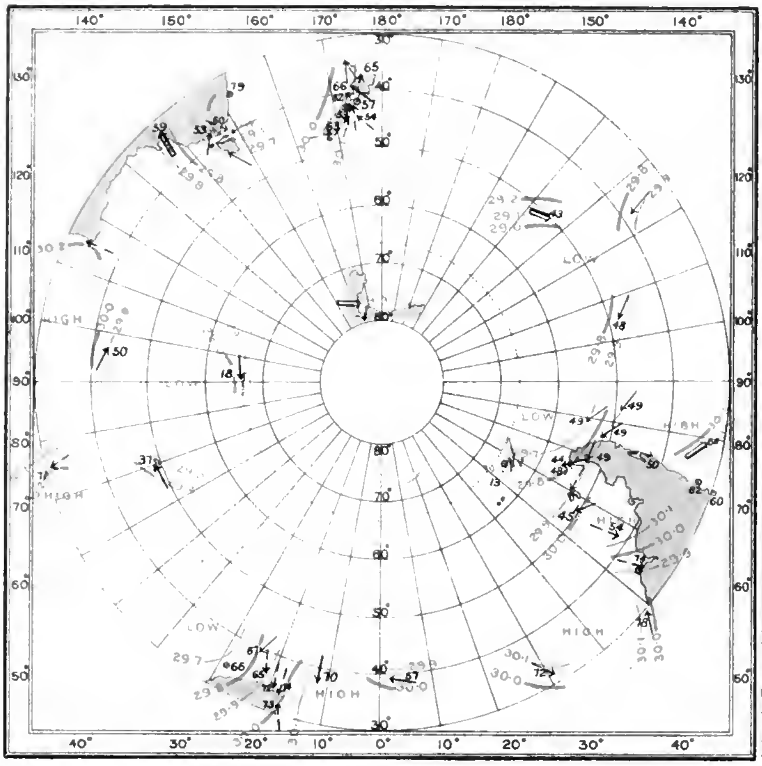
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 MARCH 26



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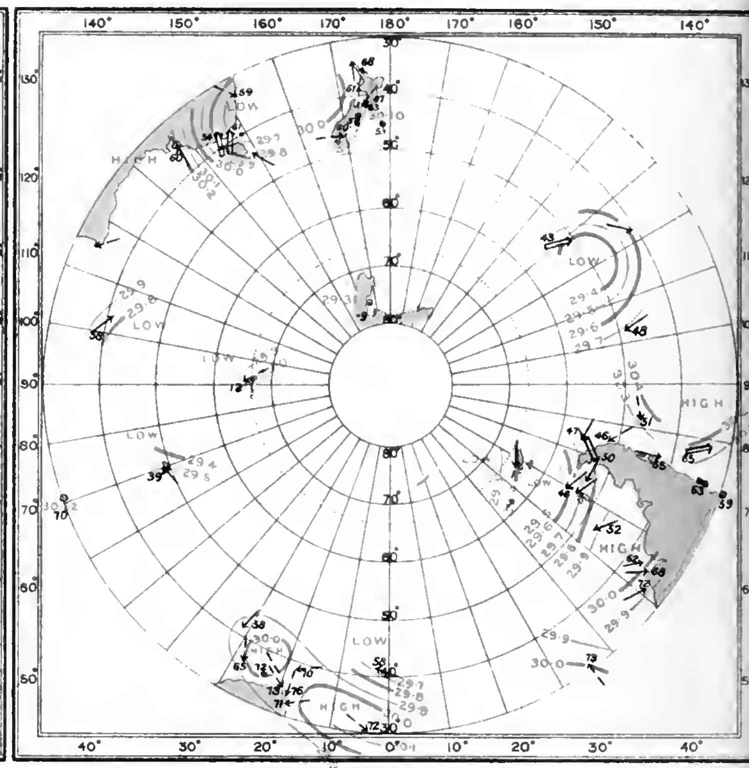

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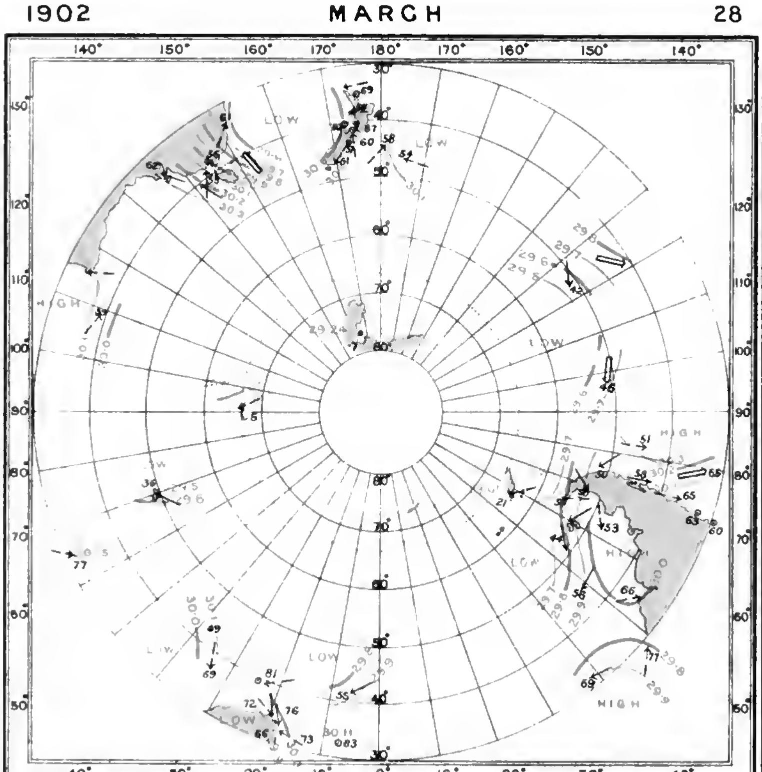

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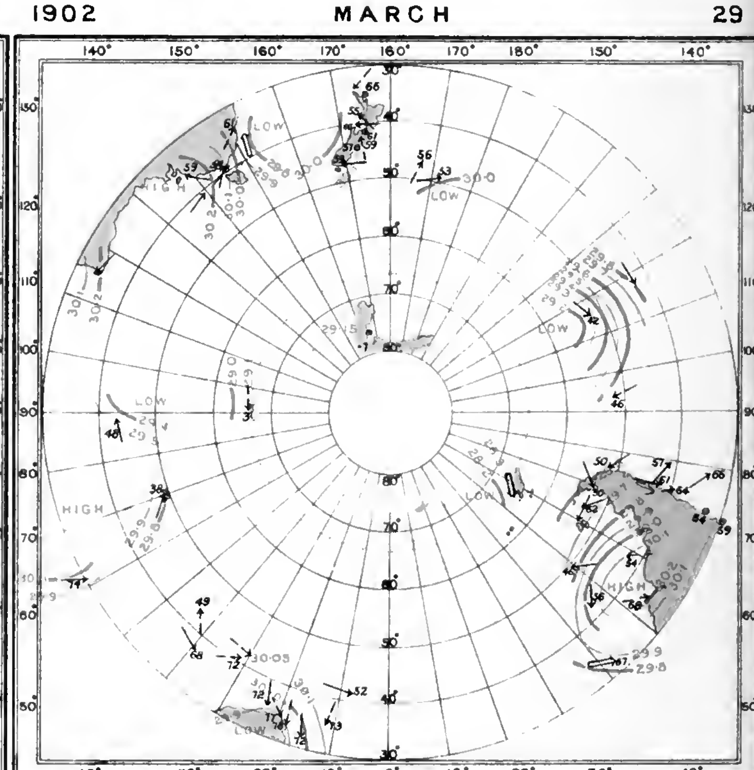


Huth London.

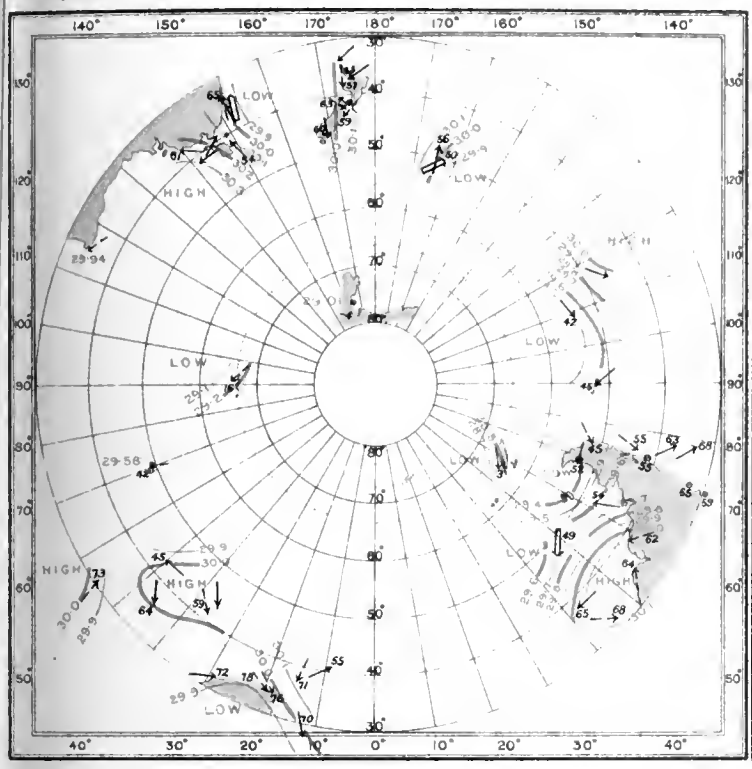
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 MARCH 30



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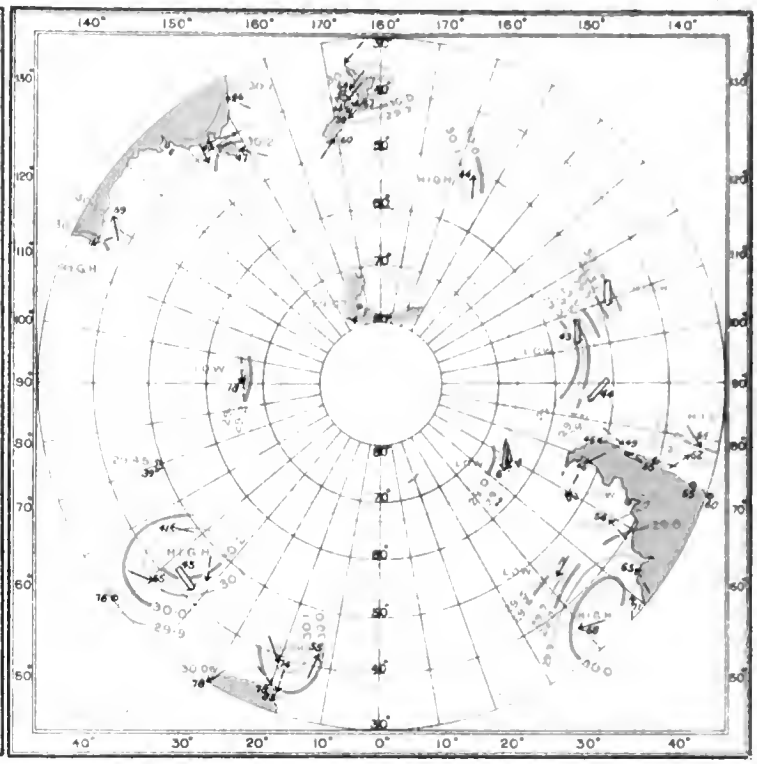
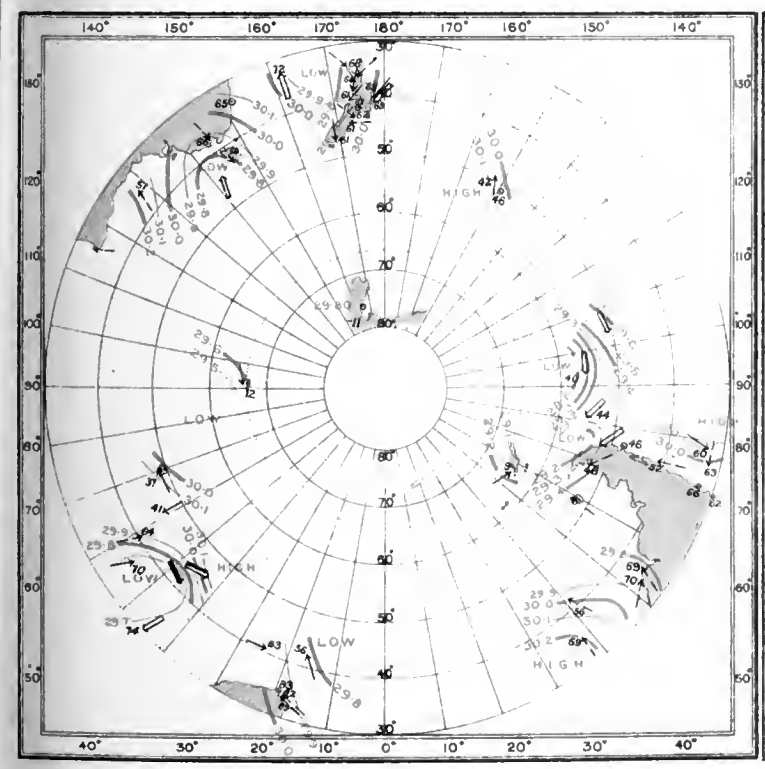


1902 APRIL 1



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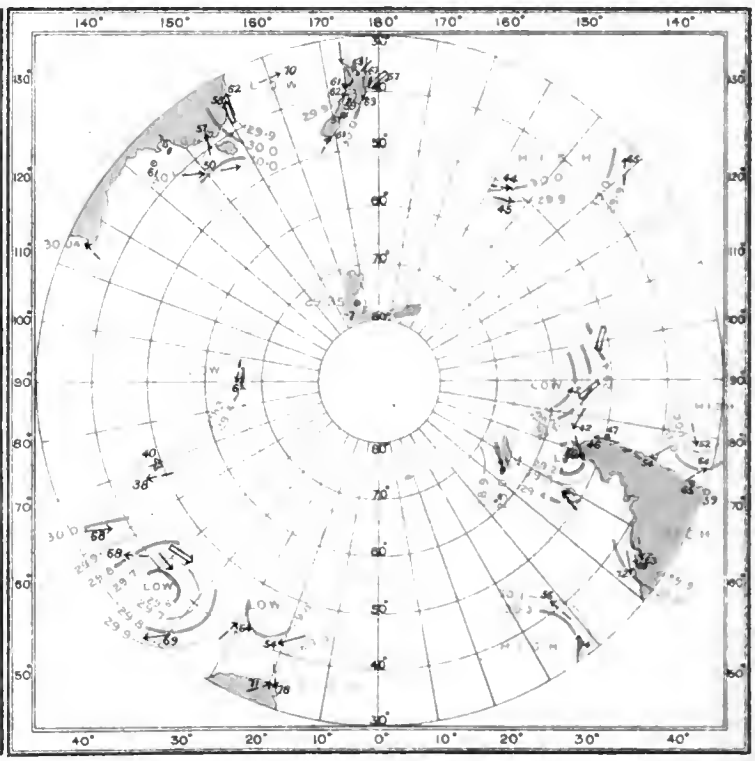


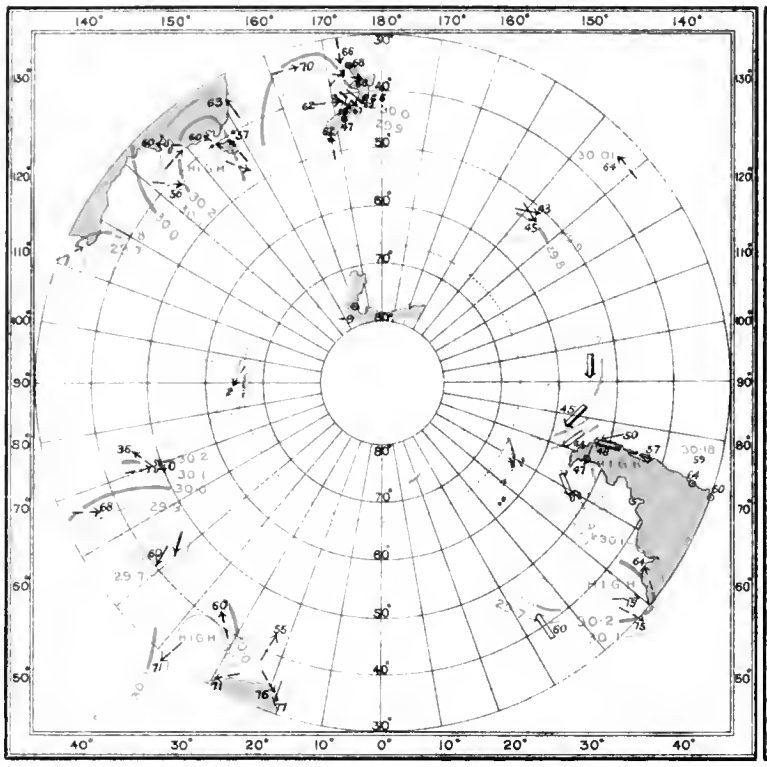
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1902 APRIL 3



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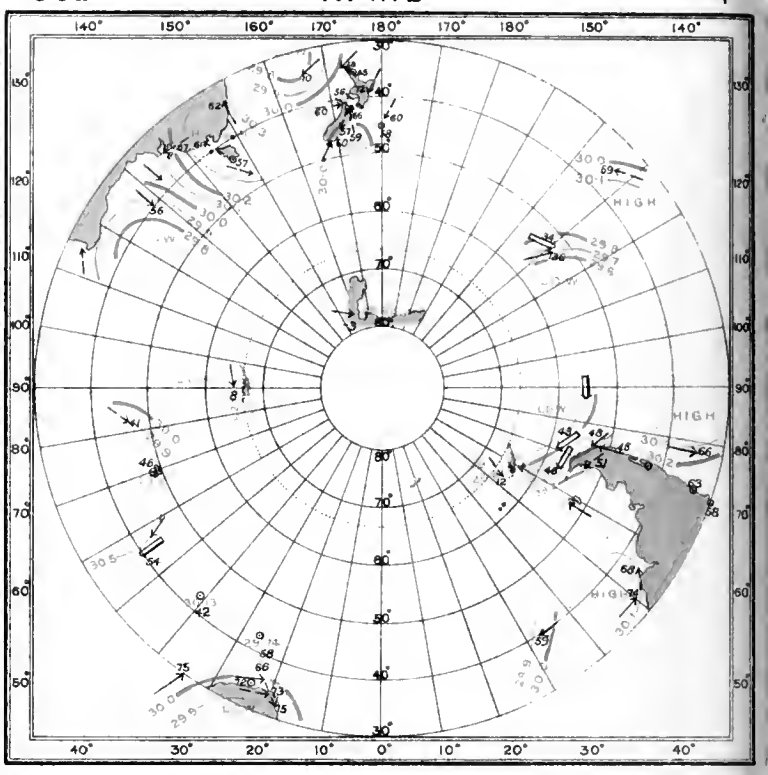

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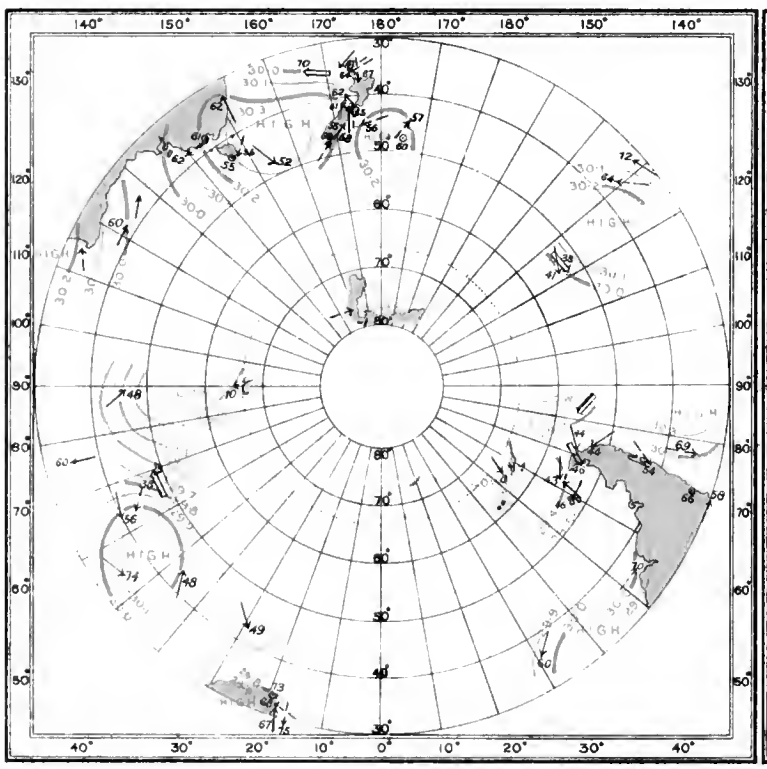

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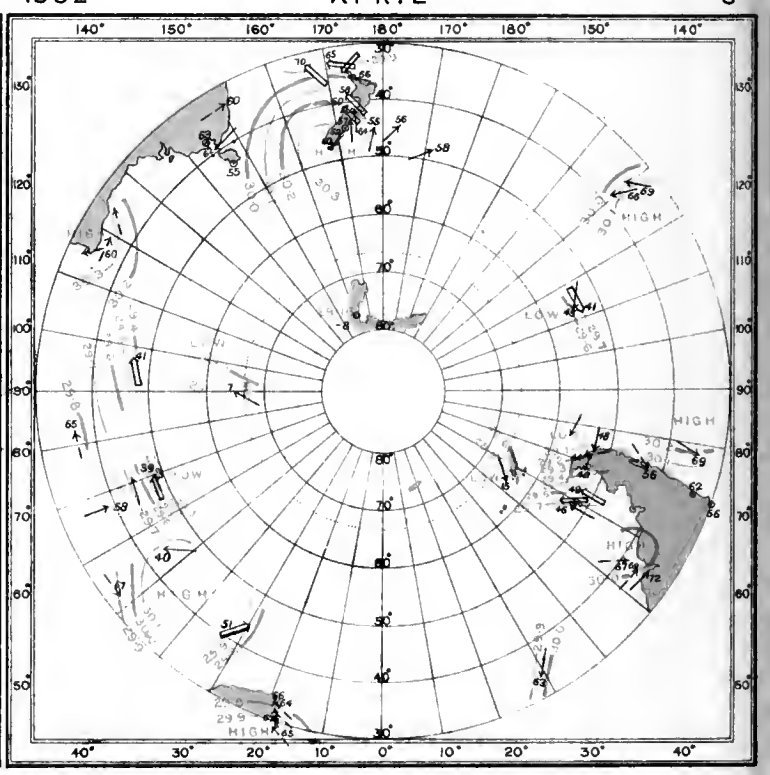

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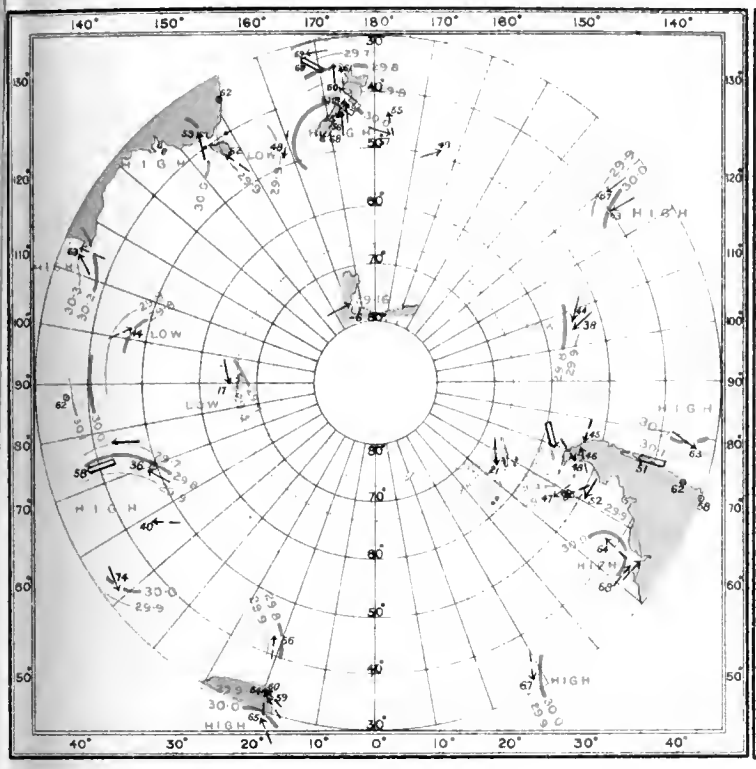
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 APRIL 7



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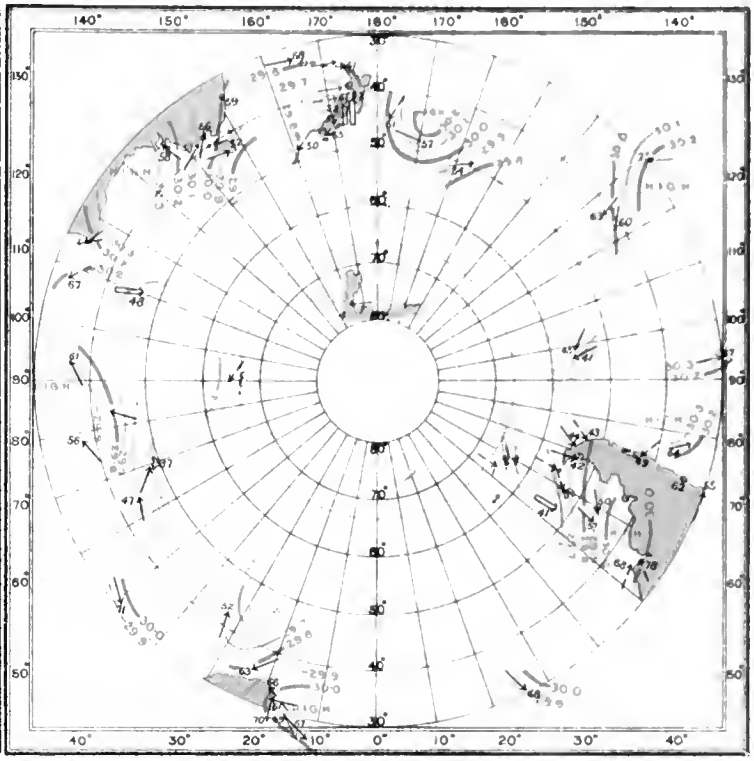

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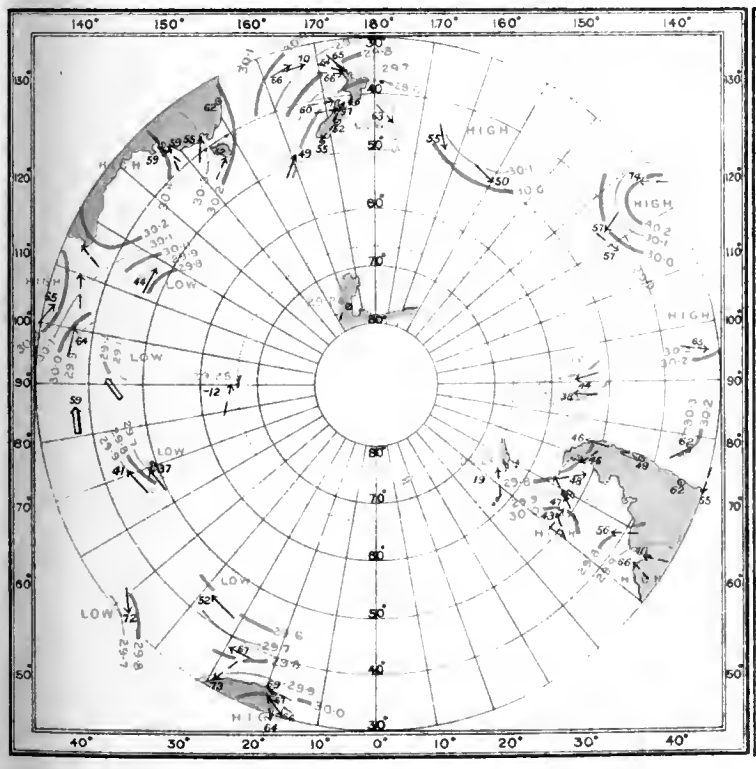

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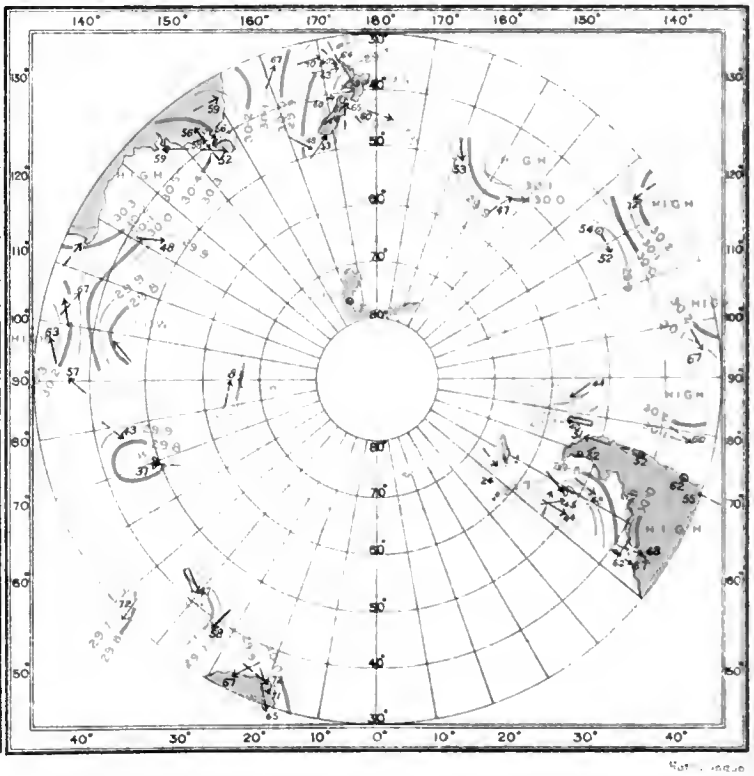

For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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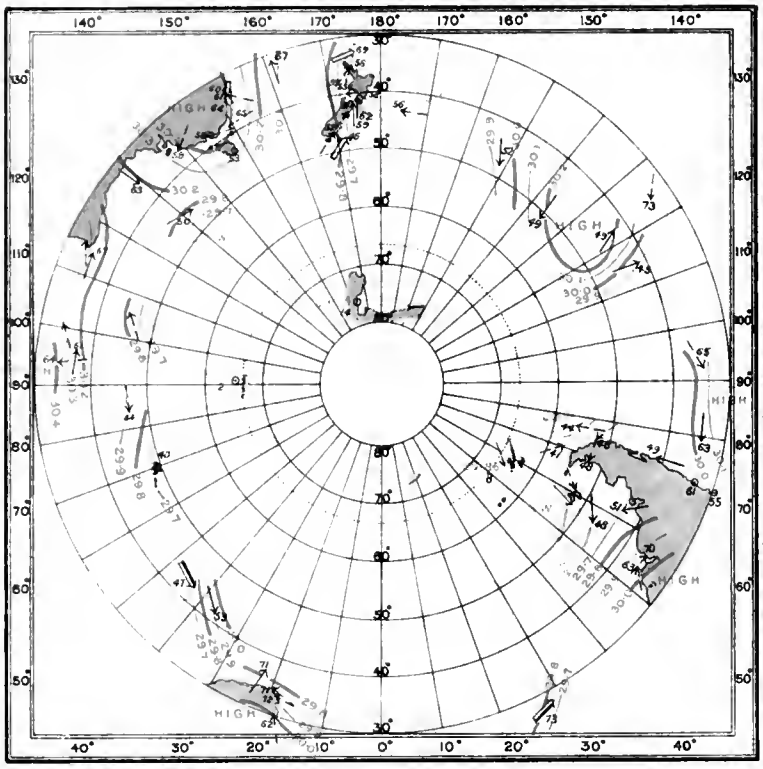

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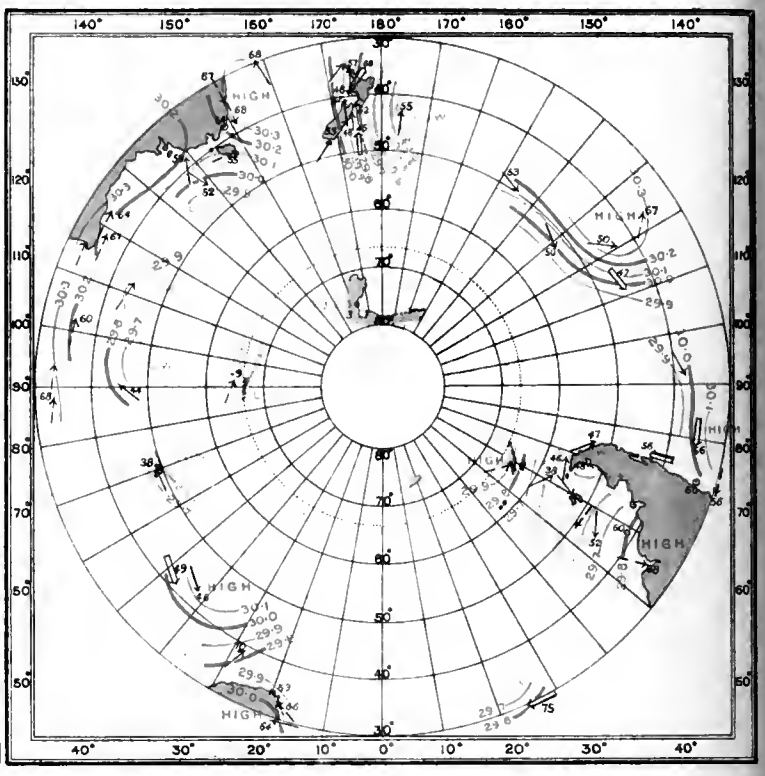

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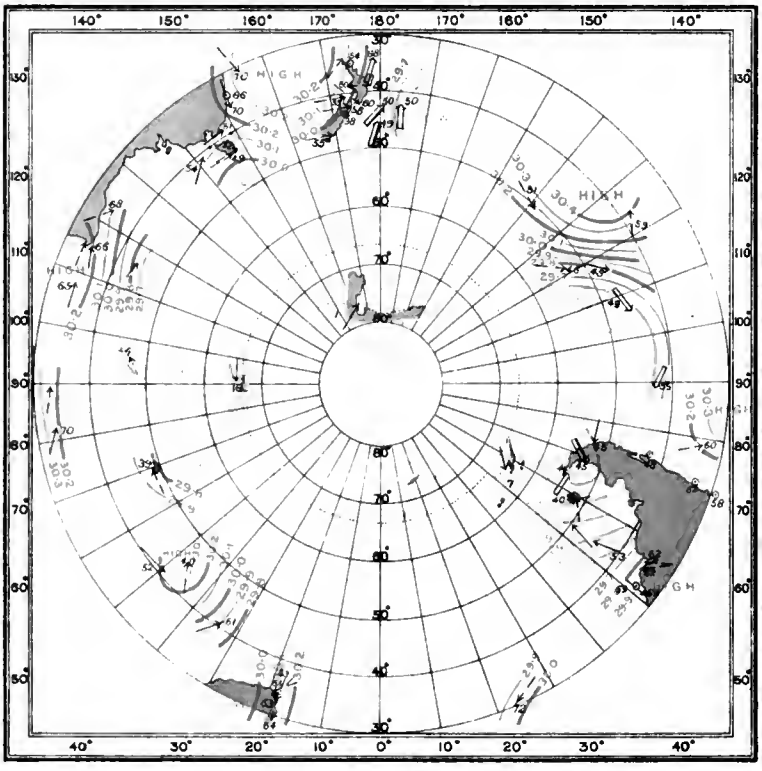

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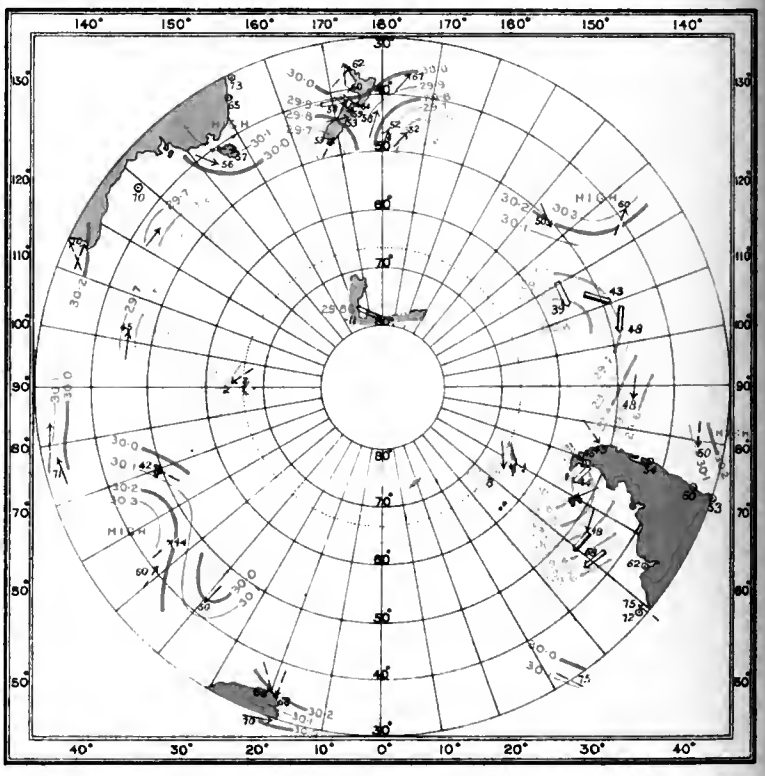

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

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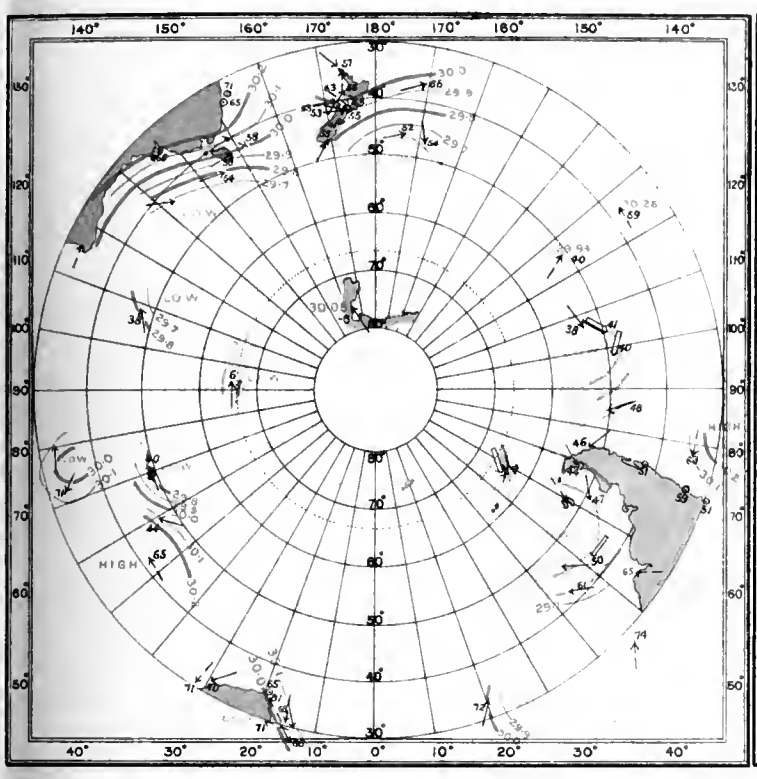

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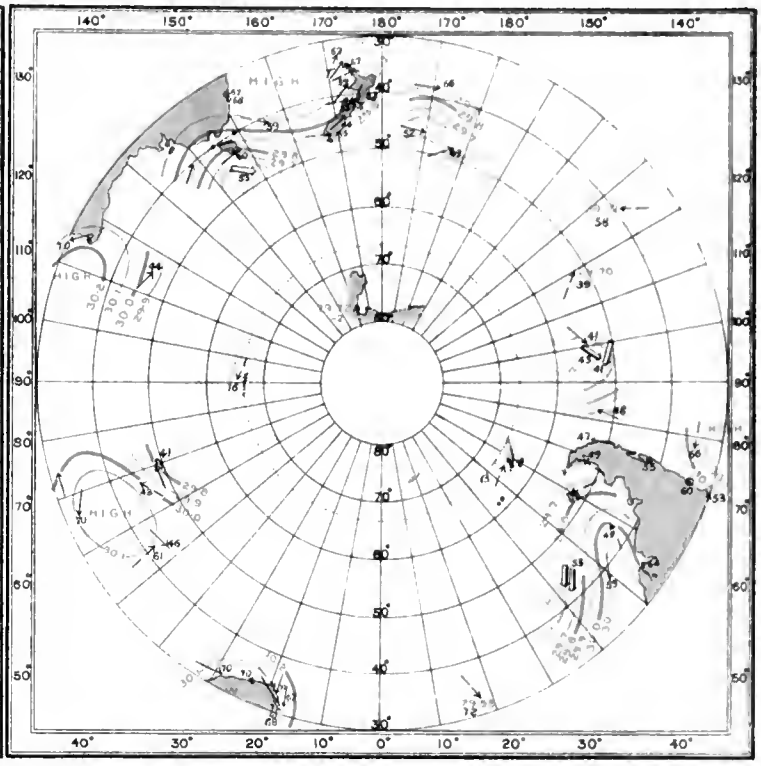

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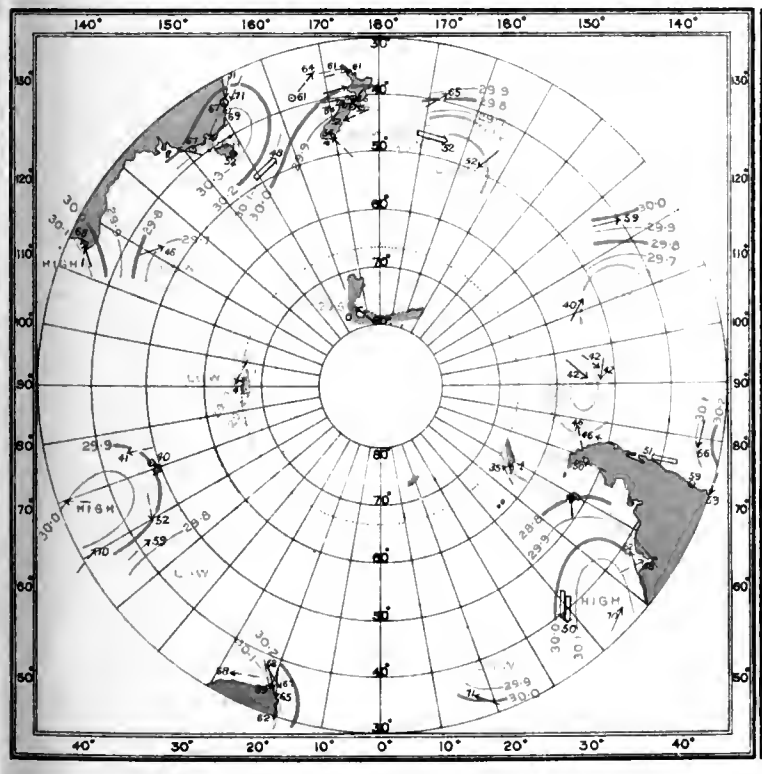

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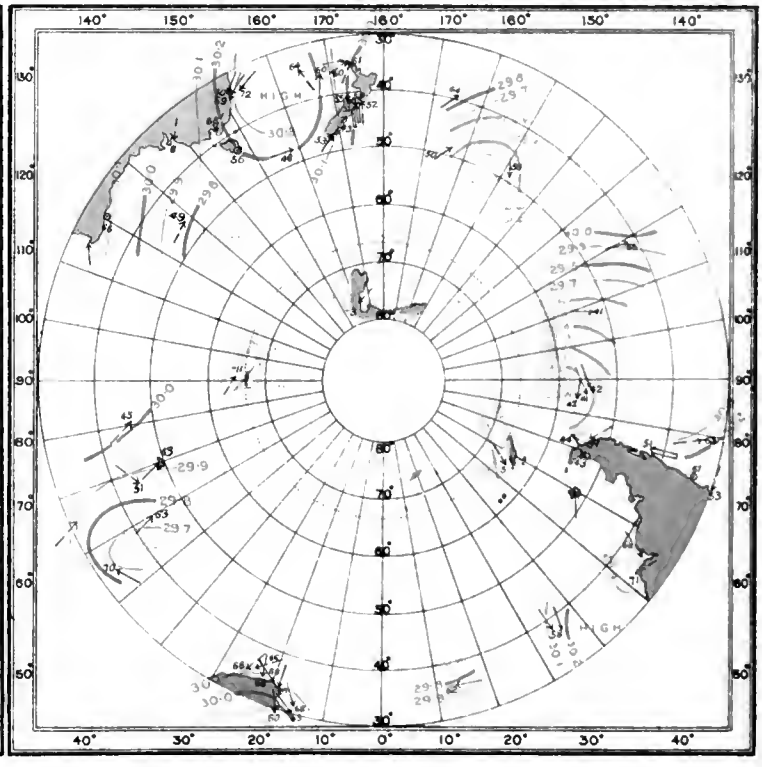

For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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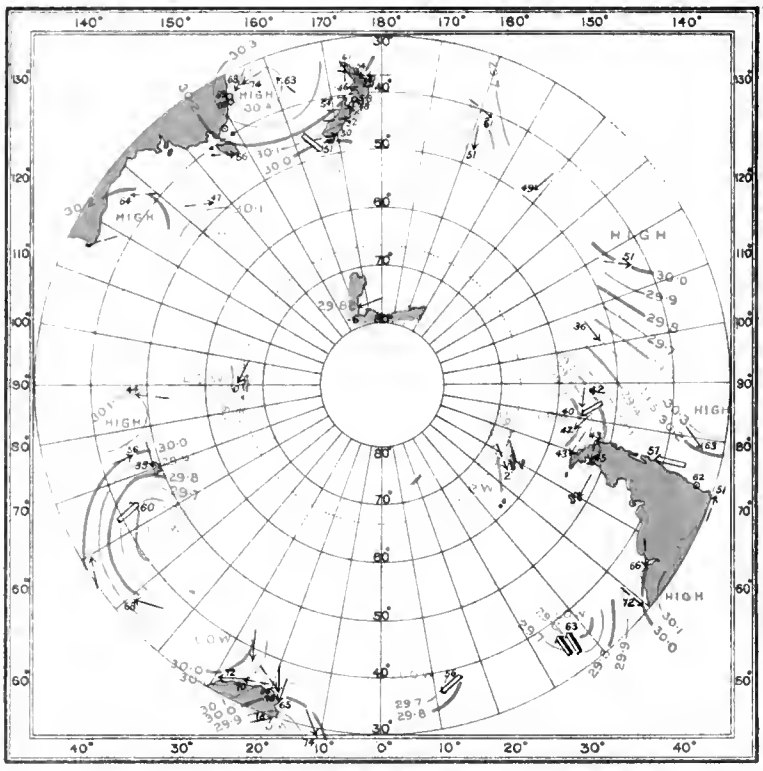

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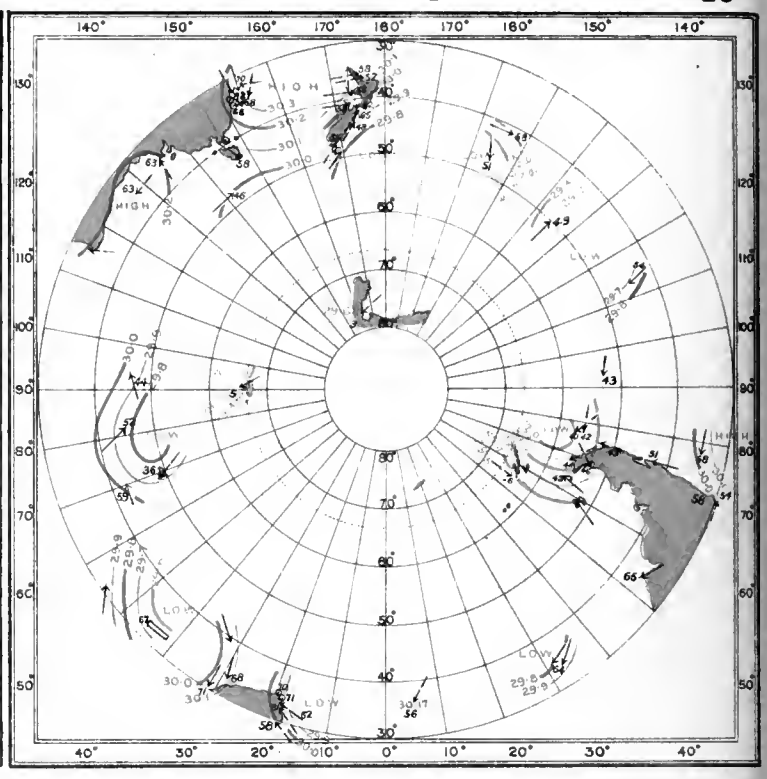

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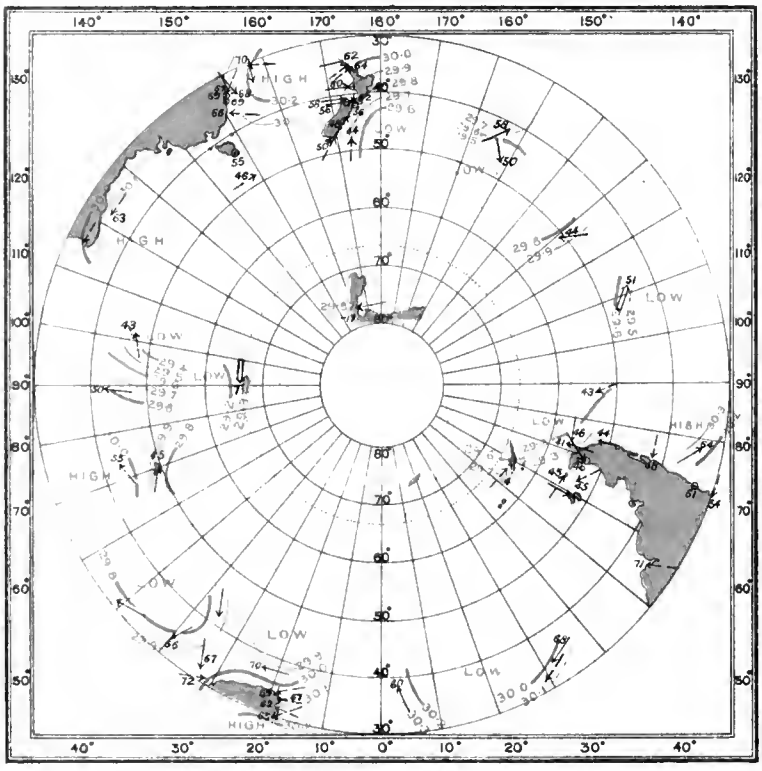

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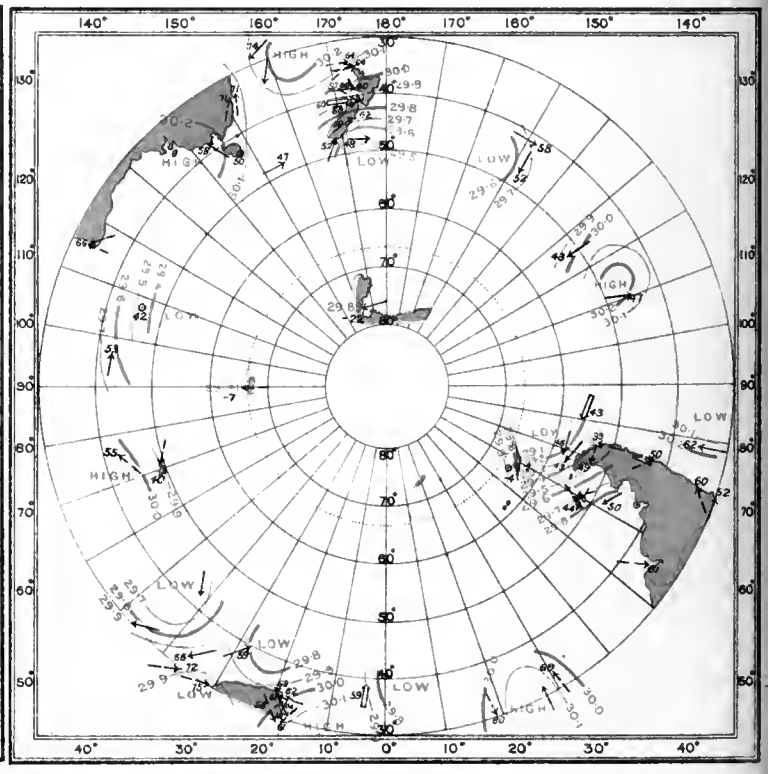

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

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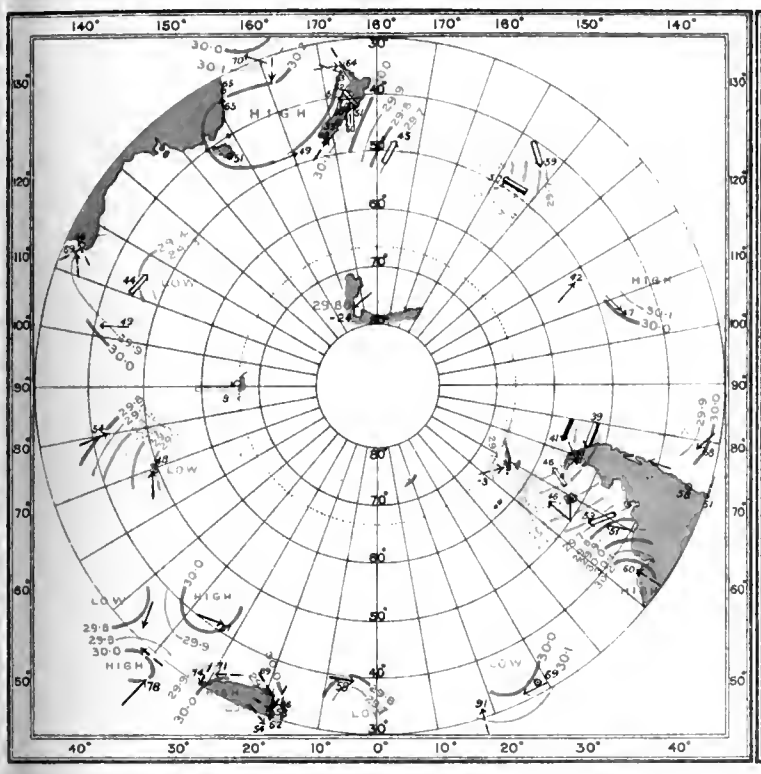

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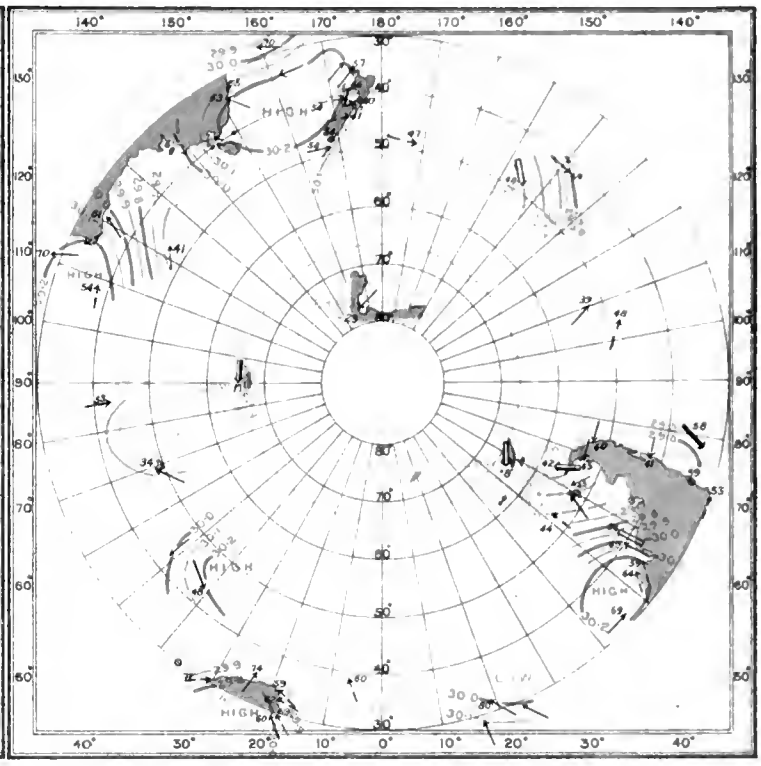

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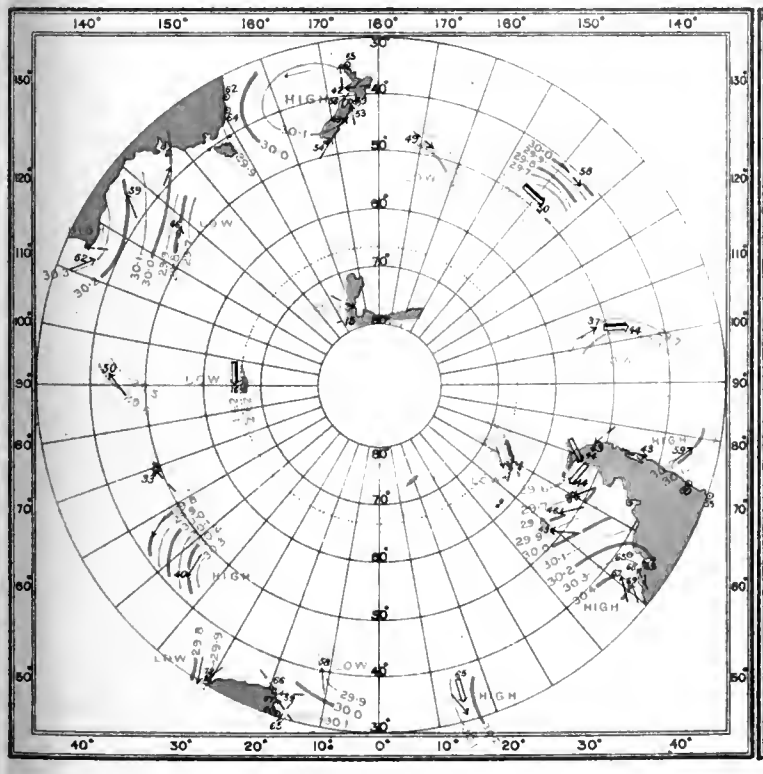

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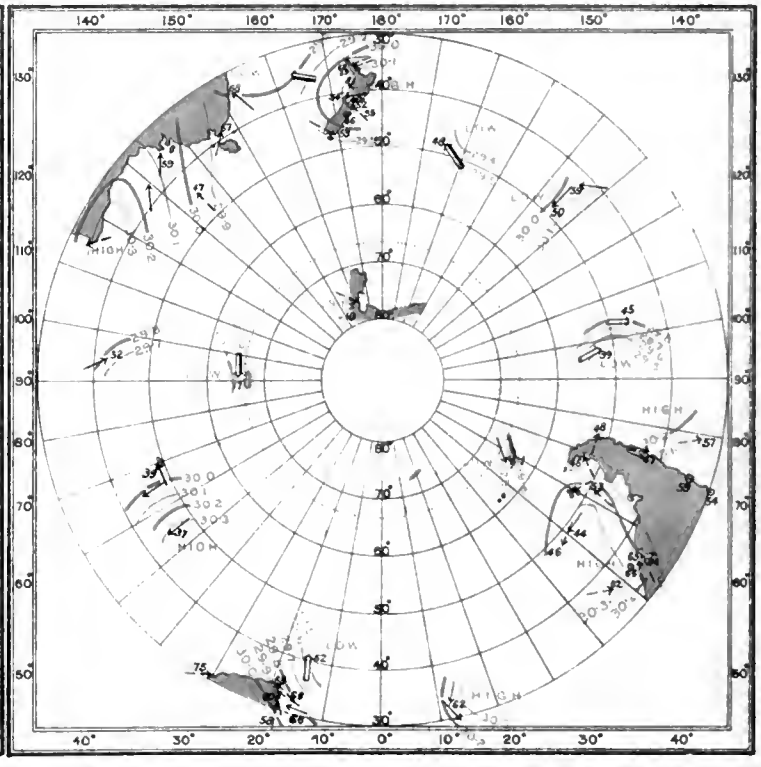

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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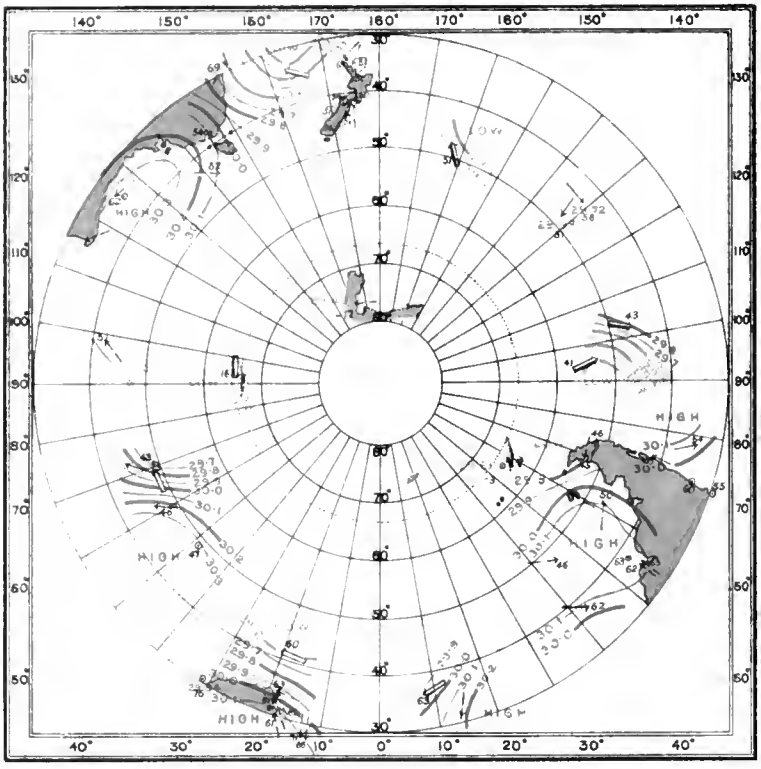

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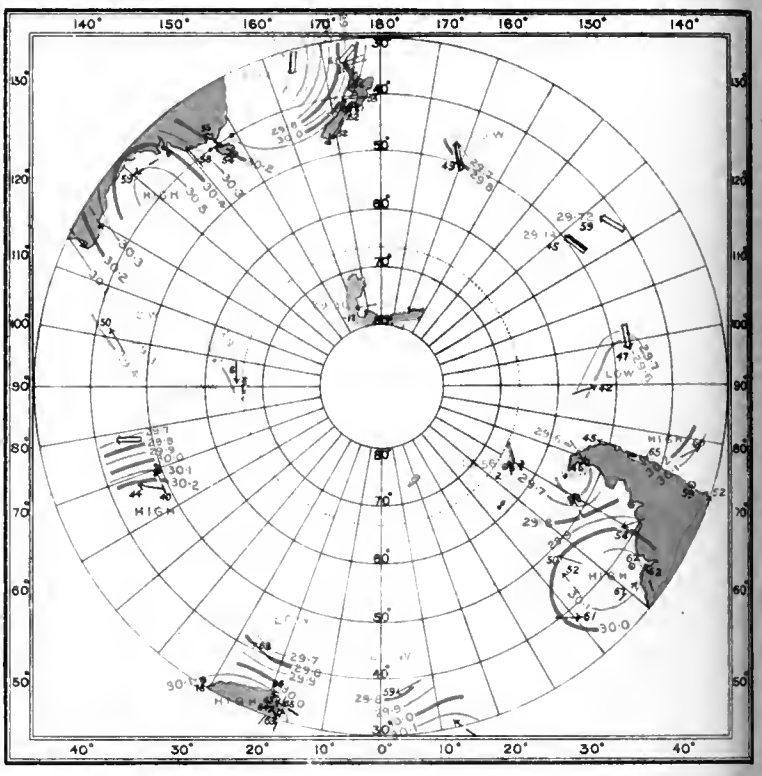

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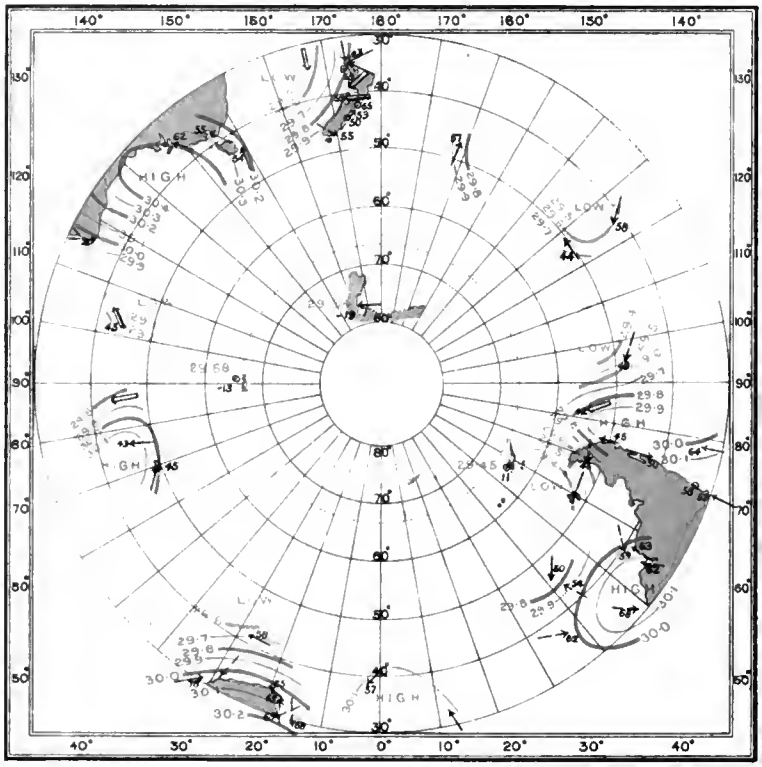

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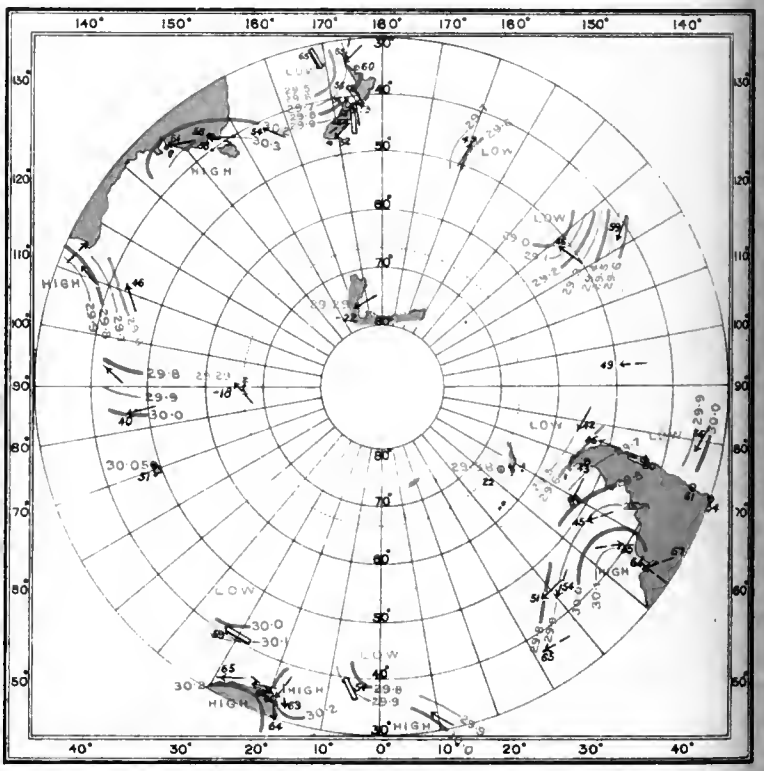

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

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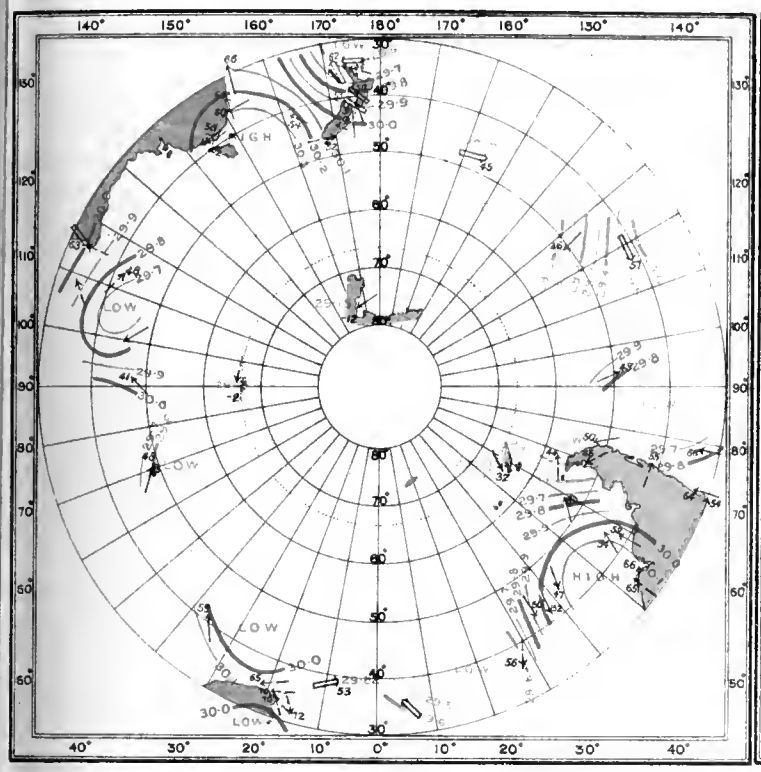

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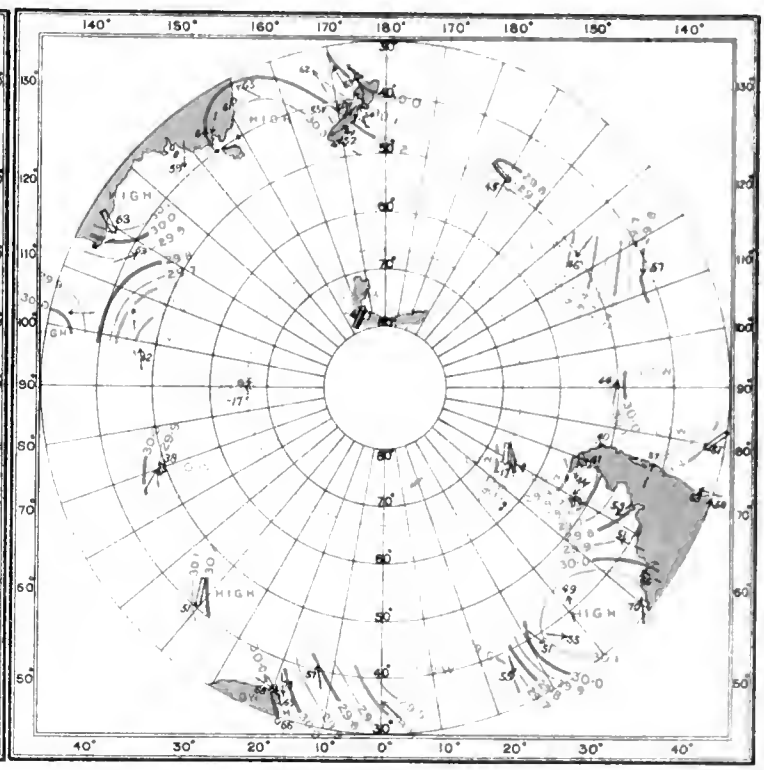

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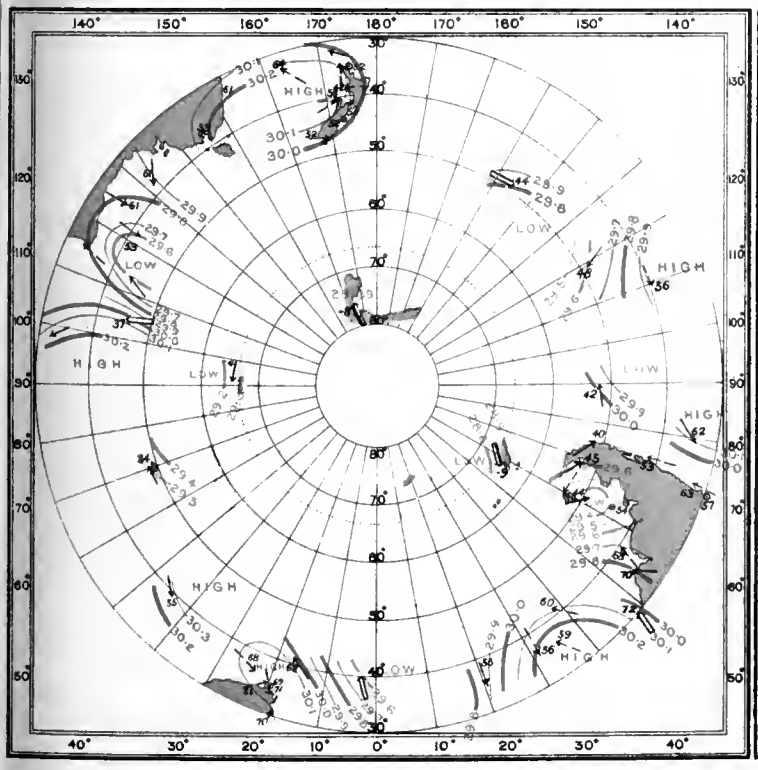

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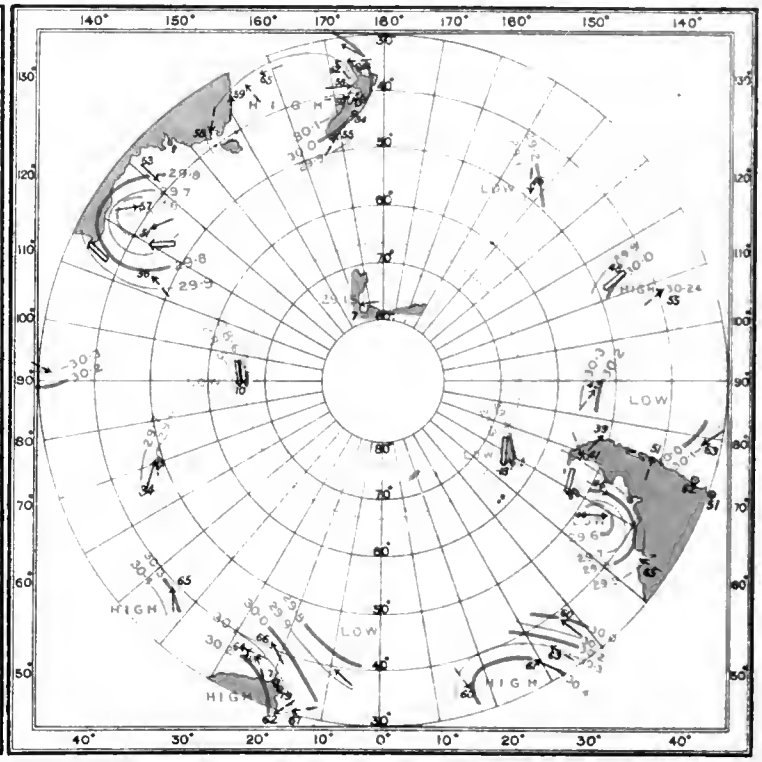

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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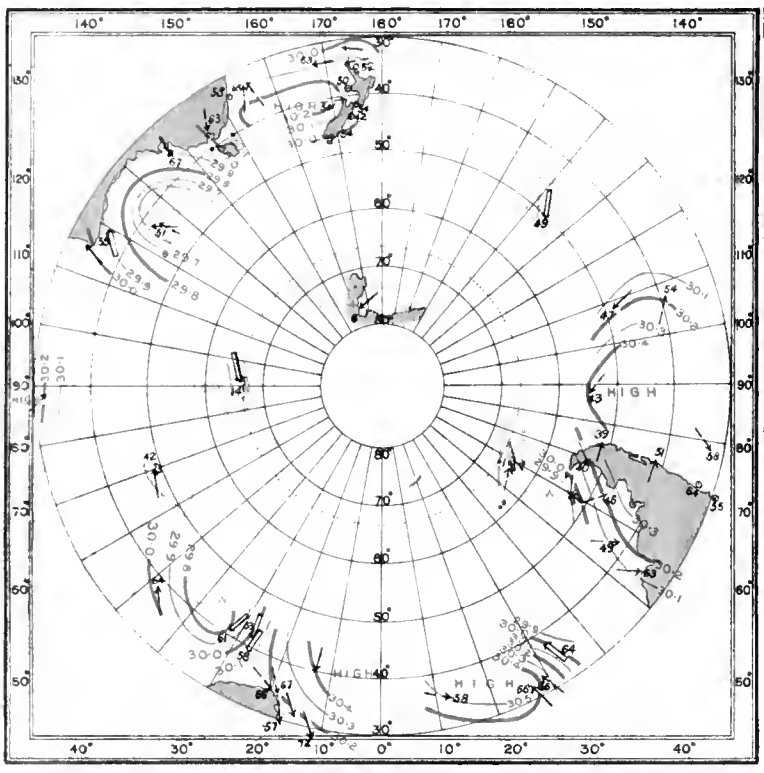

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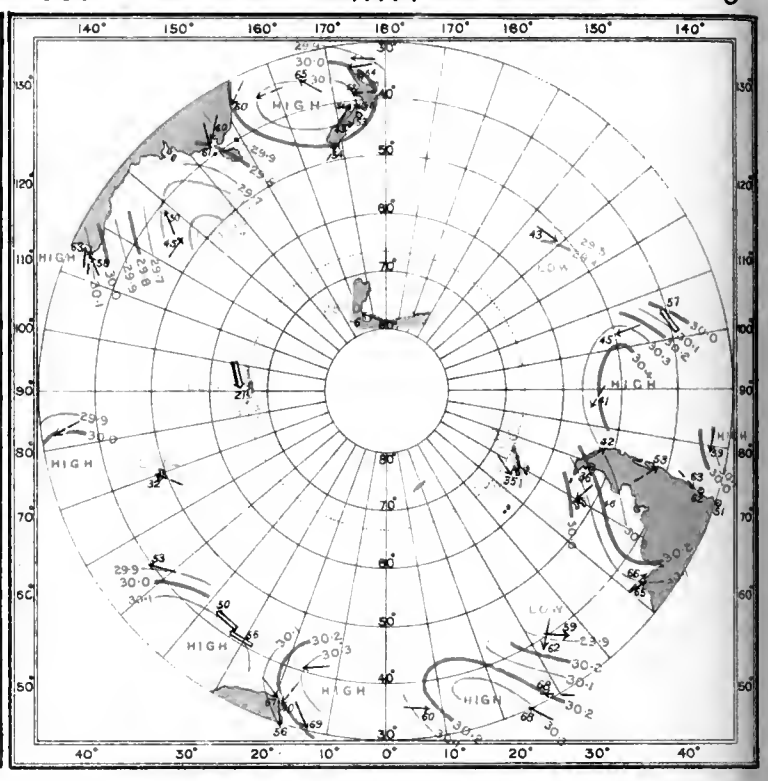

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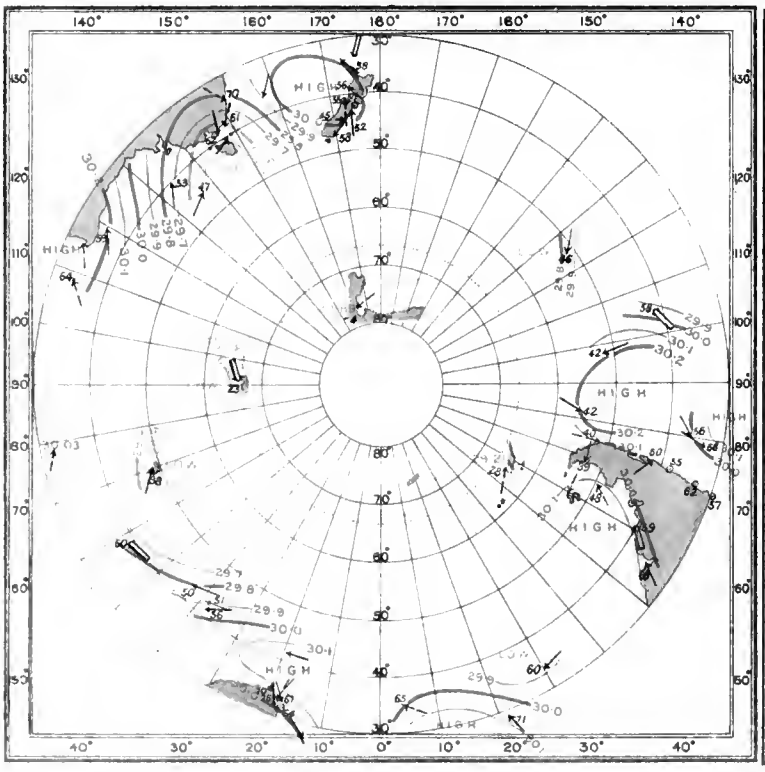

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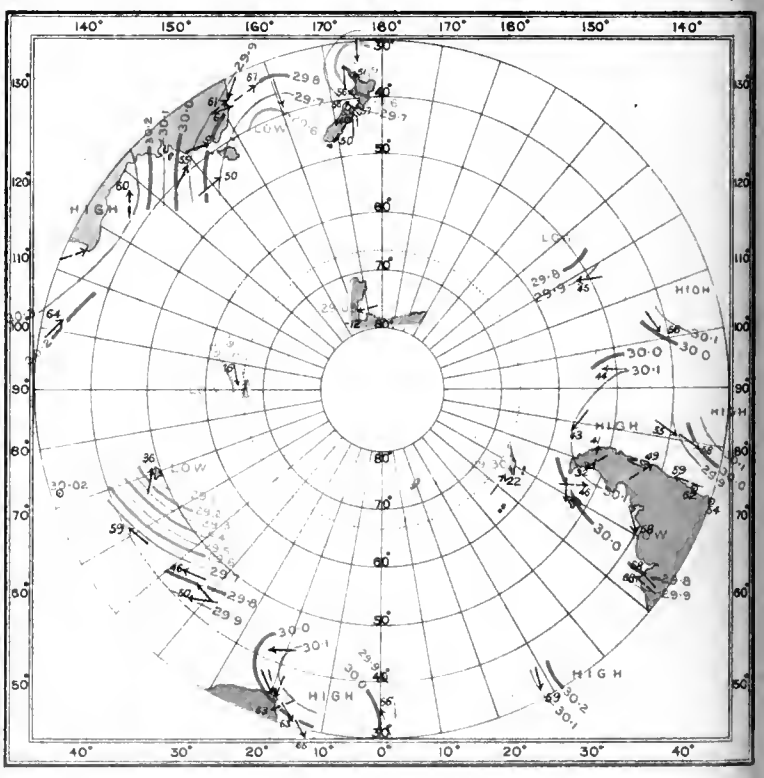


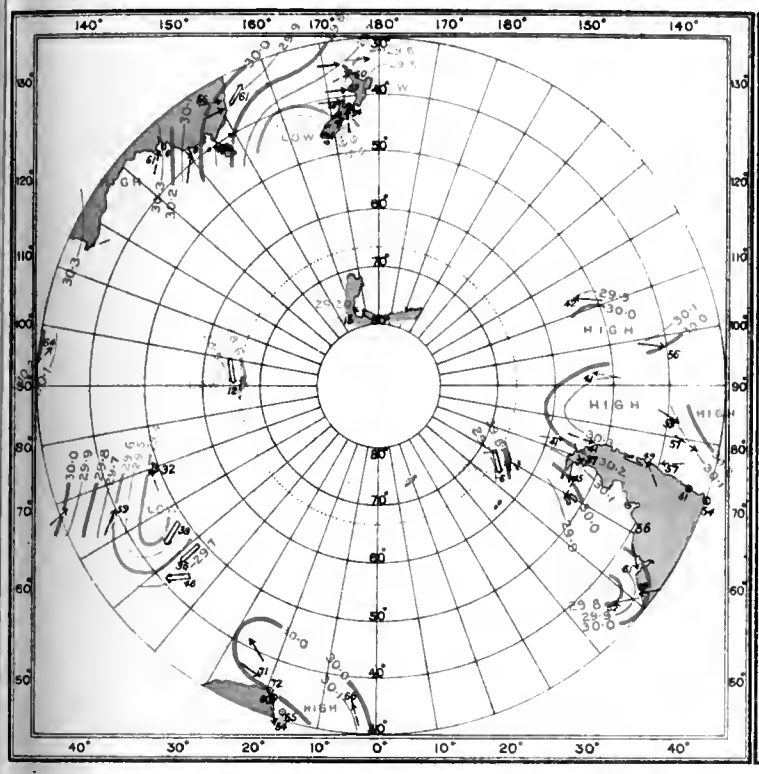
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 MAY 9



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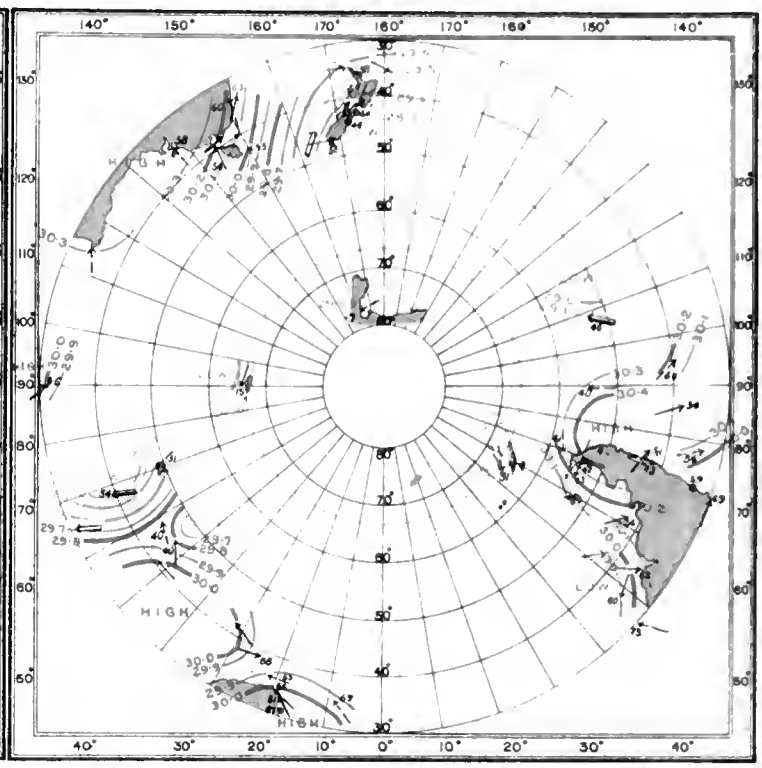

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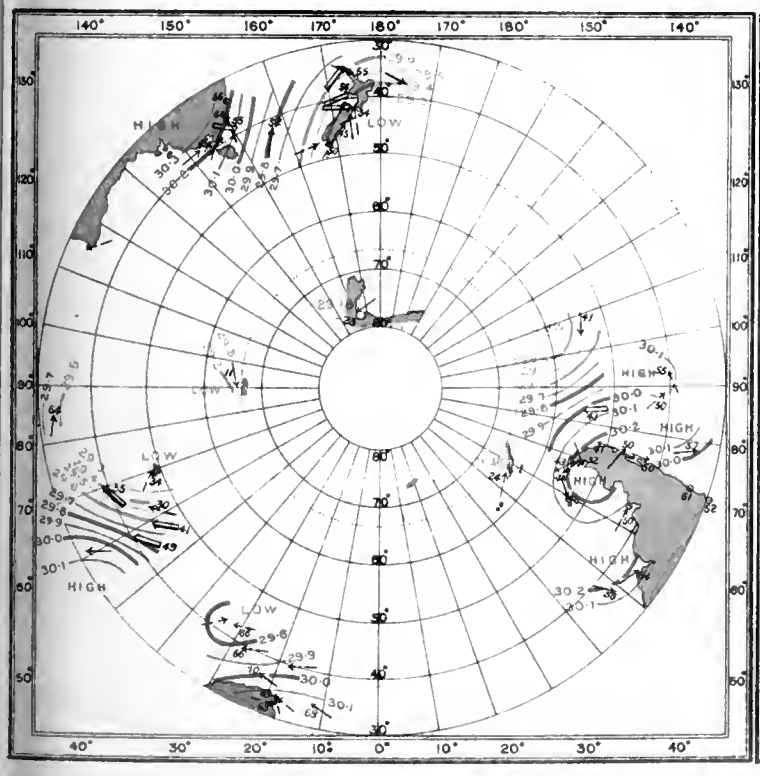

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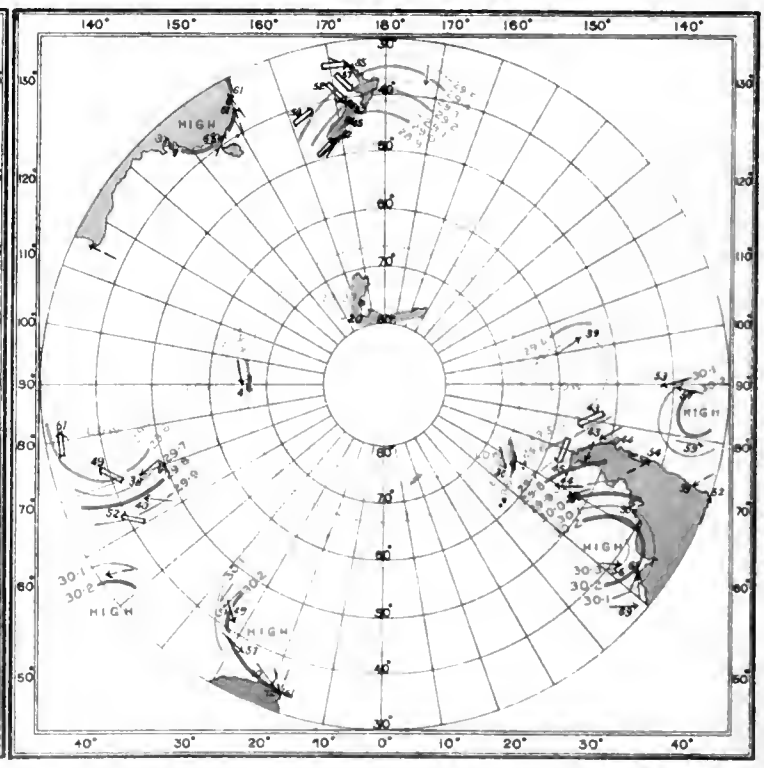

For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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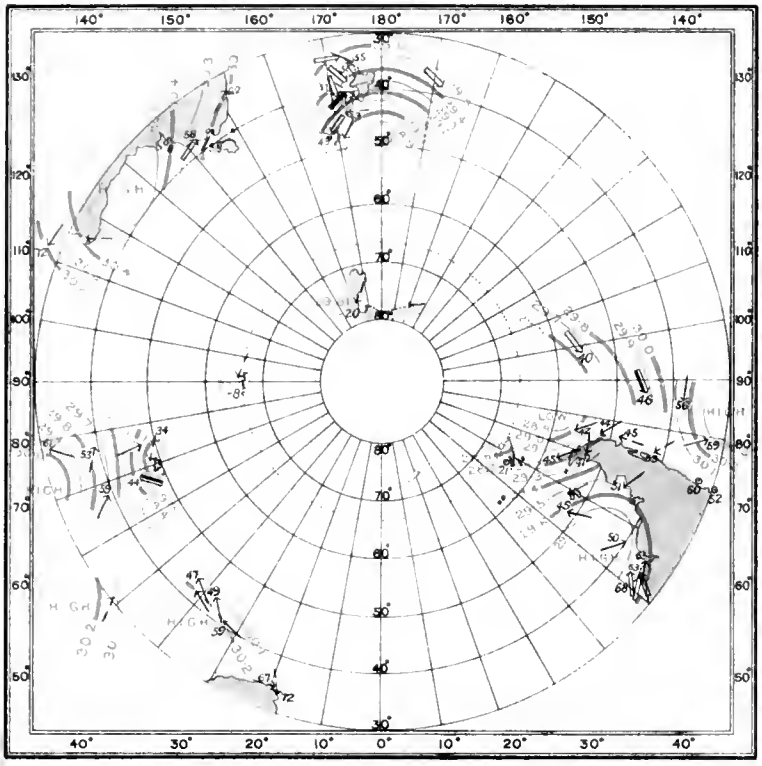

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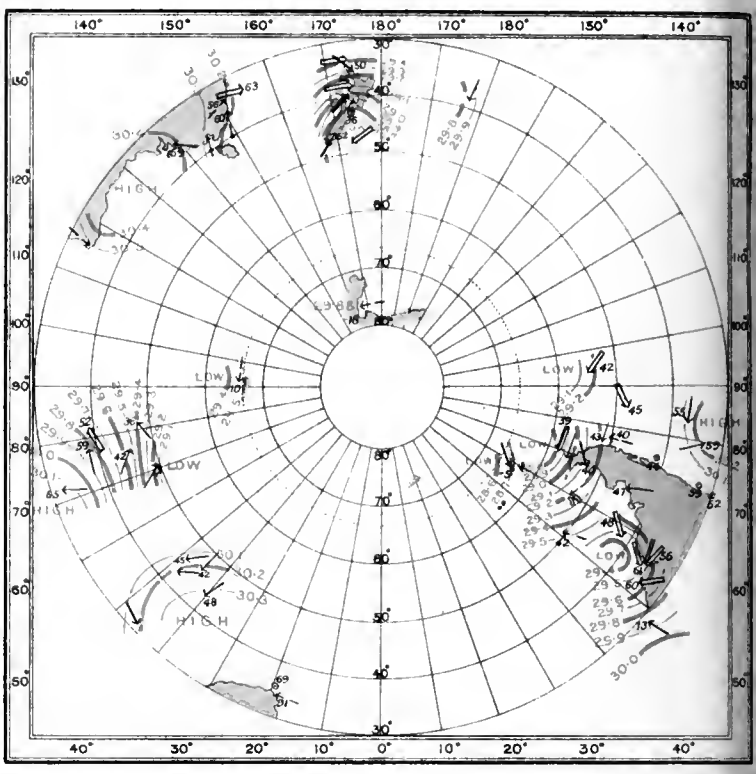

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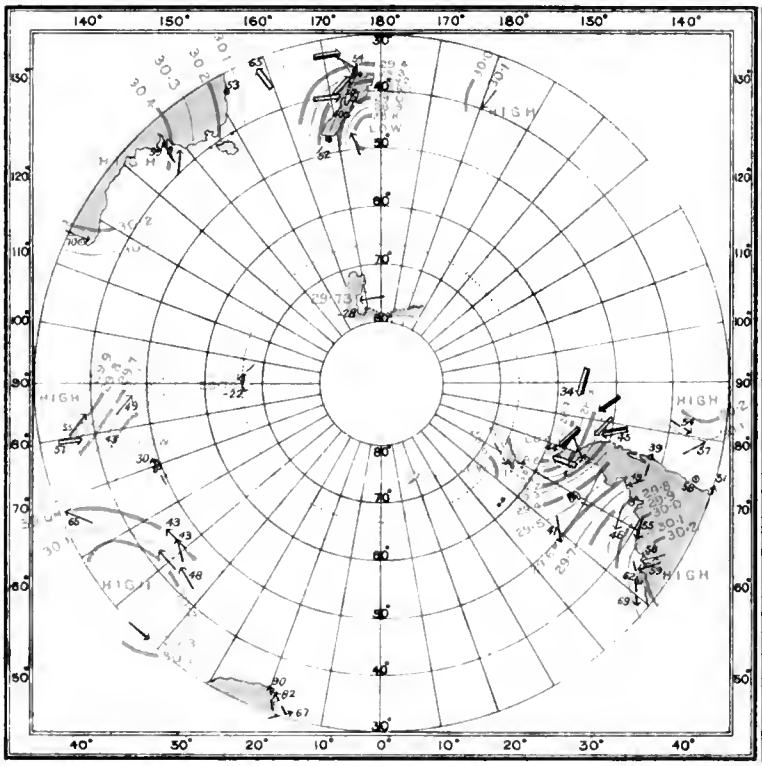

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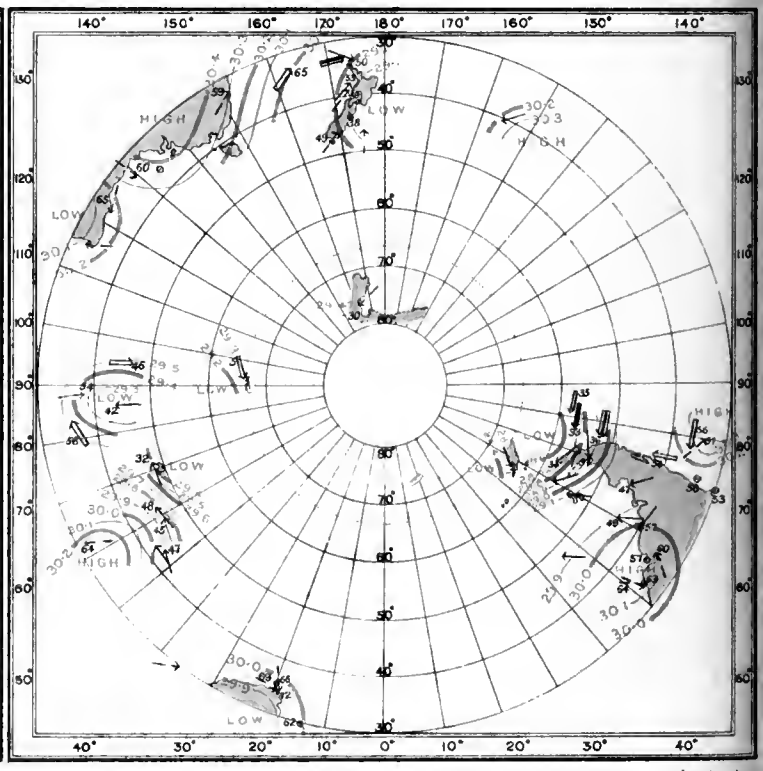

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For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

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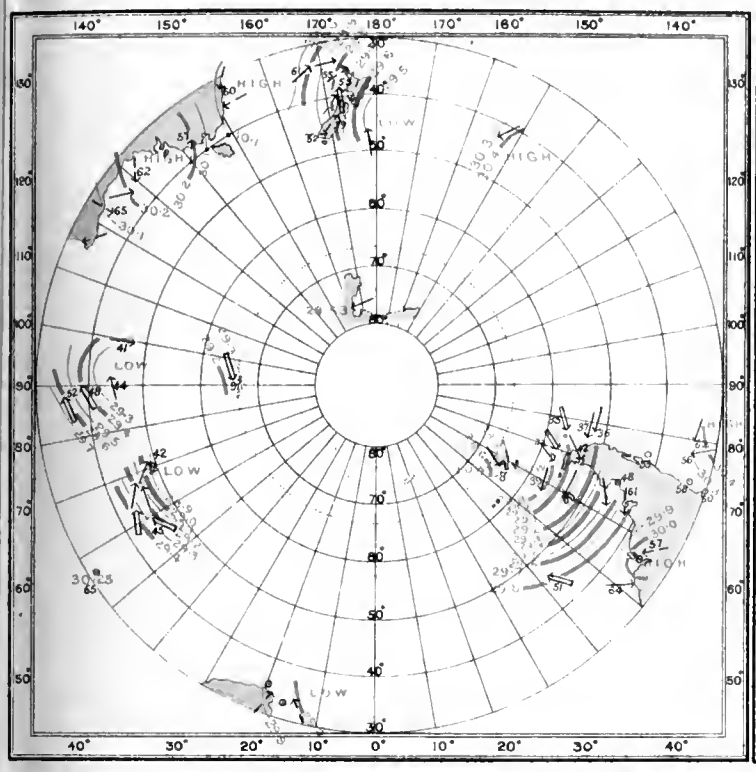

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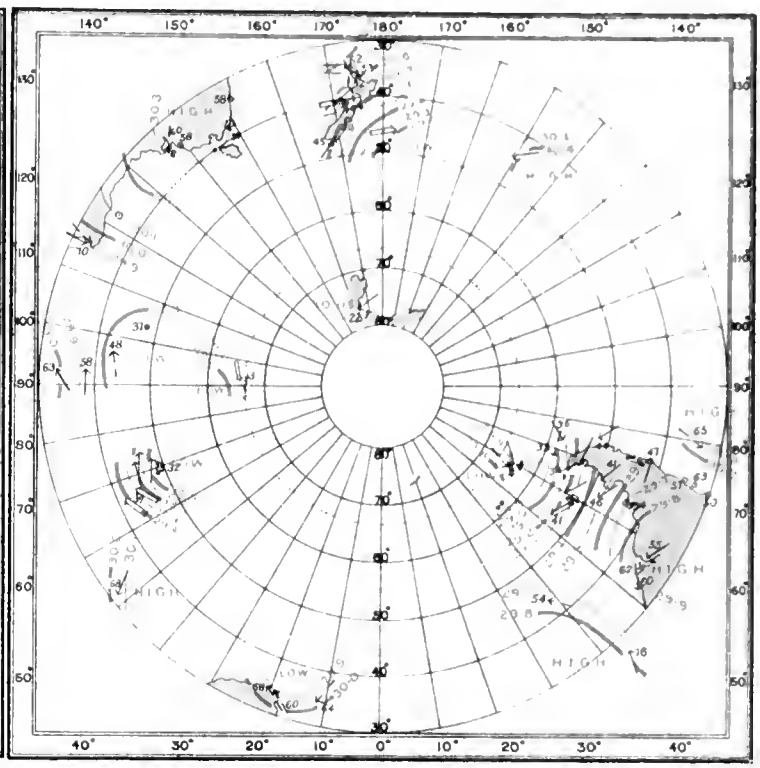

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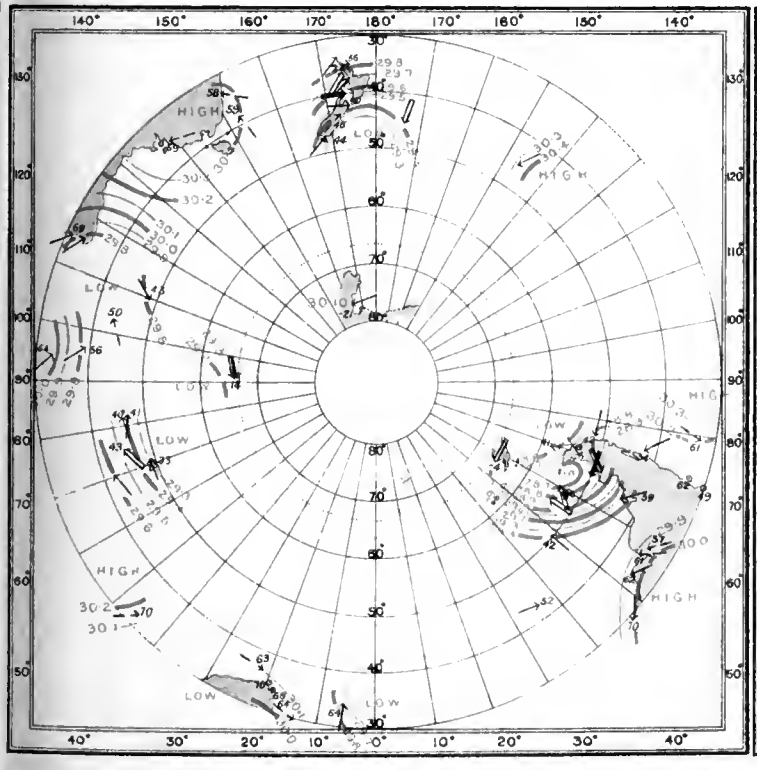

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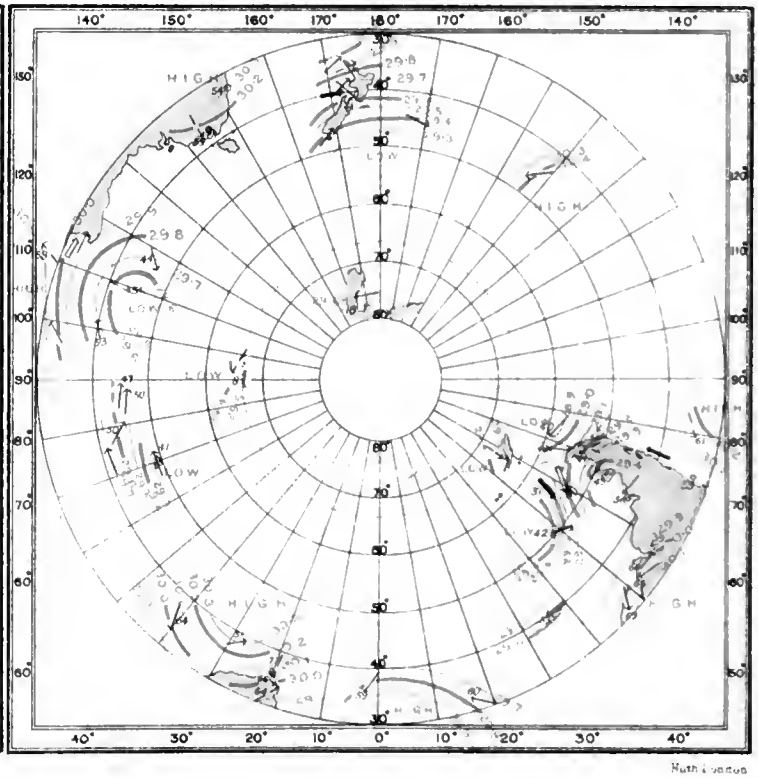

For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

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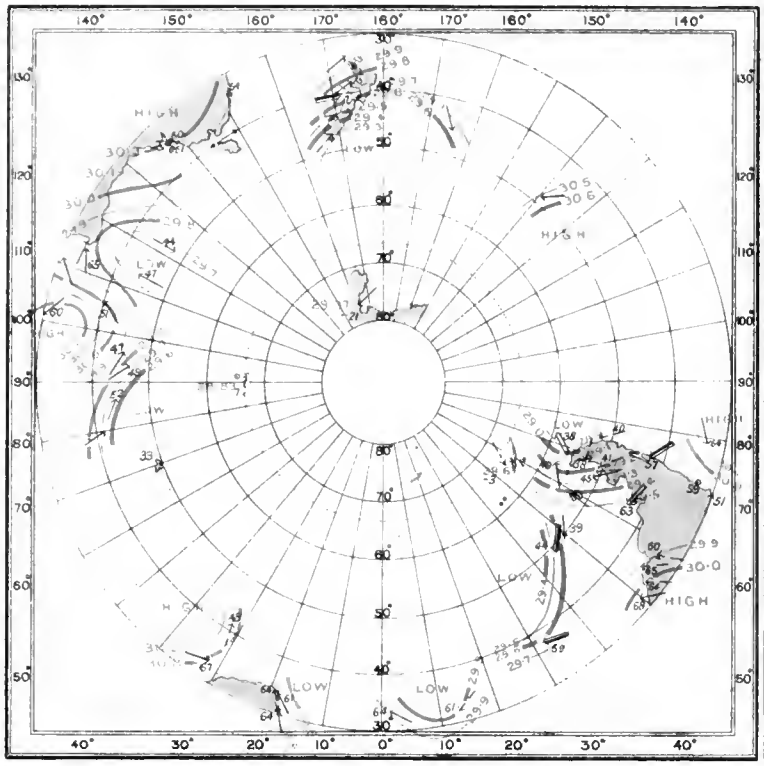

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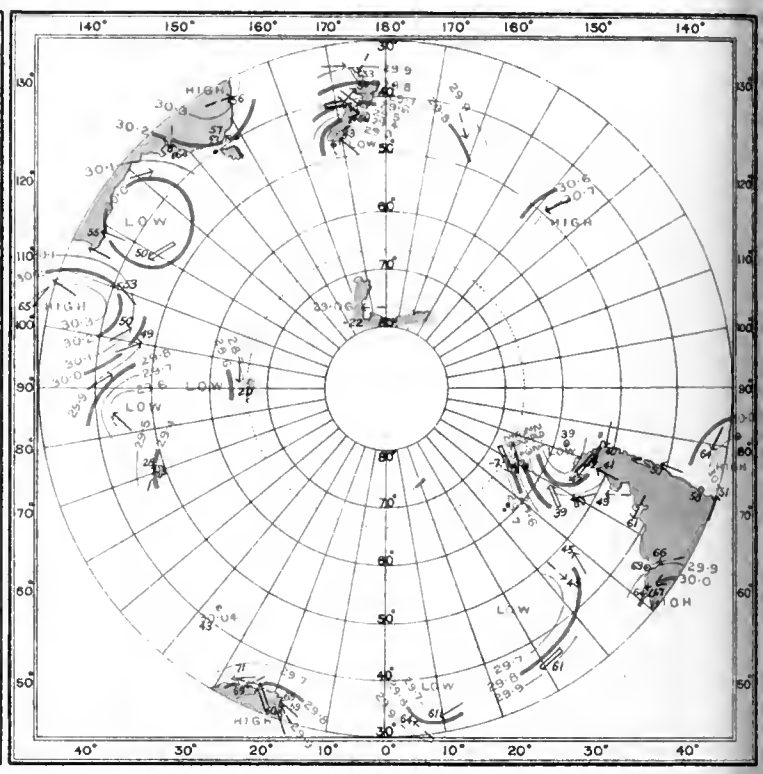

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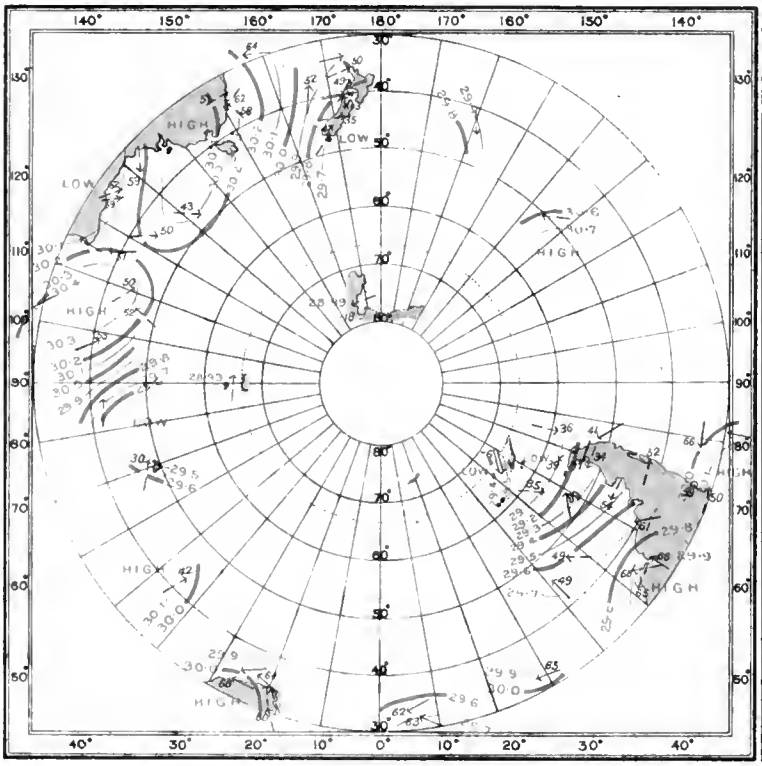

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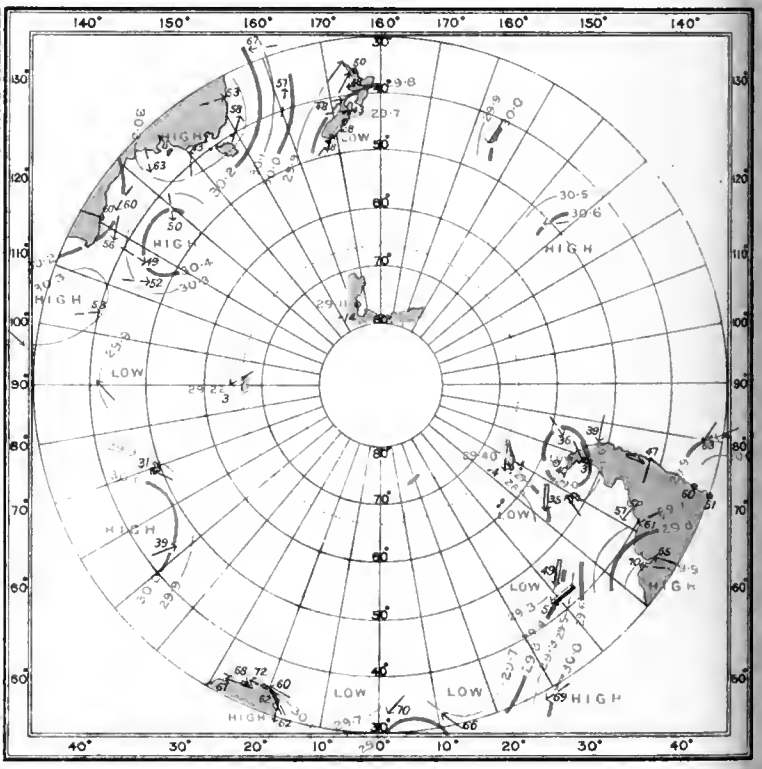


Huth, London

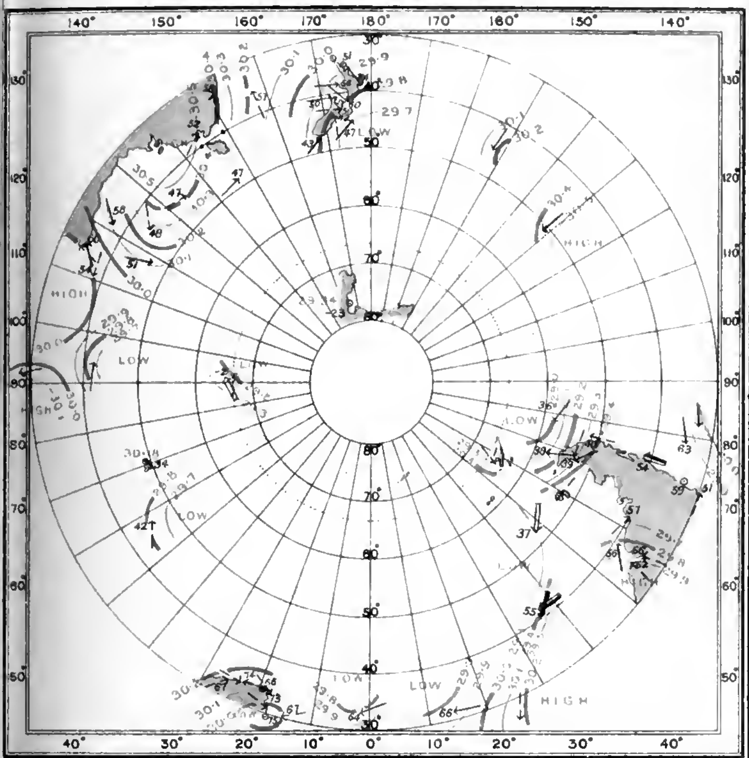
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1902 MAY 25



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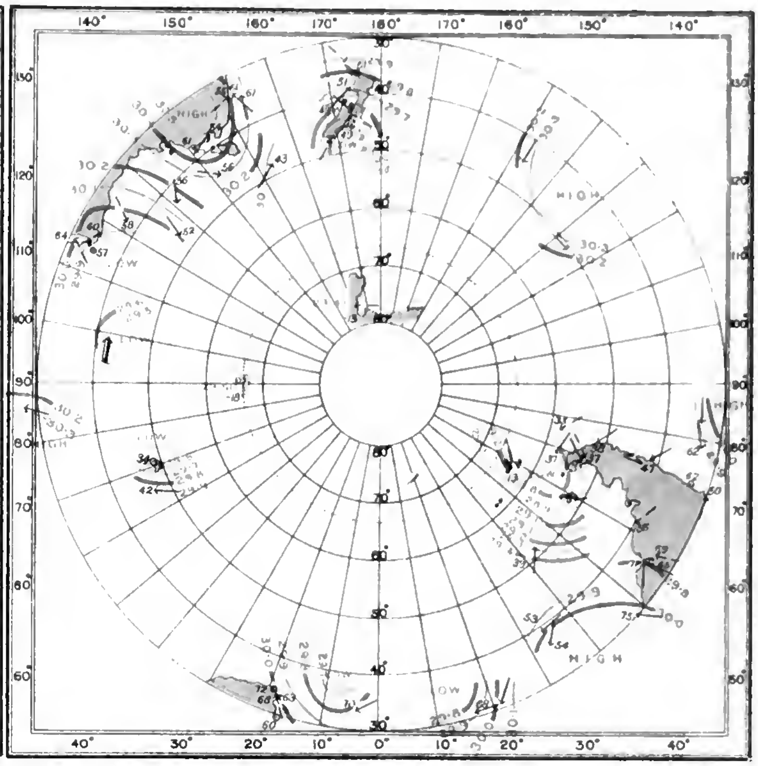

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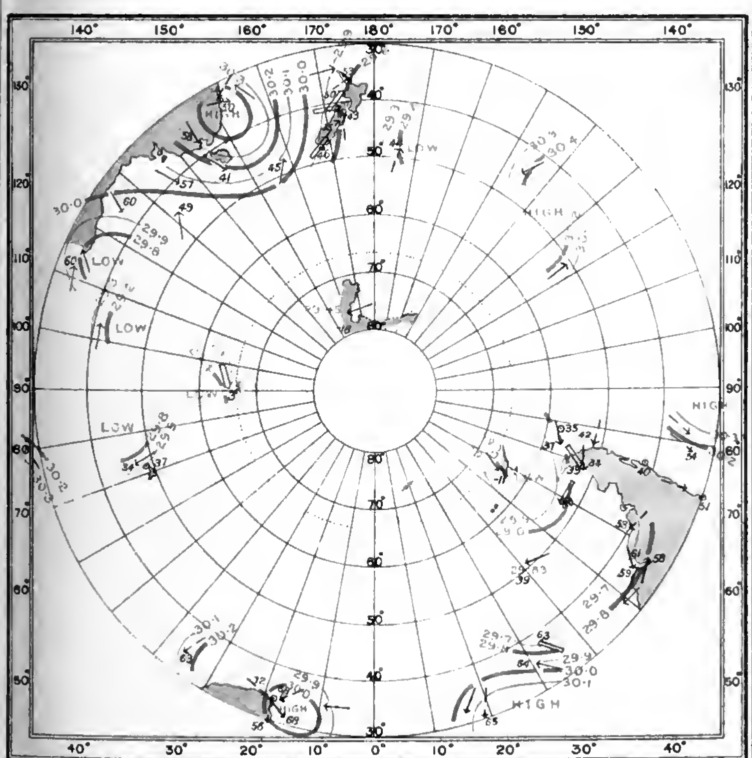

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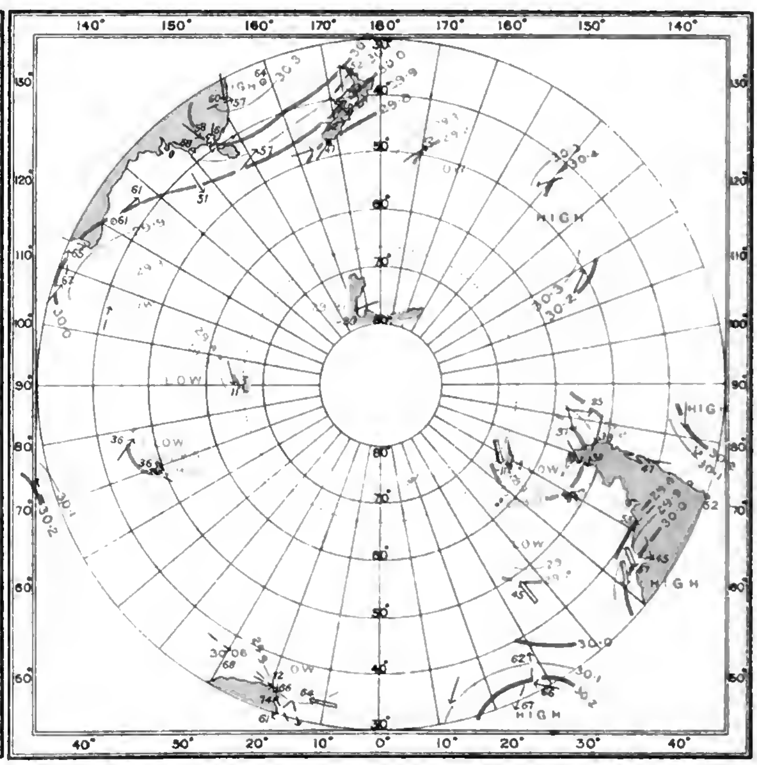

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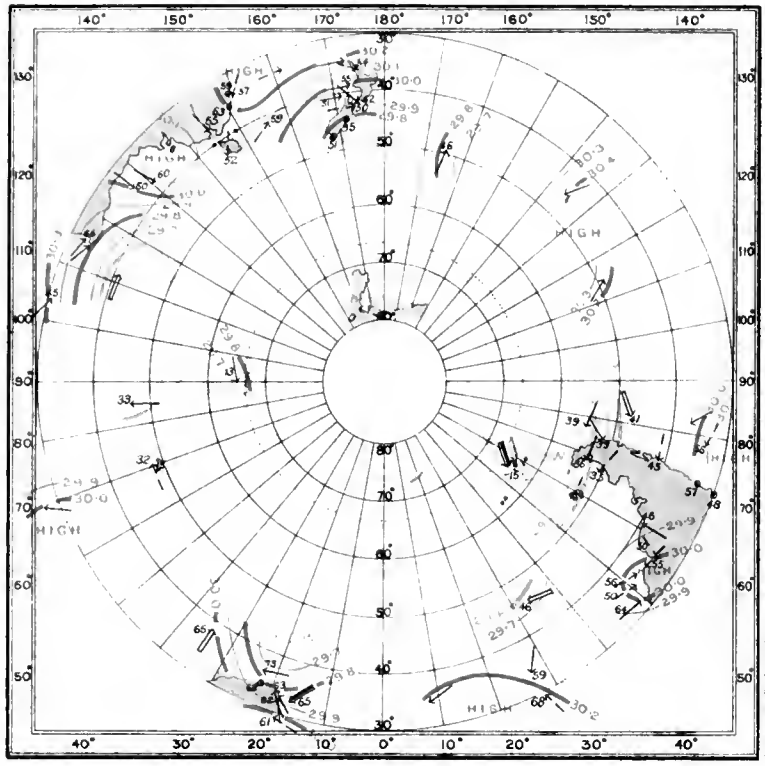
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 MAY 29



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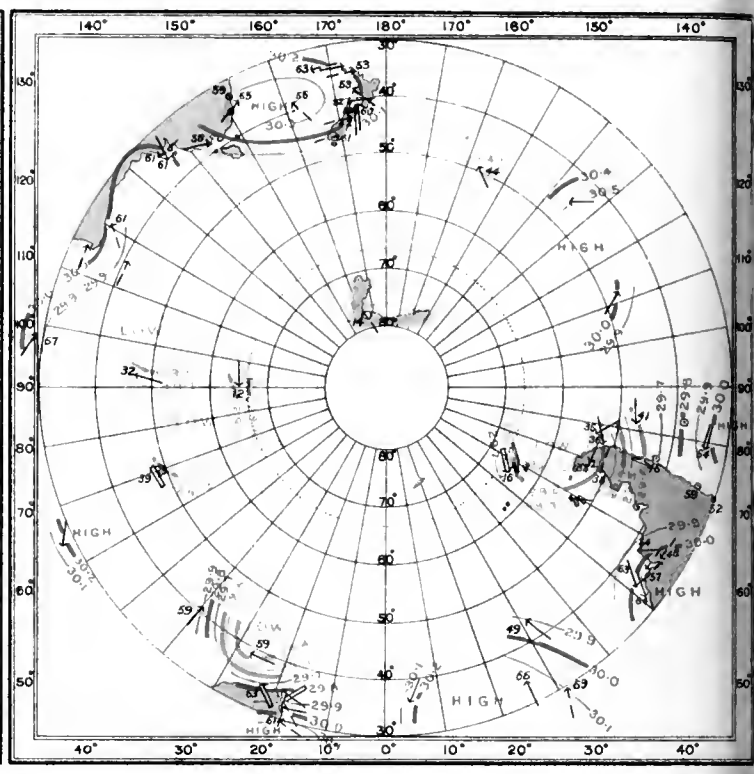

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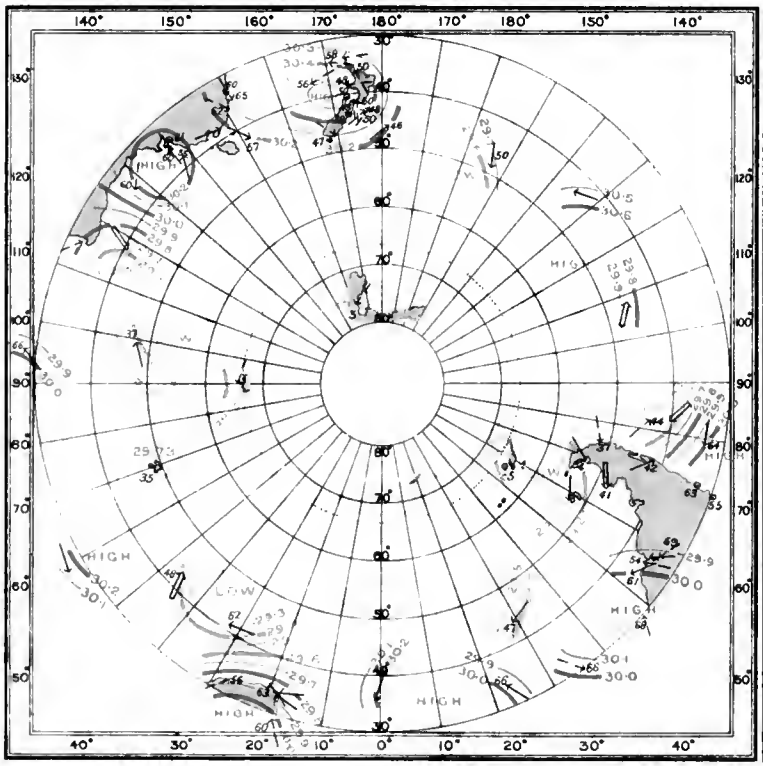

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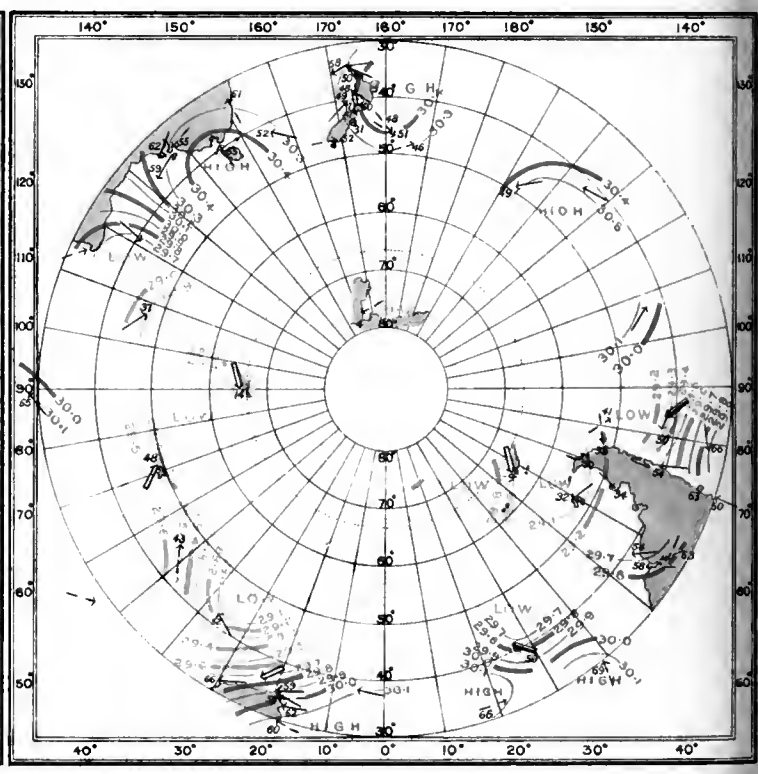

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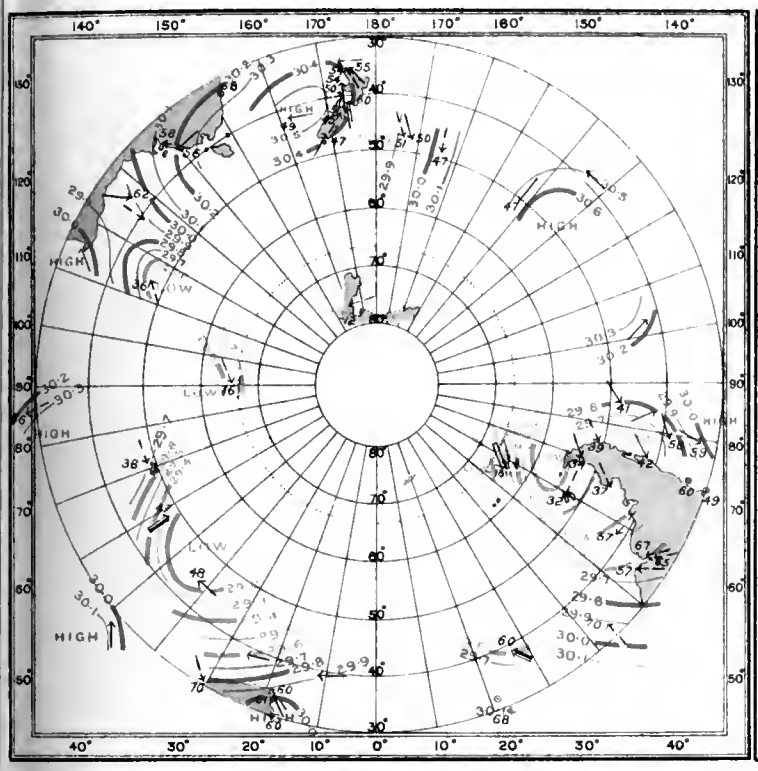
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 JUNE 2



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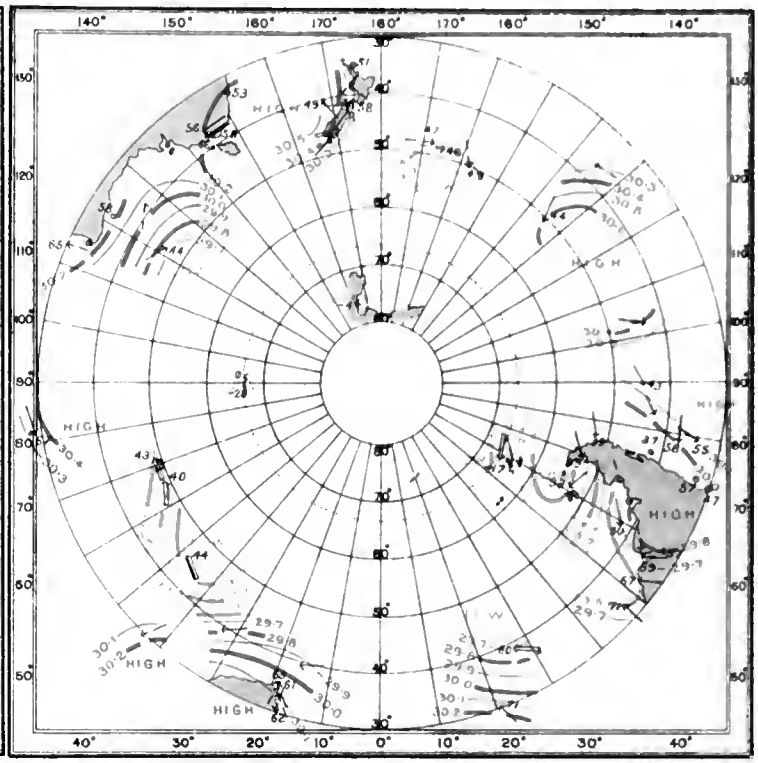

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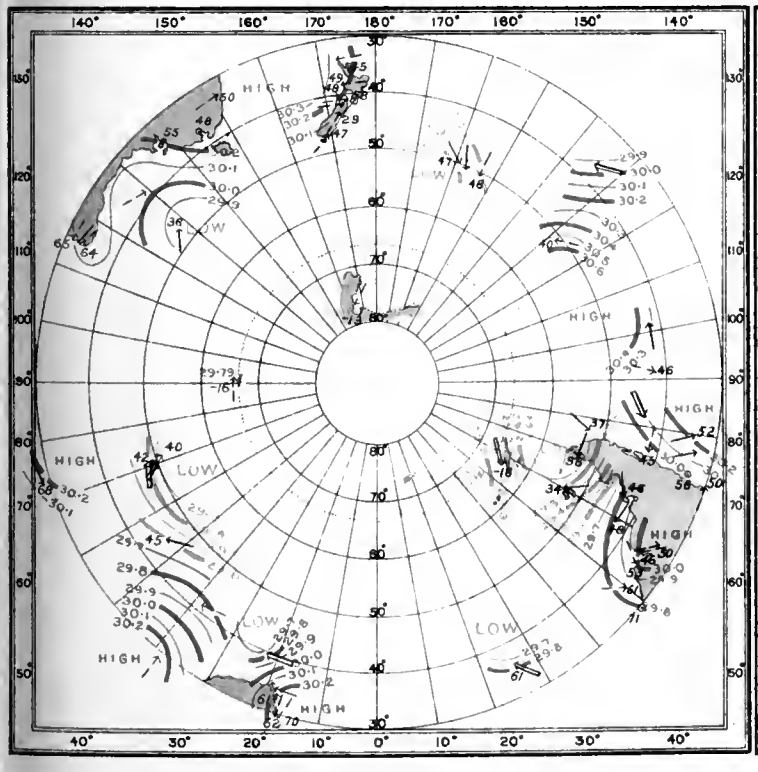

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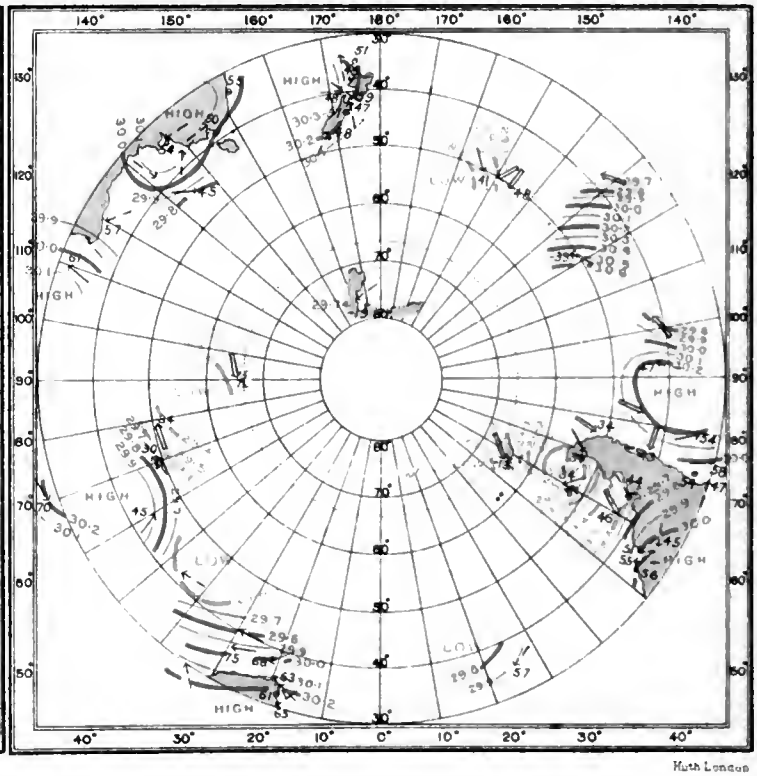

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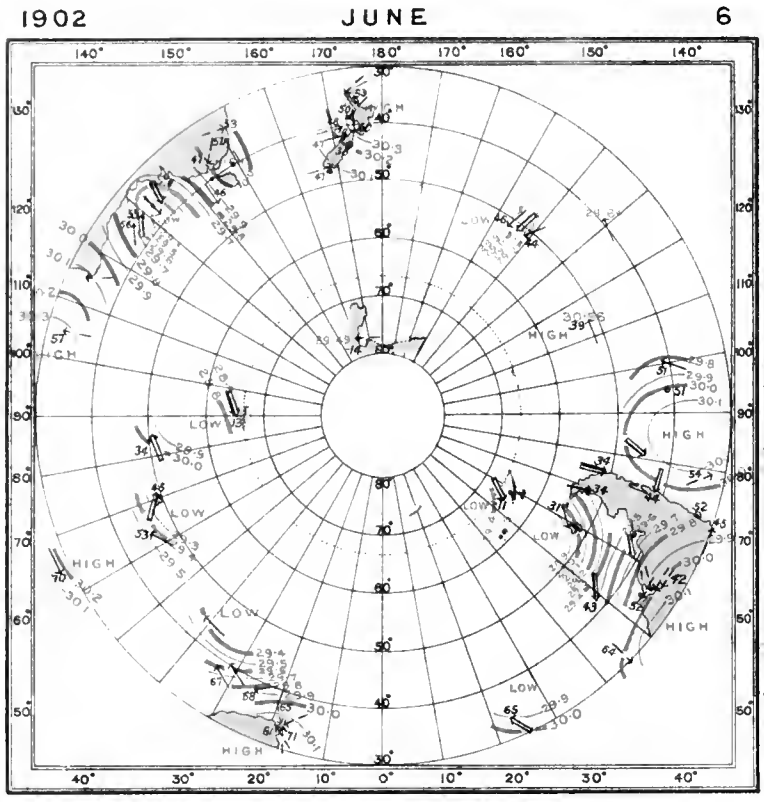
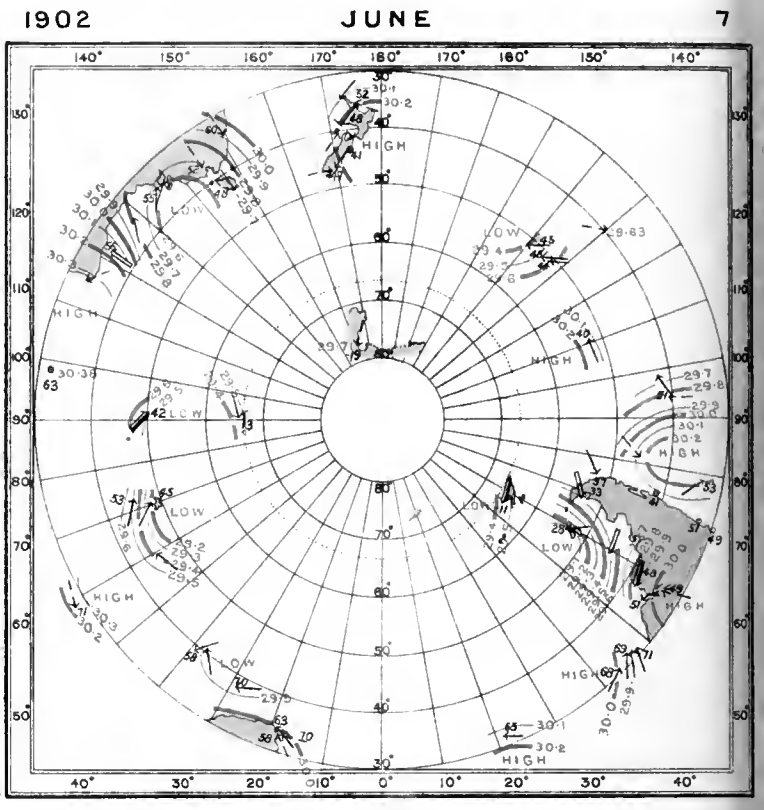
For explanation see Key map

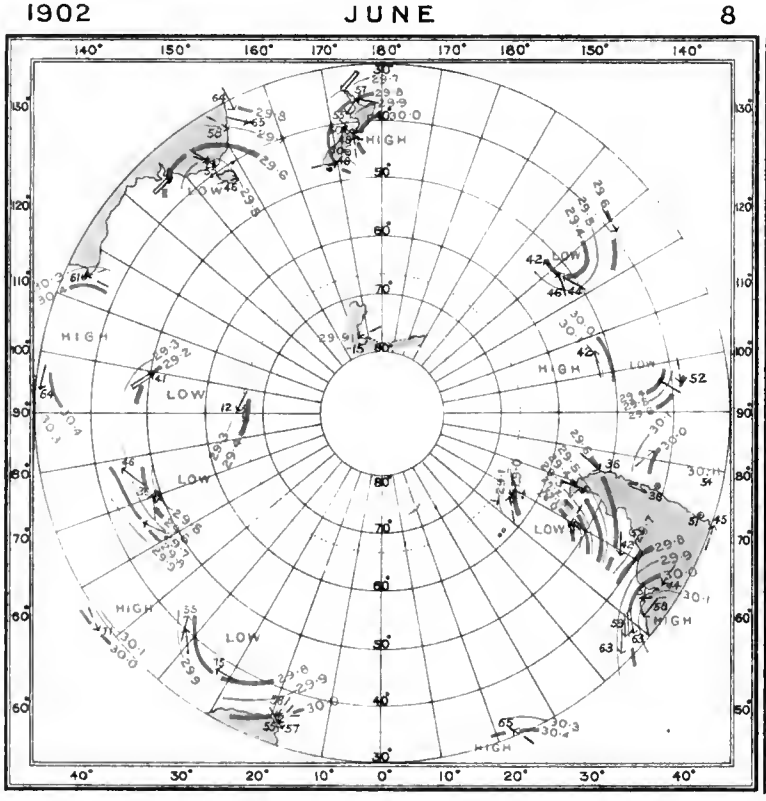
INTERNATIONAL ANTARCTIC CO-OPERATION.

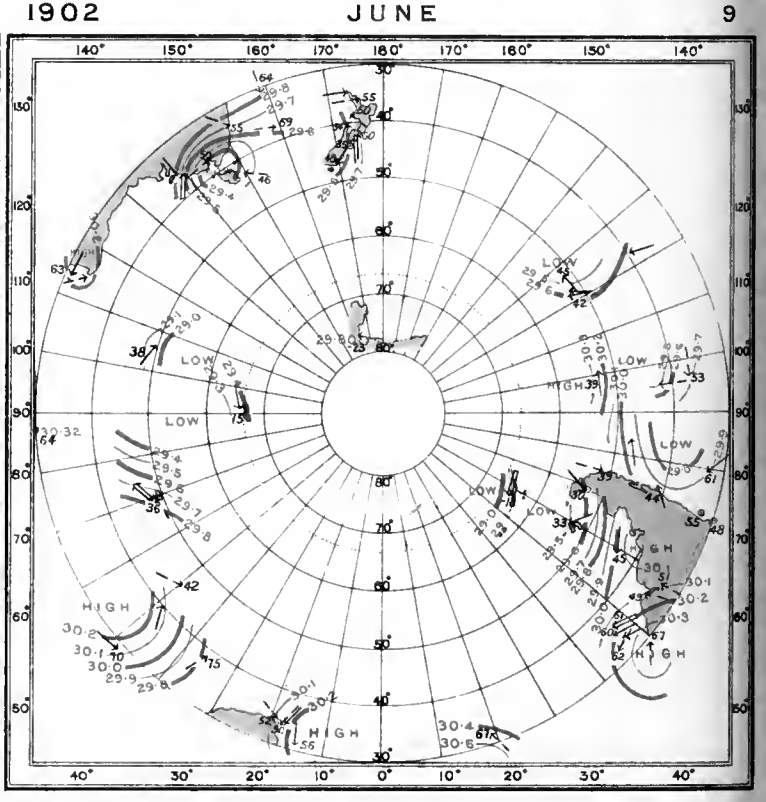
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.









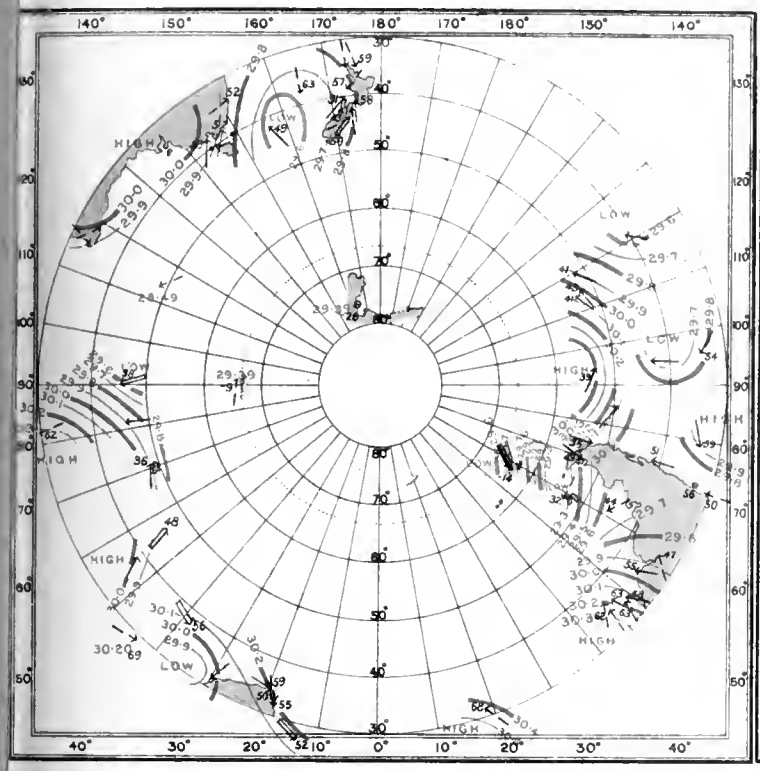
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1902 JUNE 10



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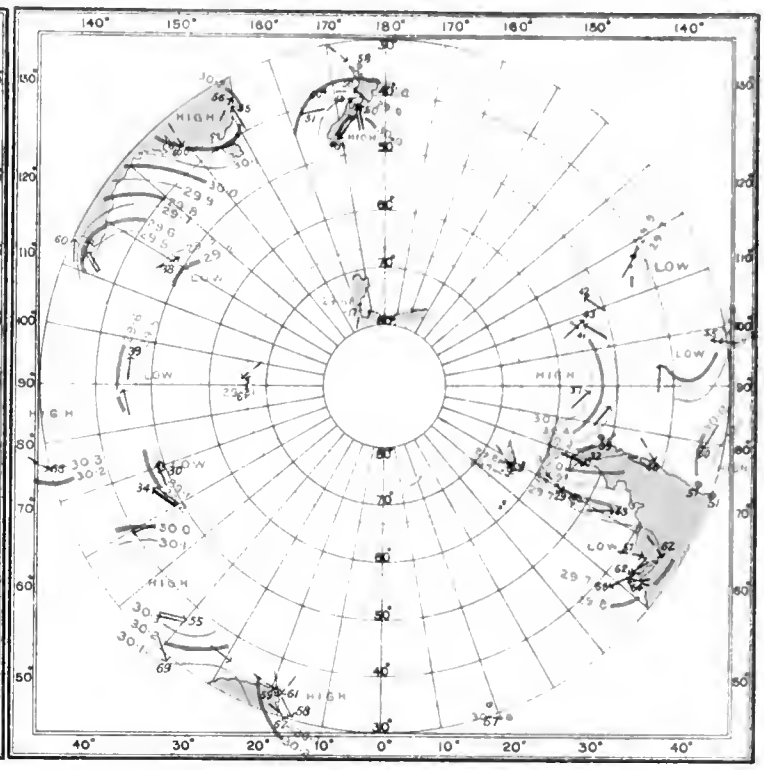

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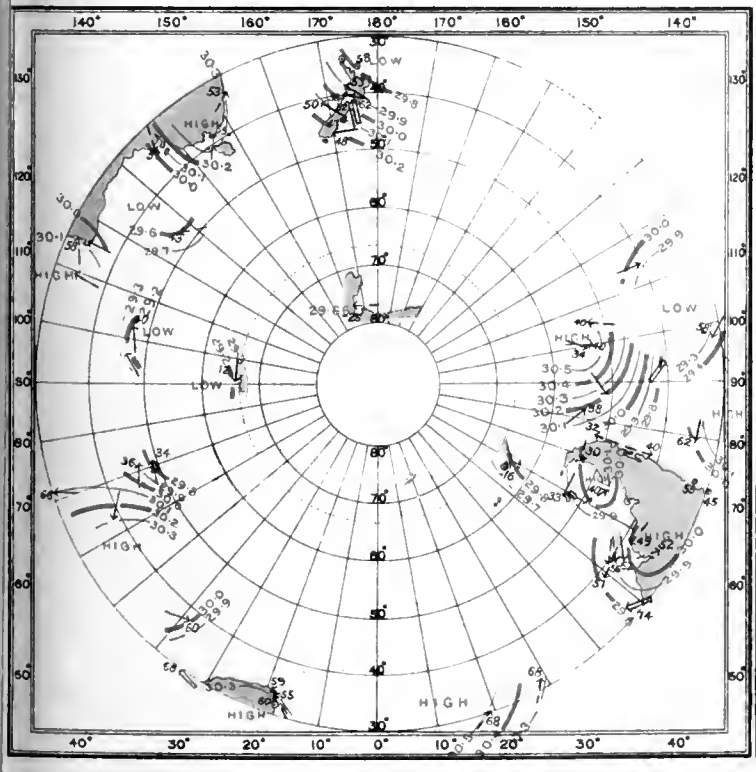

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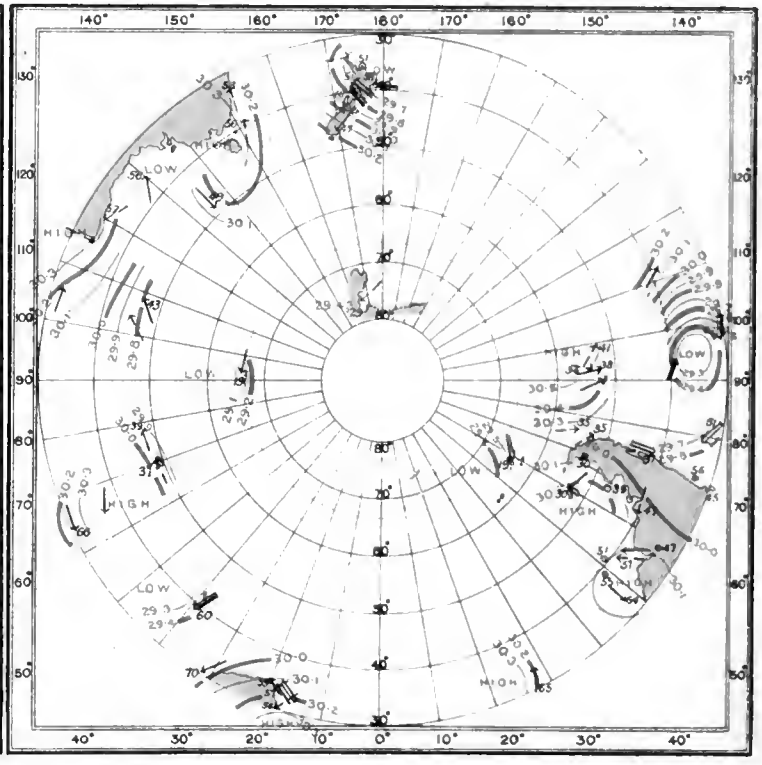


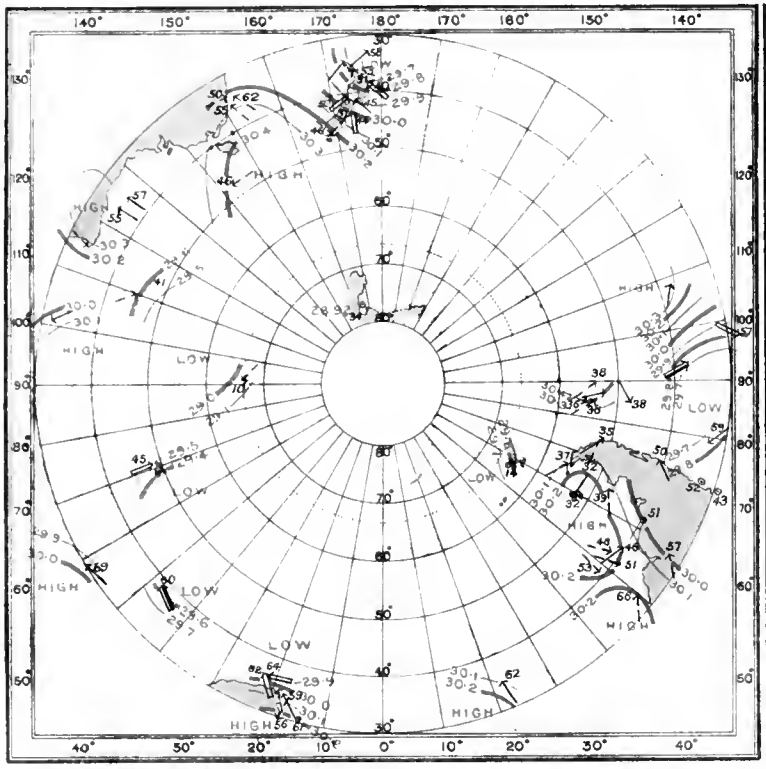
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 JUNE 14



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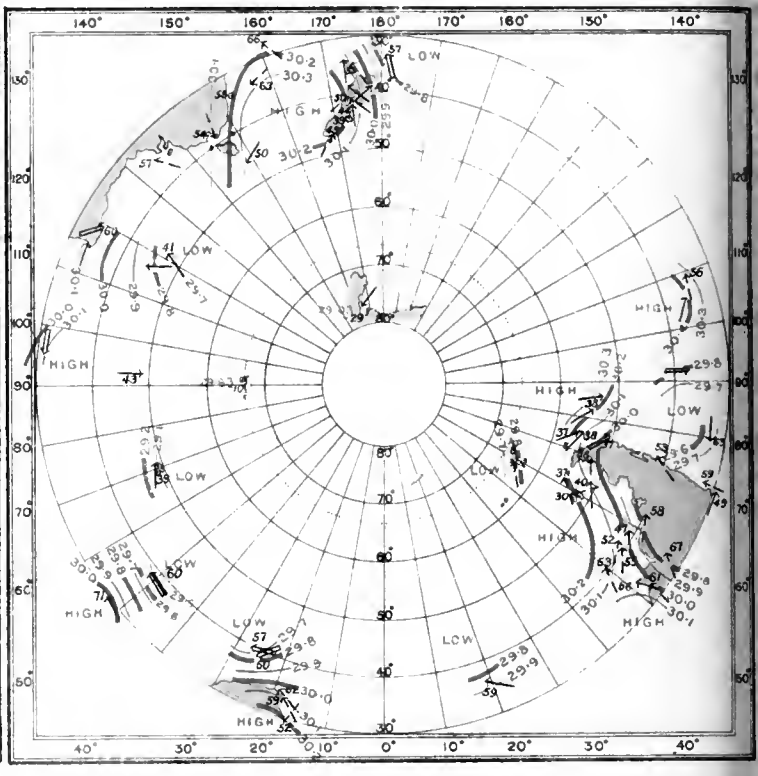

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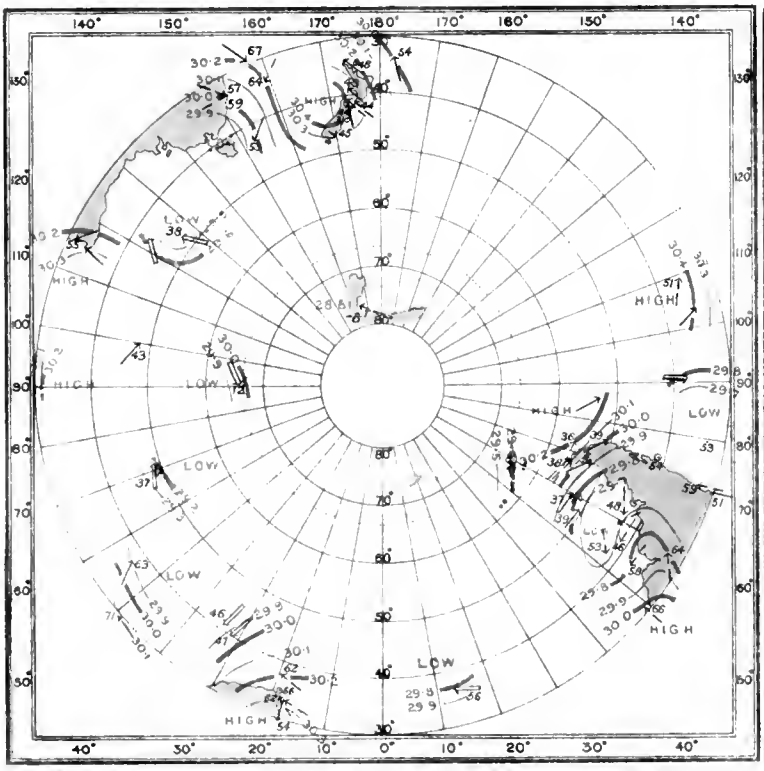

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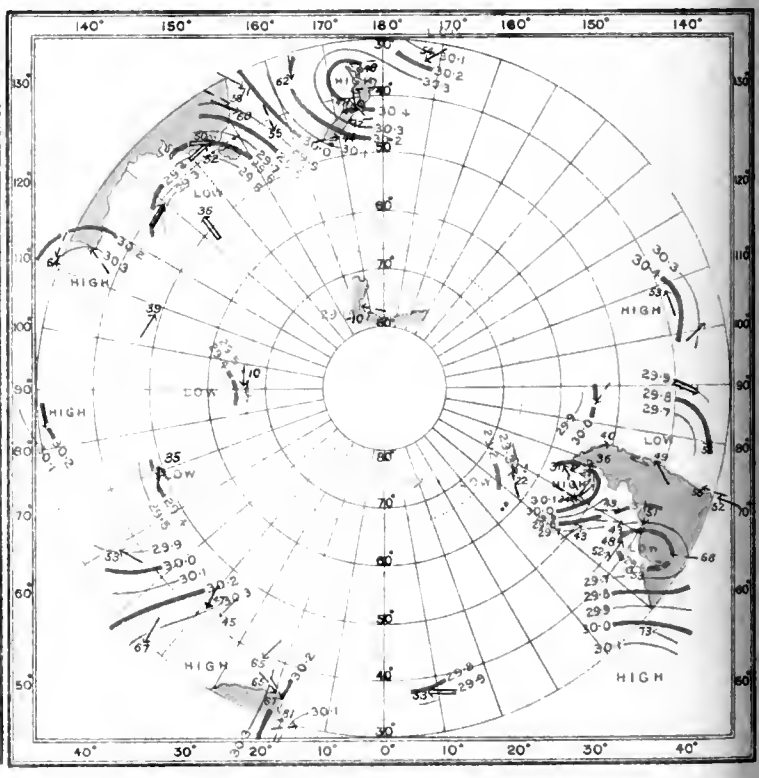


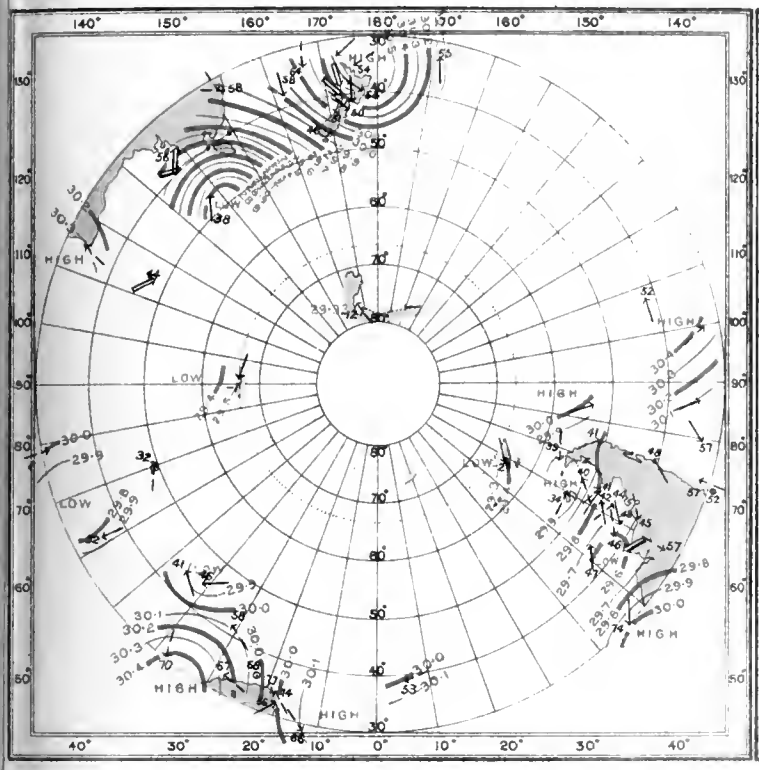
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 JUNE 18



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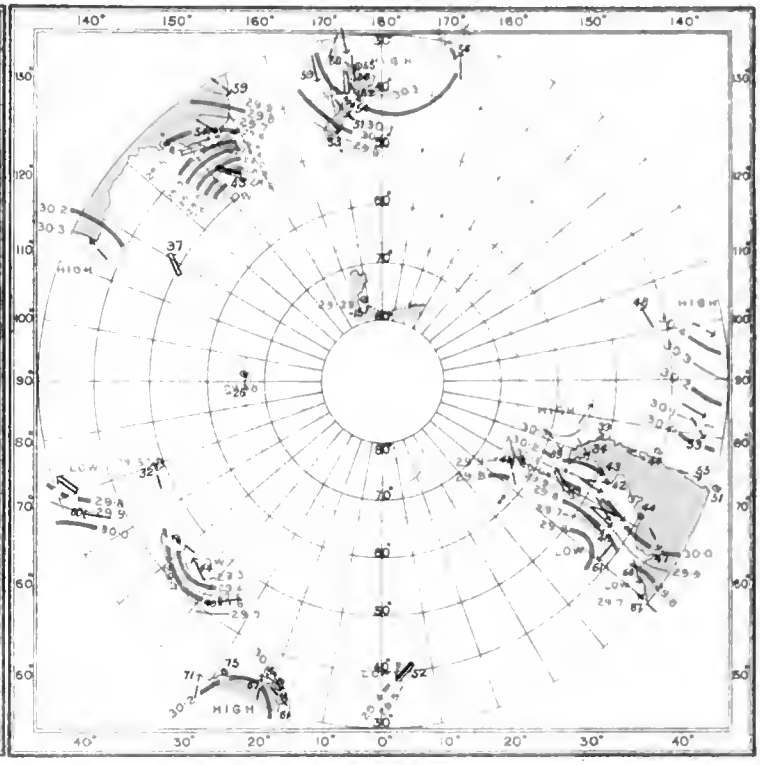

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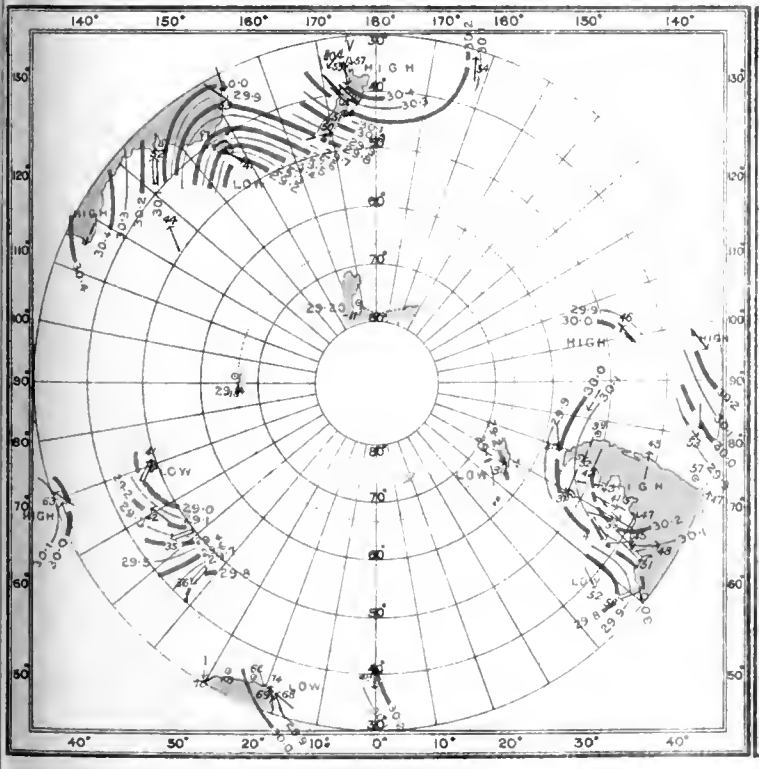

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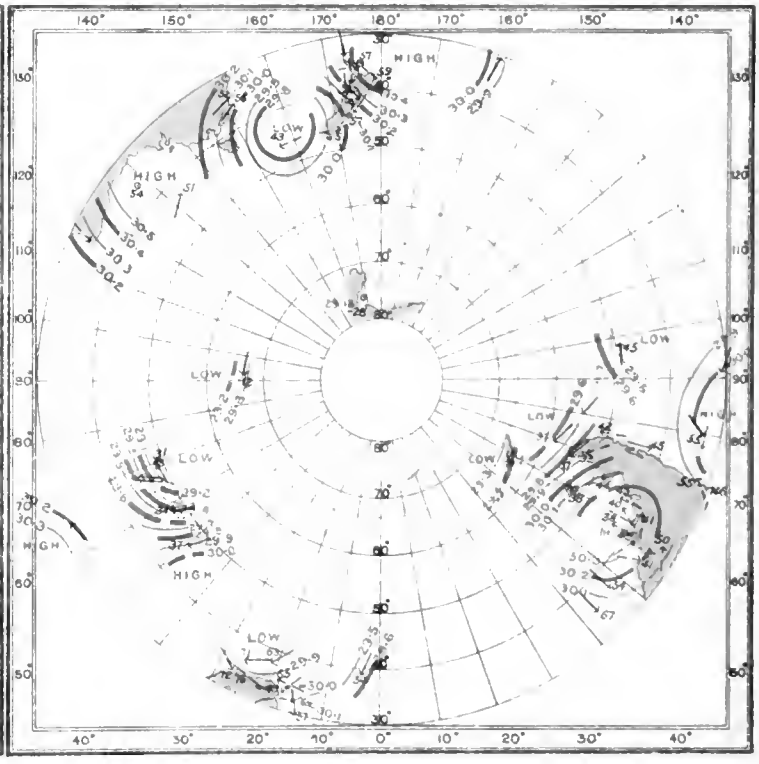
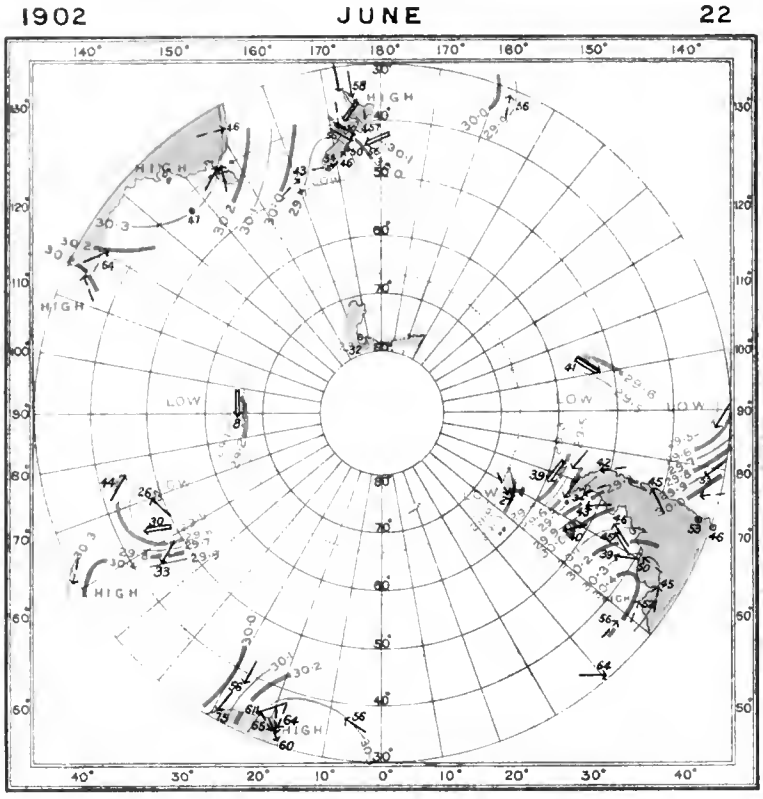


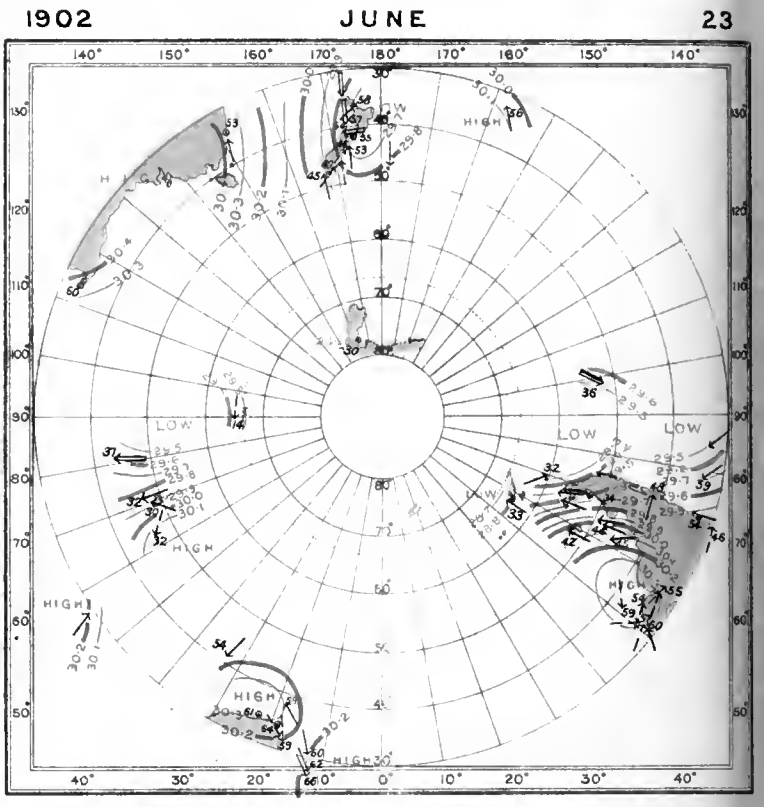
For explanation see Key map

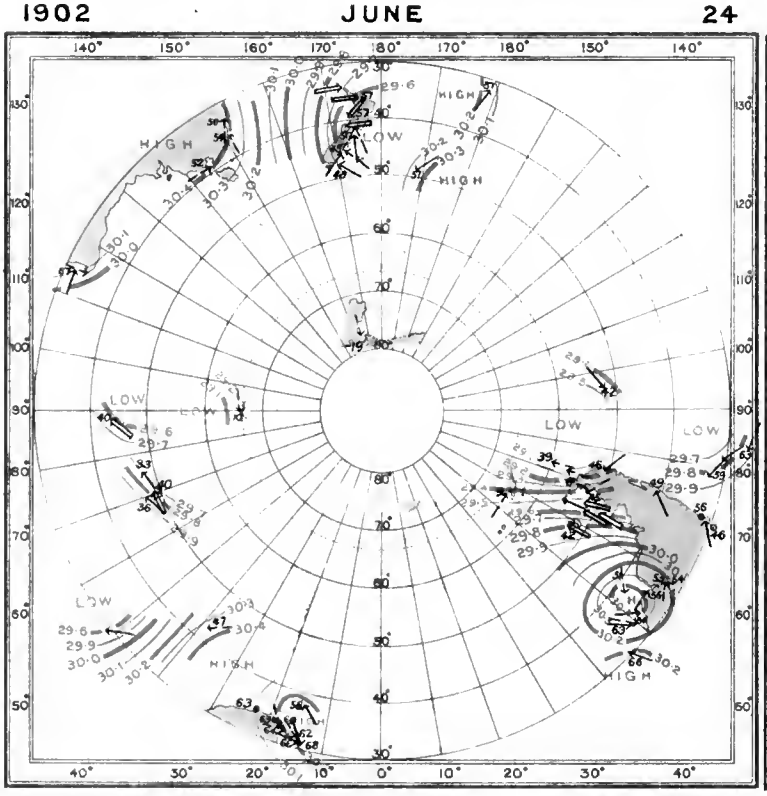
INTERNATIONAL ANTARCTIC CO-OPERATION.

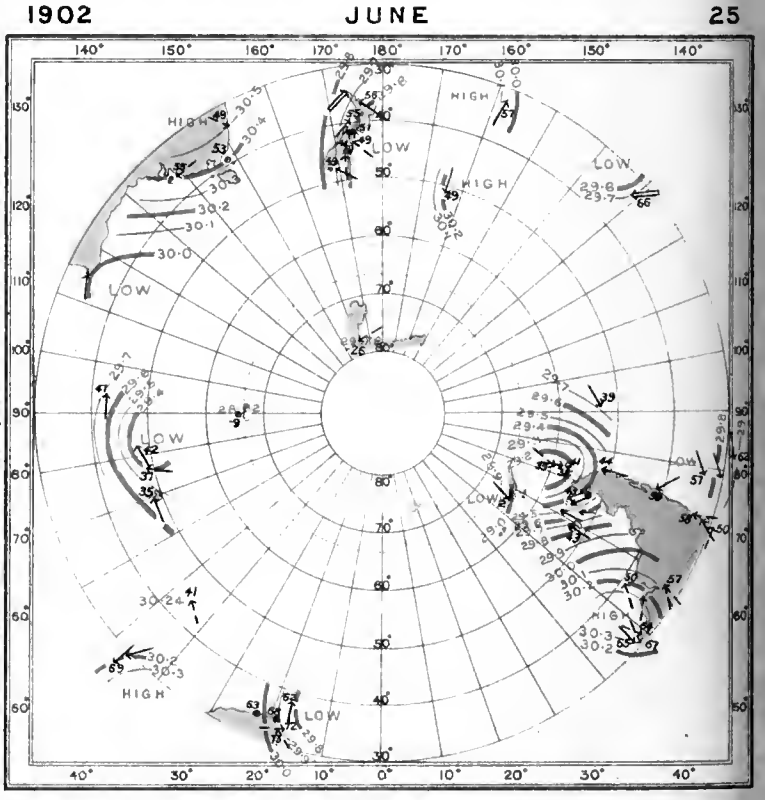
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.









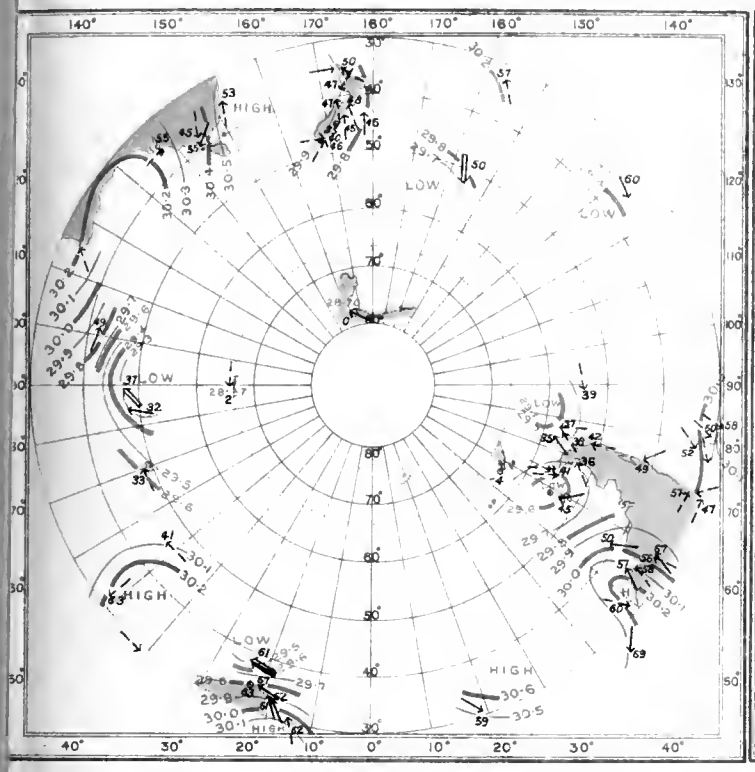
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 JUNE 26



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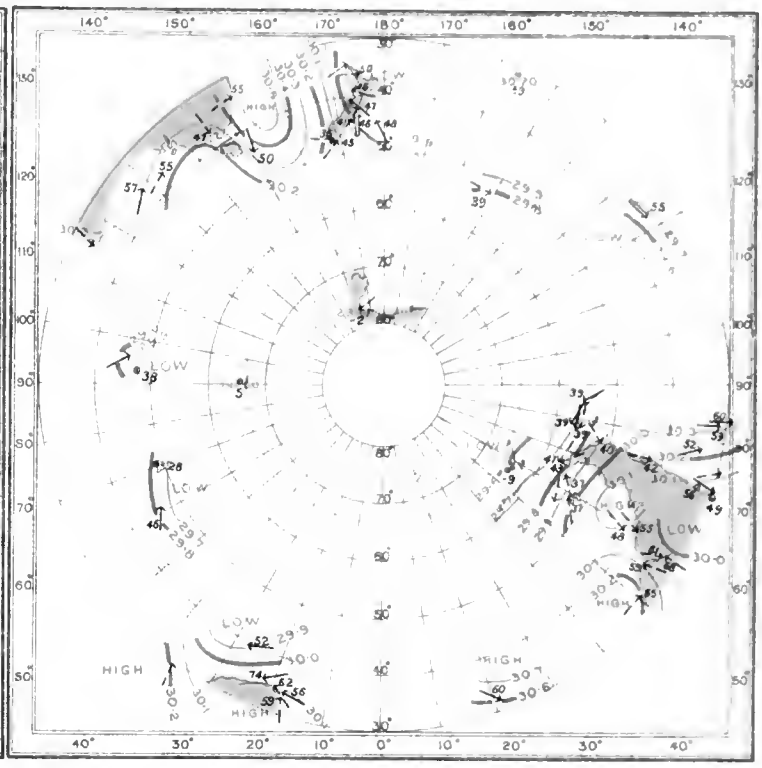

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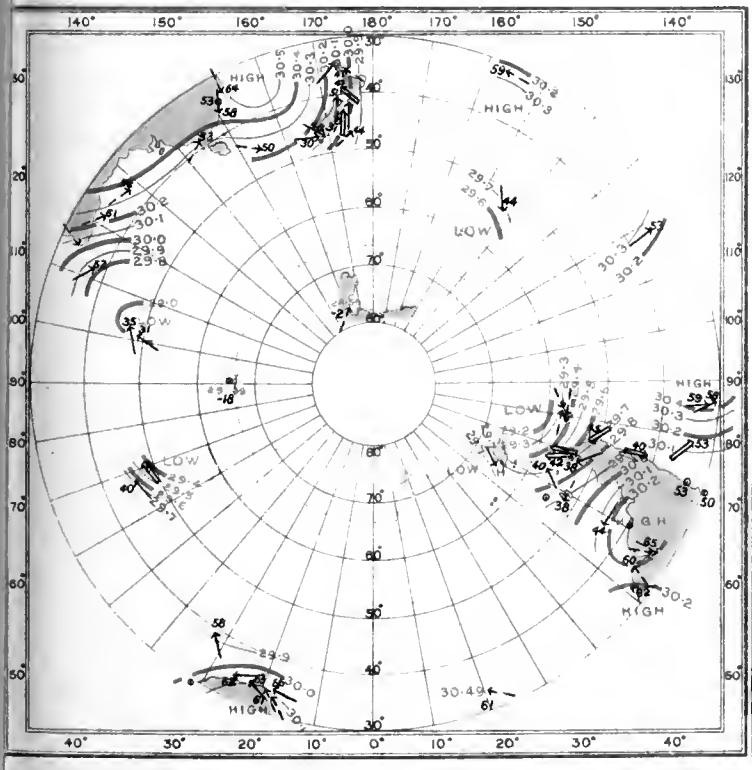

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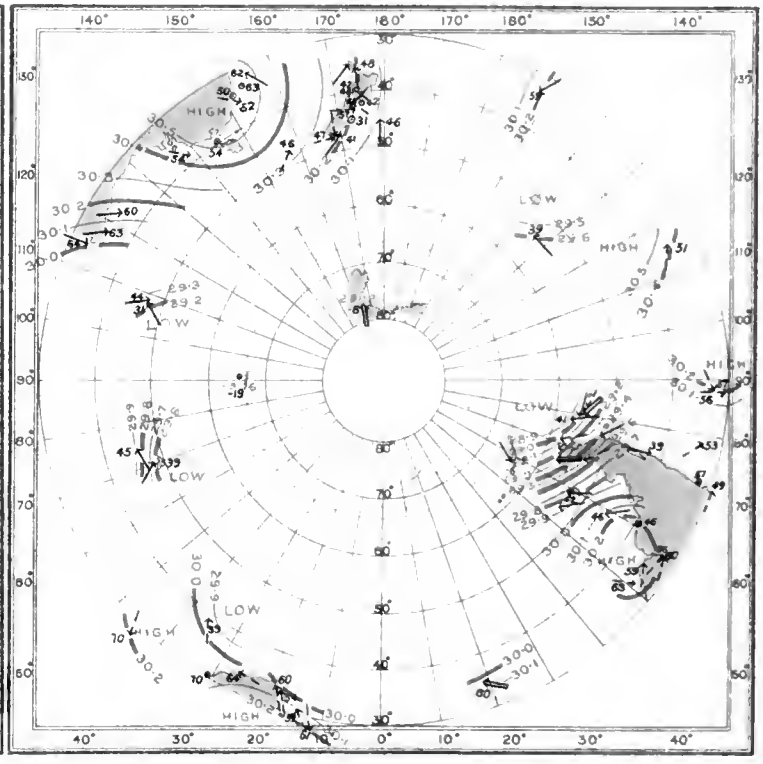


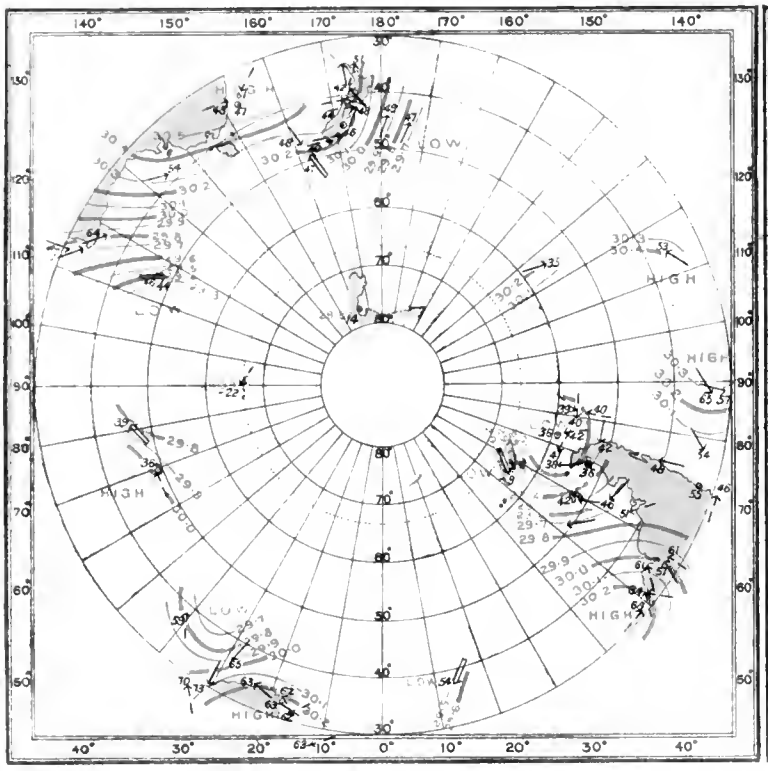
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1902 JUNE 30



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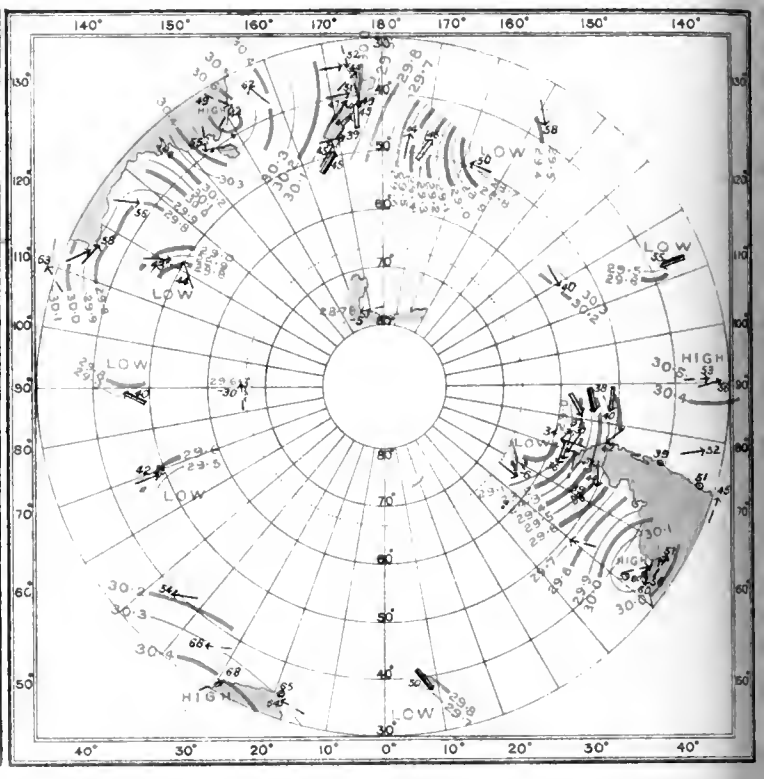

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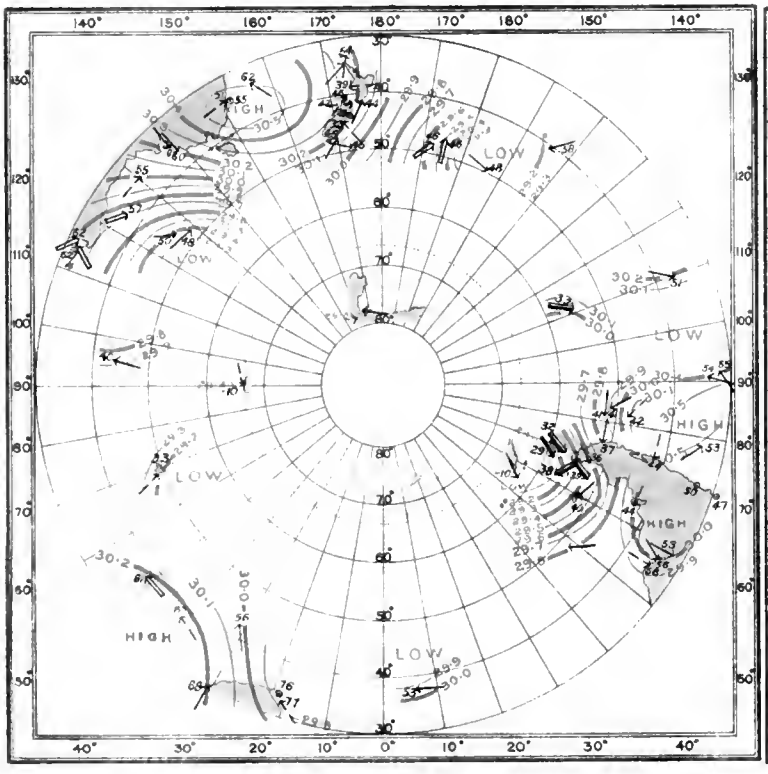

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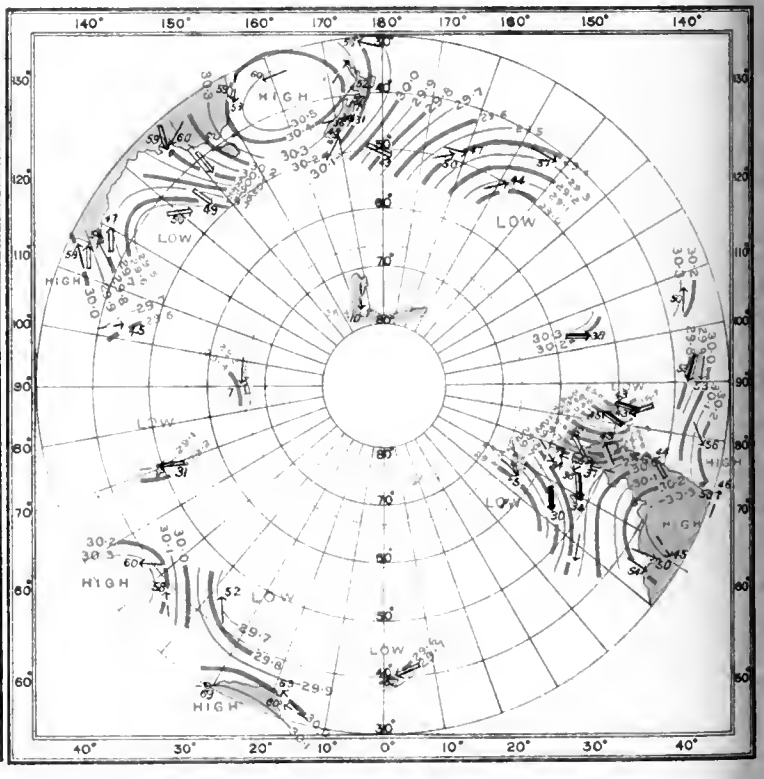

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

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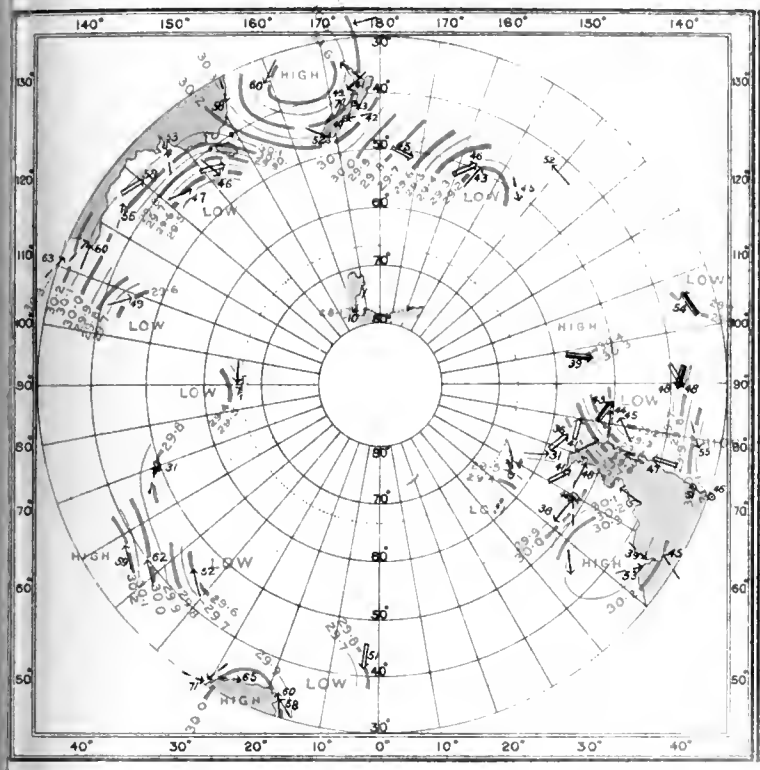

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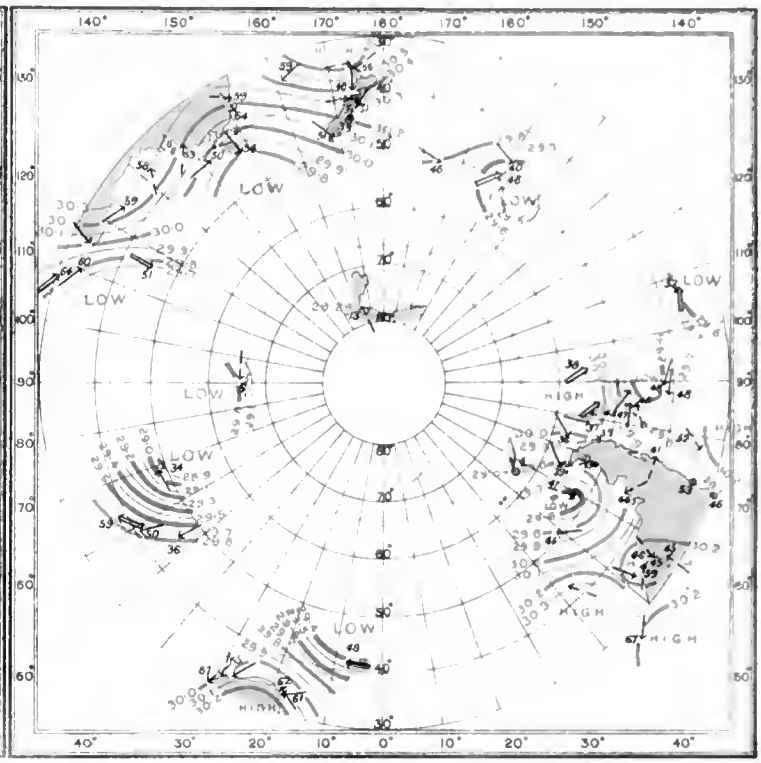

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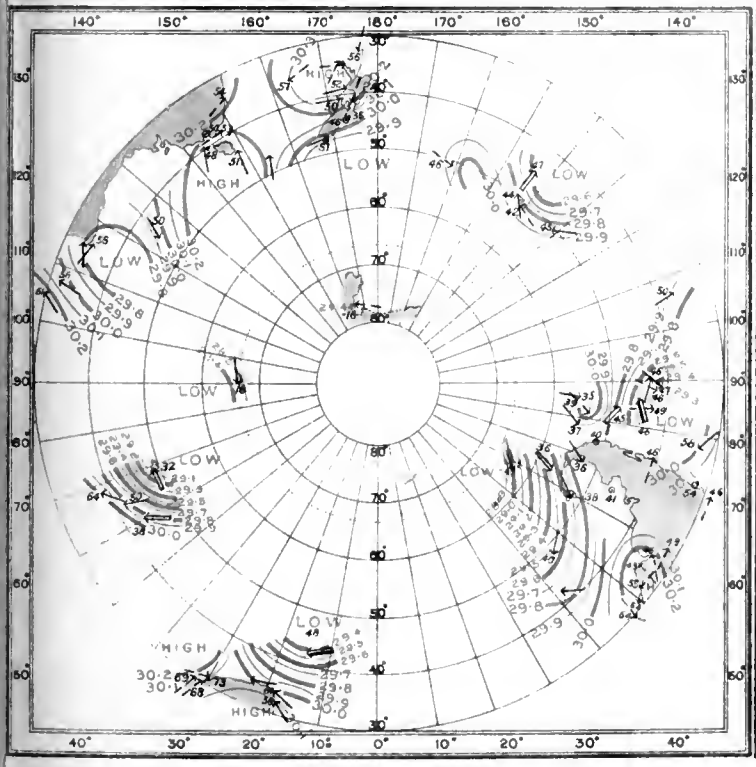

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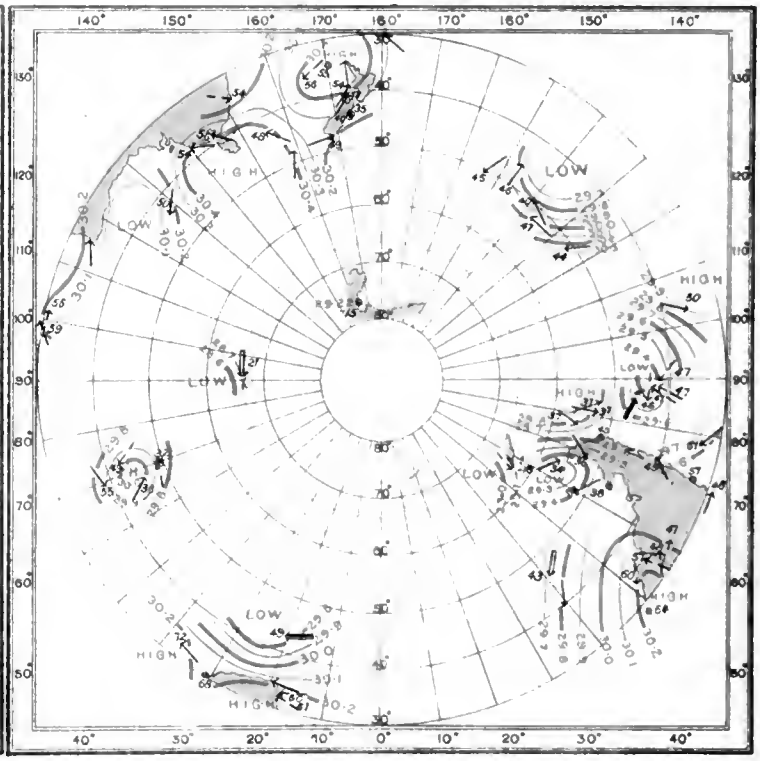
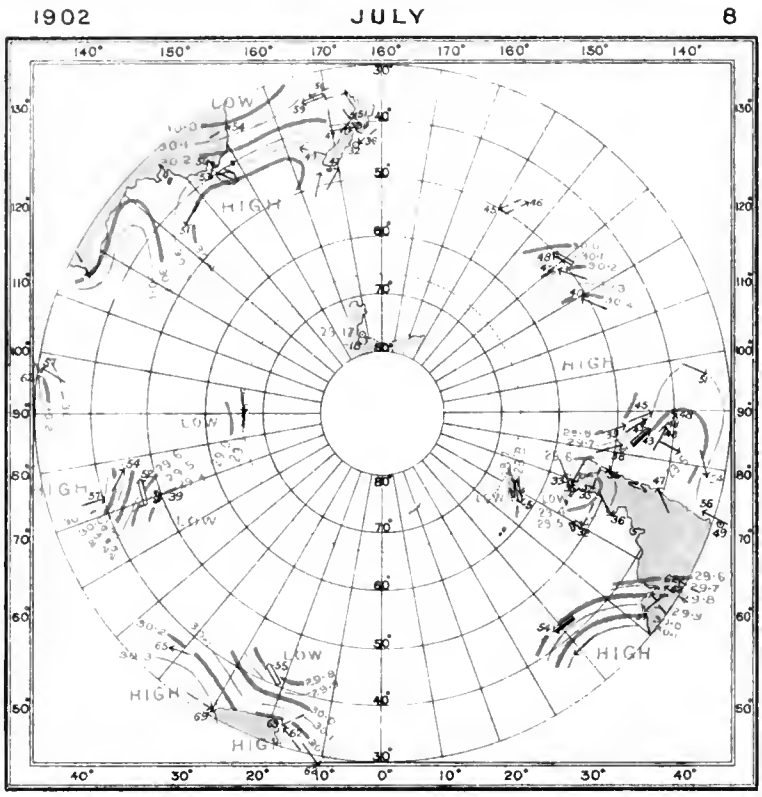


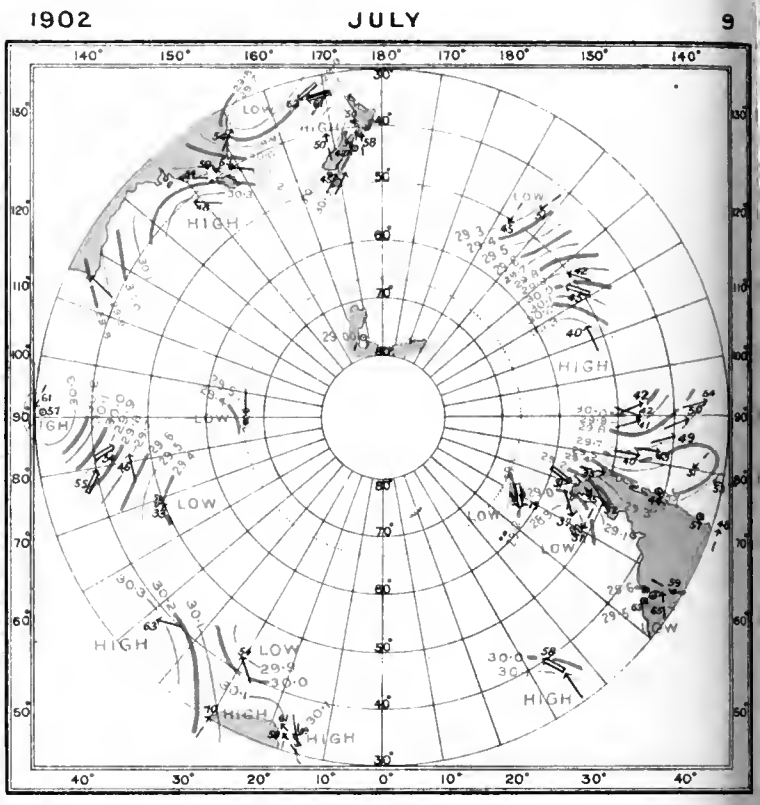
For explanation see Key map

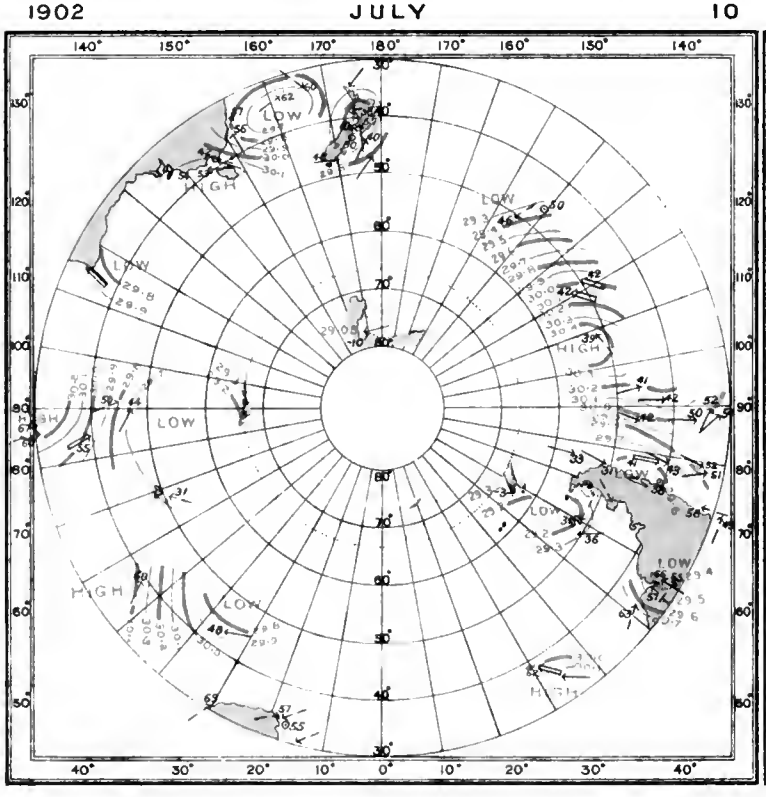
INTERNATIONAL ANTARCTIC CO-OPERATION.

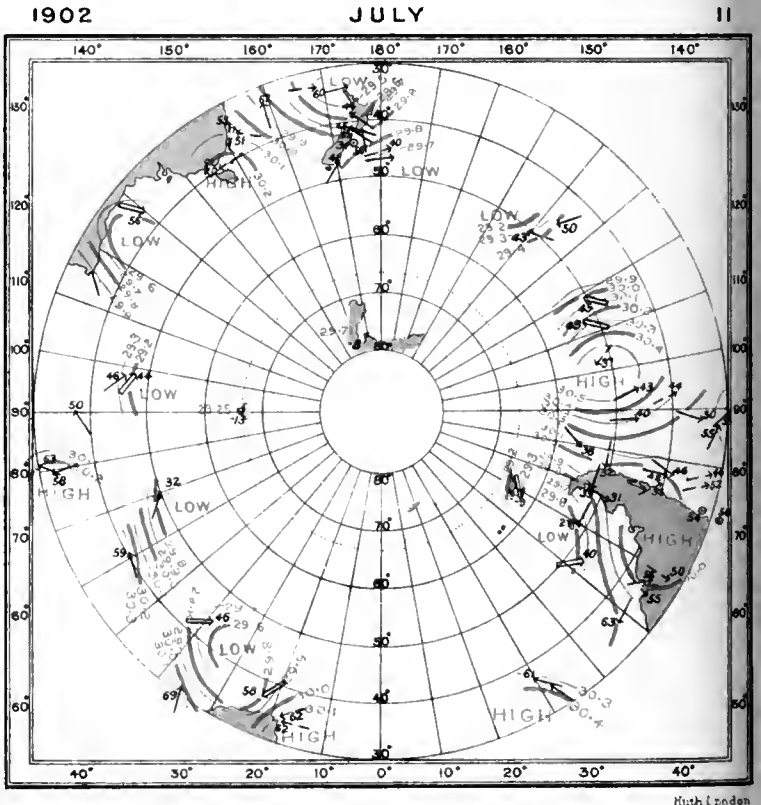
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES









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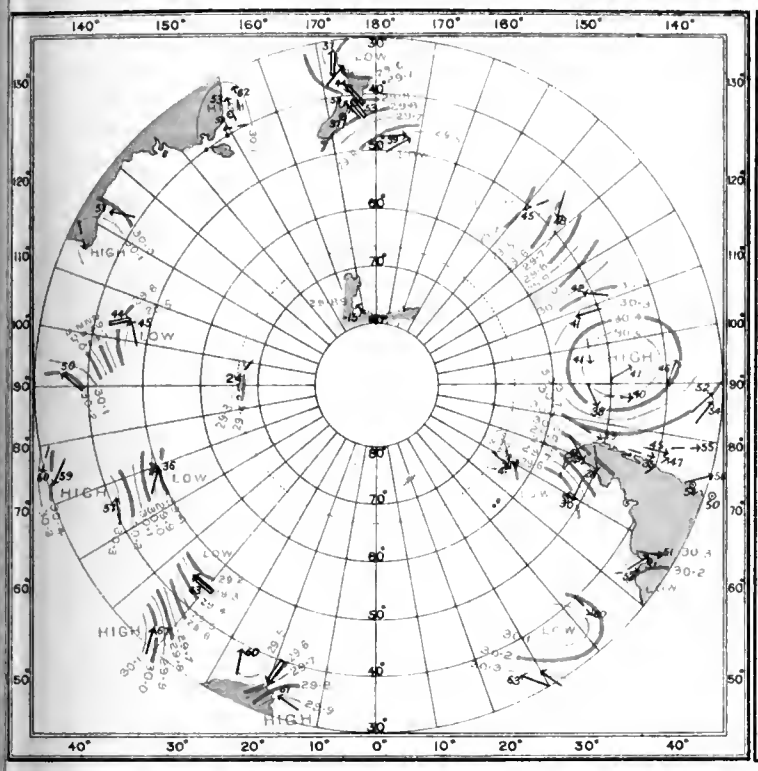
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1902 JULY 12



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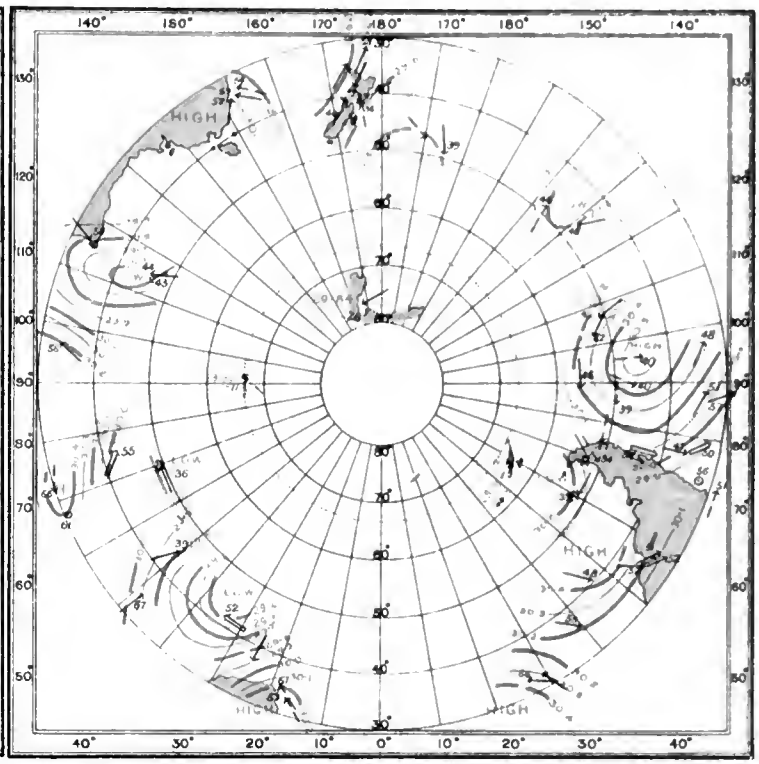

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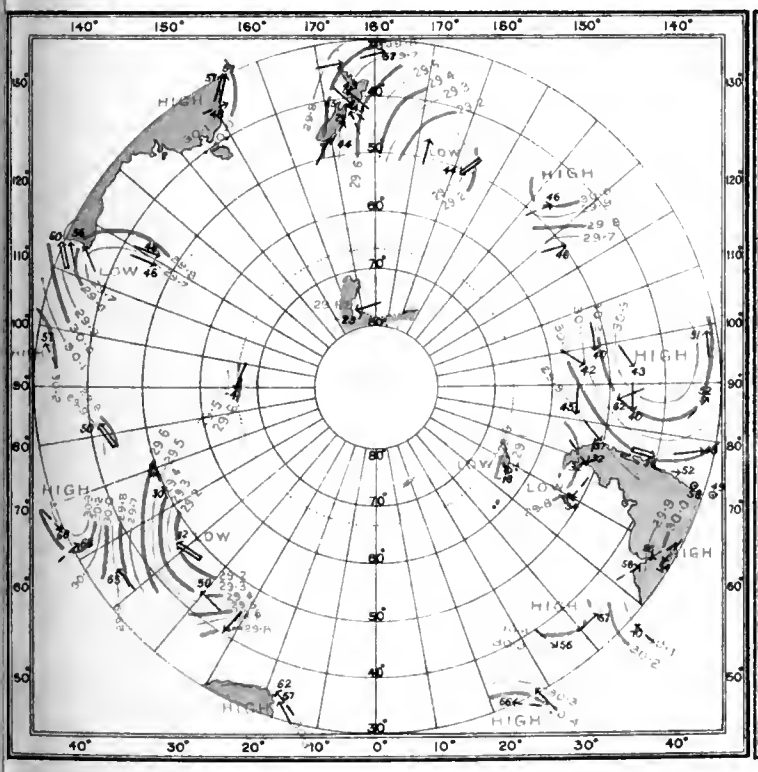

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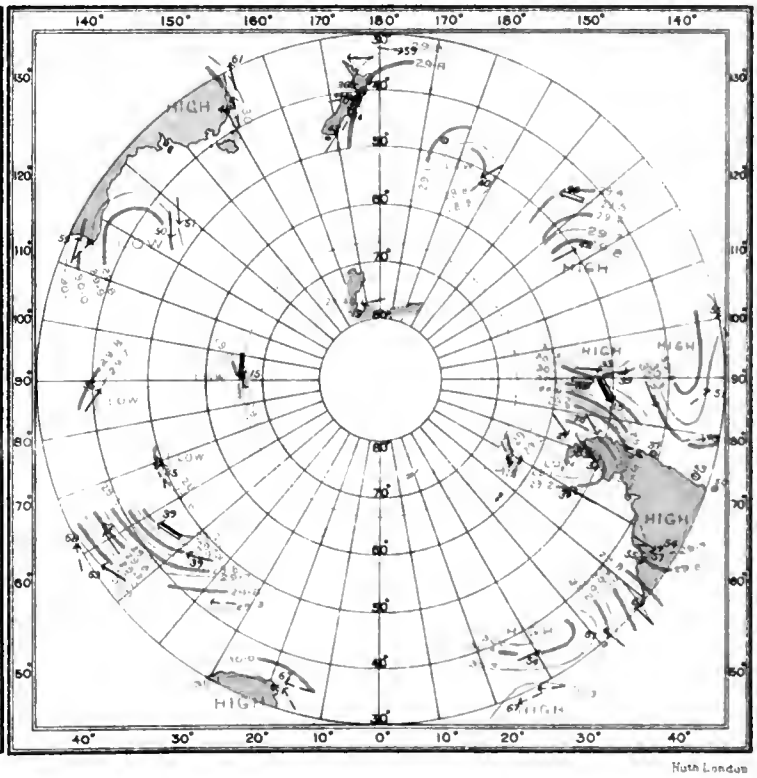

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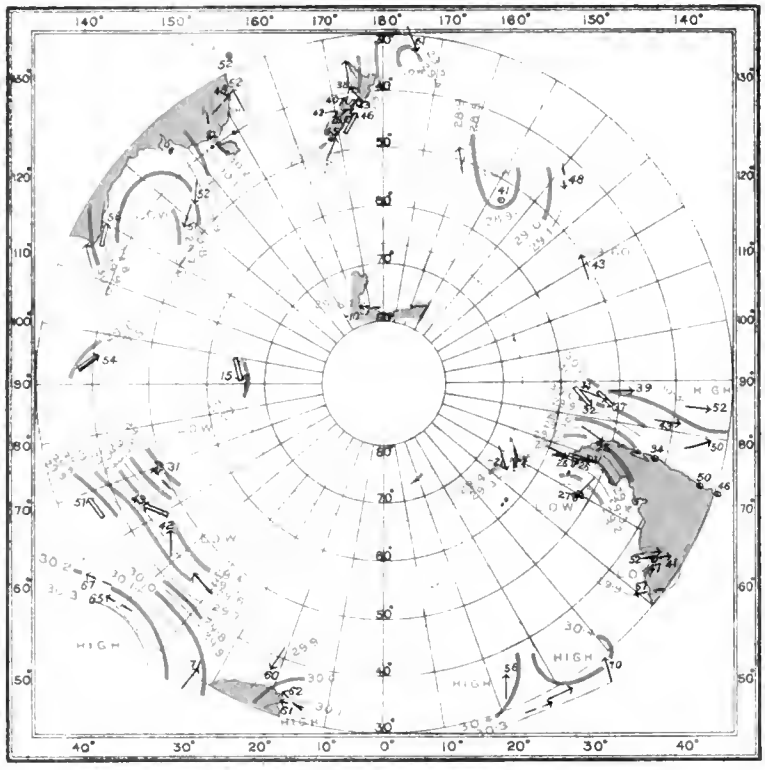
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1902 JULY 16



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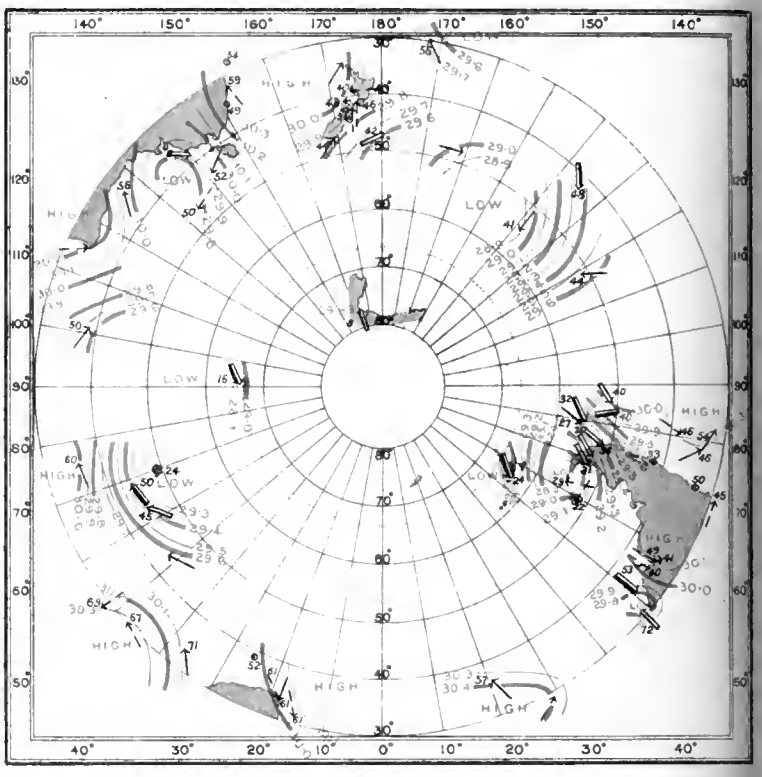

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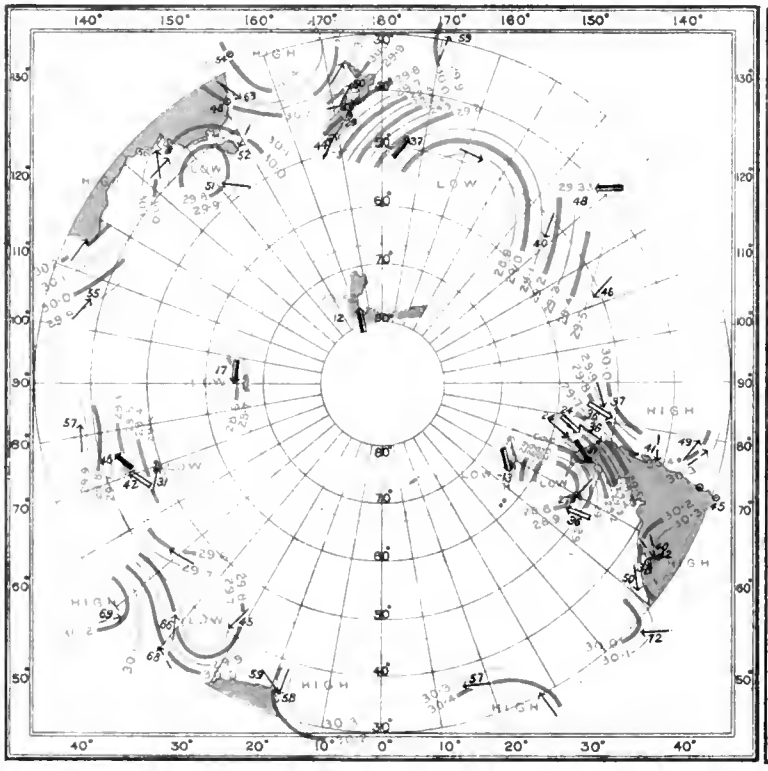

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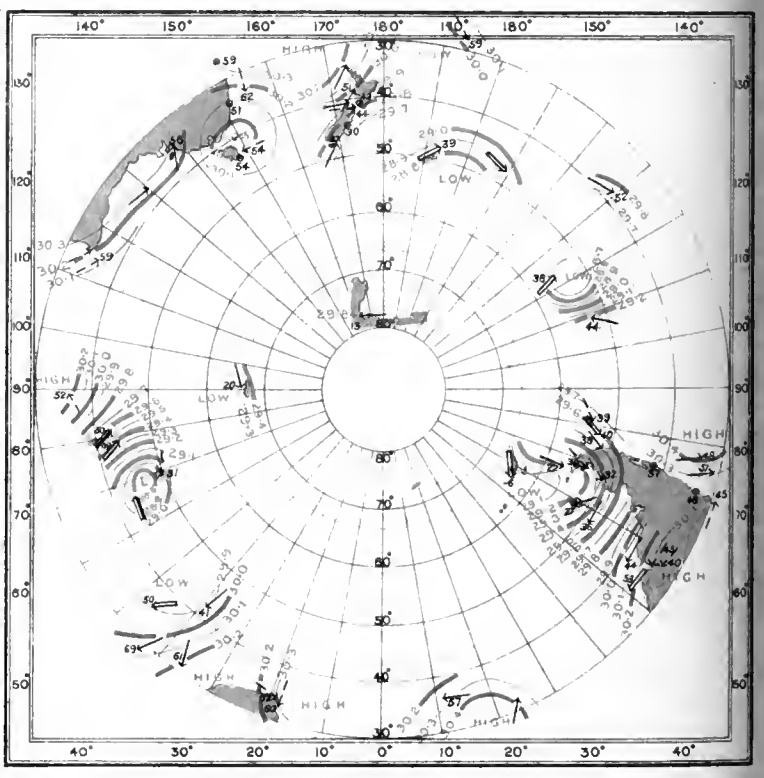


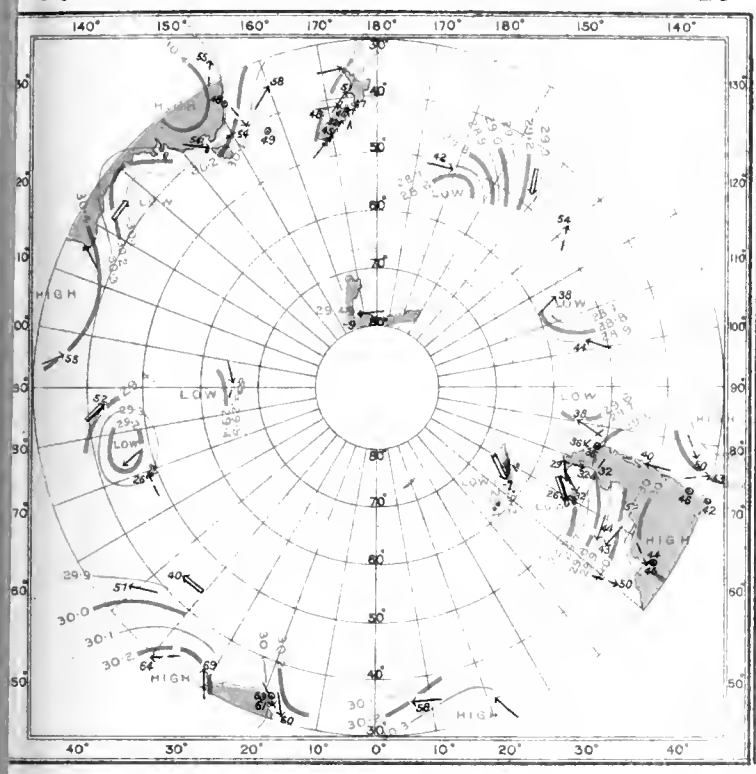
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

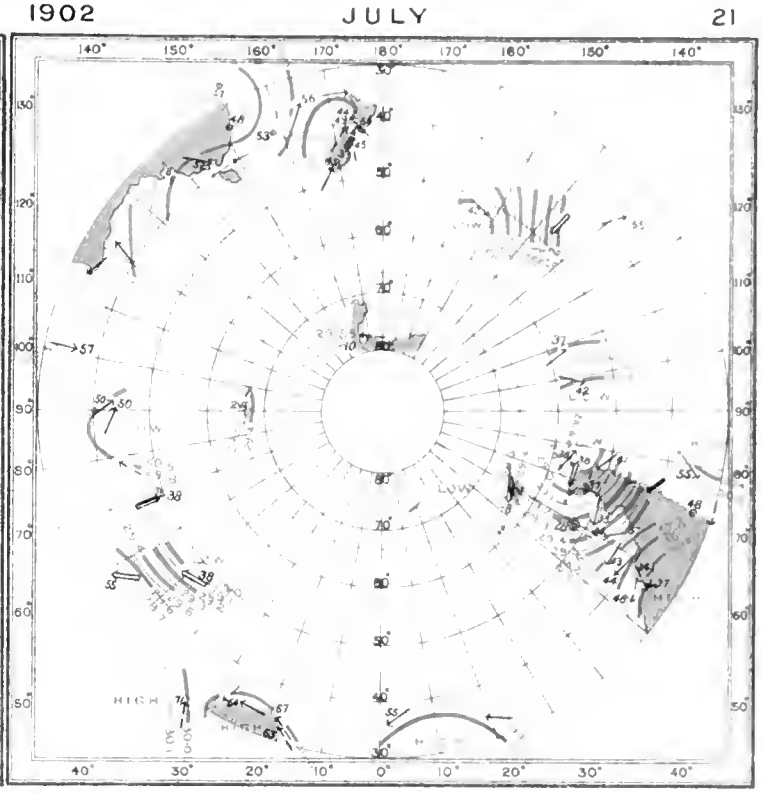
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

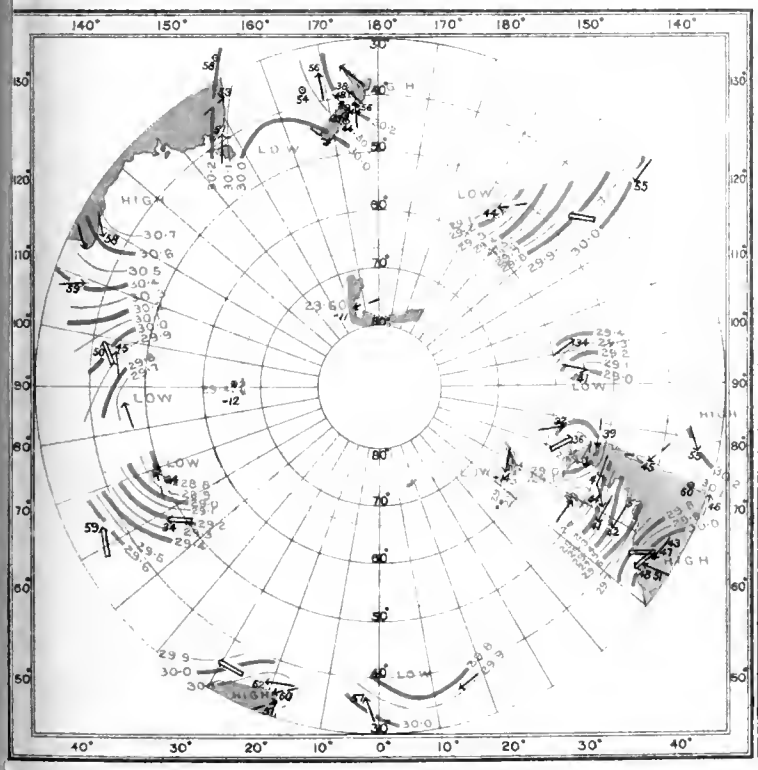
1902 JULY 20



1902 JULY 21



1902 JULY 22



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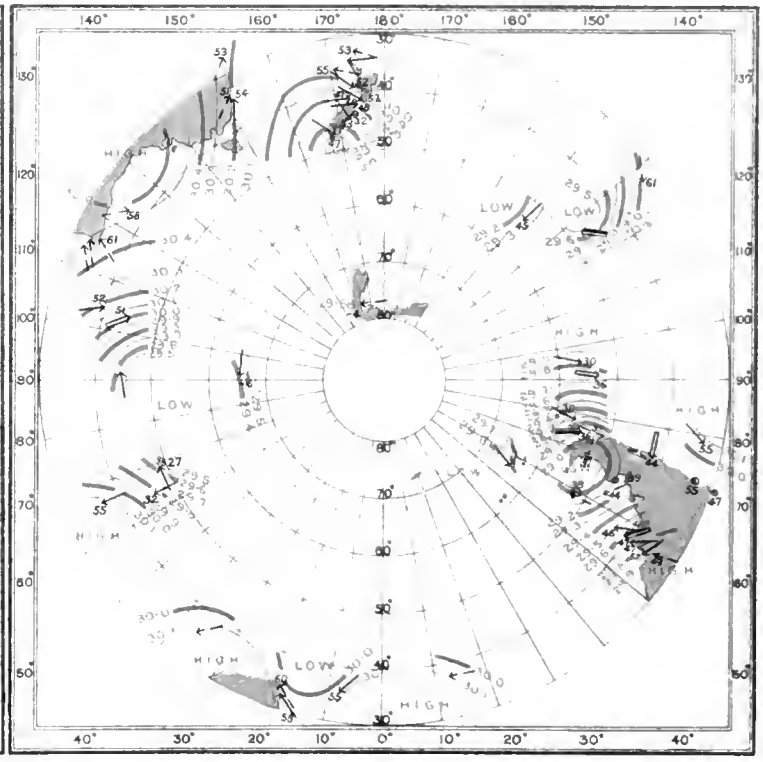


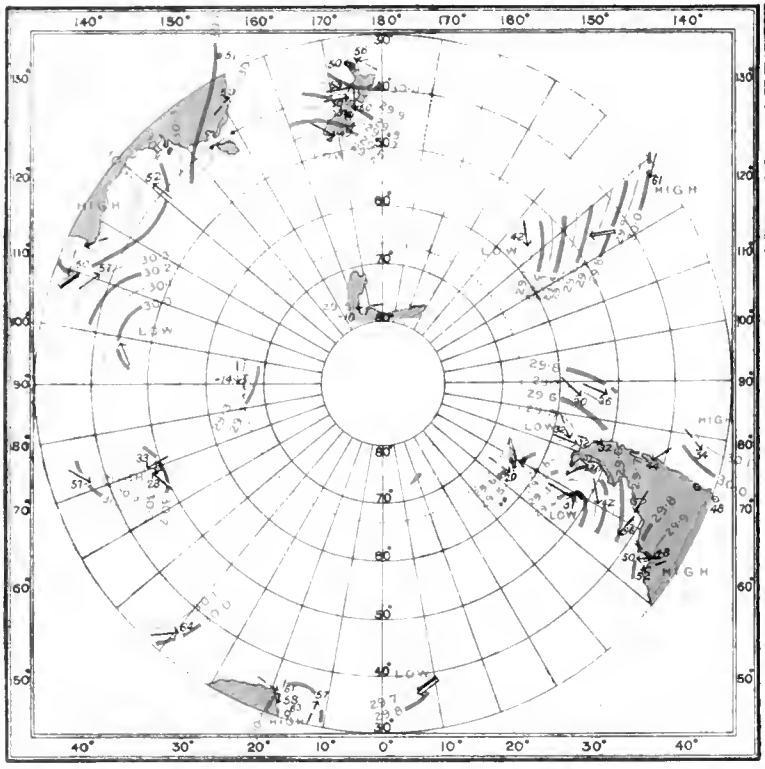
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1902 JULY 24



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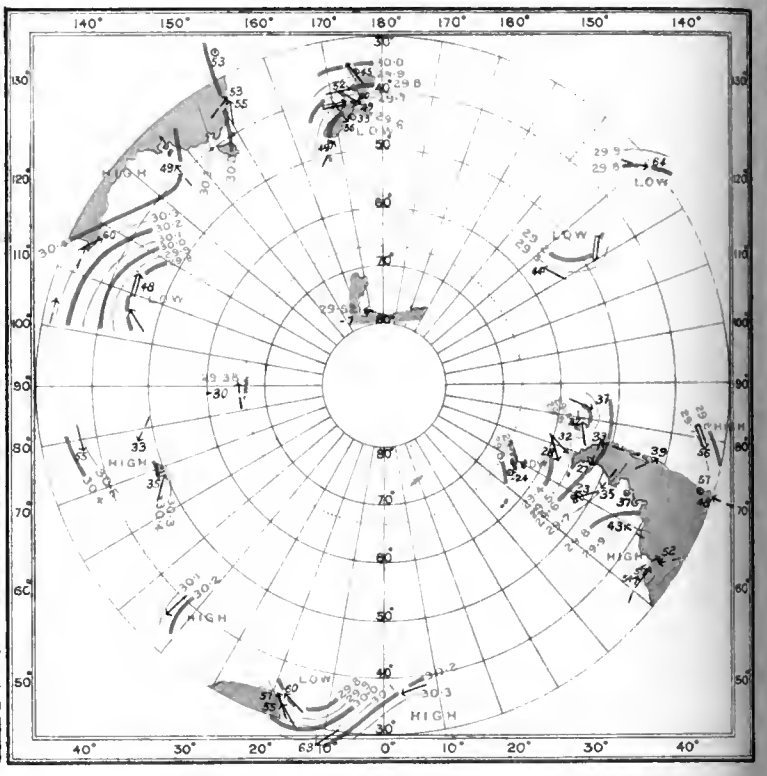

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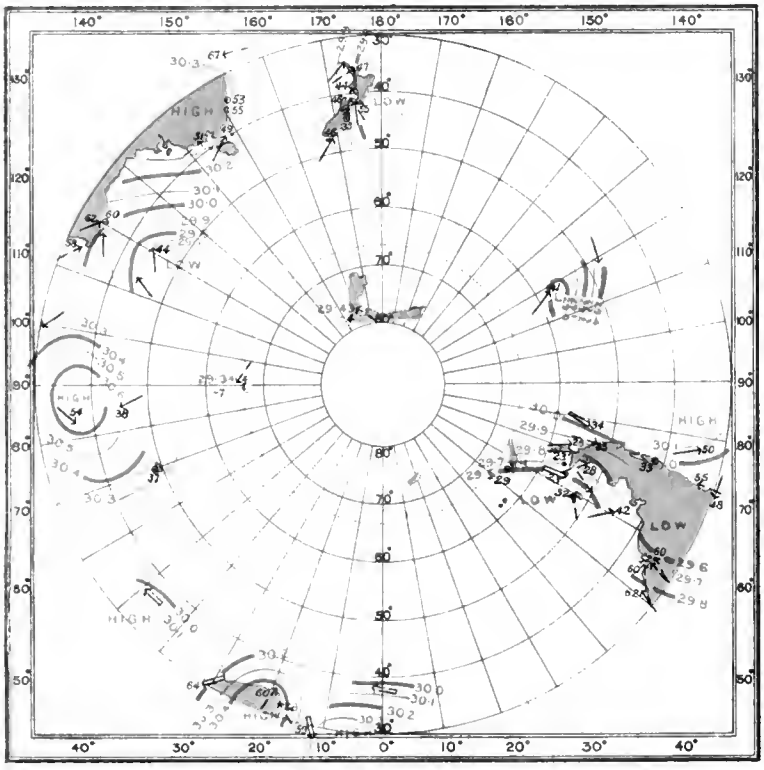

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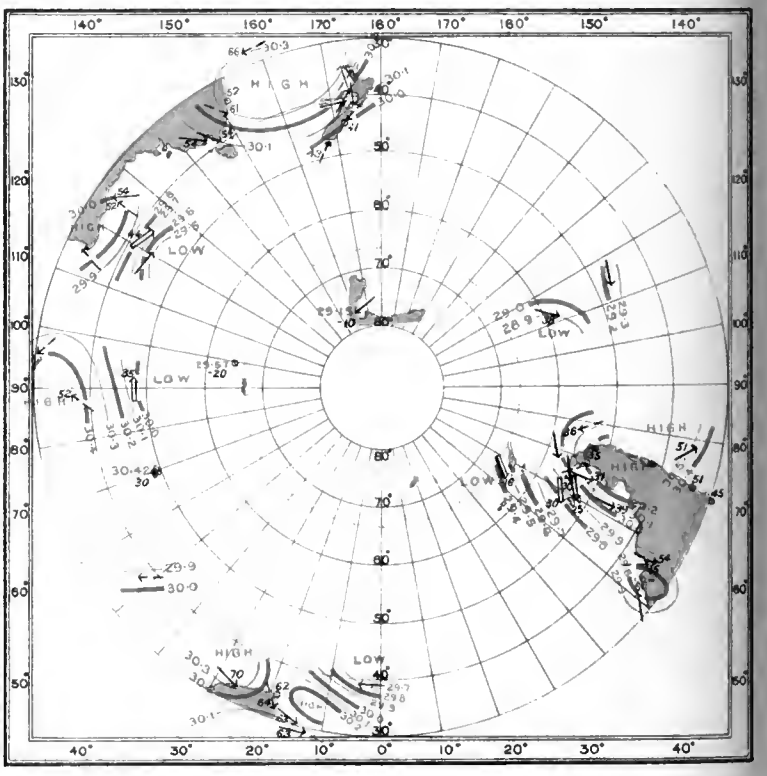
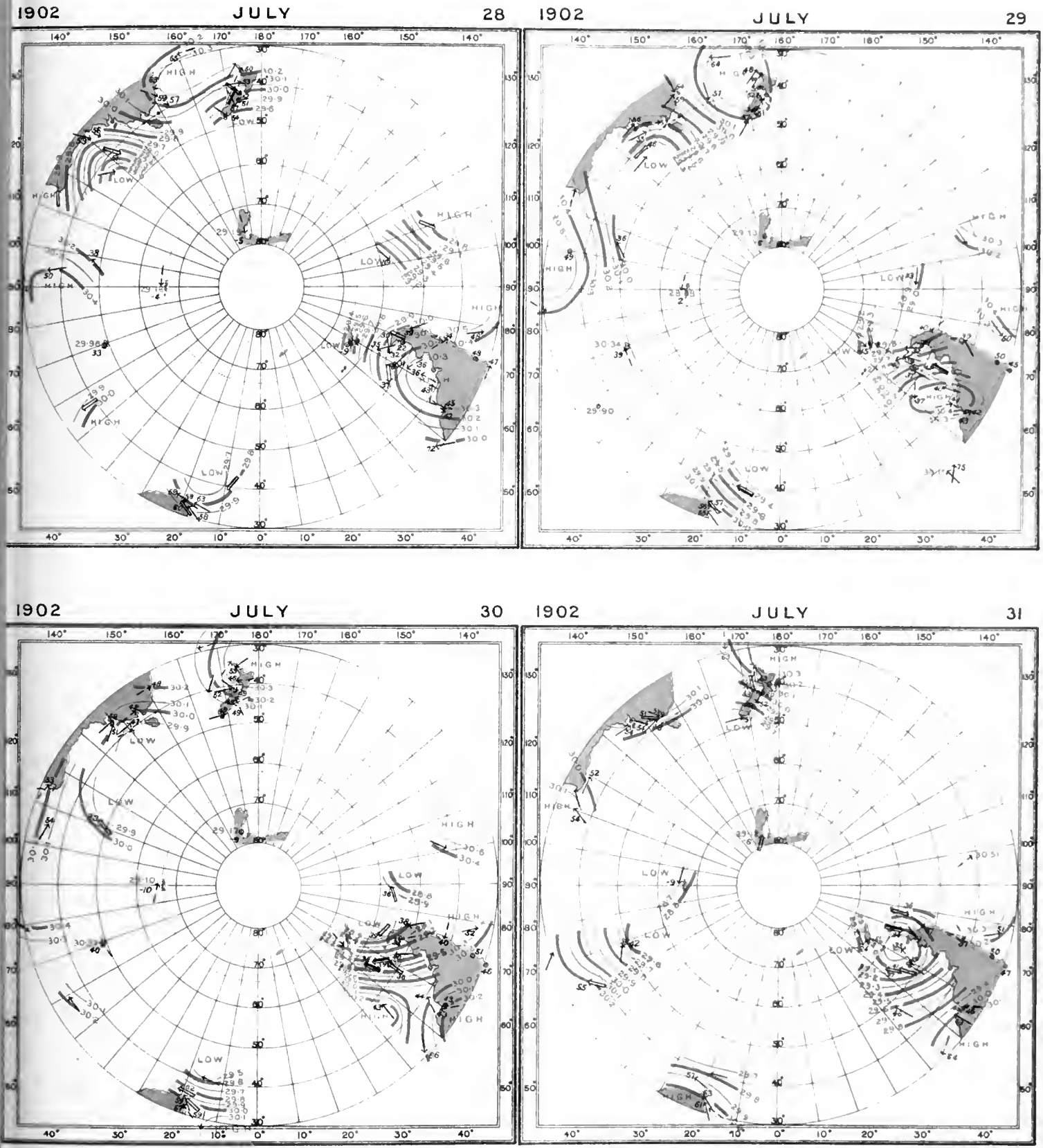


For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

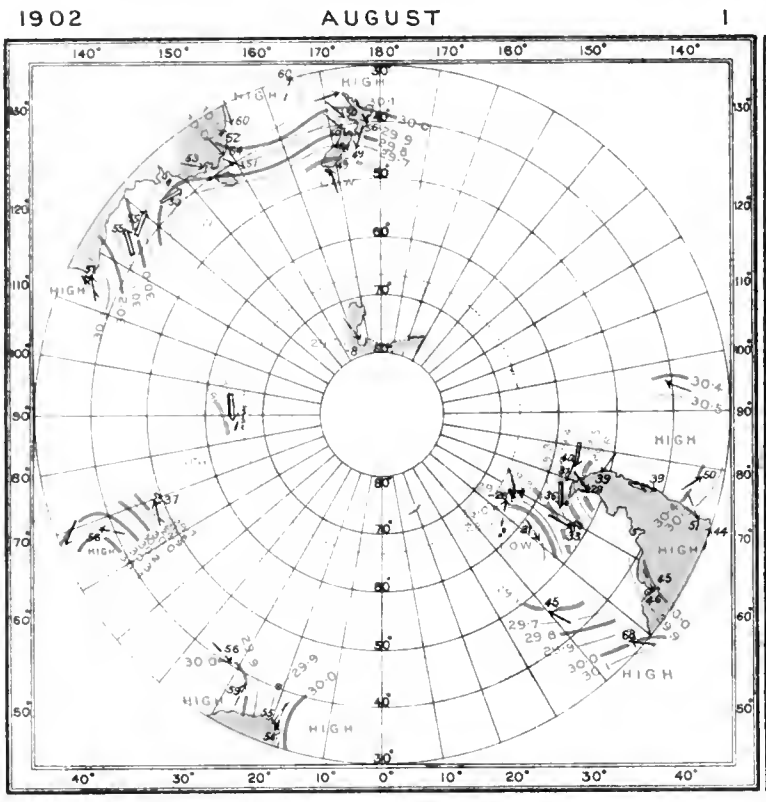


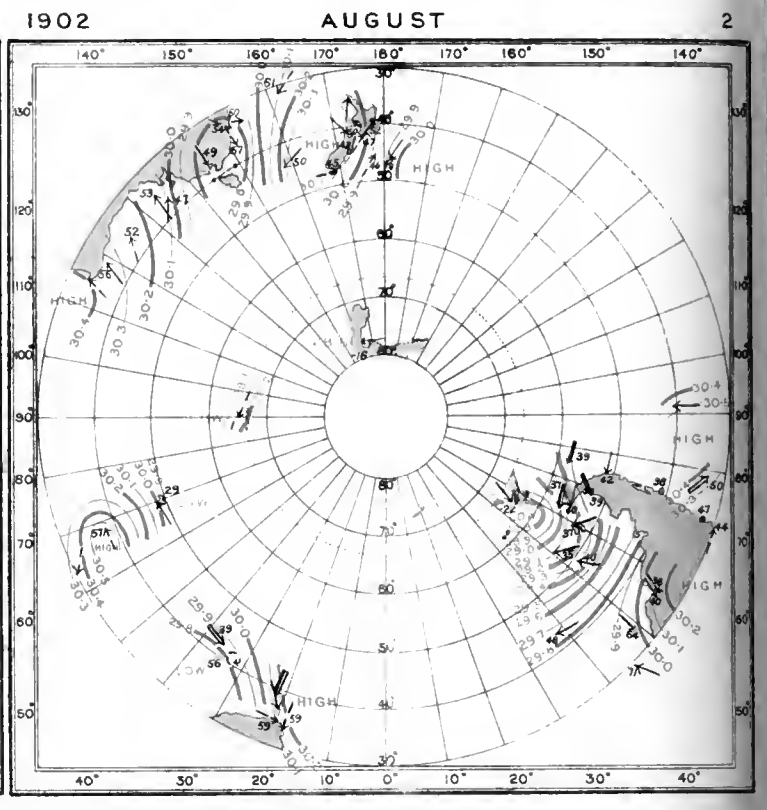
For explanation see Key map

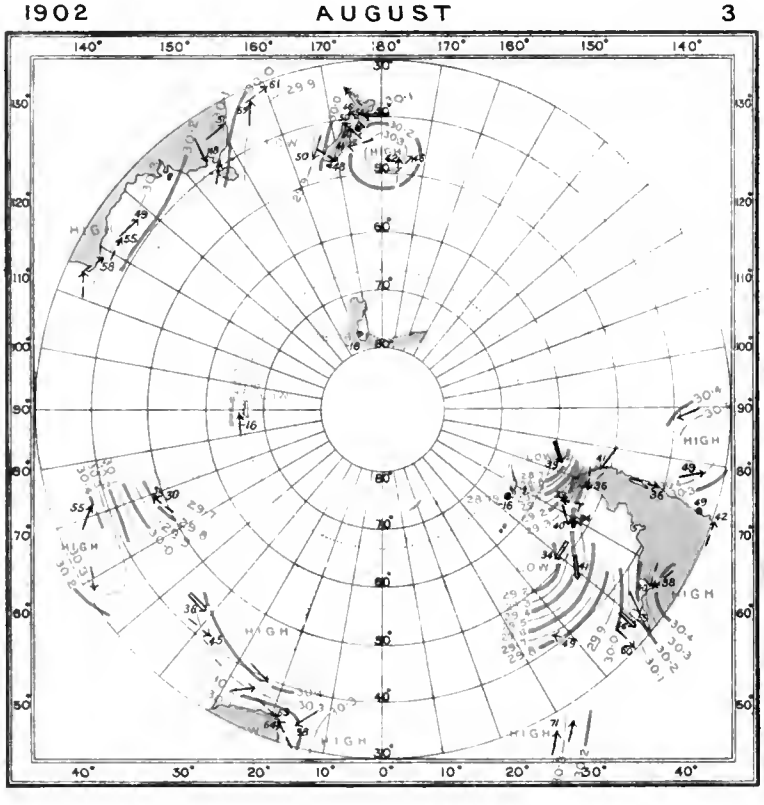
INTERNATIONAL ANTARCTIC CO-OPERATION.

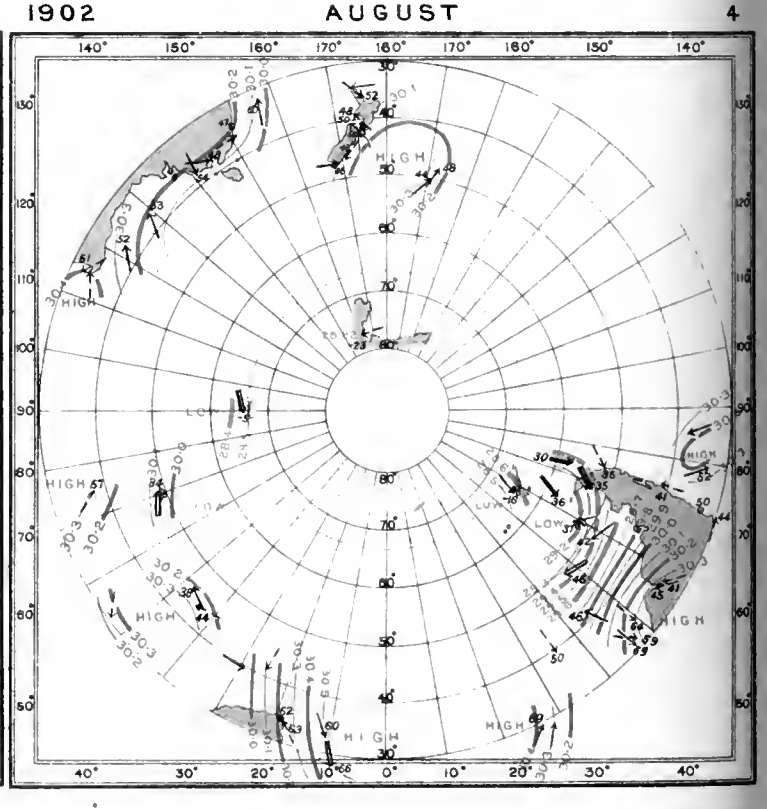
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.









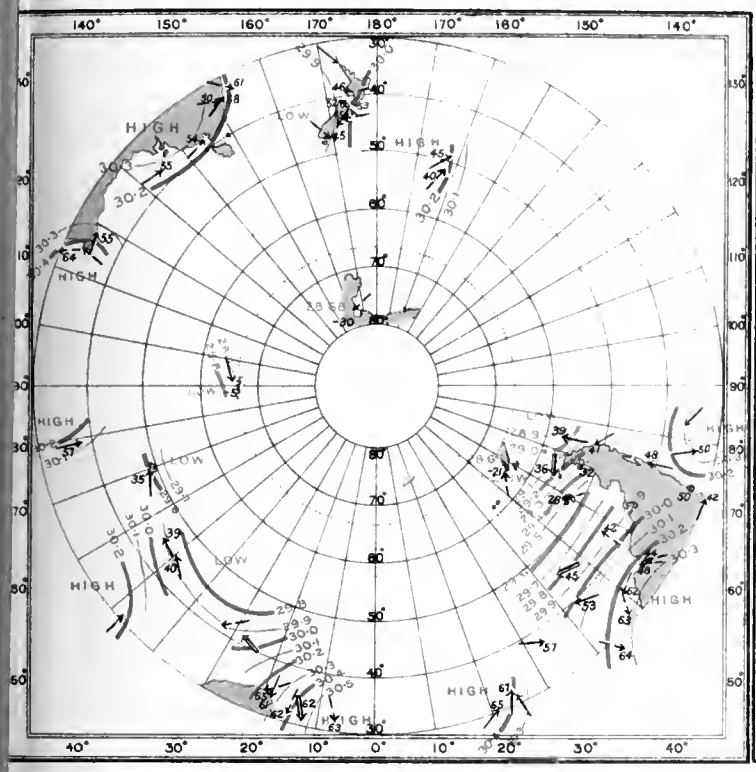
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 AUGUST 5



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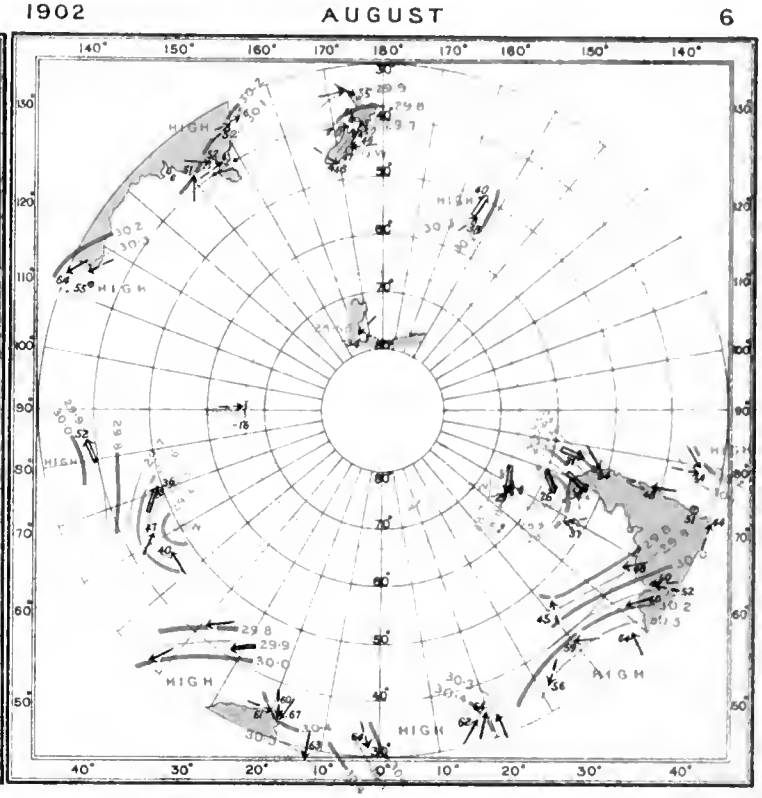

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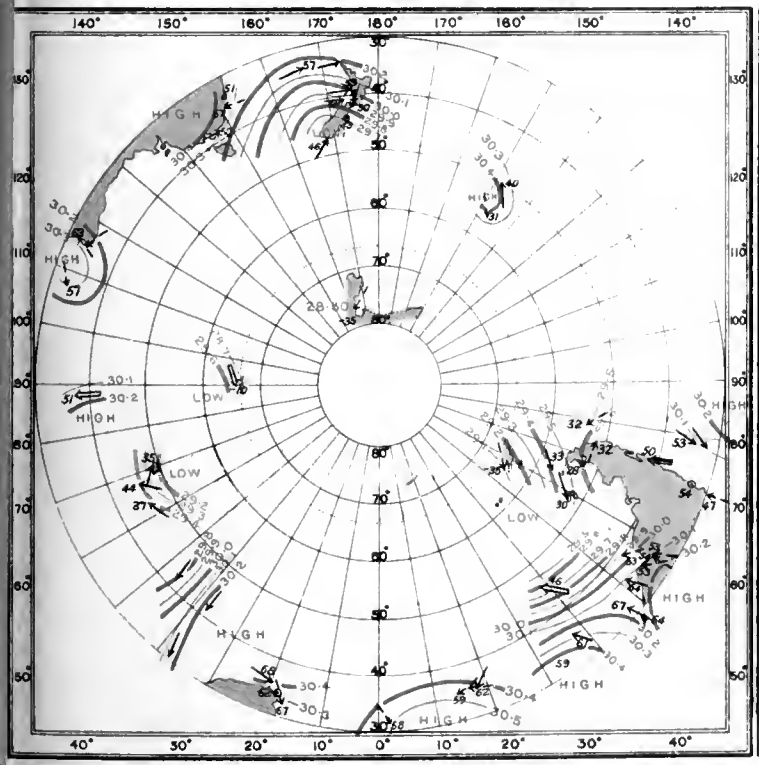

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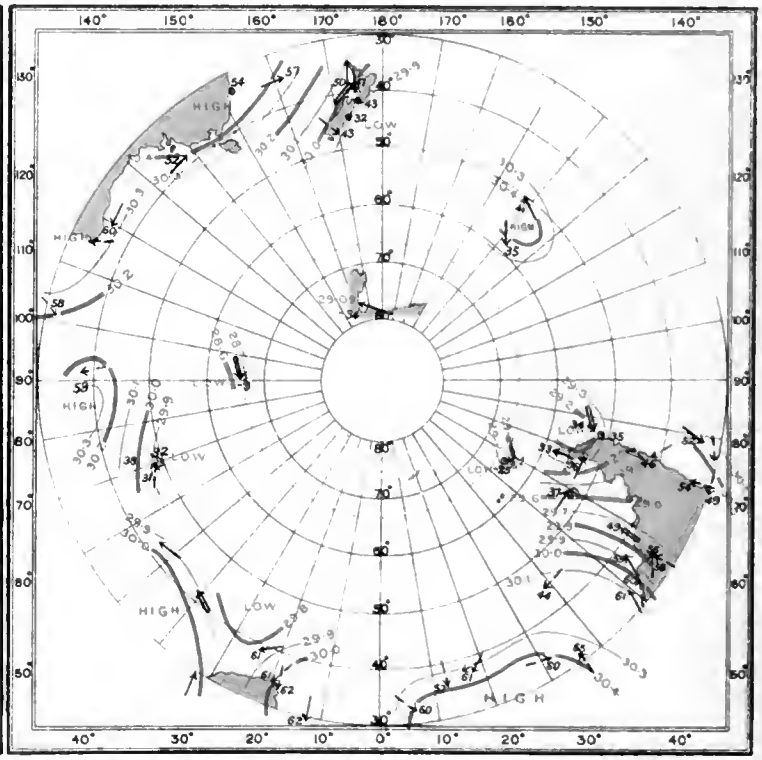
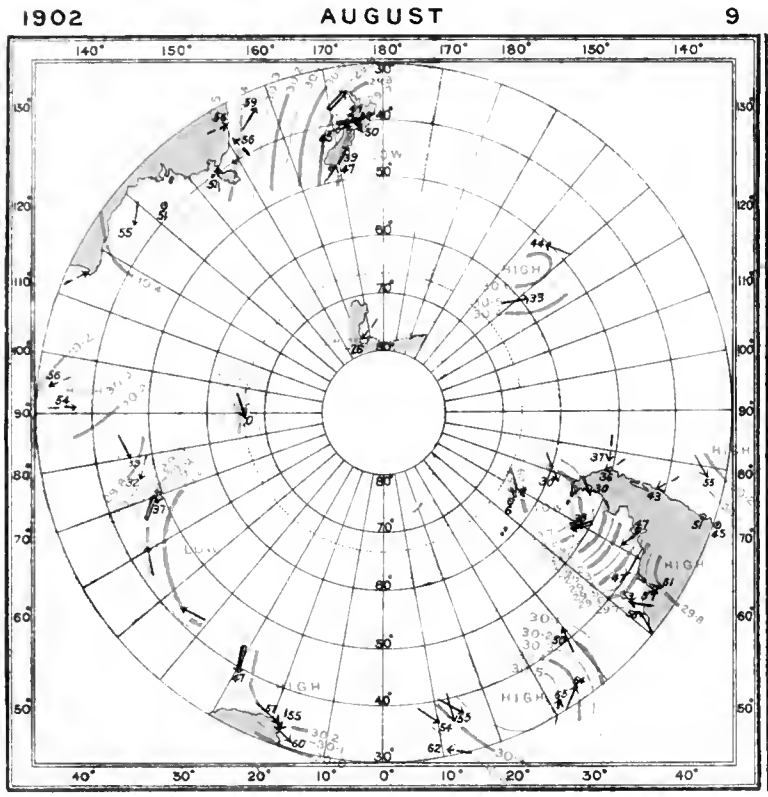


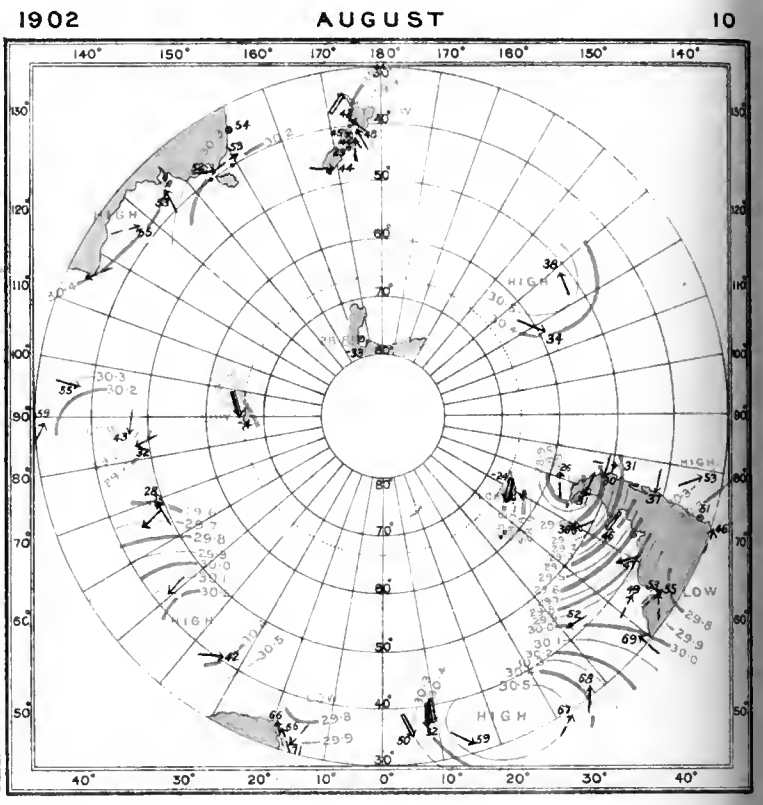
For explanation see Key map

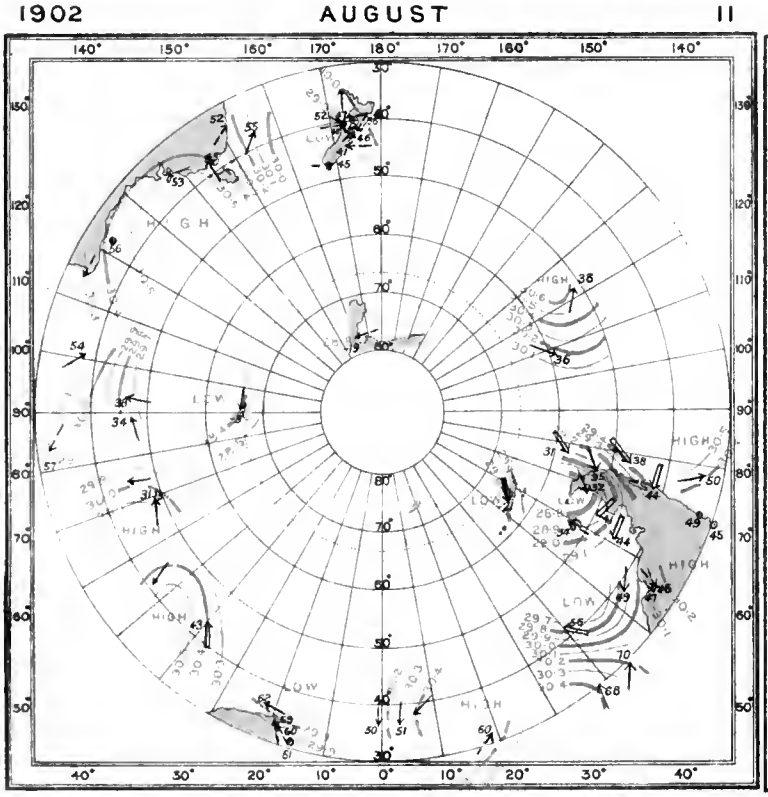
INTERNATIONAL ANTARCTIC CO-OPERATION.

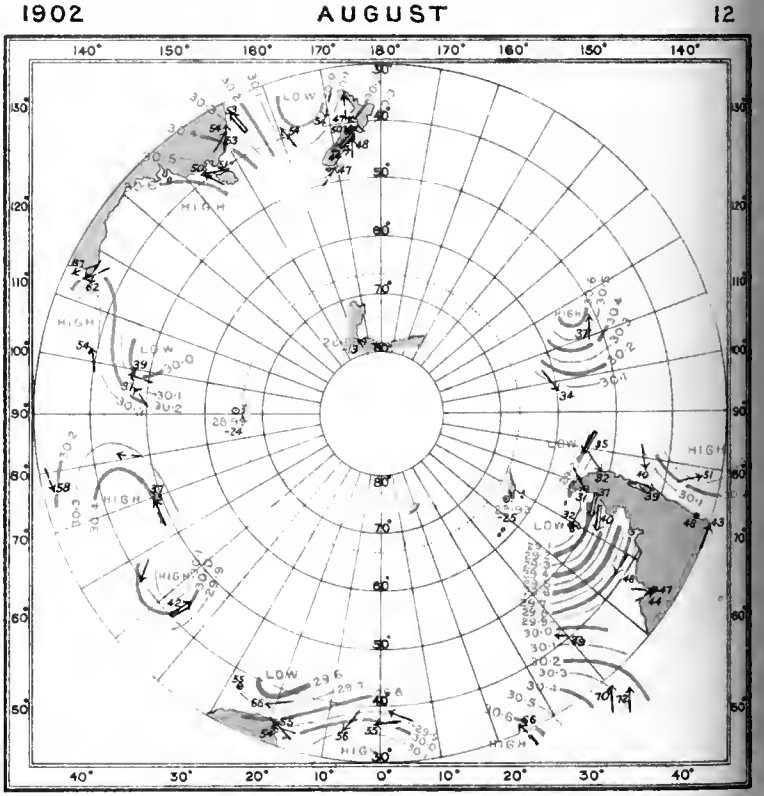
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.







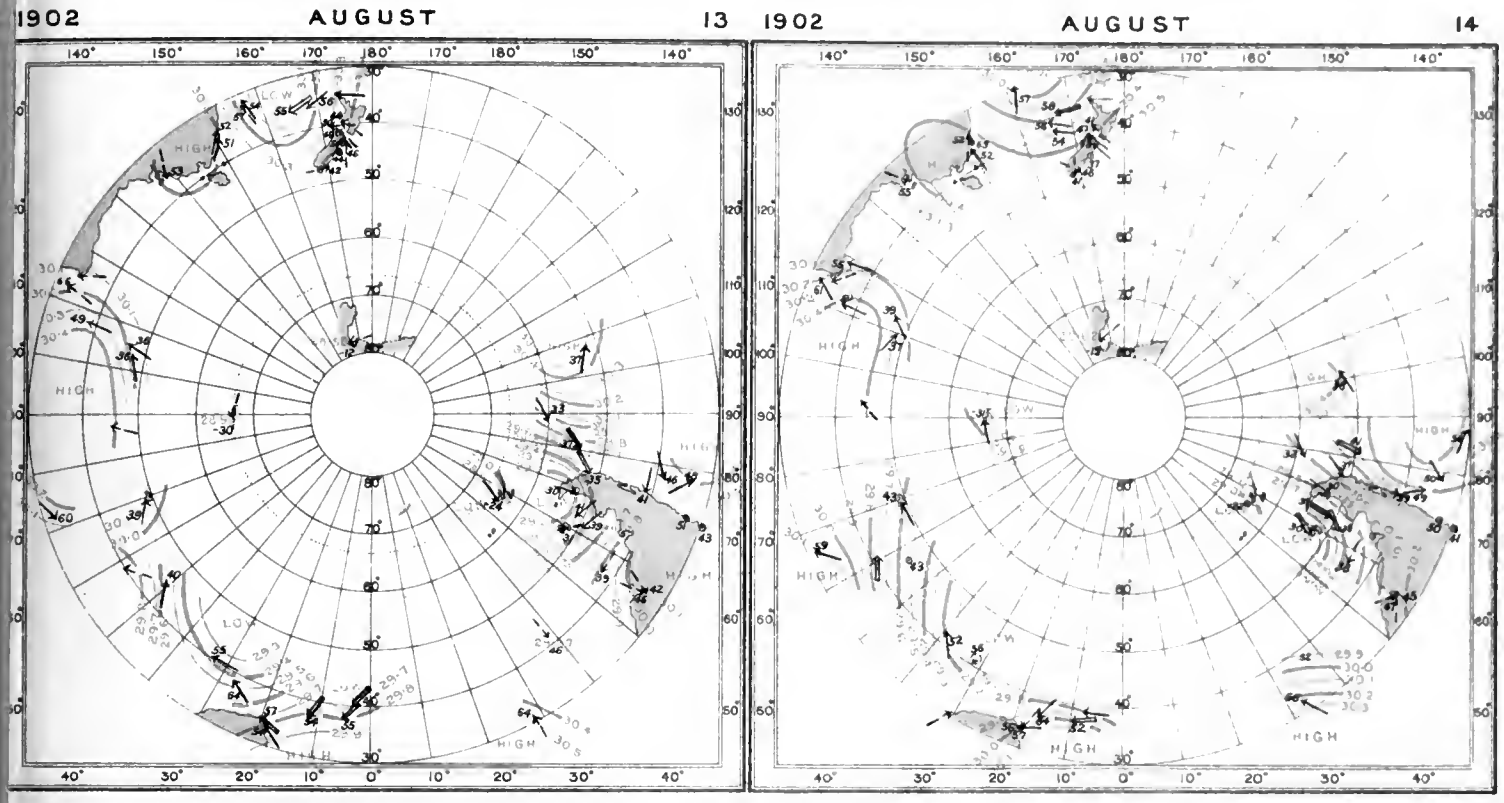


For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES



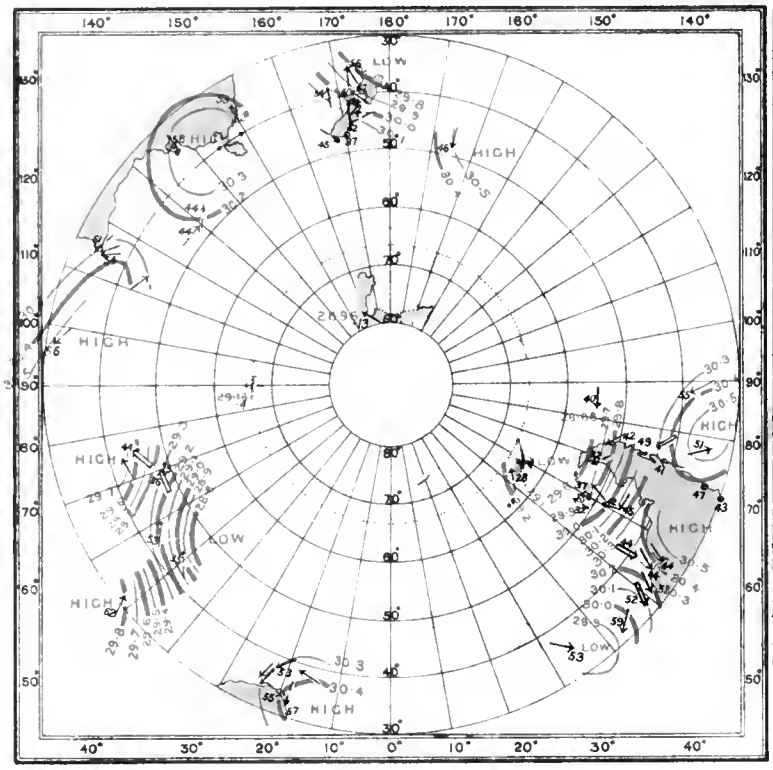
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 AUGUST 17



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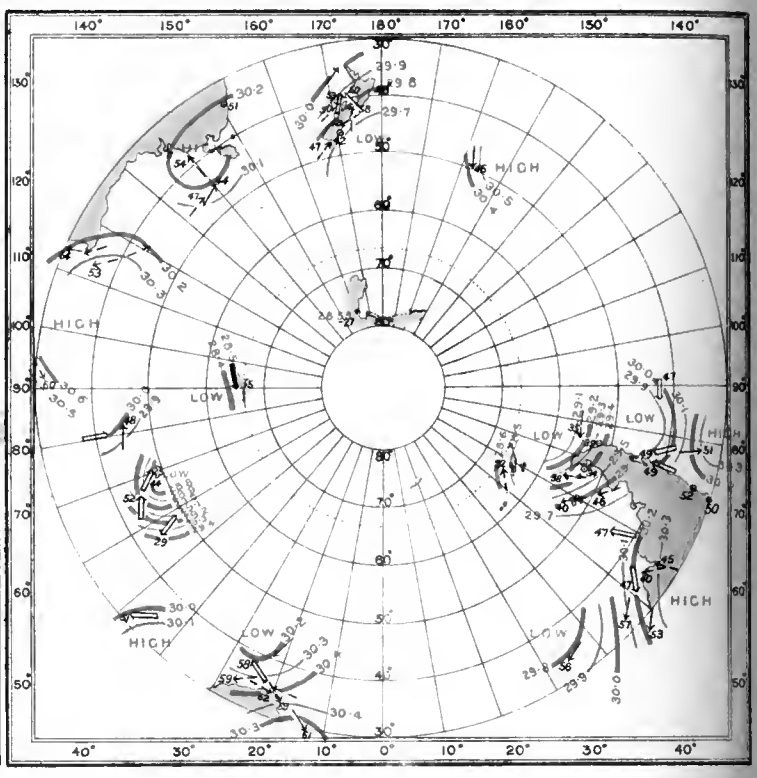

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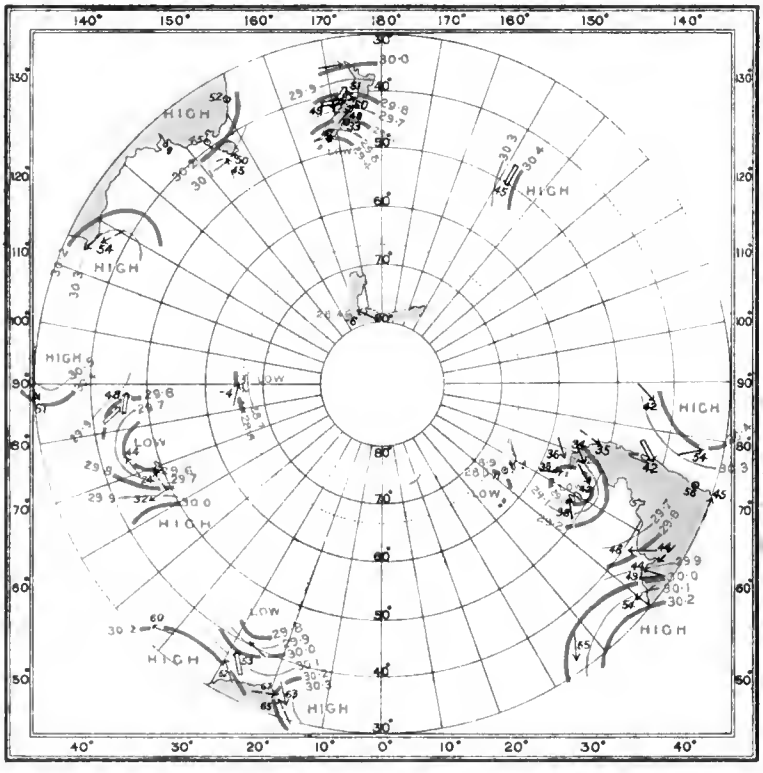

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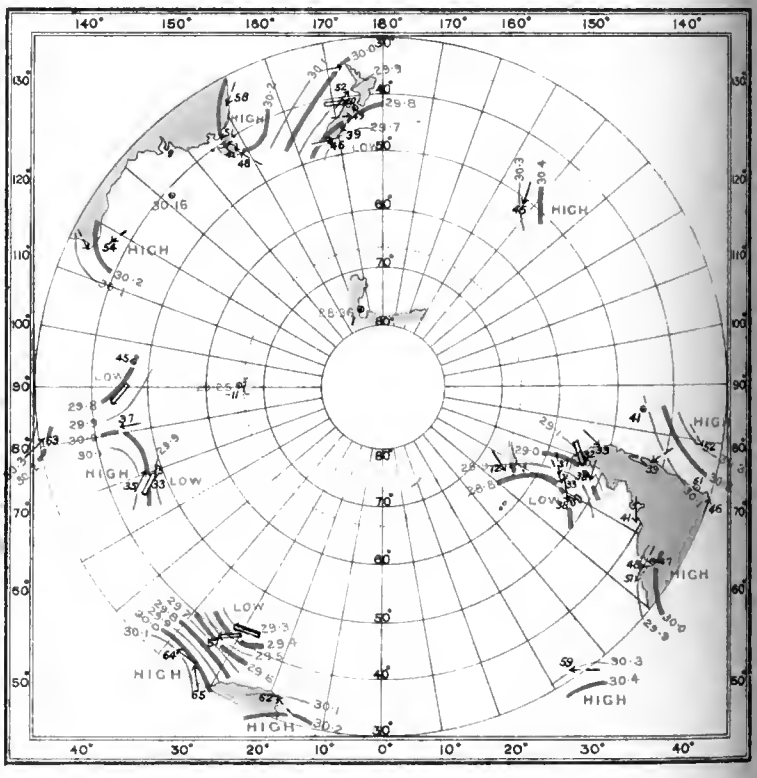


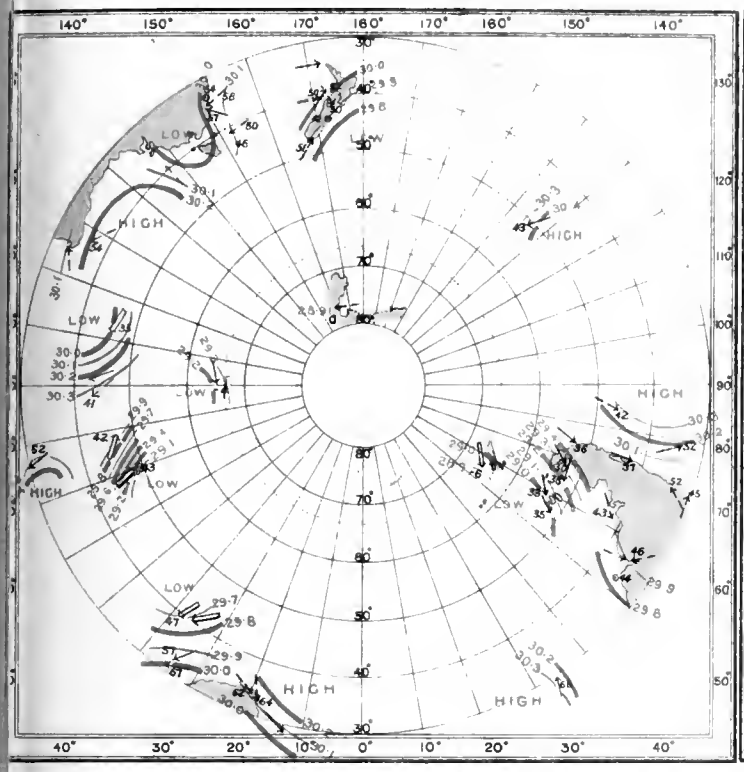
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 AUGUST 21



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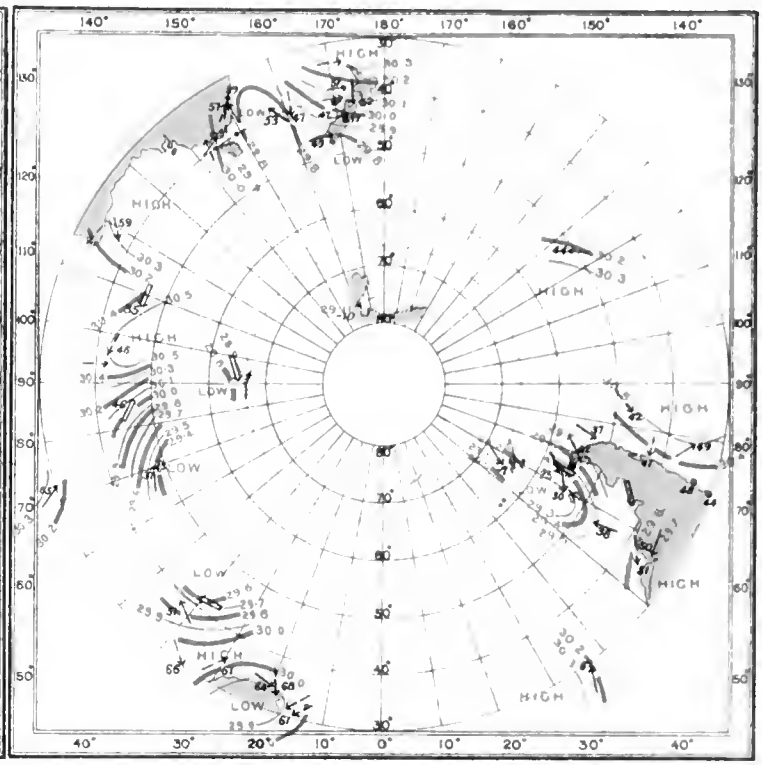

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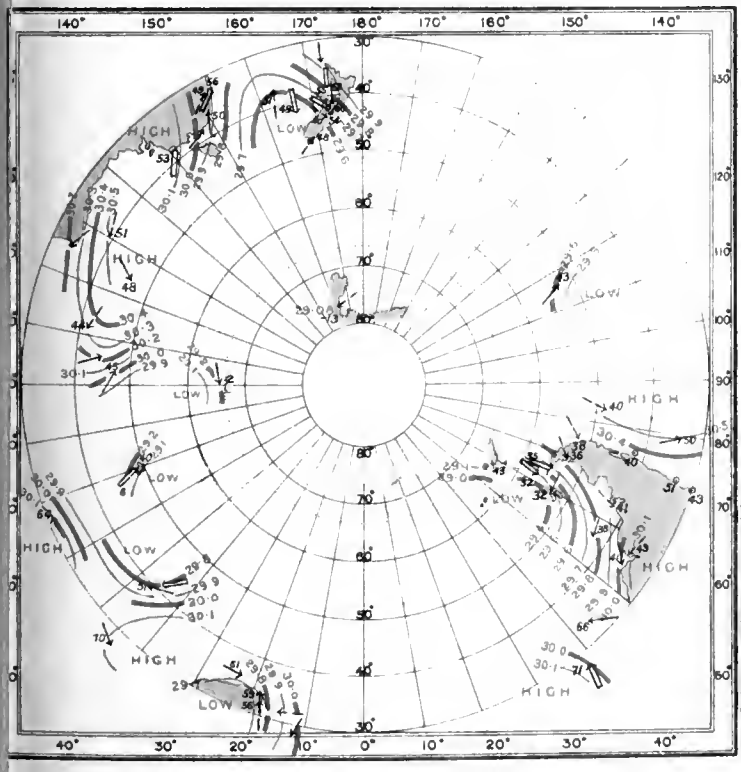

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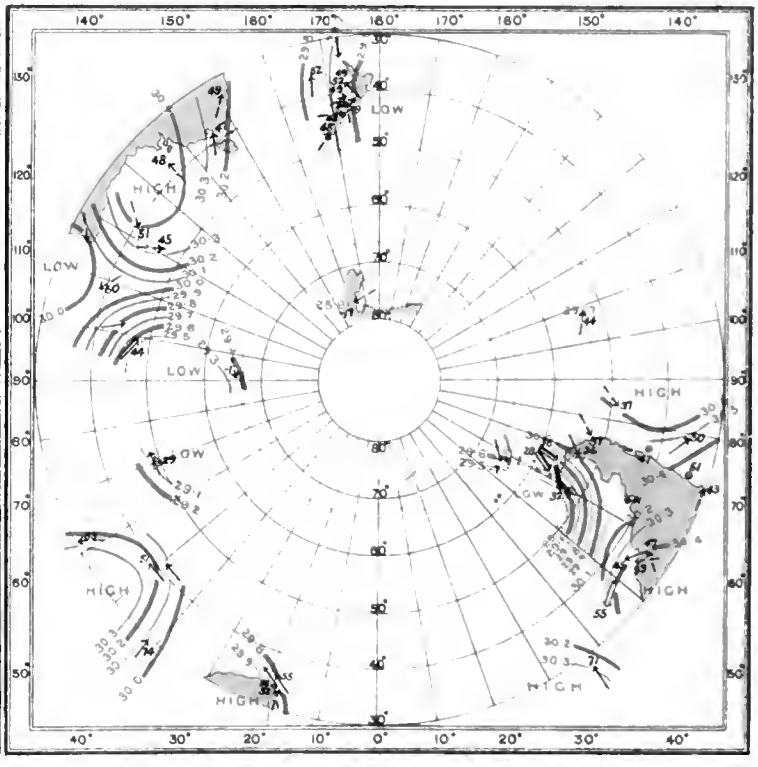


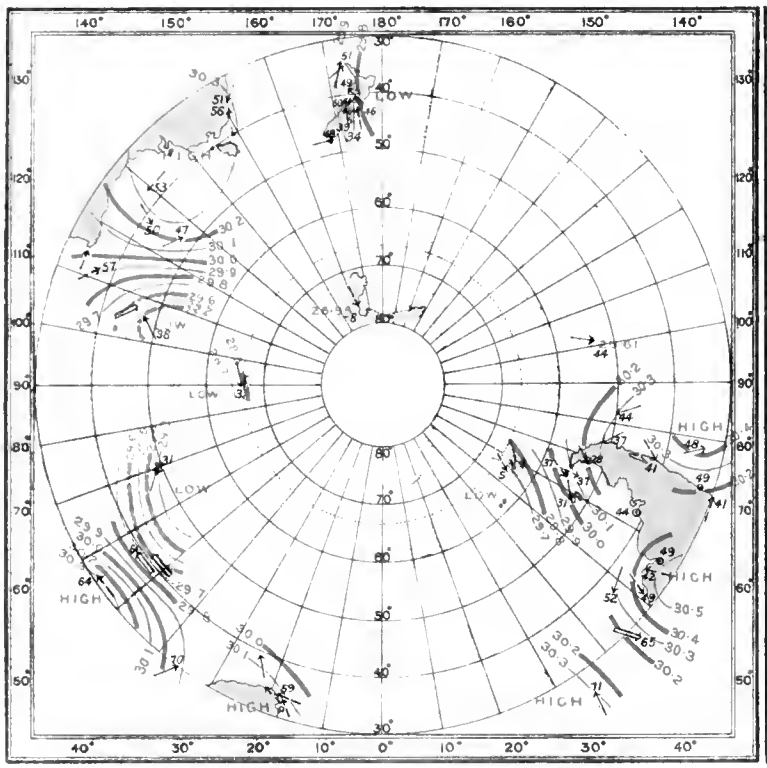
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 AUGUST 25



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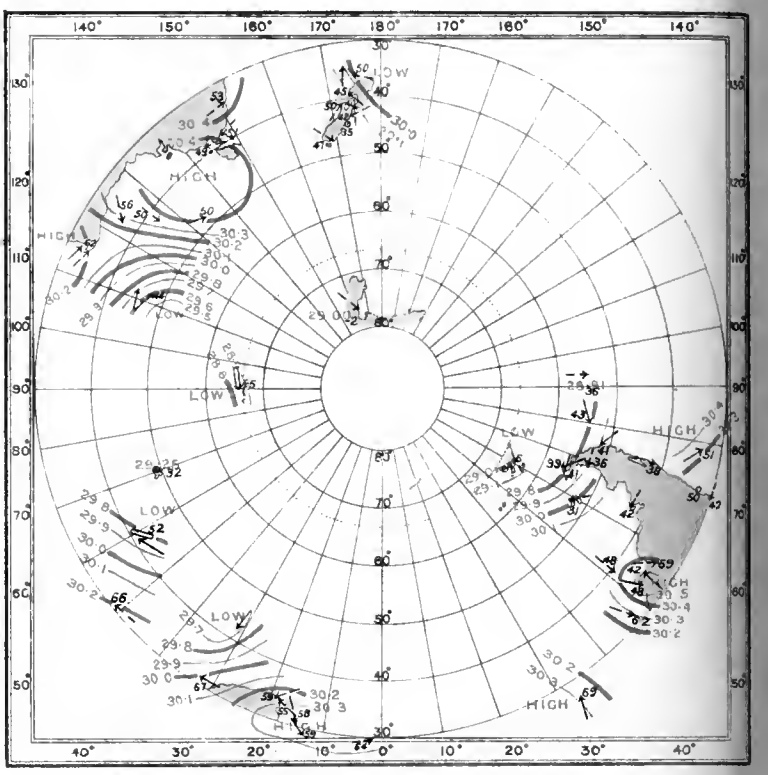

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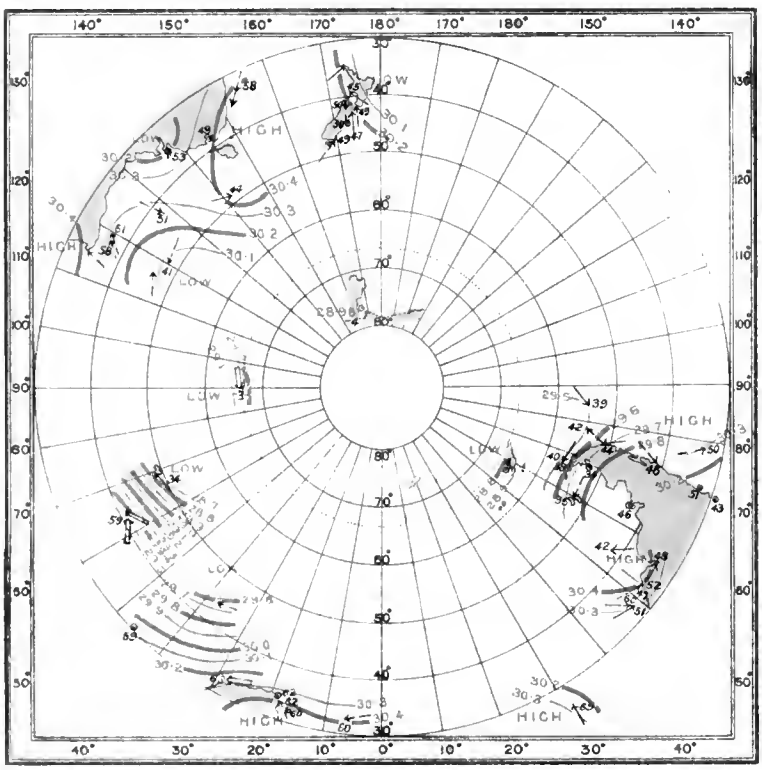

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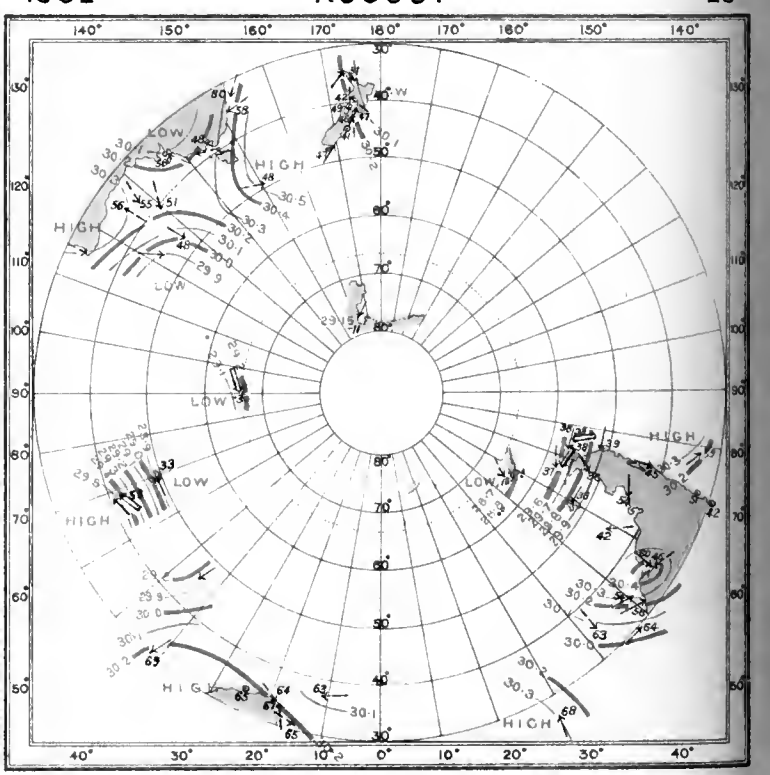


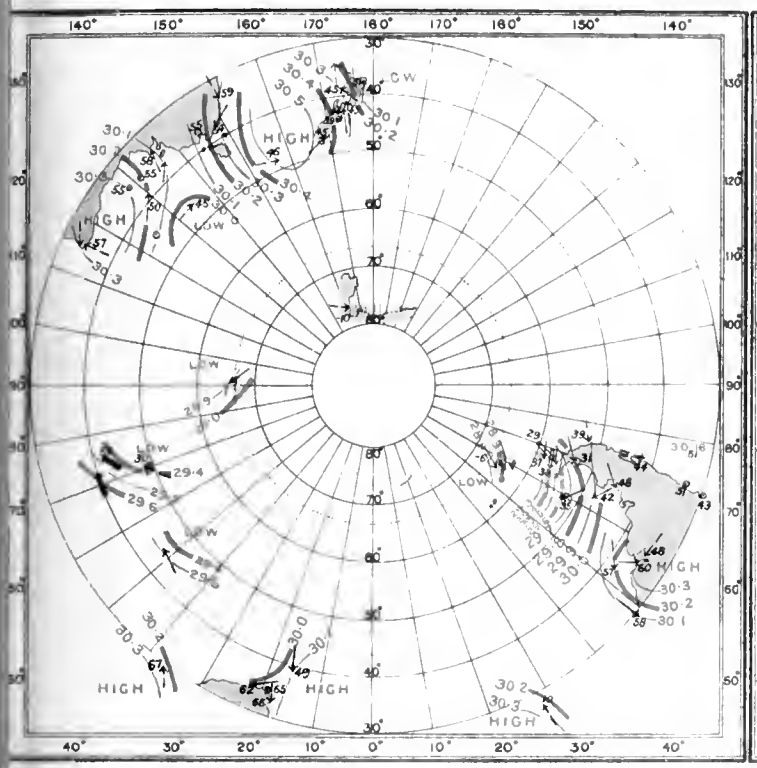
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 AUGUST 29



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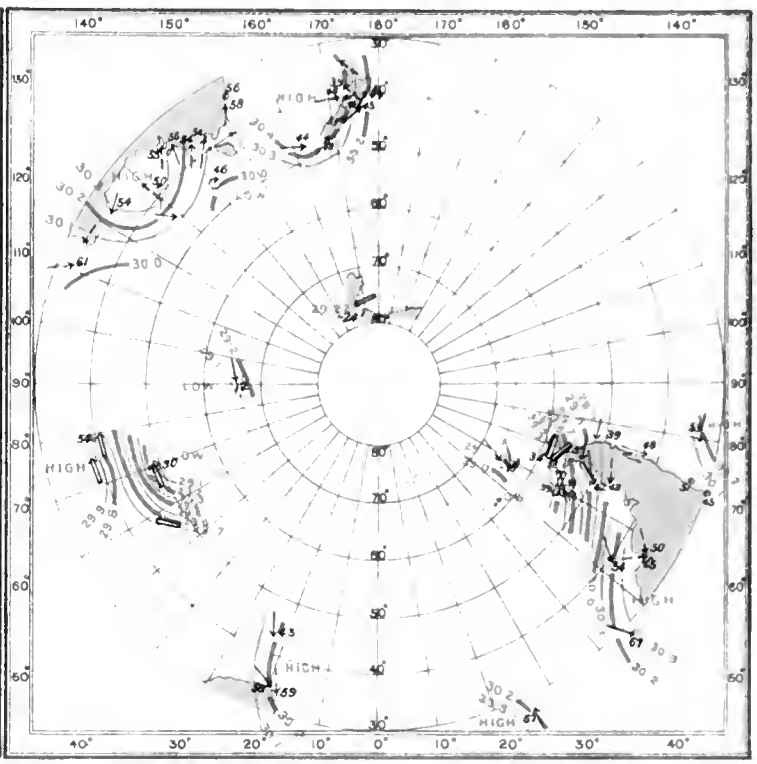

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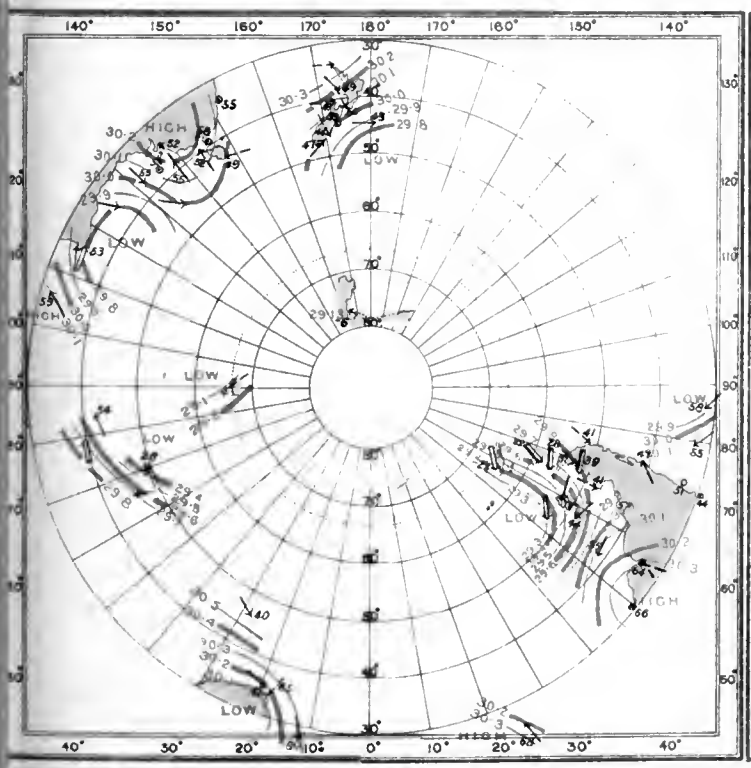

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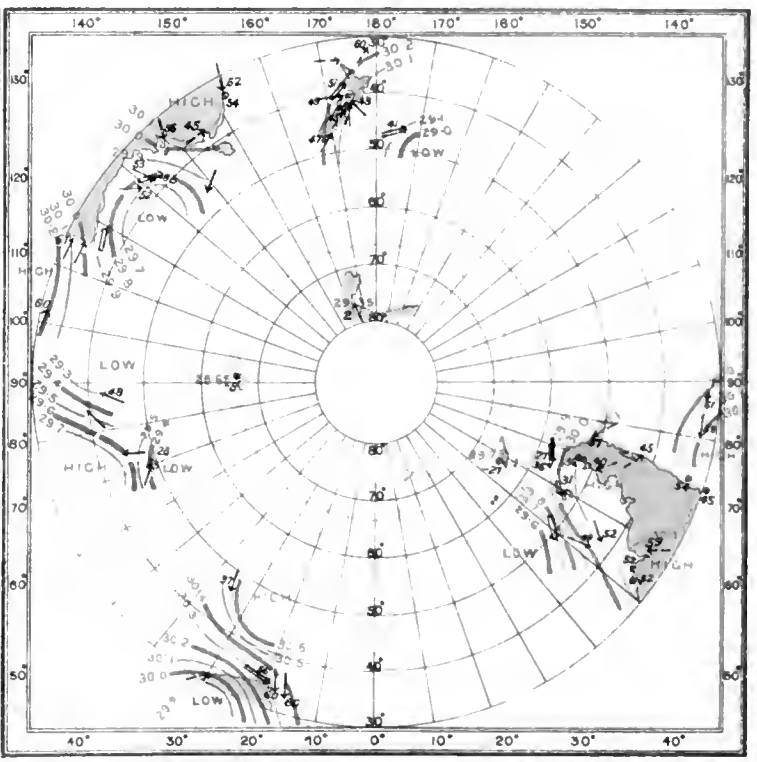


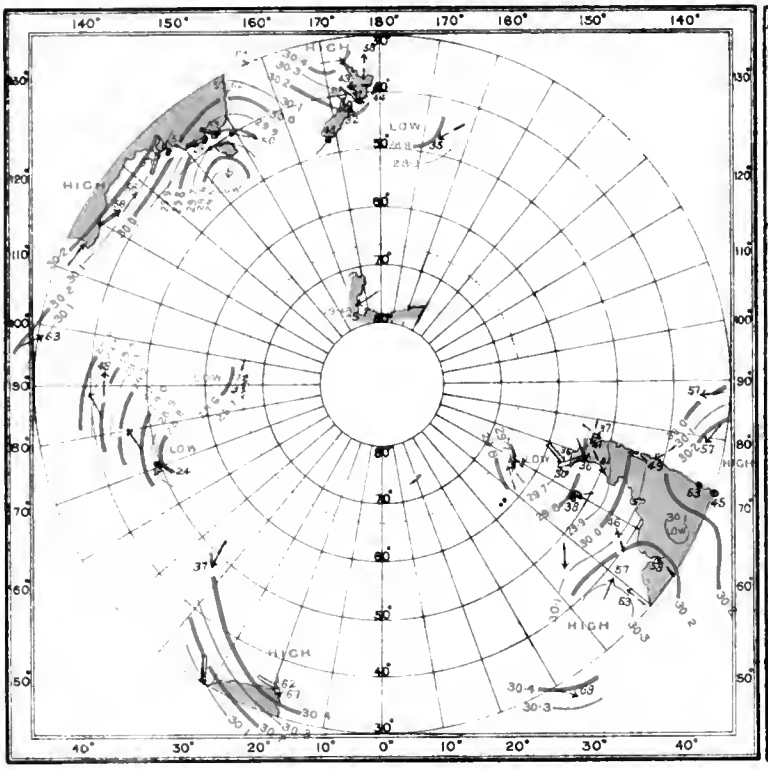
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 SEPTEMBER 2



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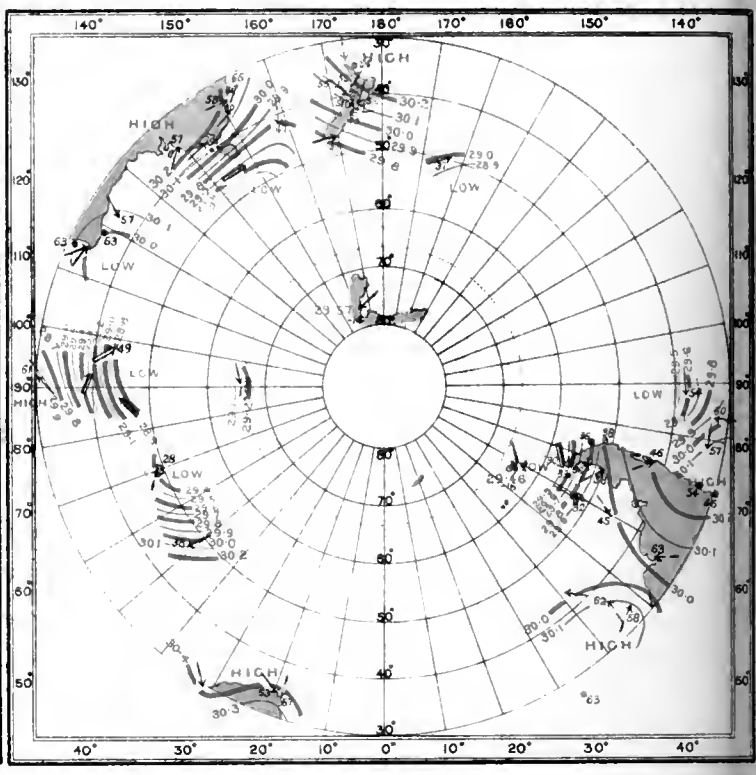

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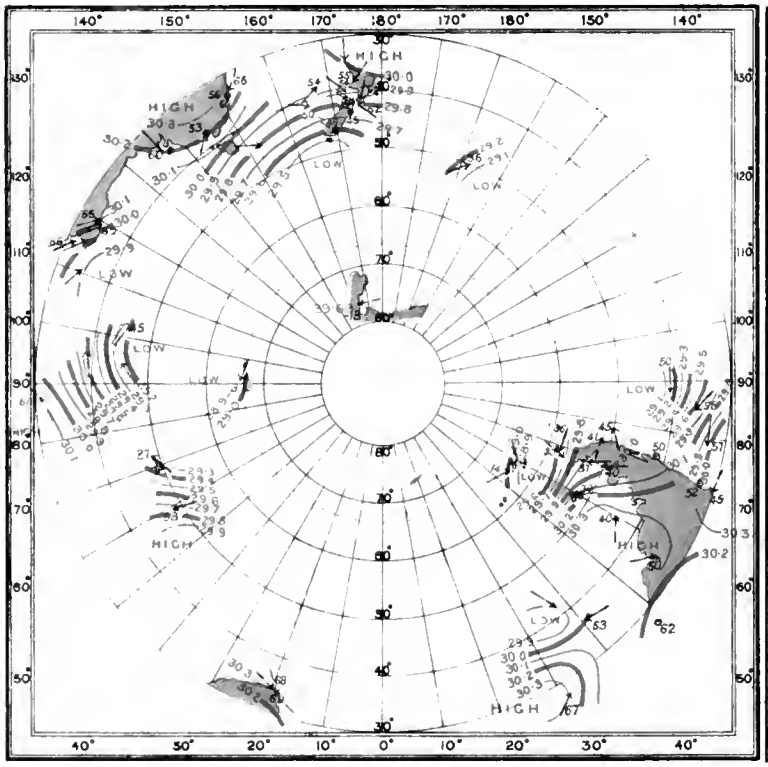

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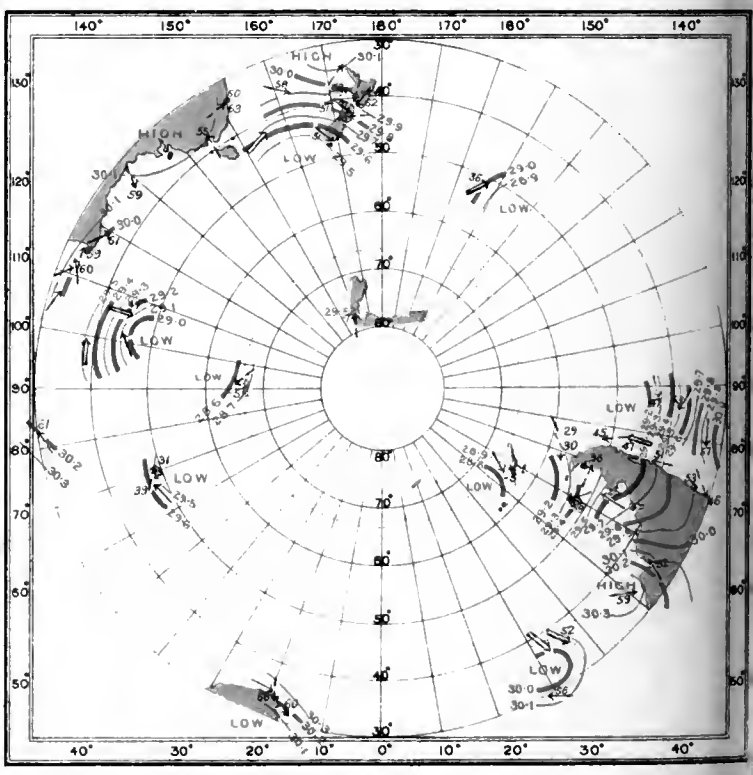


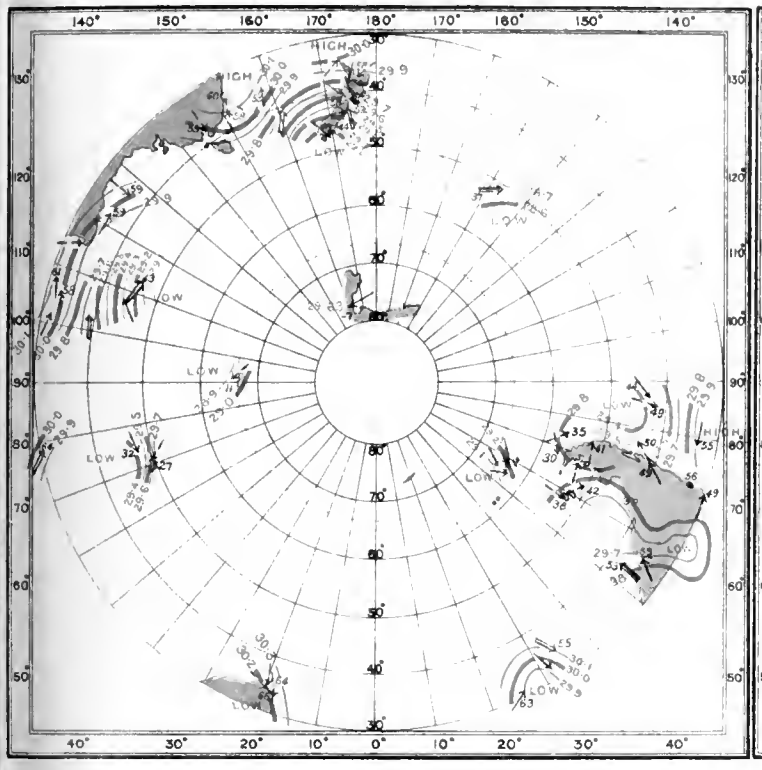
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 SEPTEMBER 6



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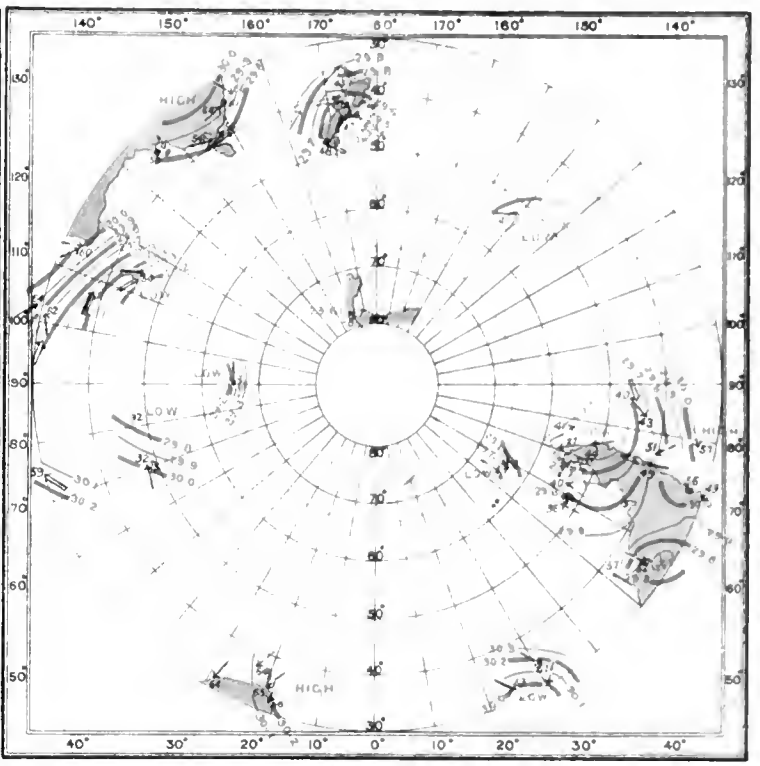

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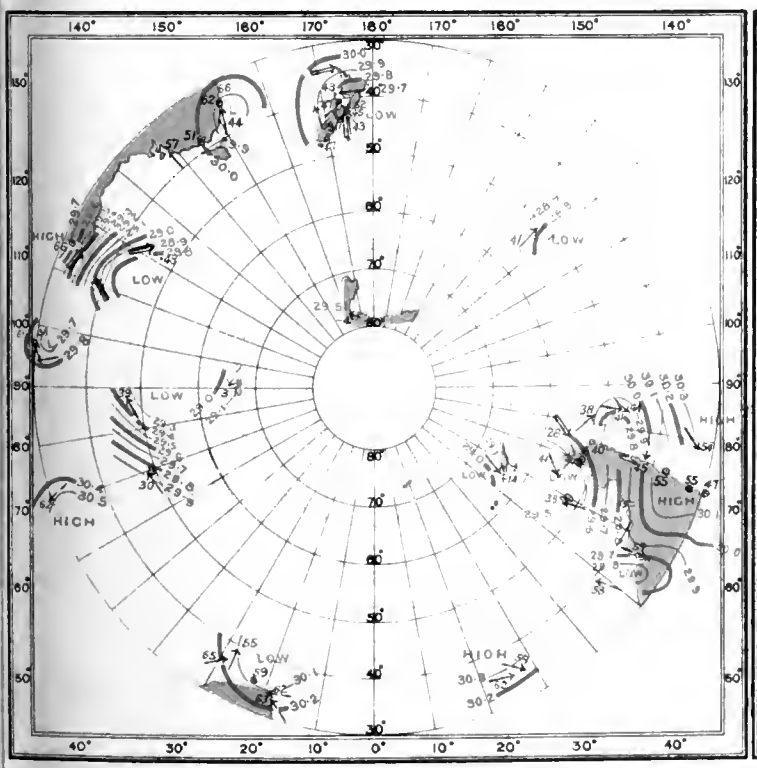

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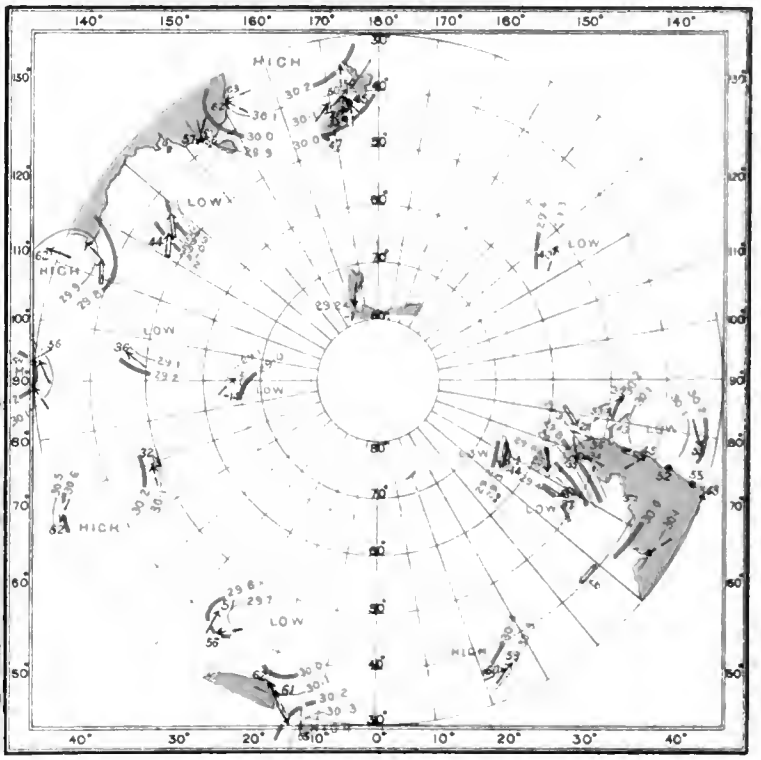


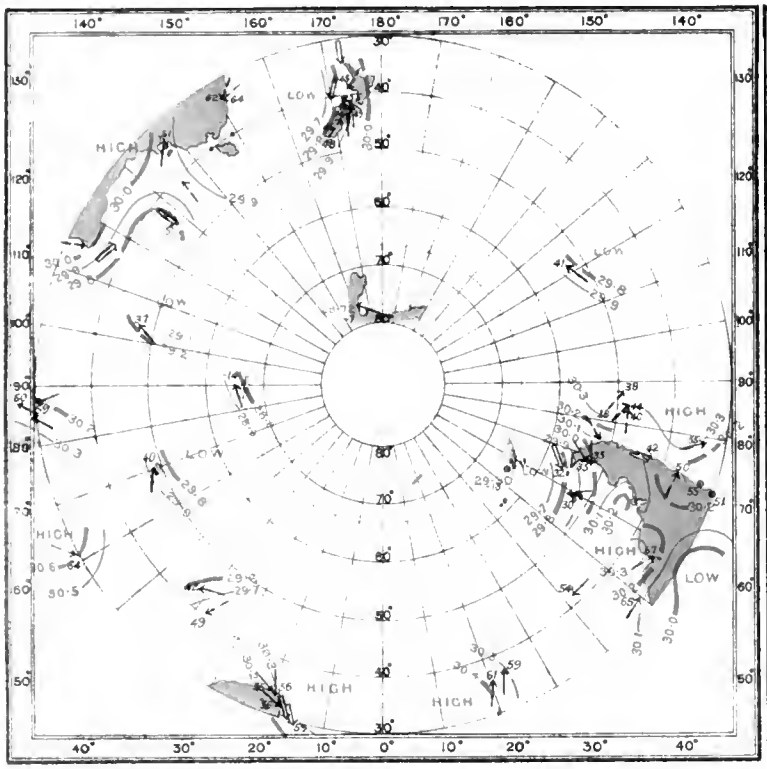
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1902 SEPTEMBER 10



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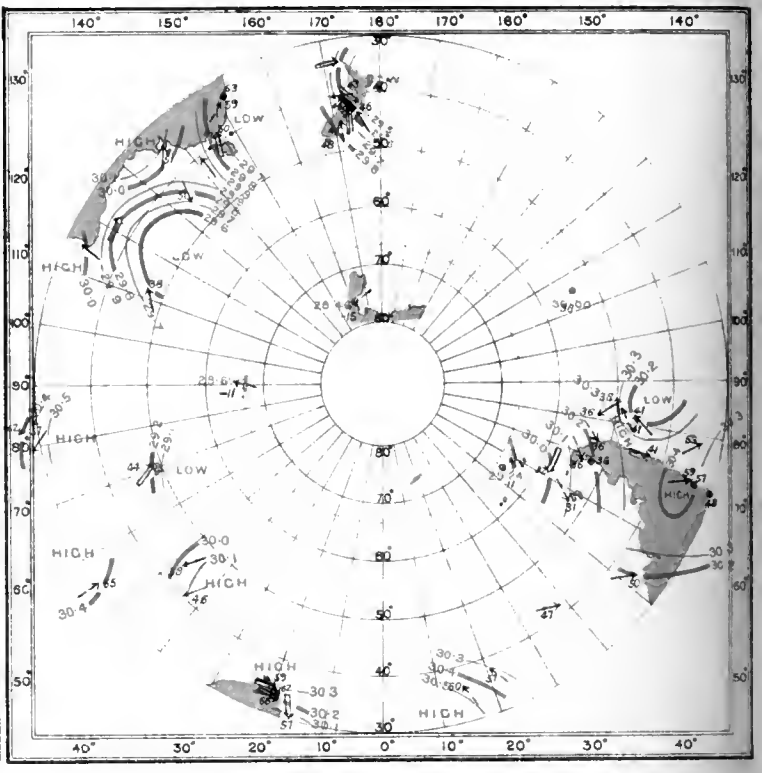

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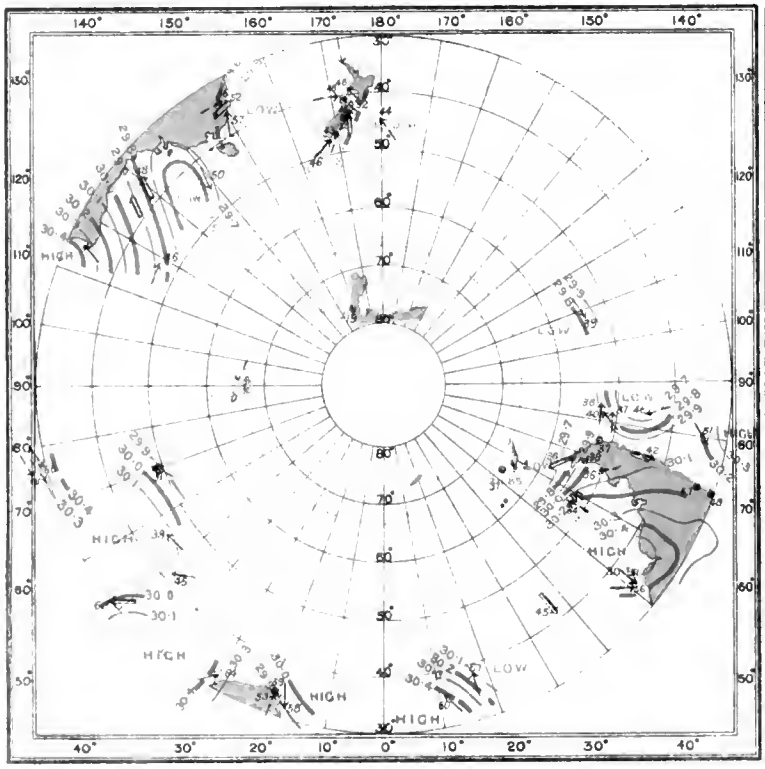

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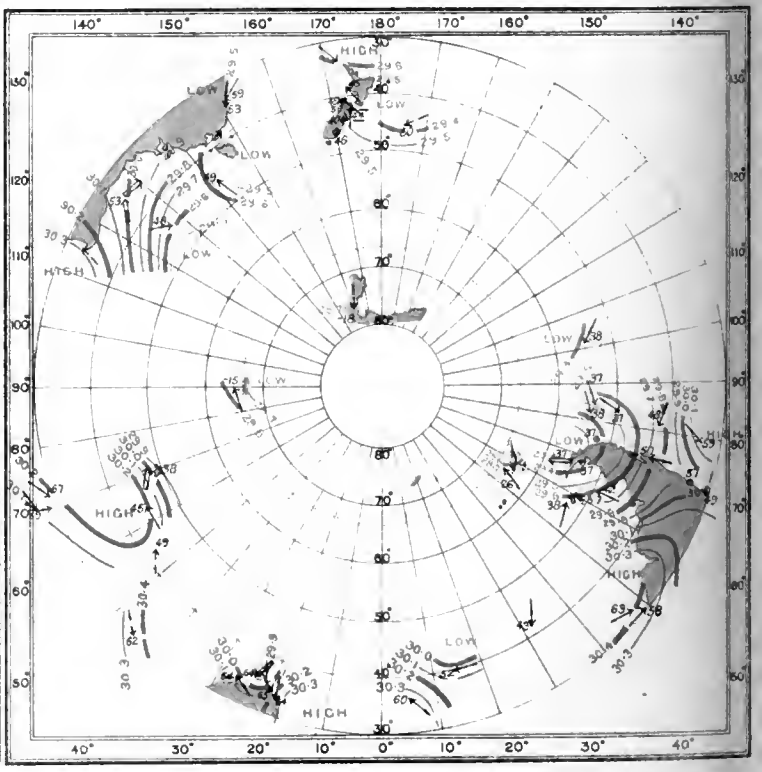


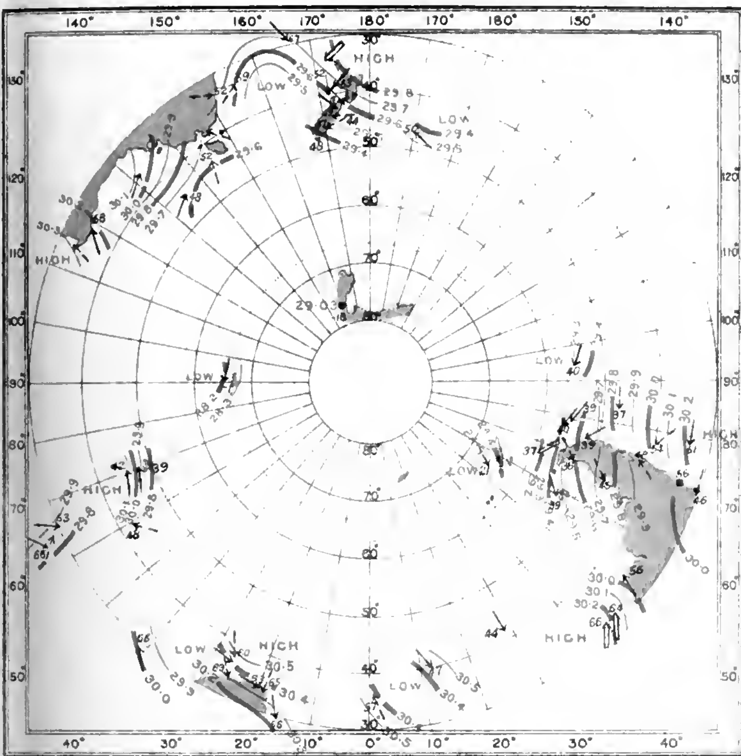
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 SEPTEMBER 14



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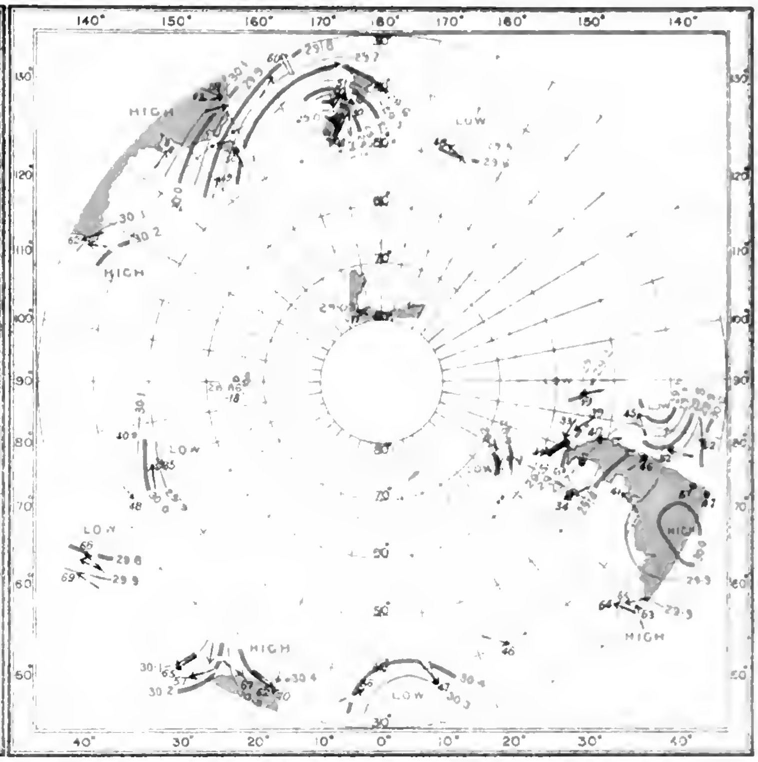

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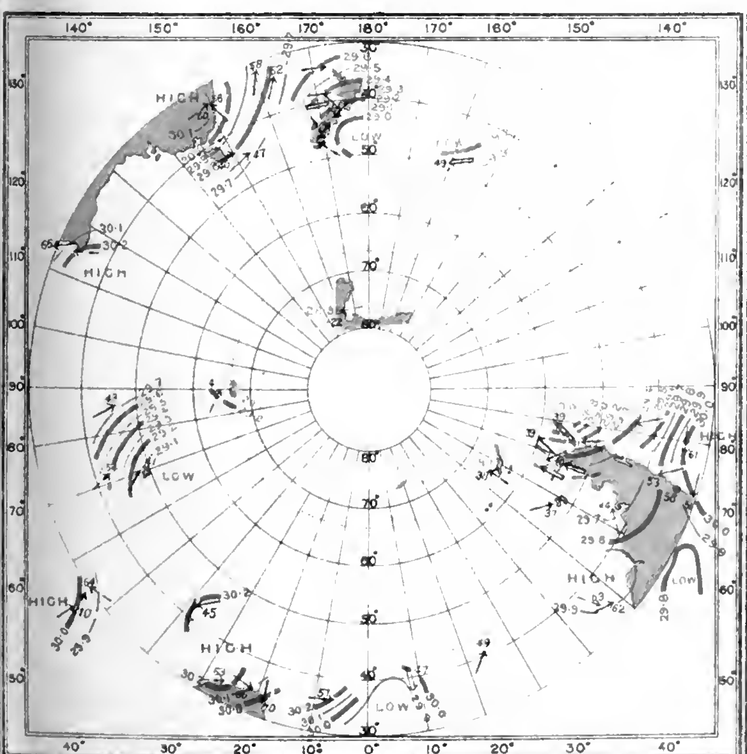
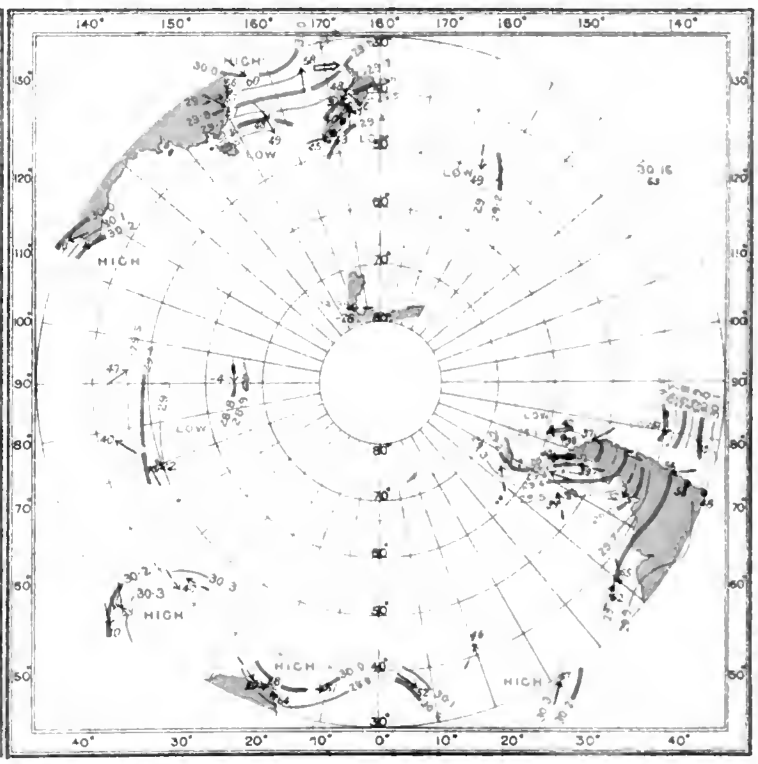


1902 SEPTEMBER 17



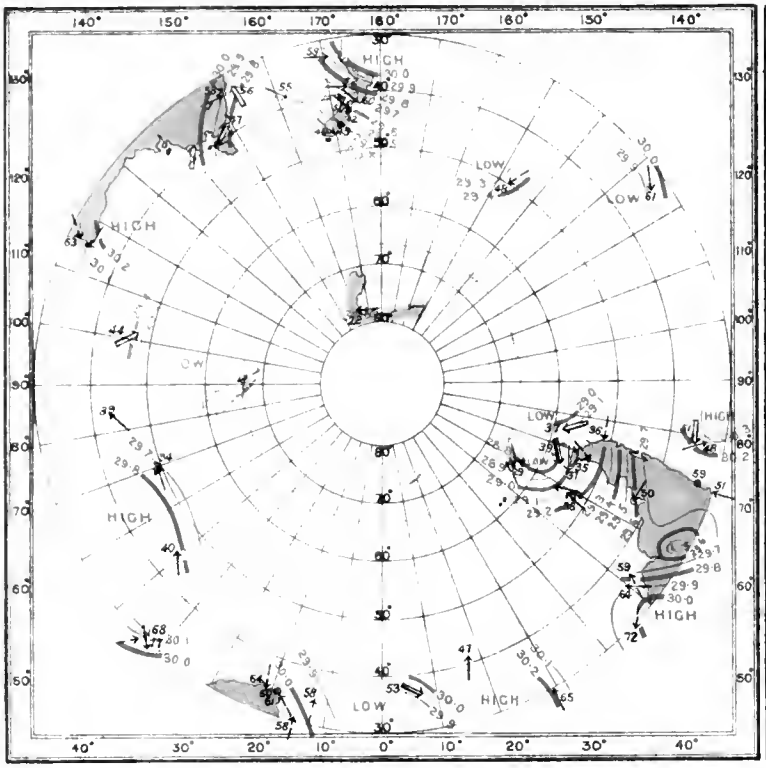
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1902 SEPTEMBER 18



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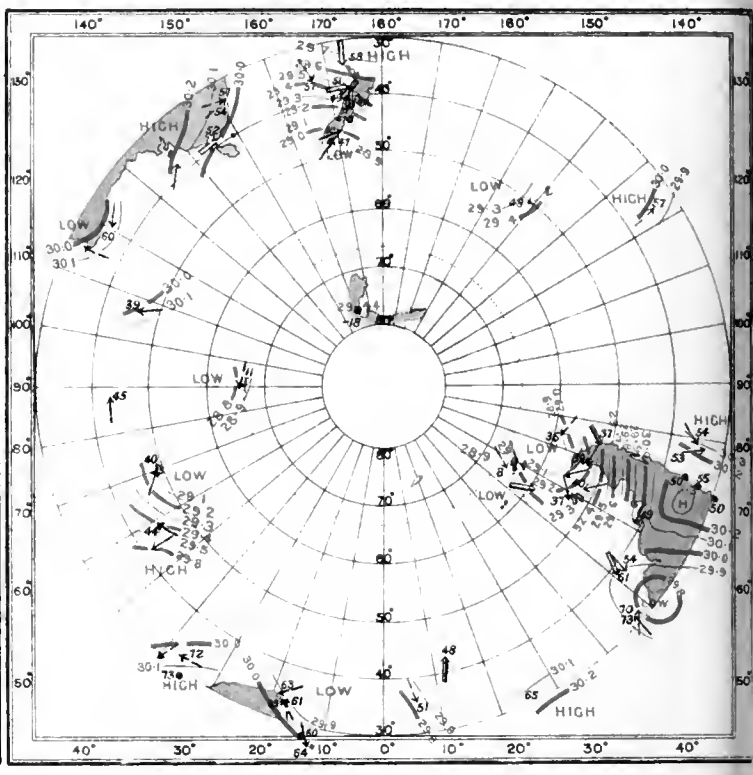

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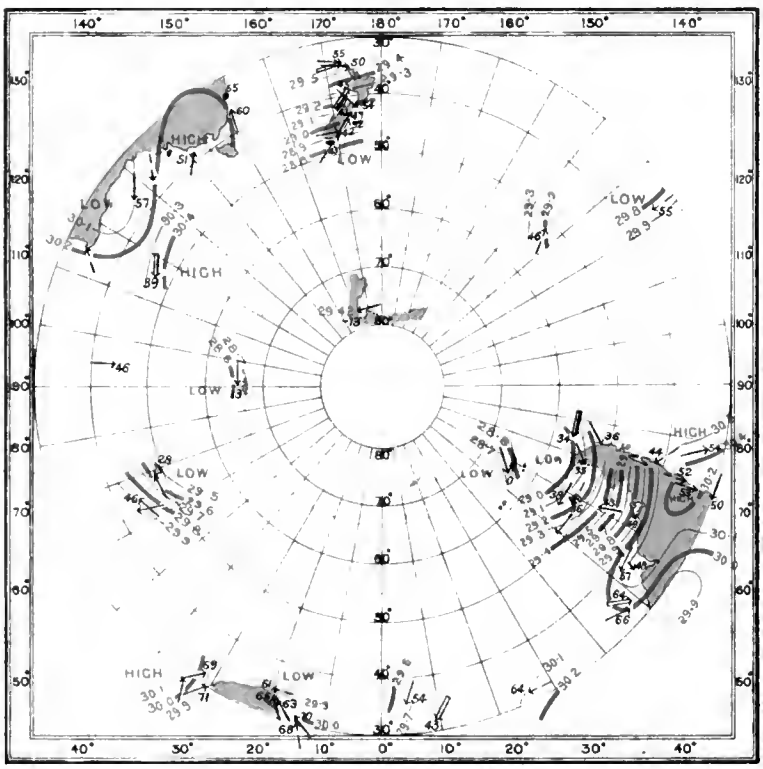

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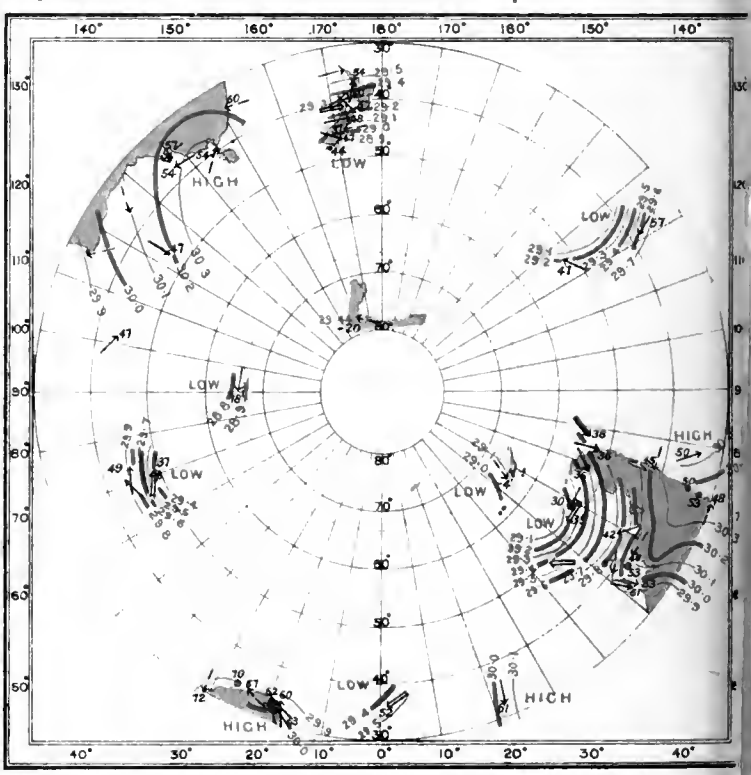


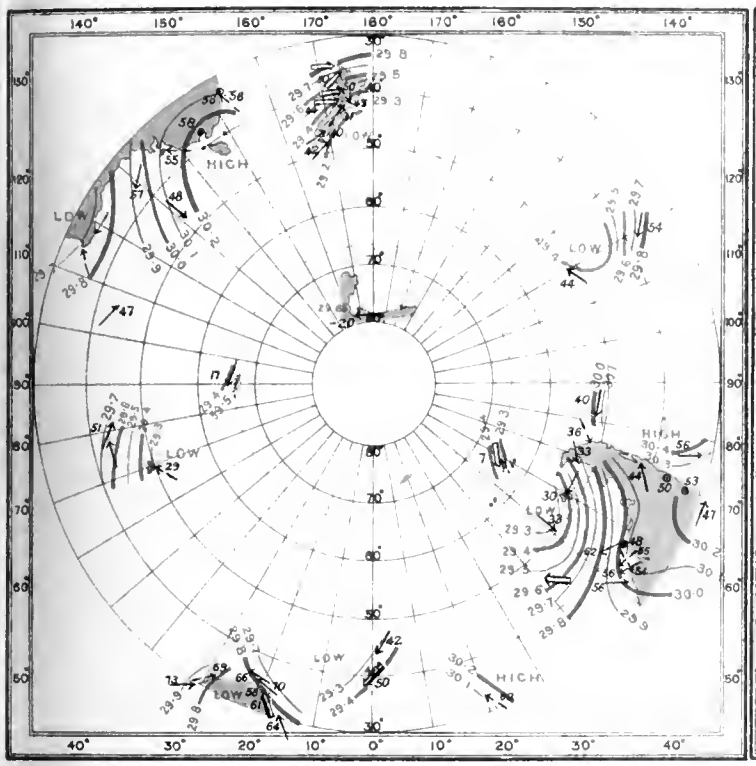
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 SEPTEMBER 22



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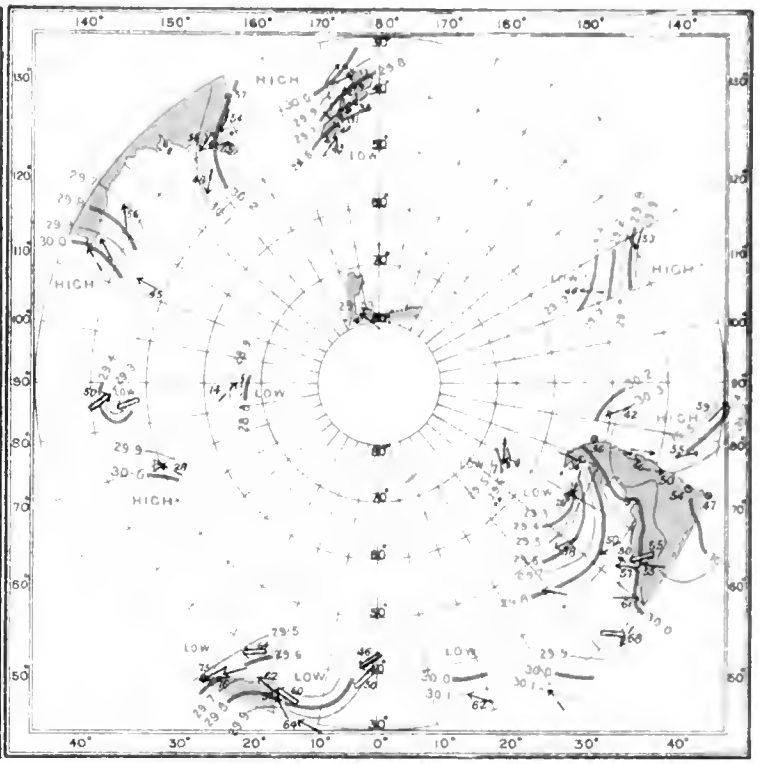

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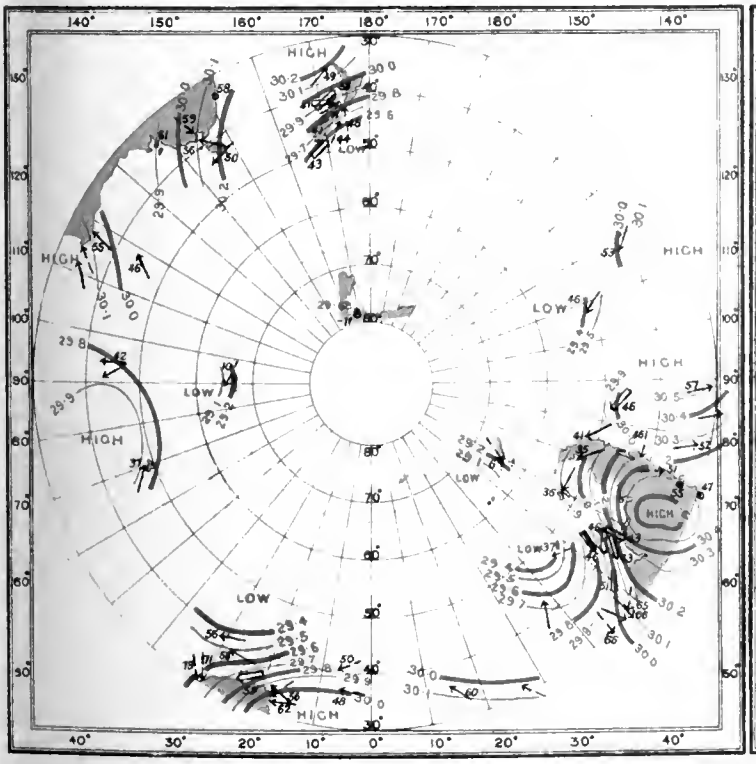

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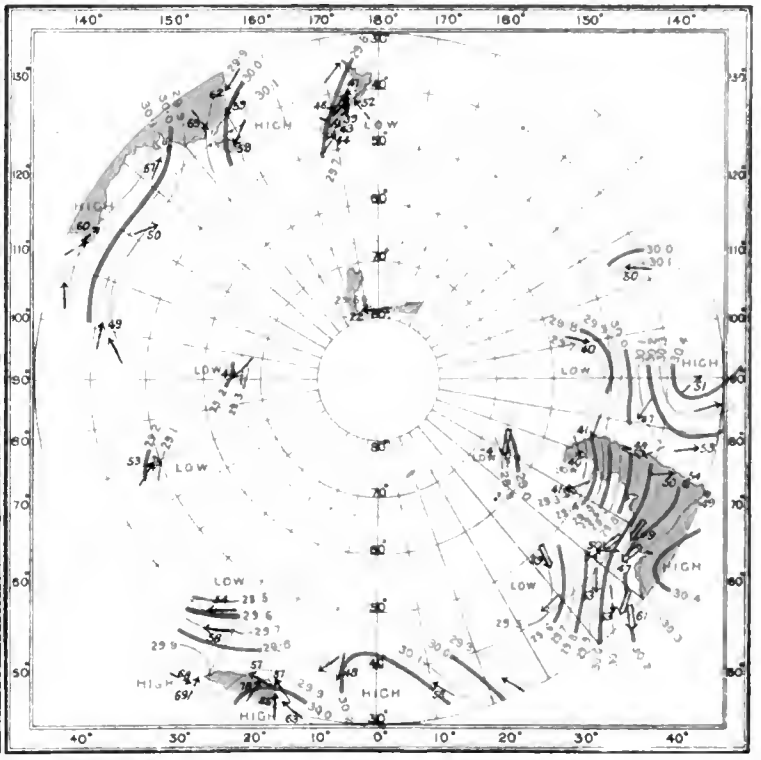


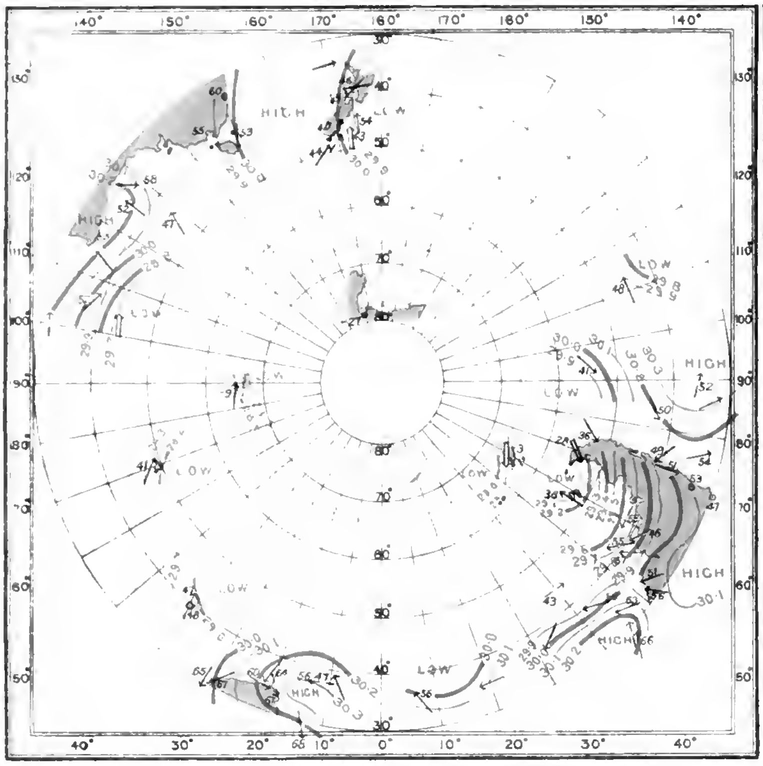
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 SEPTEMBER 26



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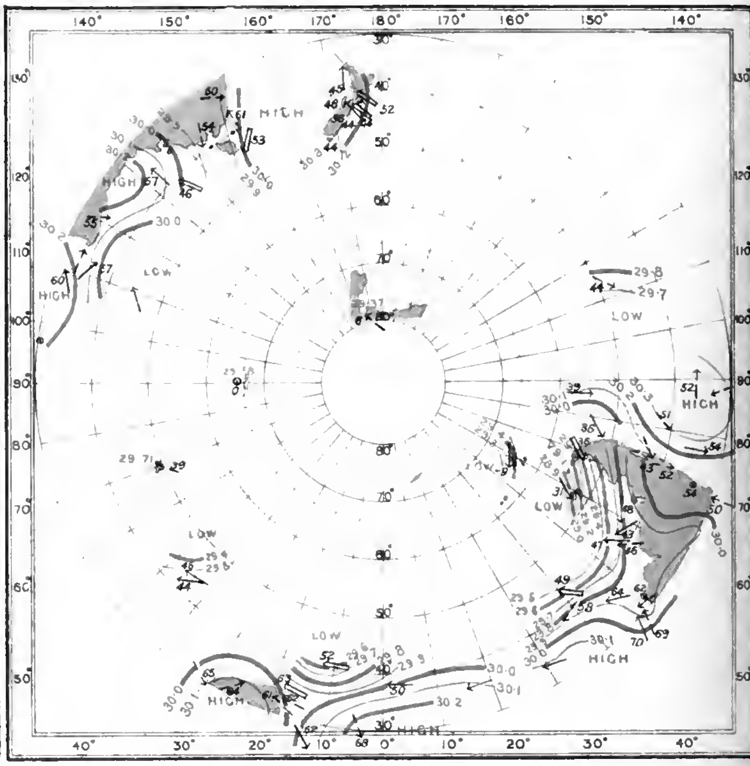

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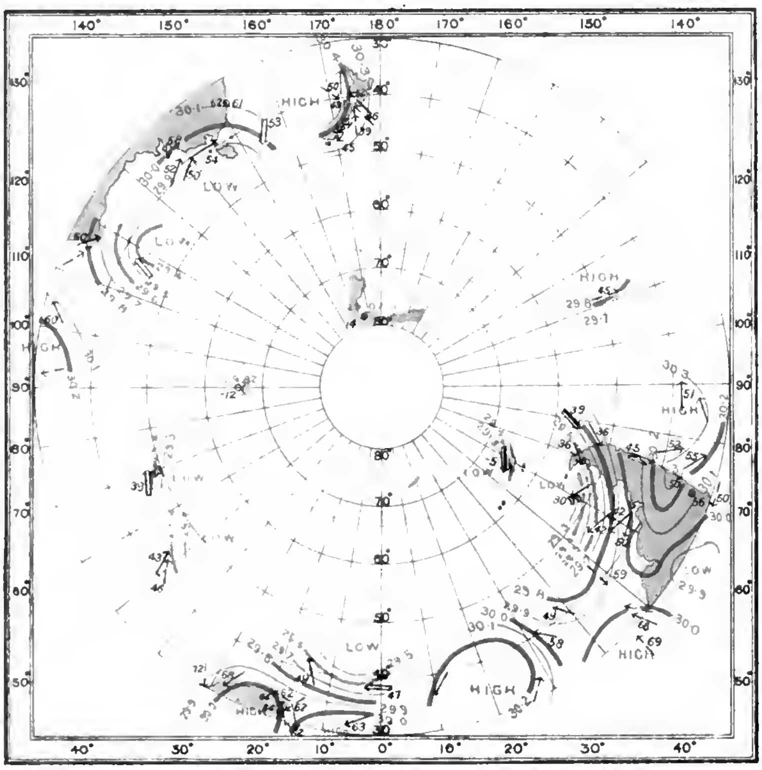

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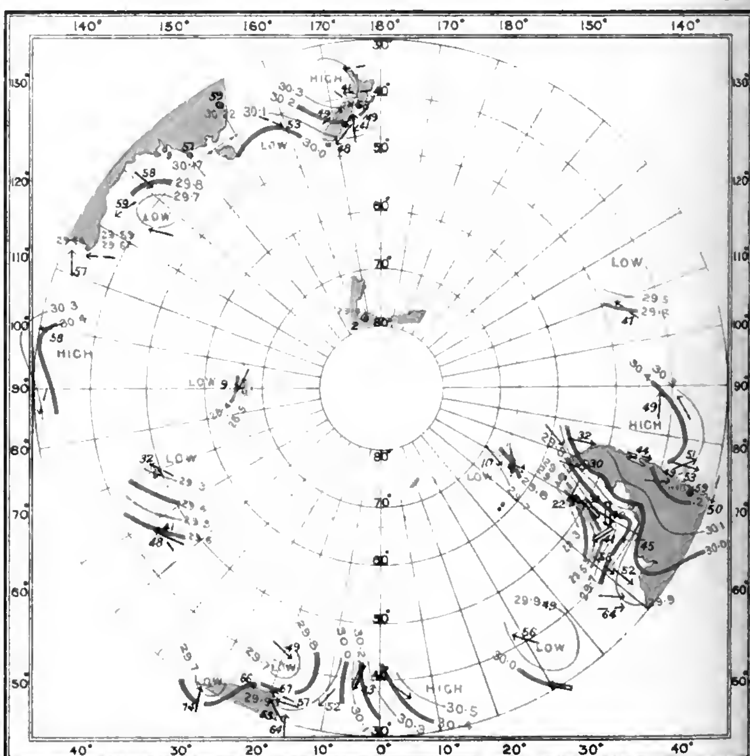


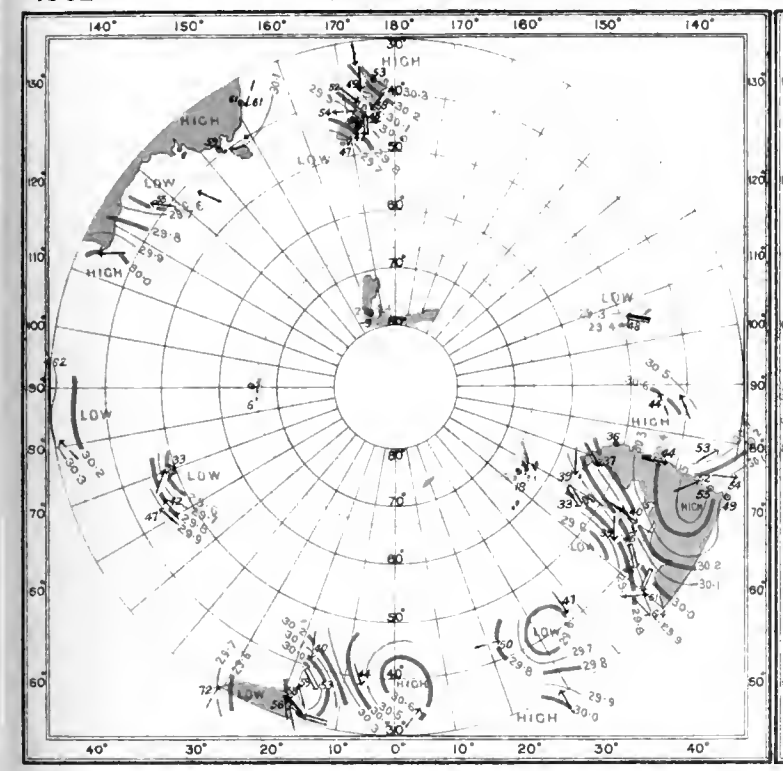
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 SEPTEMBER 30



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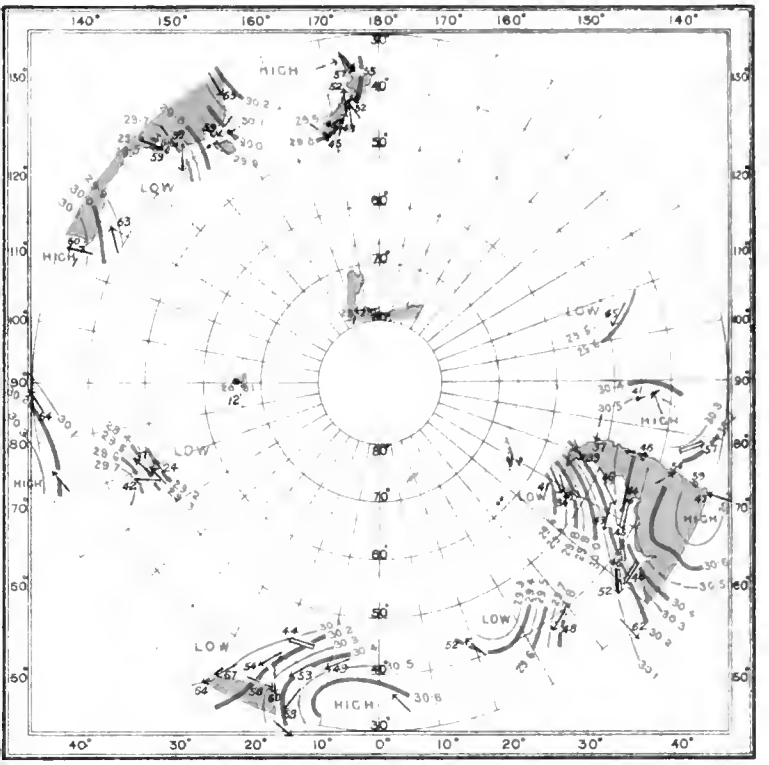

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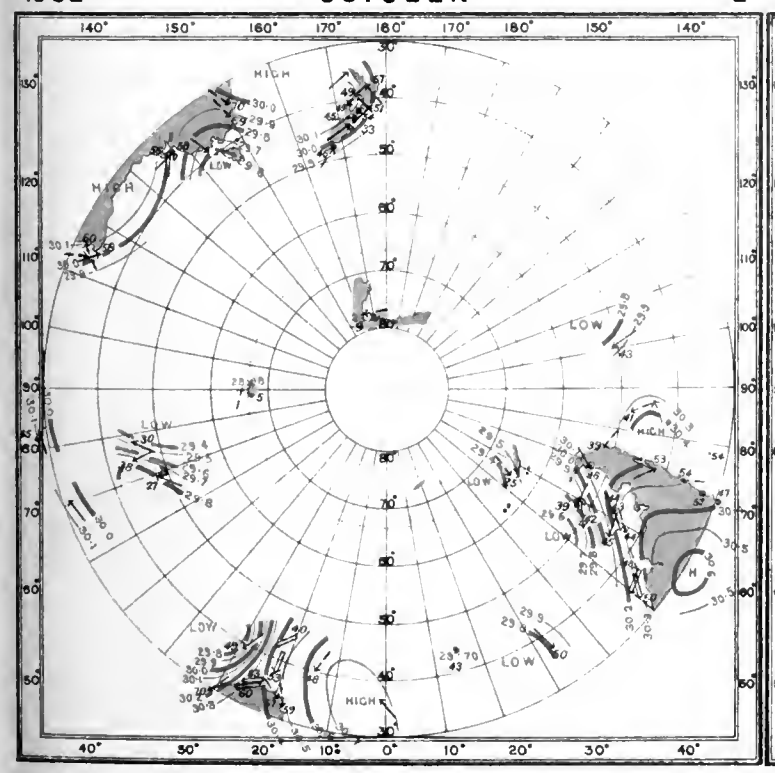

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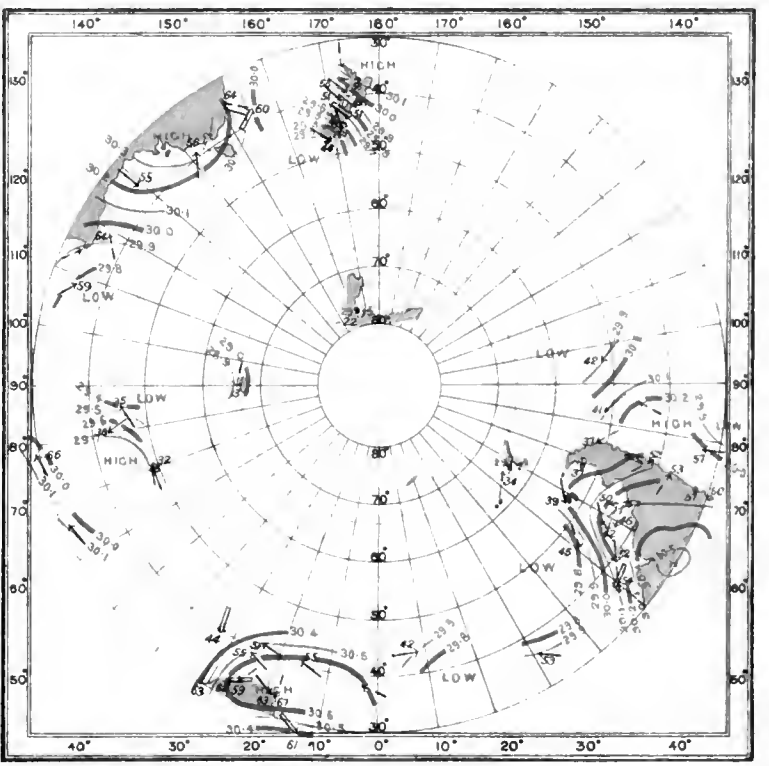


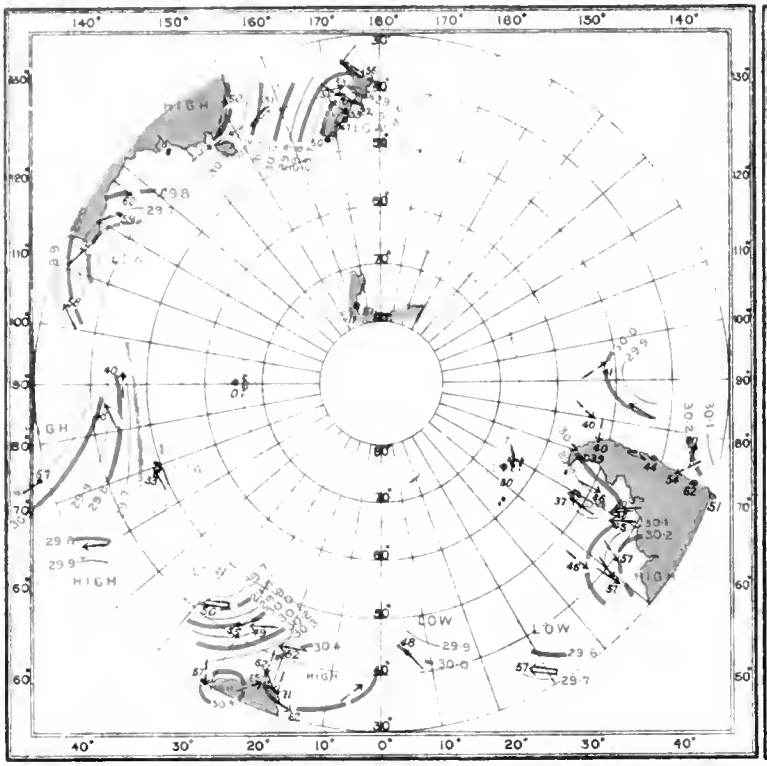
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1902 OCTOBER 4



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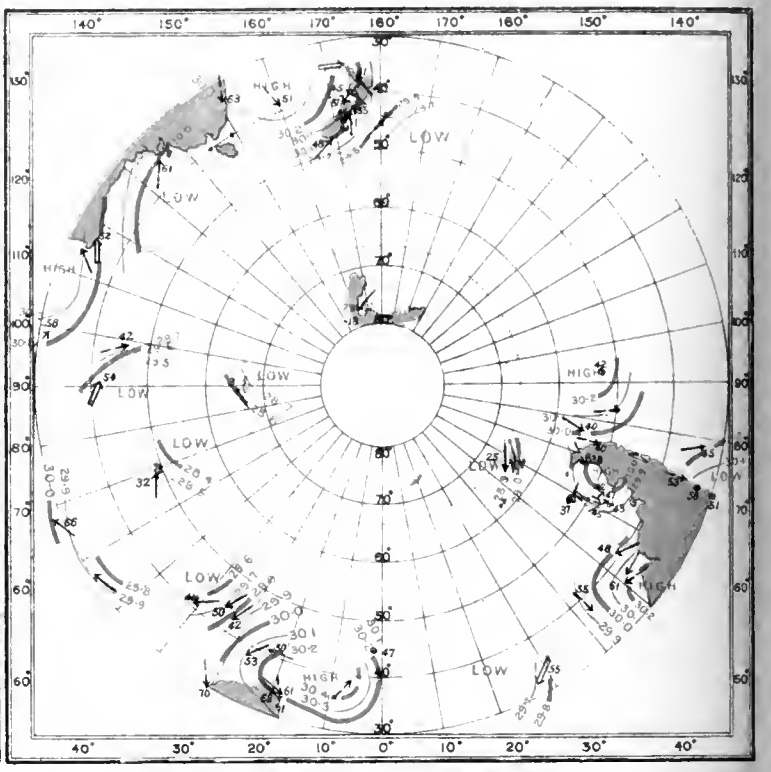

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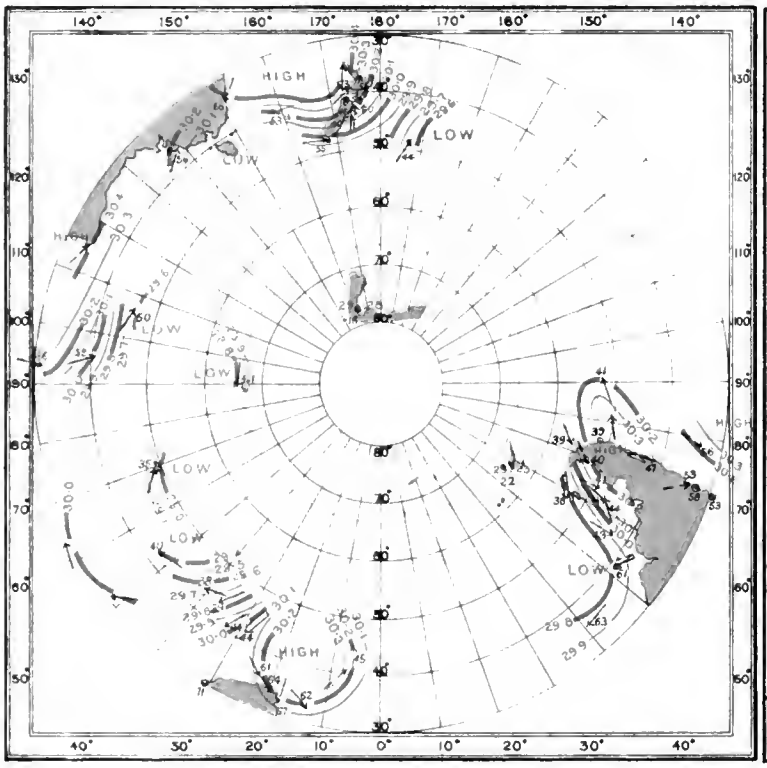

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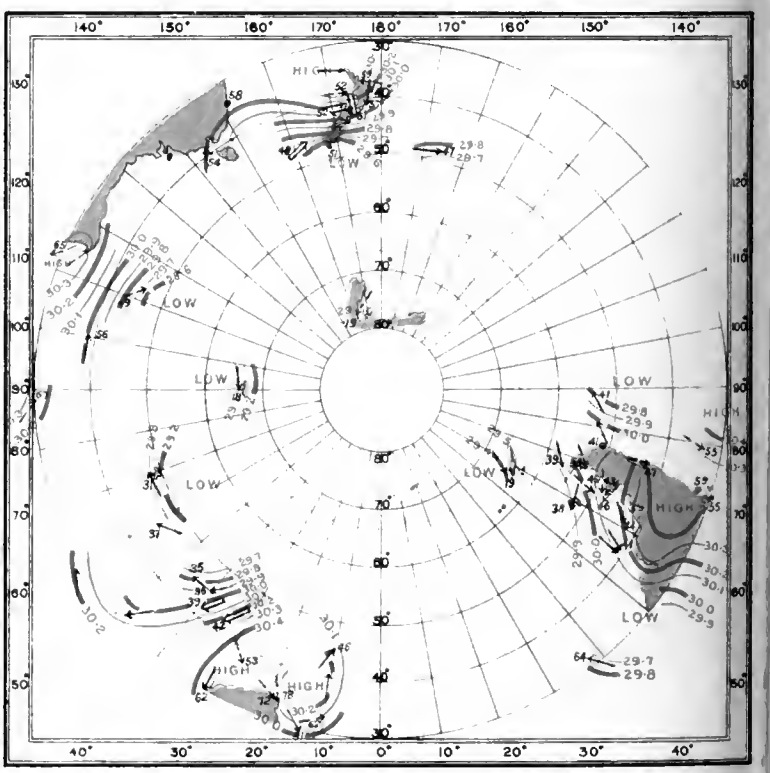


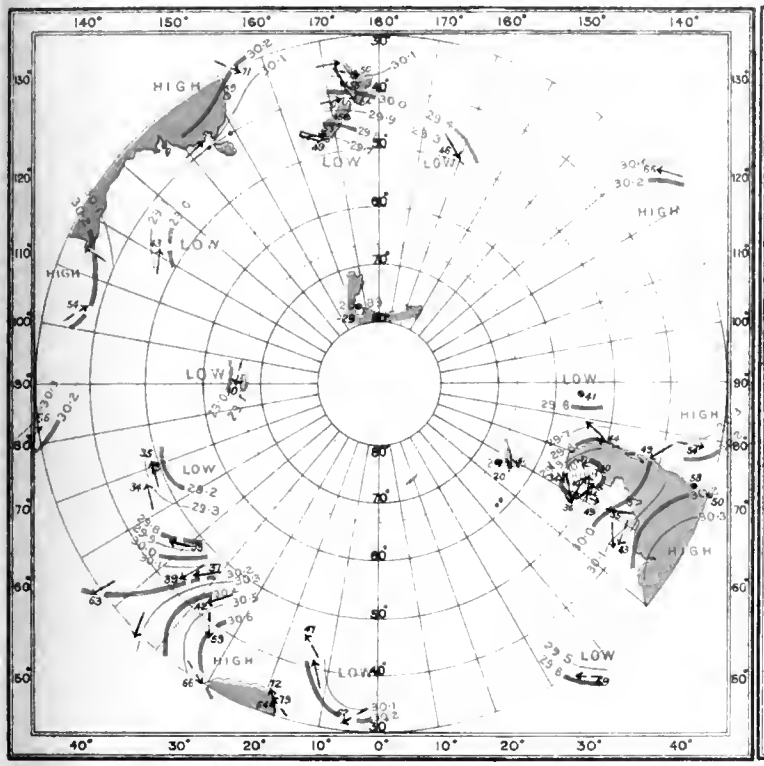
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1902 OCTOBER 8



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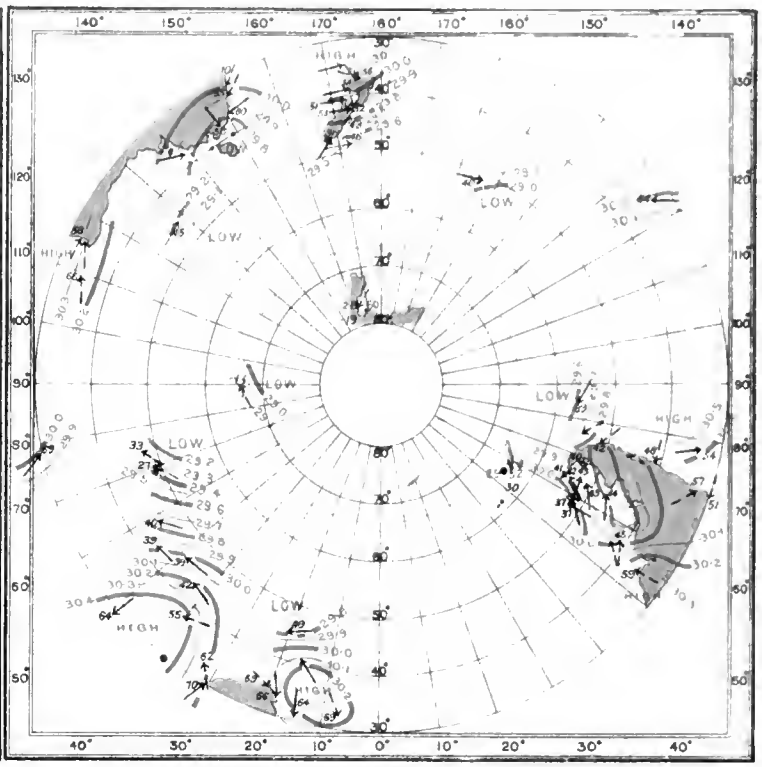

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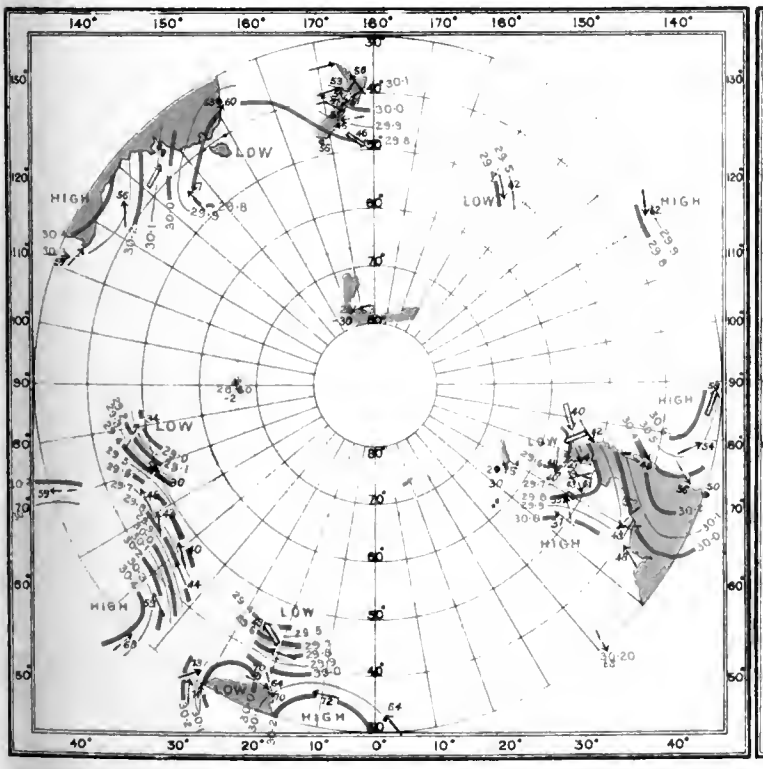

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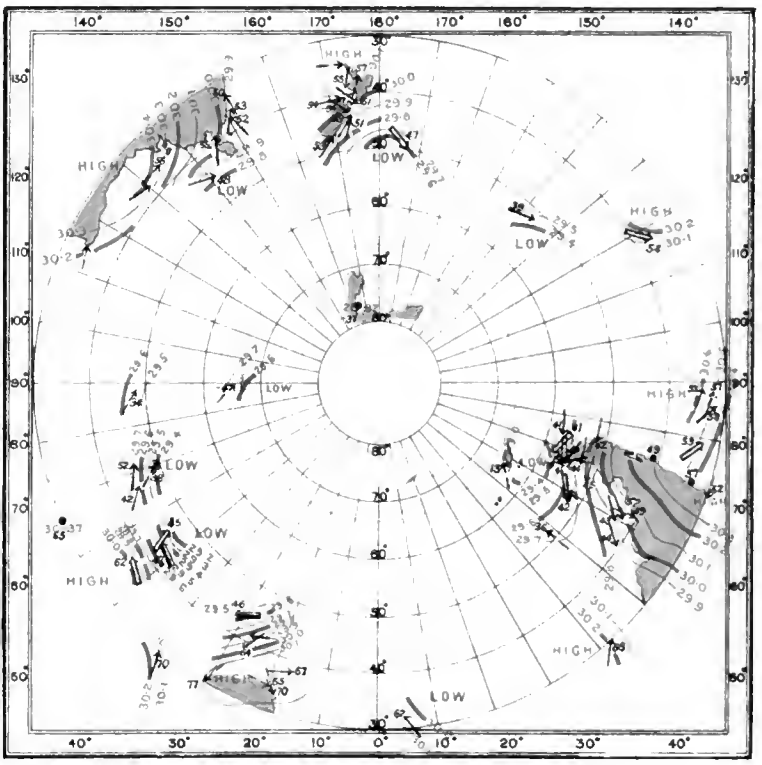


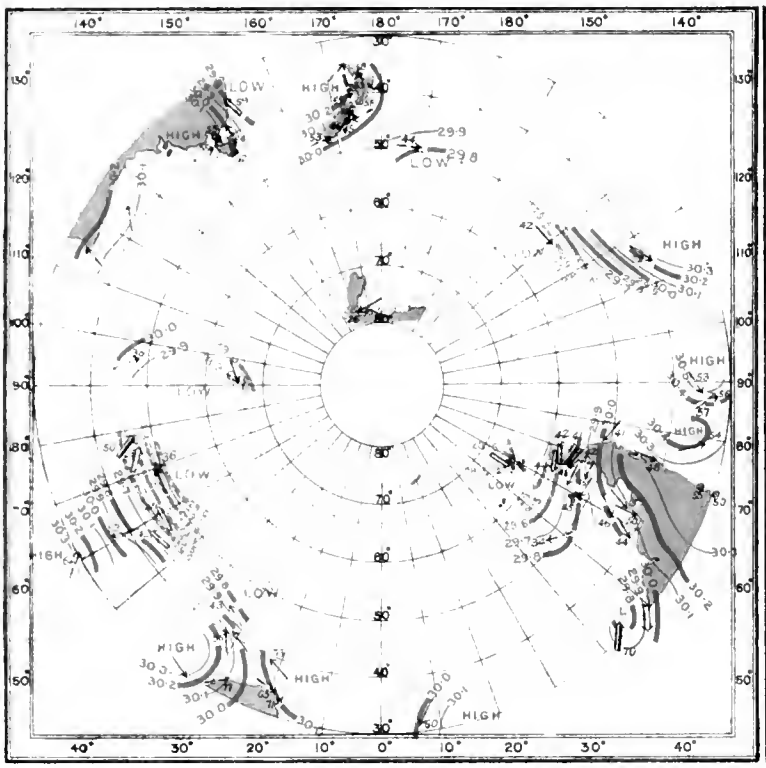
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 OCTOBER 12



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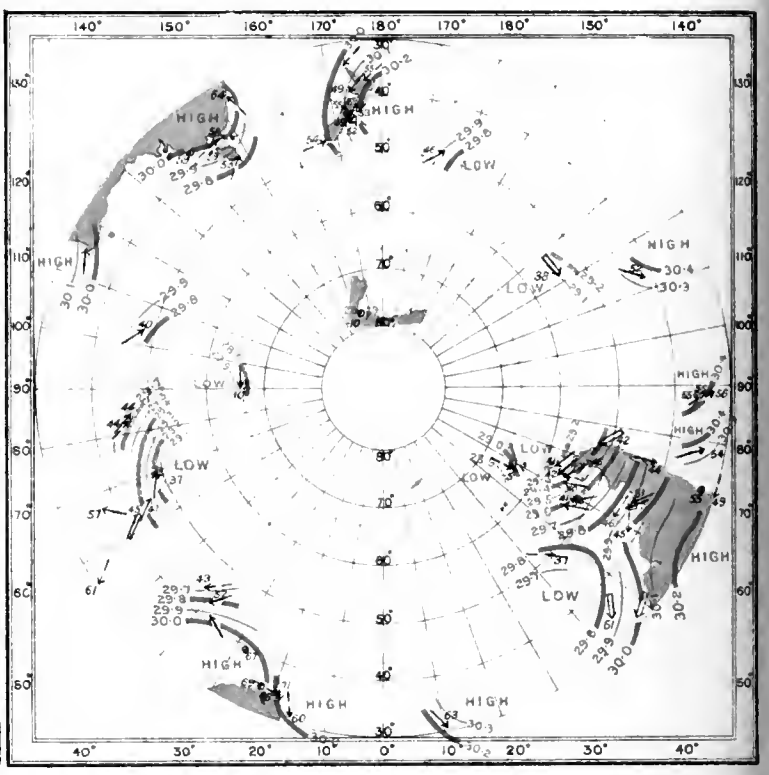

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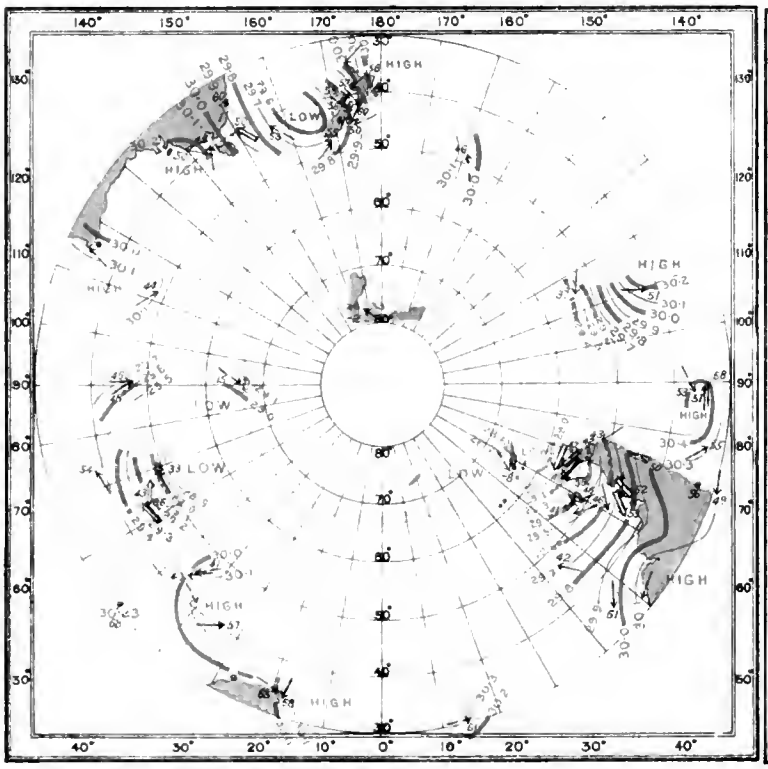

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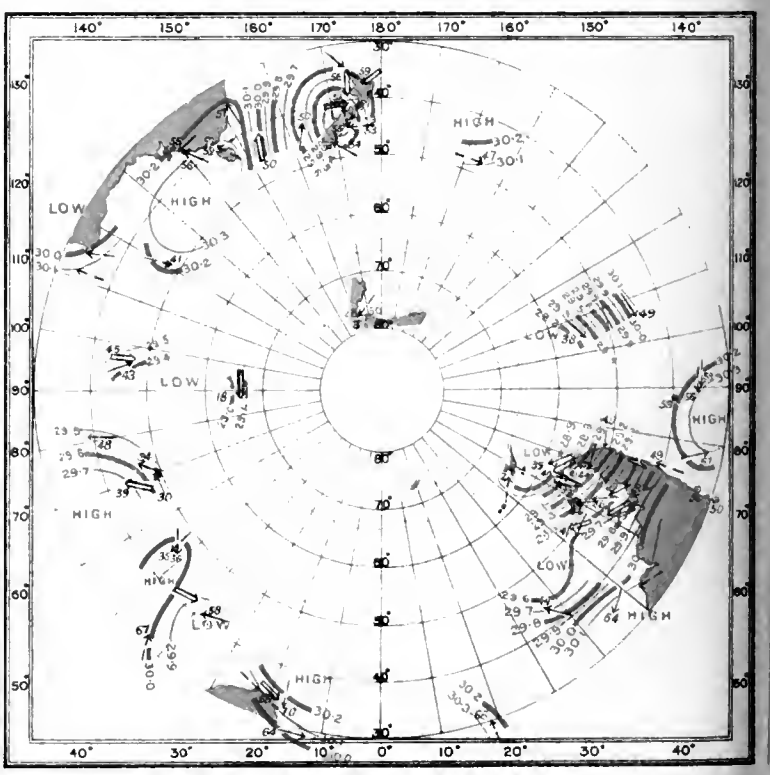


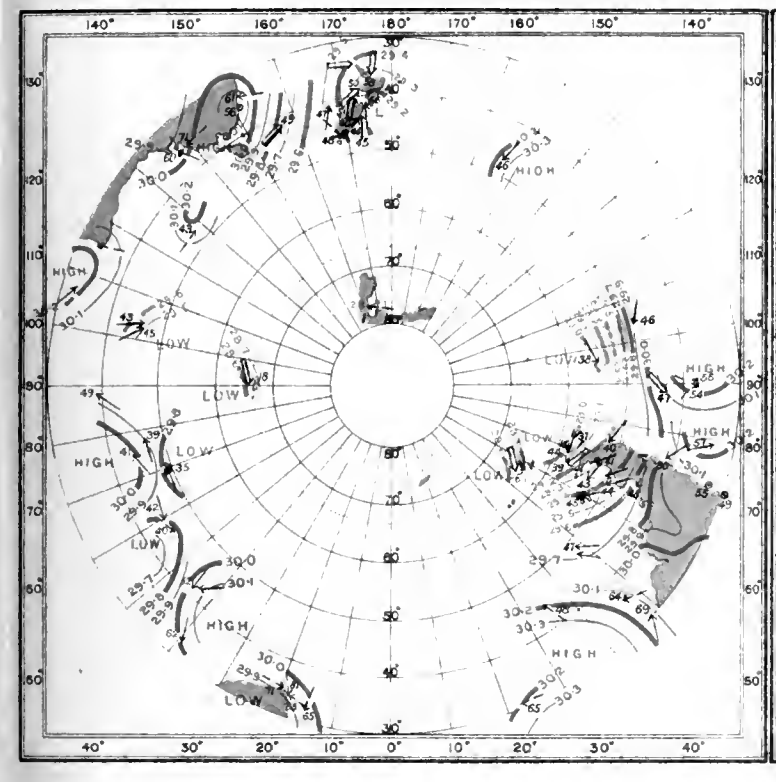
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1902 OCTOBER 16



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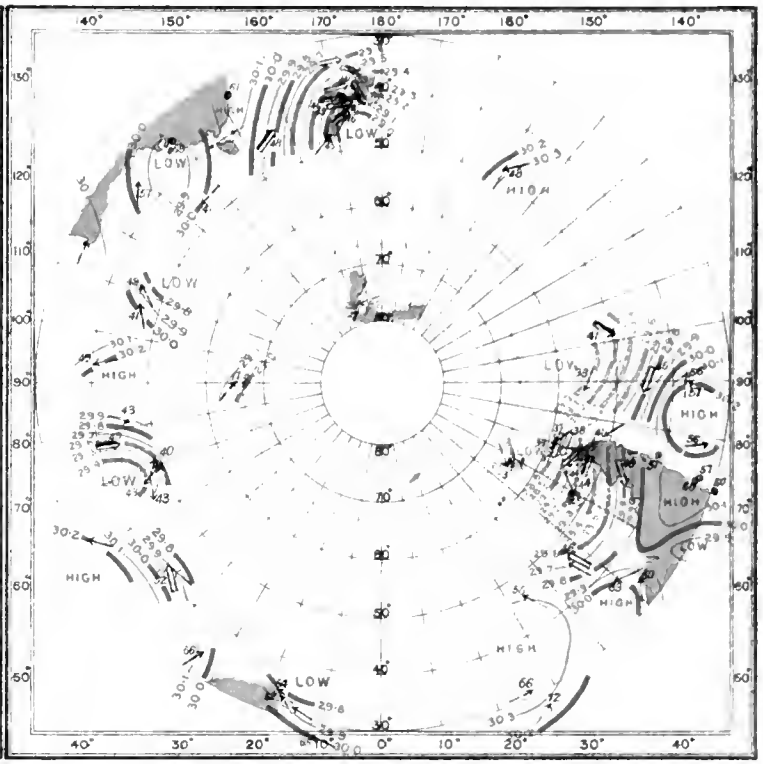

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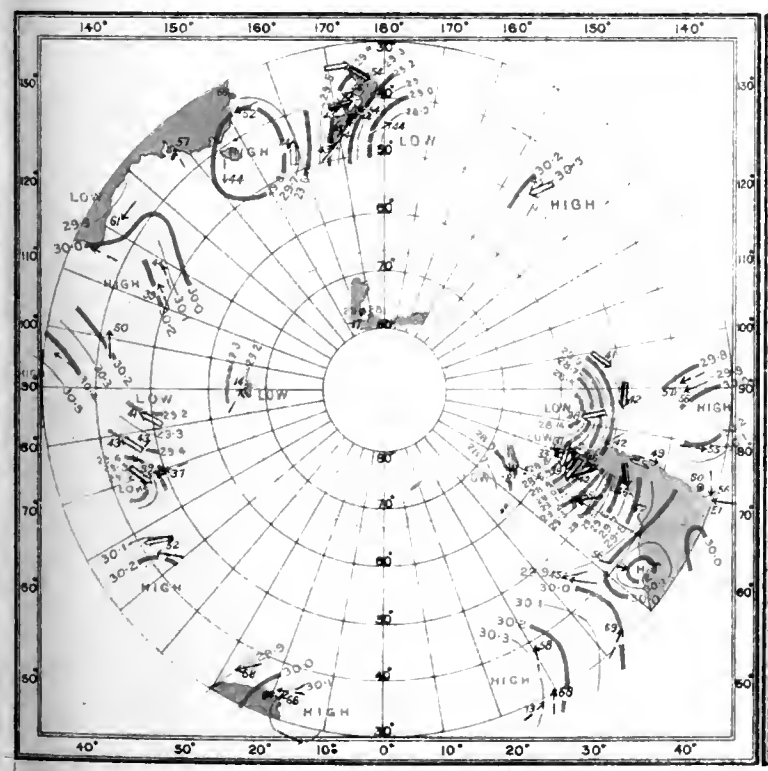

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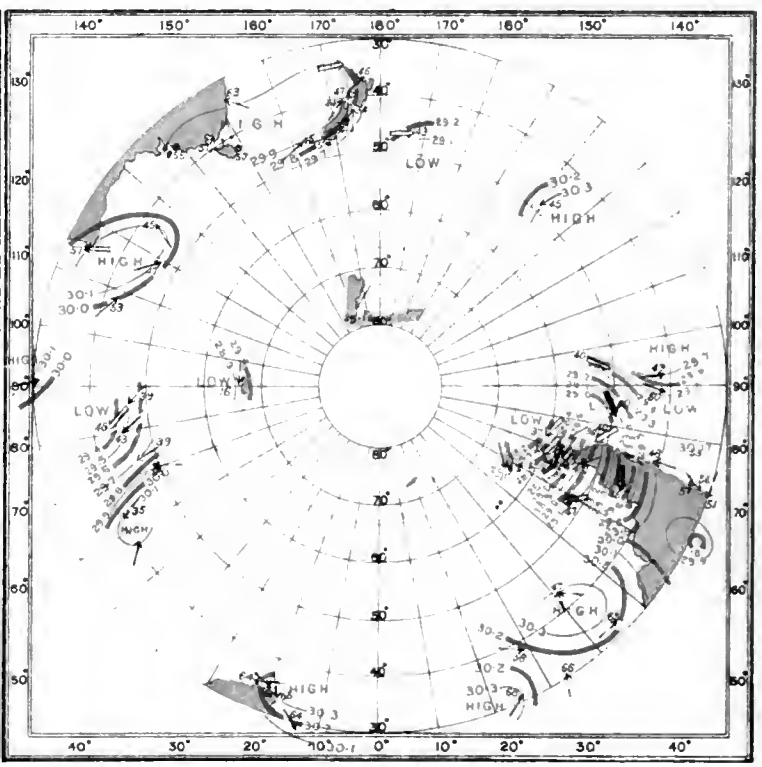


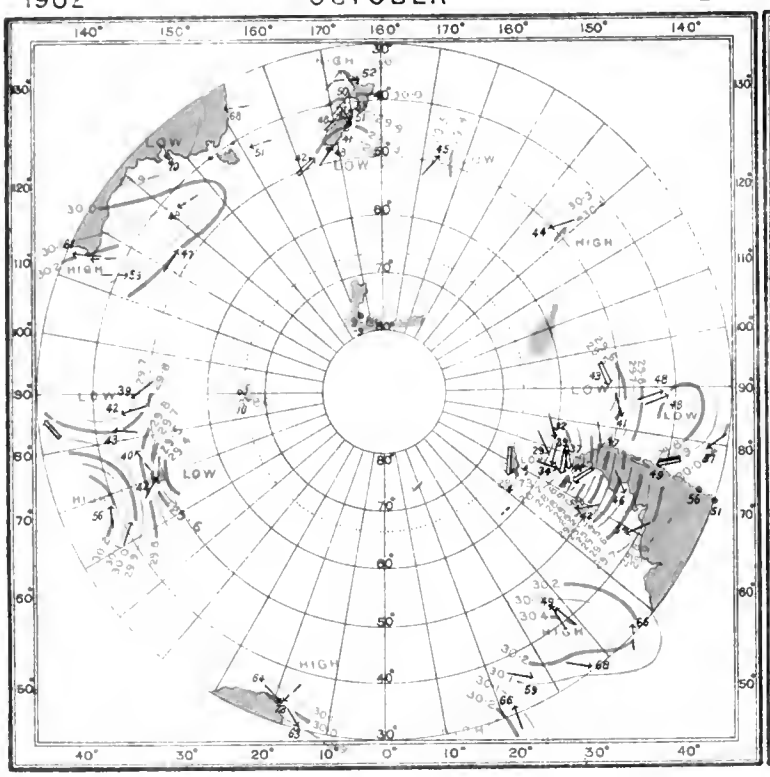
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 OCTOBER 20



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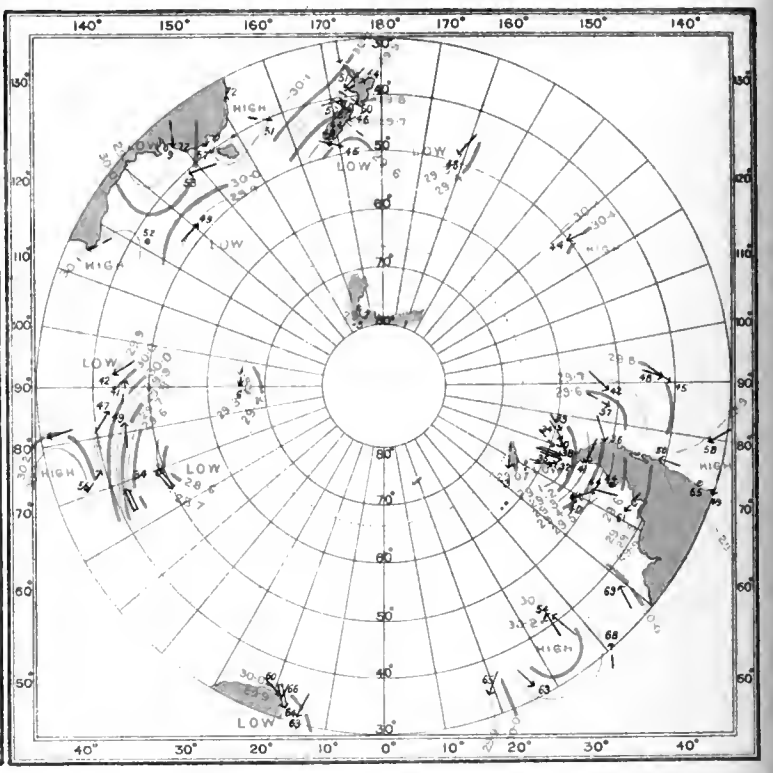

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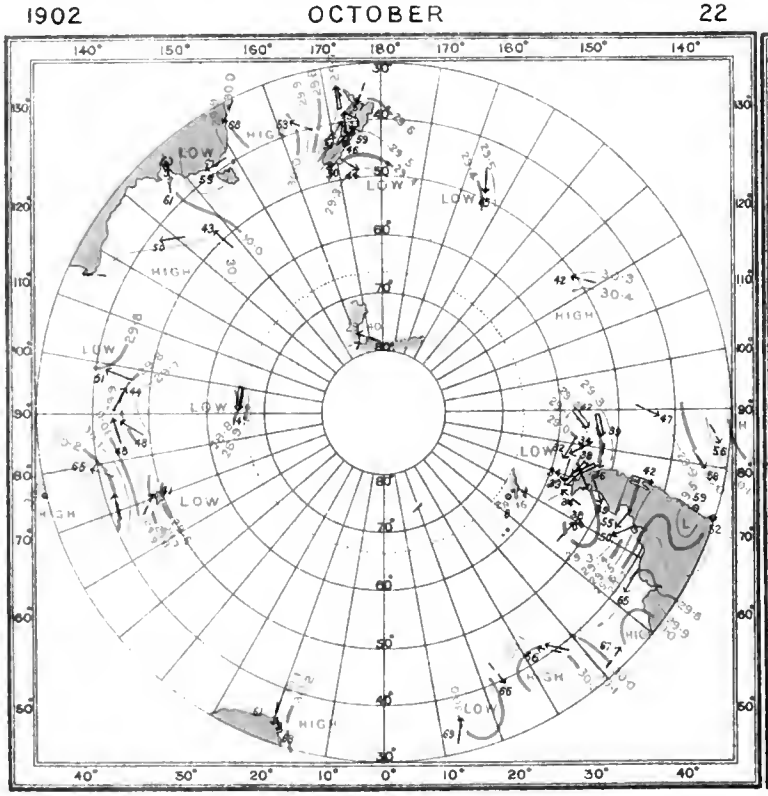

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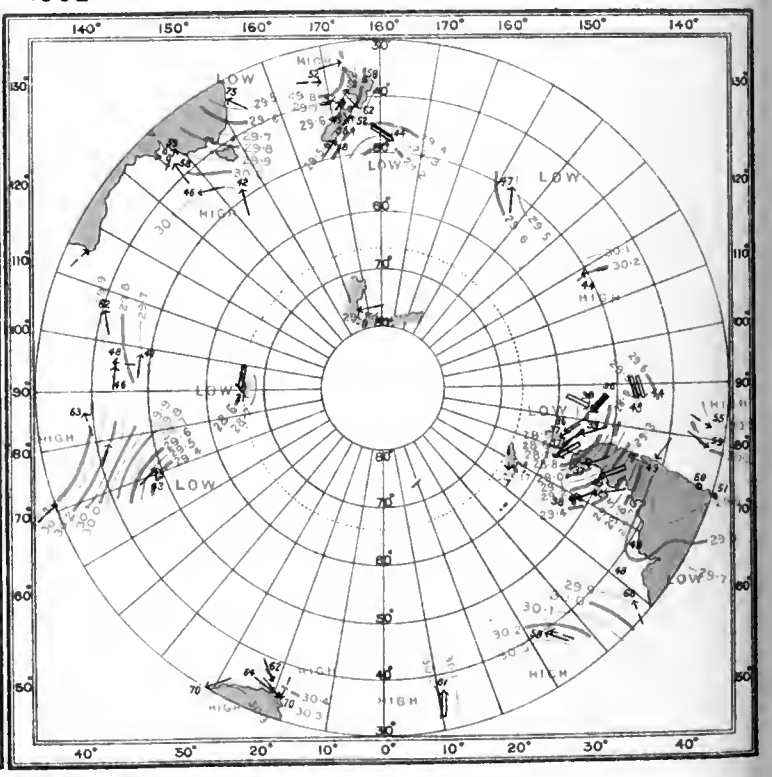


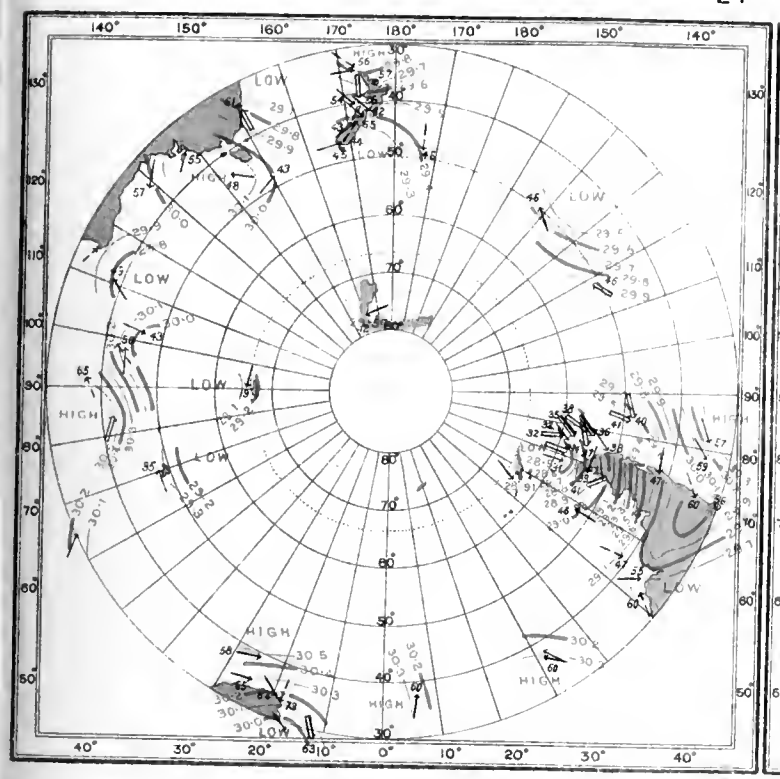
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1902 OCTOBER 24



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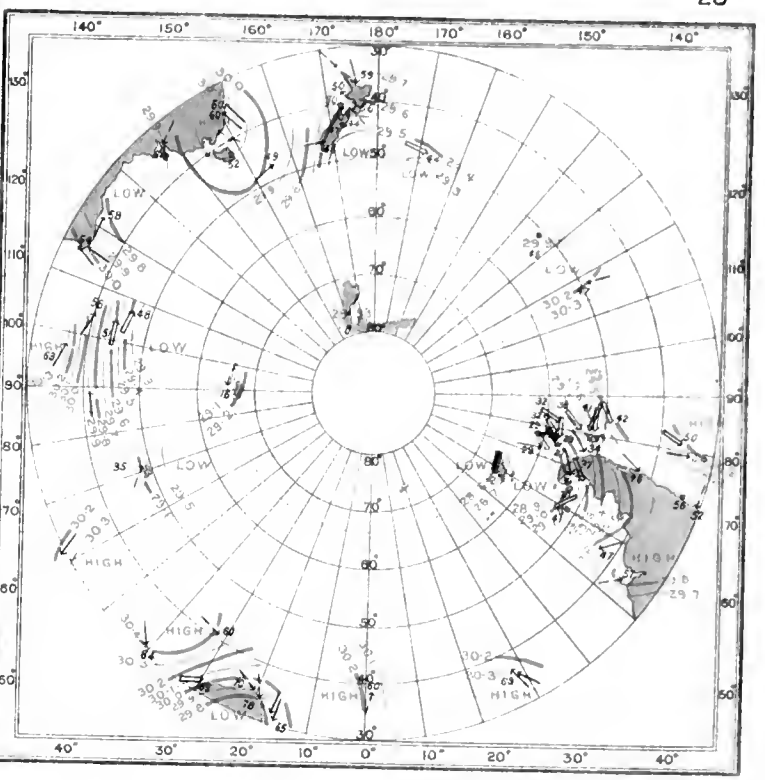

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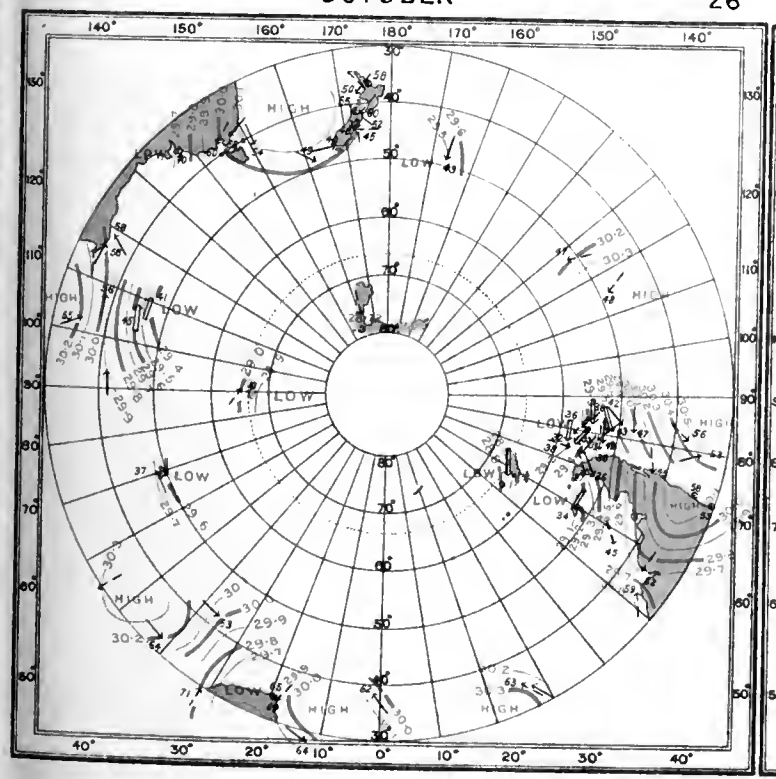

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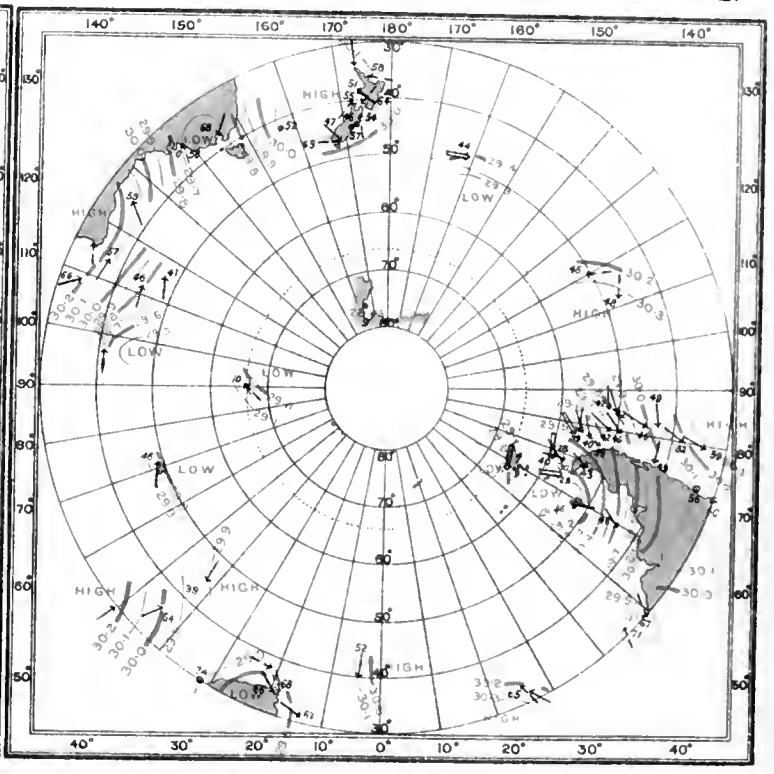

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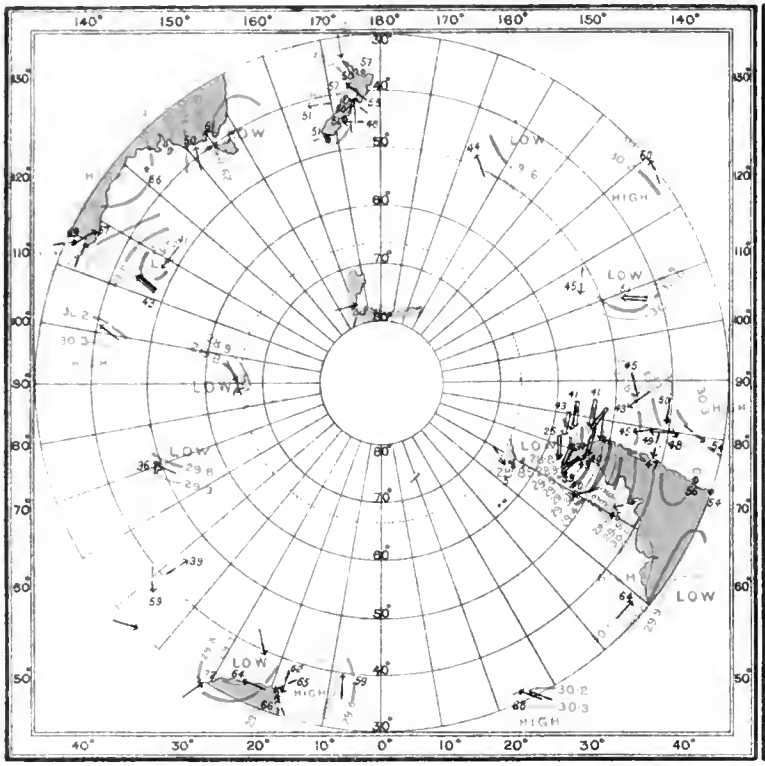
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 OCTOBER 28



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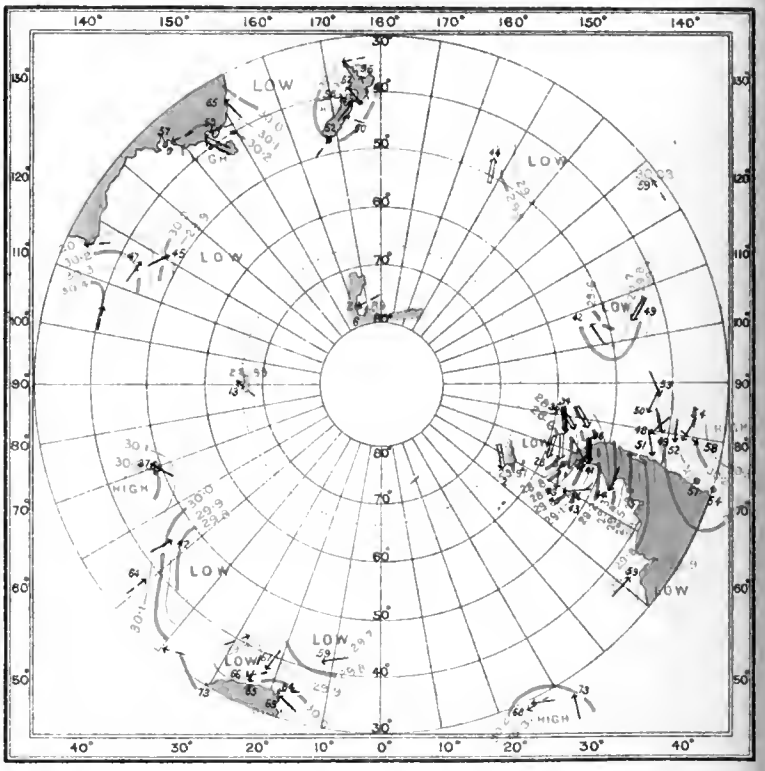

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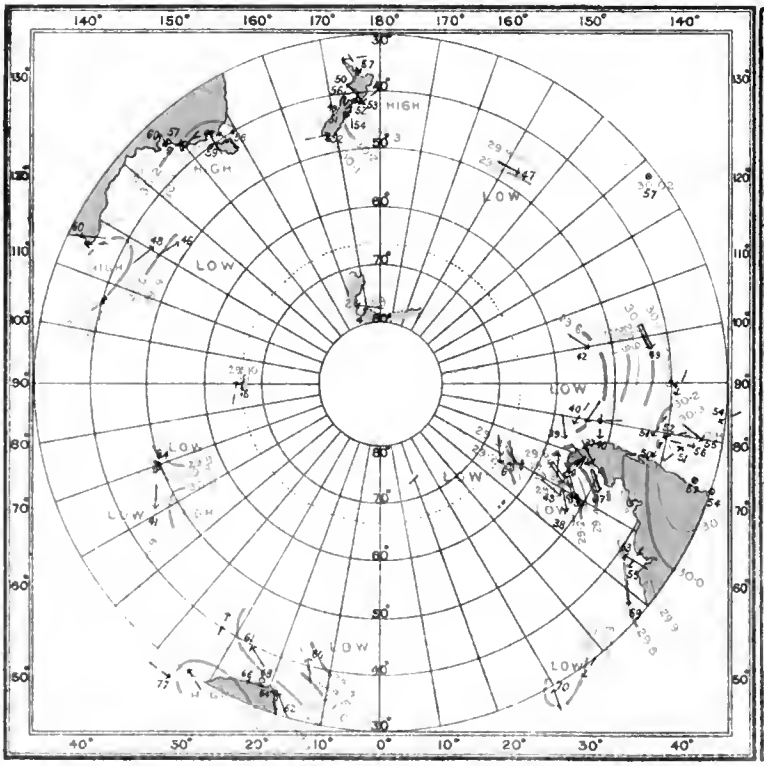

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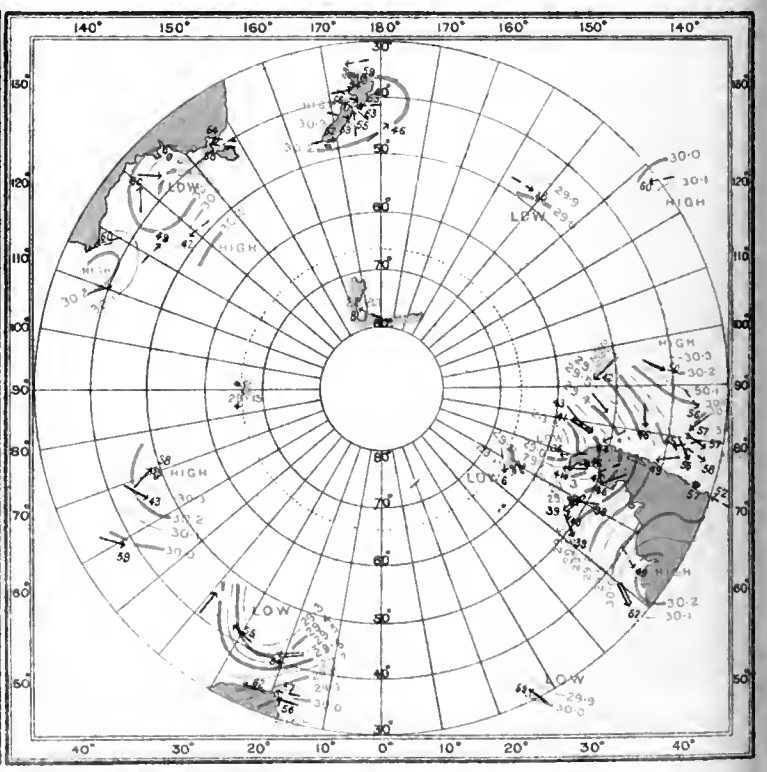

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

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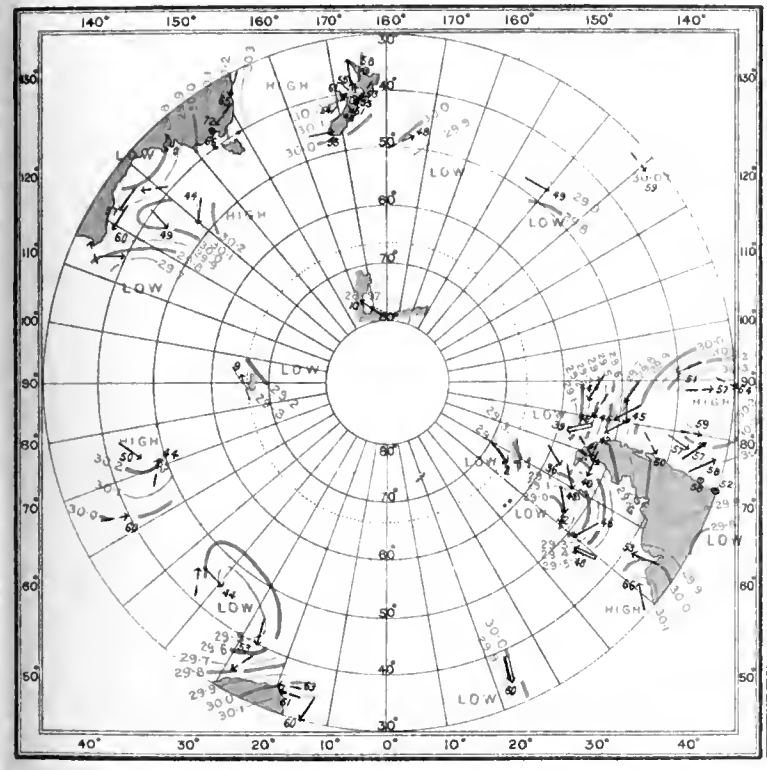

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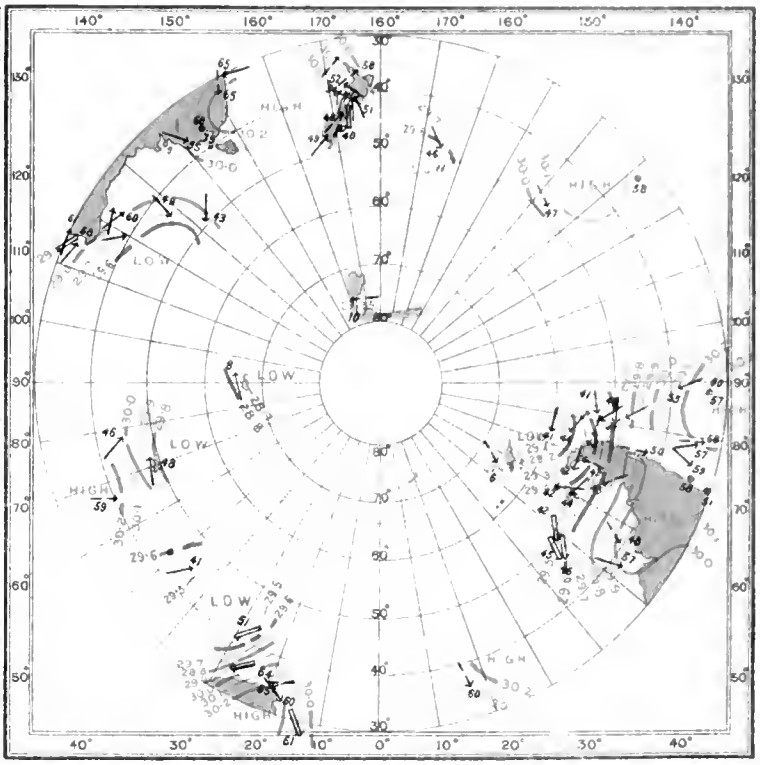

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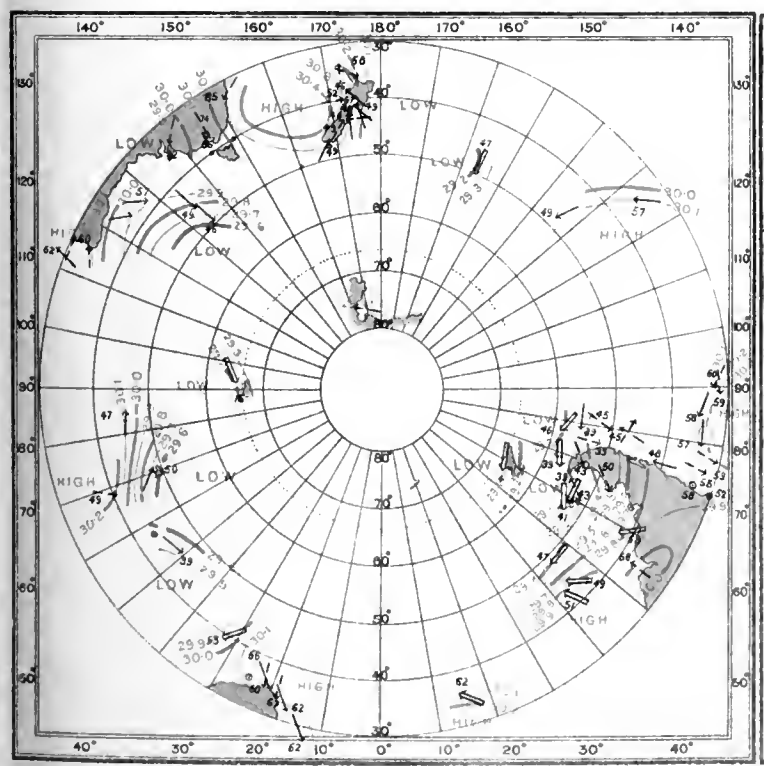

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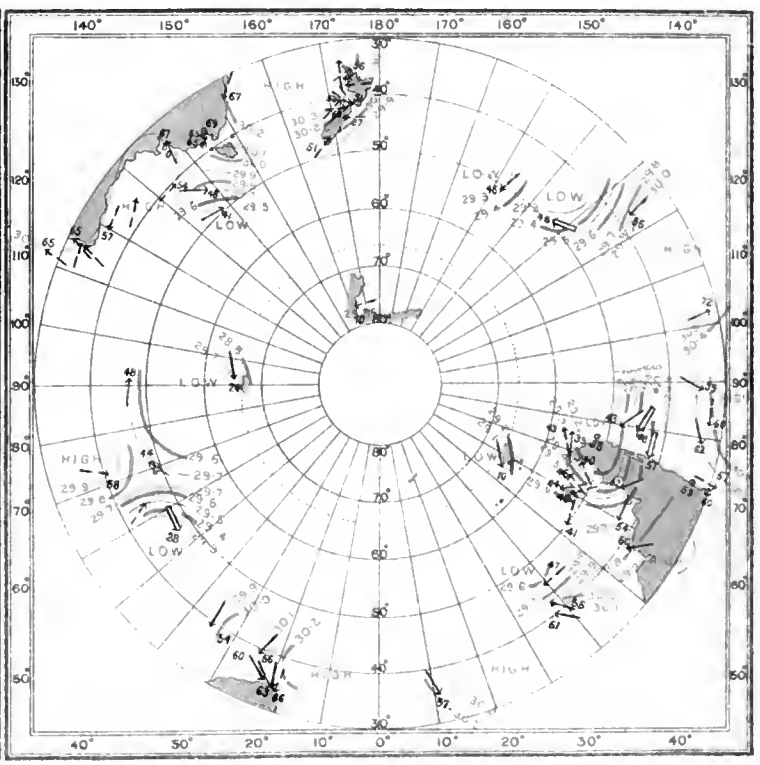

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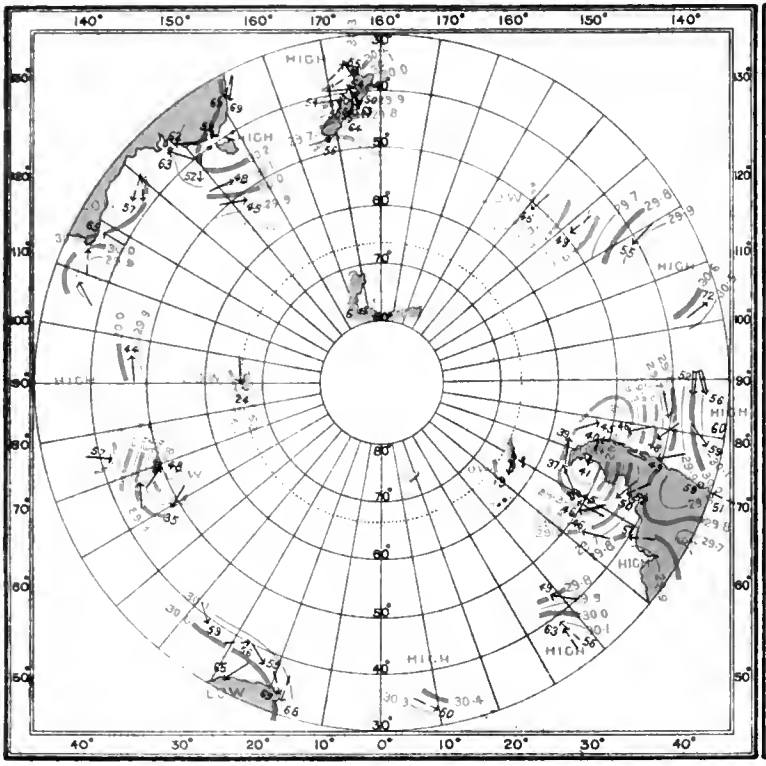
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 NOVEMBER 5



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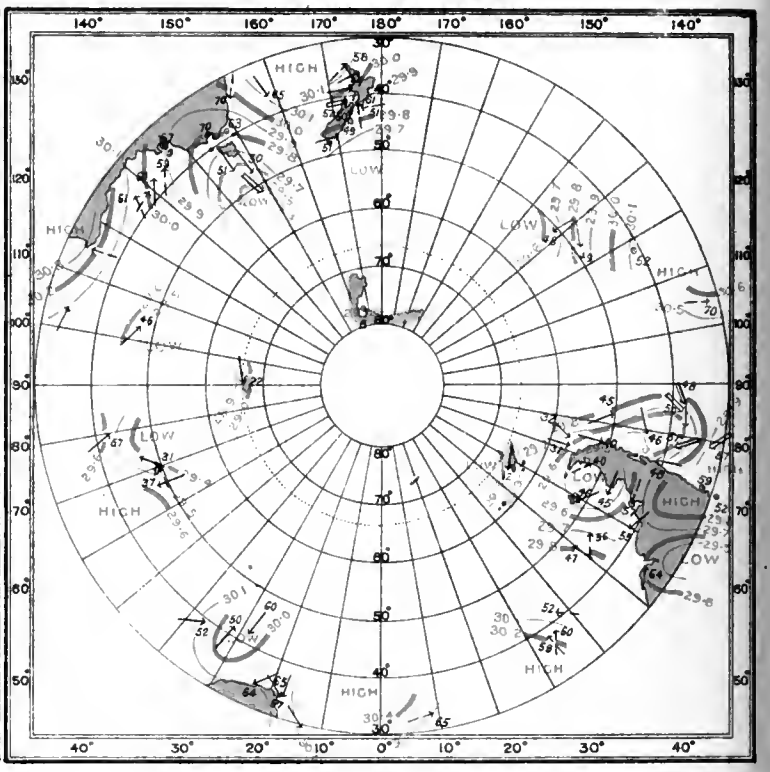

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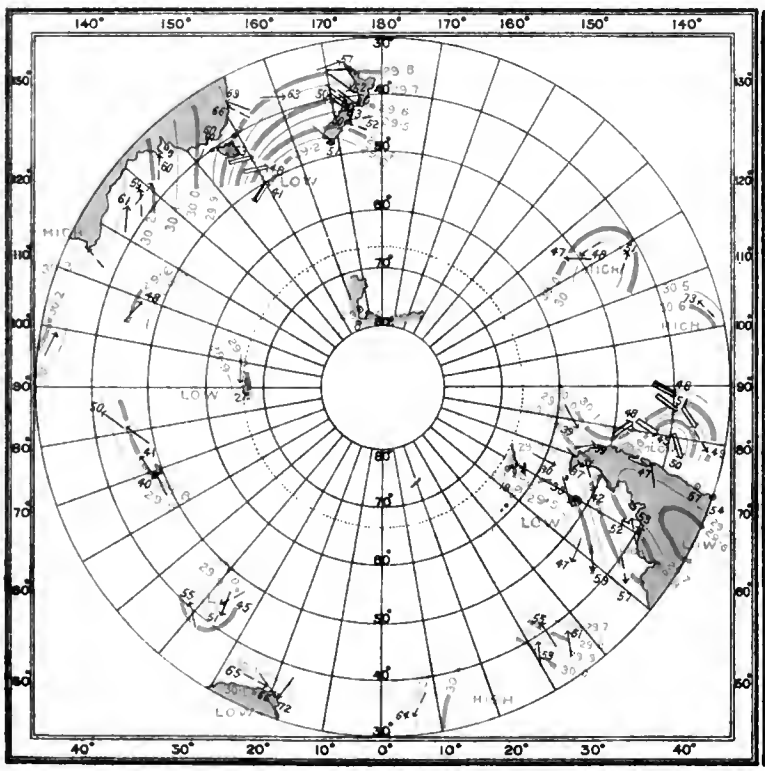

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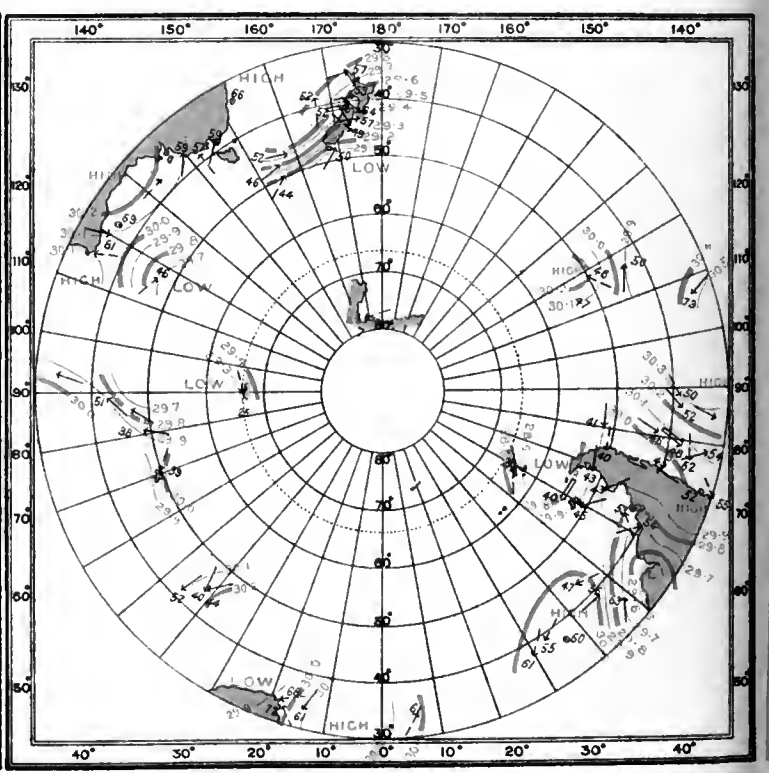


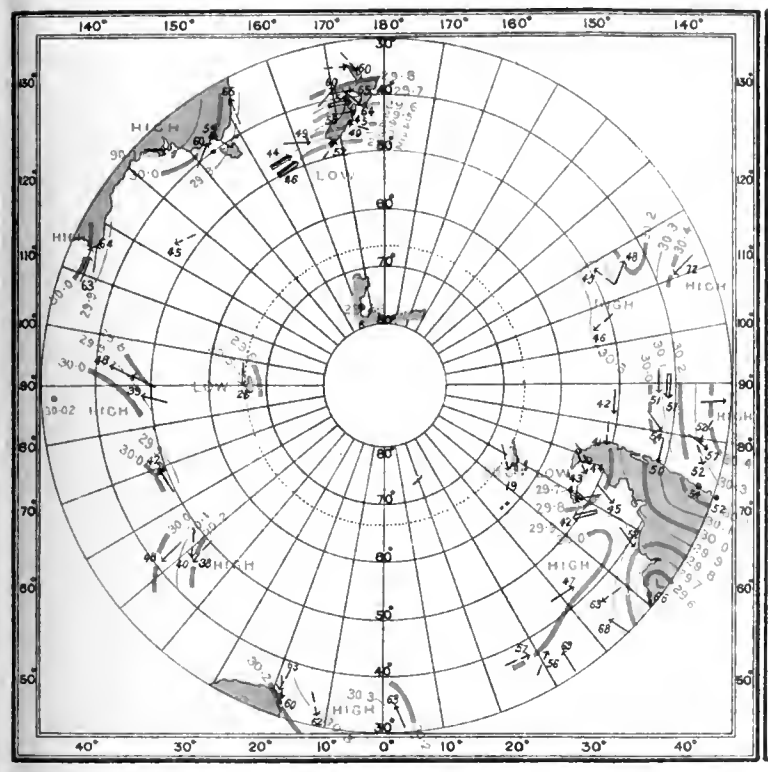
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

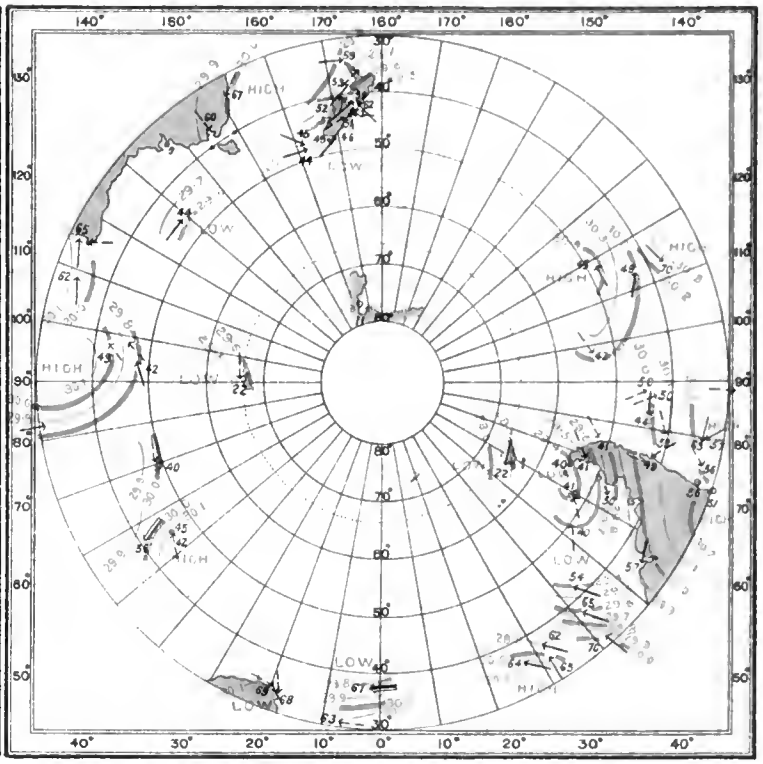
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

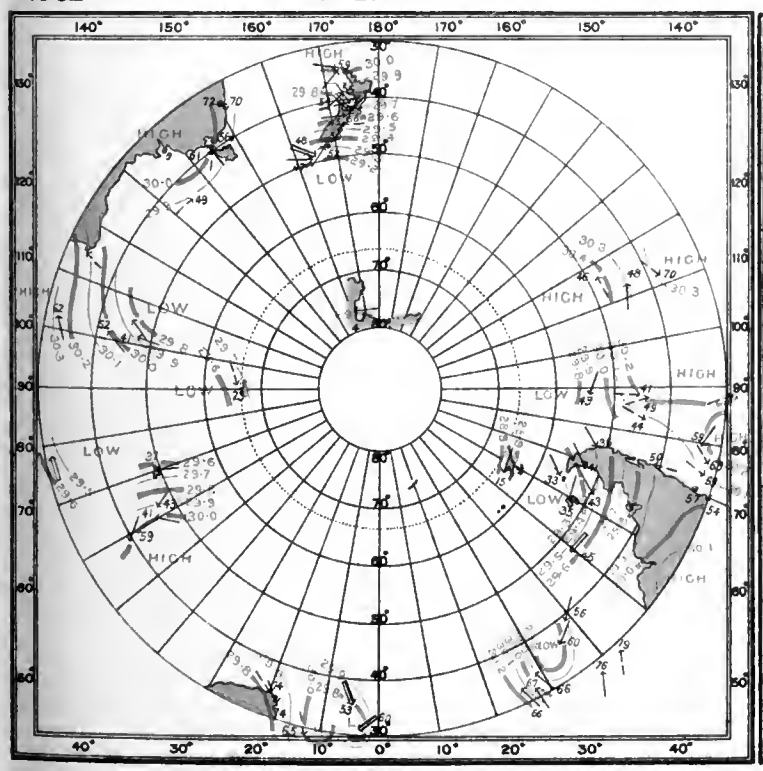
1902 NOVEMBER 9



1902 NOVEMBER 10



1902 NOVEMBER 11



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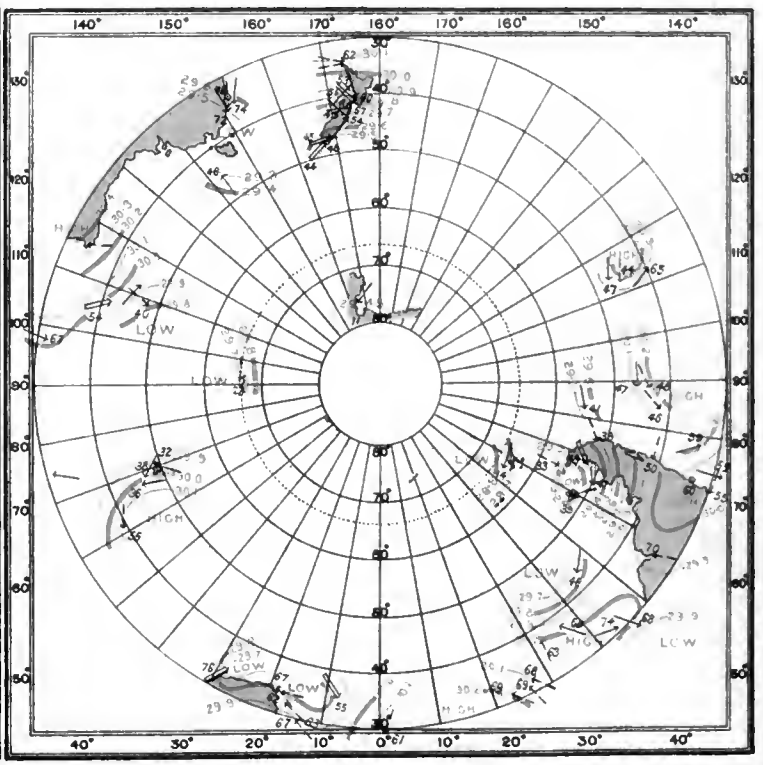

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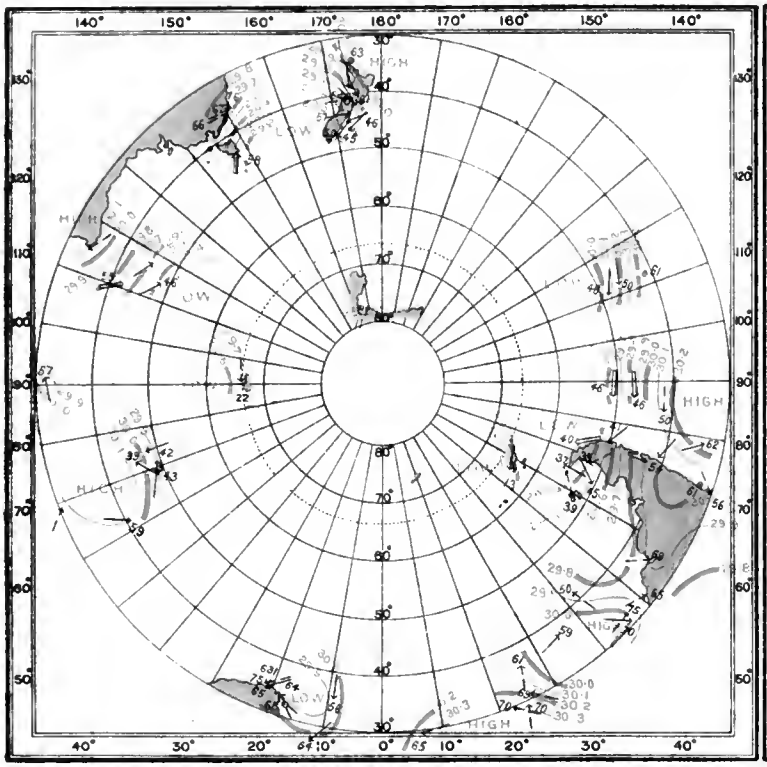
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 NOVEMBER 13



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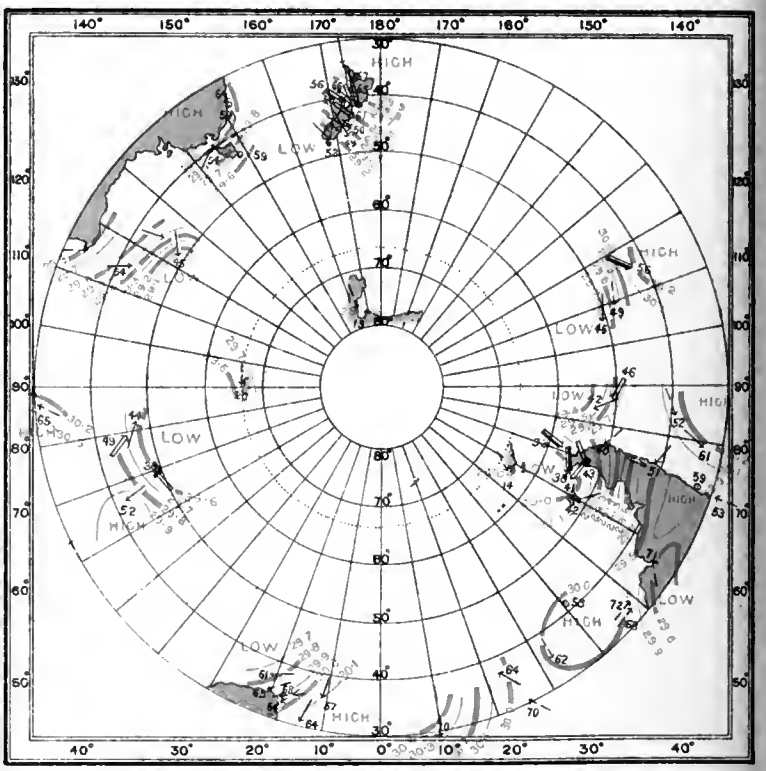

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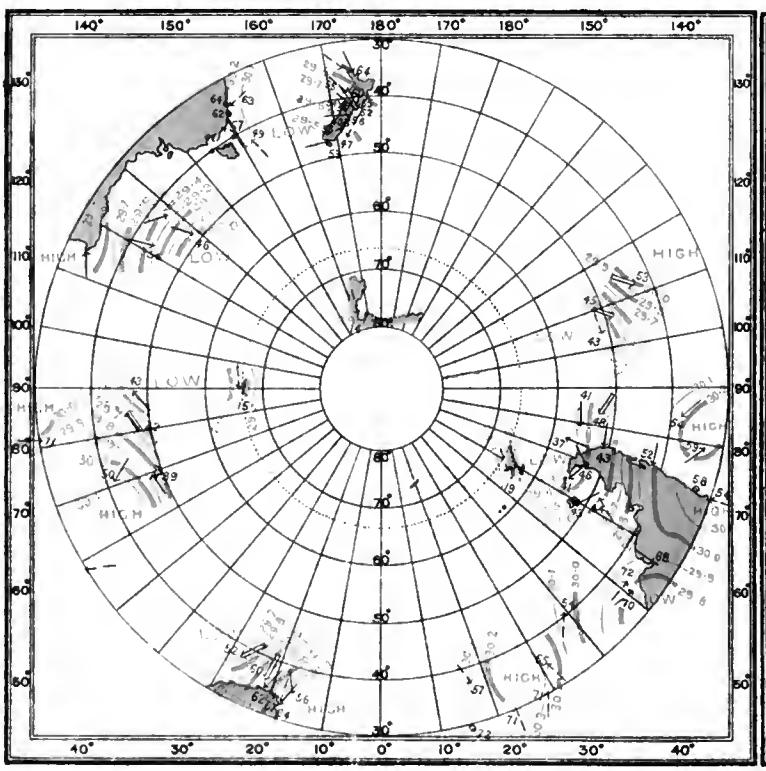

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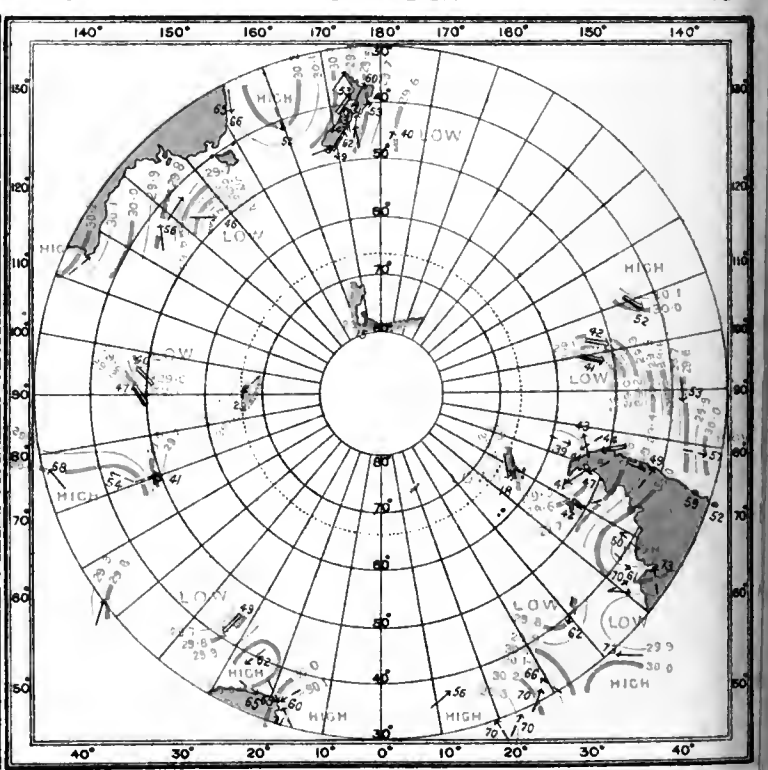


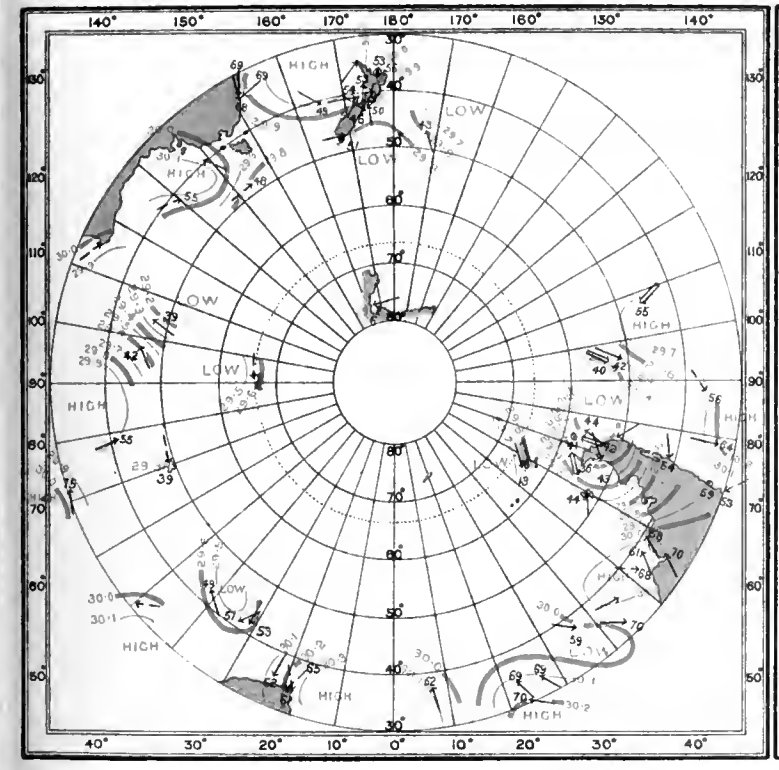
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 NOVEMBER 17



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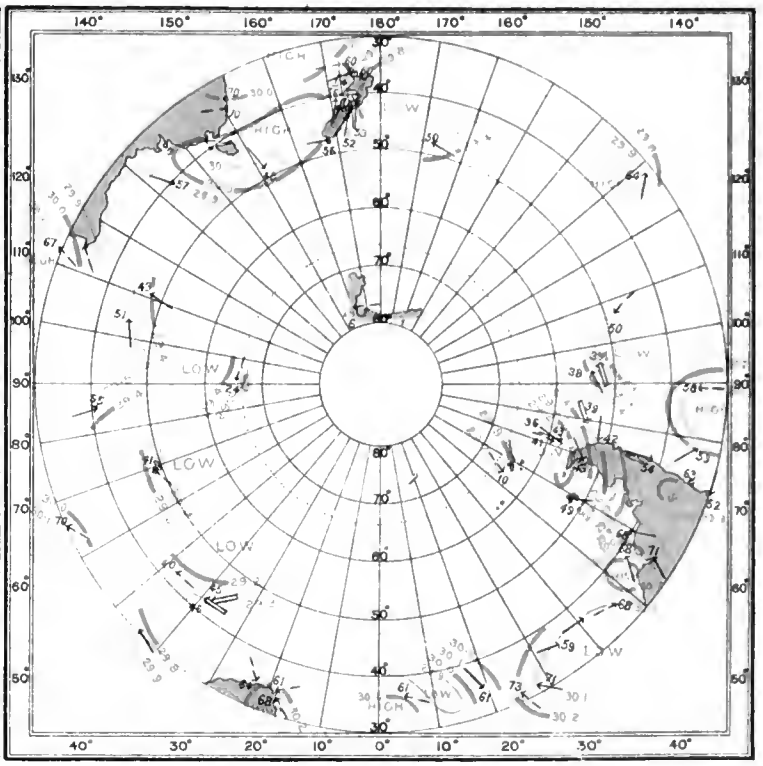

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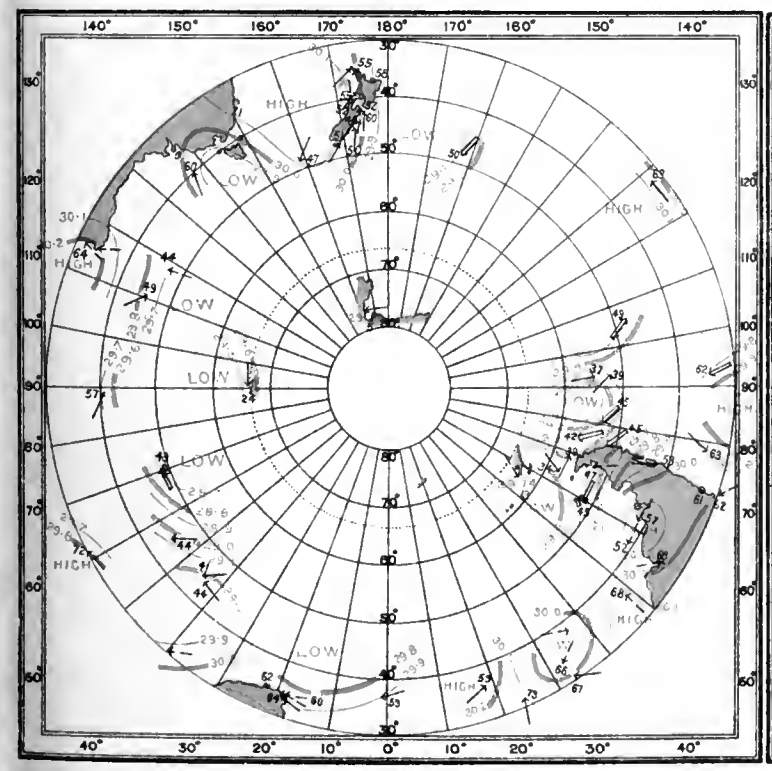

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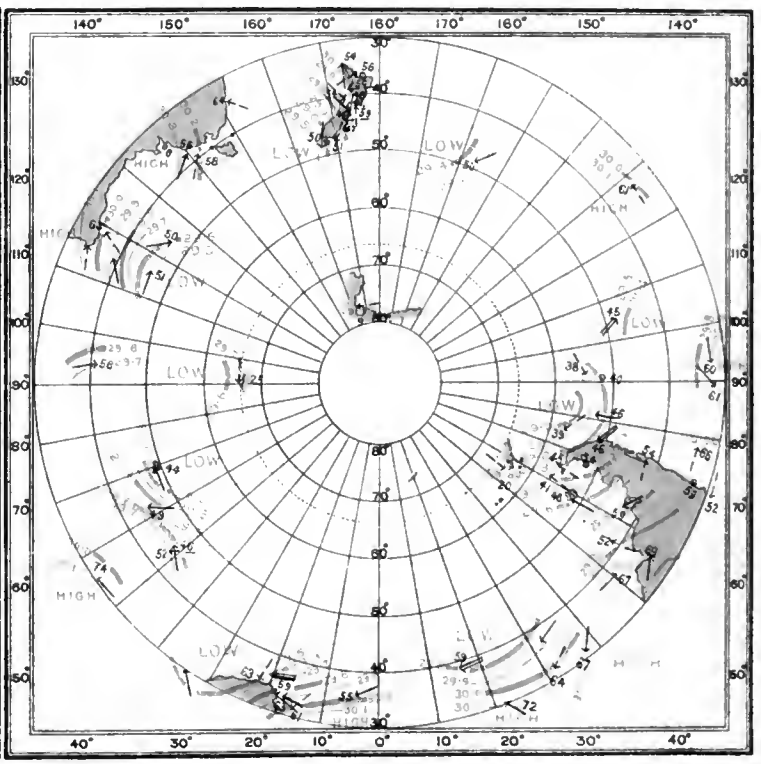

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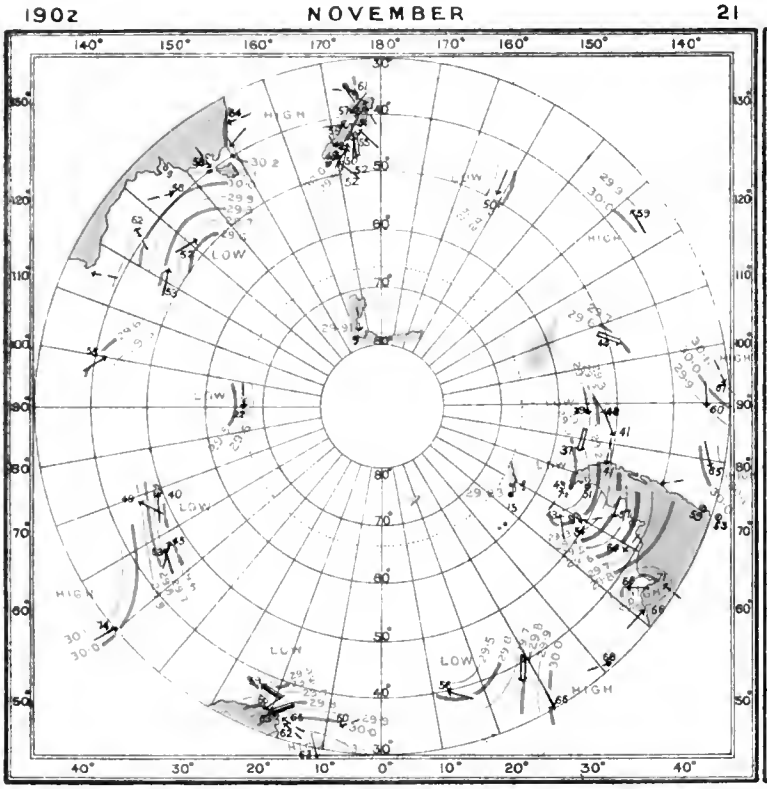
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 NOVEMBER 21



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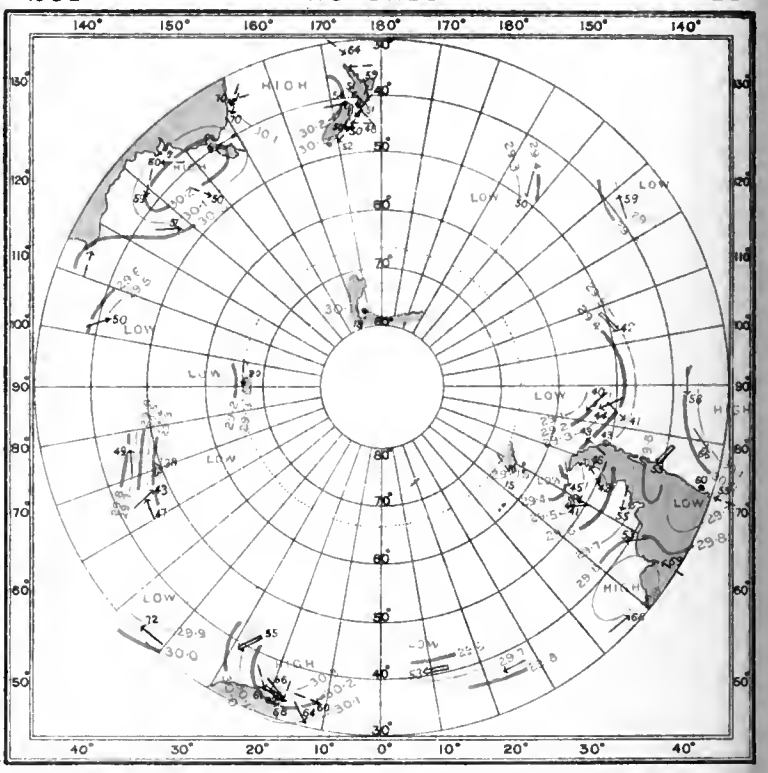

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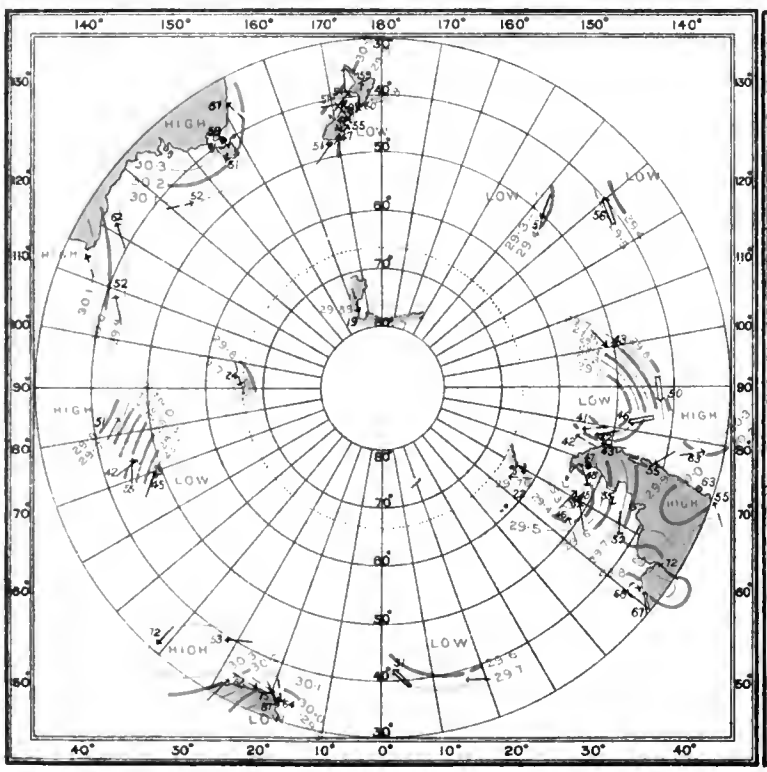

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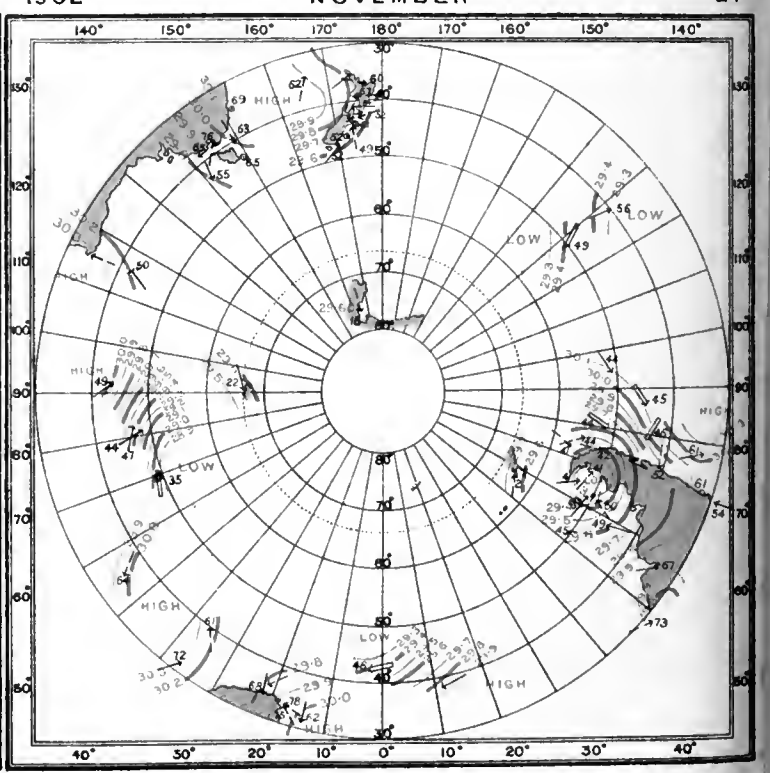


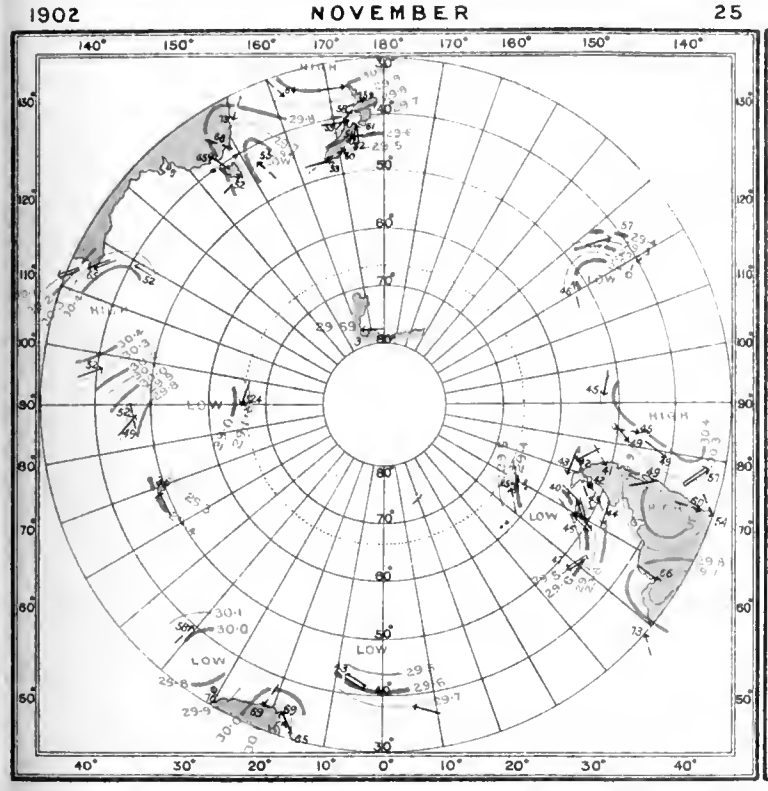
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1902 NOVEMBER 25



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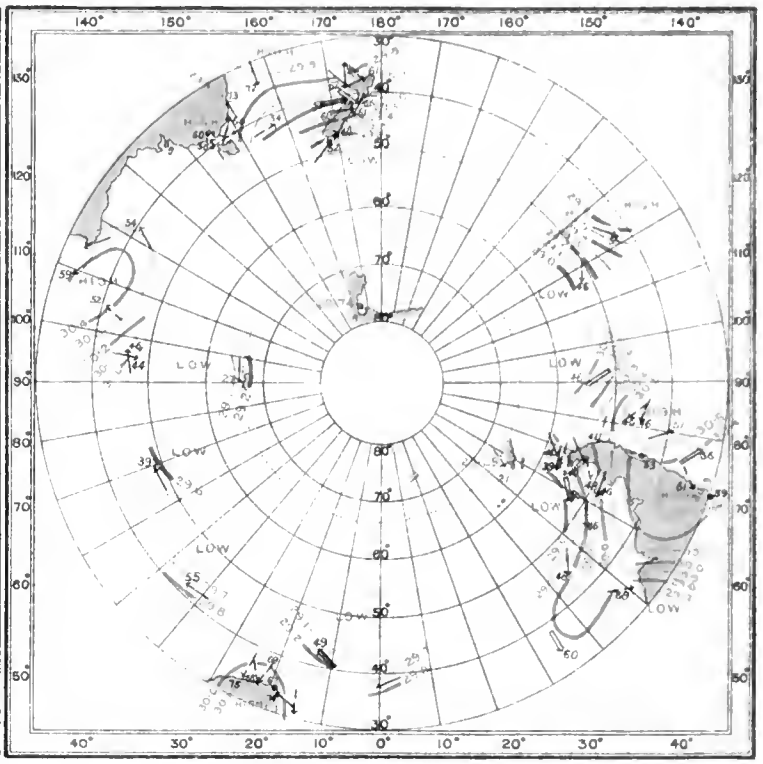

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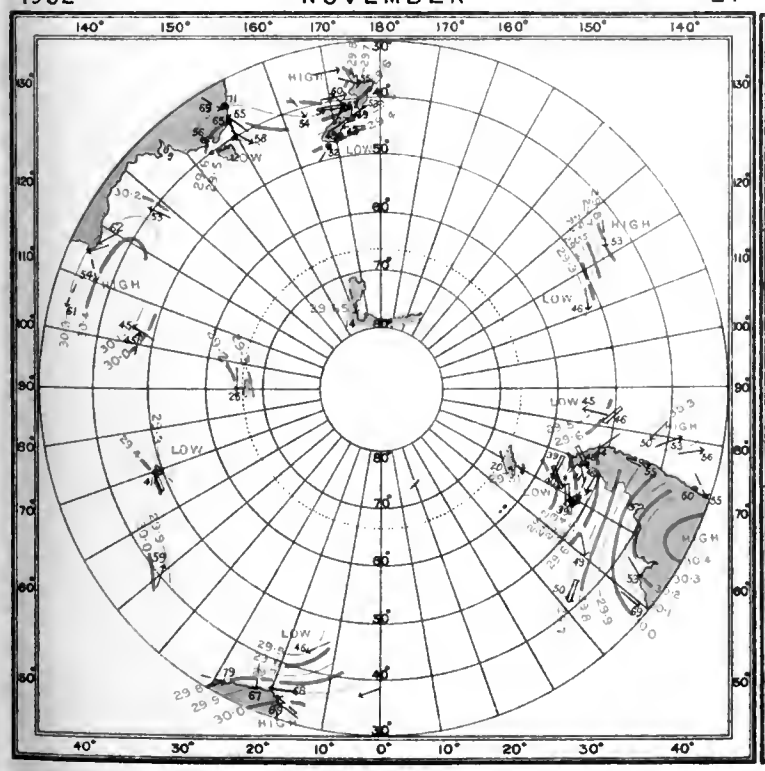

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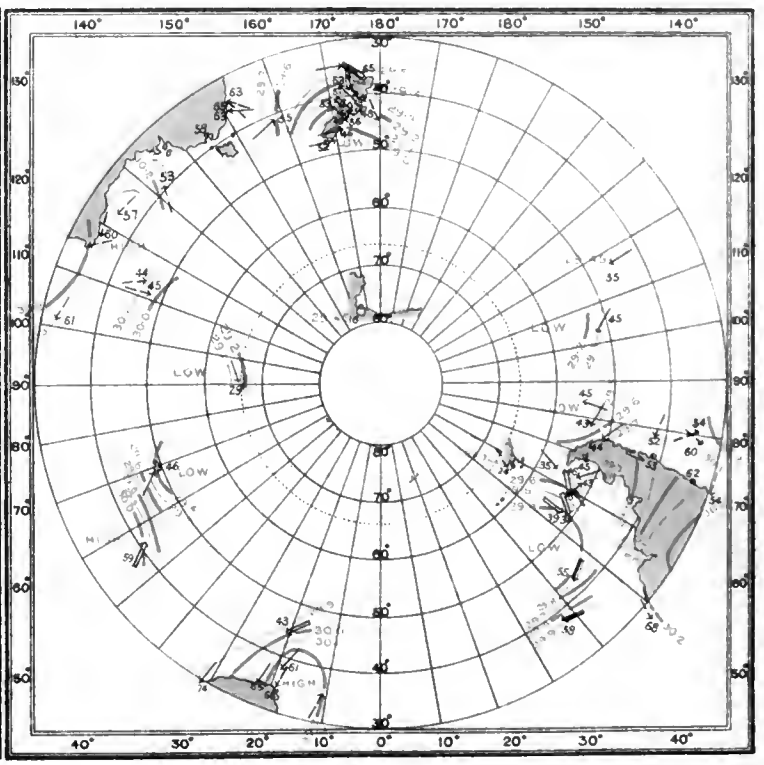

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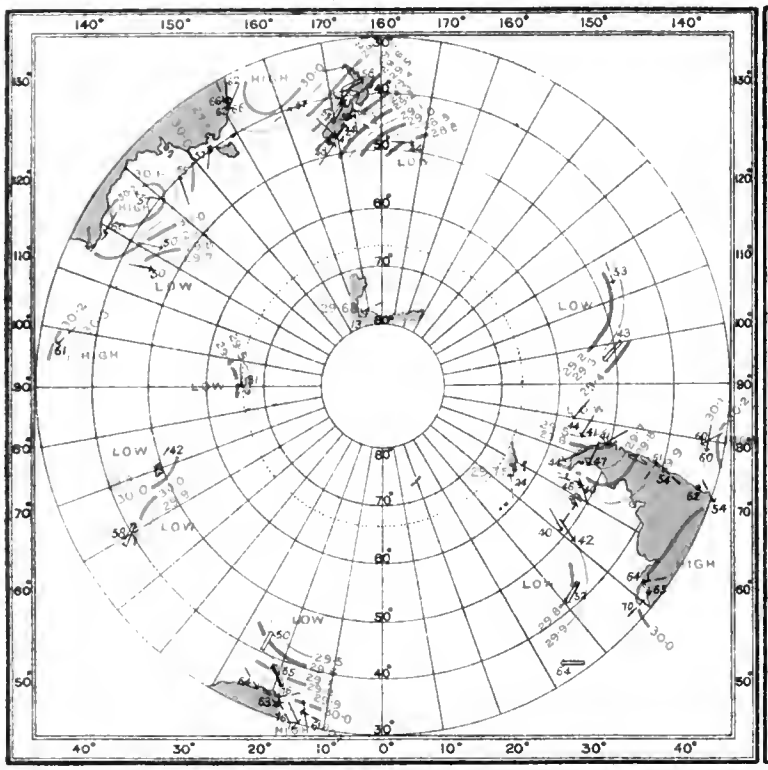
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 NOVEMBER 29



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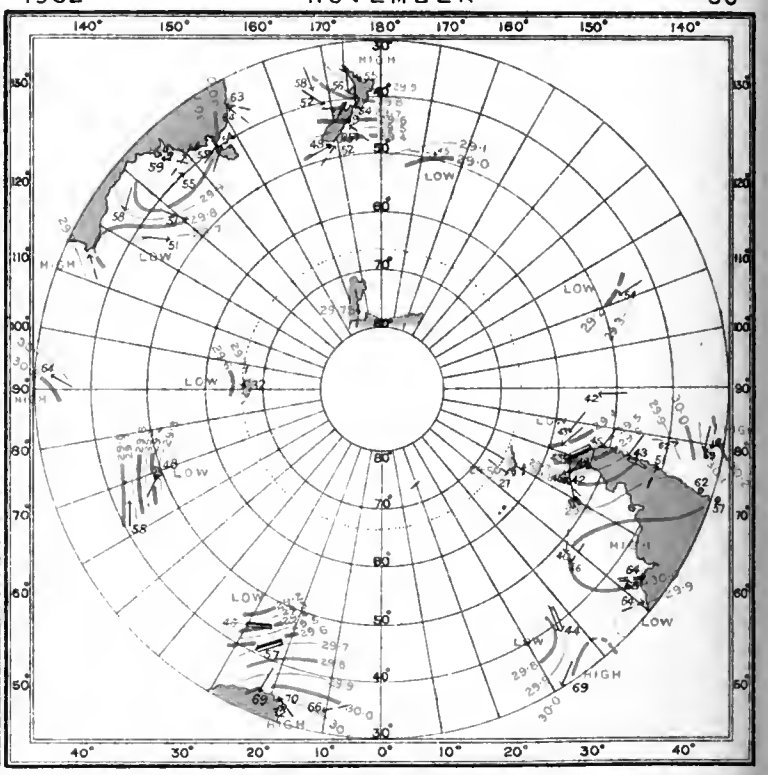
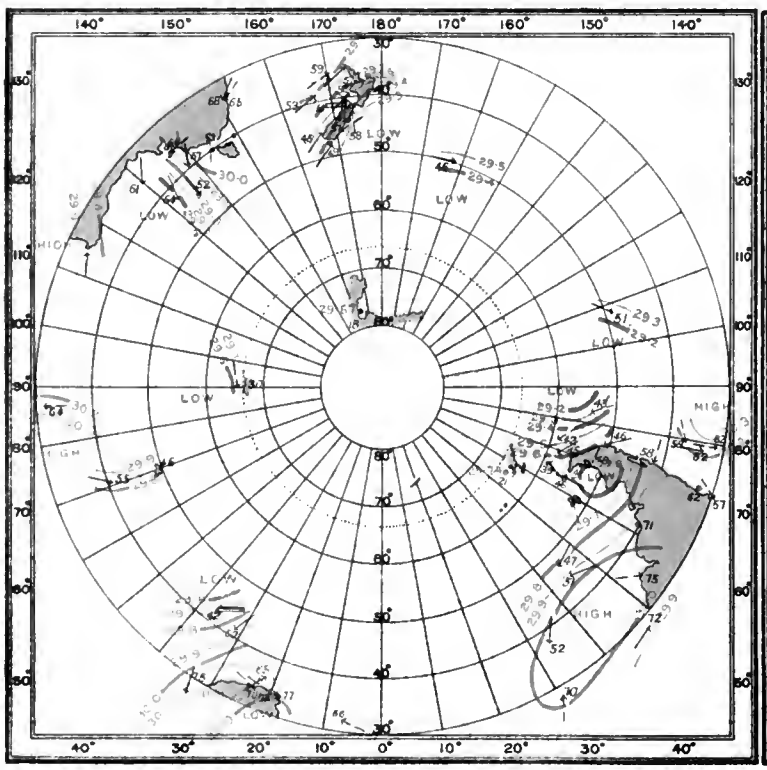


1902 DECEMBER 1



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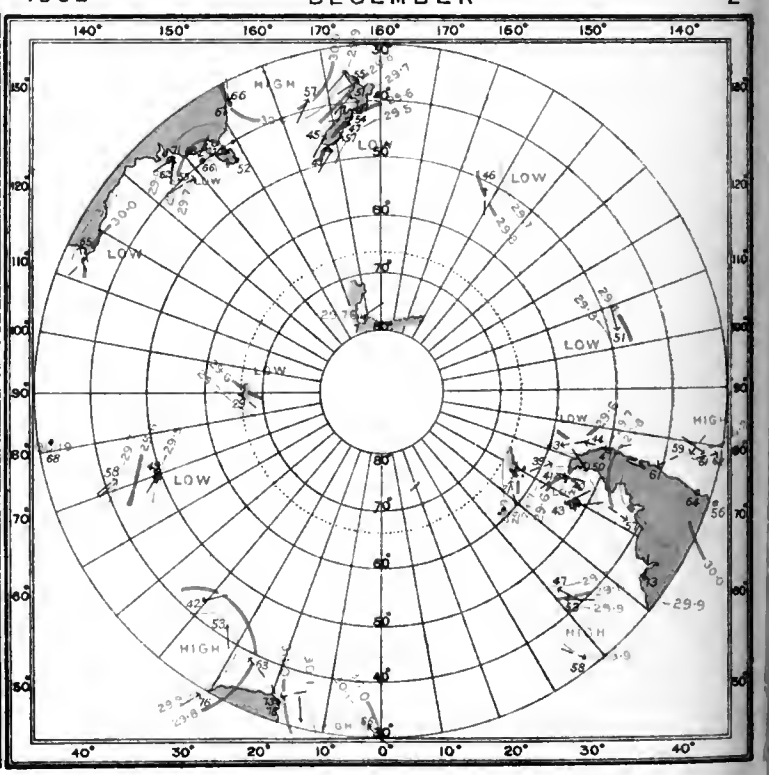
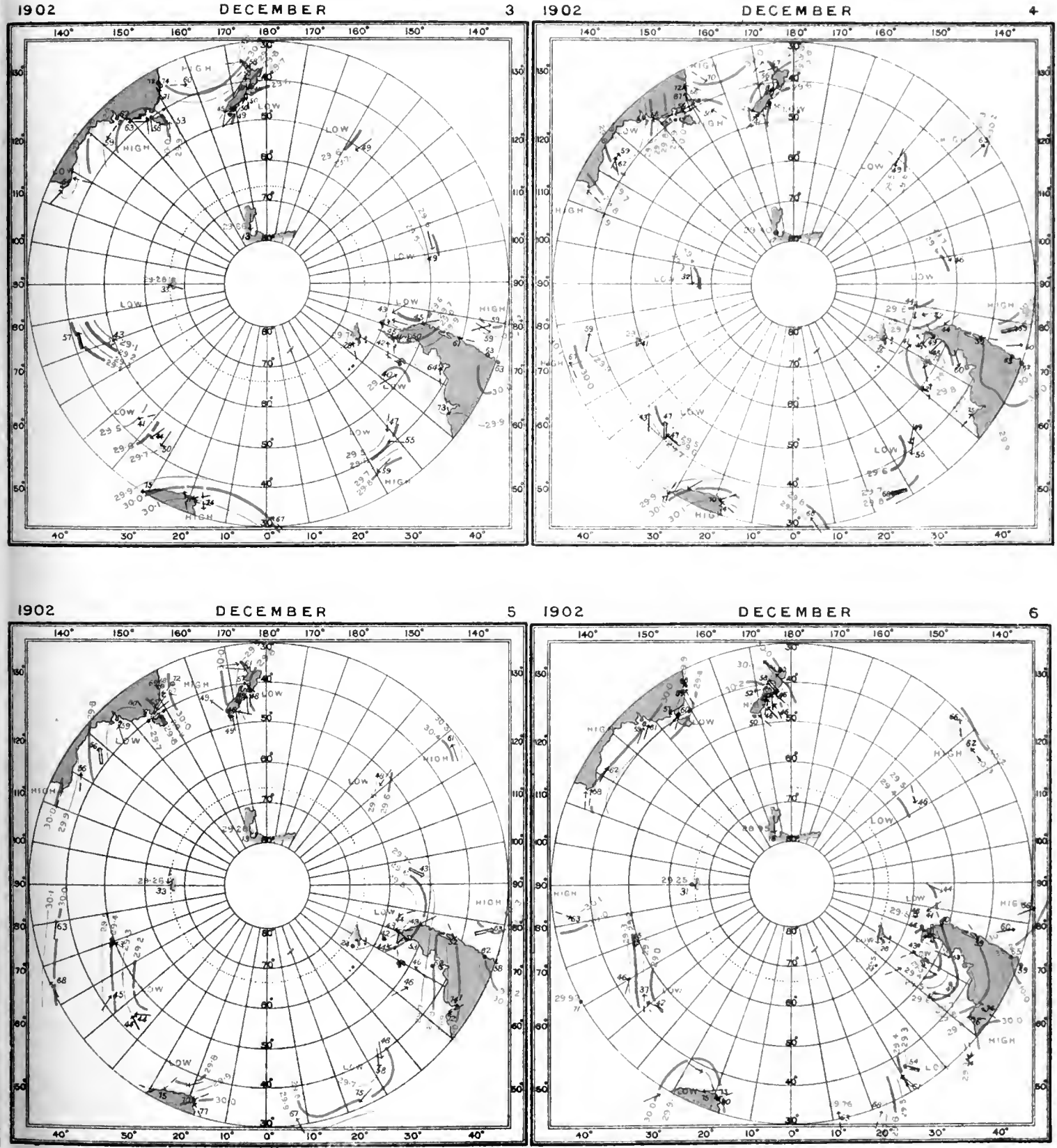


For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.



Huth, London.

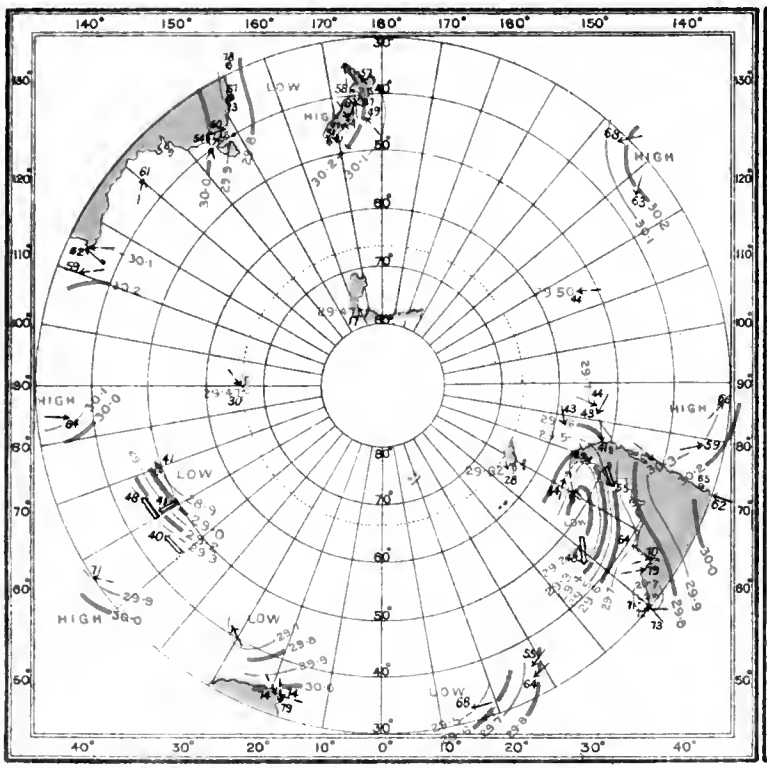
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 DECEMBER 7



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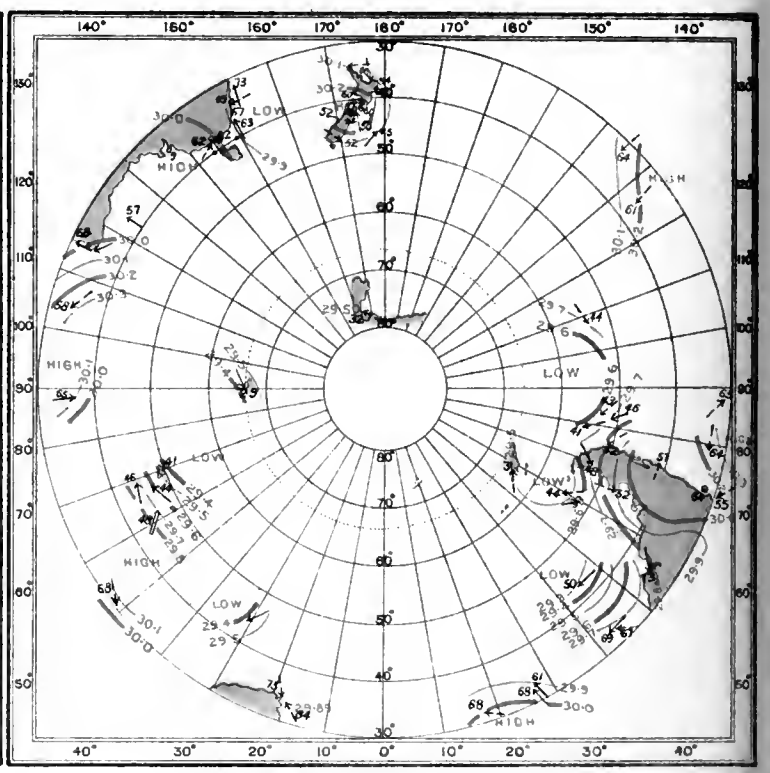

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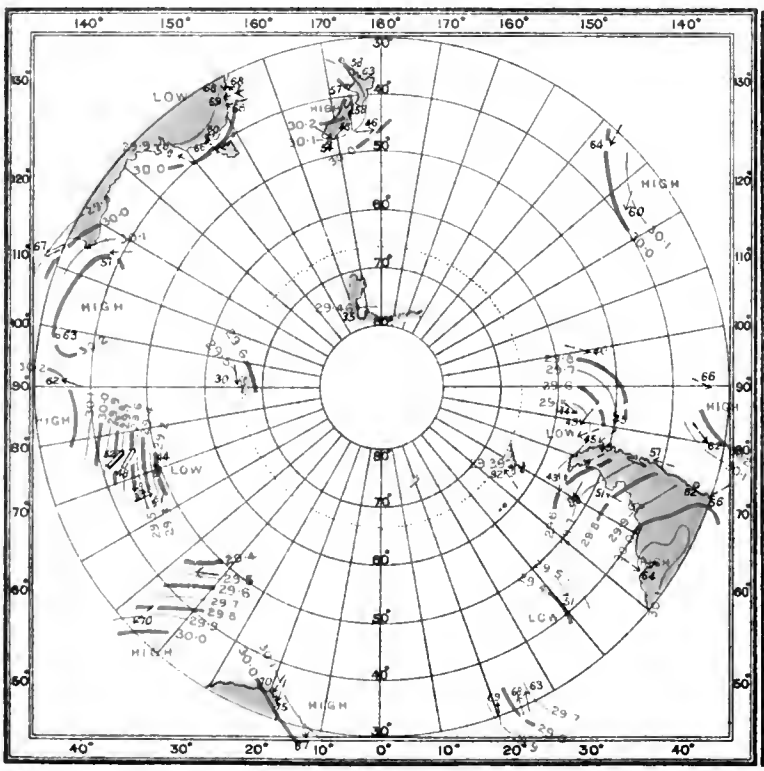

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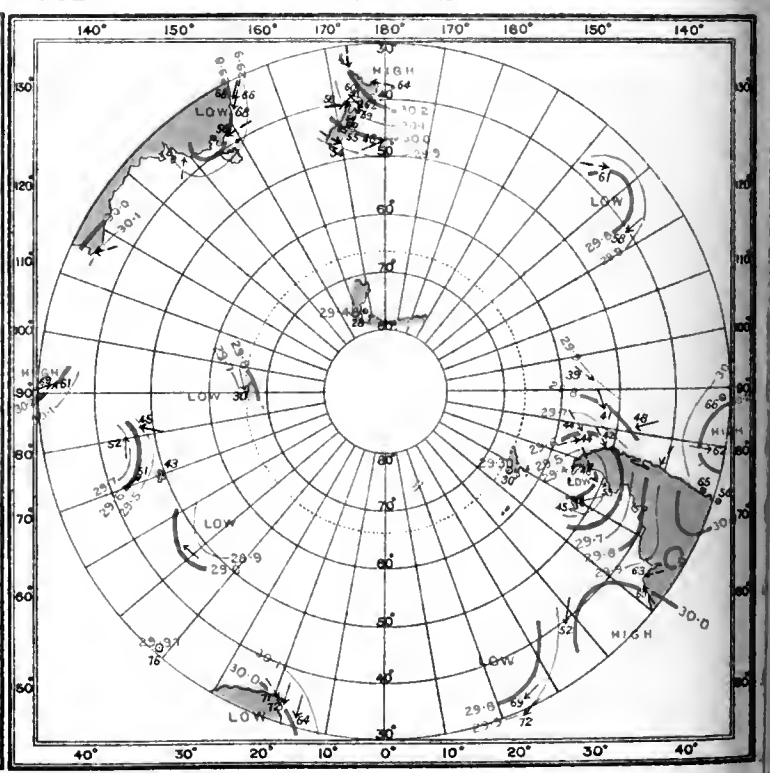


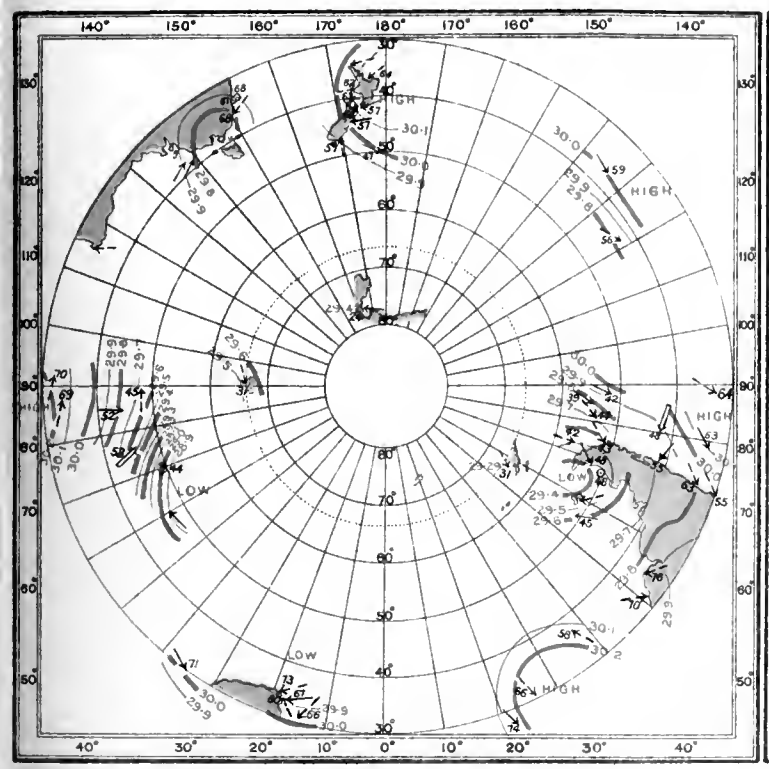
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 DECEMBER 11



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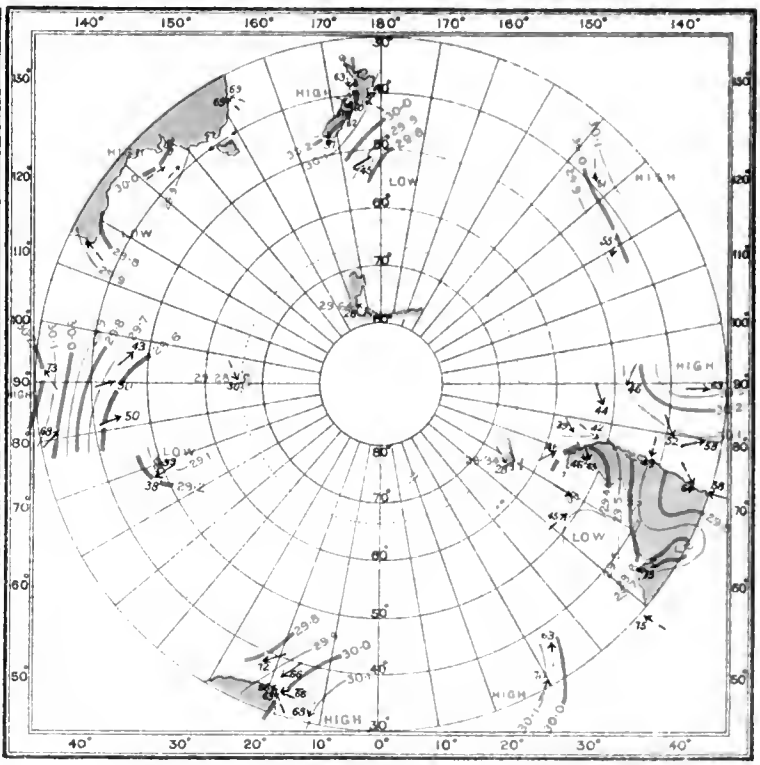

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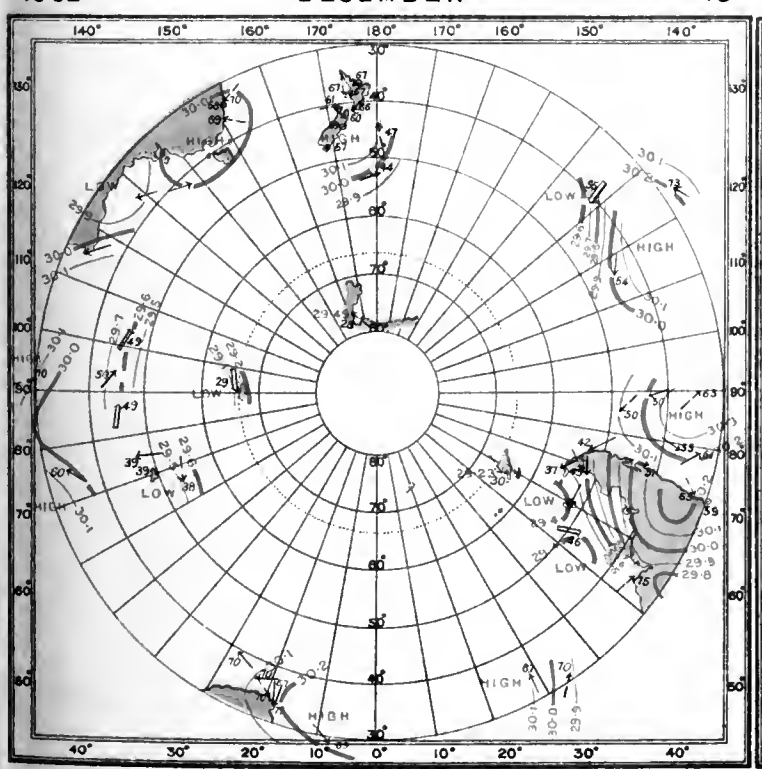

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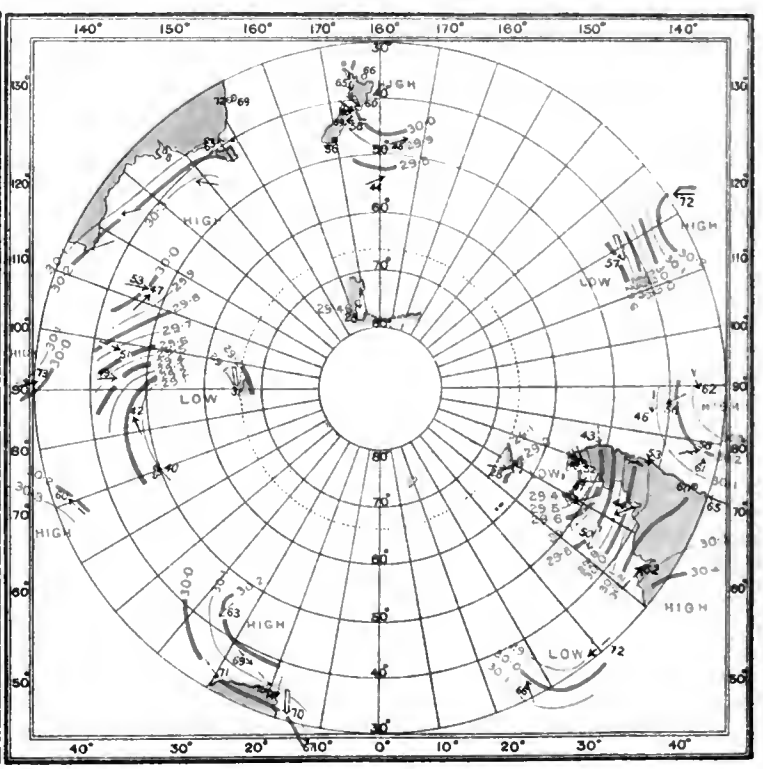

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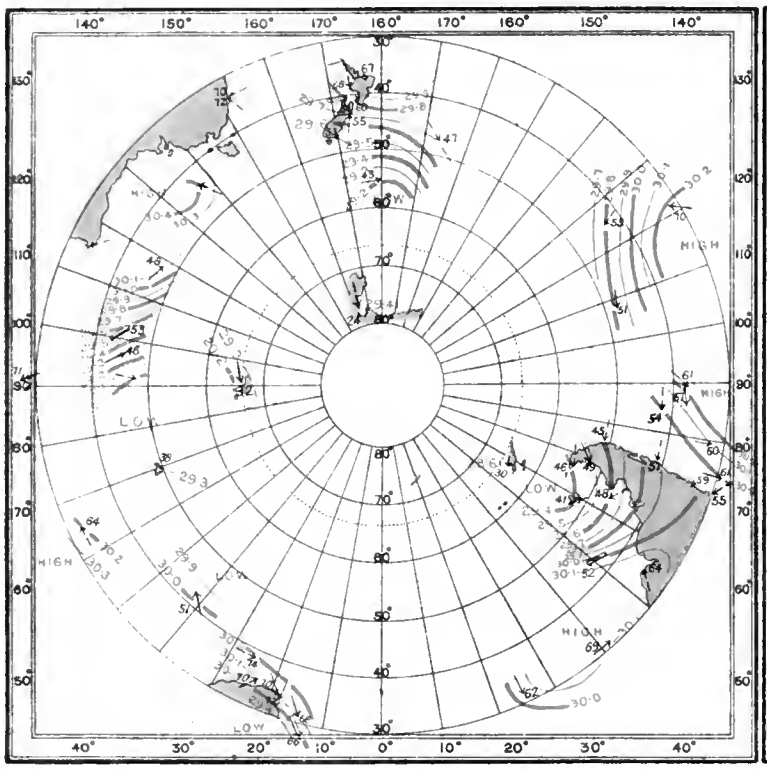
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 DECEMBER 15



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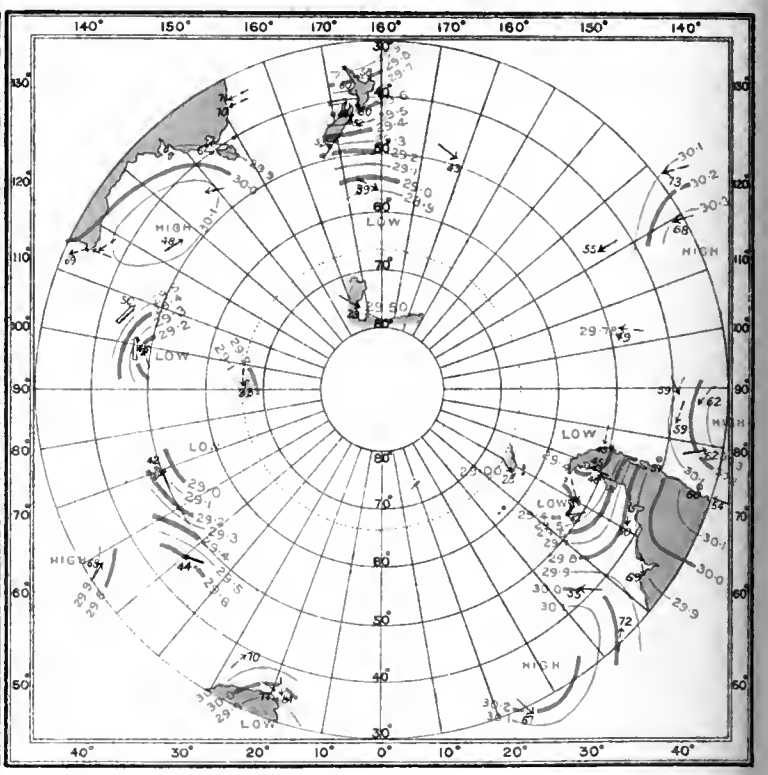

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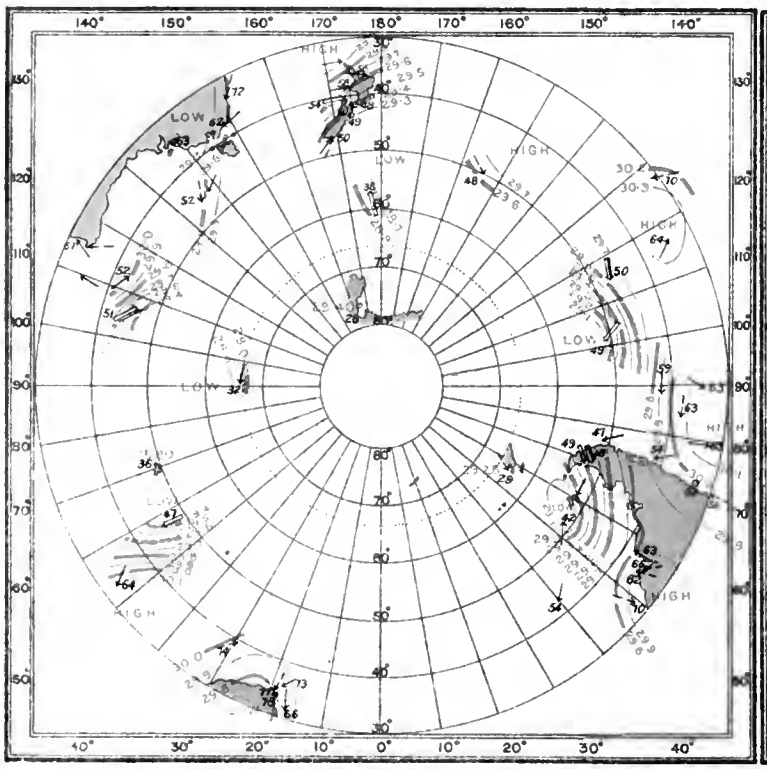

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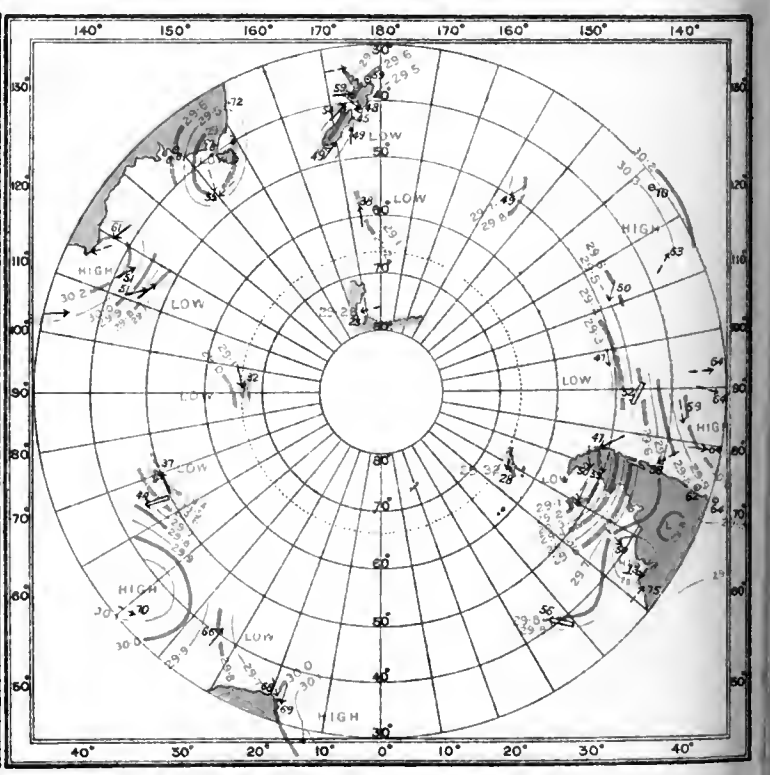


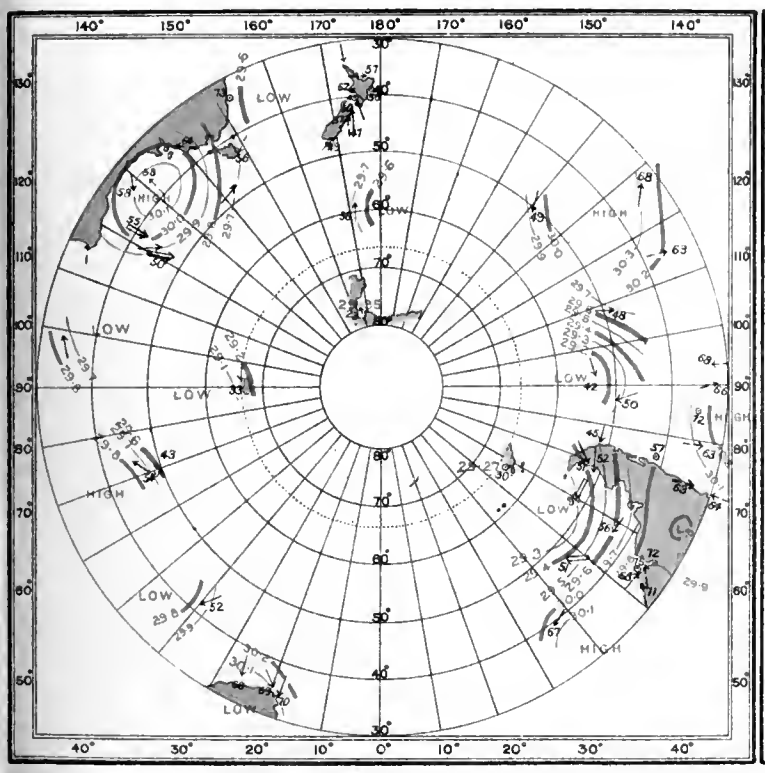
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 DECEMBER 19



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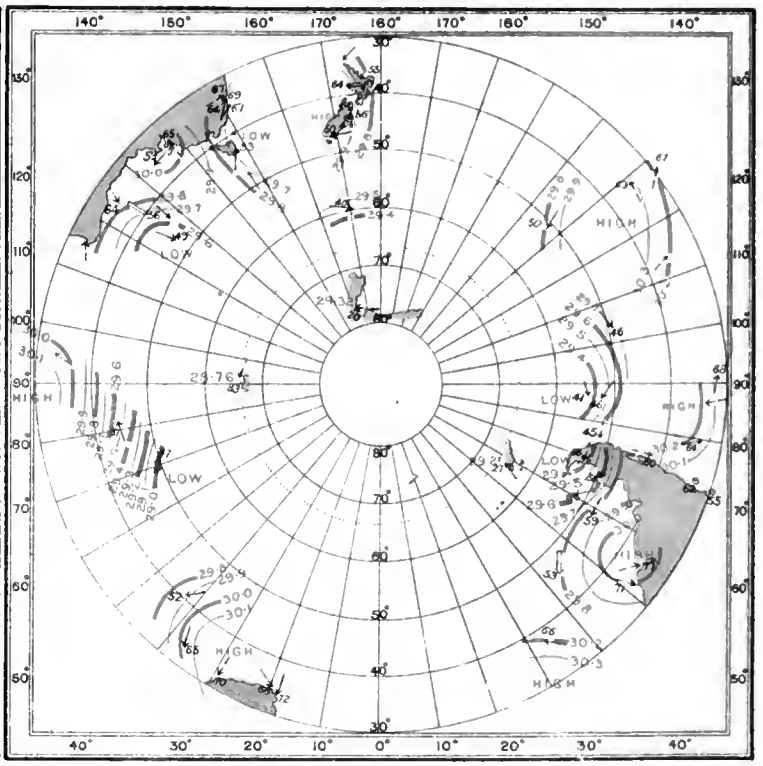

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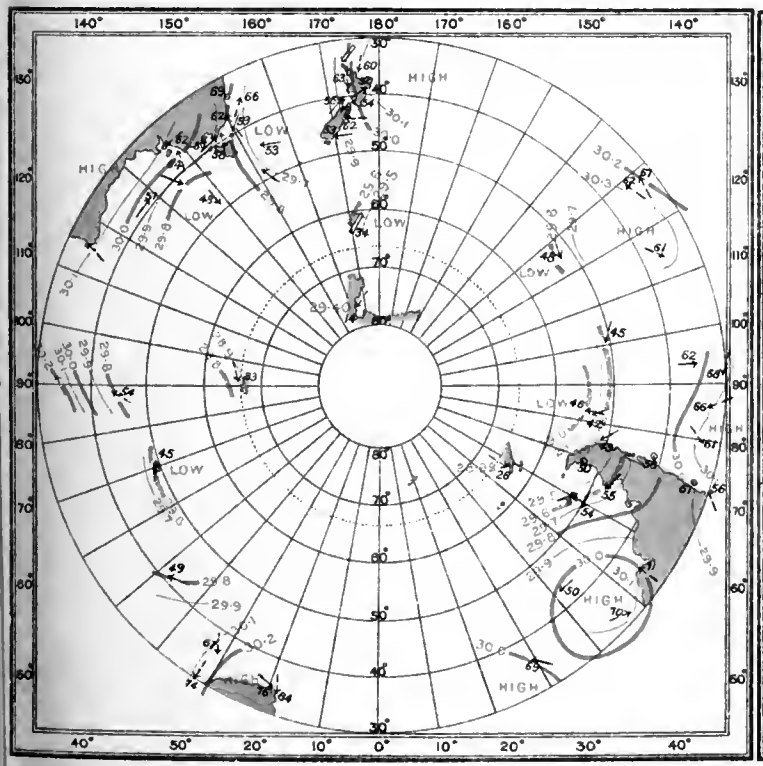

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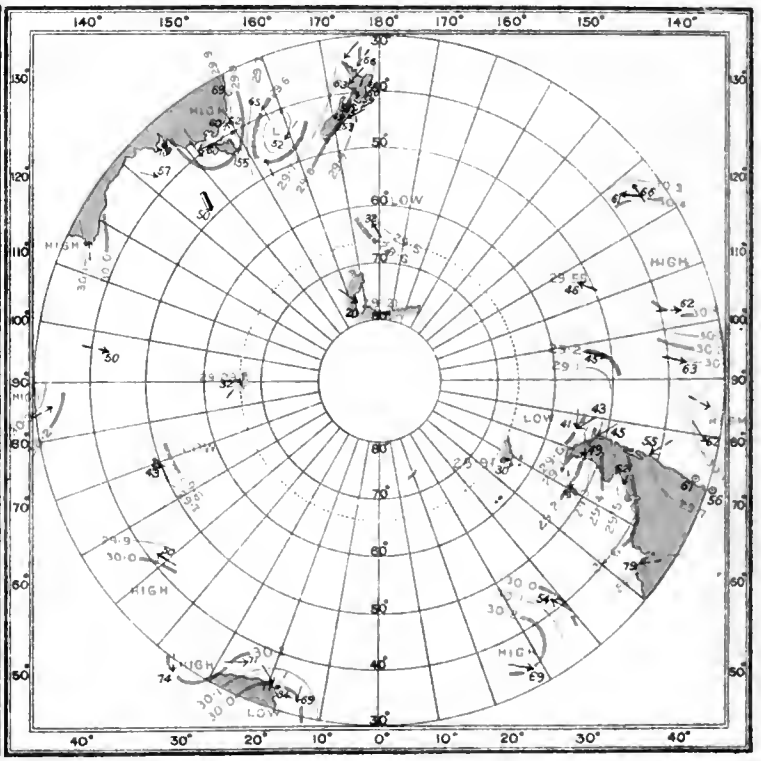

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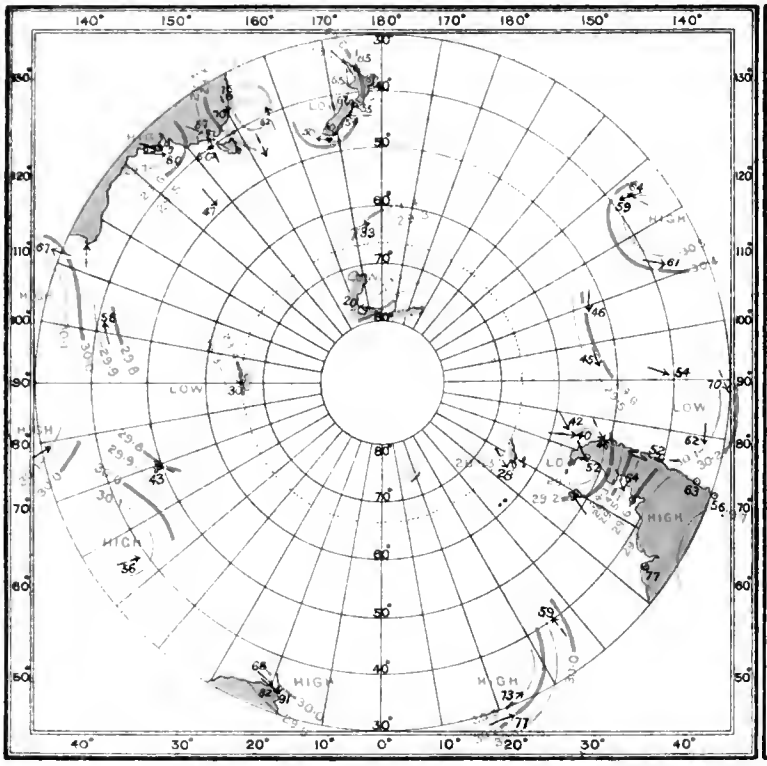
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 DECEMBER 23



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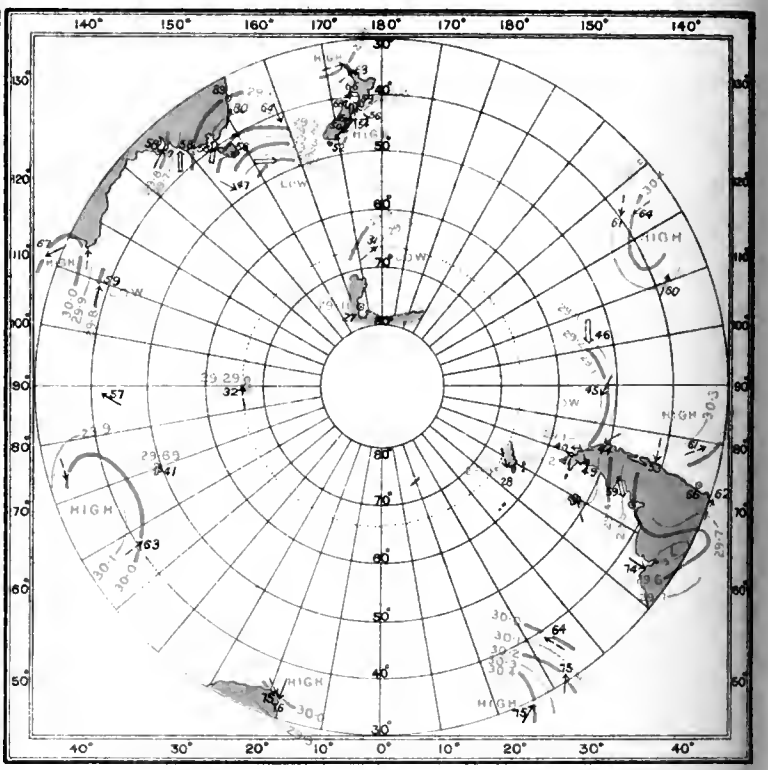

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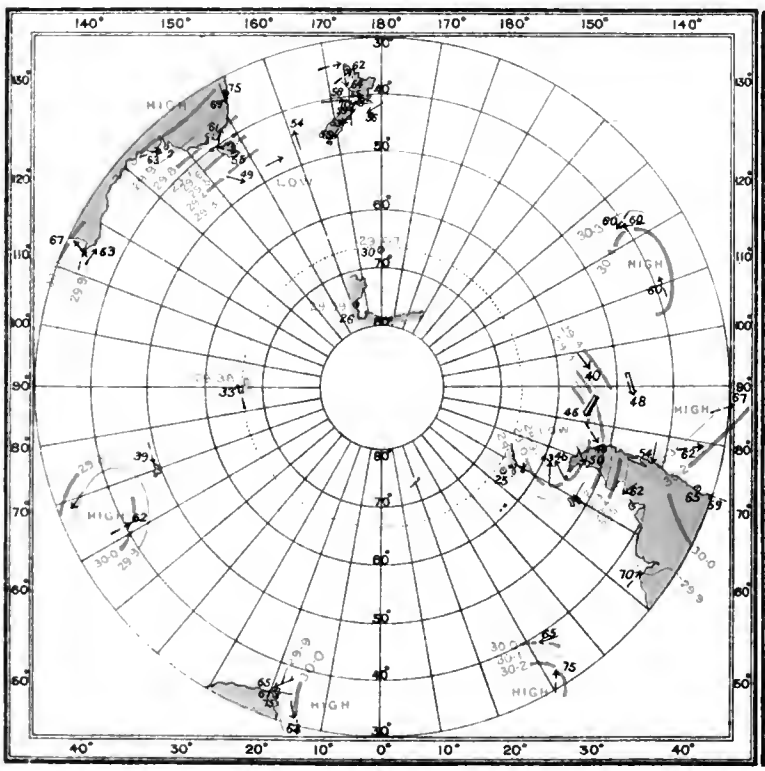

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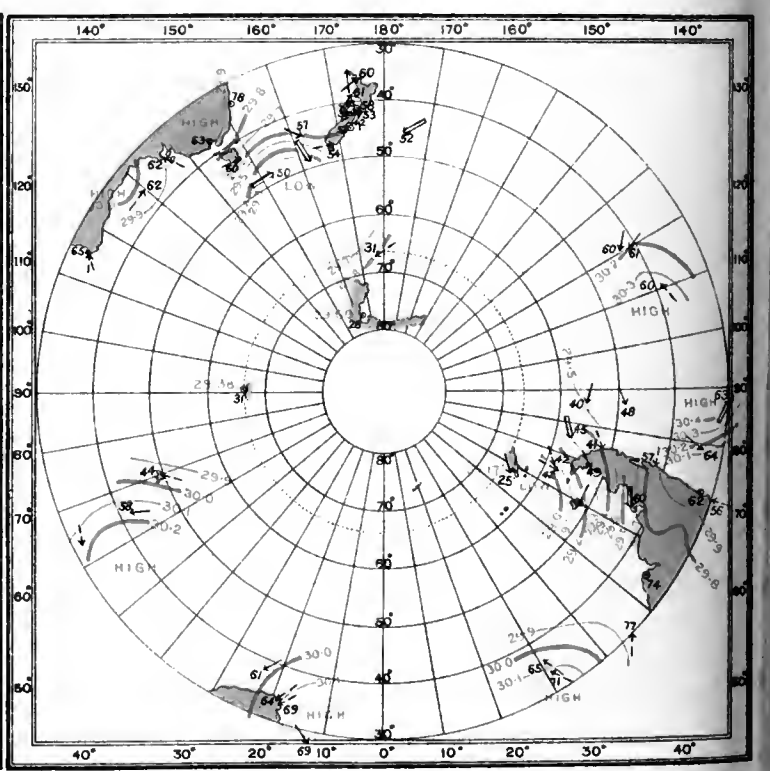


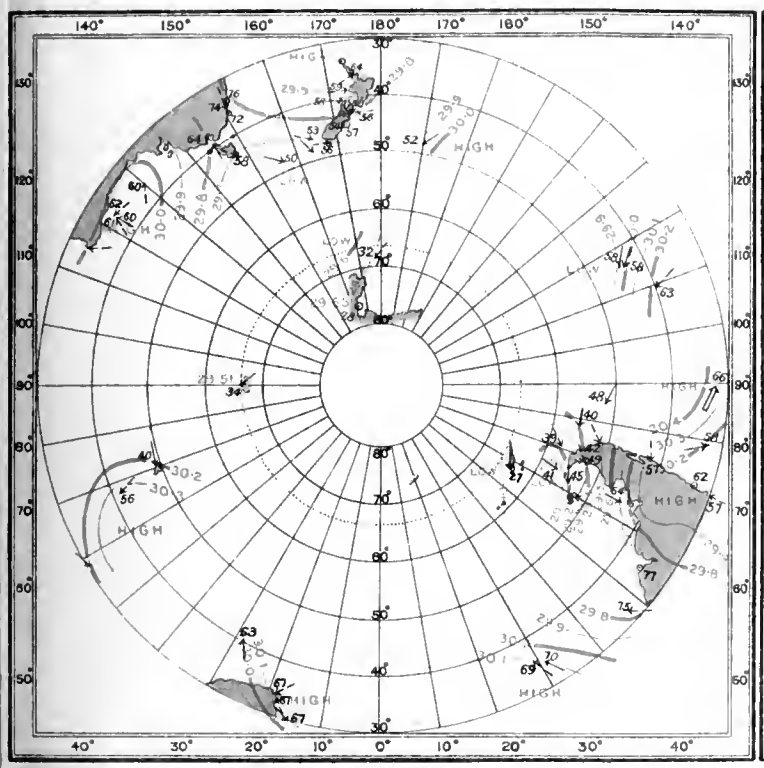
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1902 DECEMBER 27



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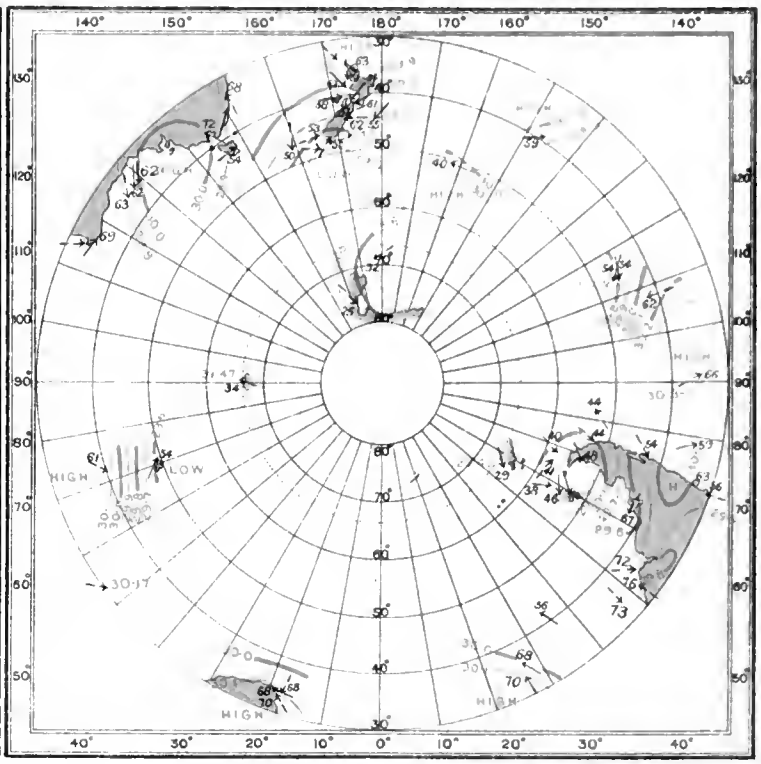

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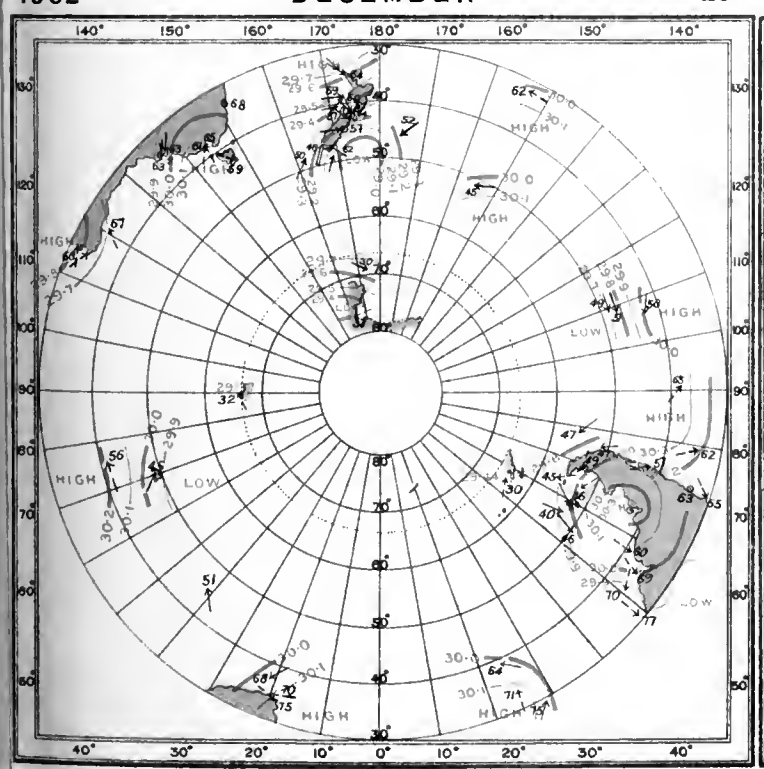
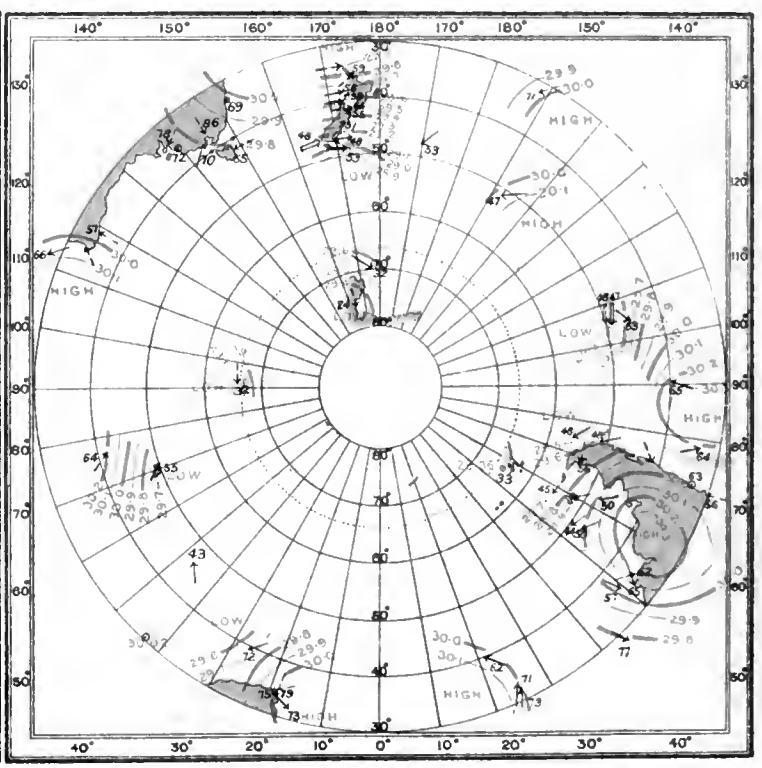


1902 DECEMBER 30



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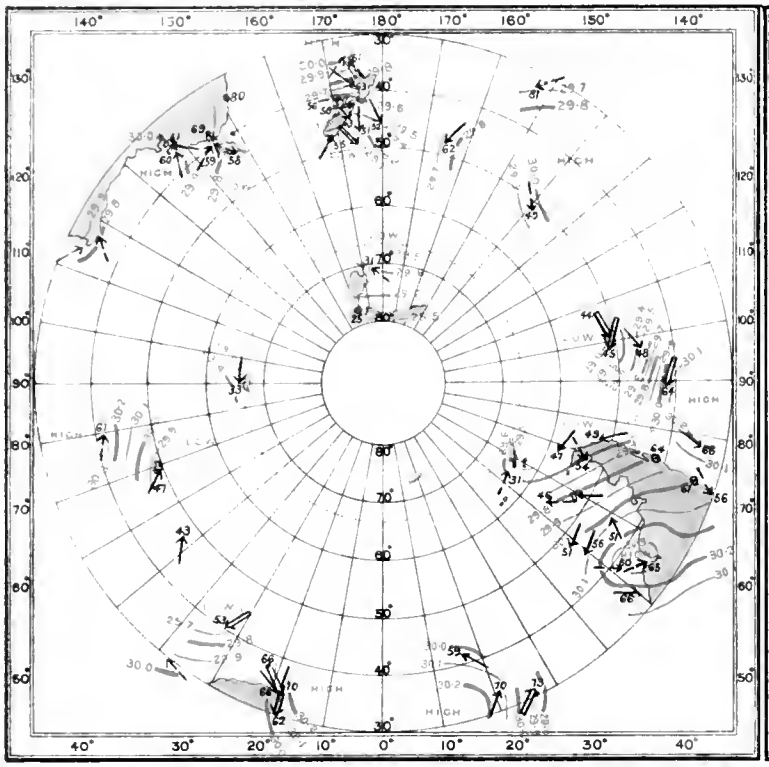
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

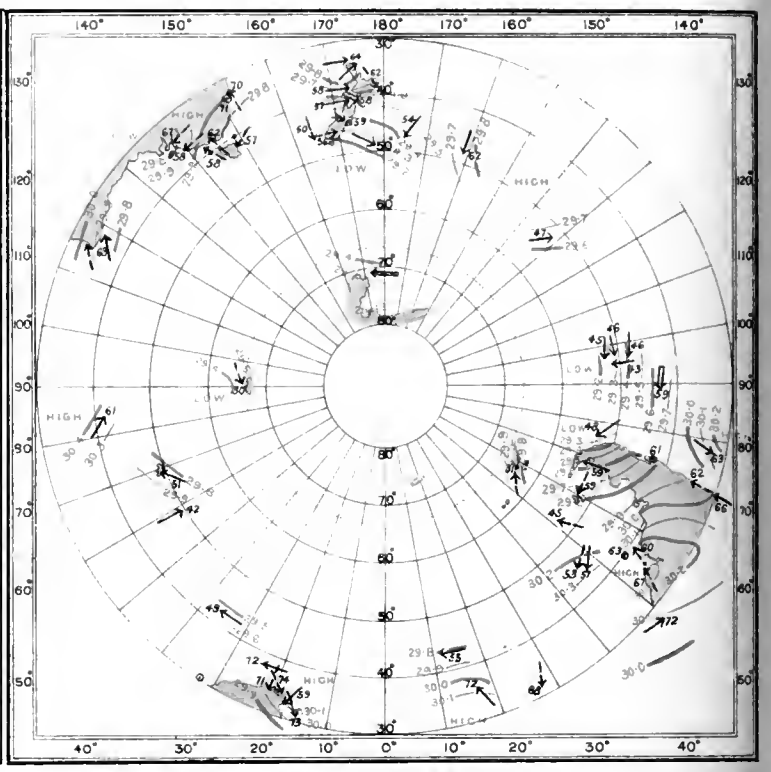
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

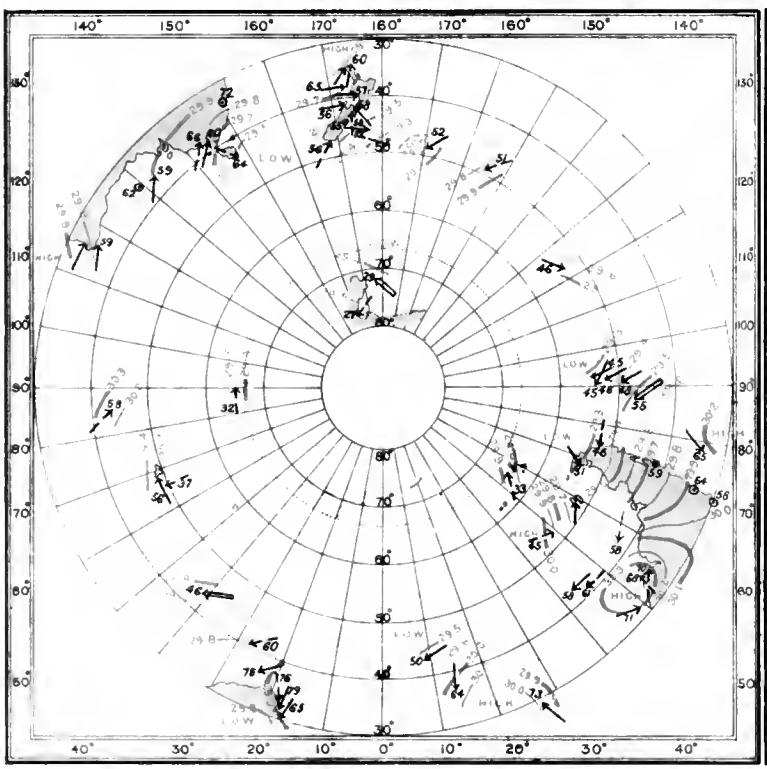
1902 DECEMBER 31



1903 JANUARY 1



1903 JANUARY 2



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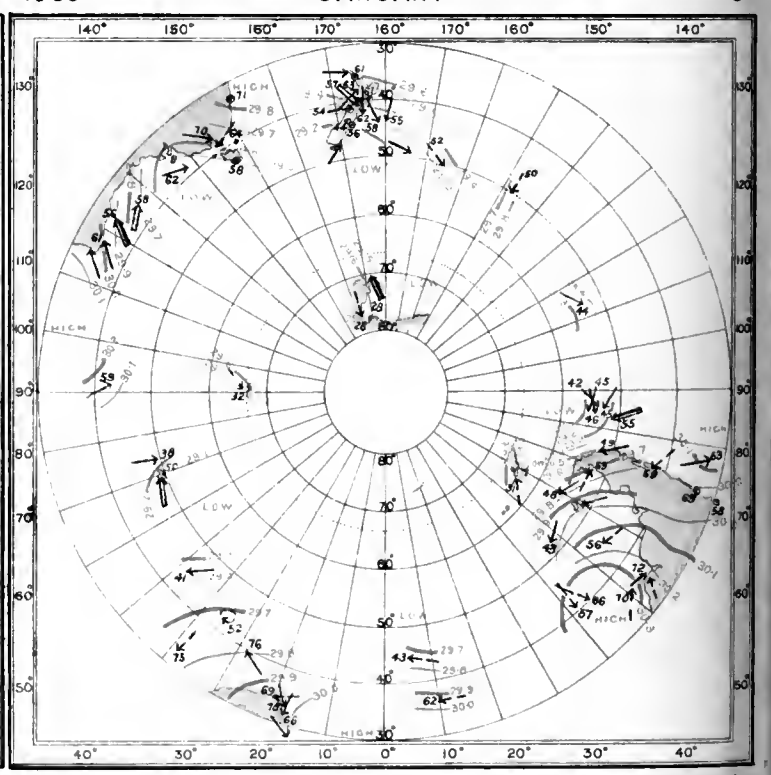

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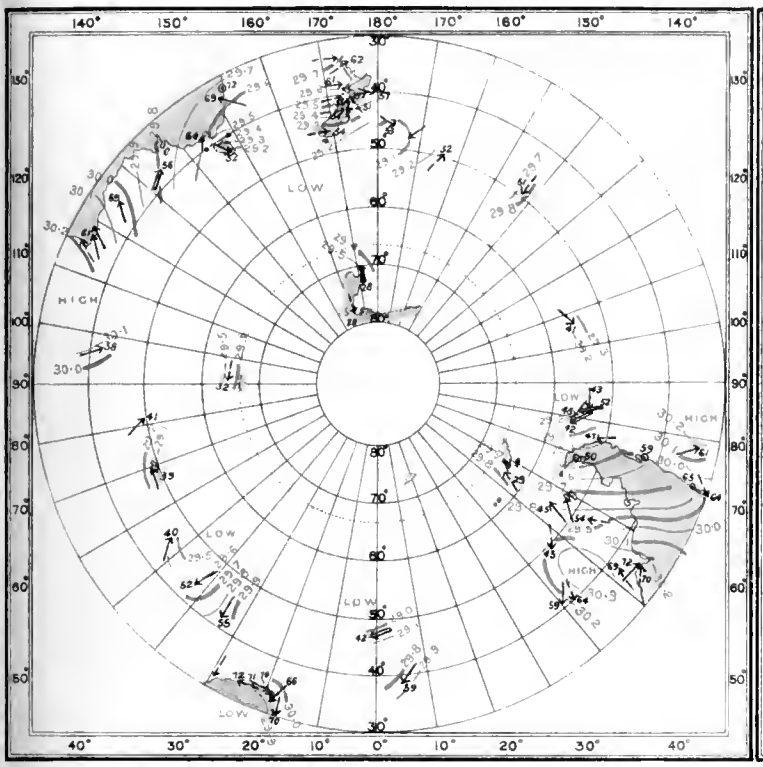
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1903 JANUARY 4



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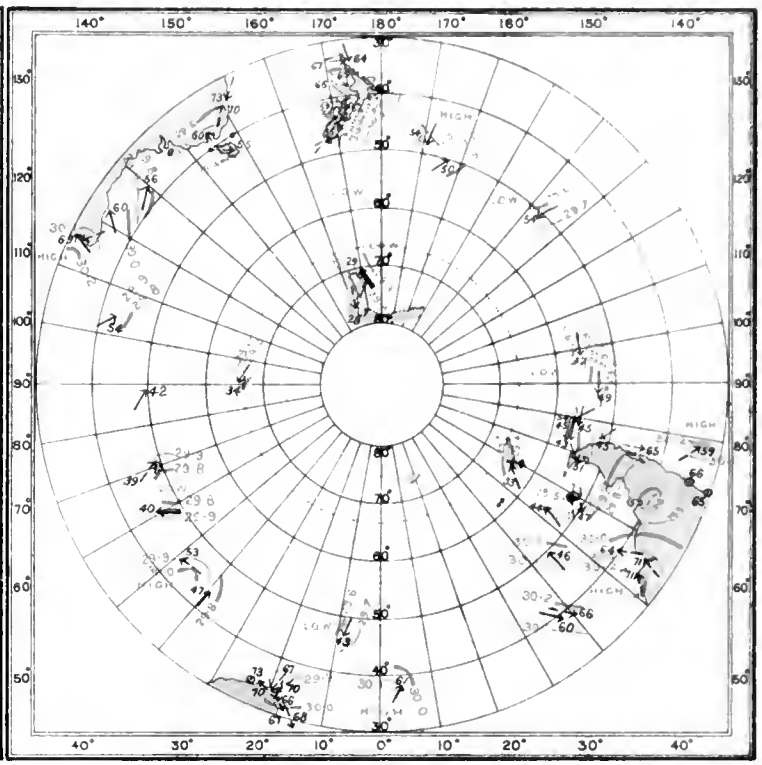

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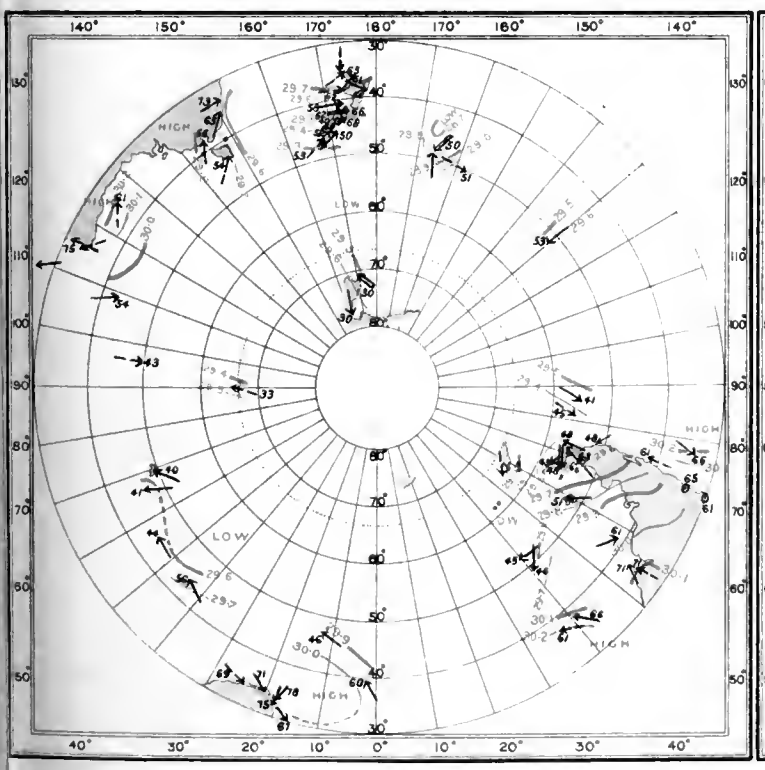

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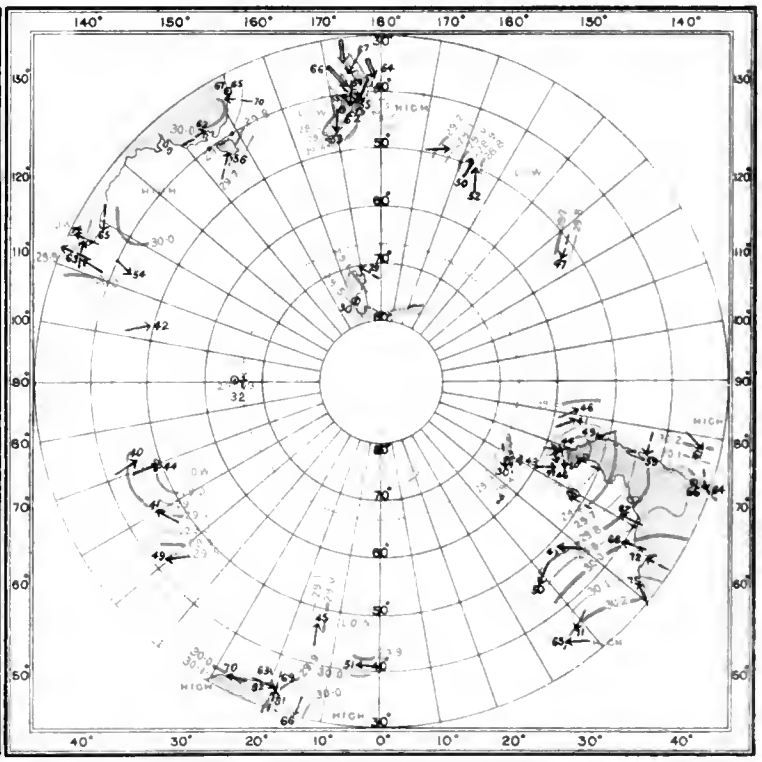

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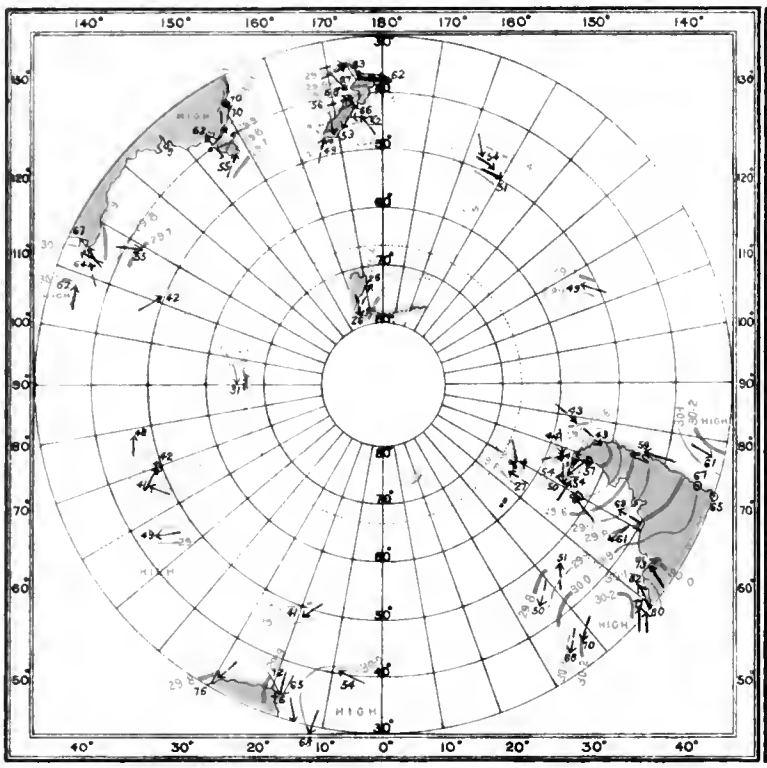
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 JANUARY 8



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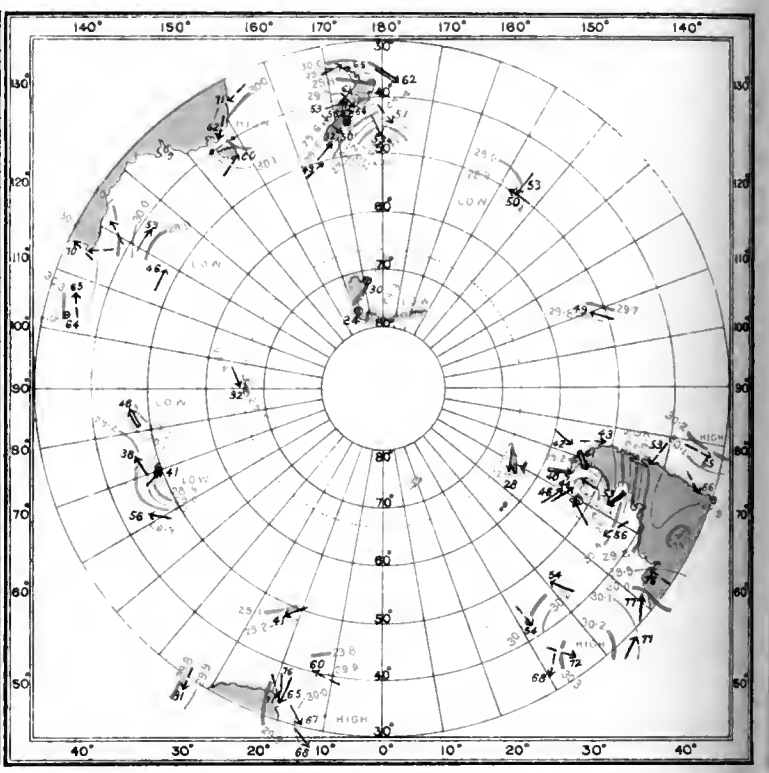

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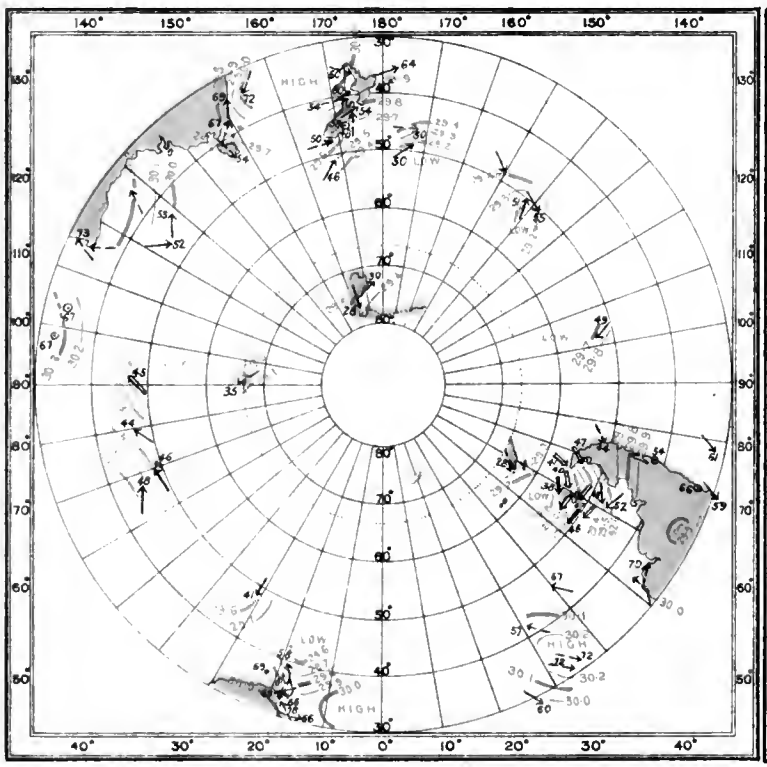

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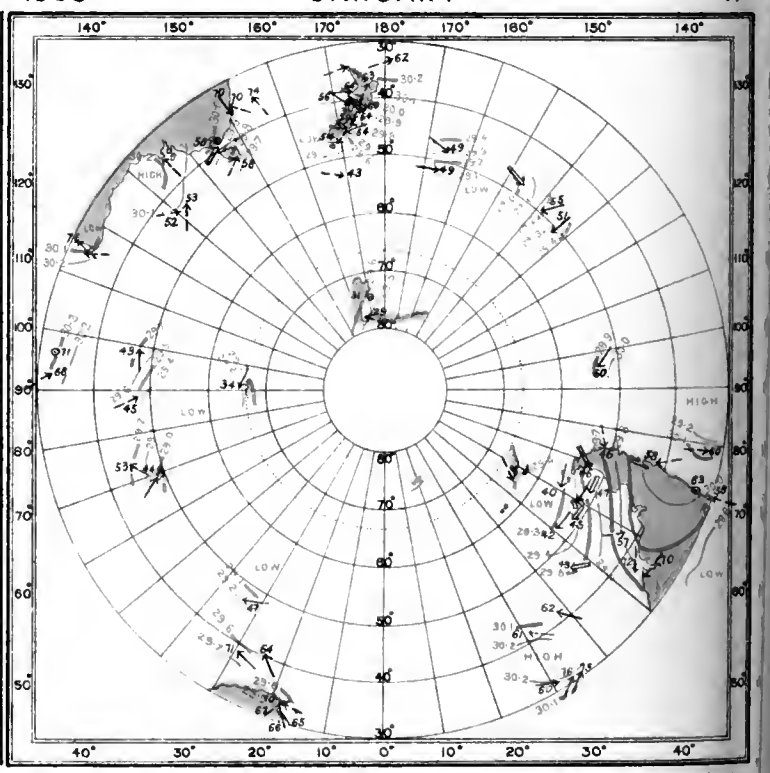

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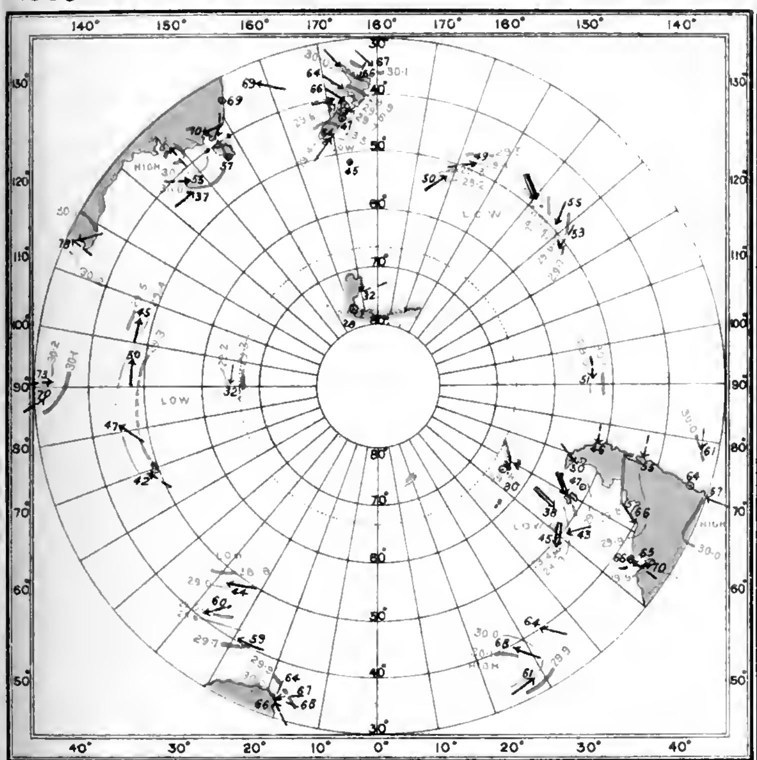
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1903 JANUARY 12



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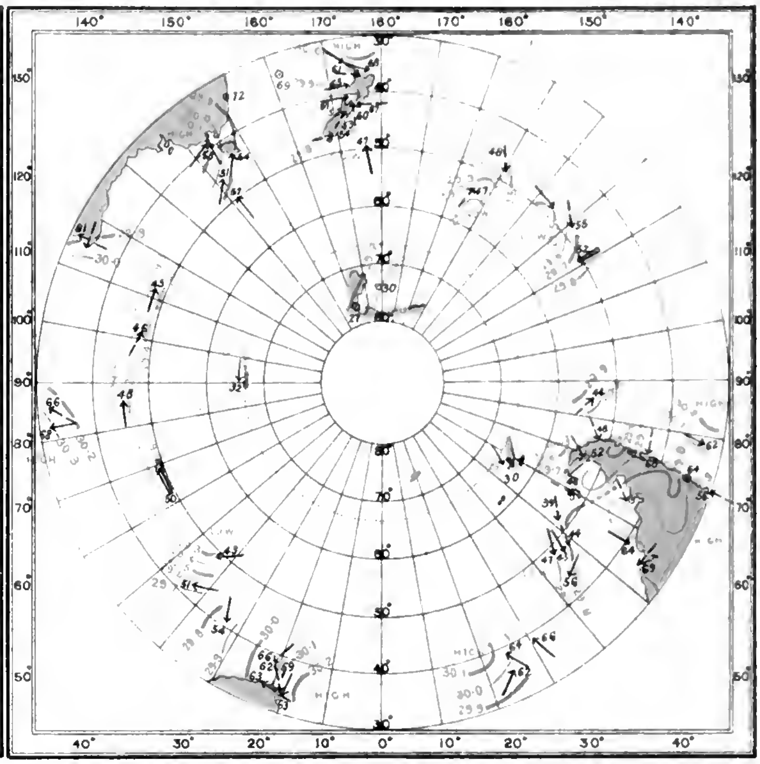

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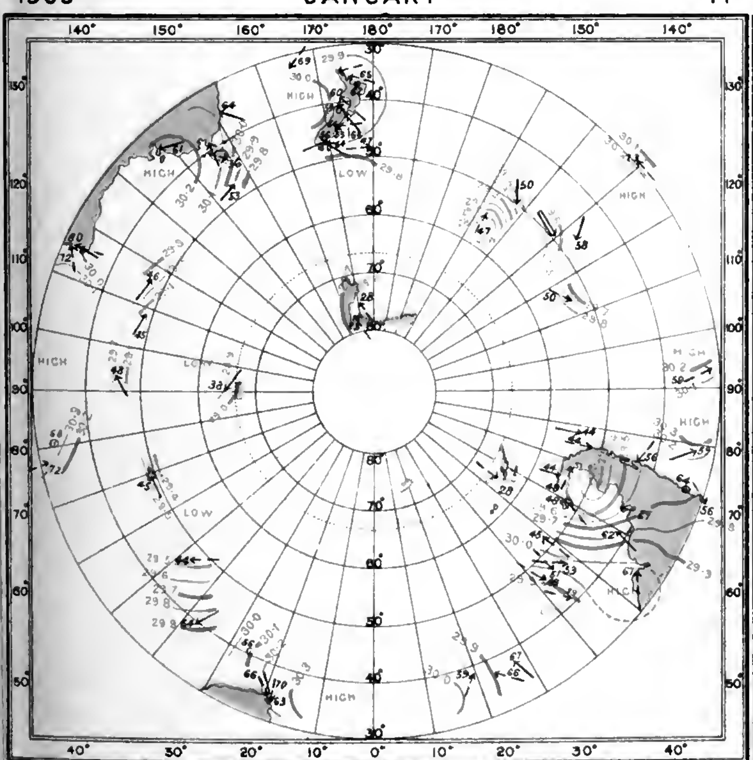

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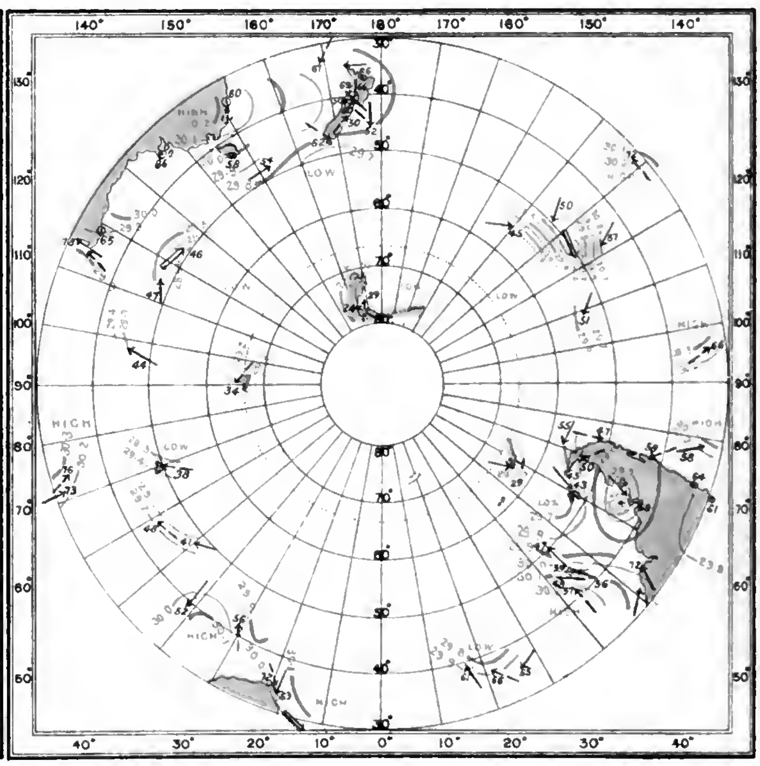

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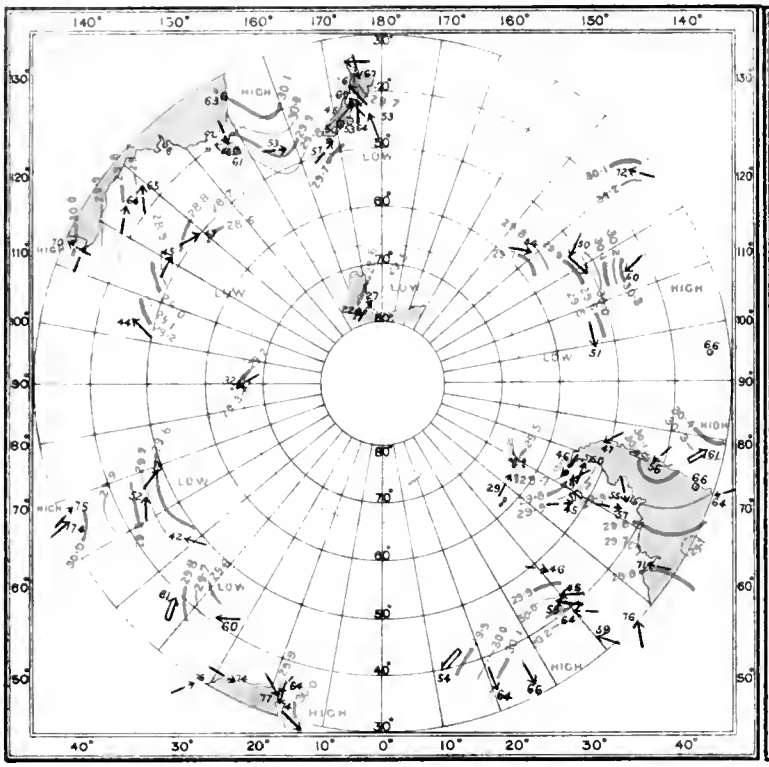
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 JANUARY 16



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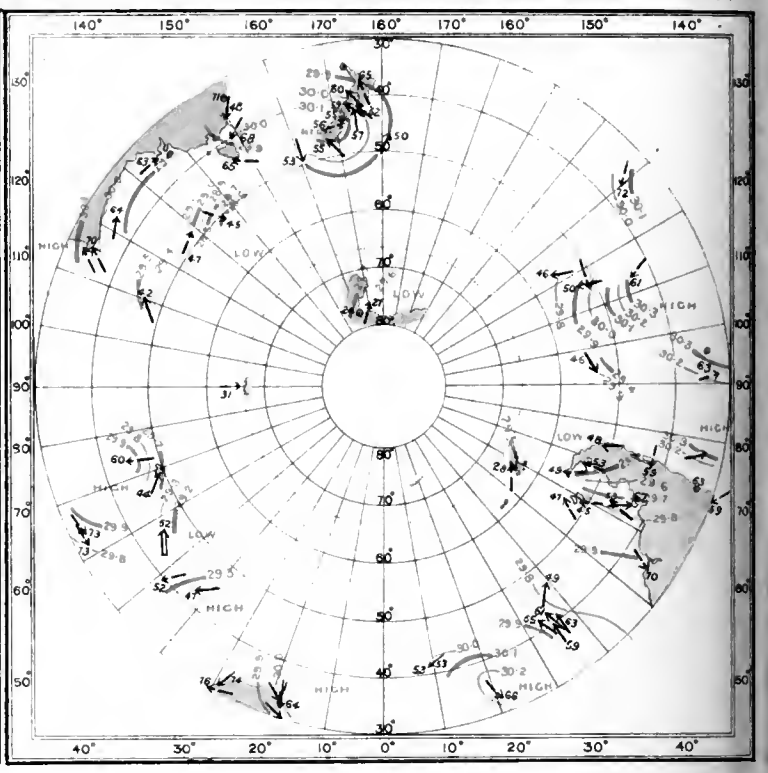

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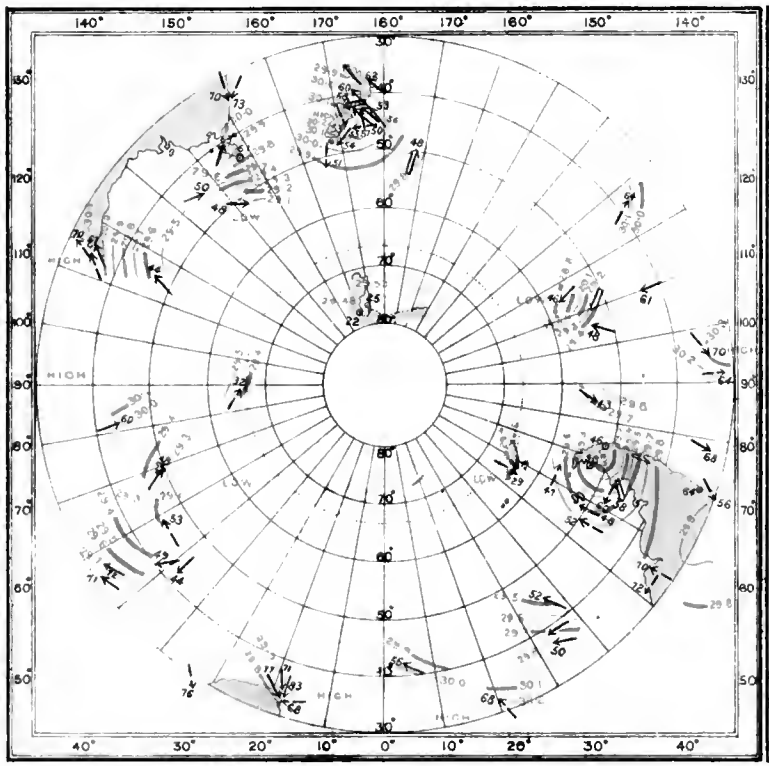

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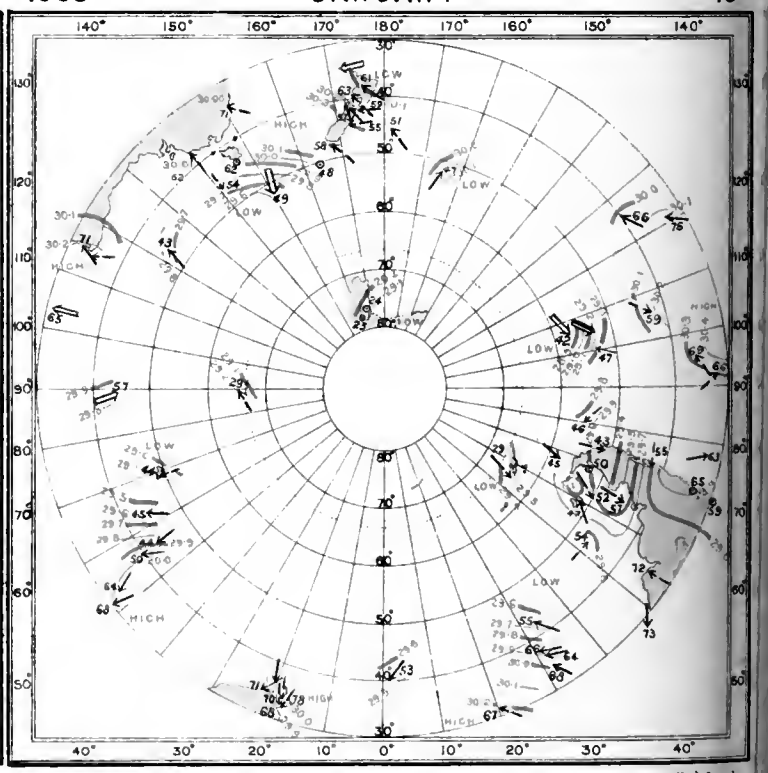

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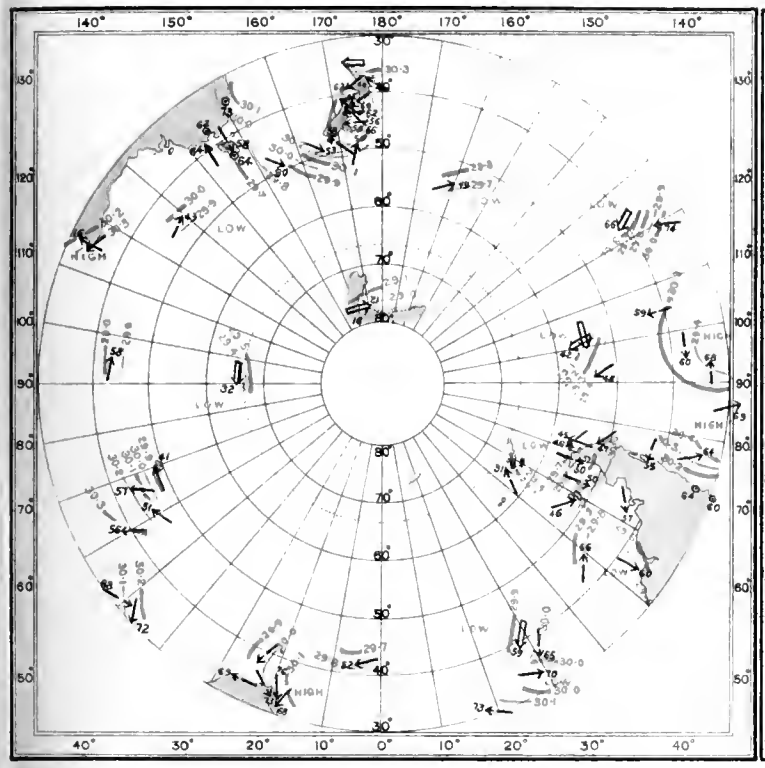
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JANUARY 20



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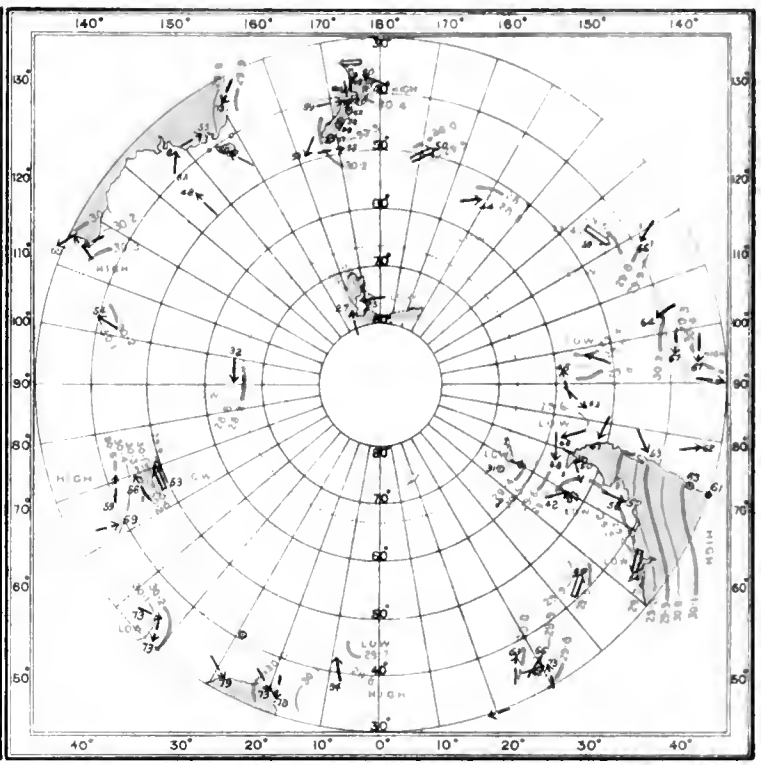

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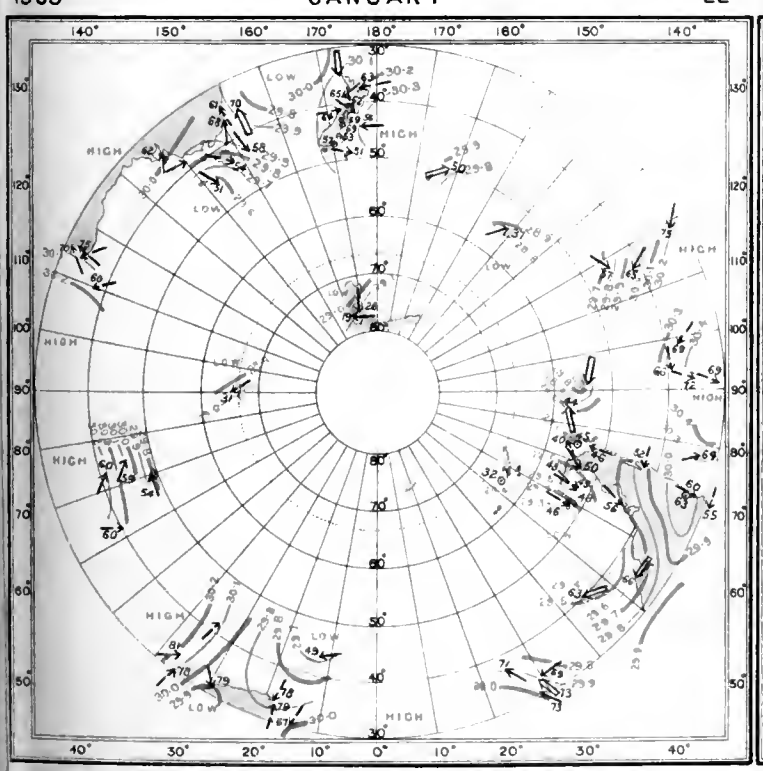

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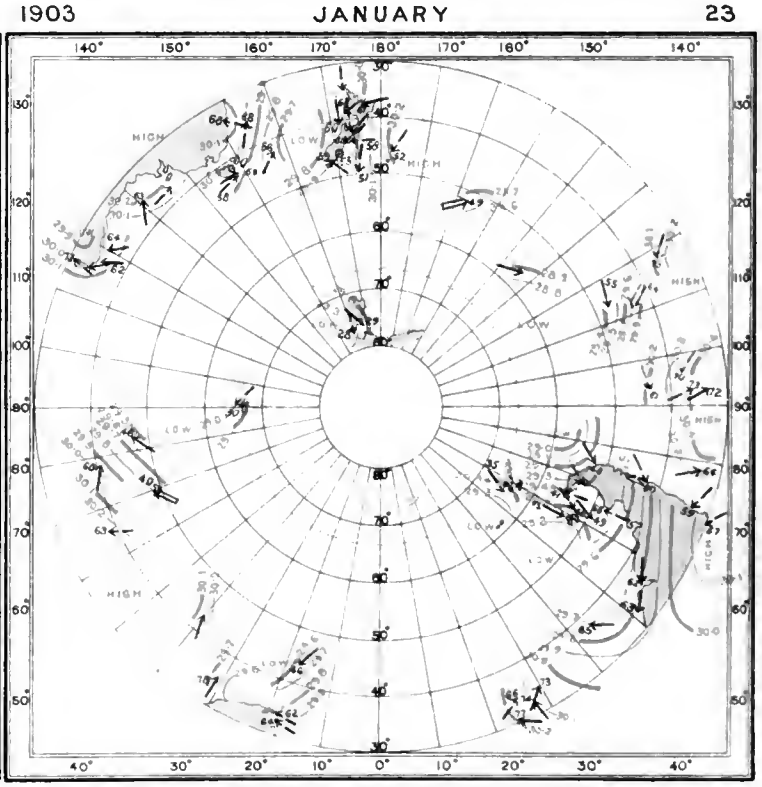

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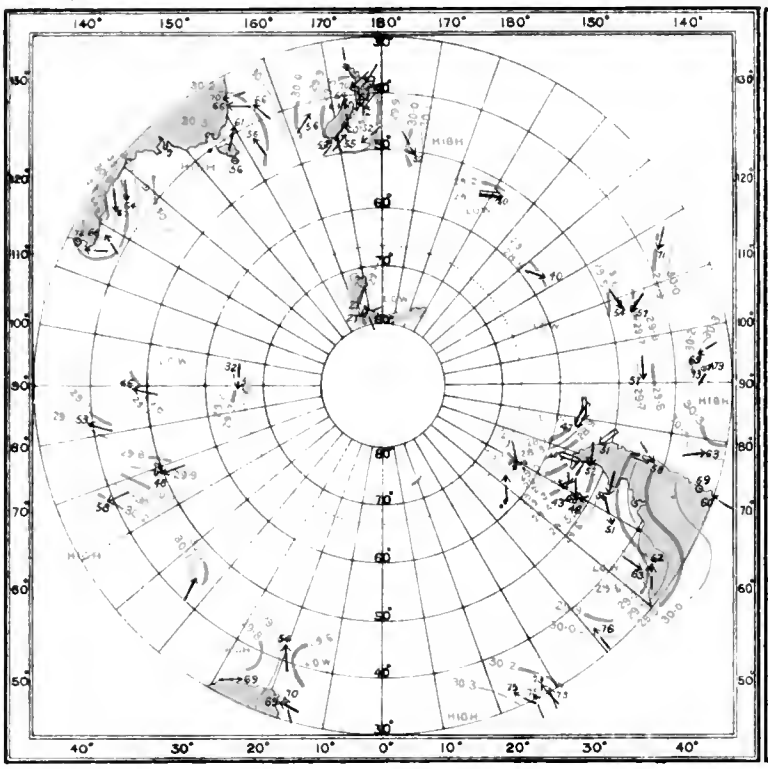
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 JANUARY 24



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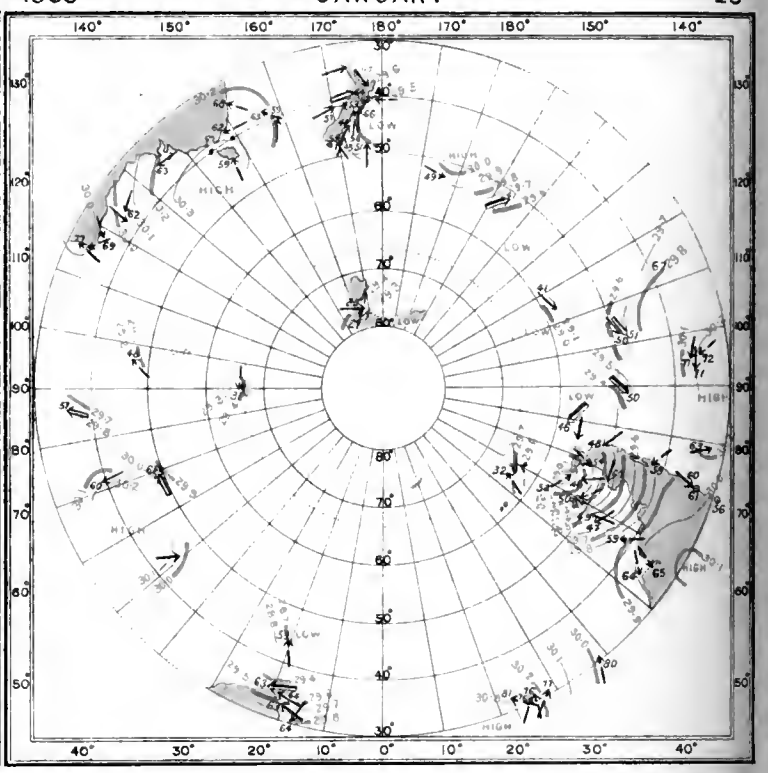

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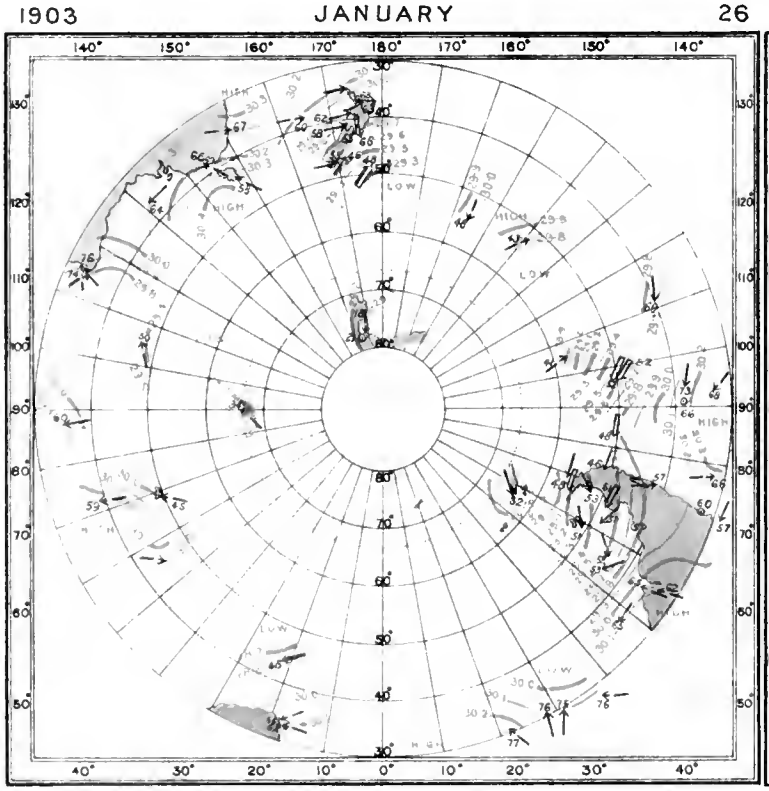

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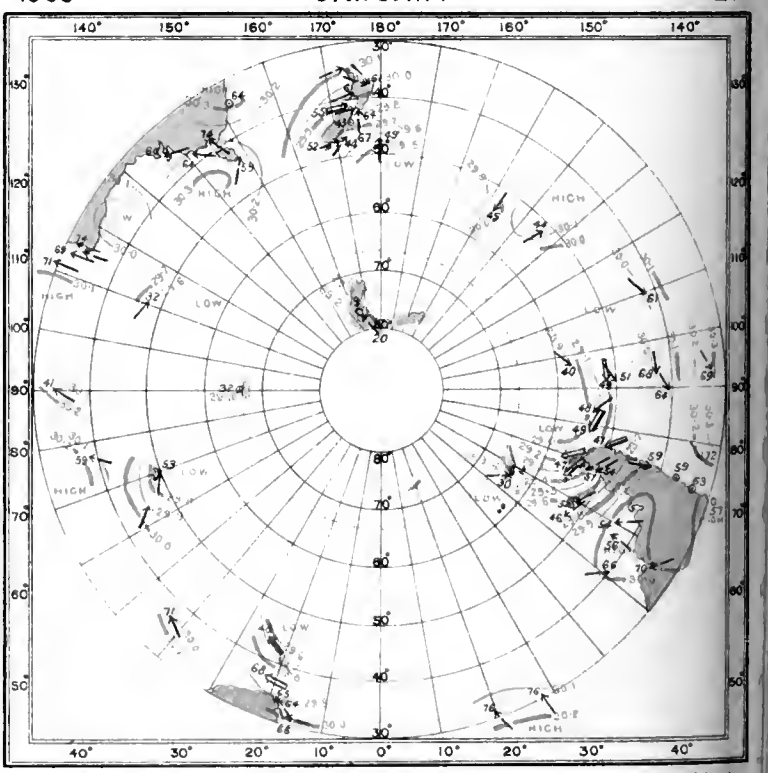

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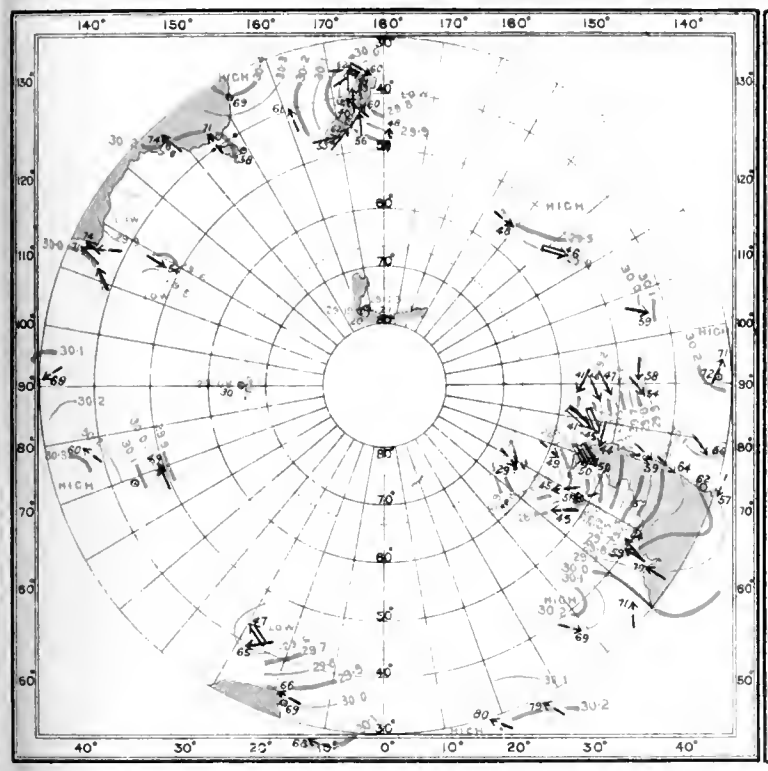
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JANUARY 28



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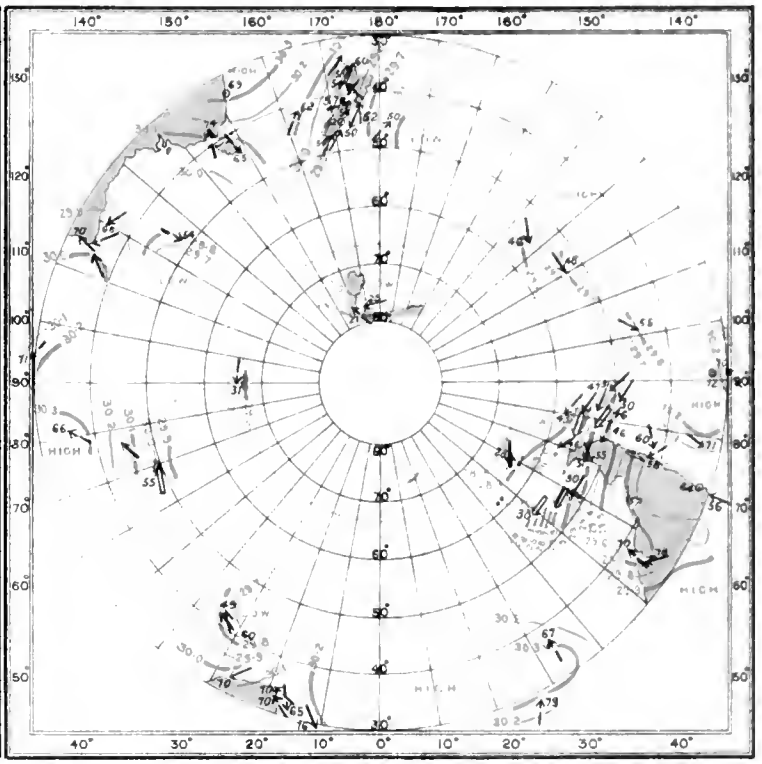

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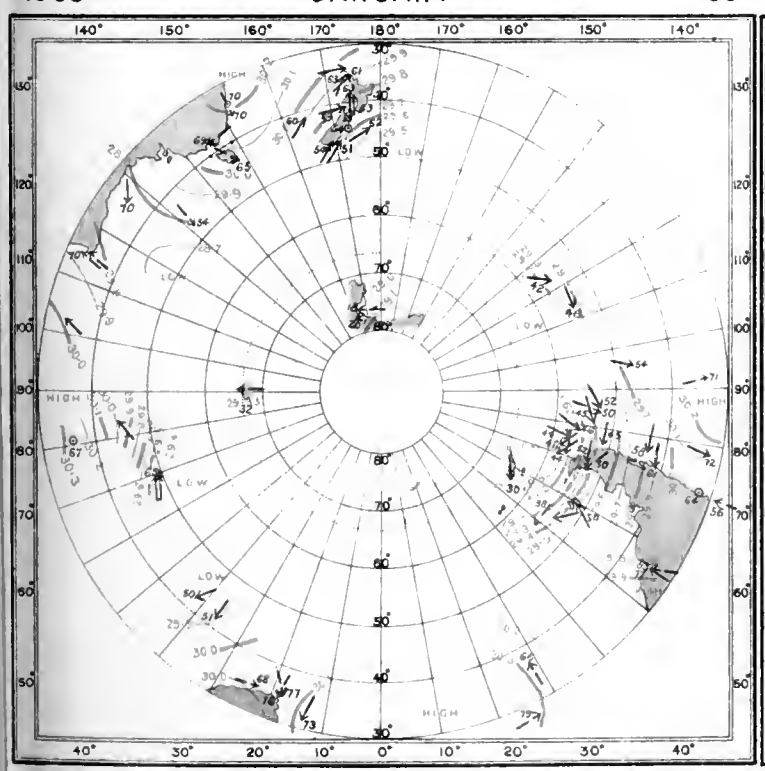

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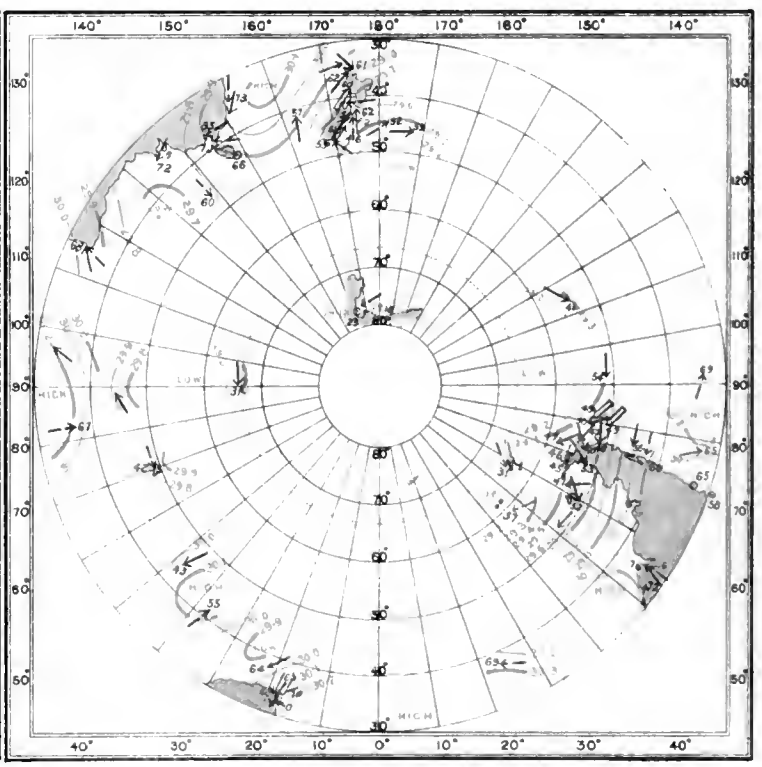

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SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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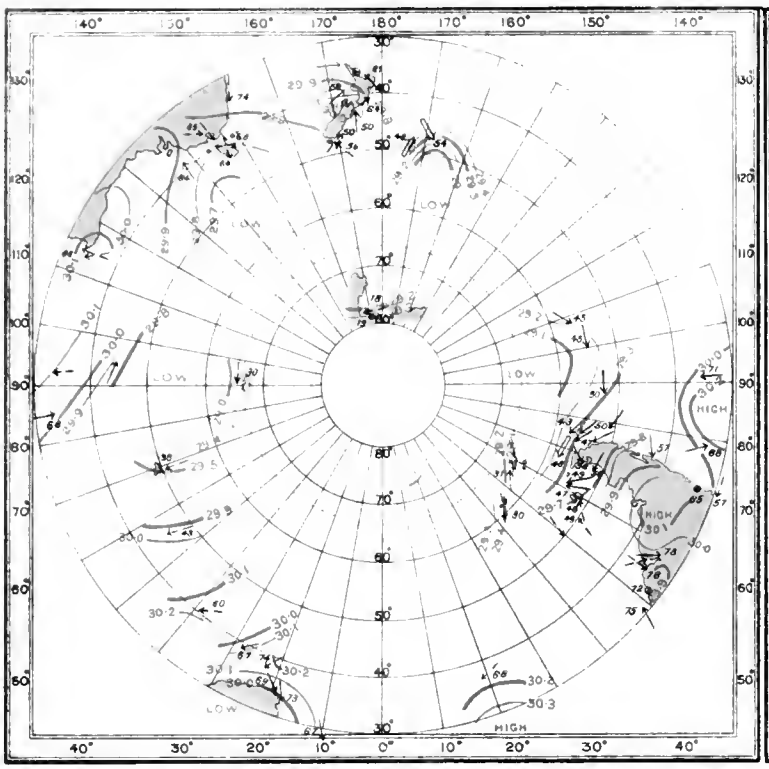

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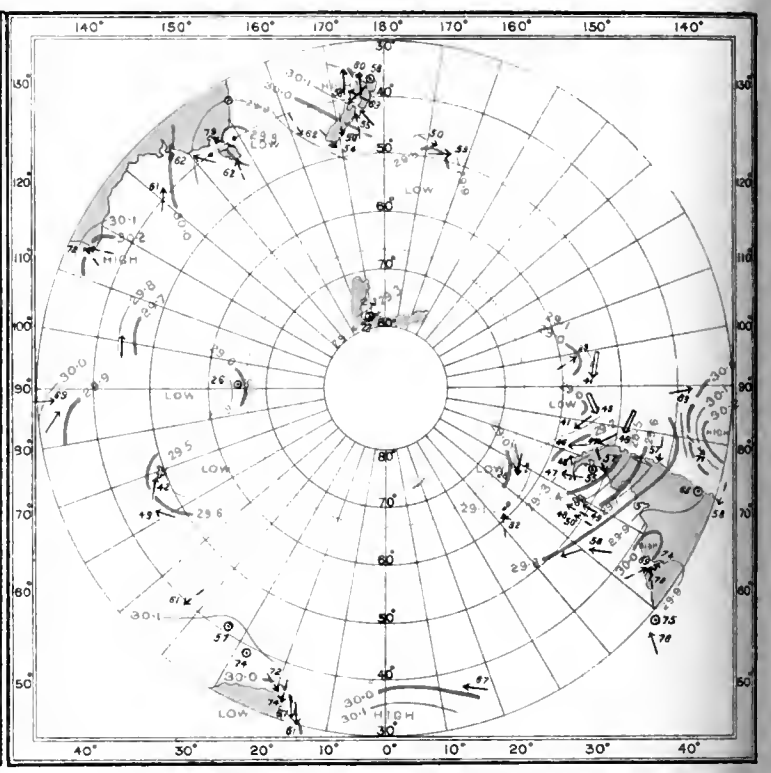

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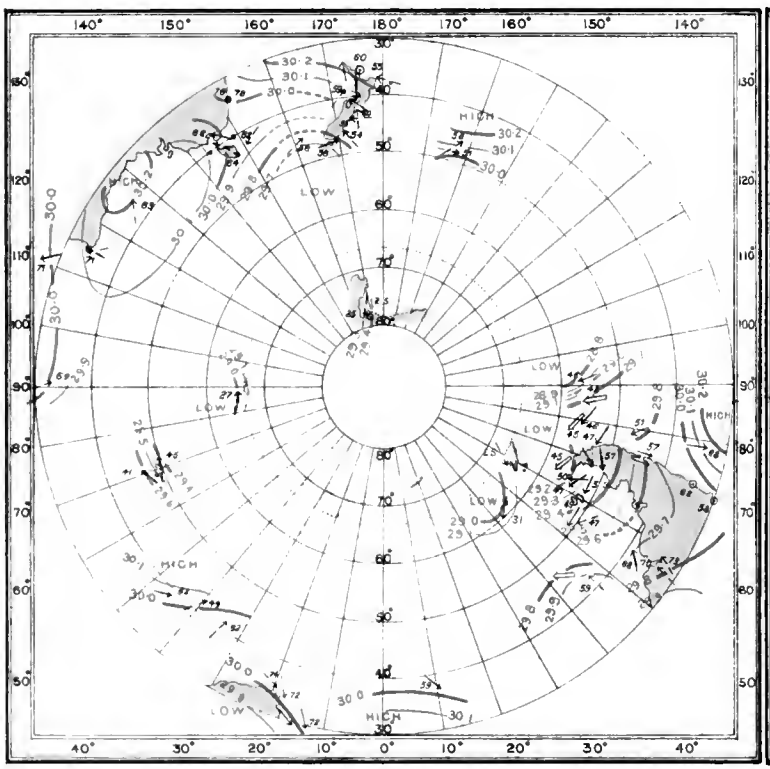

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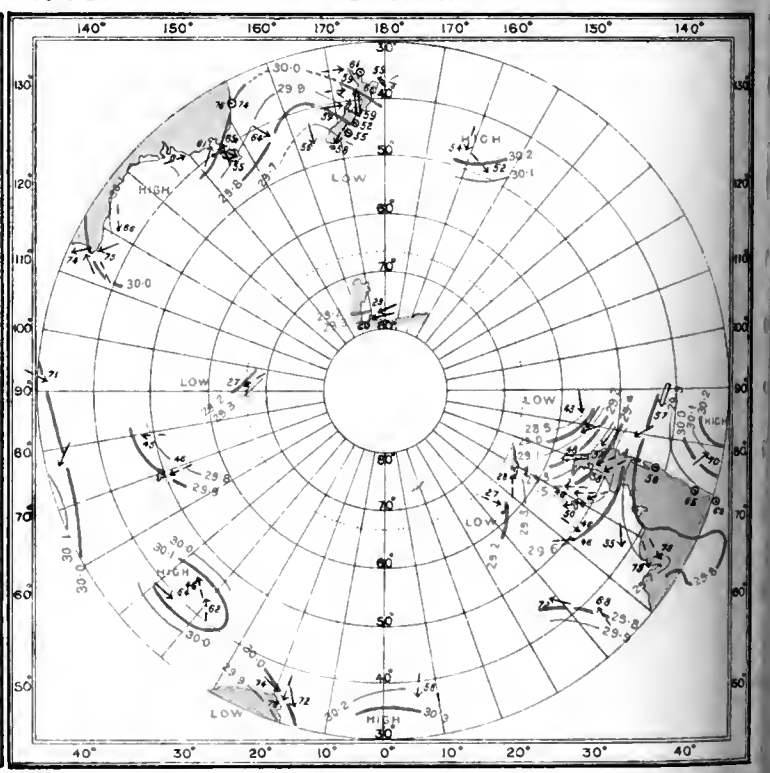

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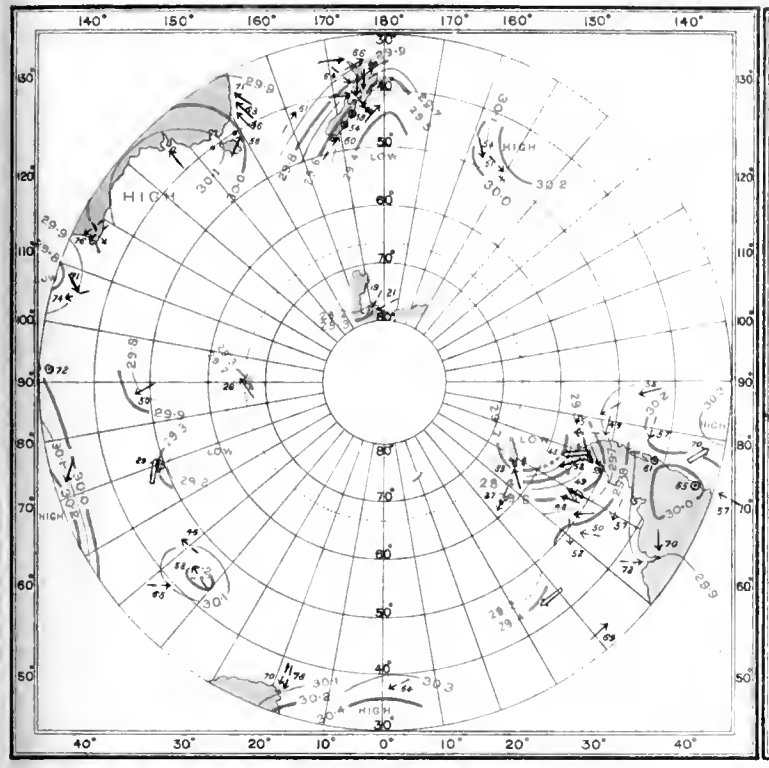
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 FEBRUARY 5



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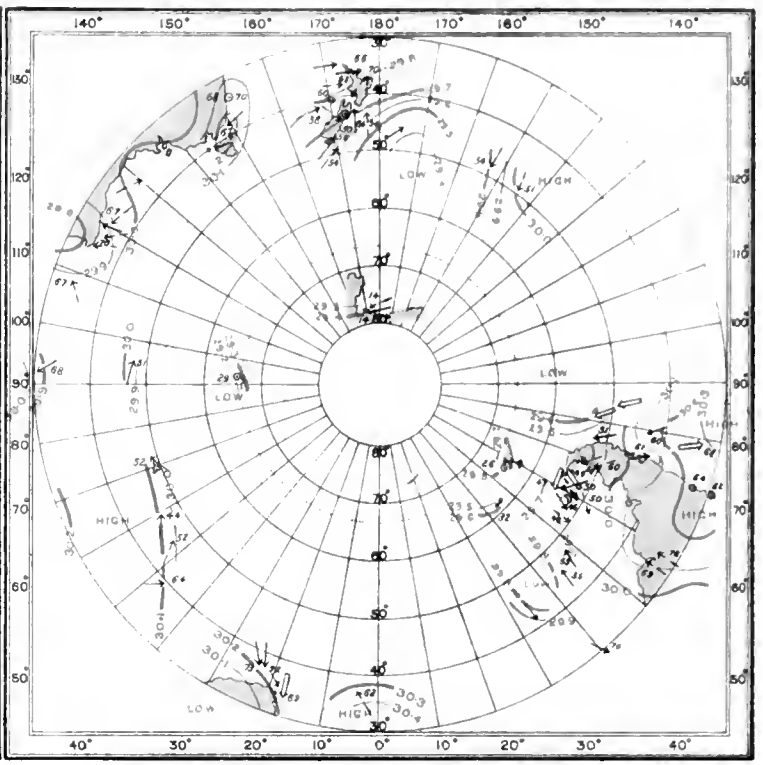

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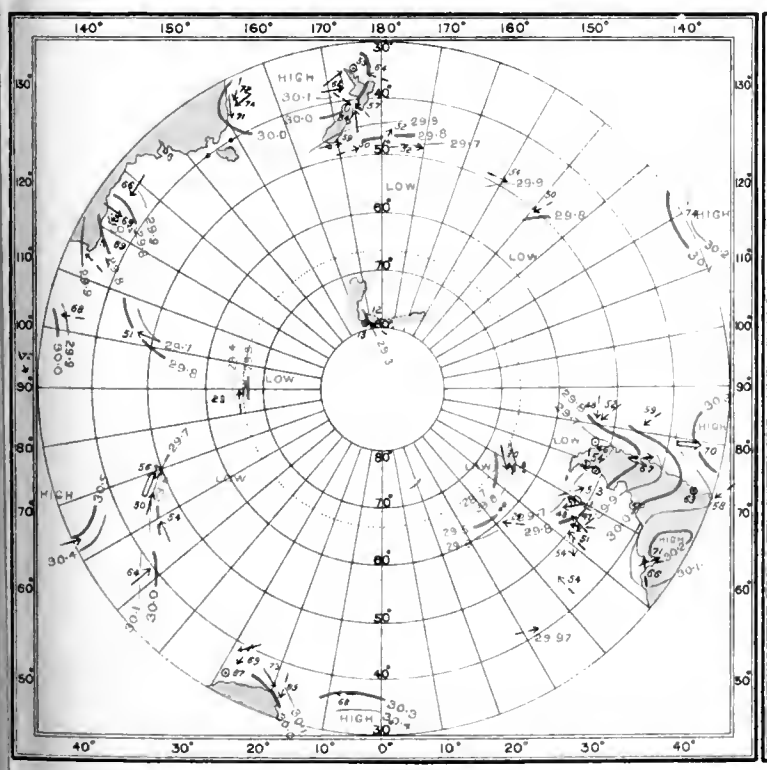

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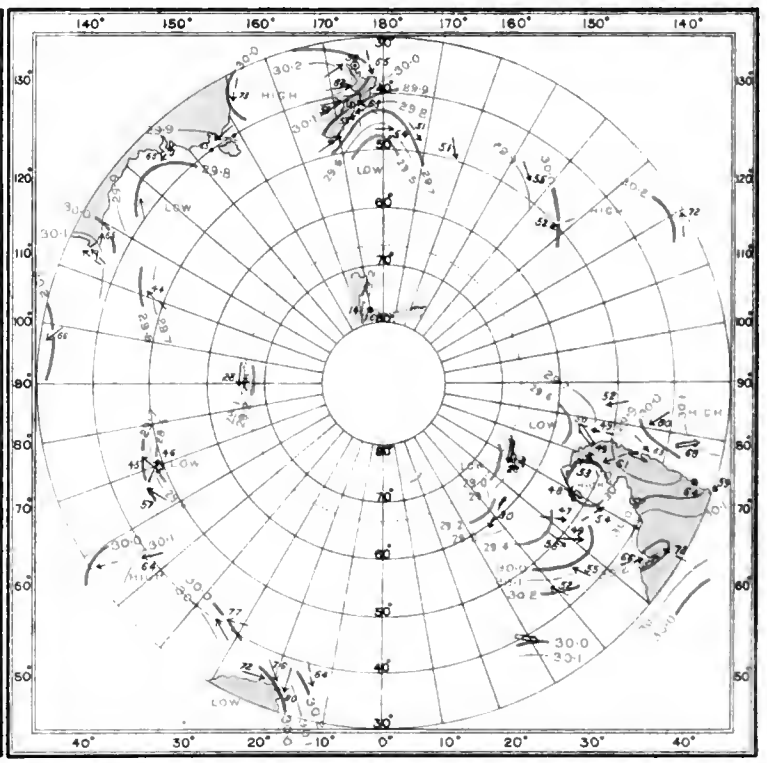

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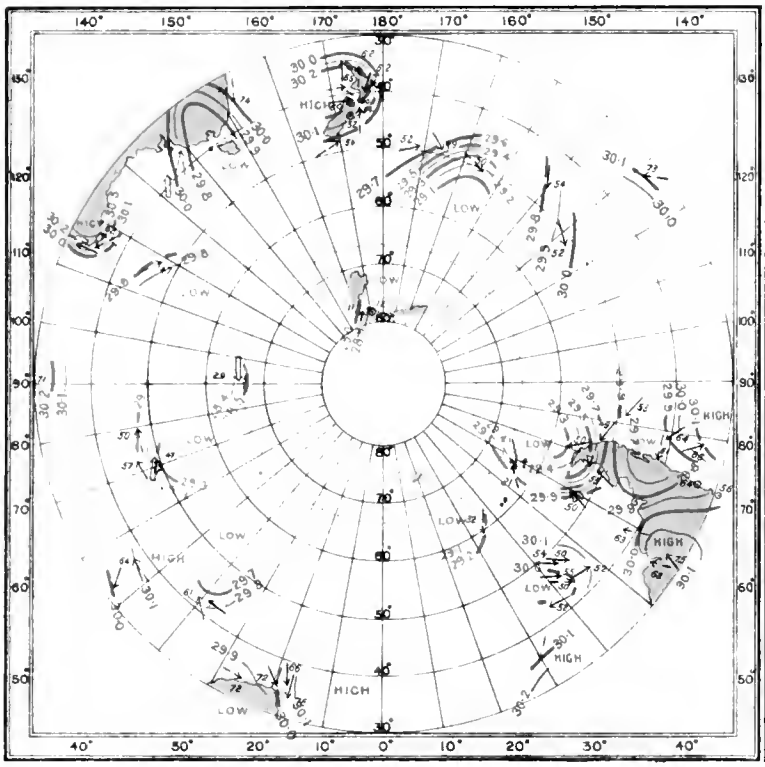
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 FEBRUARY 9



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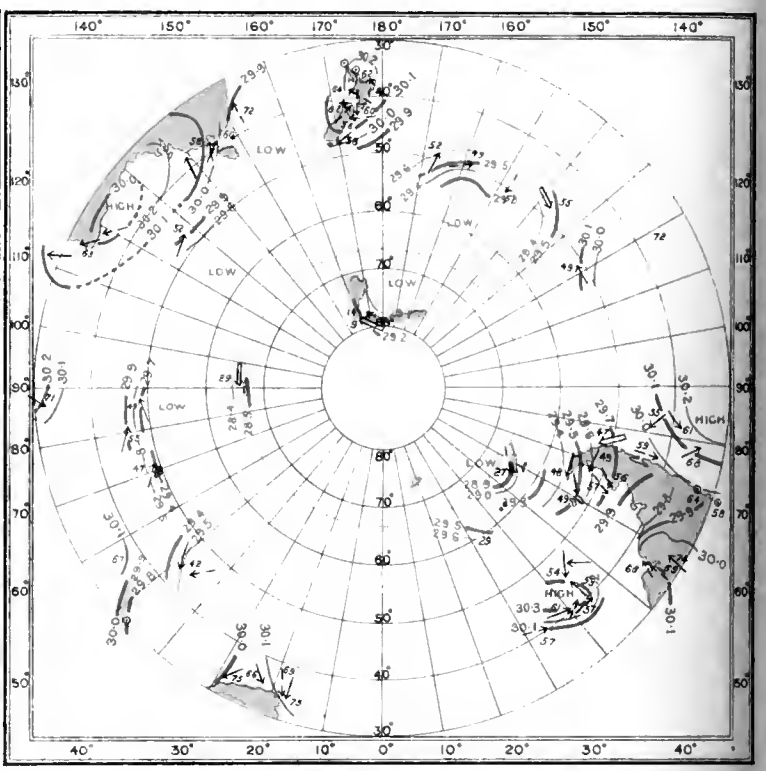

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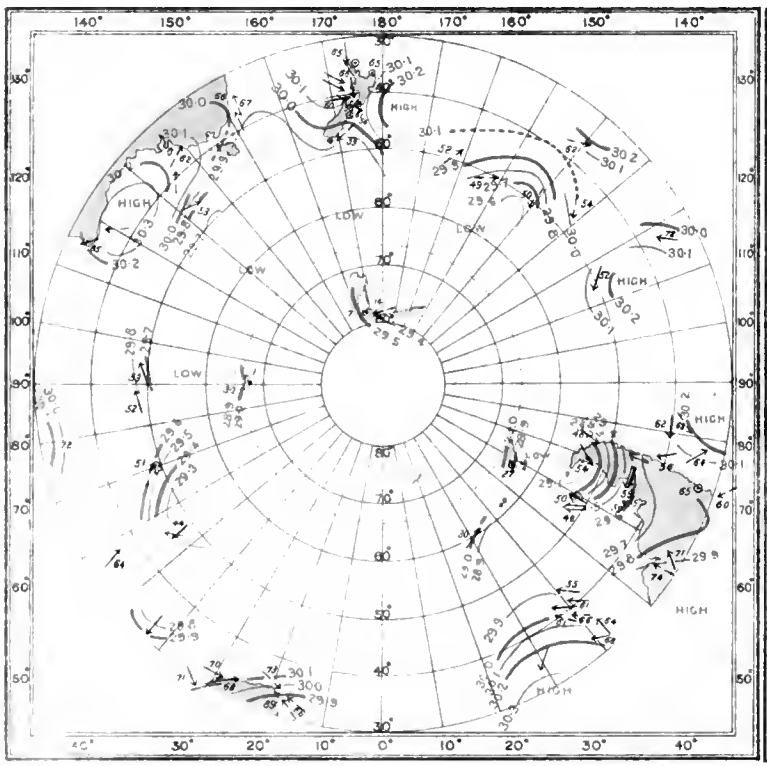

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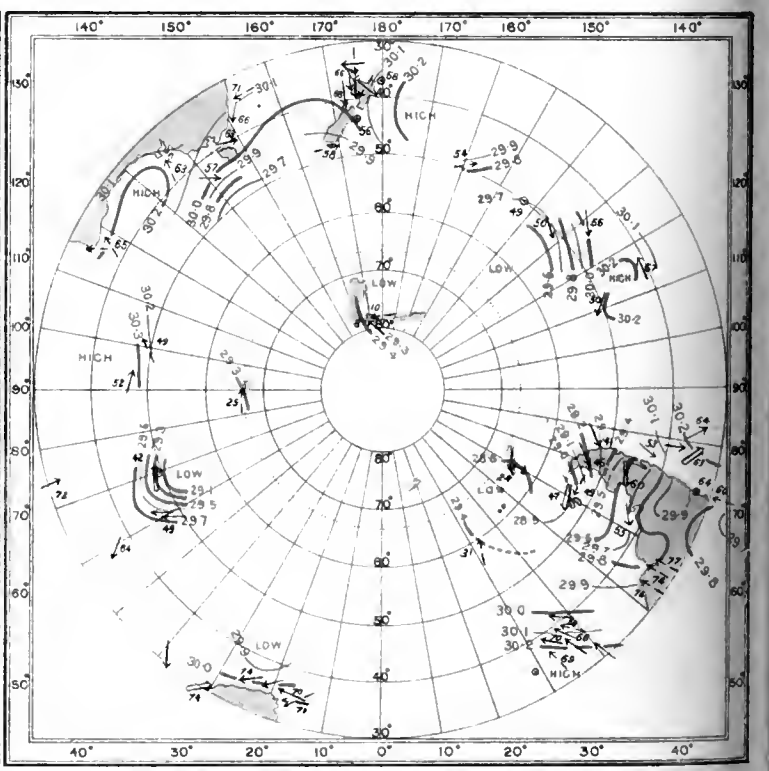

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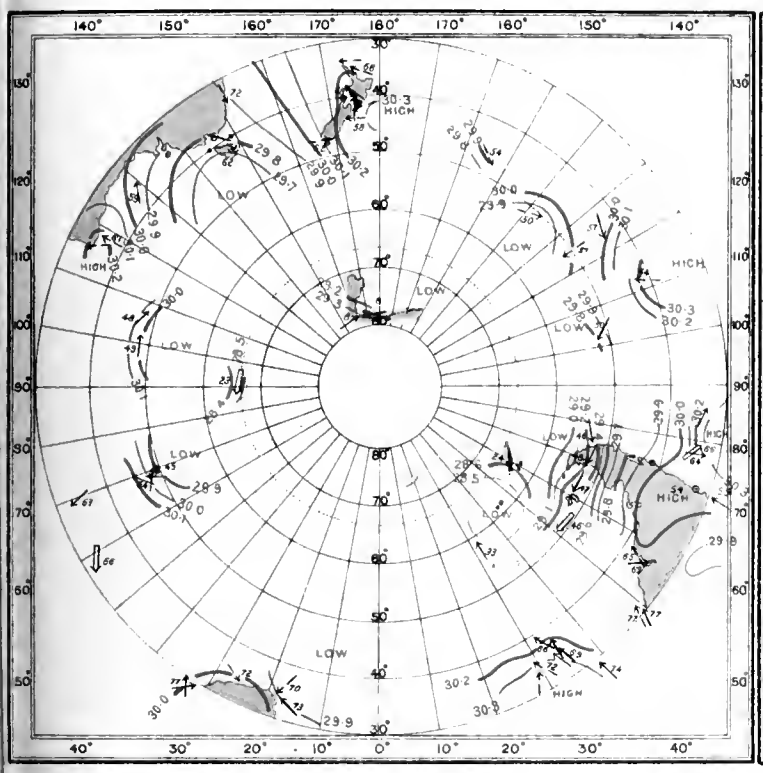
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T

WITH WINDS AND AIR TEMPERATURES

1903 FEBRUARY 13



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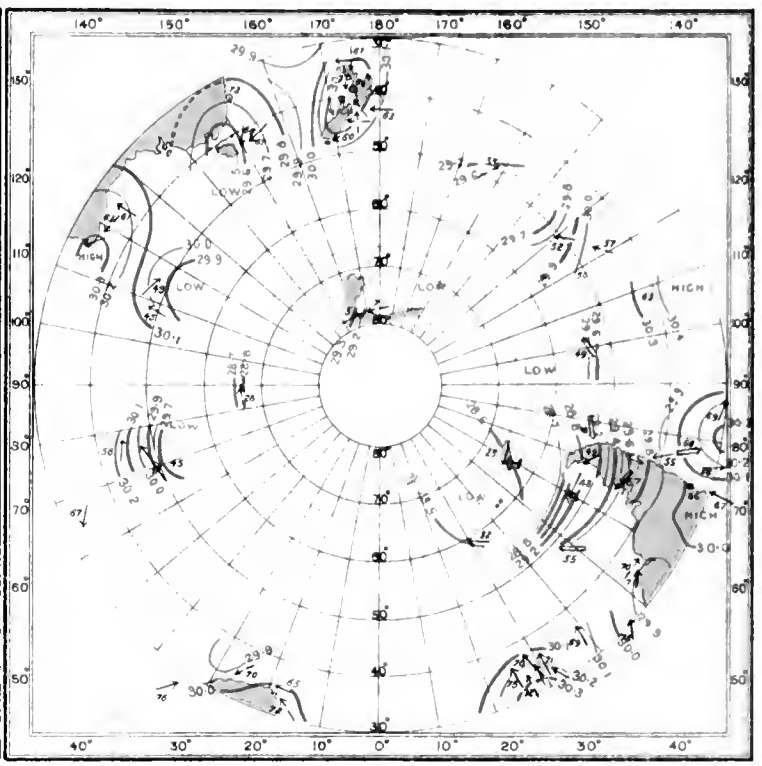

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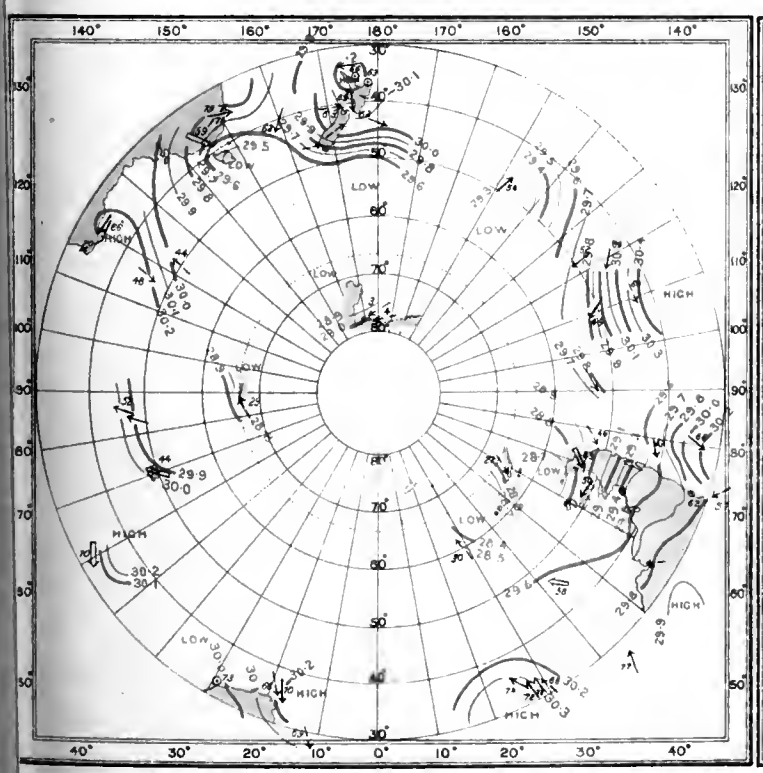

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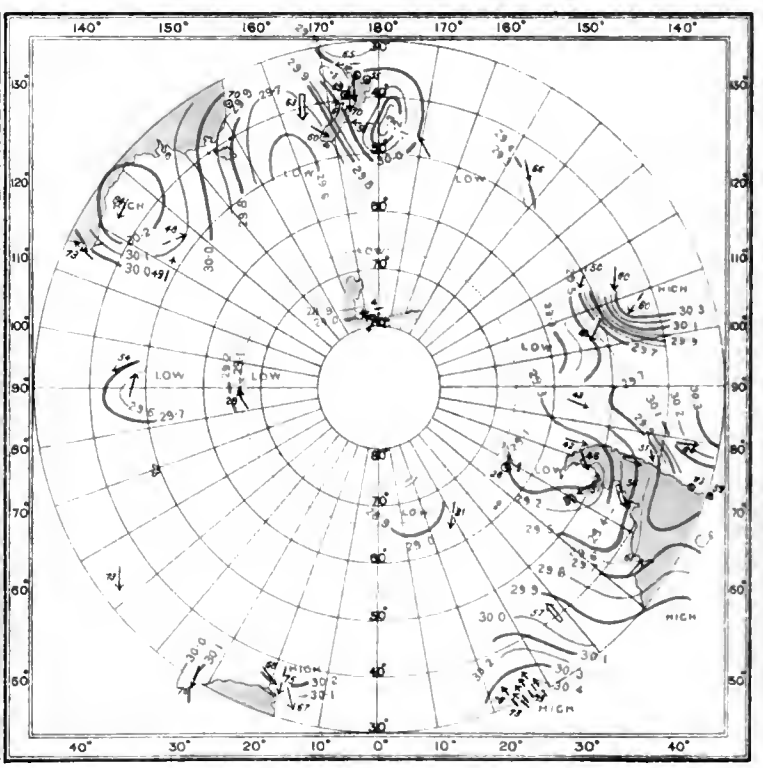

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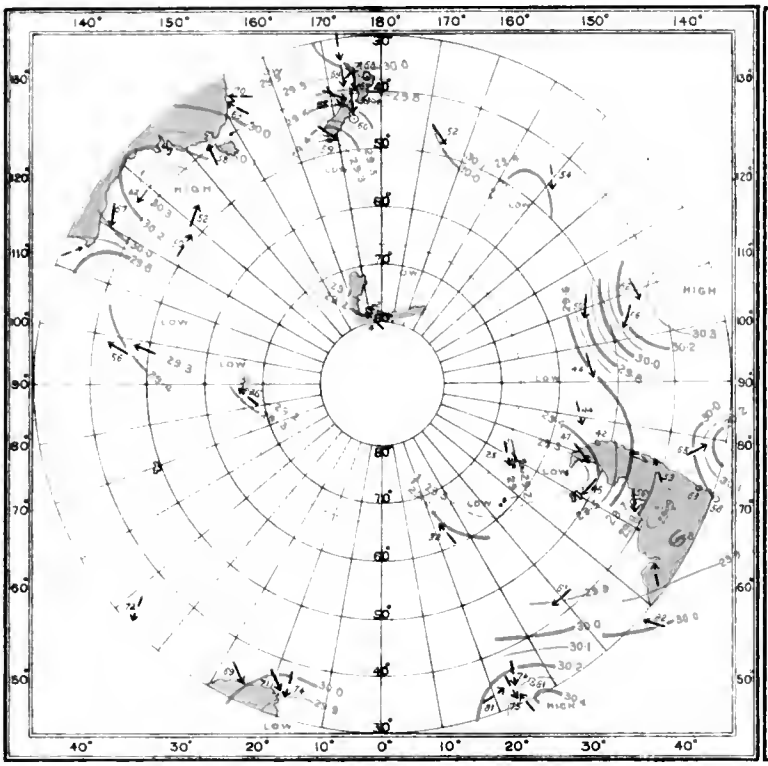
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1903 FEBRUARY 17



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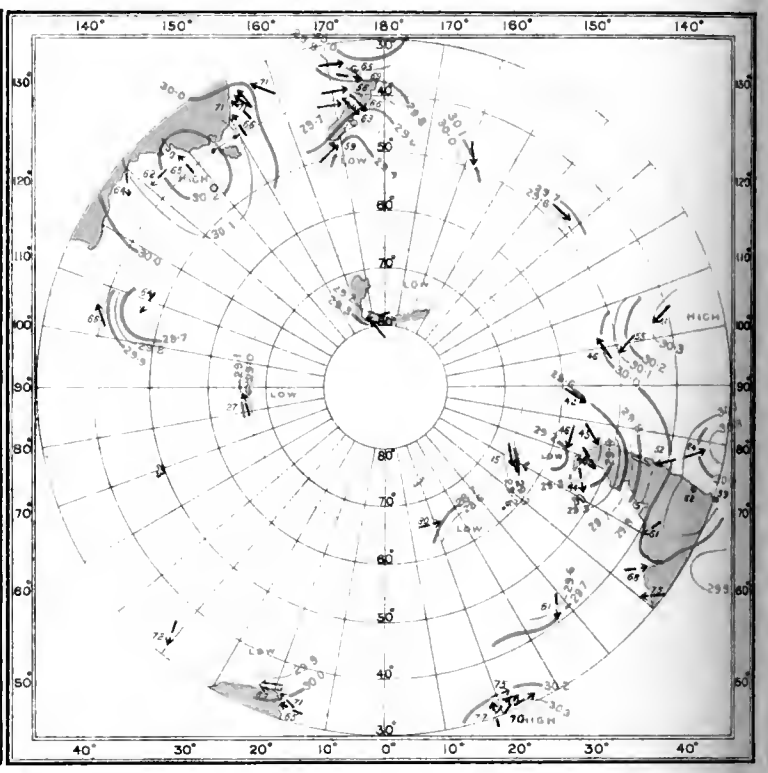

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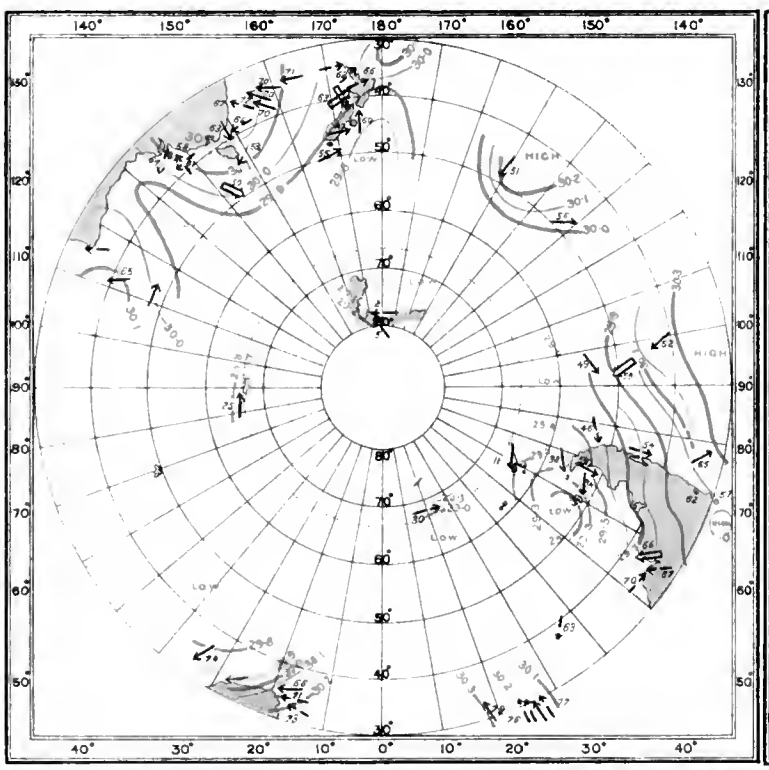

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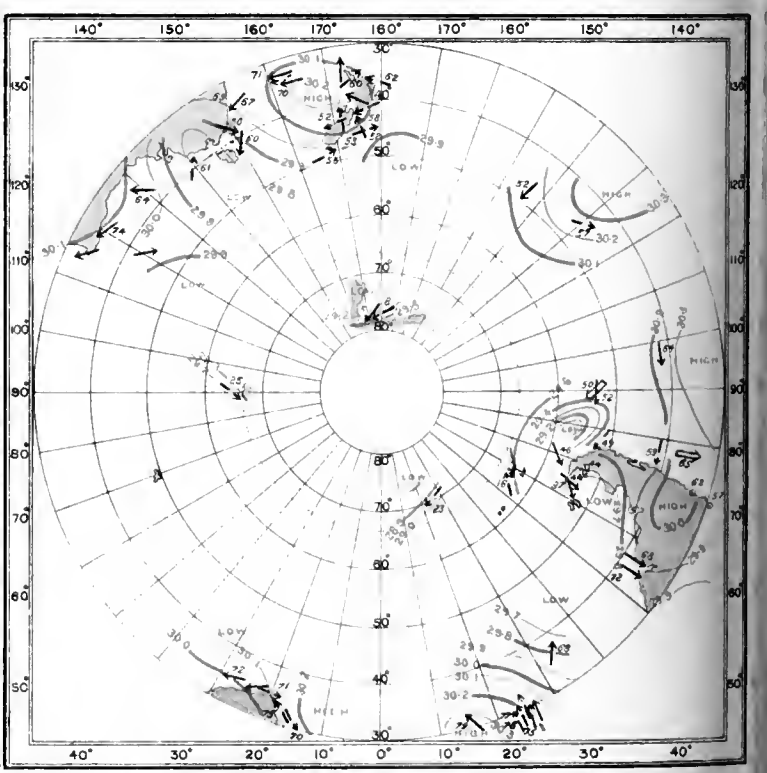

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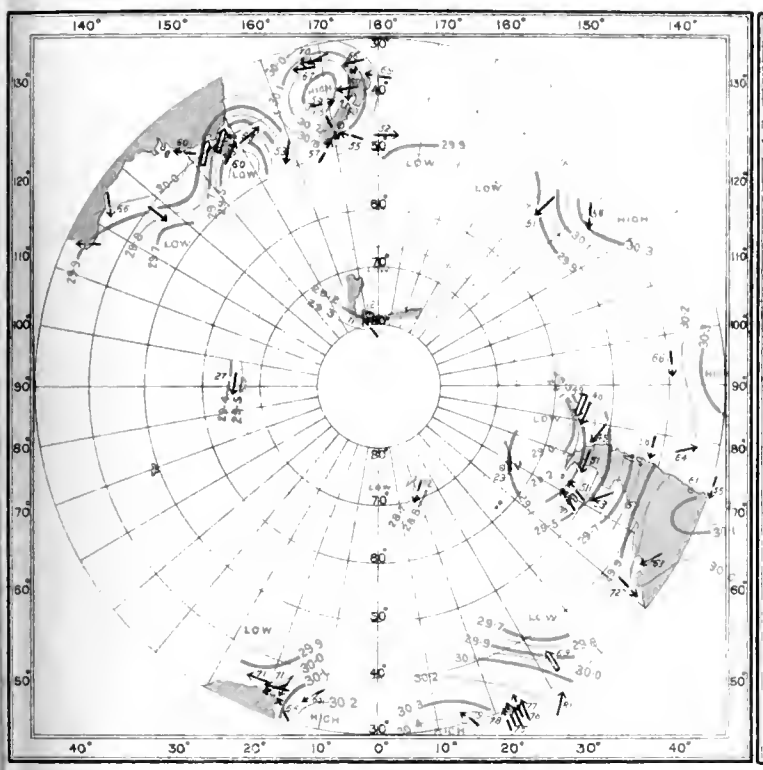
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 FEBRUARY 21



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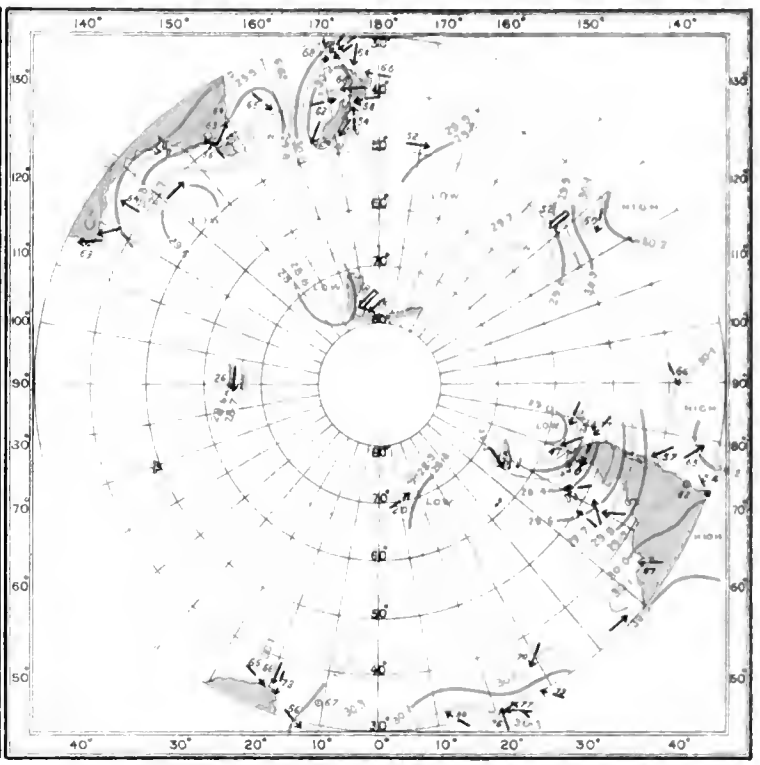
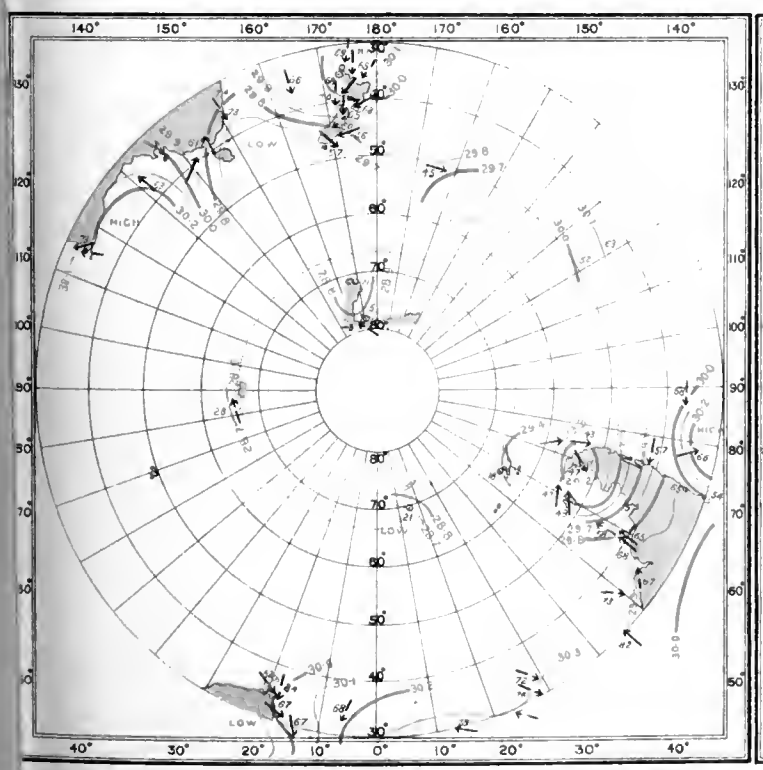


1903 FEBRUARY 23



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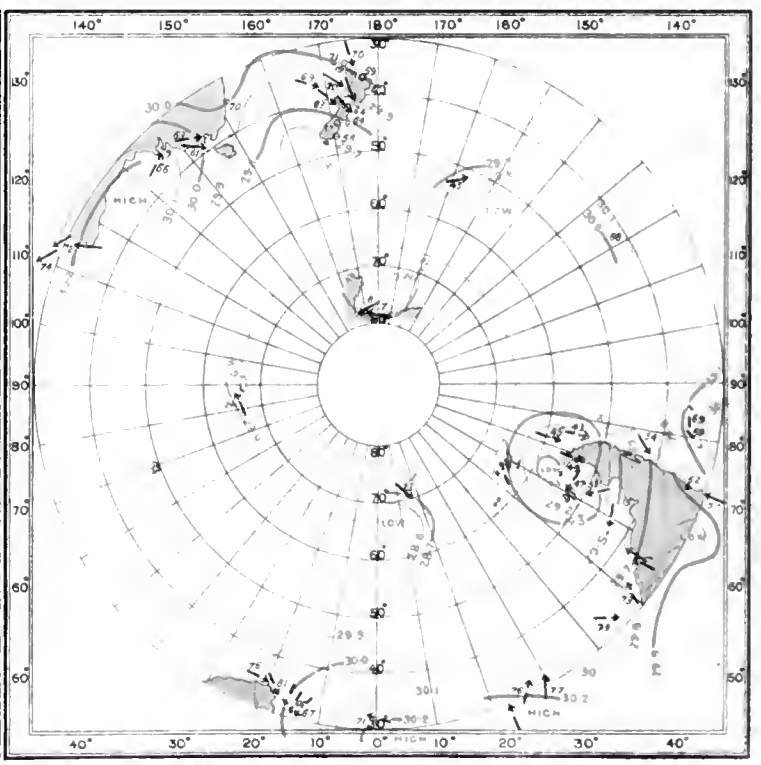


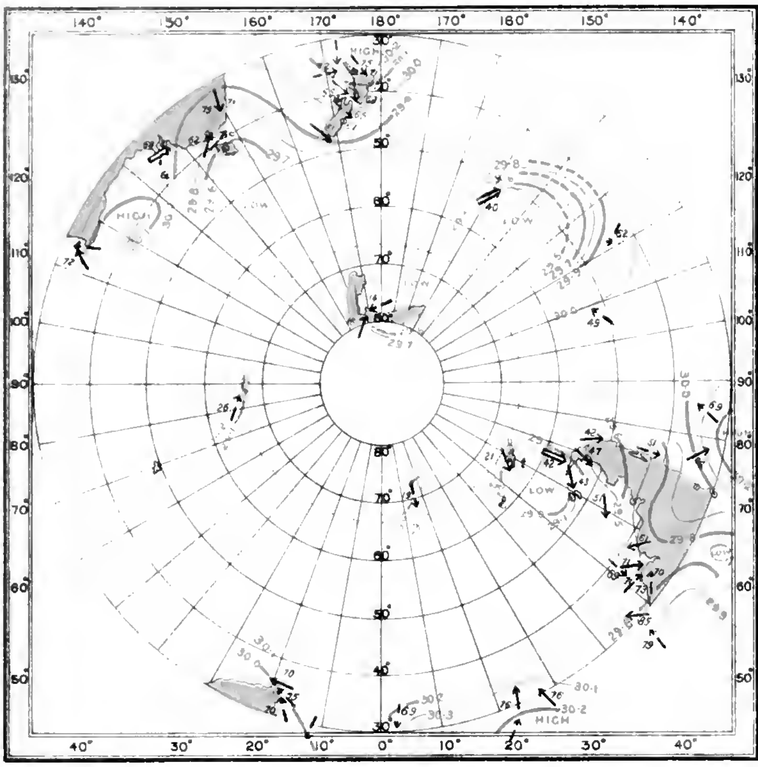
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1903 FEBRUARY 25



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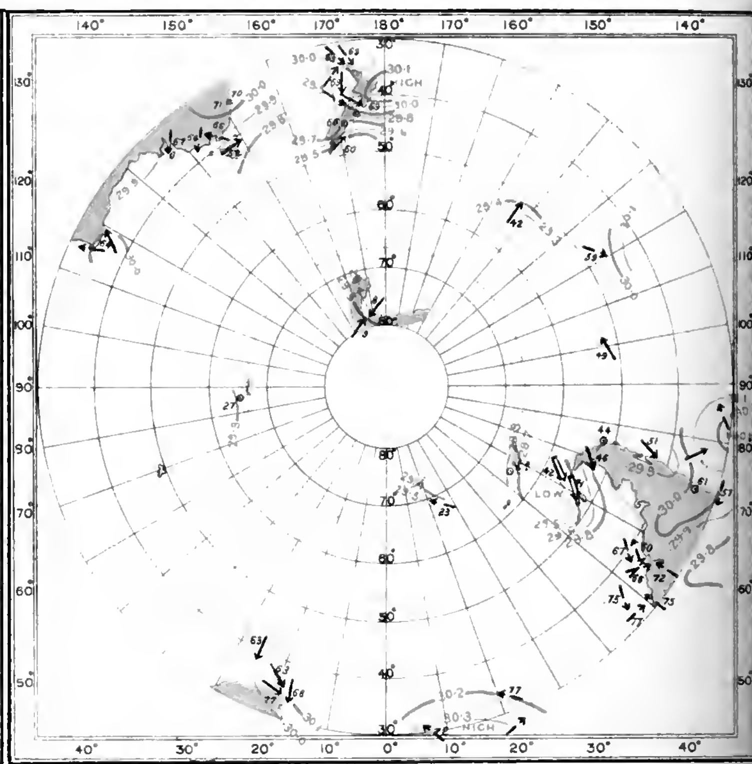

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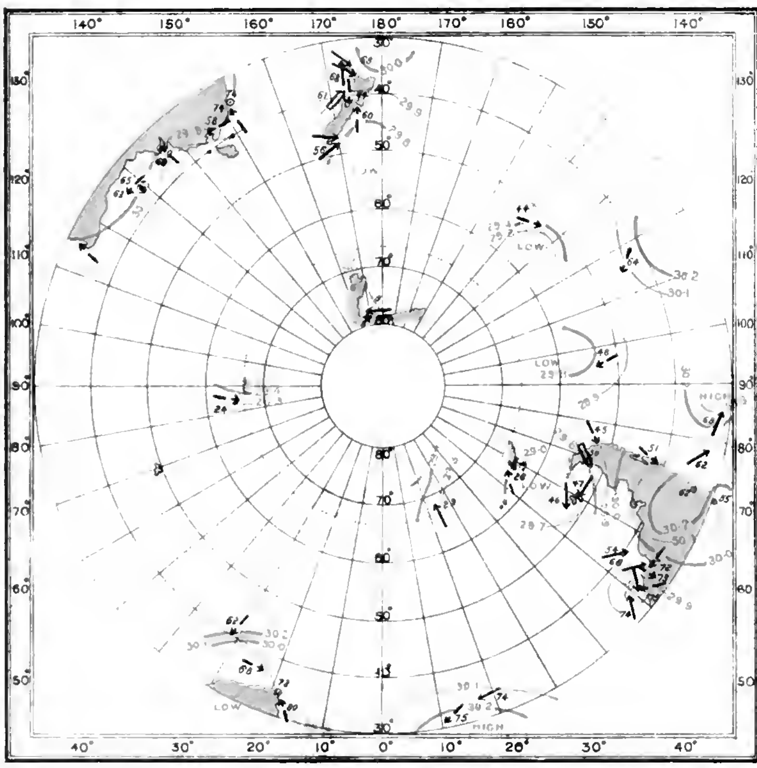

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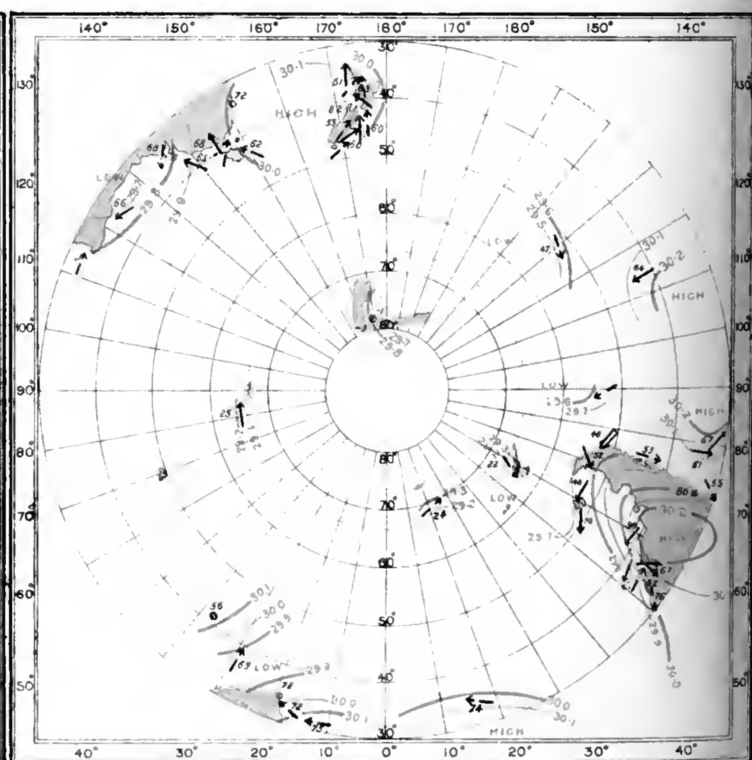

Huth London

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

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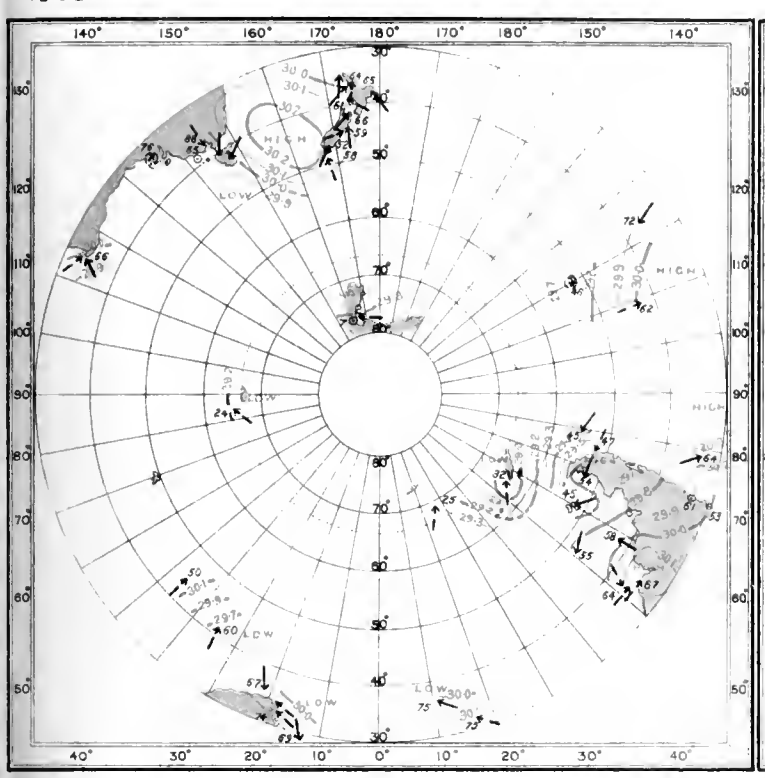

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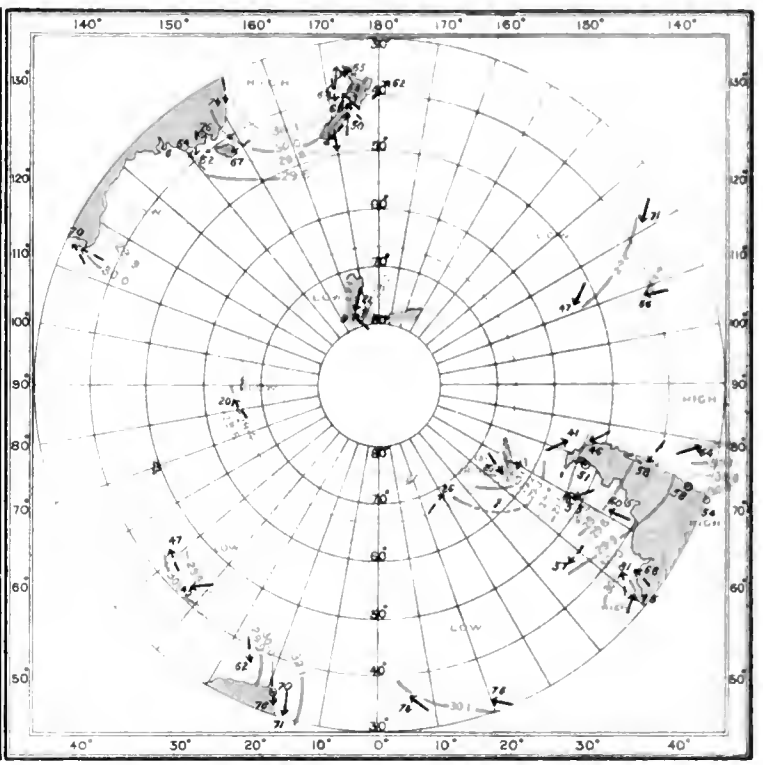

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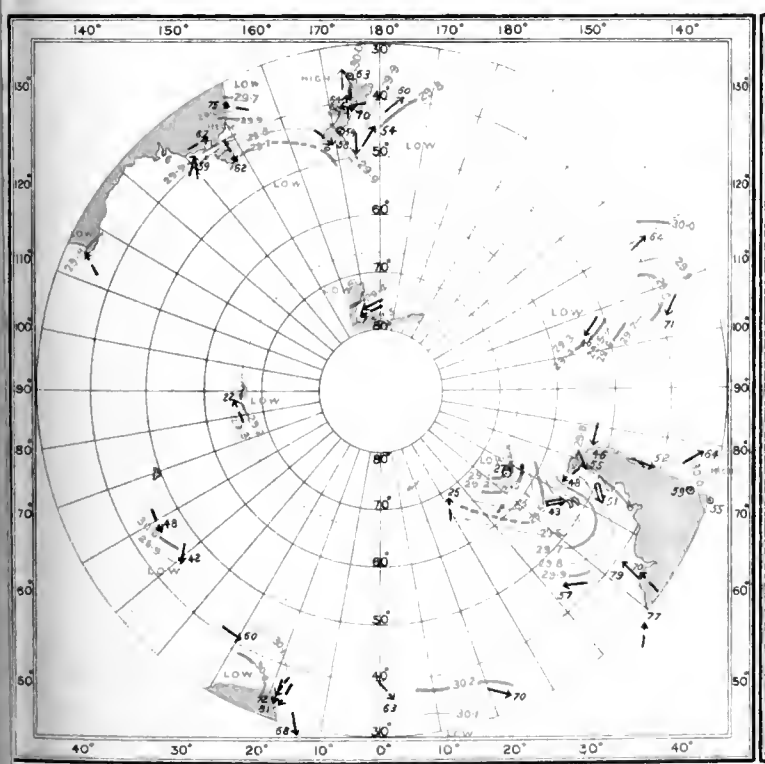

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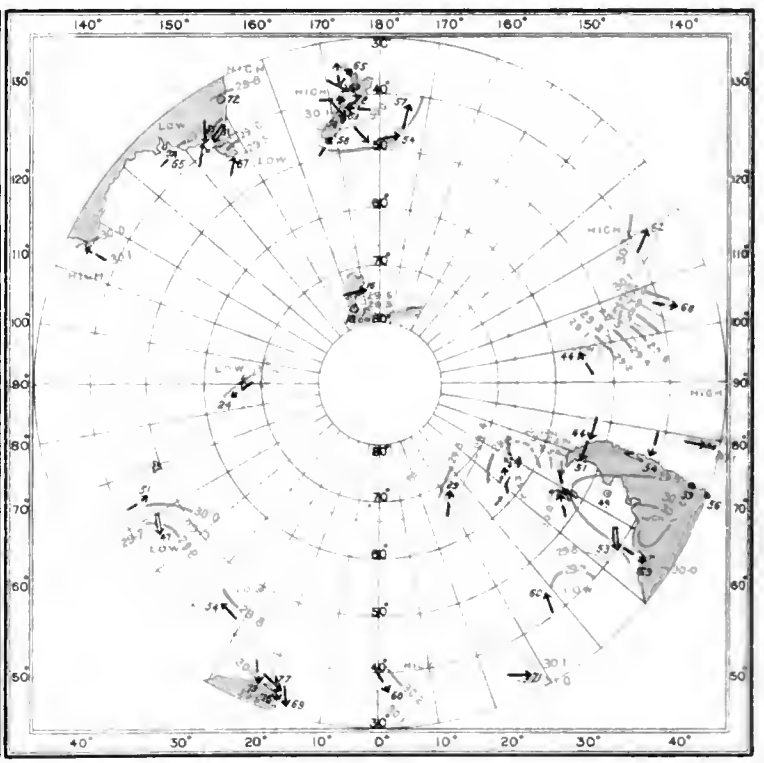


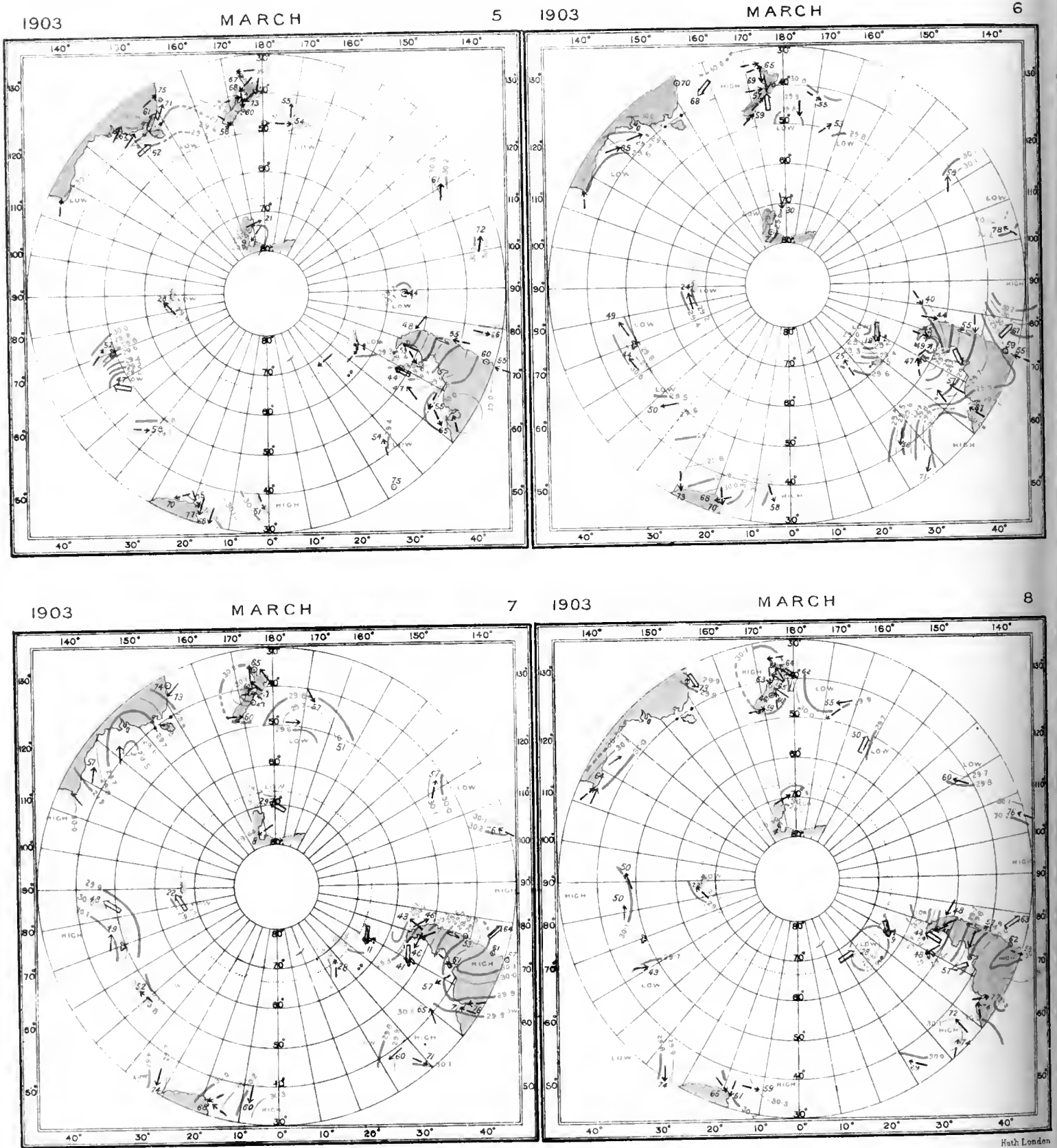
Kurt. London

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

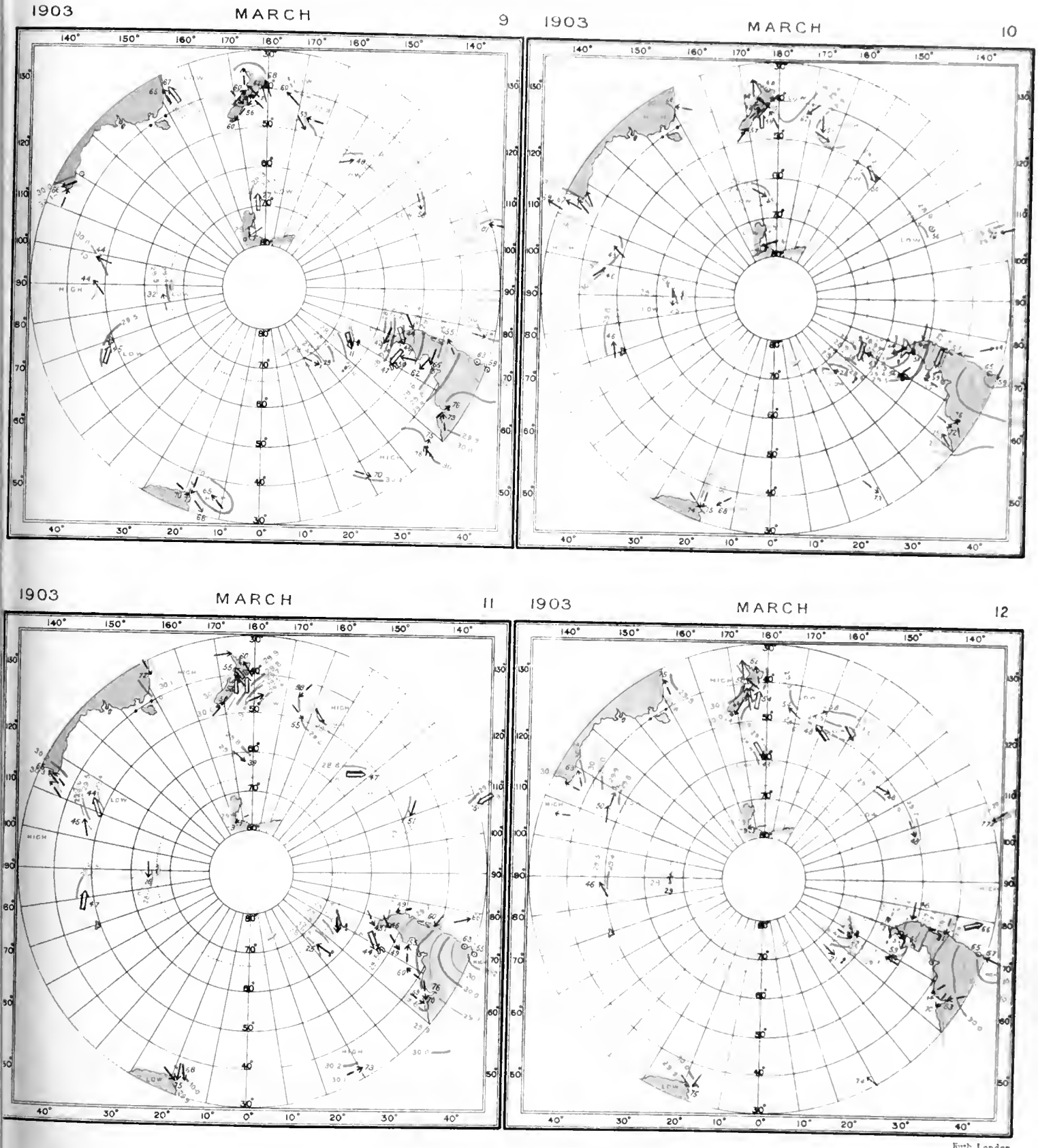


For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES



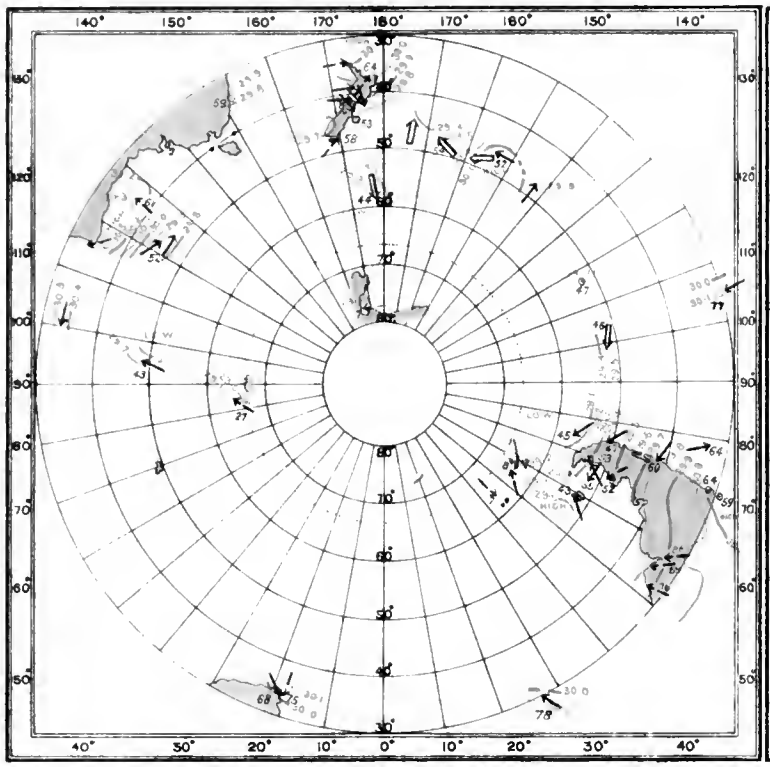
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 MARCH 13



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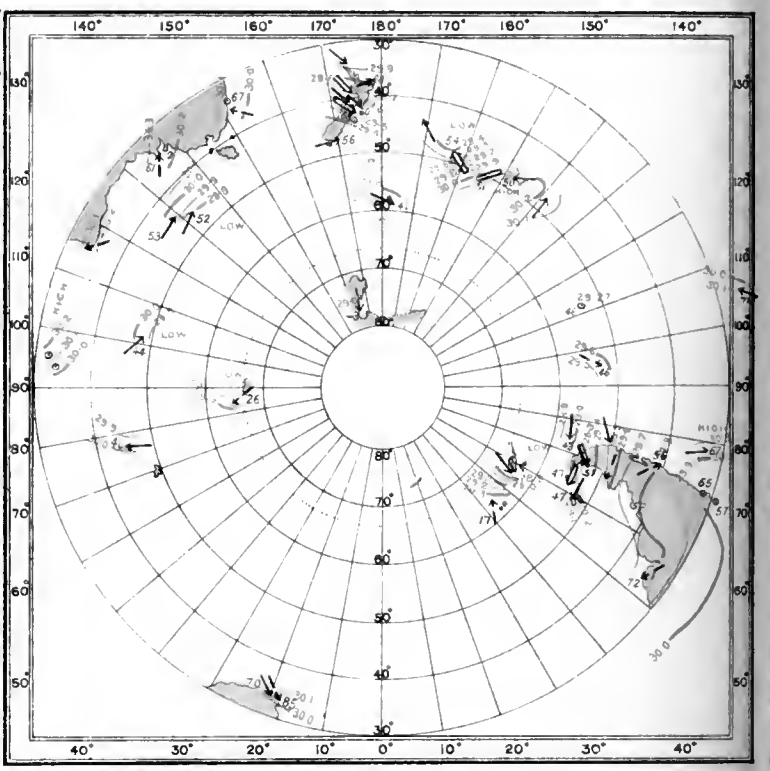

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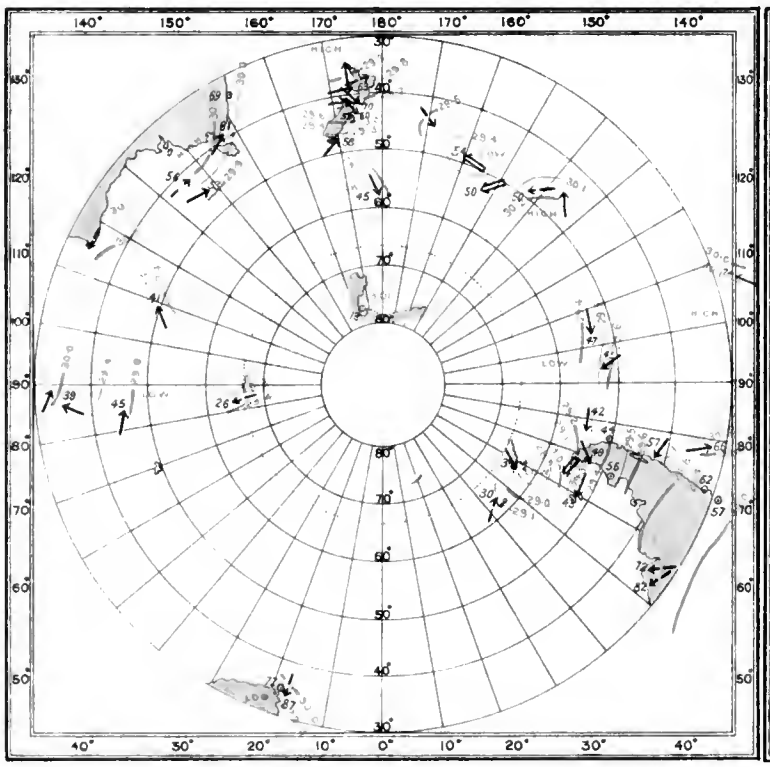

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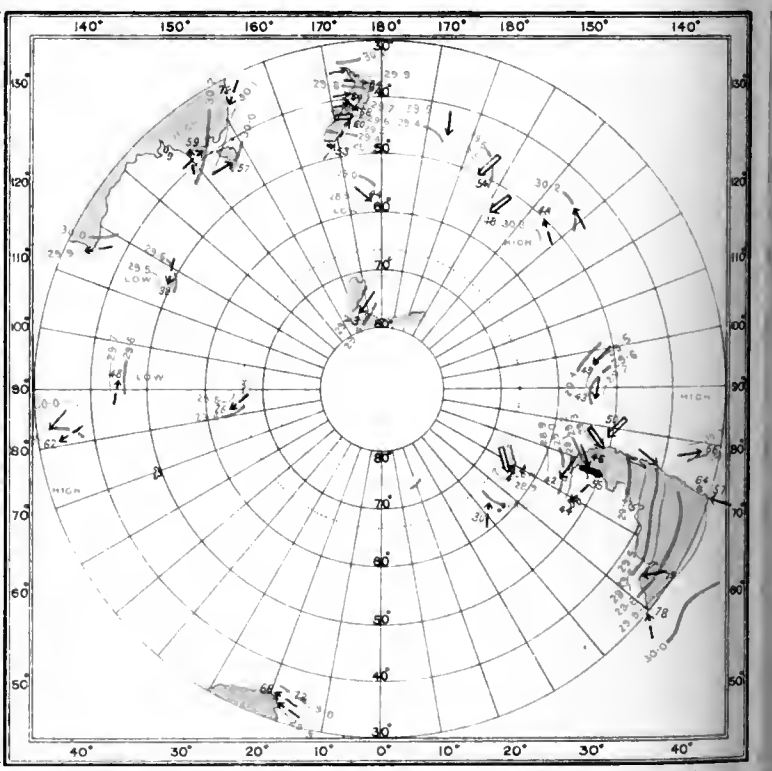


Hugh Lundon

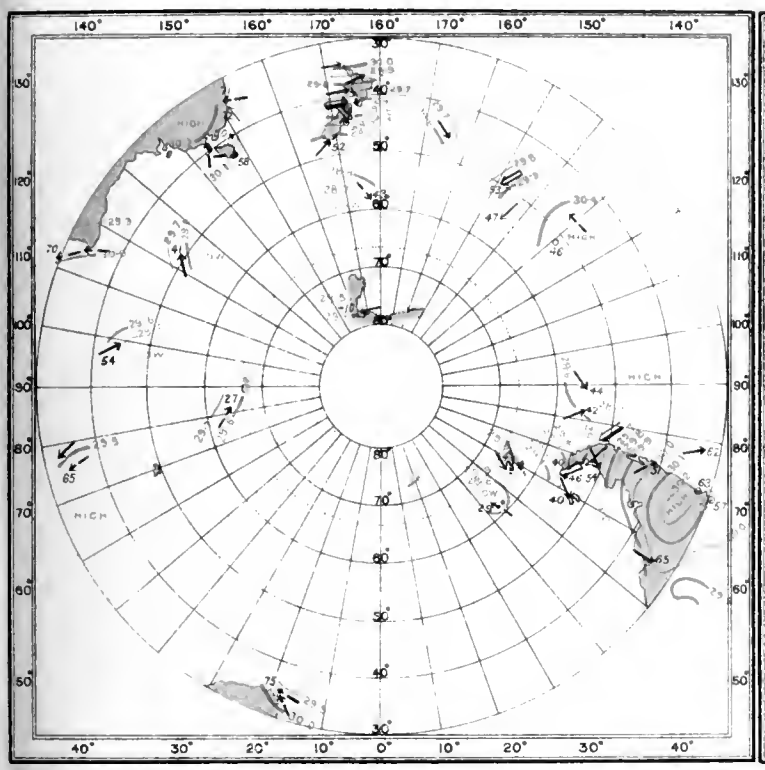
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1903 MARCH 17



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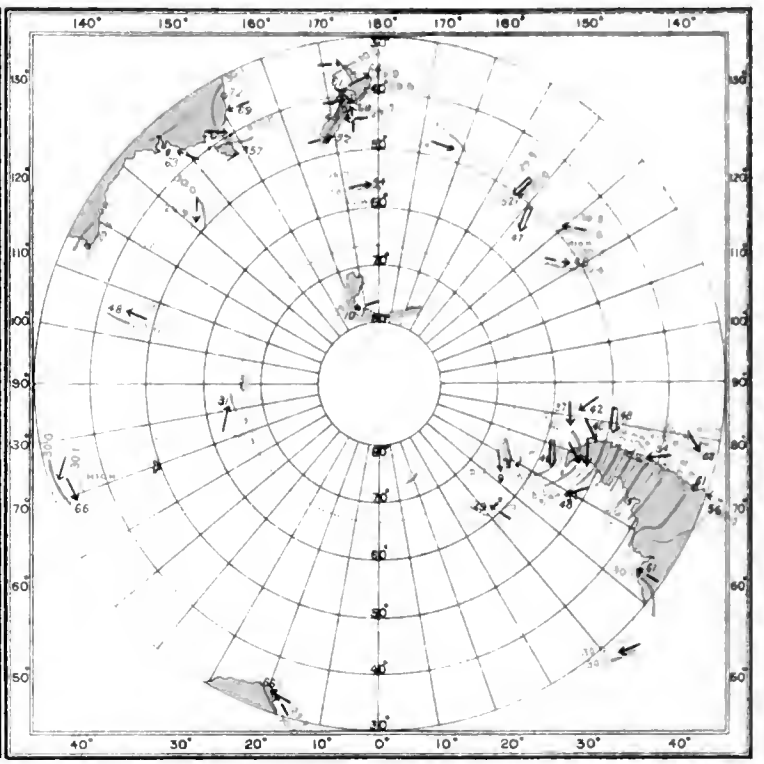

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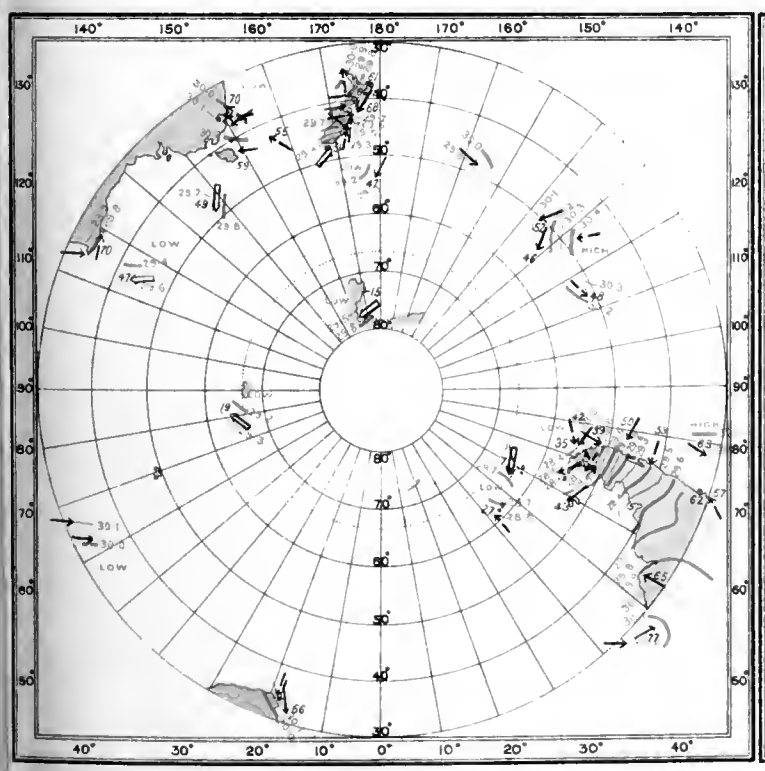

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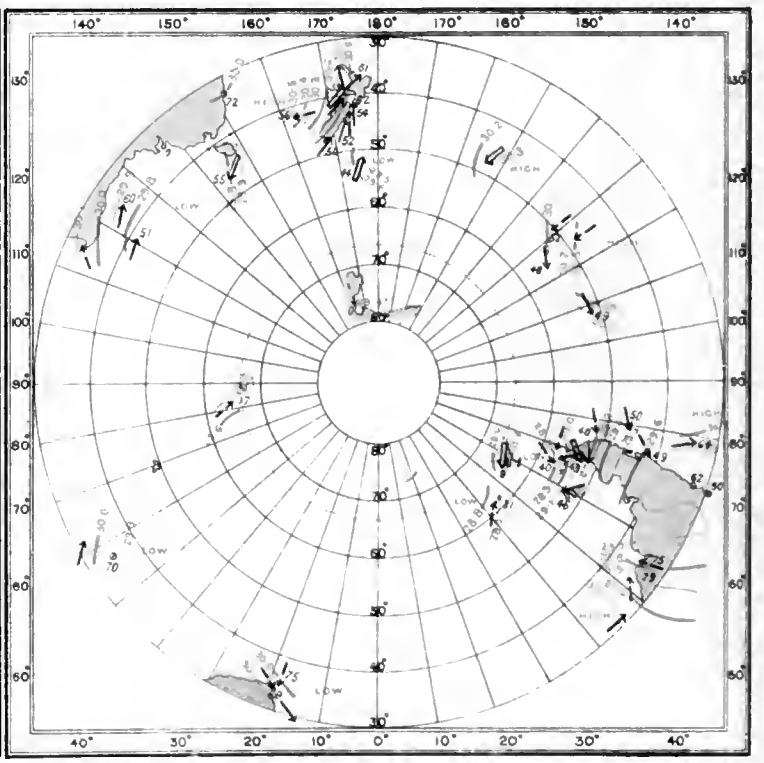


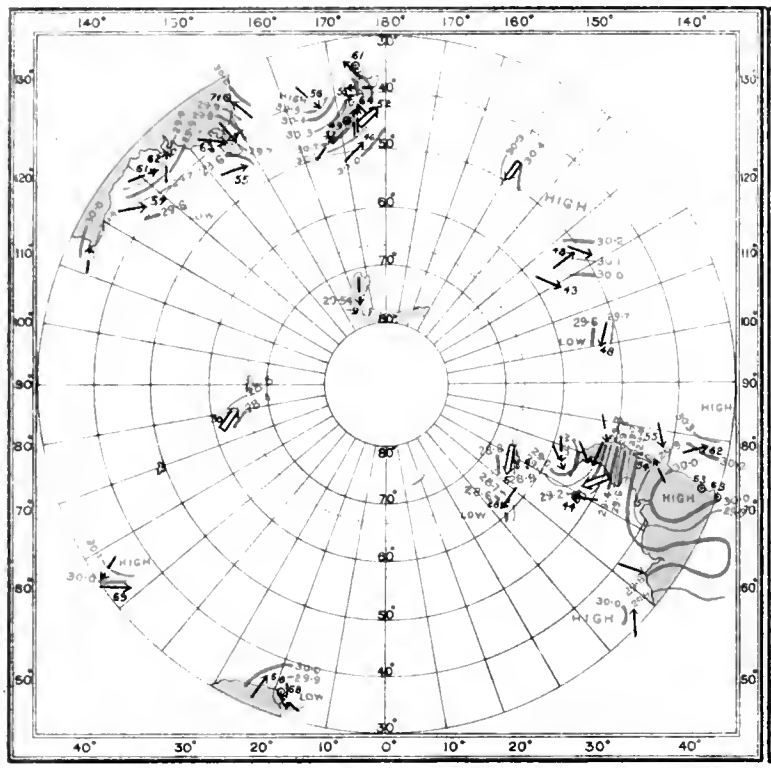
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 MARCH 21



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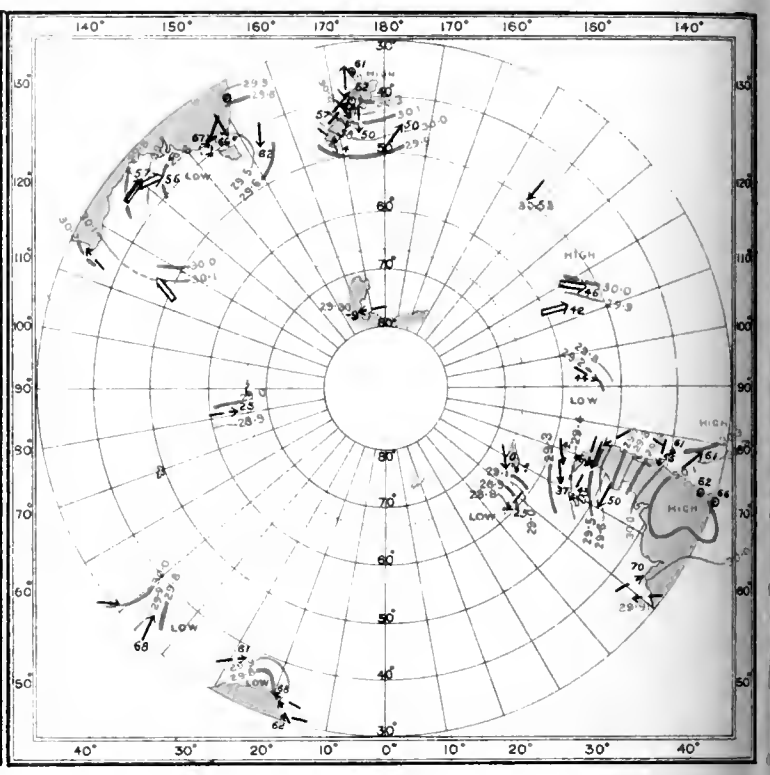

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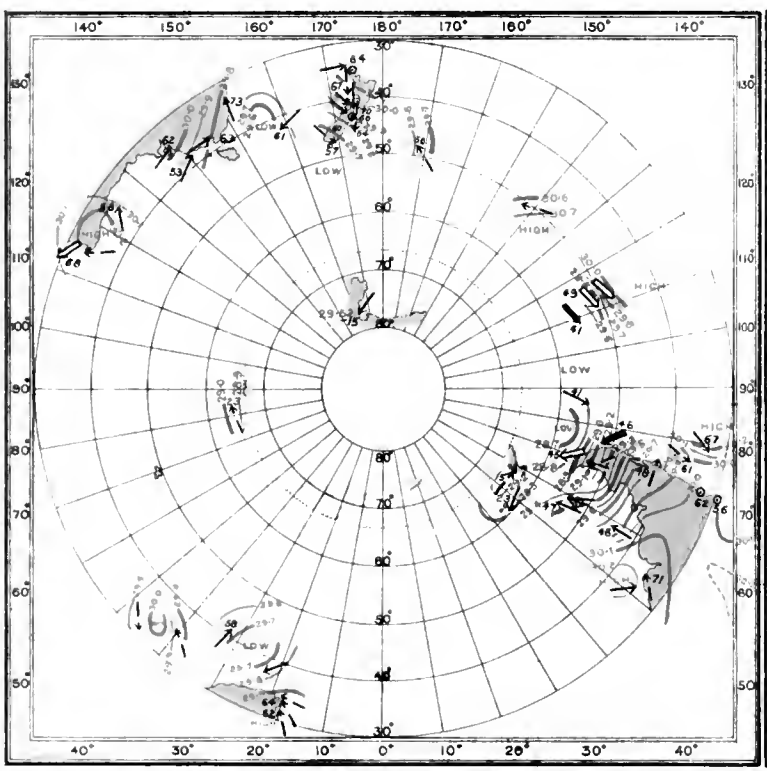

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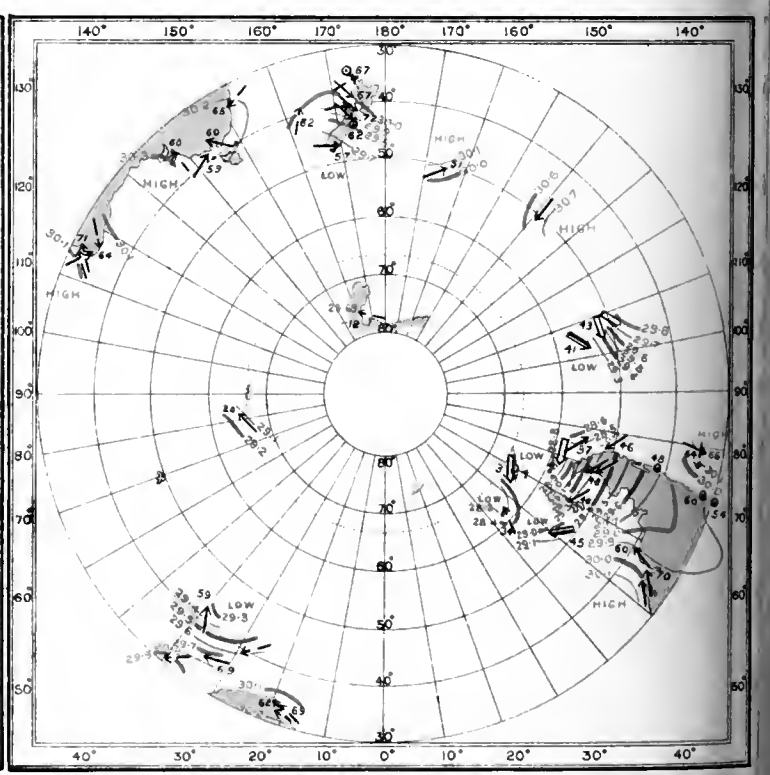


Hugh London

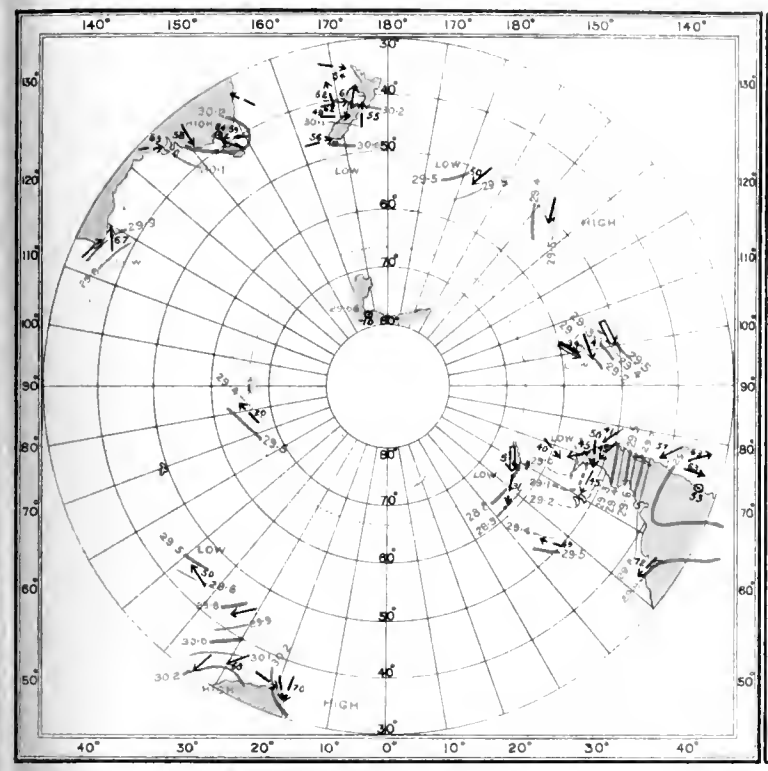
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 MARCH 25



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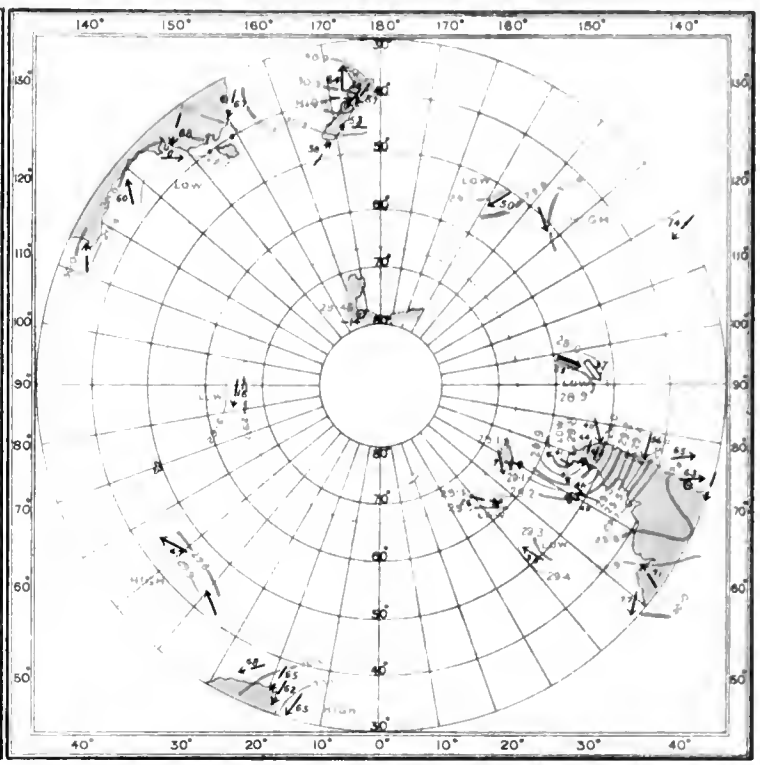

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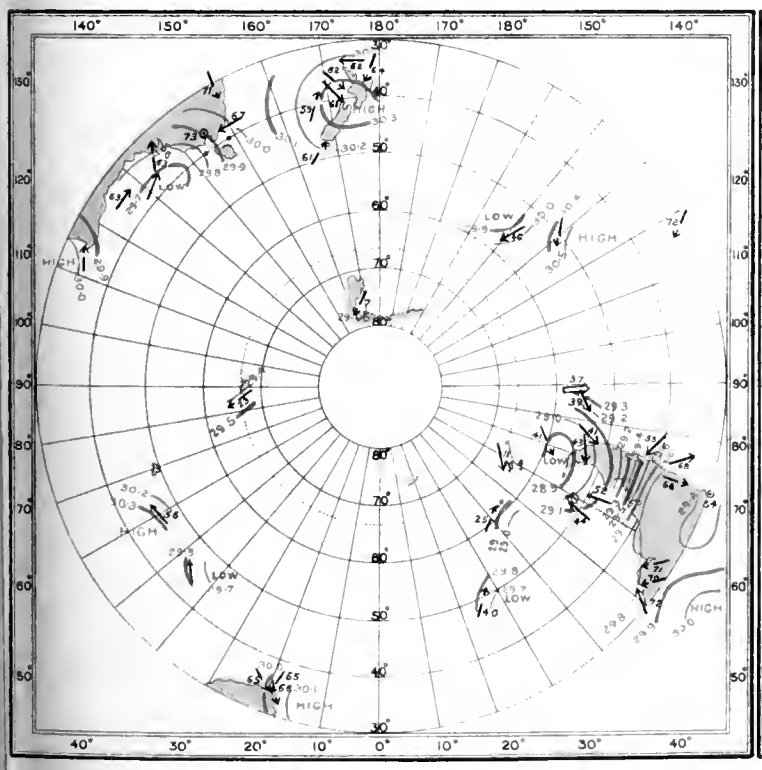

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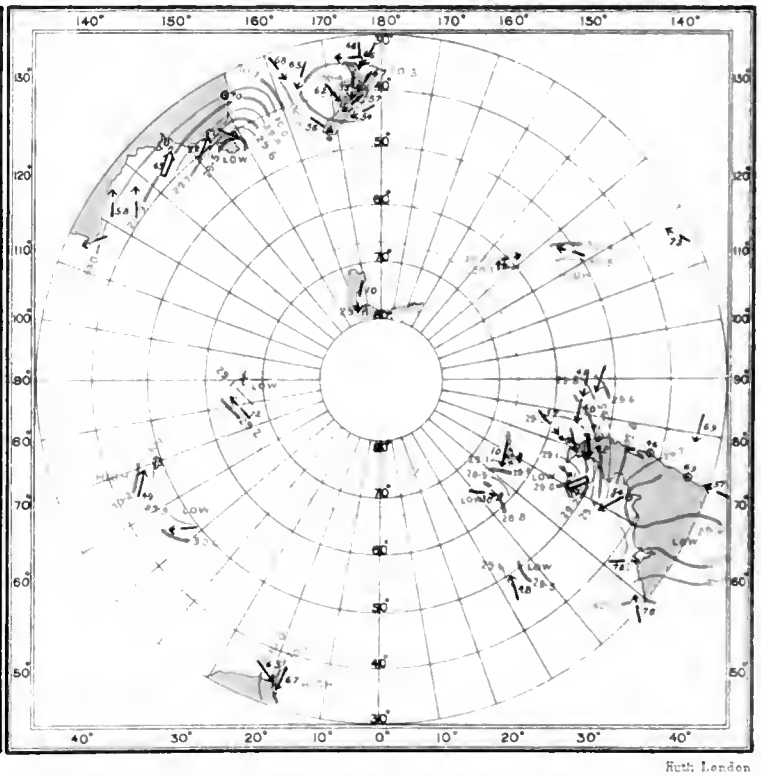


Huth, London

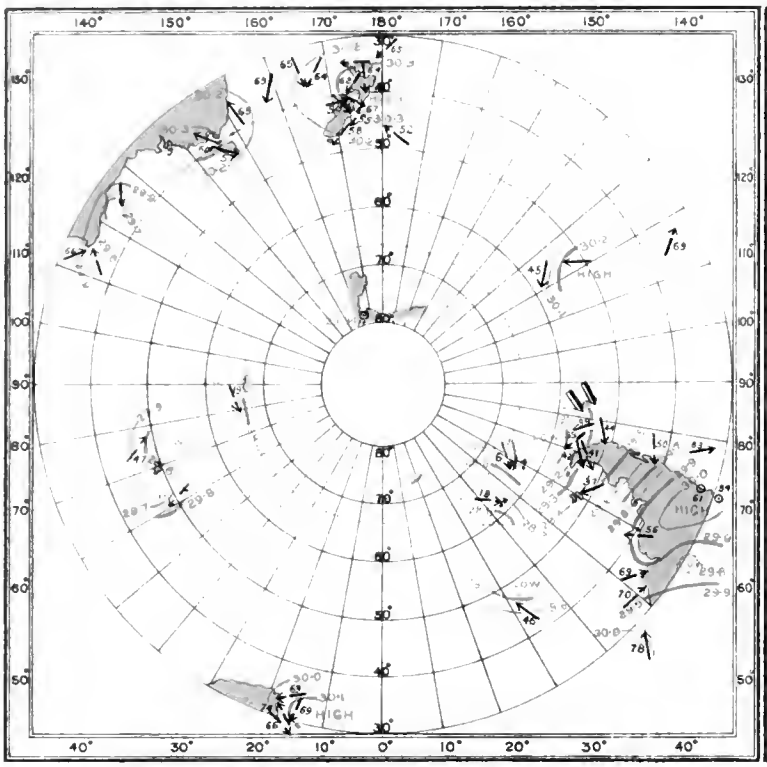
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 MARCH 29



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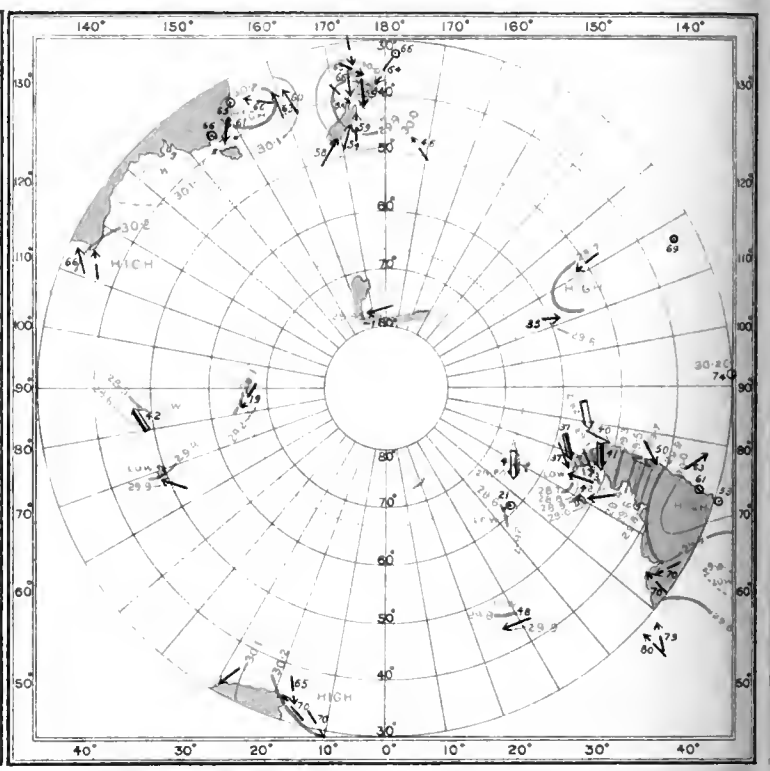

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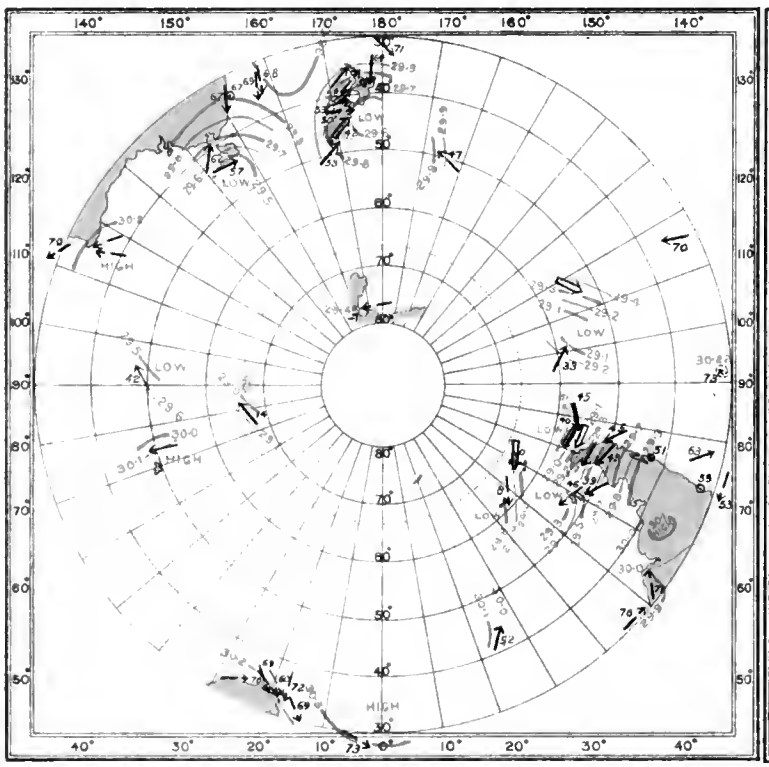

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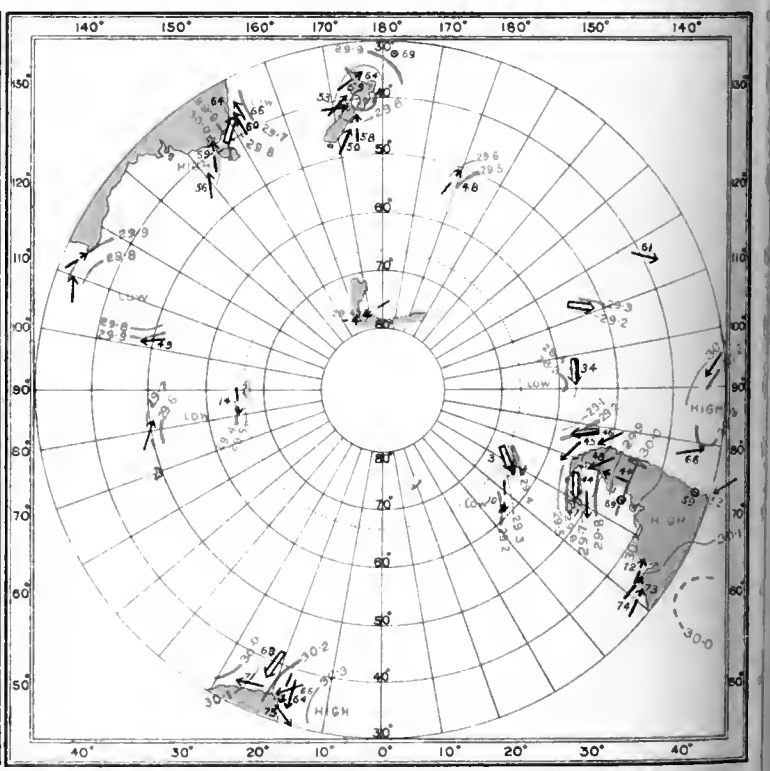


Meth London

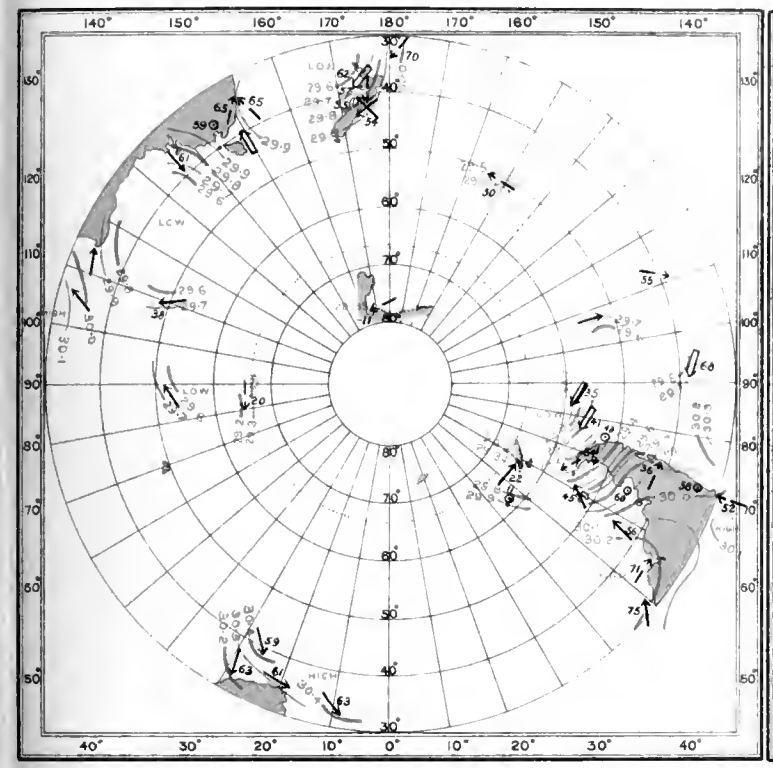
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 APRIL 2



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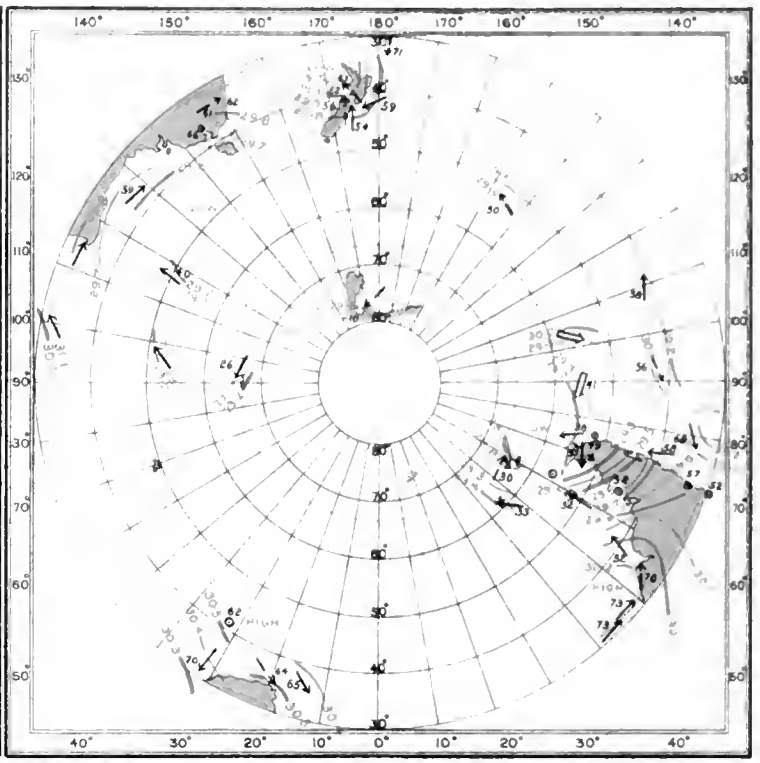

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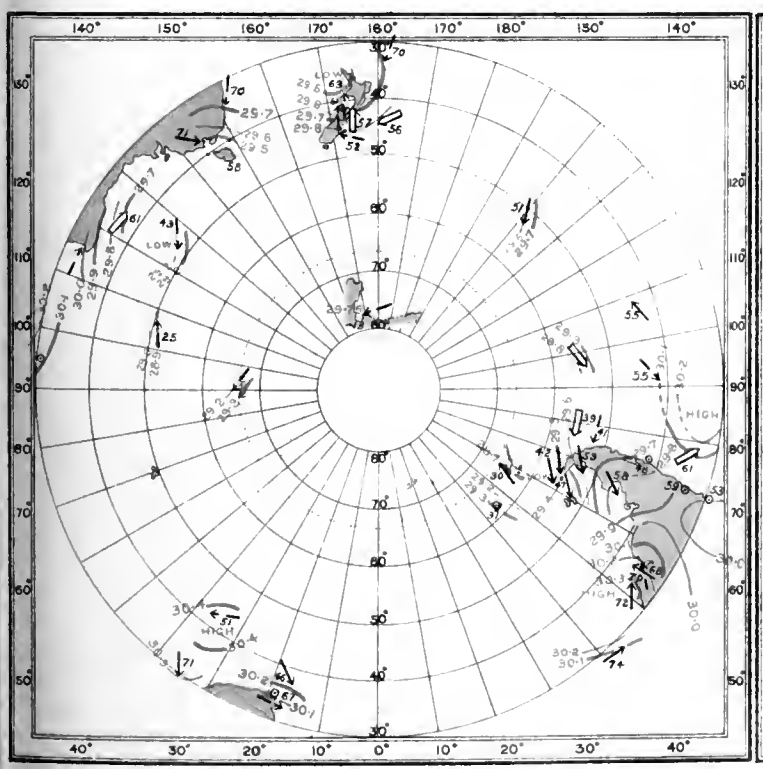

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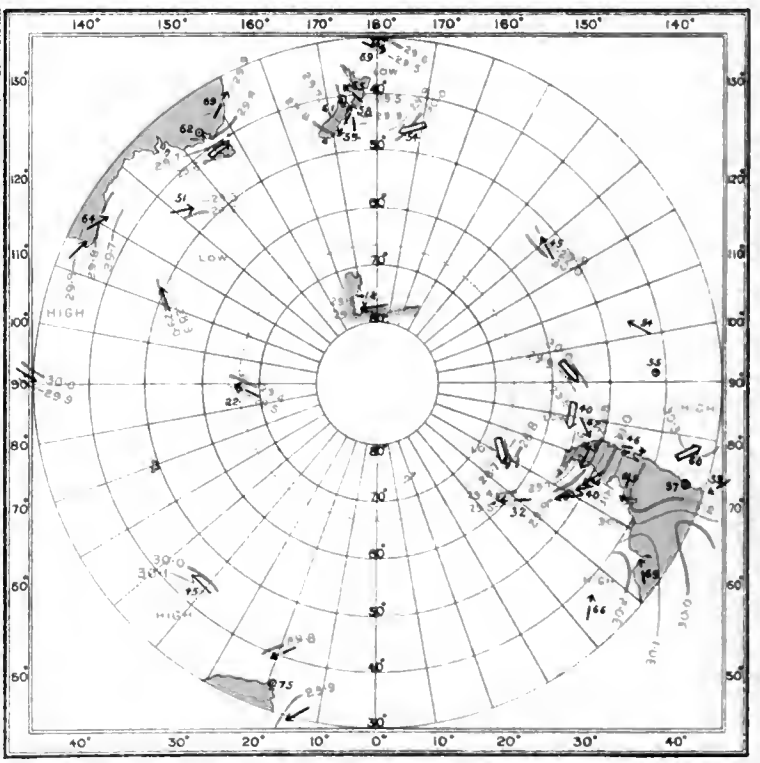


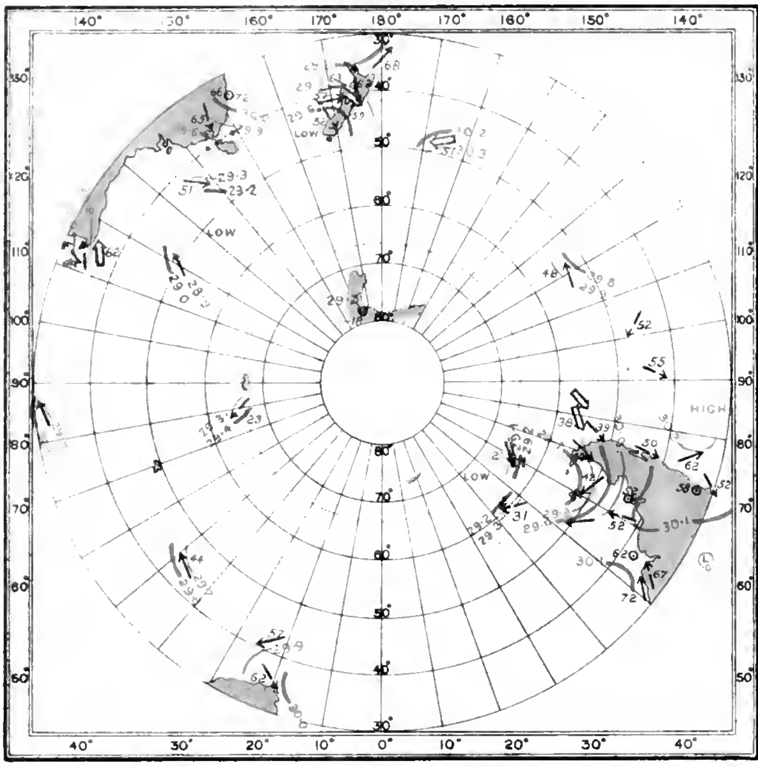
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 APRIL 6



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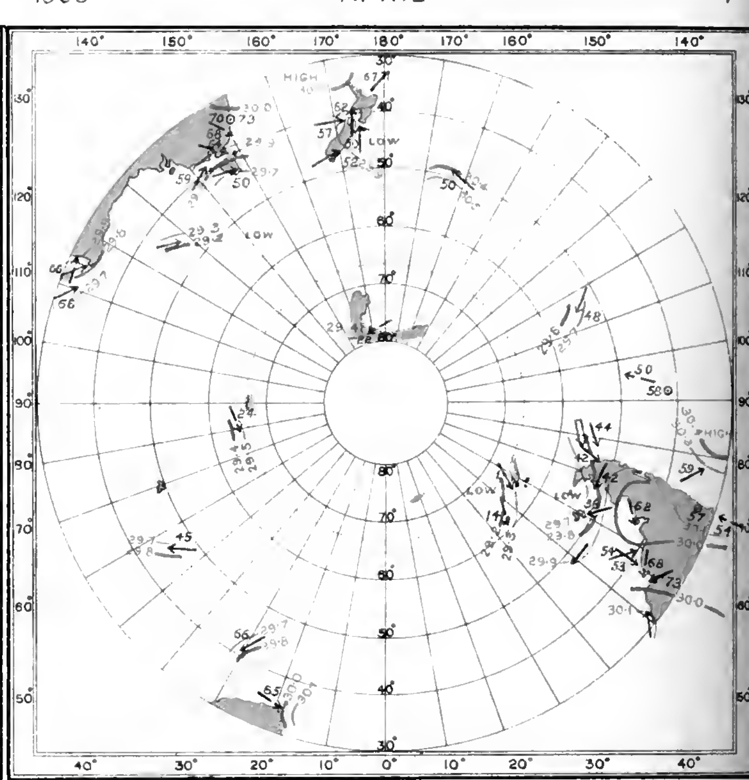

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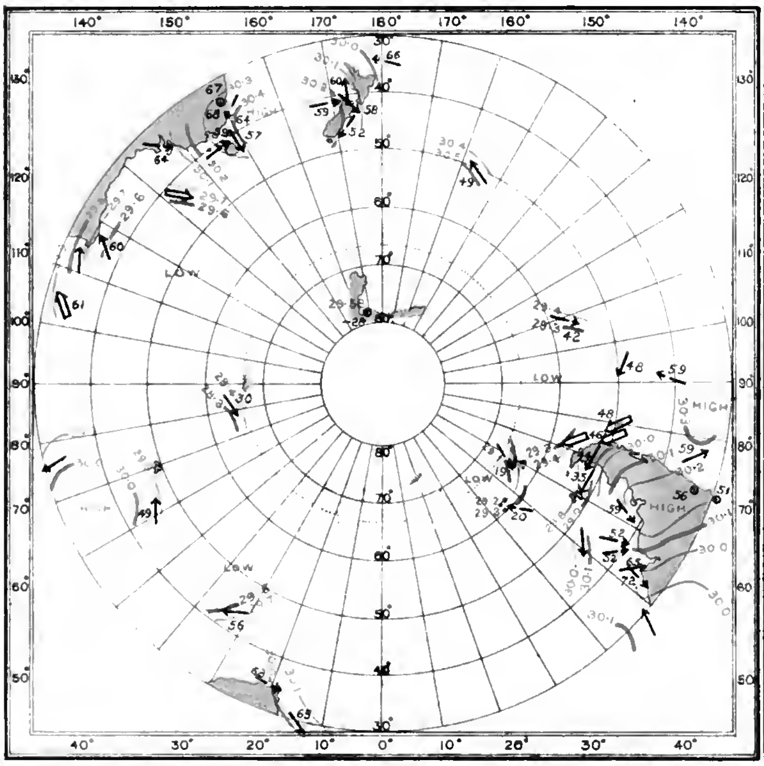

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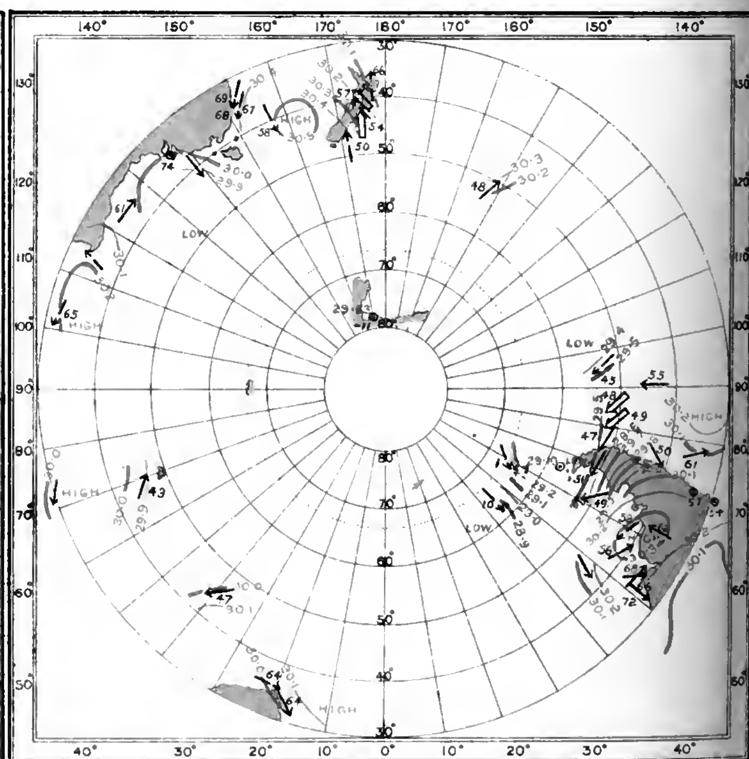


Huth London

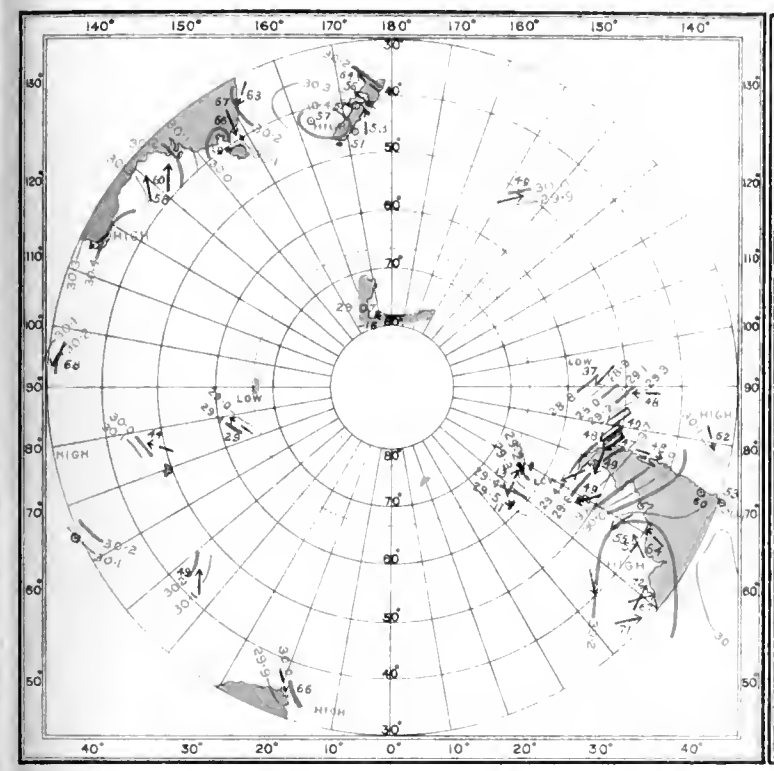
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 APRIL 10



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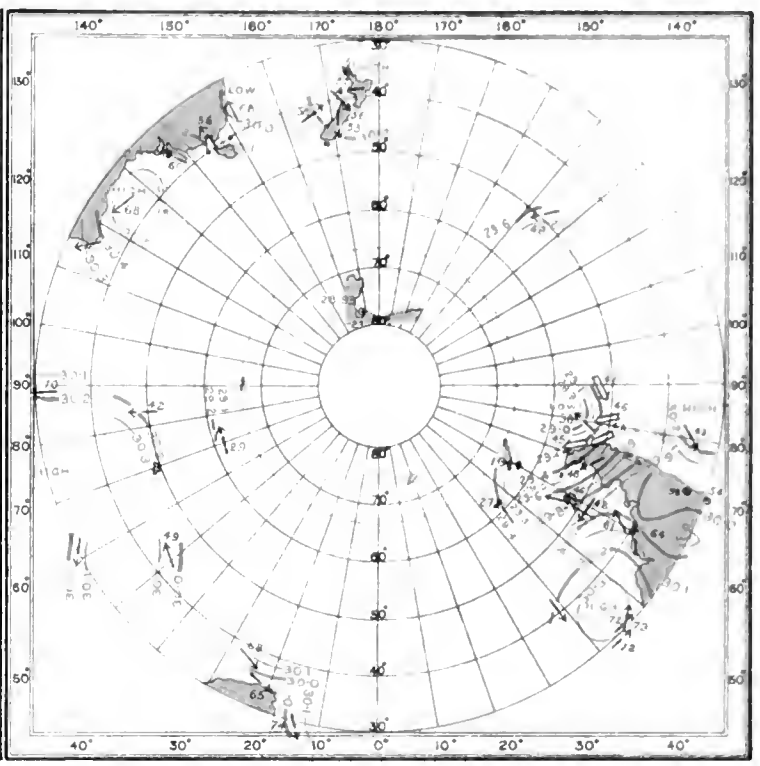

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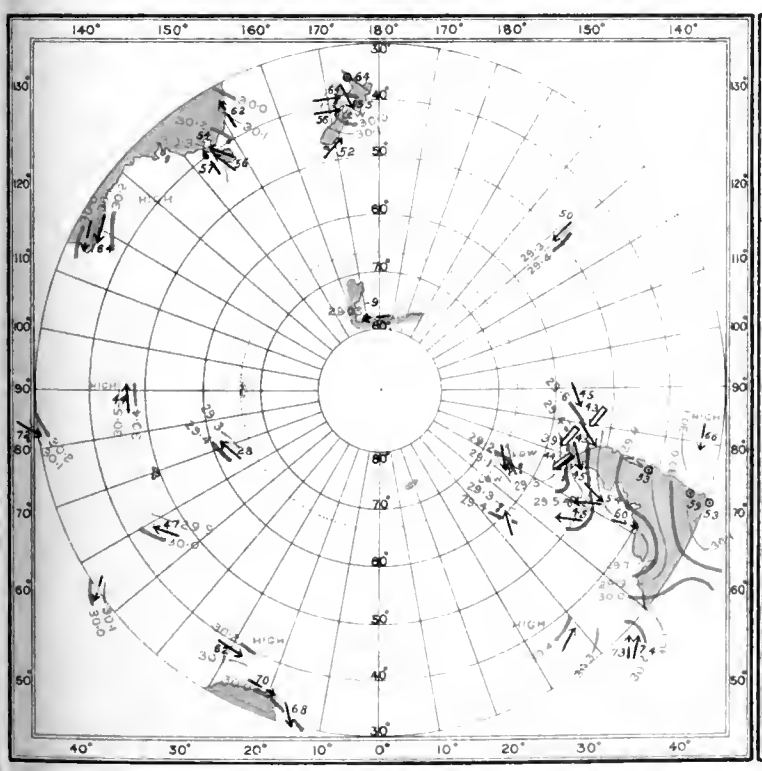

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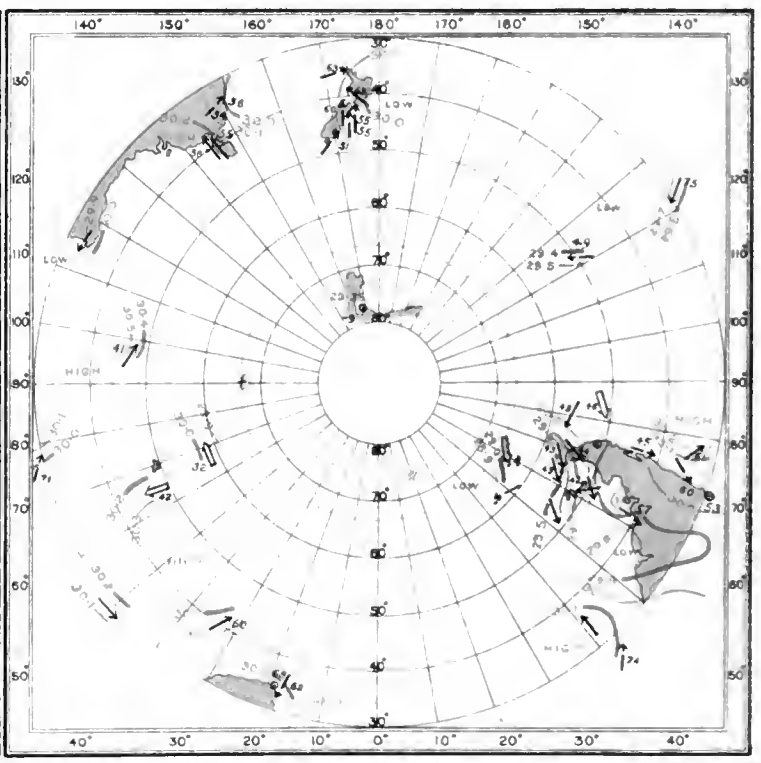


Edth London

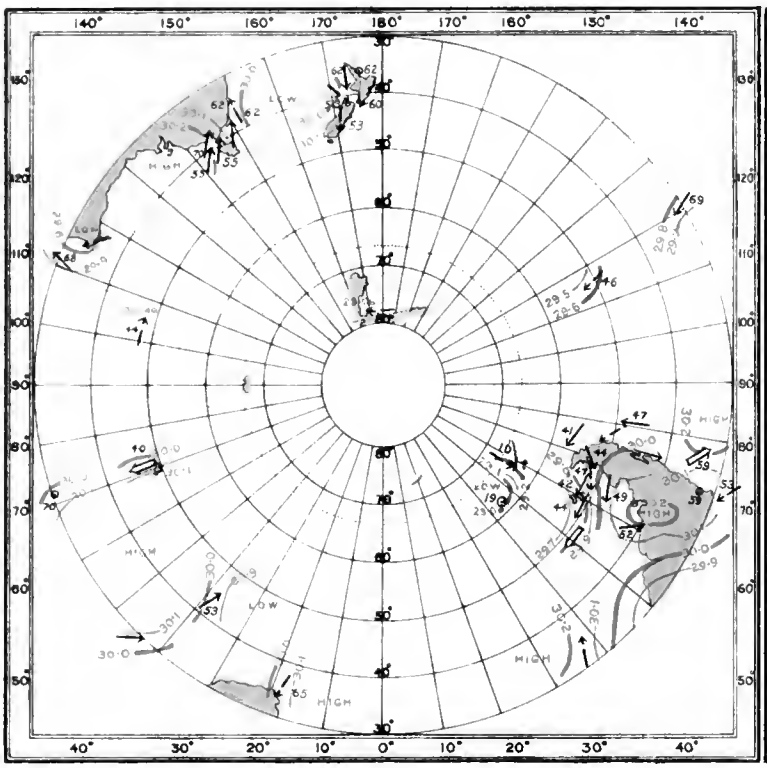
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 APRIL 14



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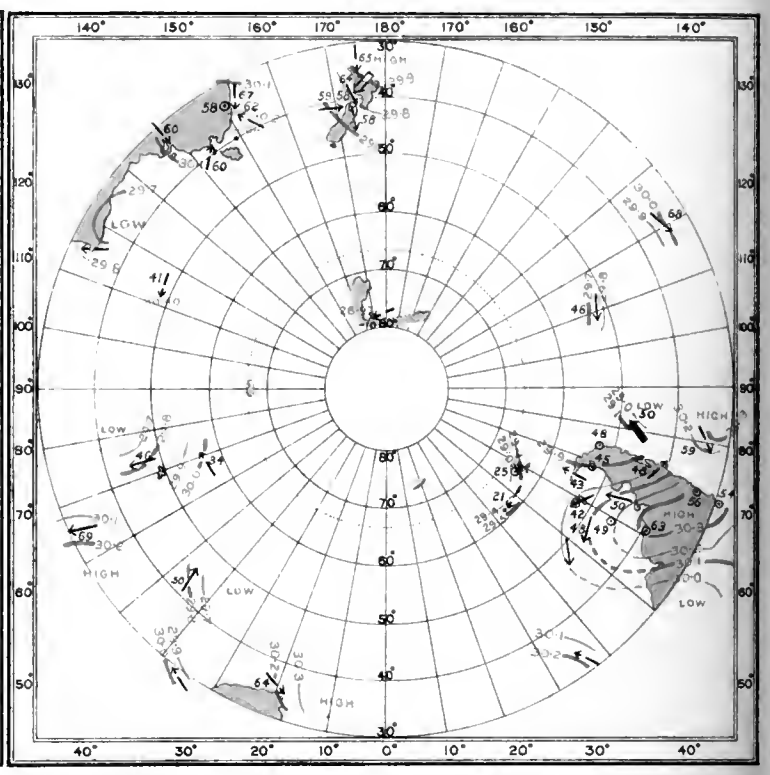

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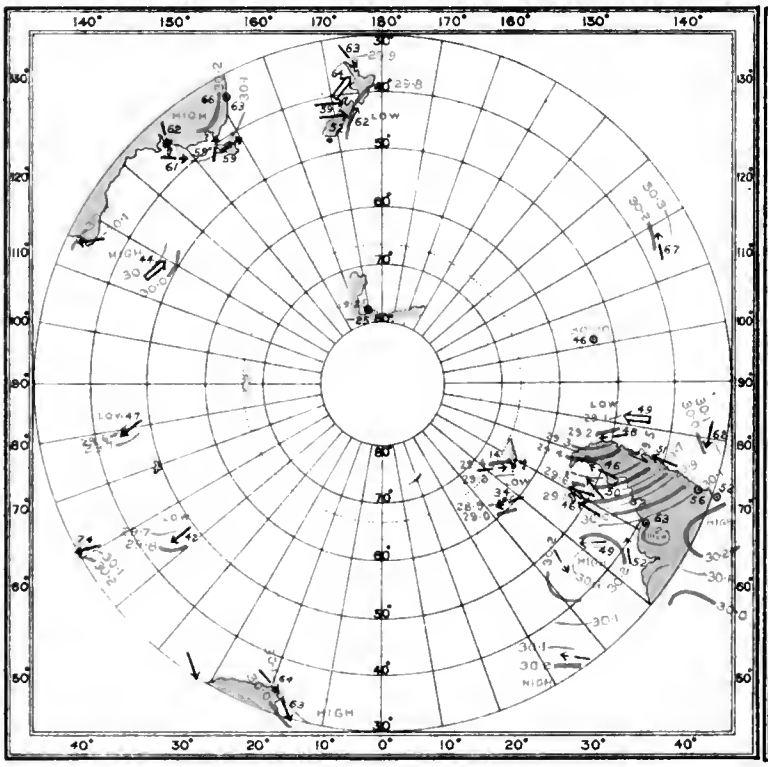

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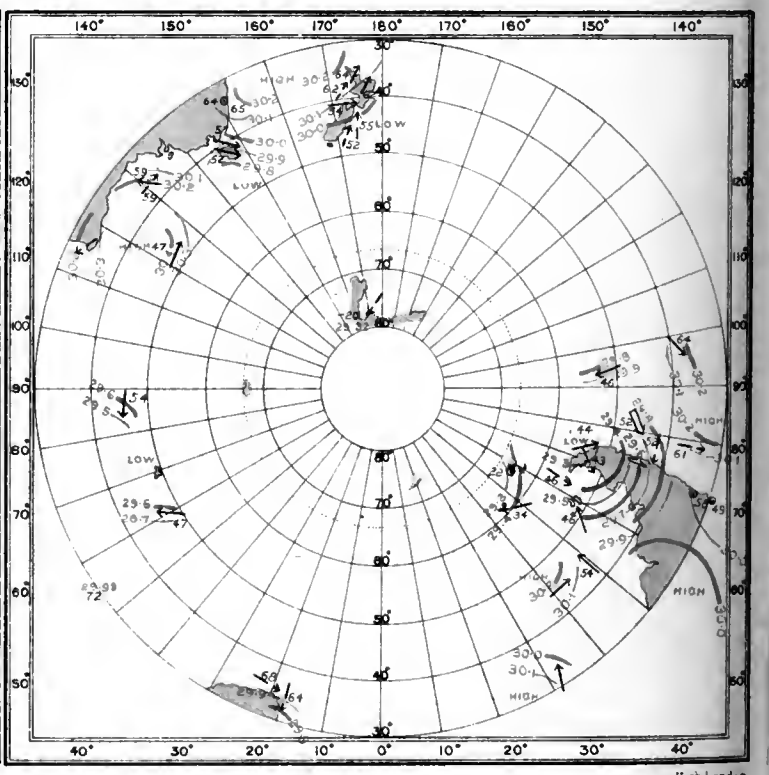


Huth, London.

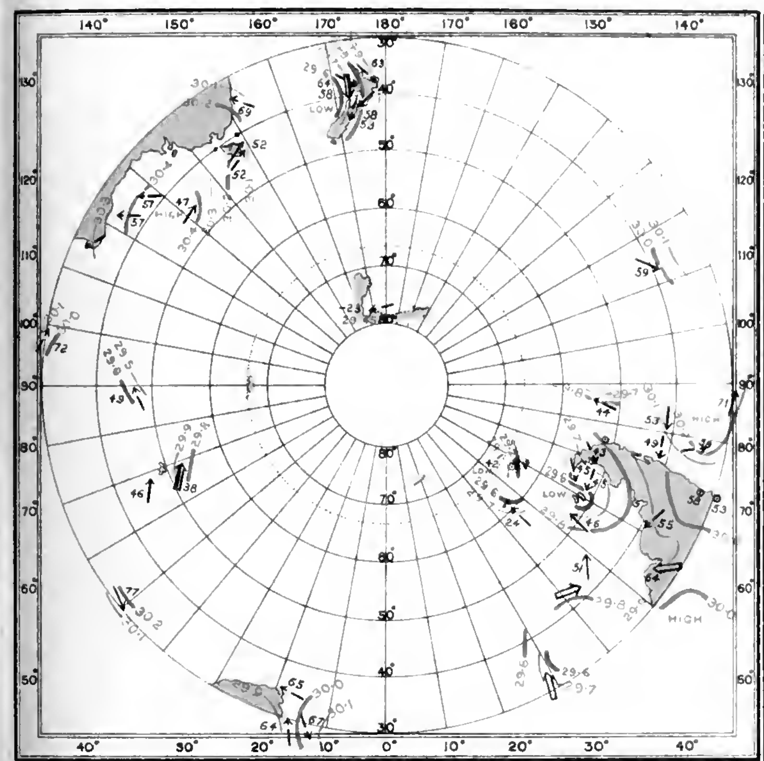
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 APRIL 18



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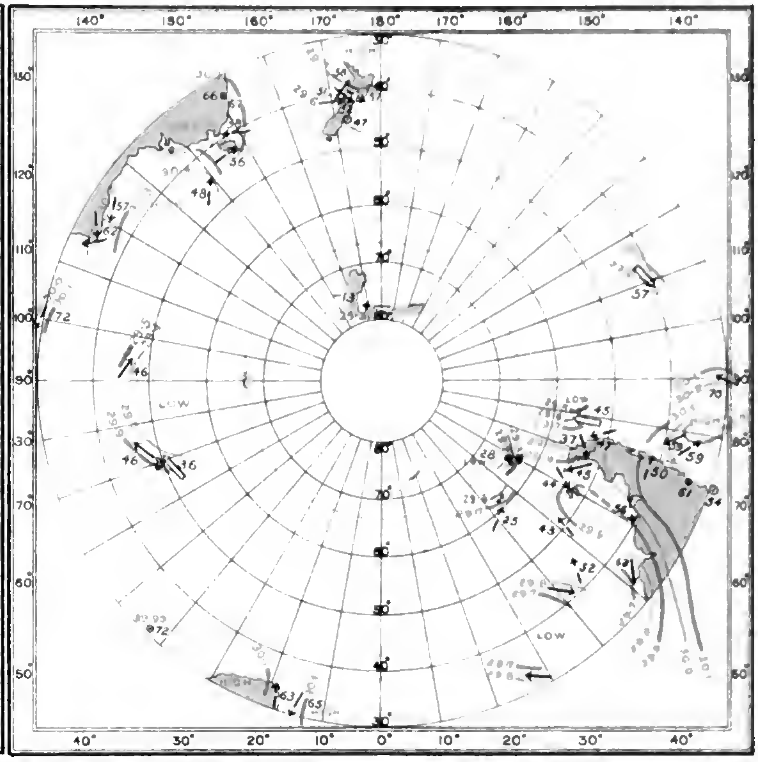

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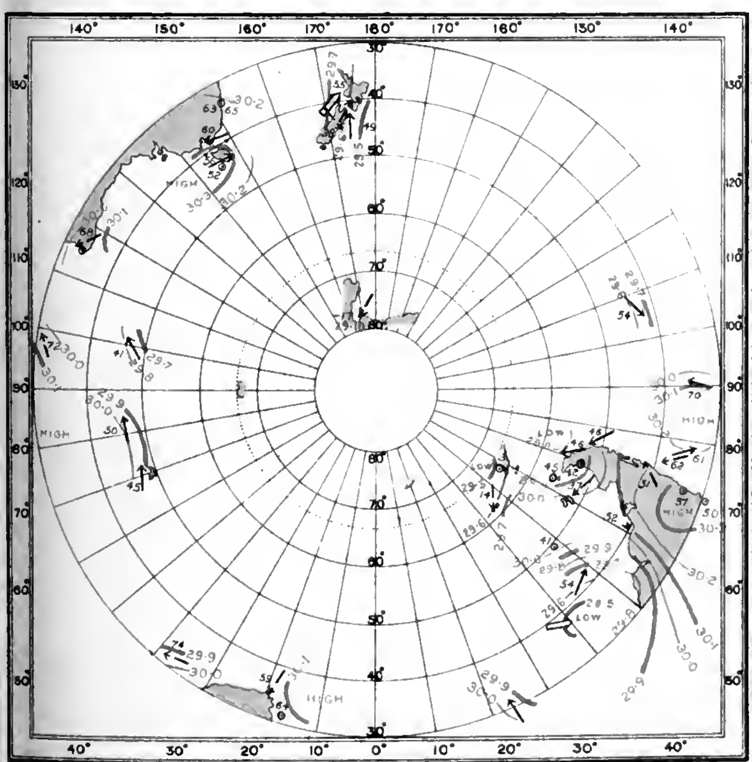

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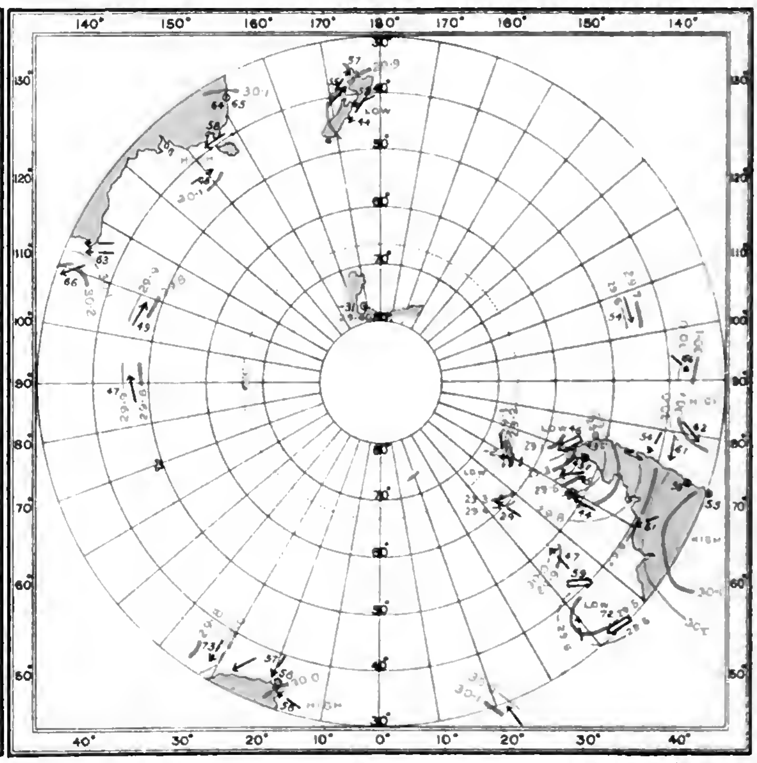

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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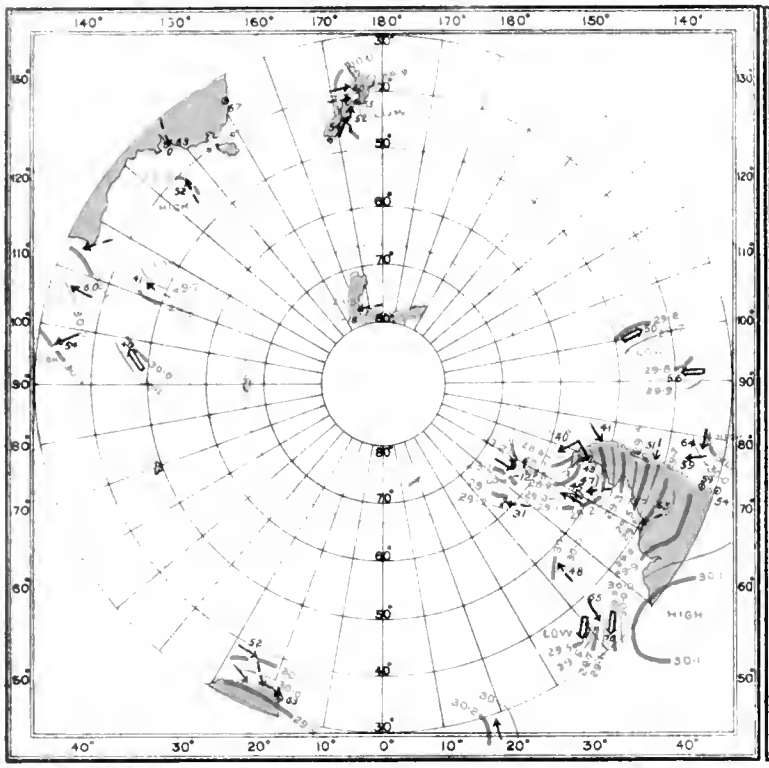

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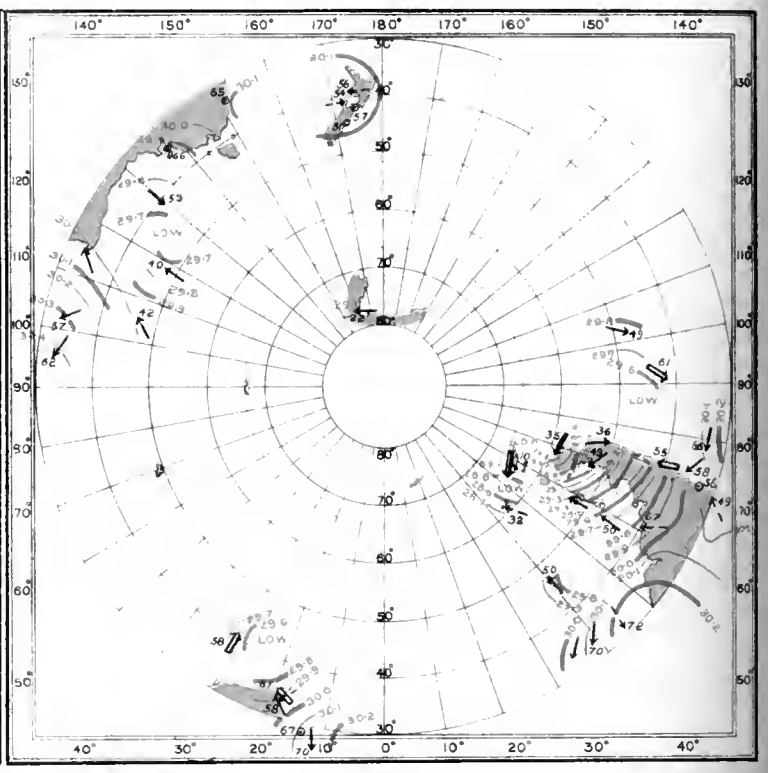

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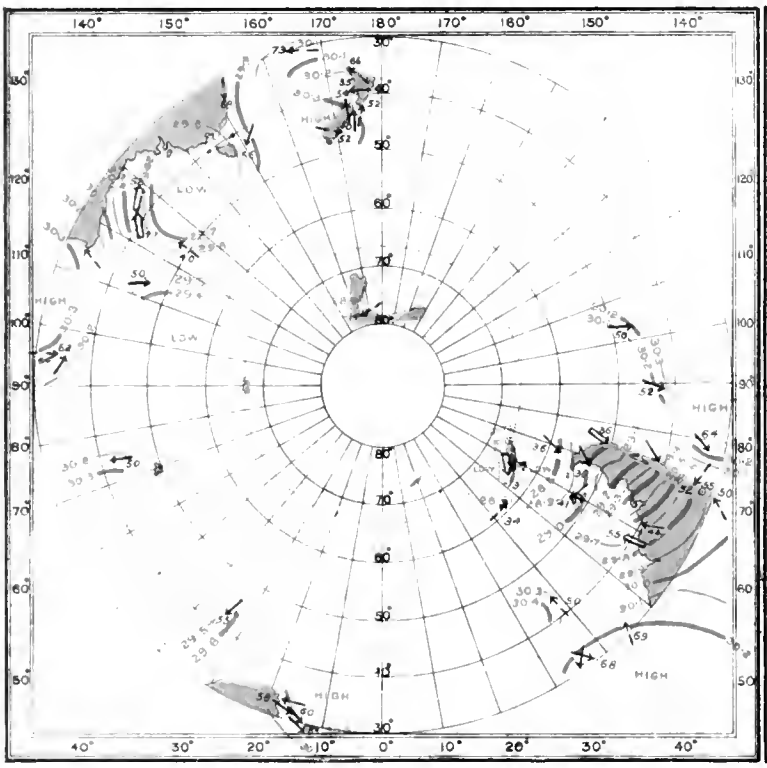

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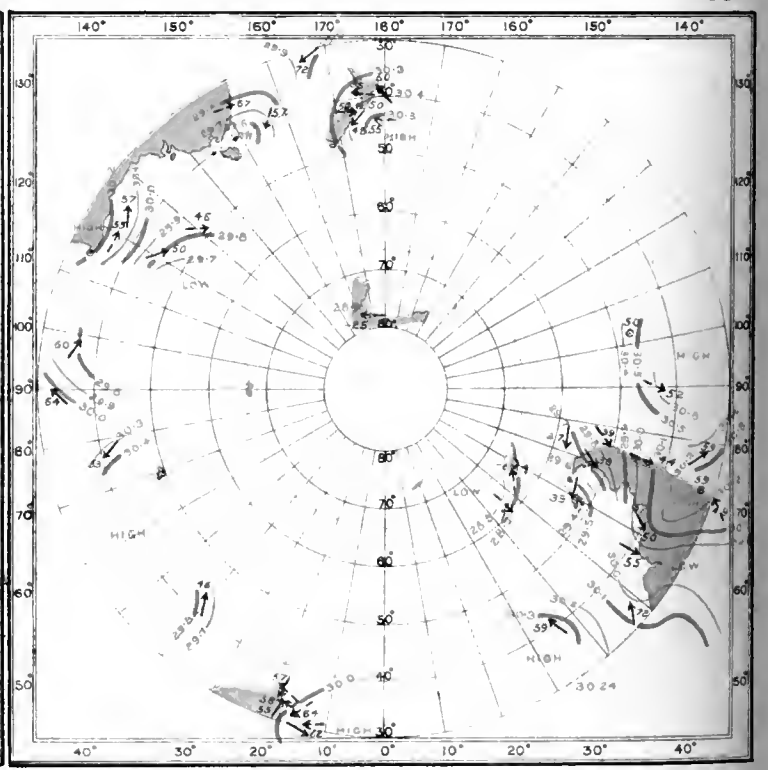

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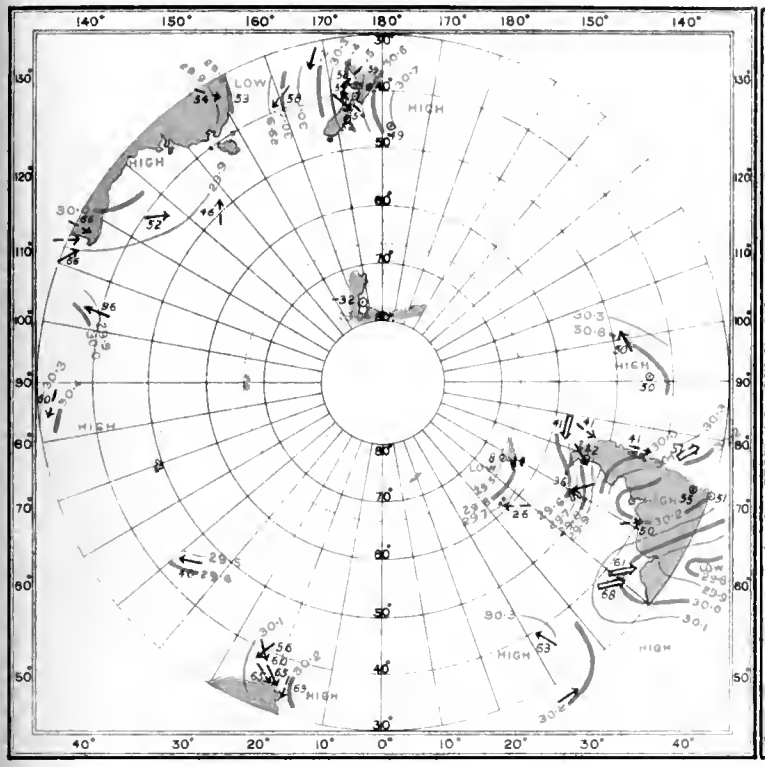
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1903 APRIL 26



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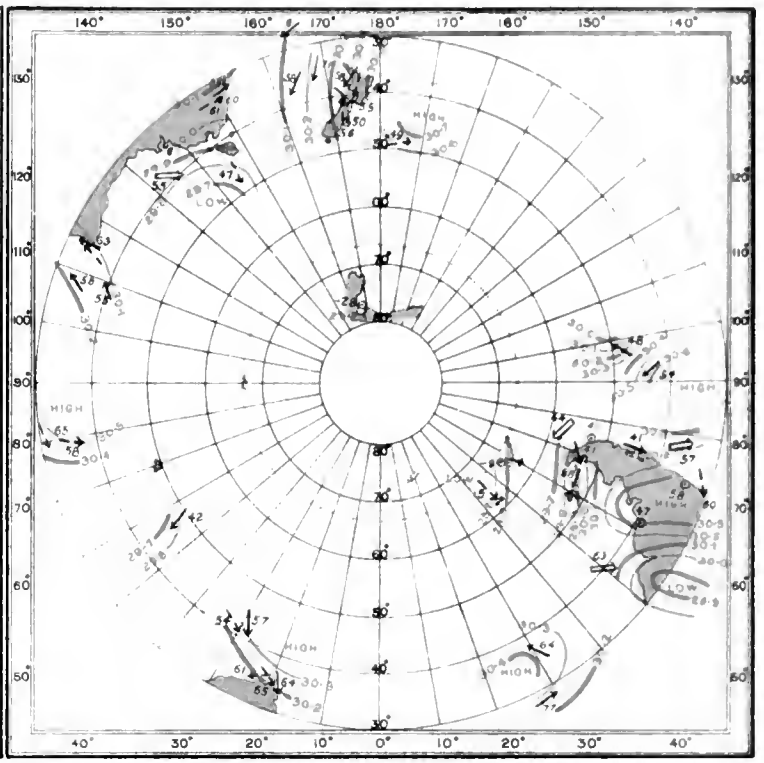

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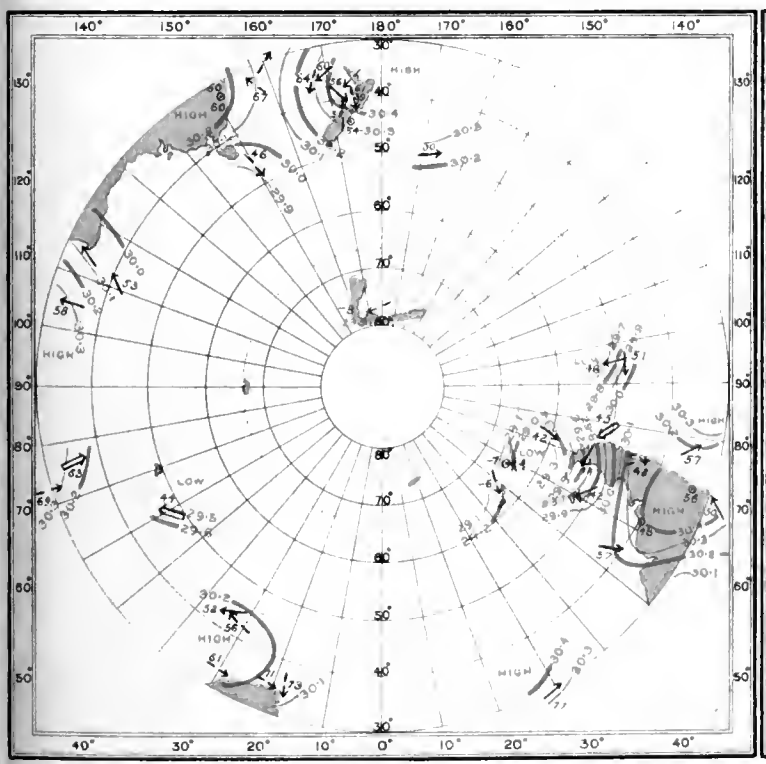

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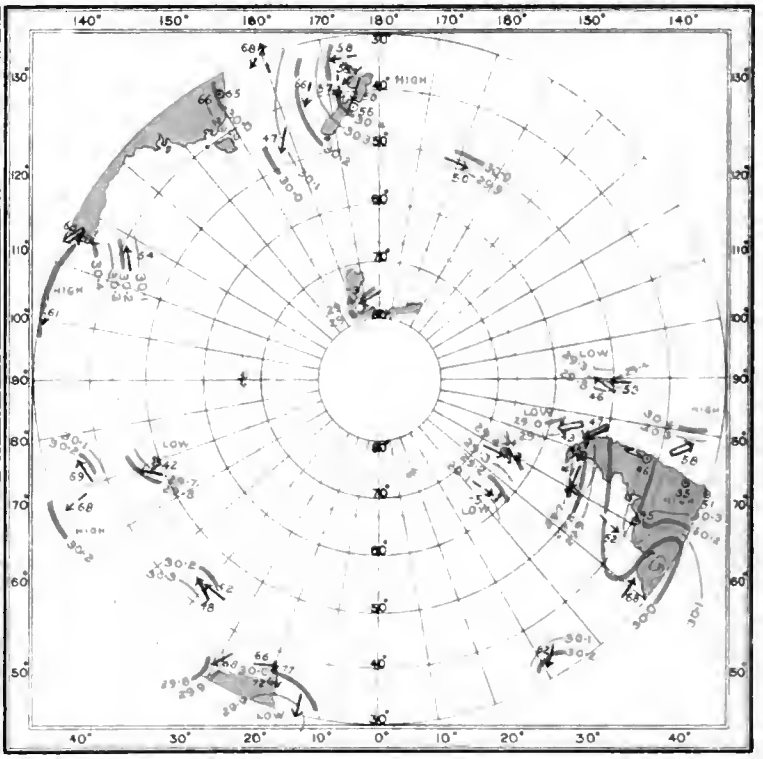

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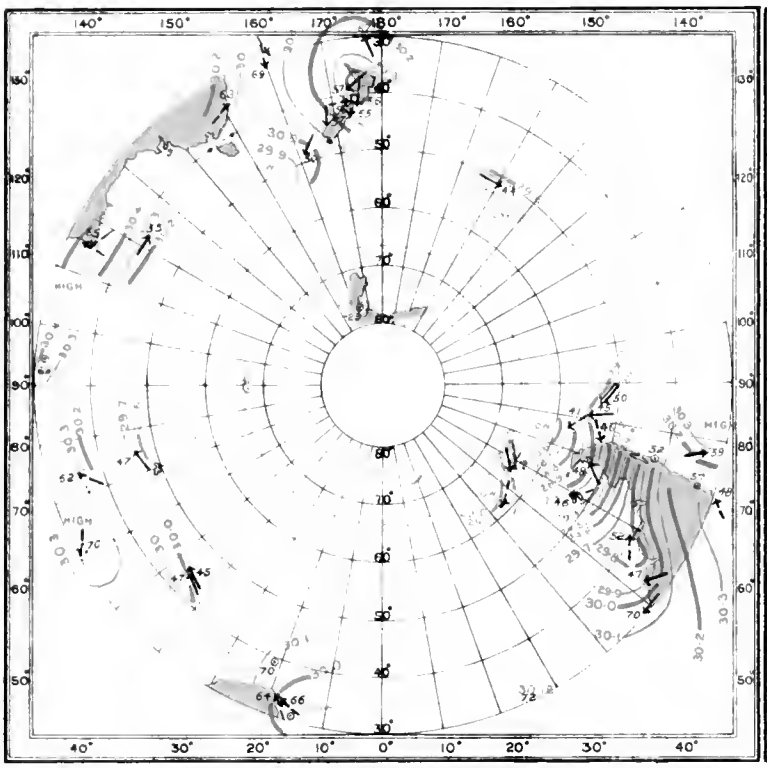
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1903 APRIL 30



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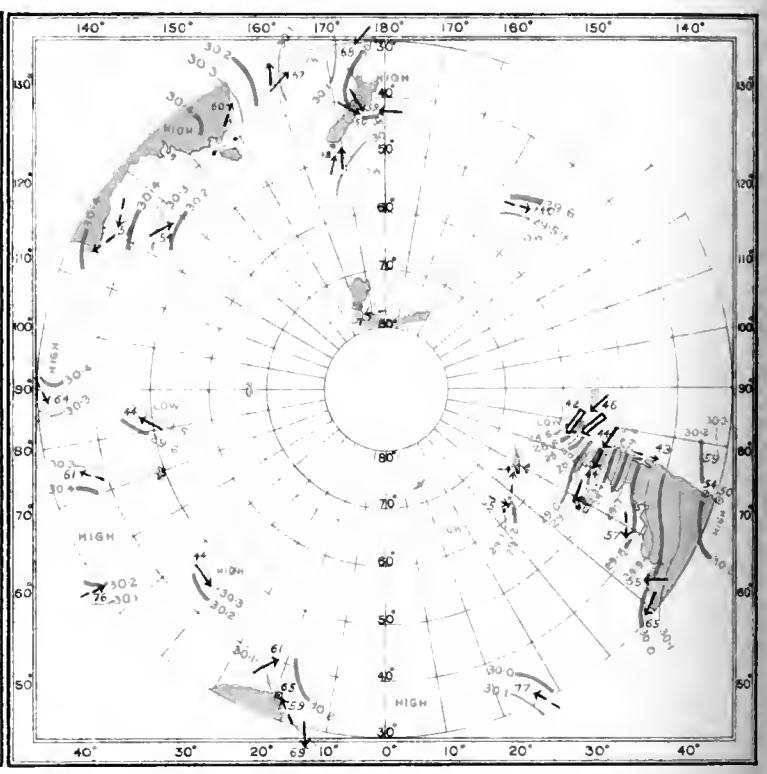

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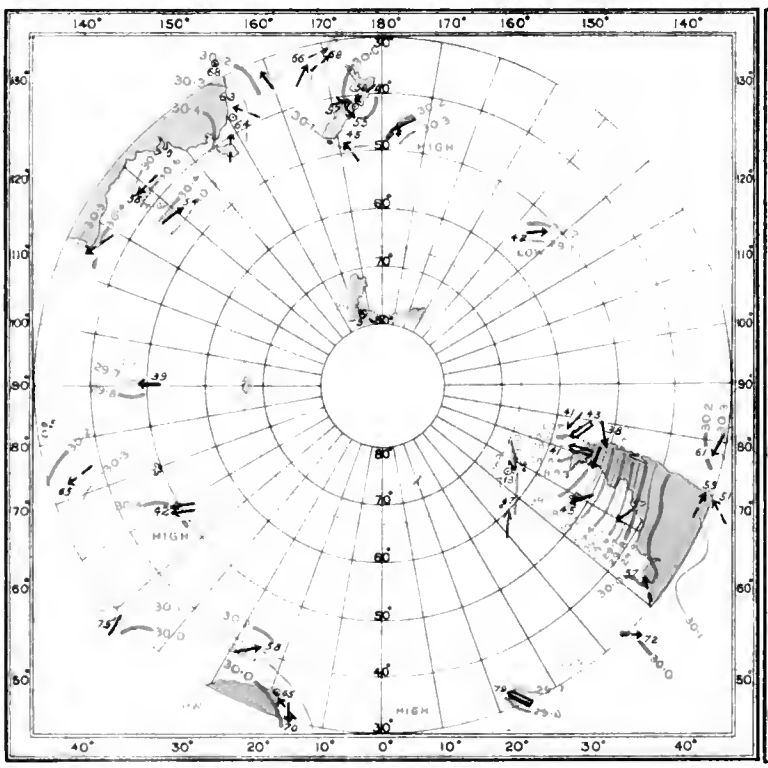

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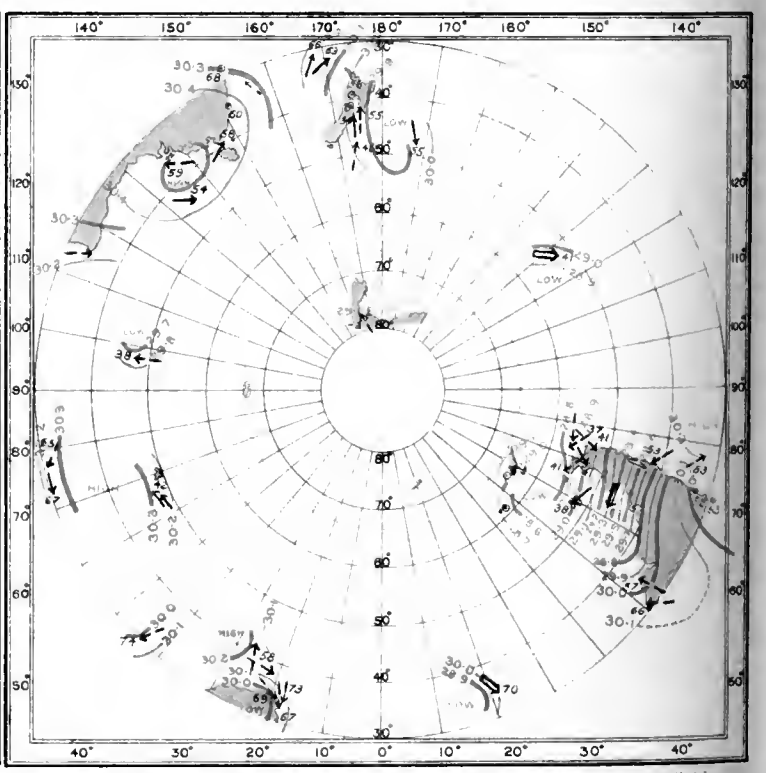

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INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

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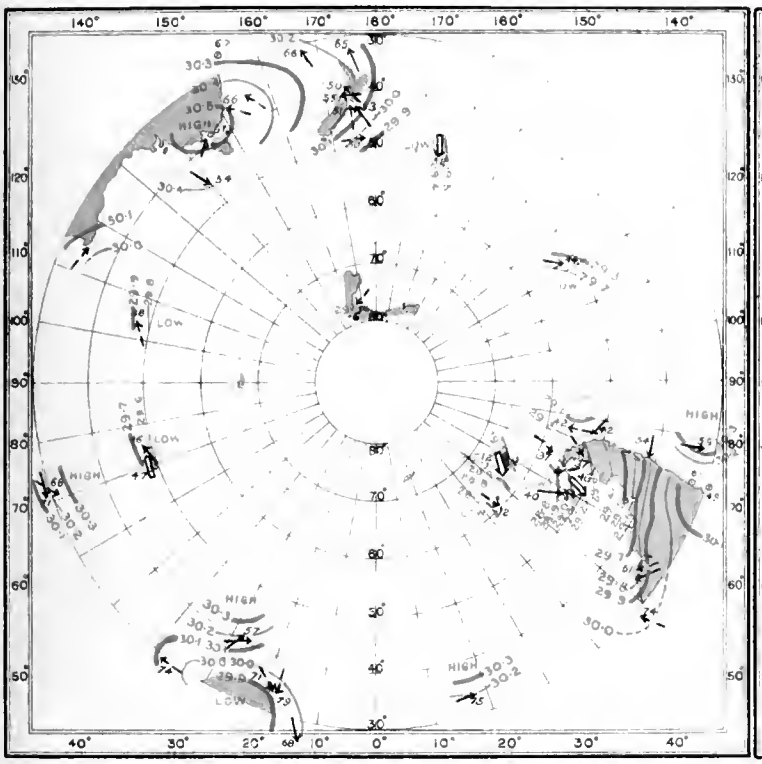

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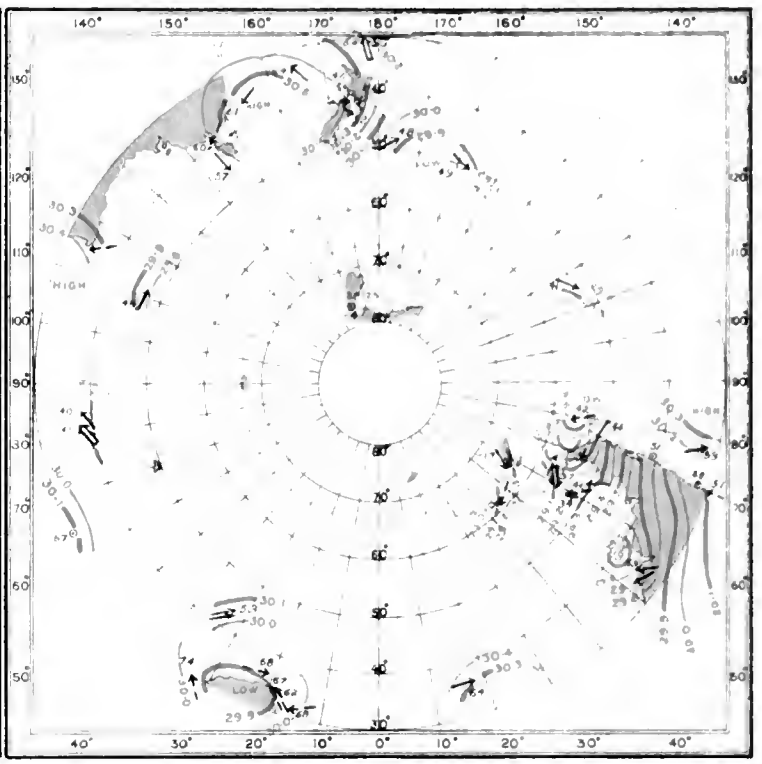

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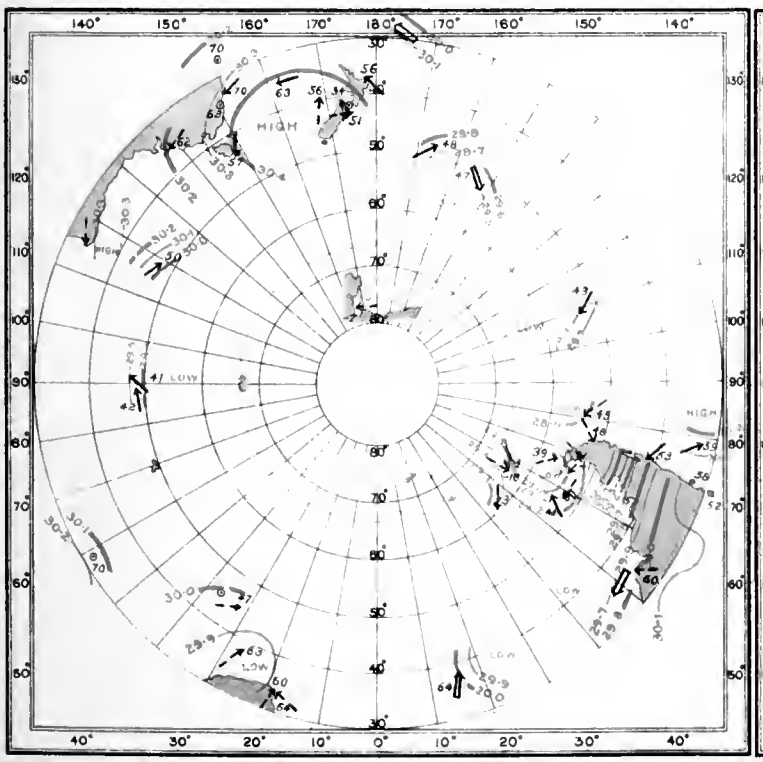

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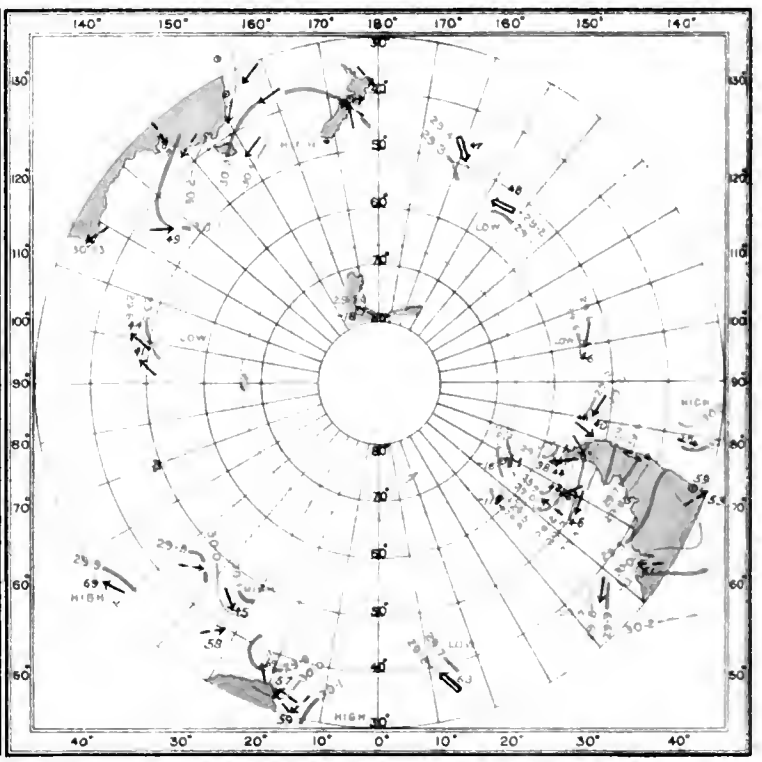


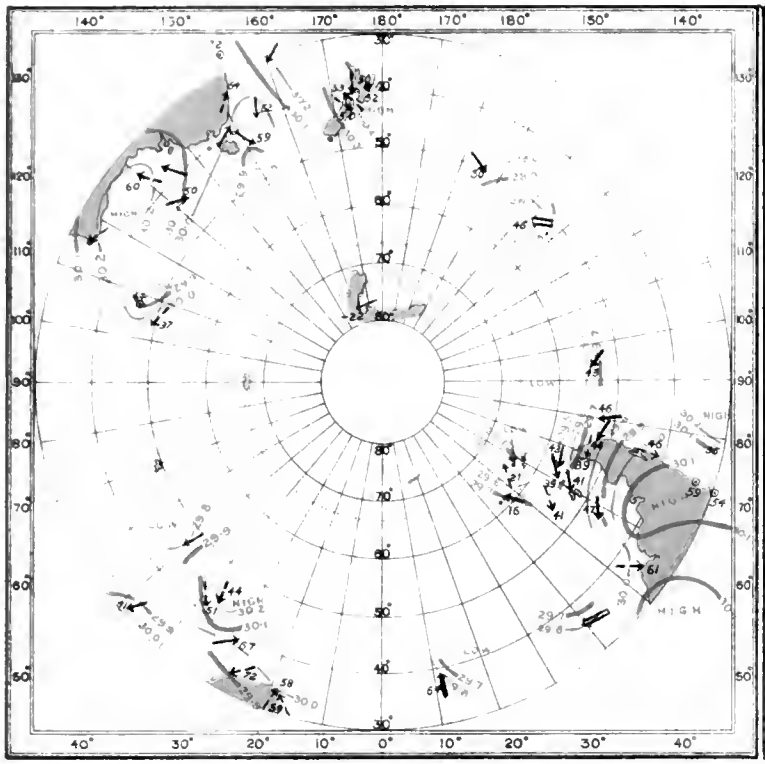
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

.903 MAY 8



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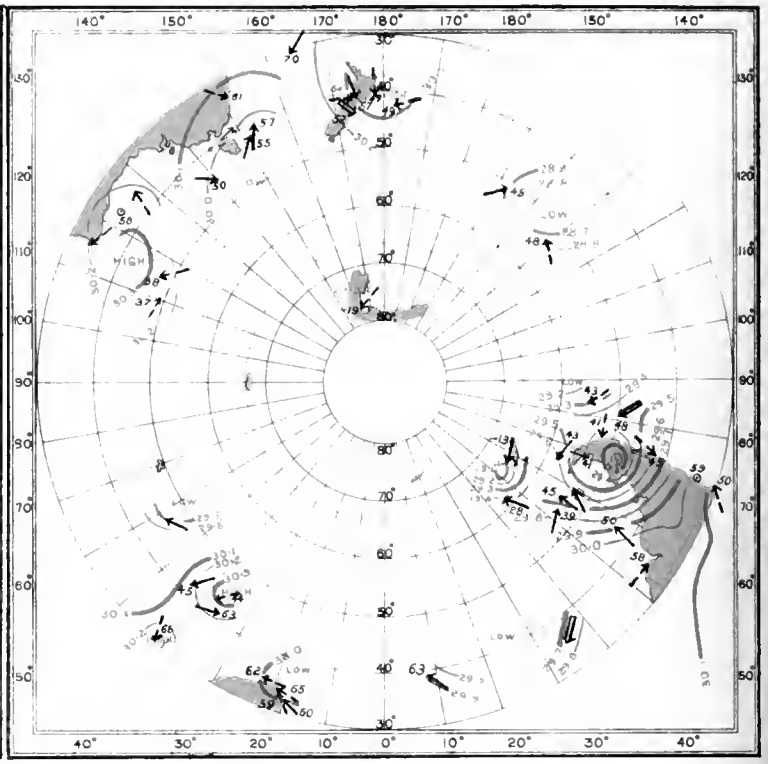

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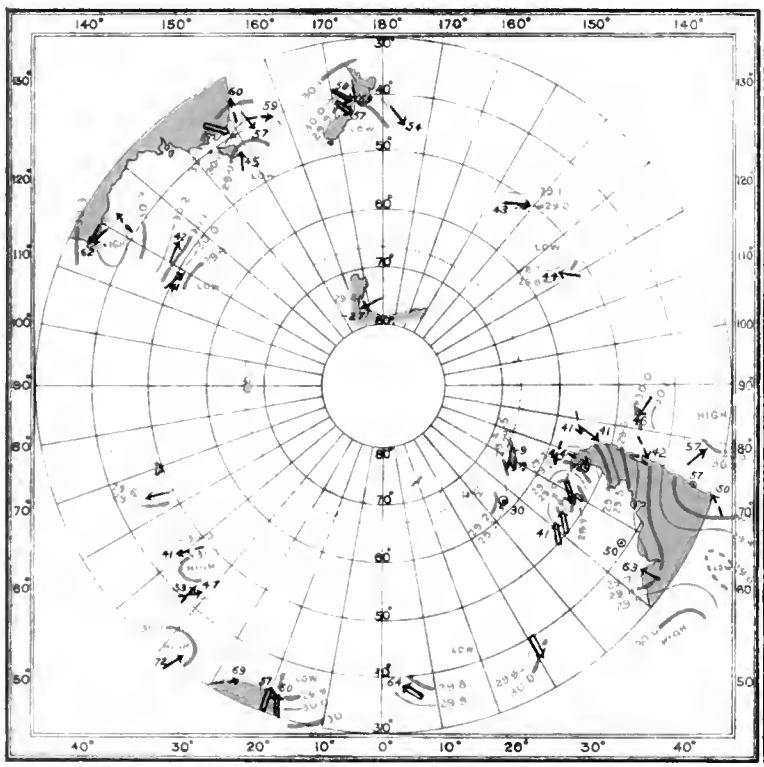

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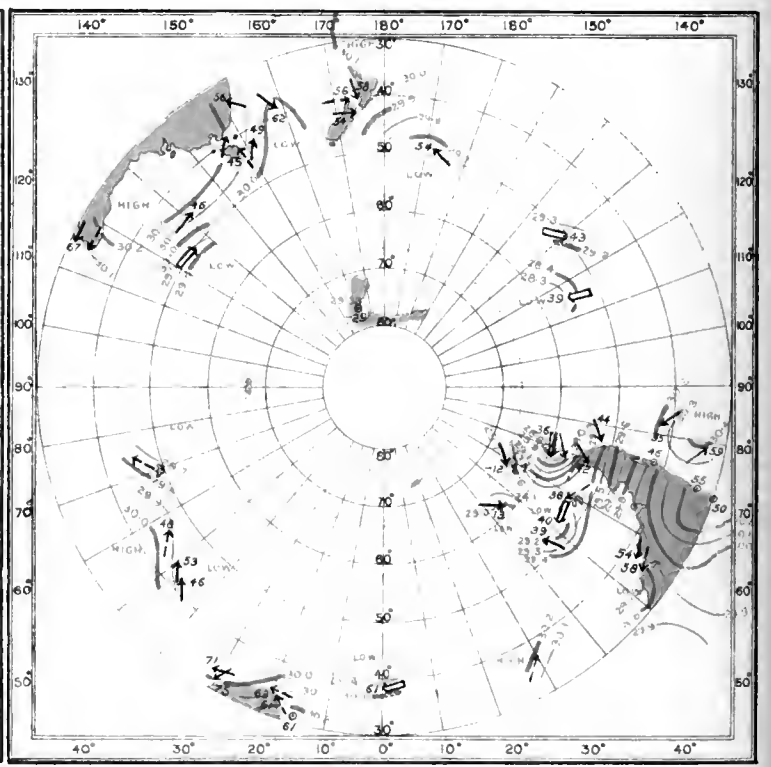

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INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

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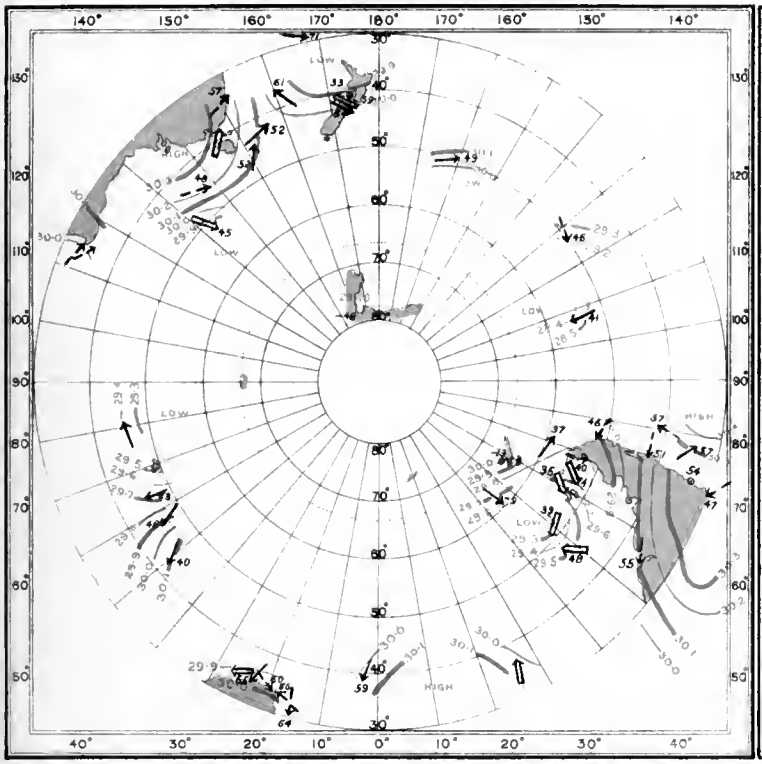

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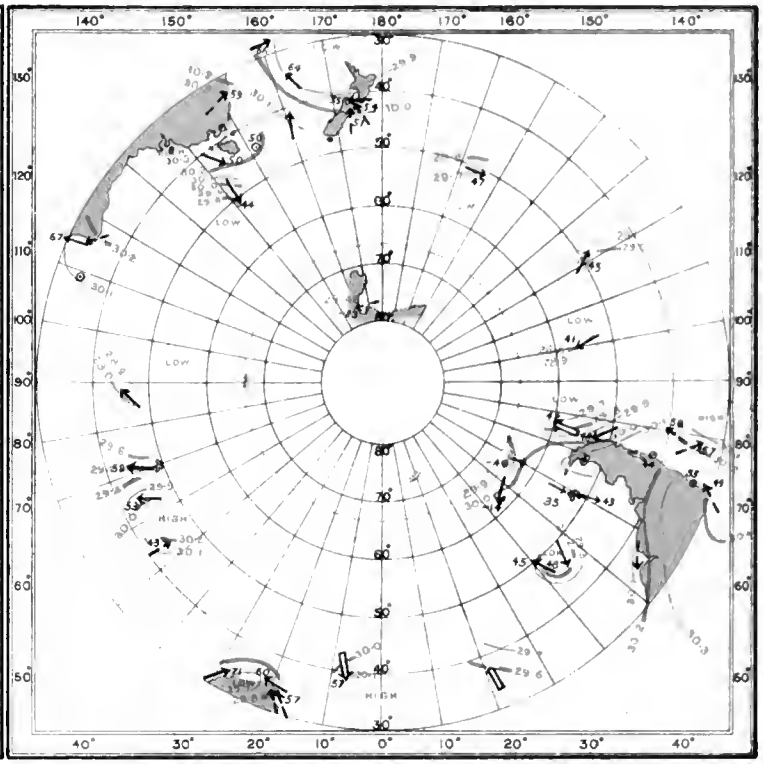

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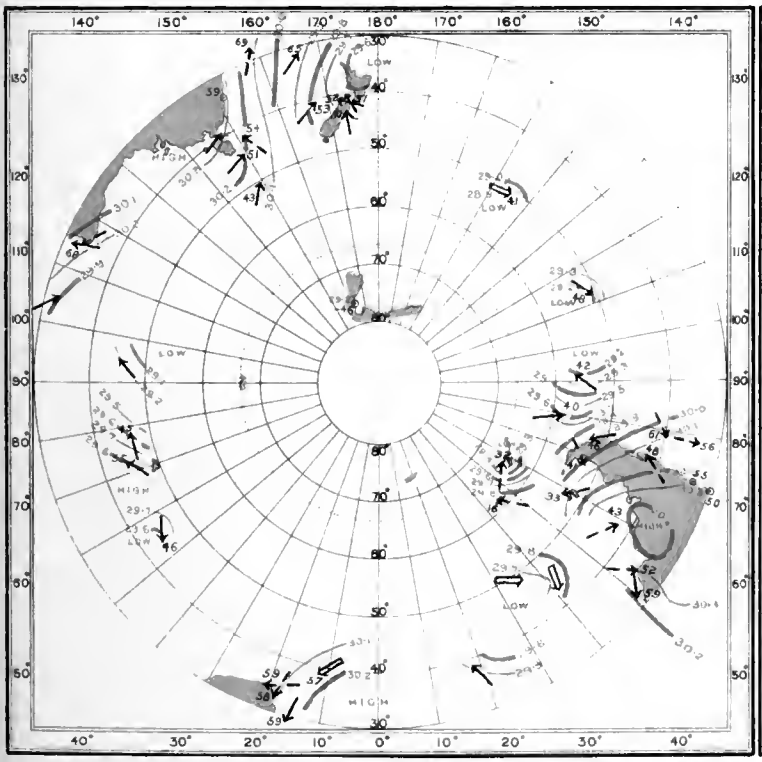

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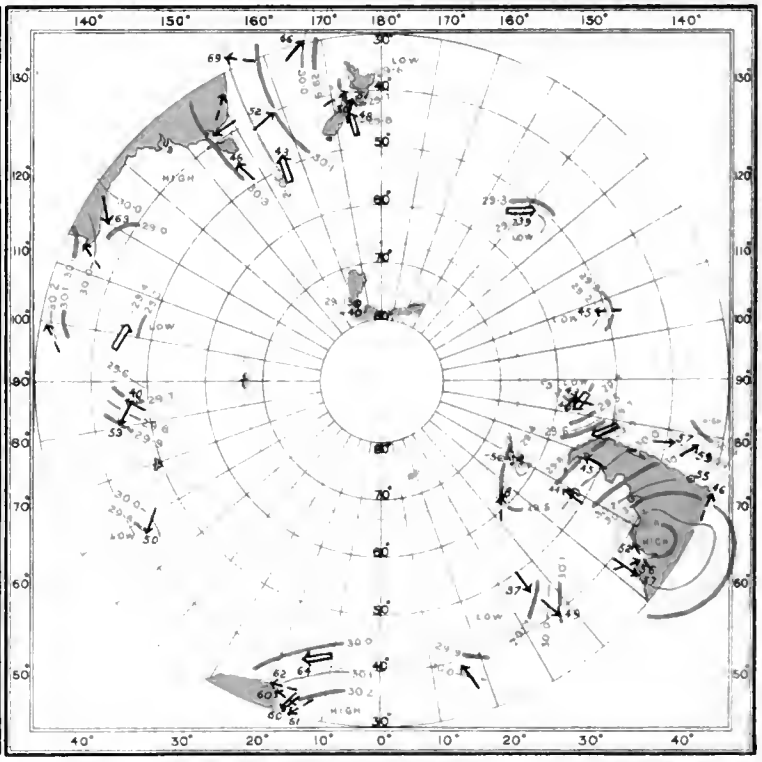

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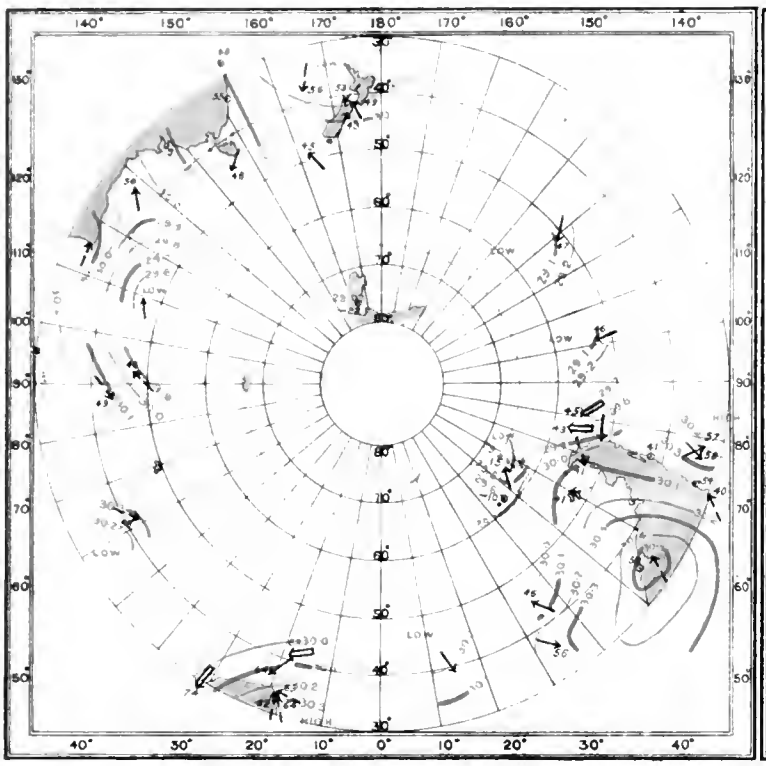
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 MAY 16



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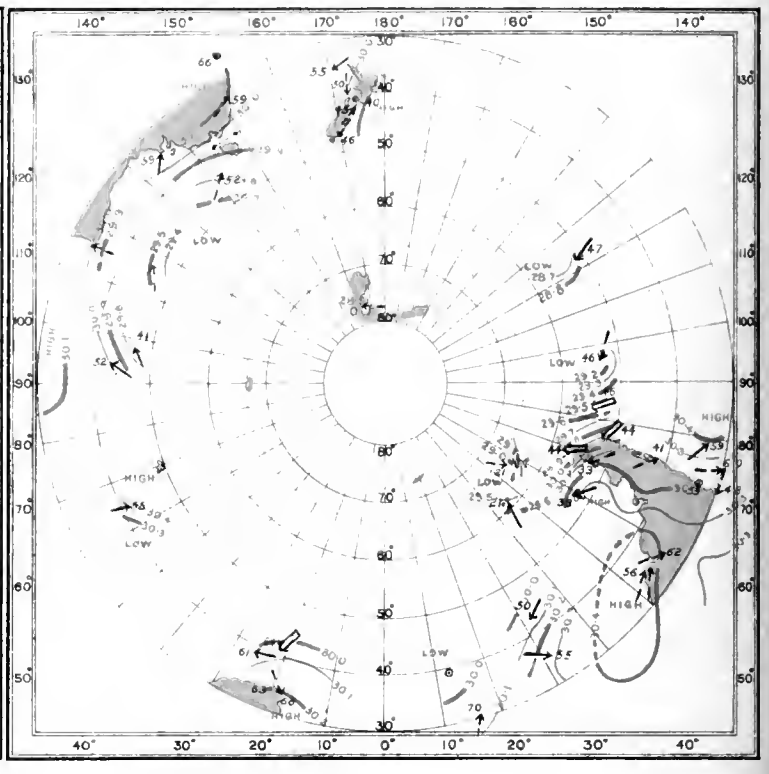

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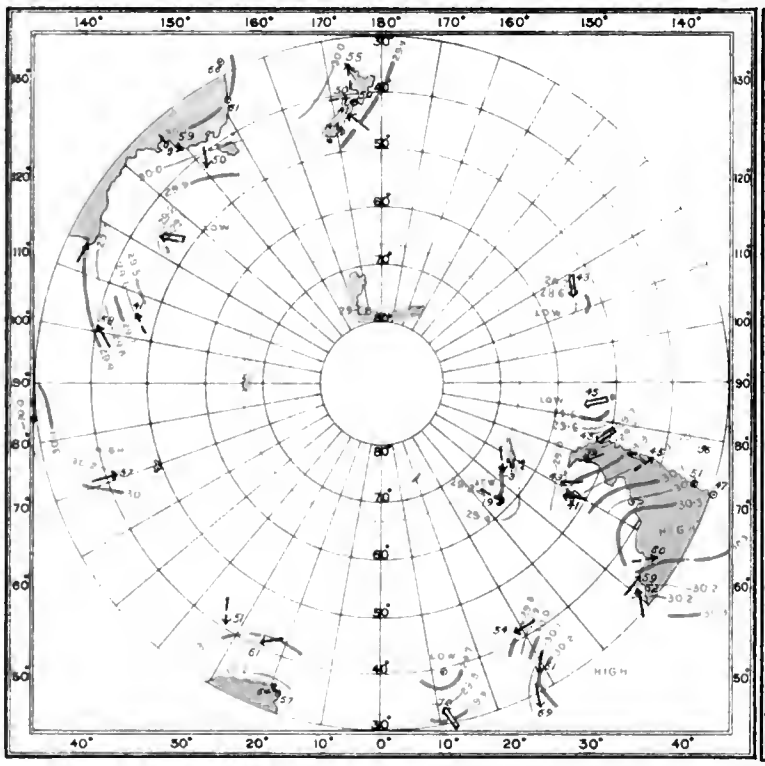

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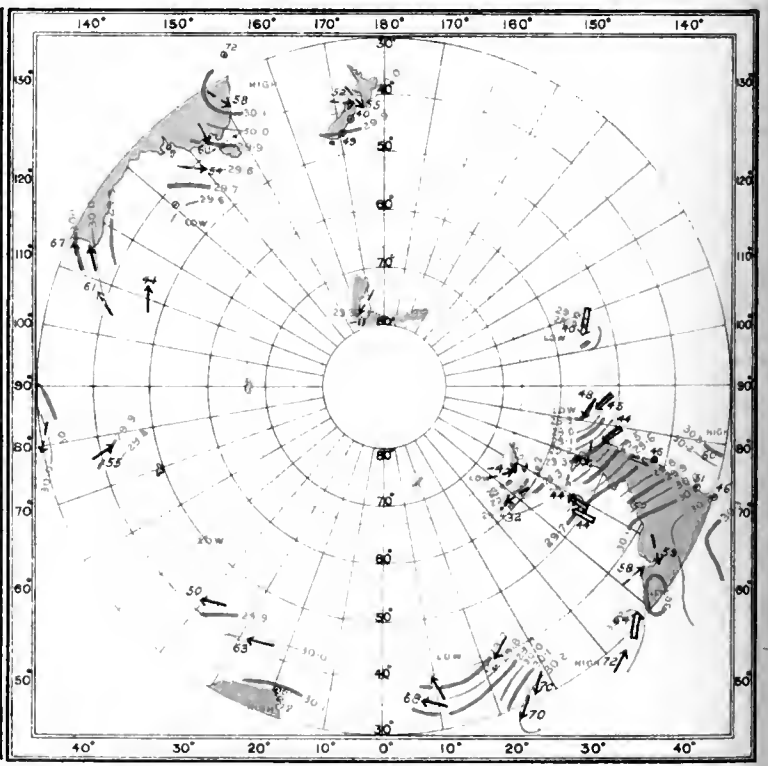

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For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

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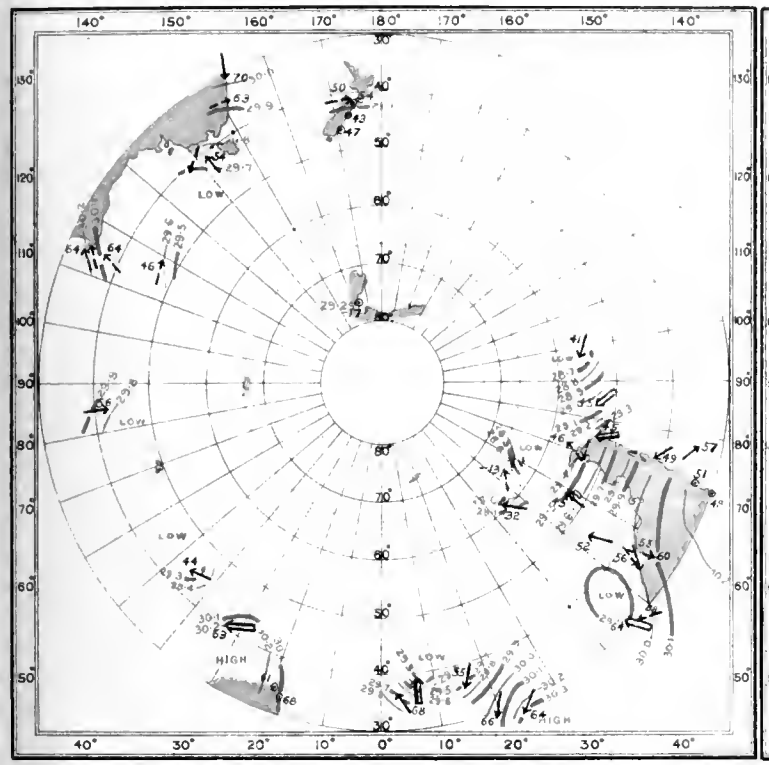

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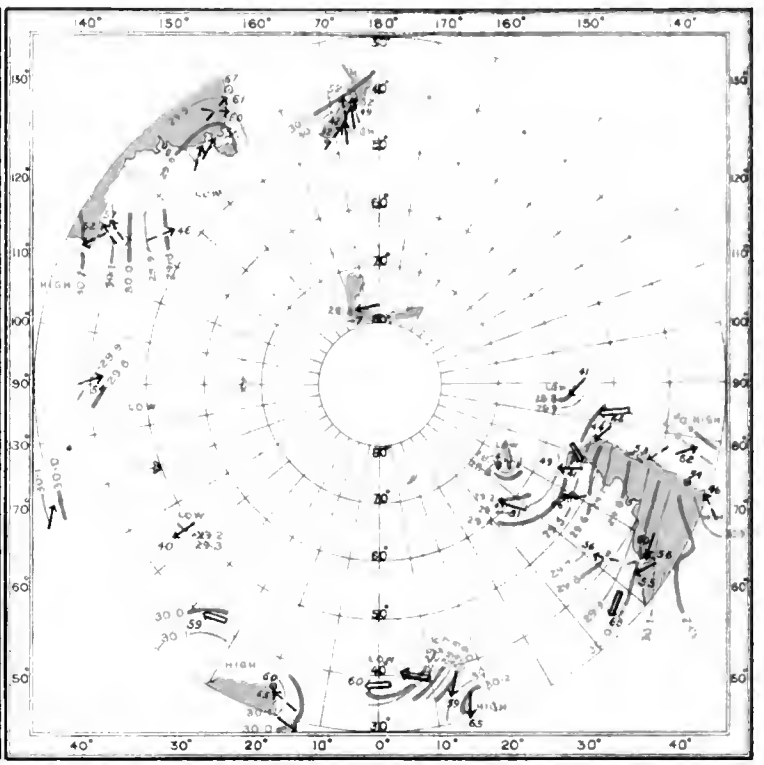

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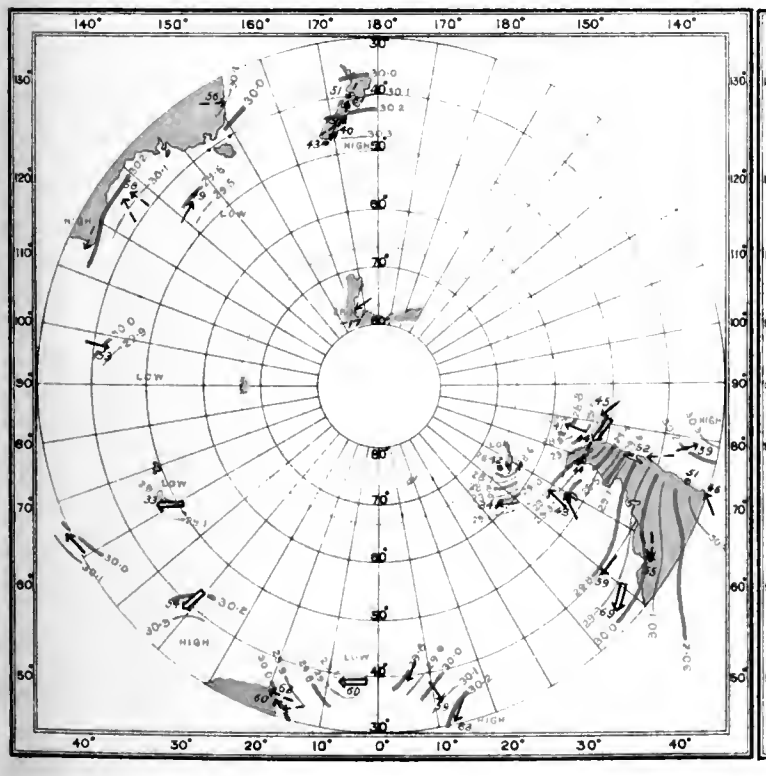

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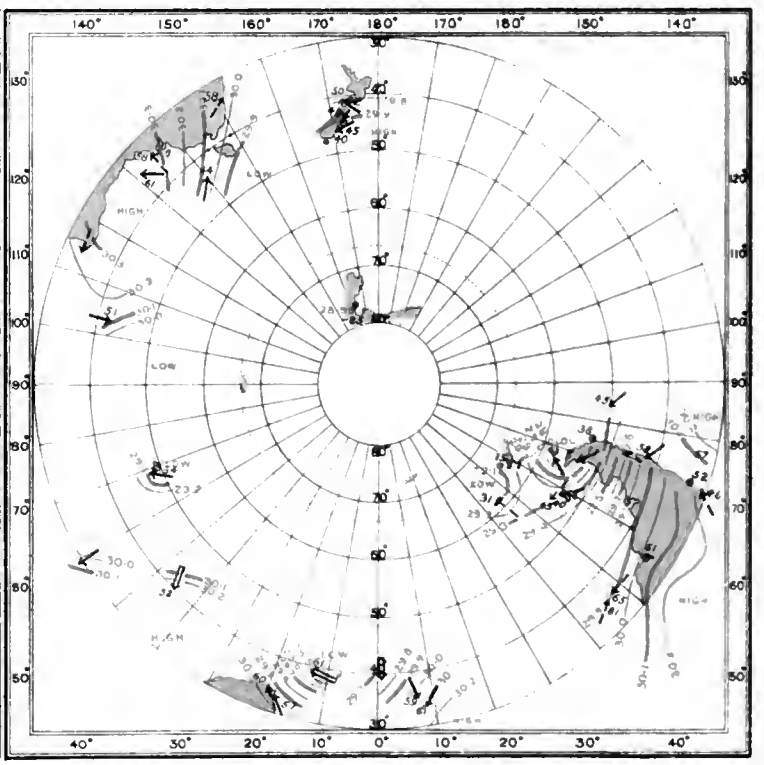

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

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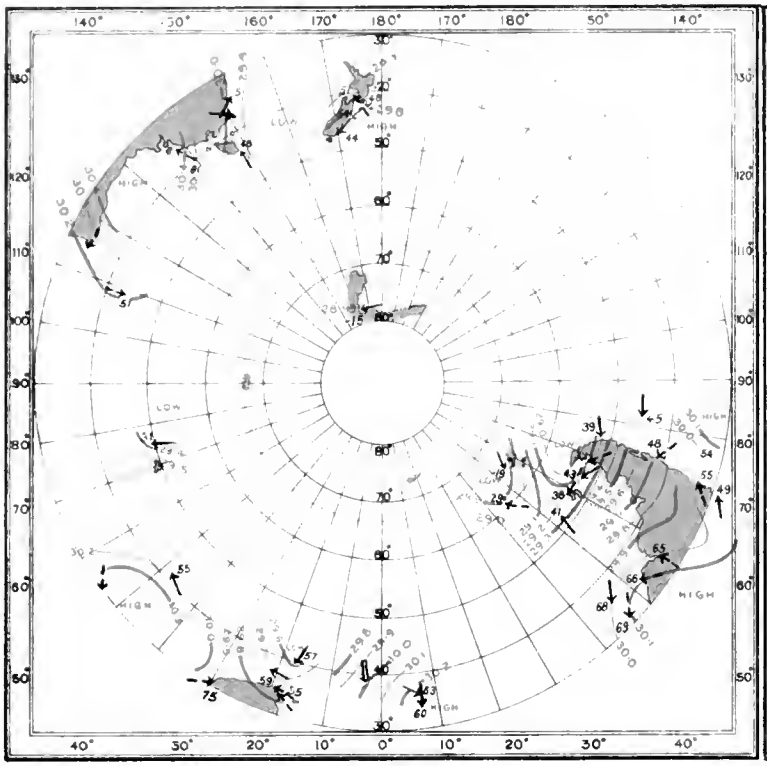

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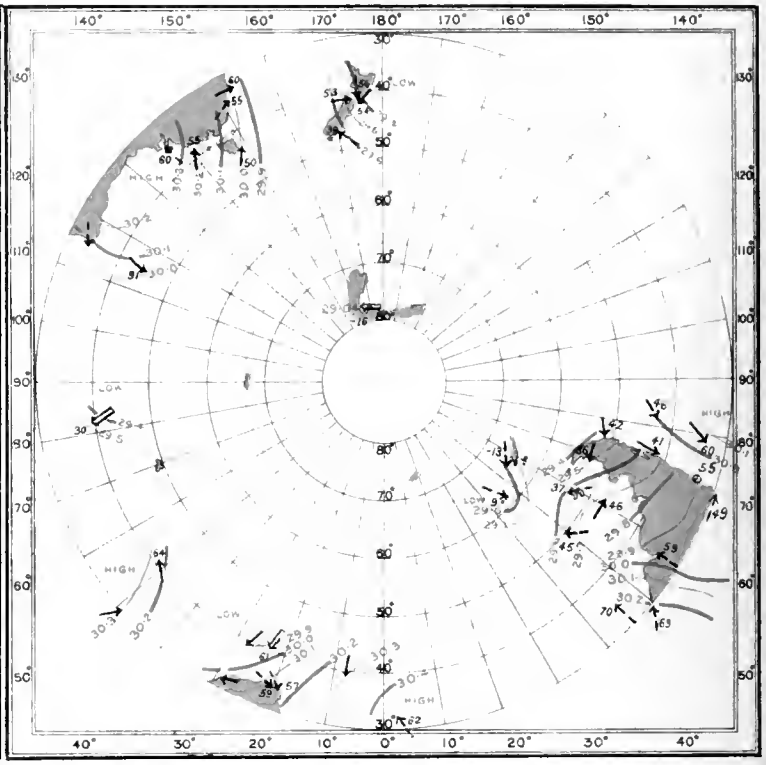

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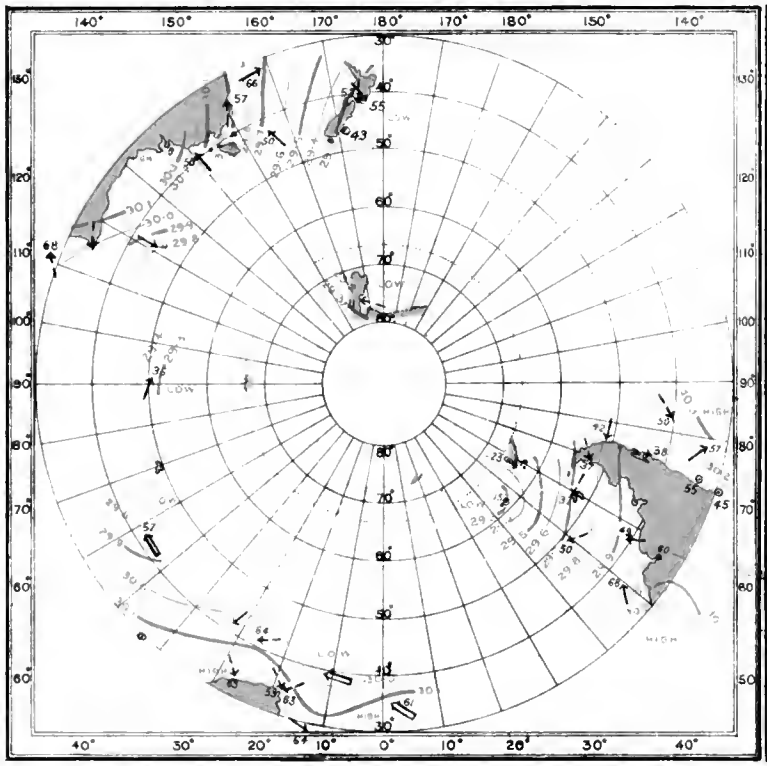

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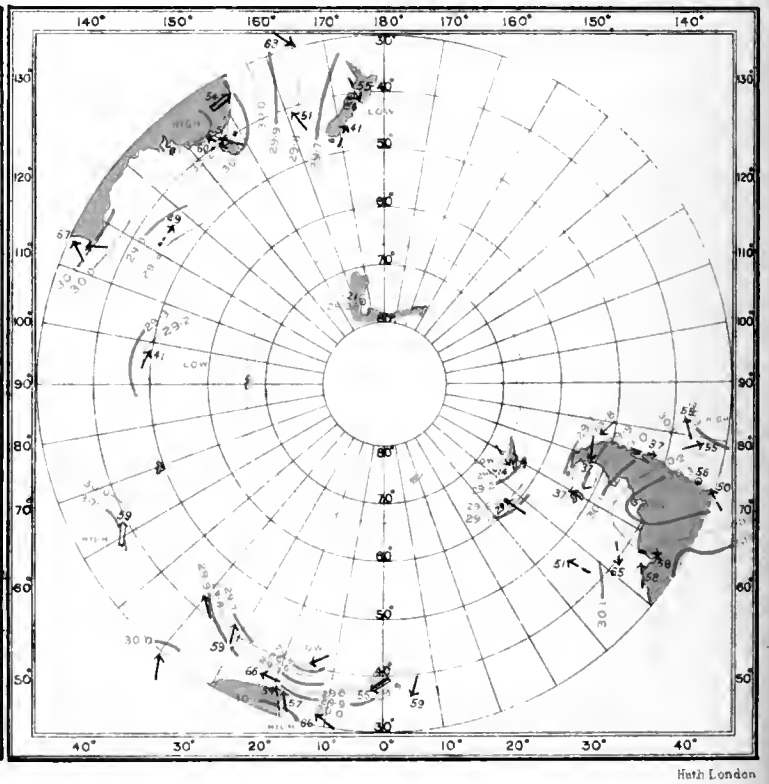

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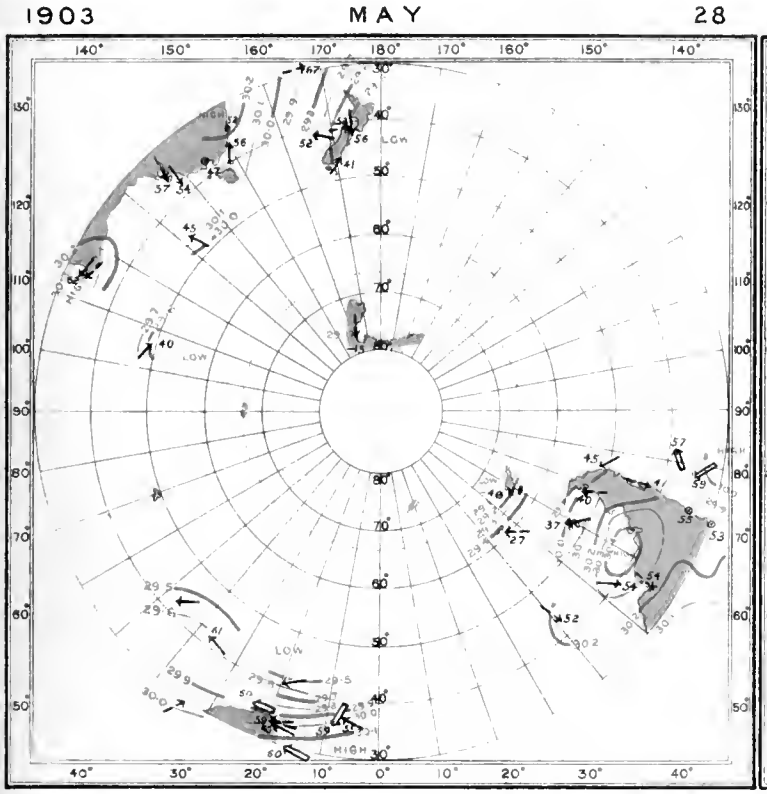
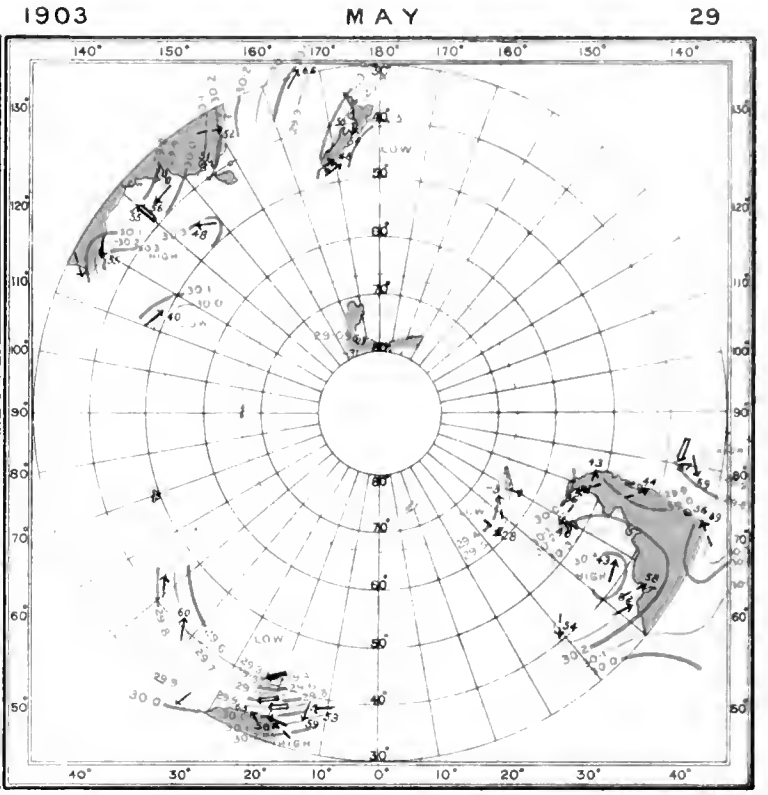
For explanation see Key map.

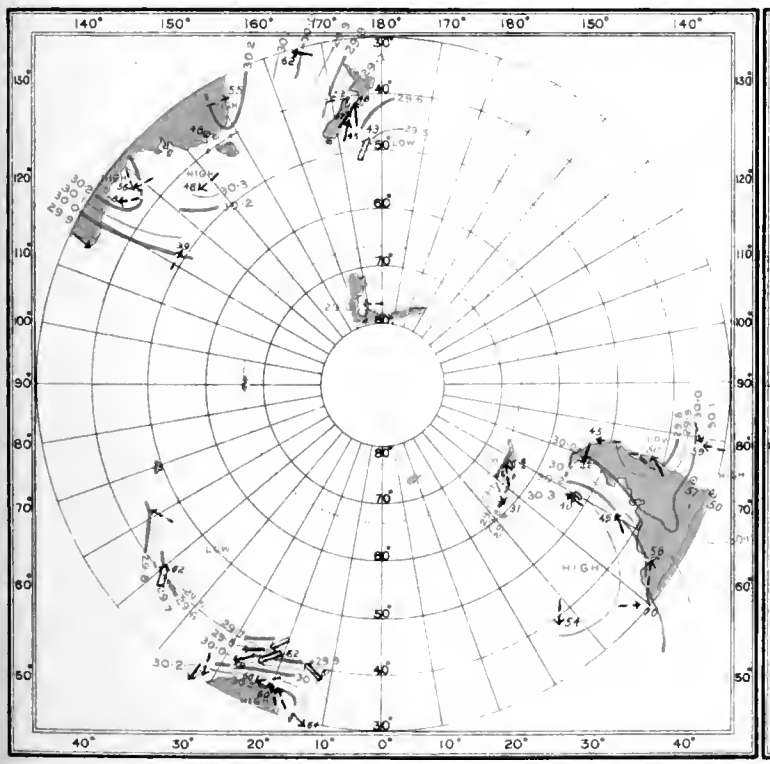
INTERNATIONAL ANTARCTIC CO-OPERATION.

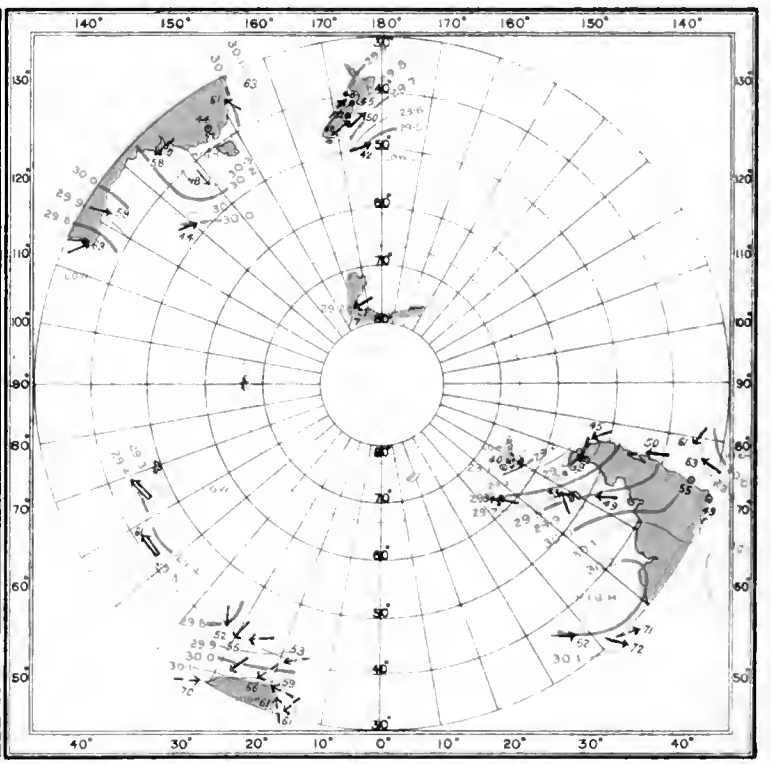
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES









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INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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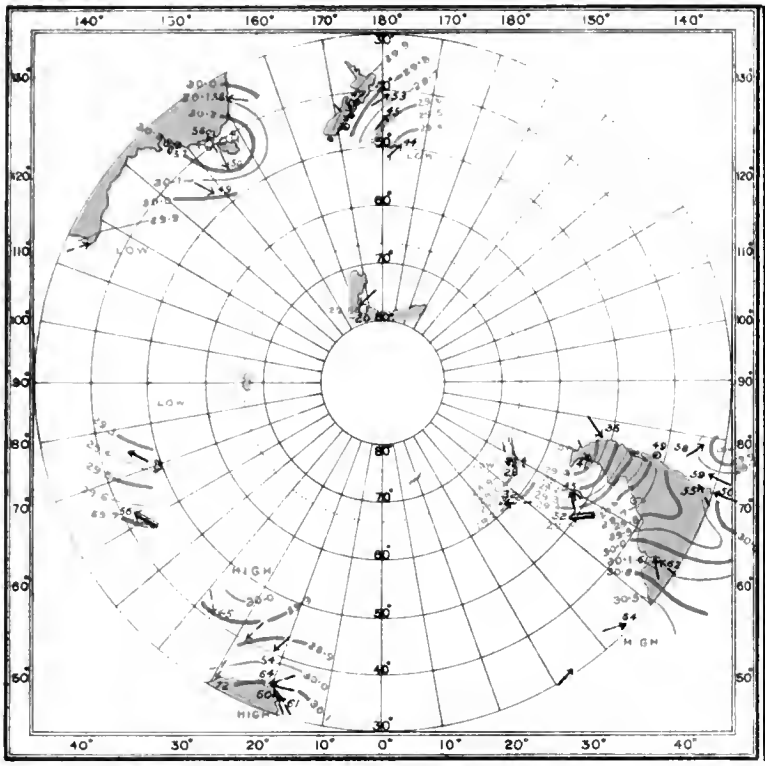

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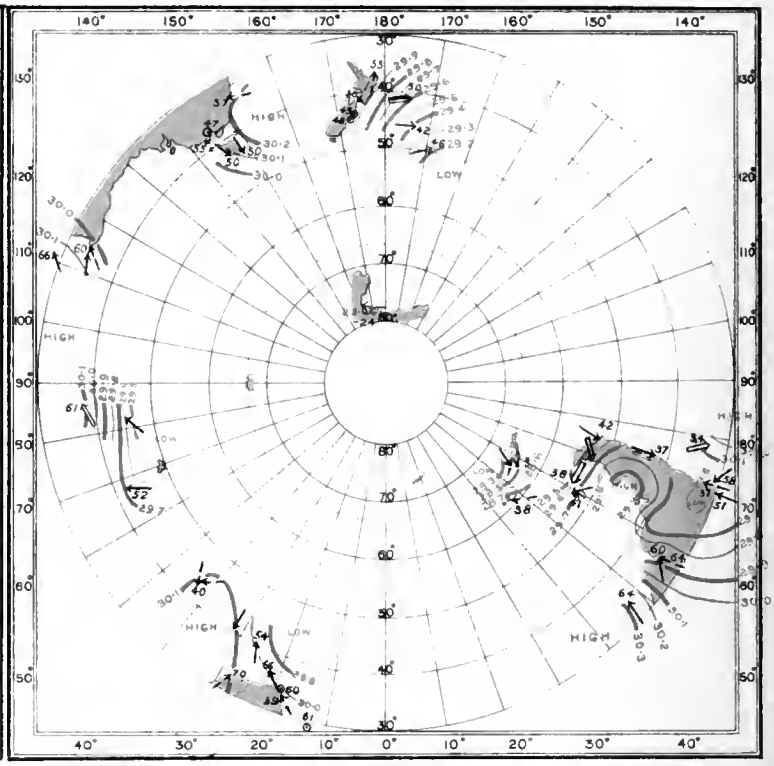

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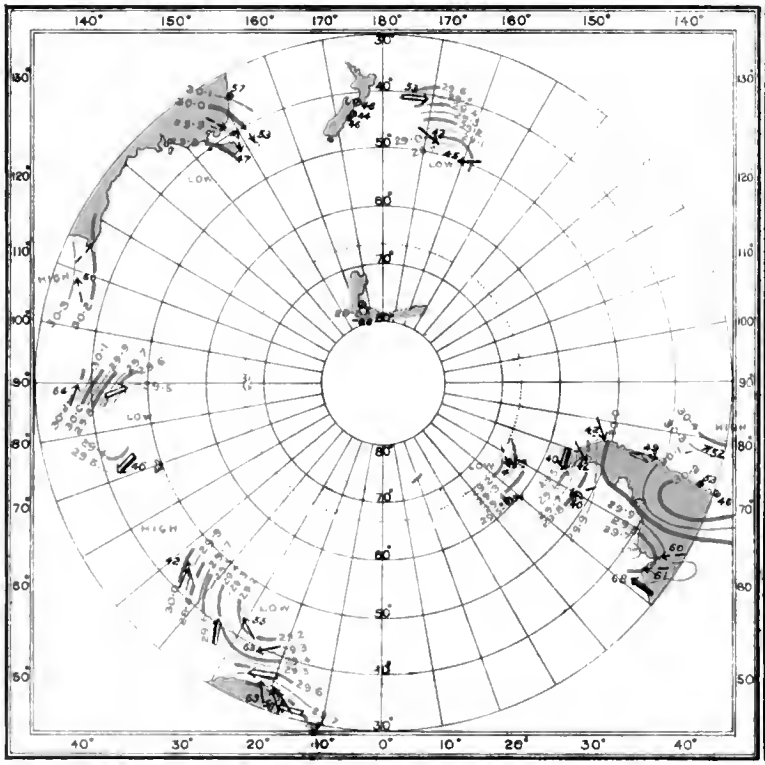

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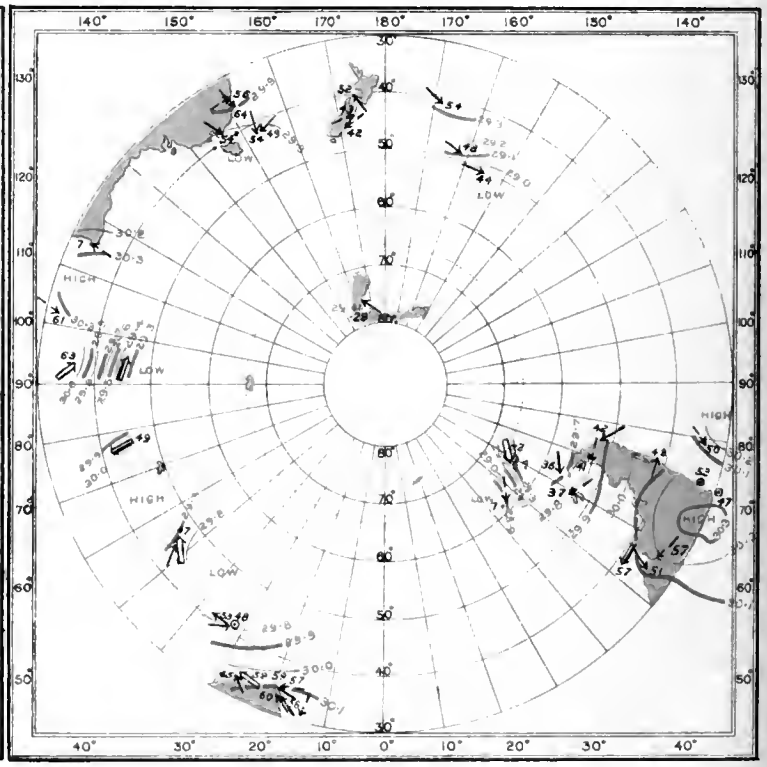

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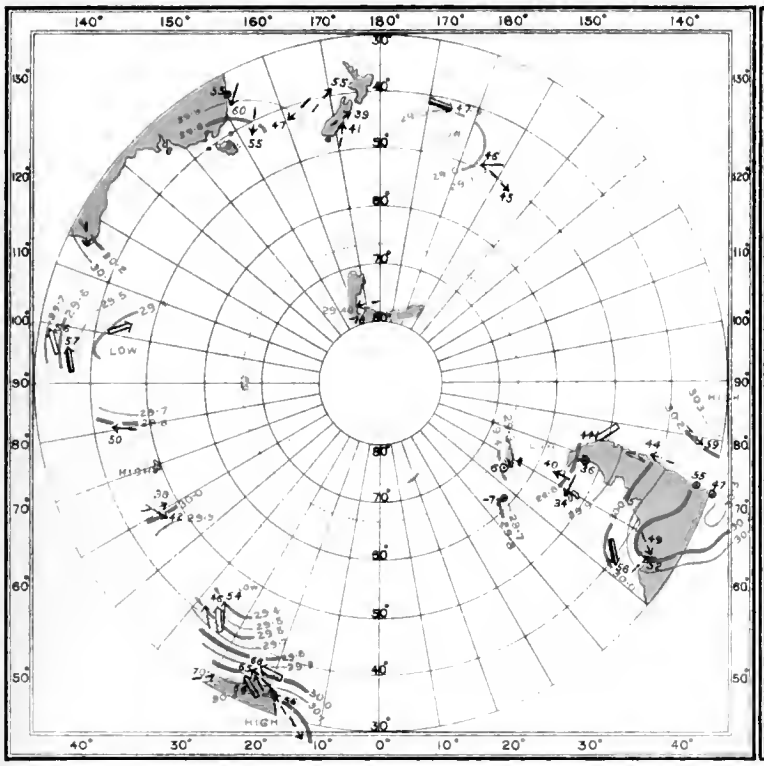
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1903 JUNE 5



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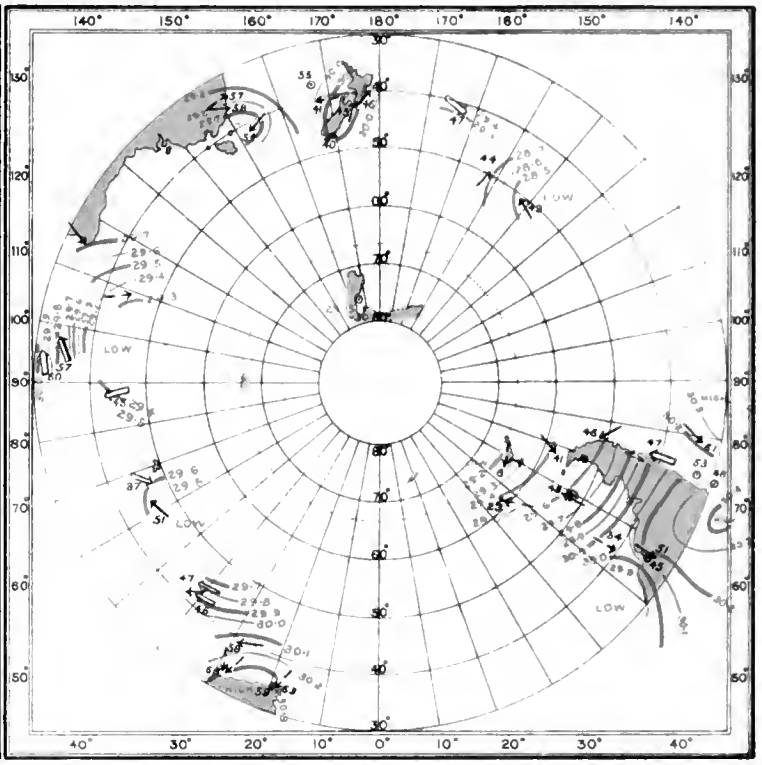

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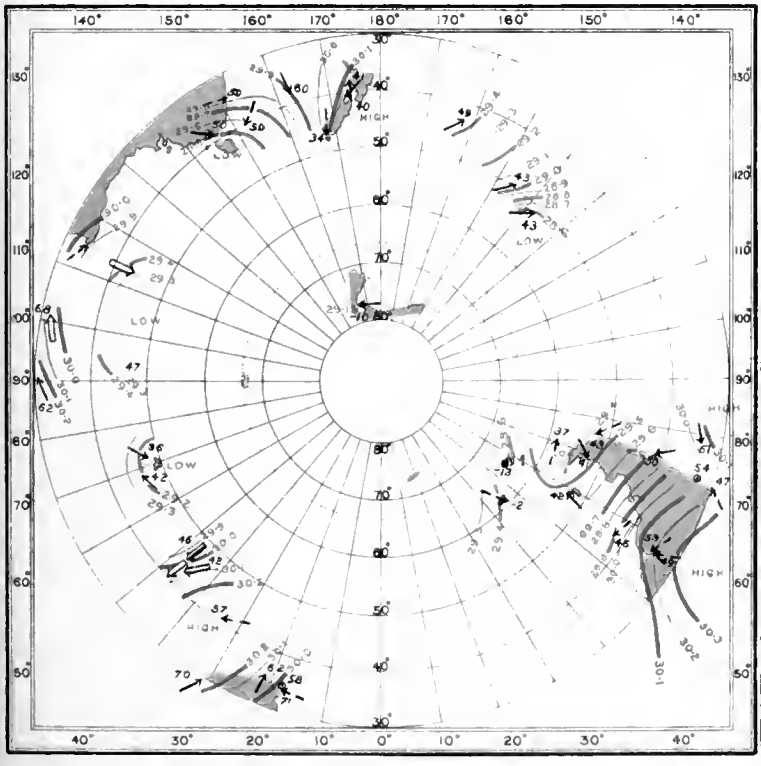

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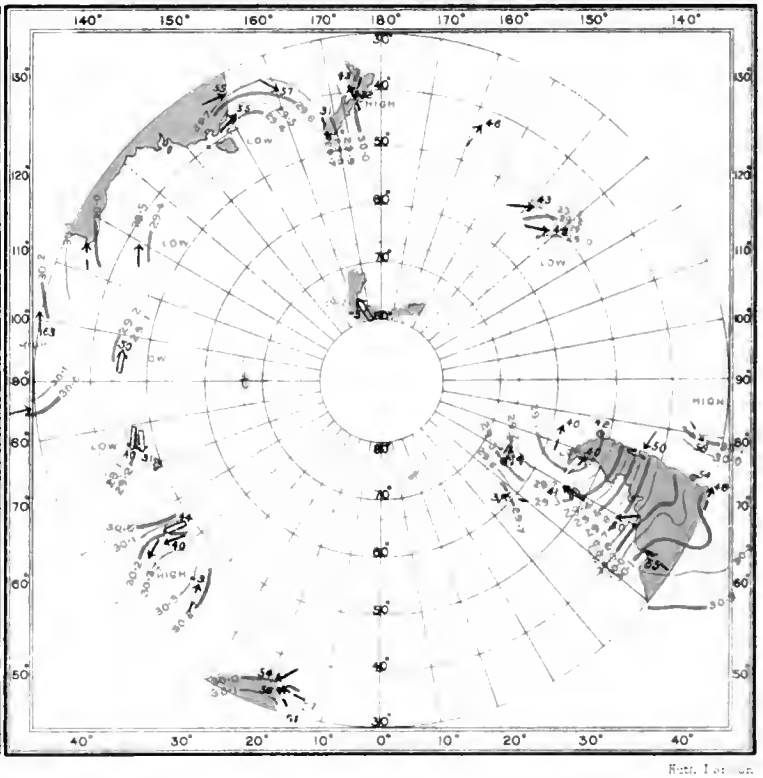


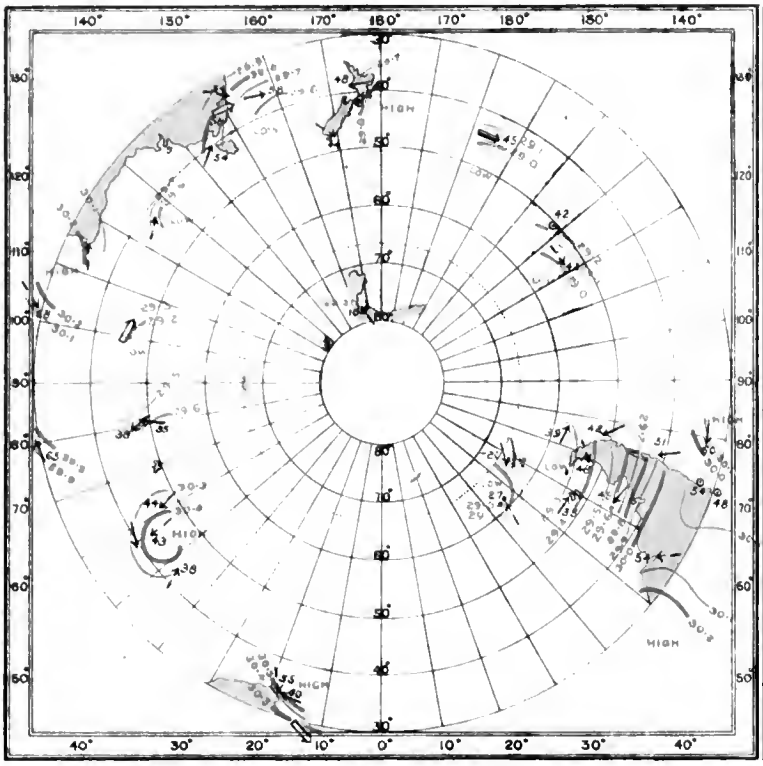
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1903 JUNE 9



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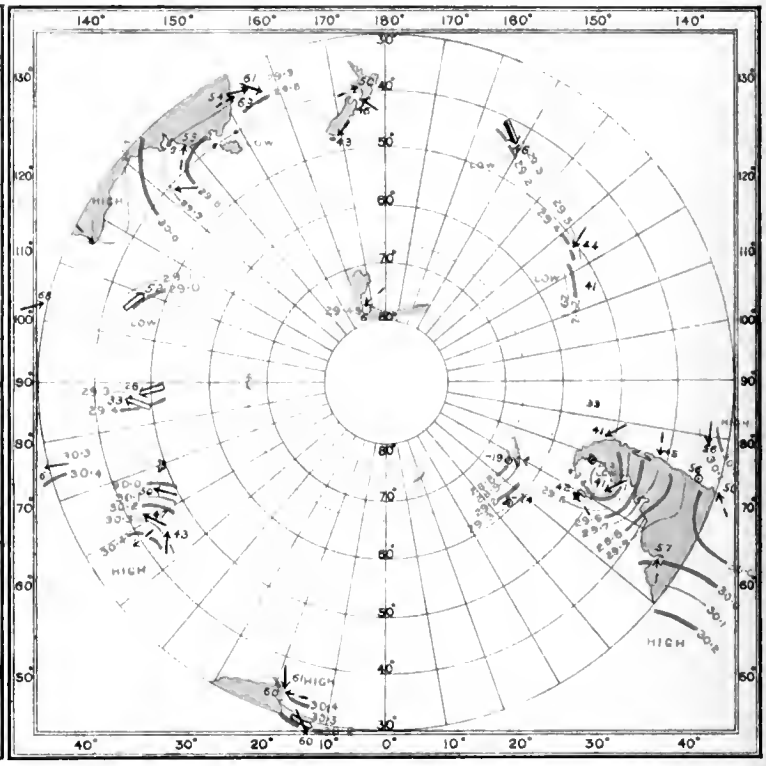

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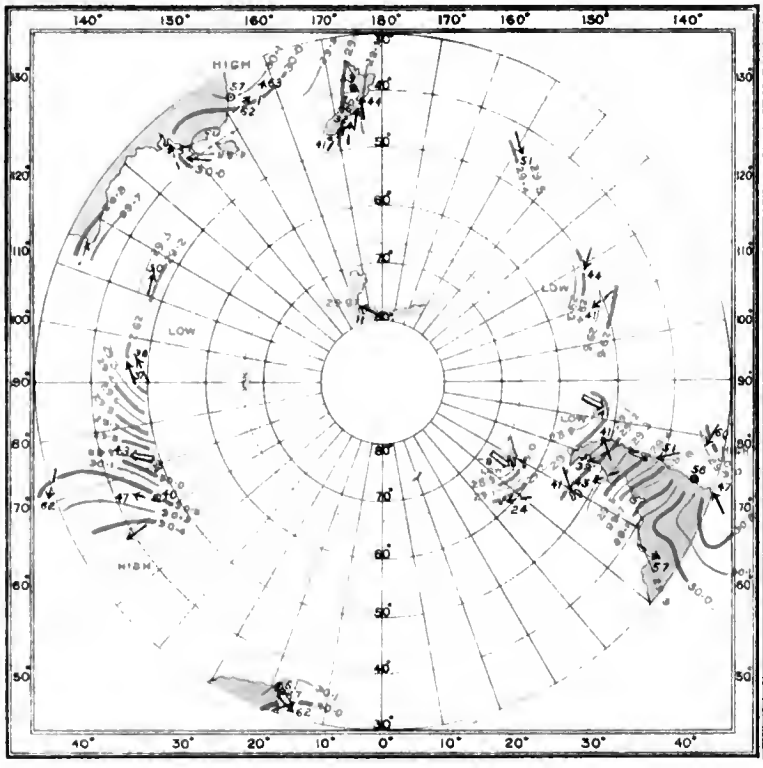

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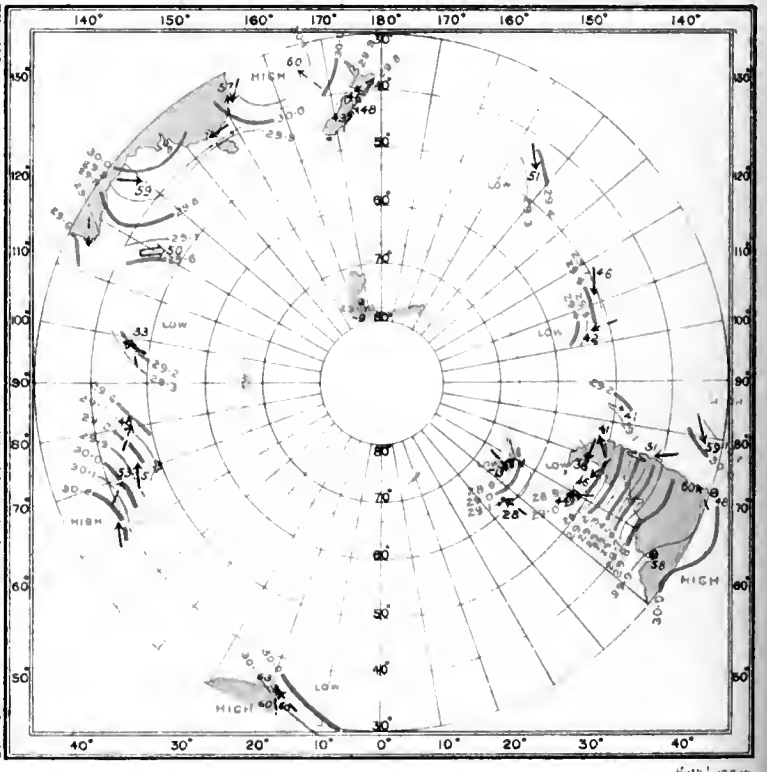


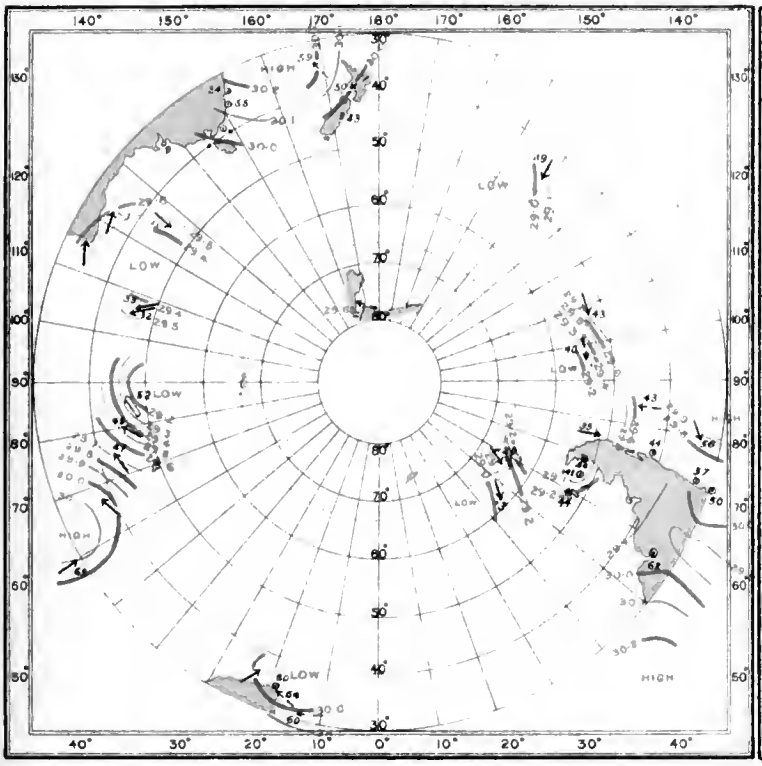
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JUNE 13



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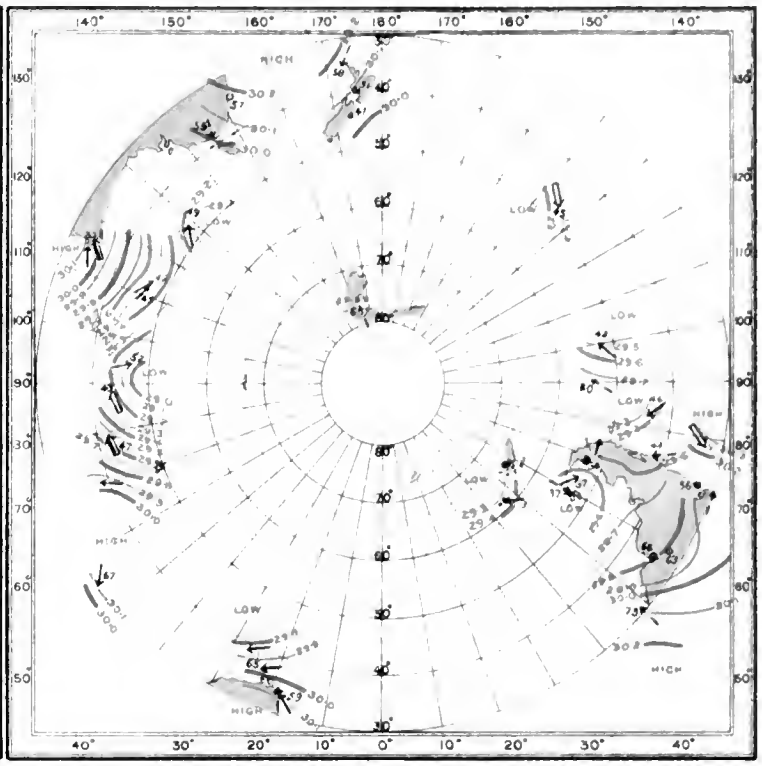

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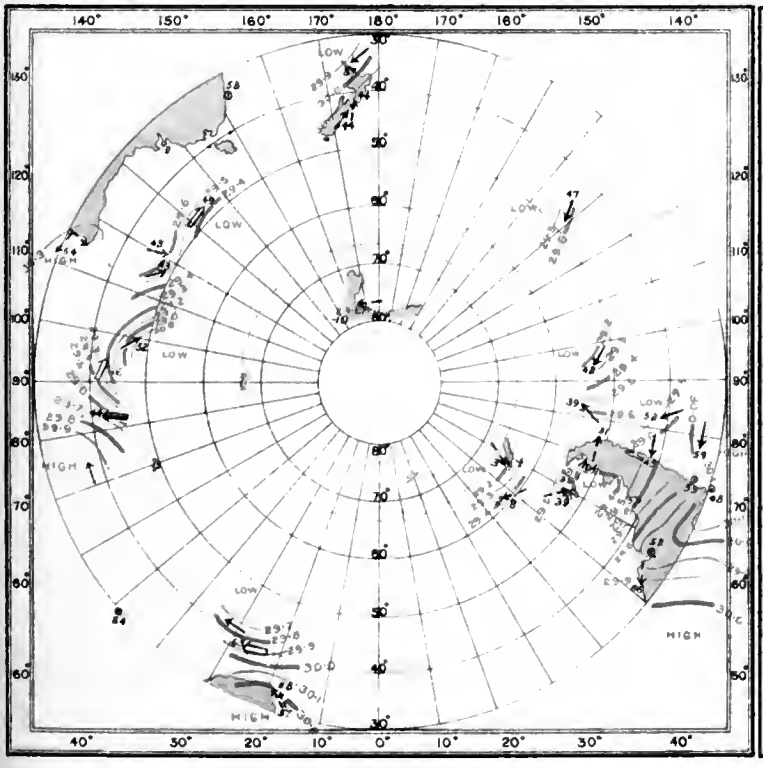

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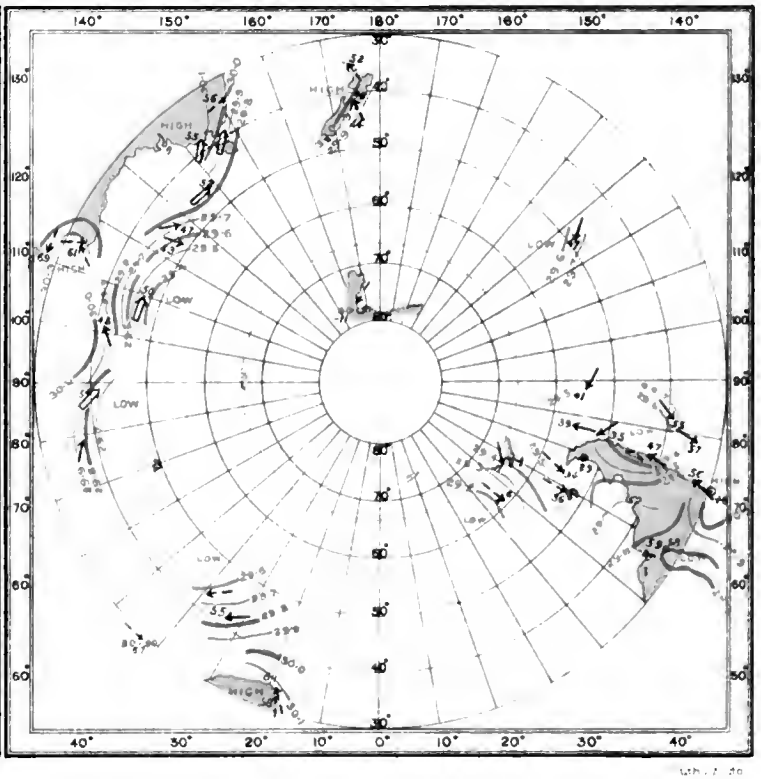


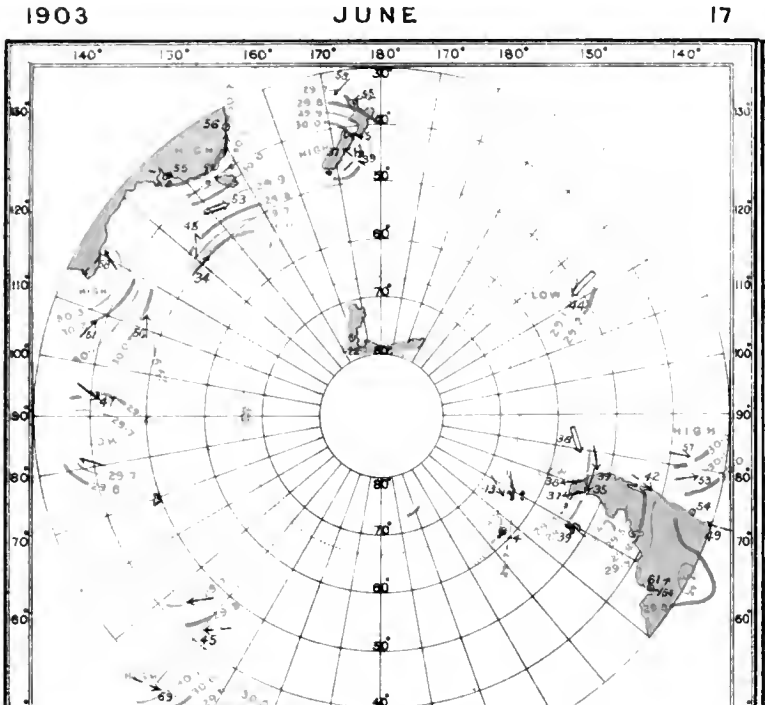
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1903 JUNE 17



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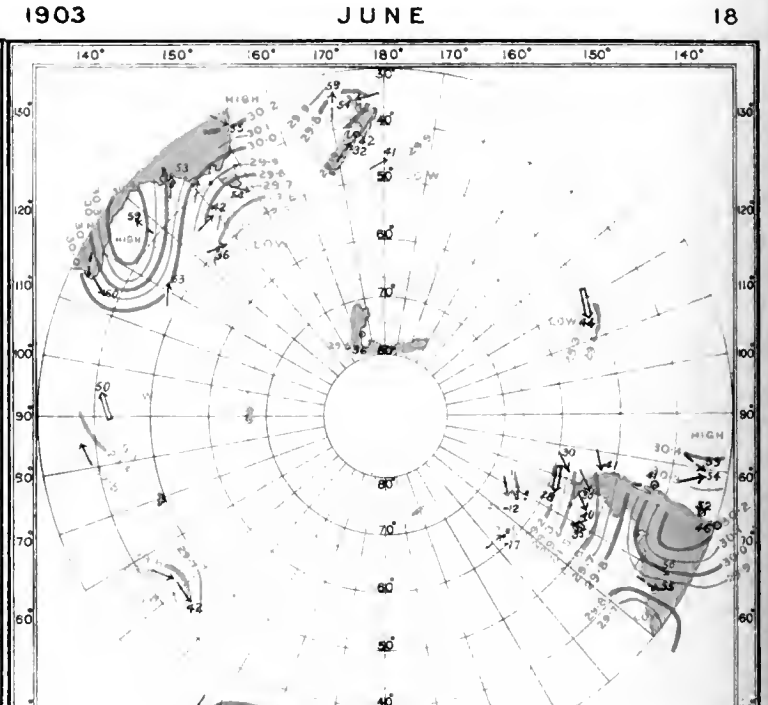

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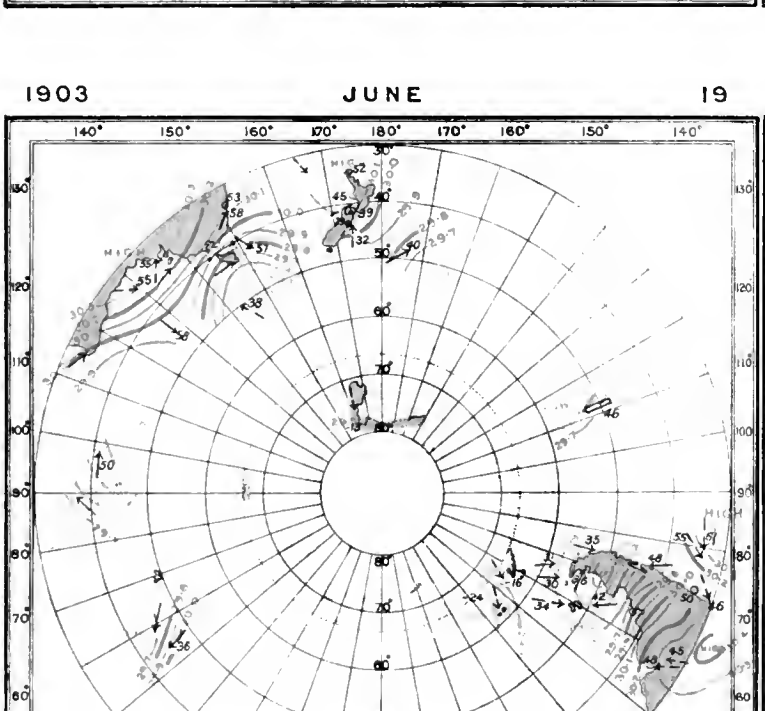

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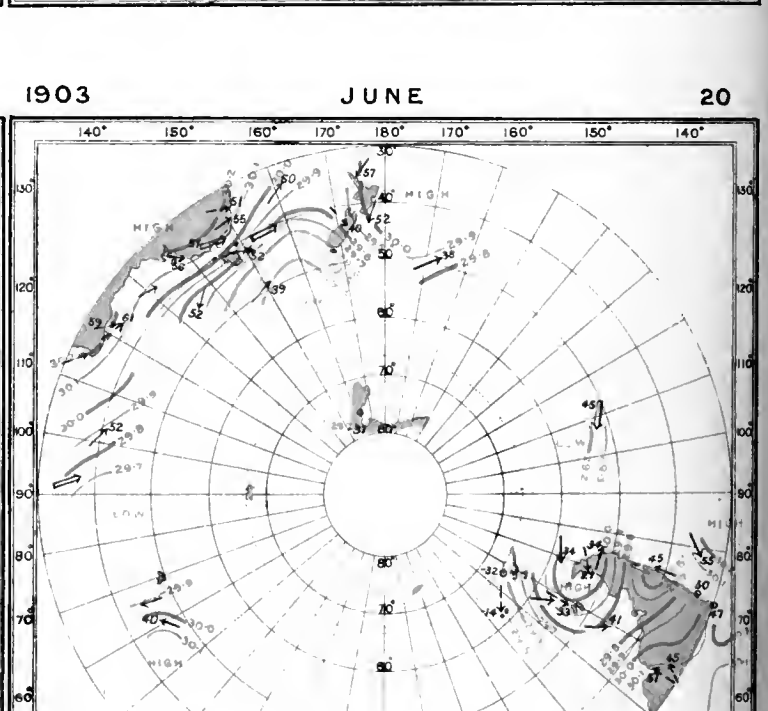

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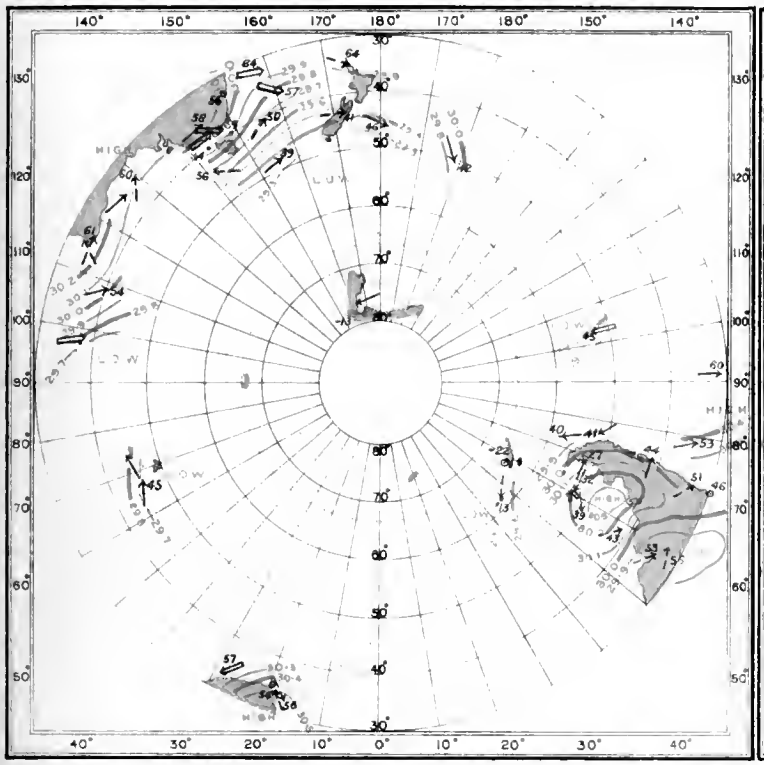
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JUNE 21



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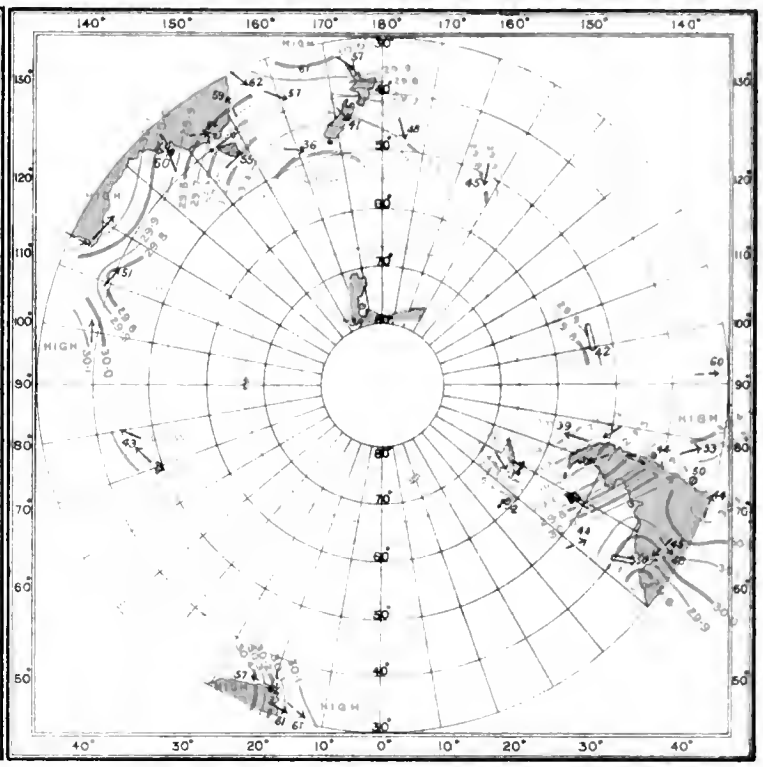

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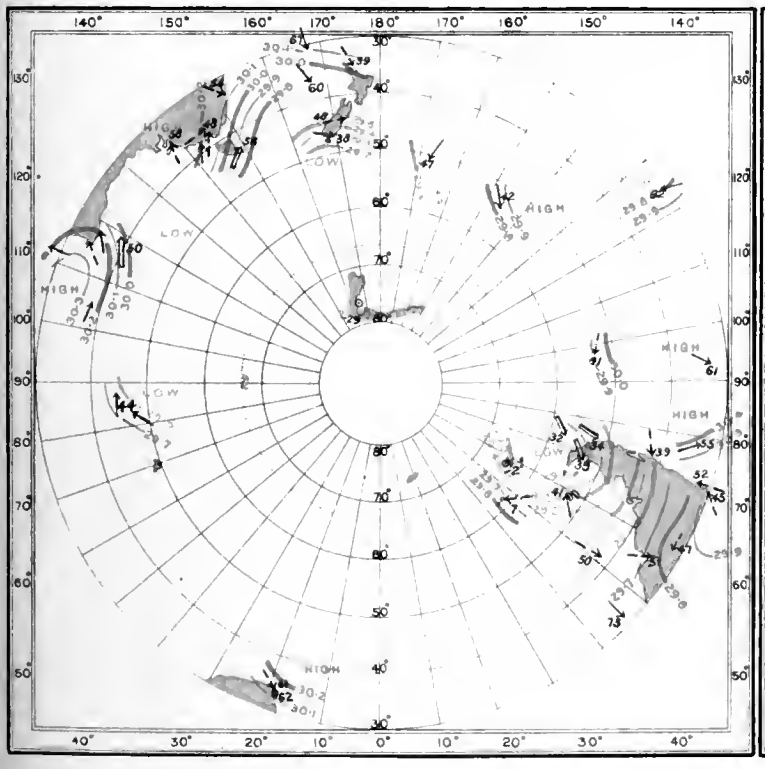

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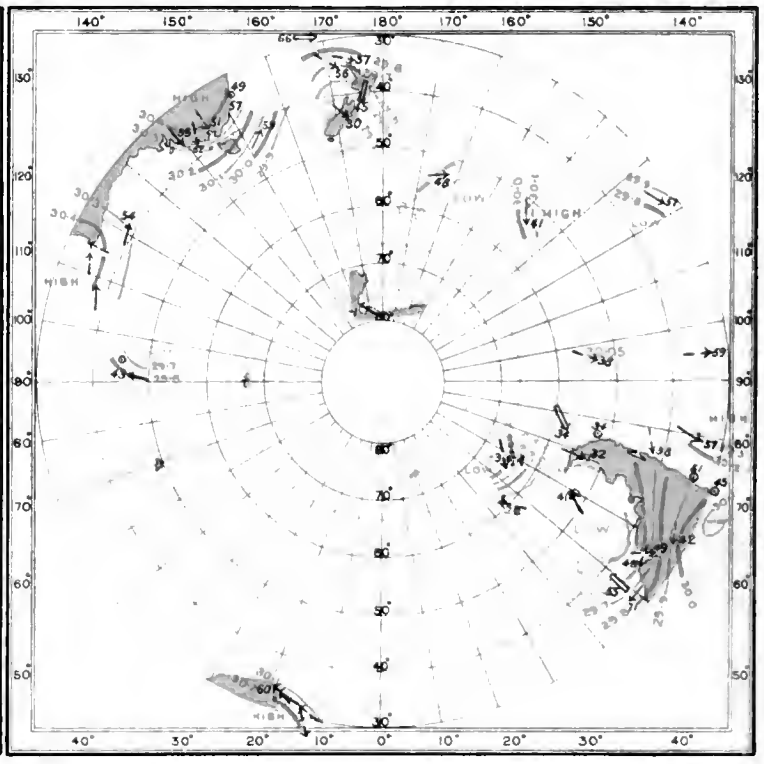


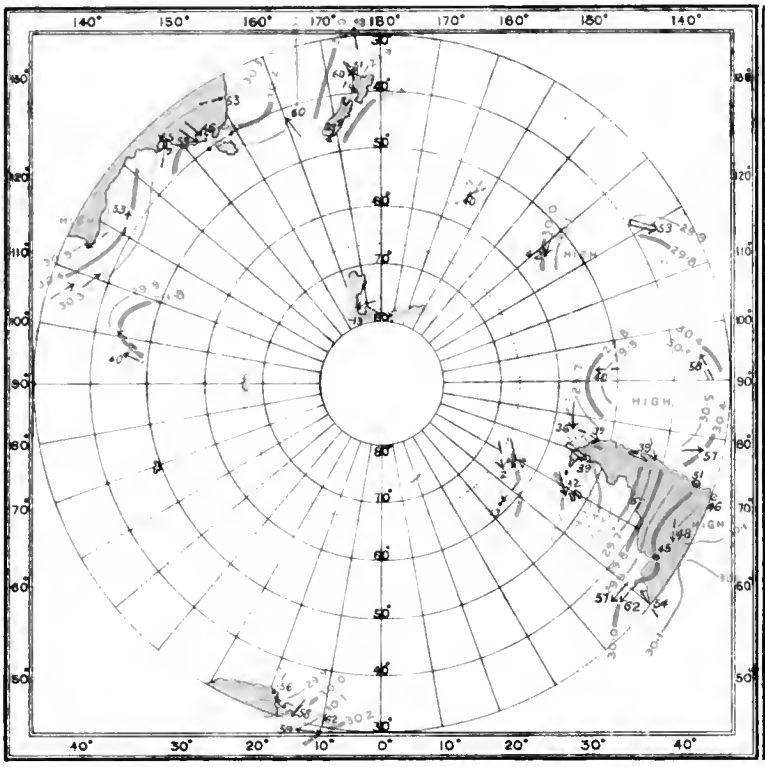
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1903 JUNE 25



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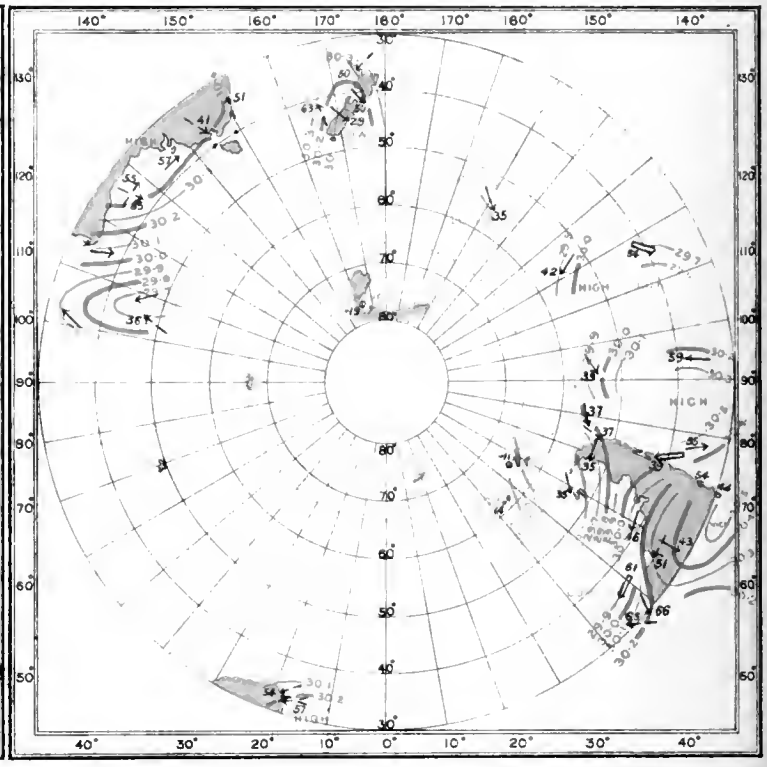

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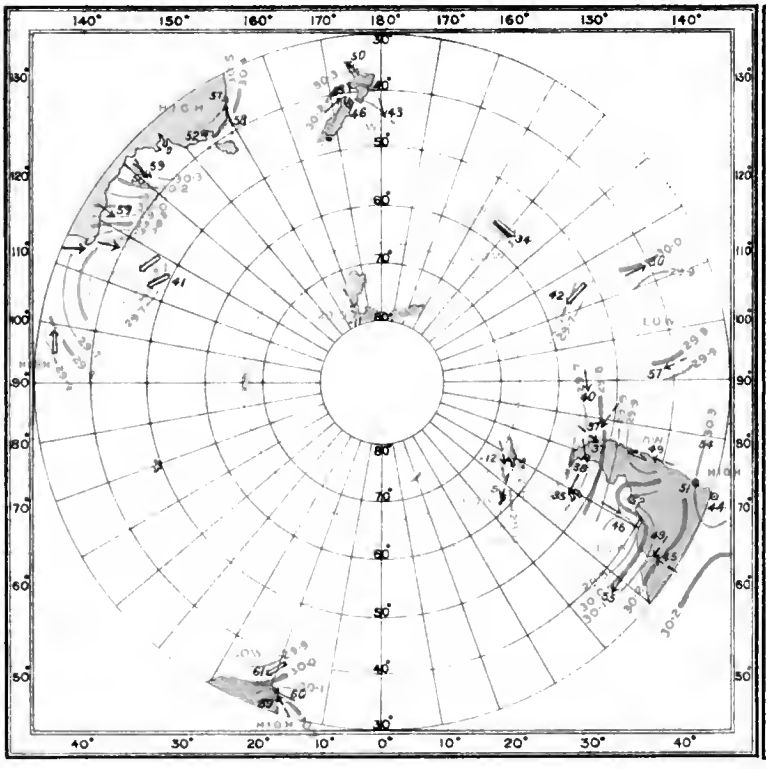

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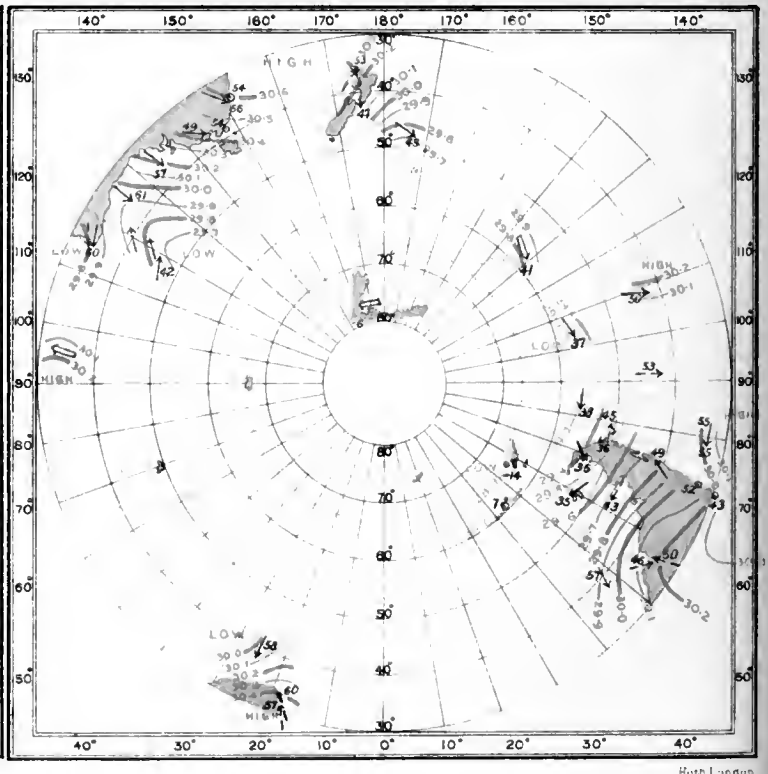

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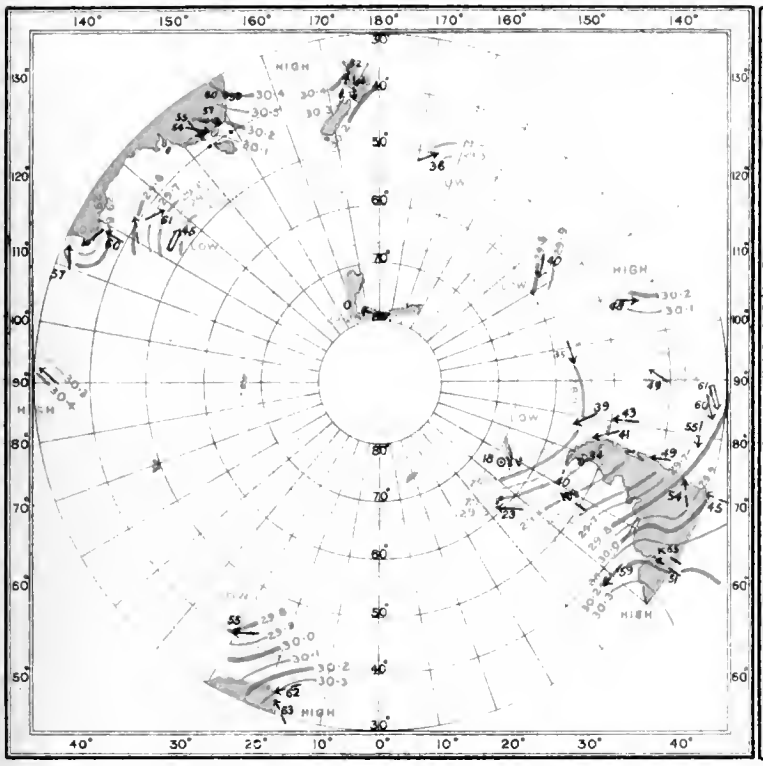
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JUNE 29



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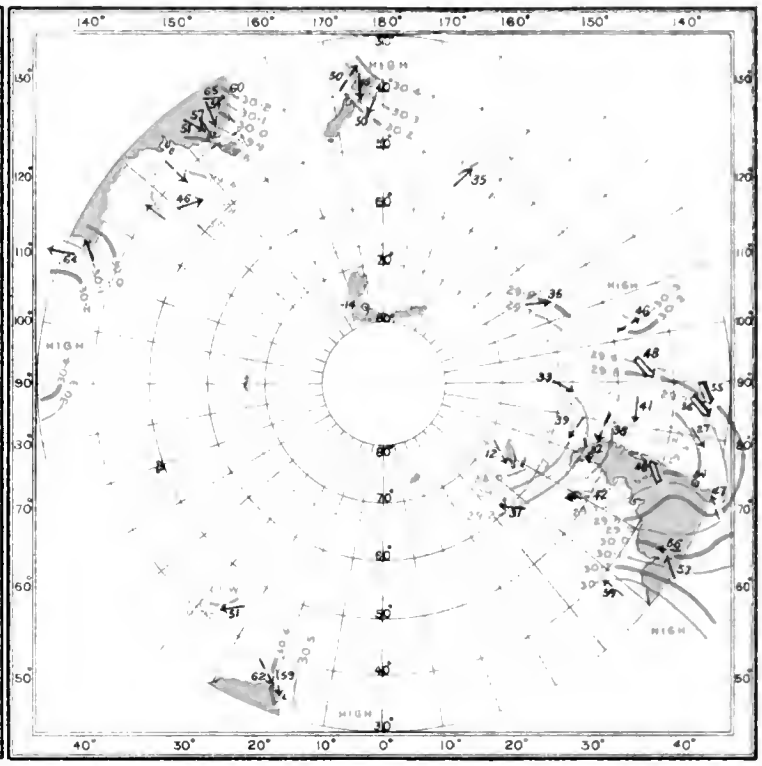

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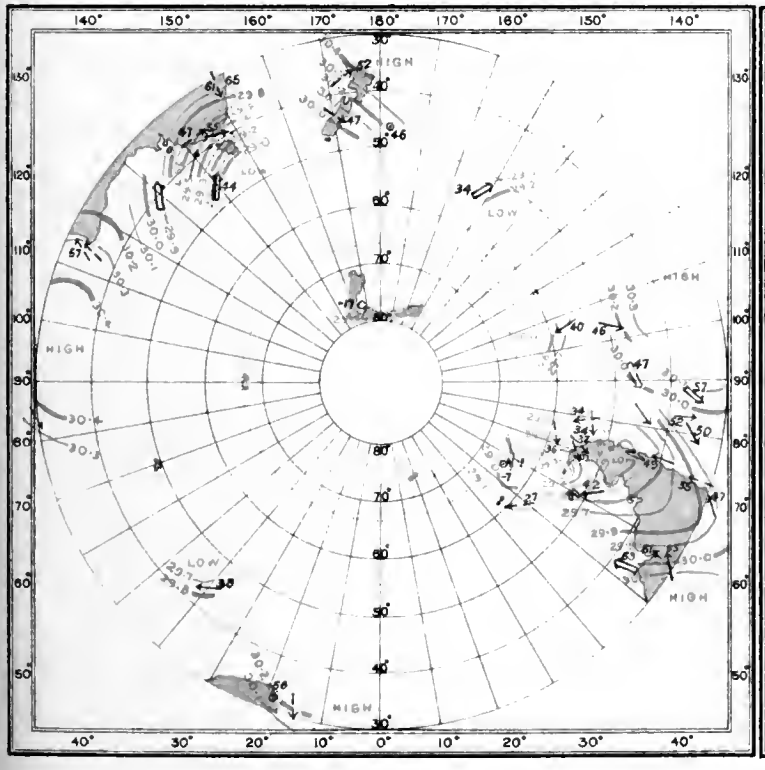

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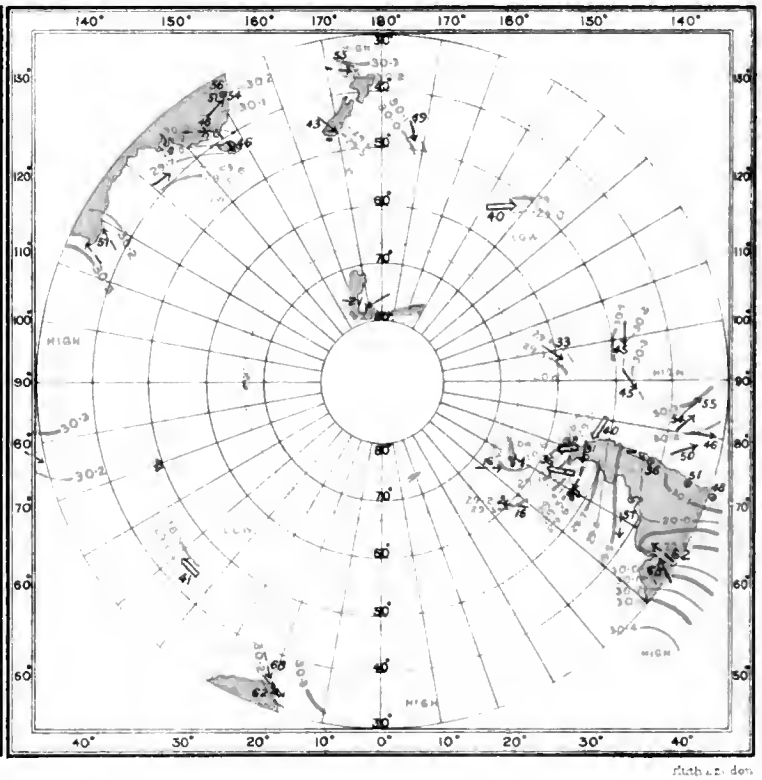

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

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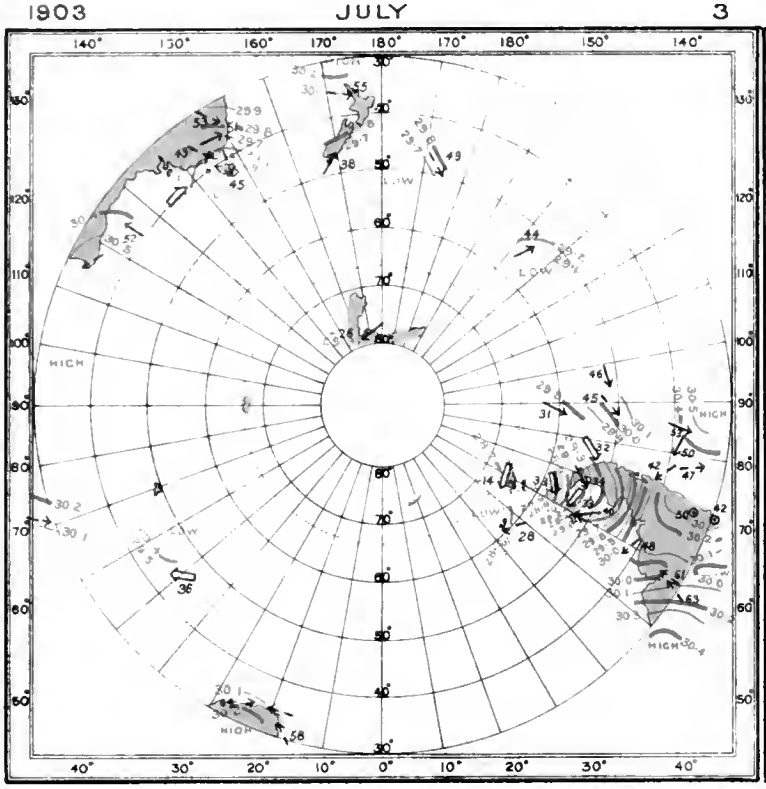

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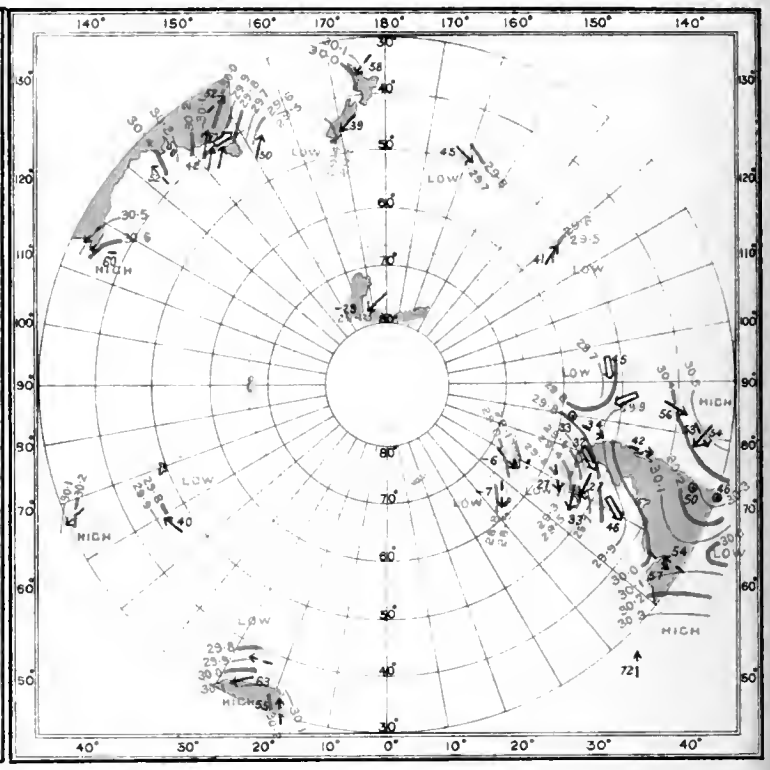

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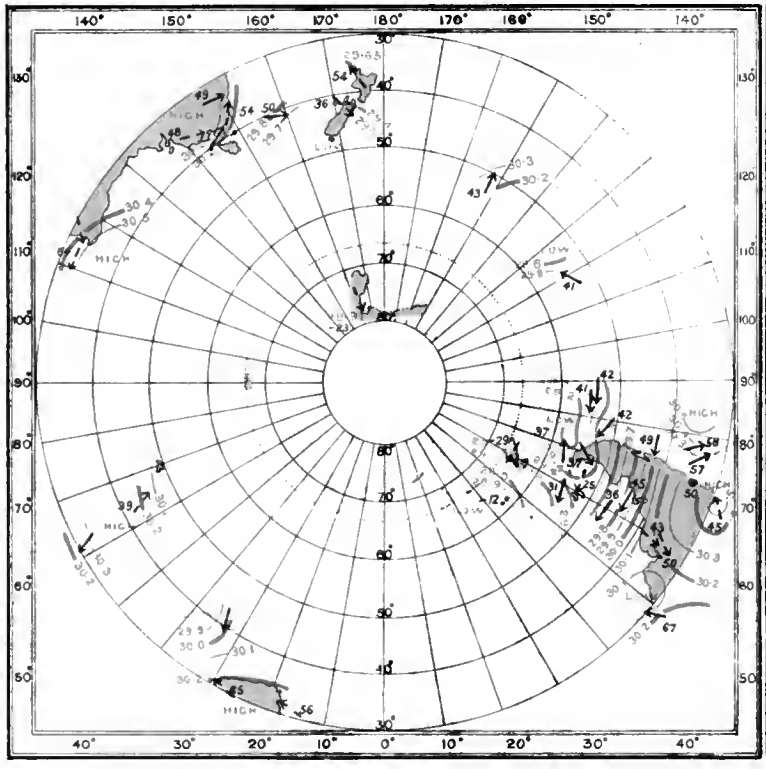

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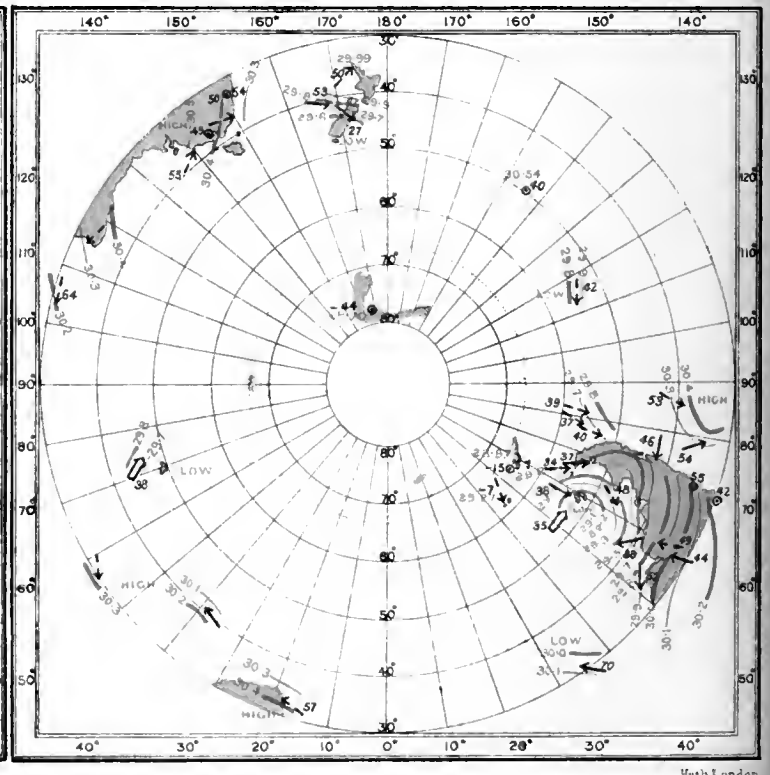

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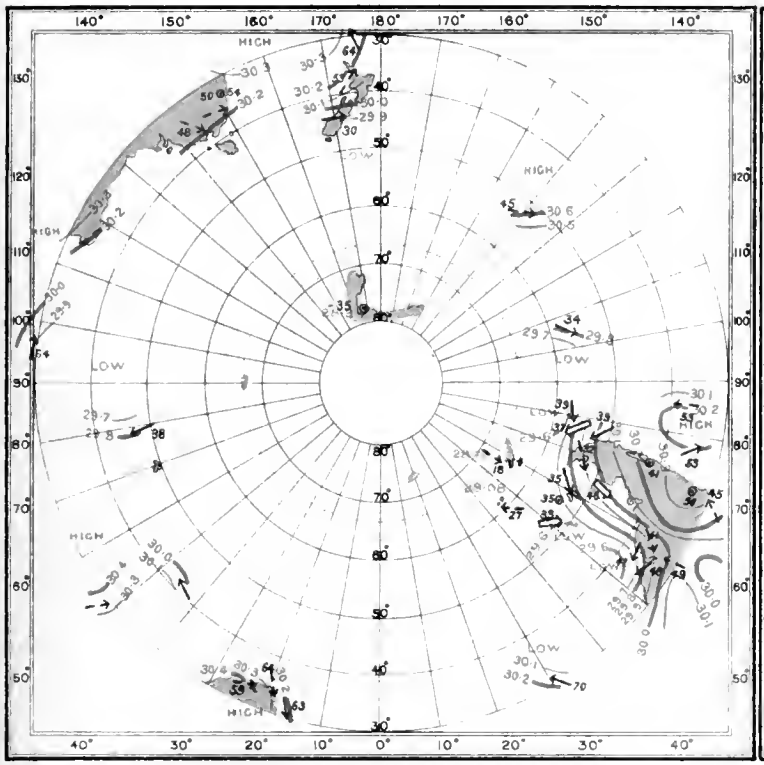
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JULY 7



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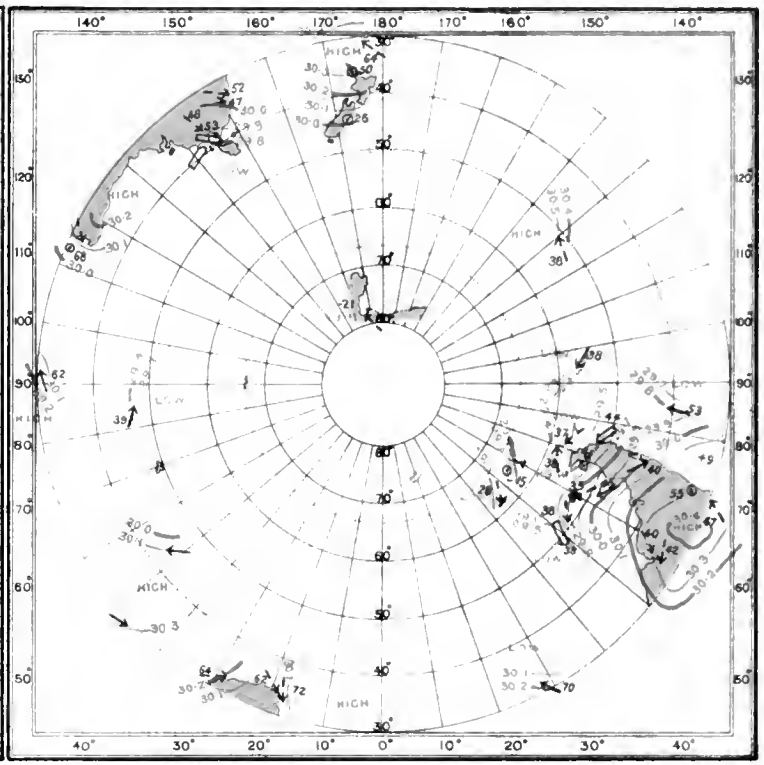

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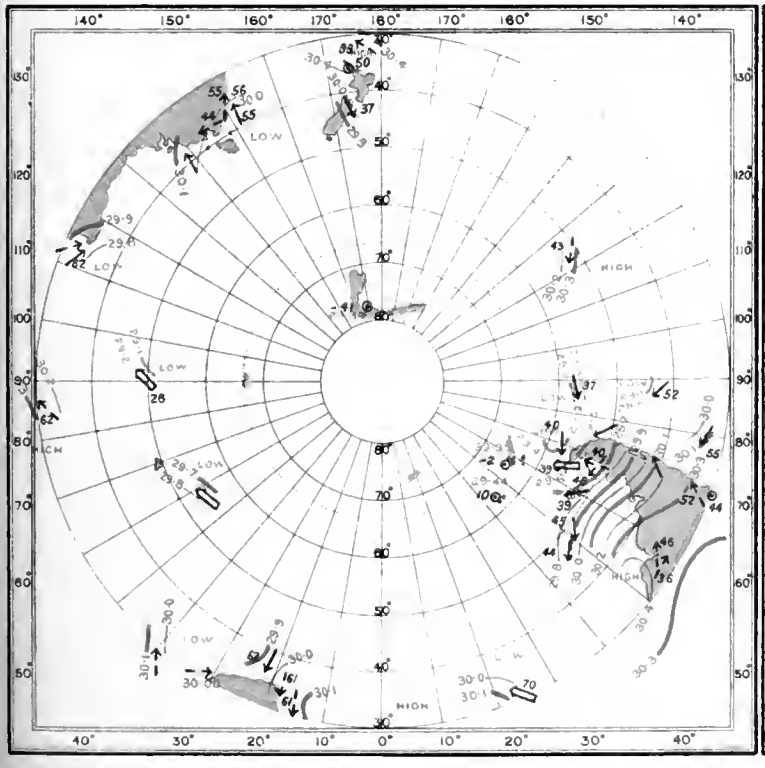

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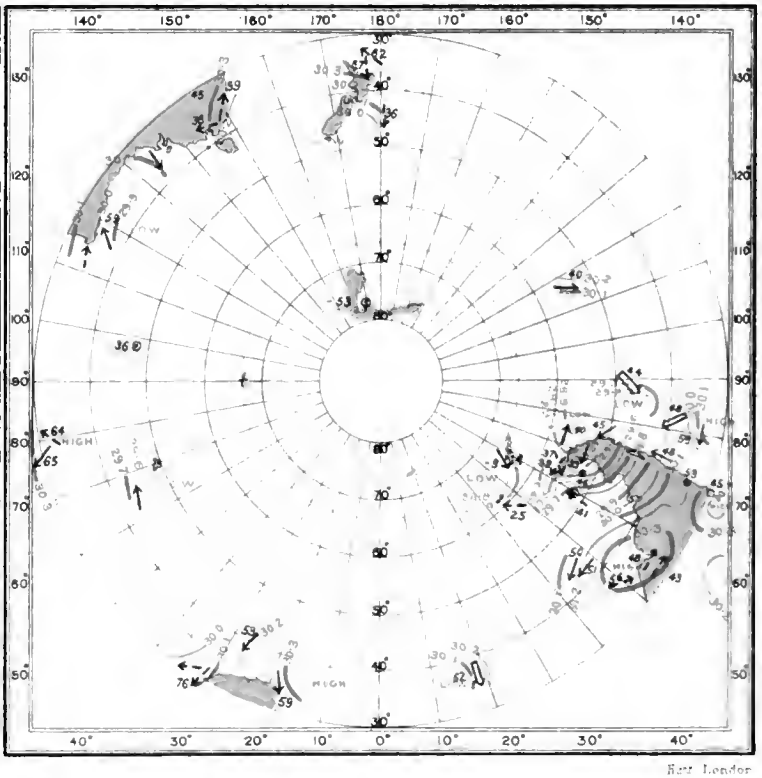


Key Leader

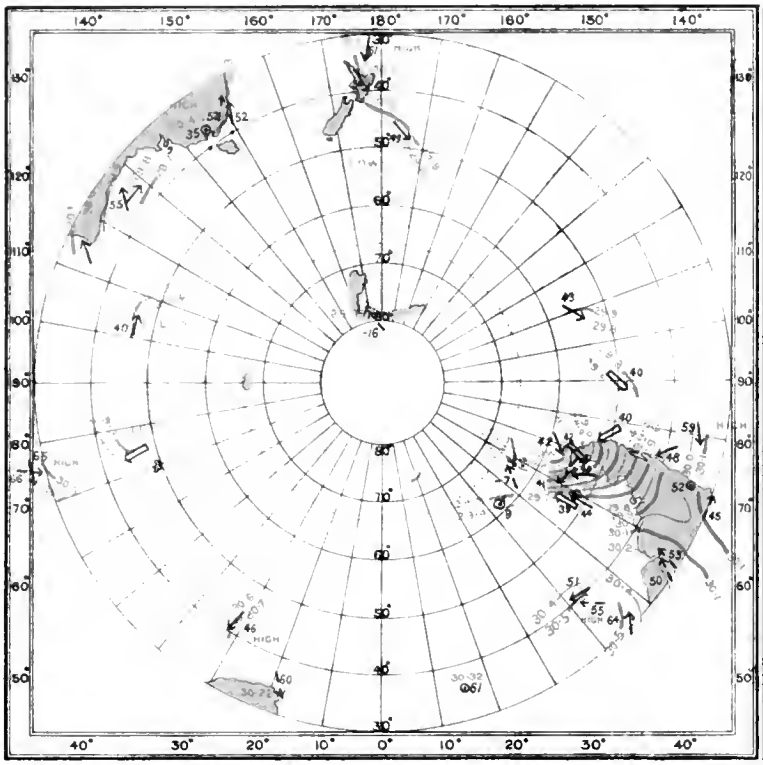
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JULY 11



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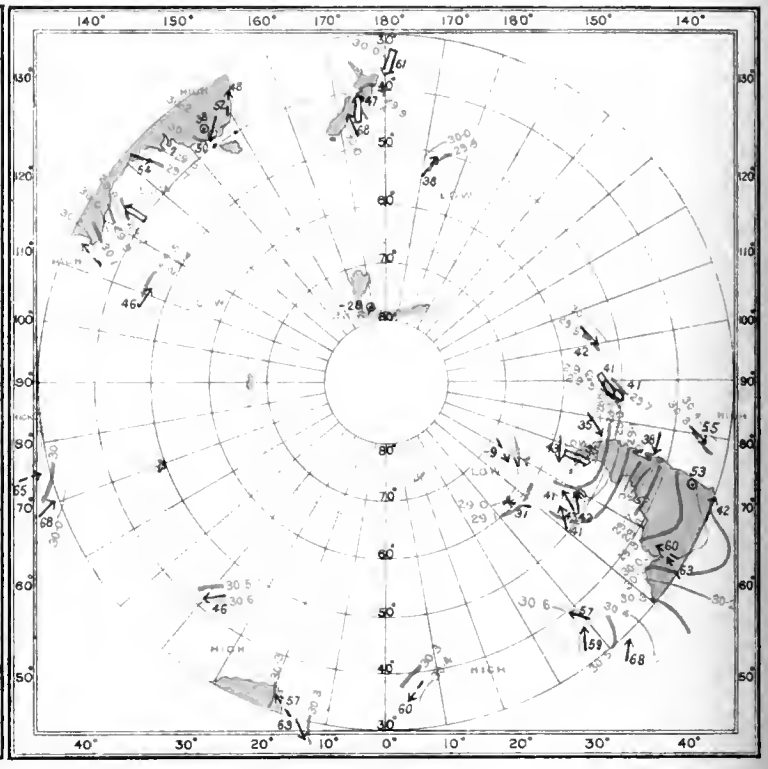

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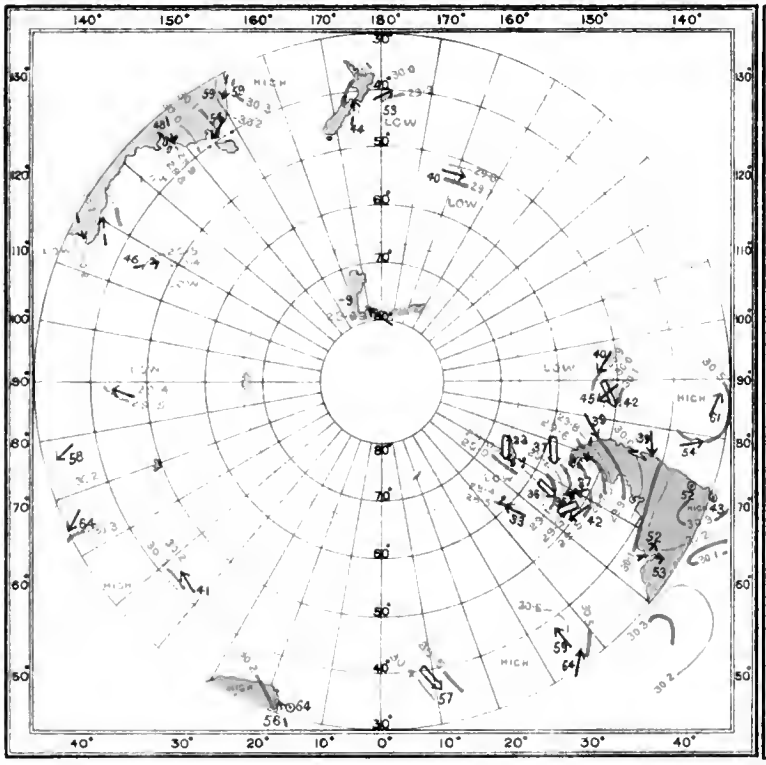

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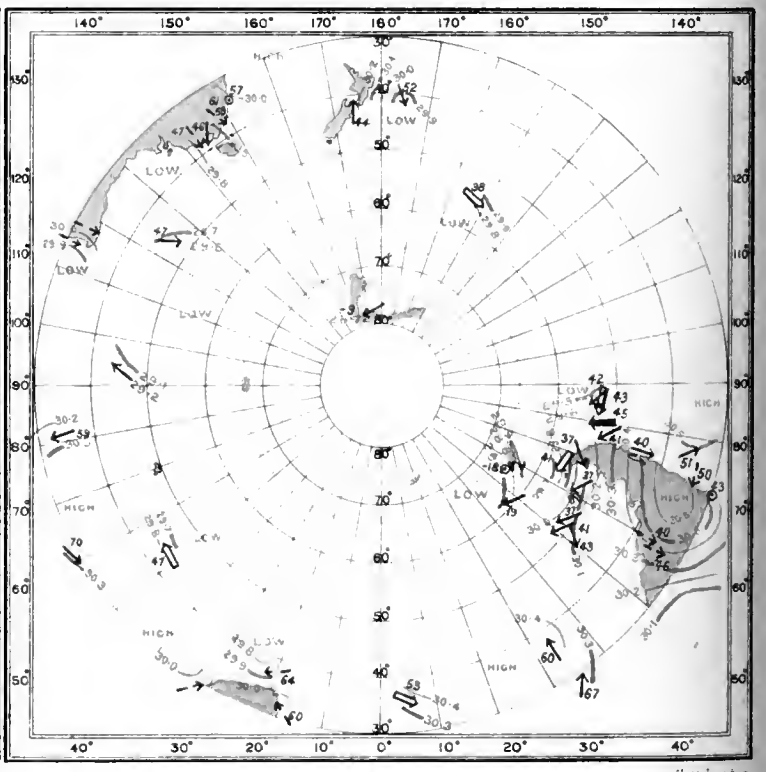


Huth London

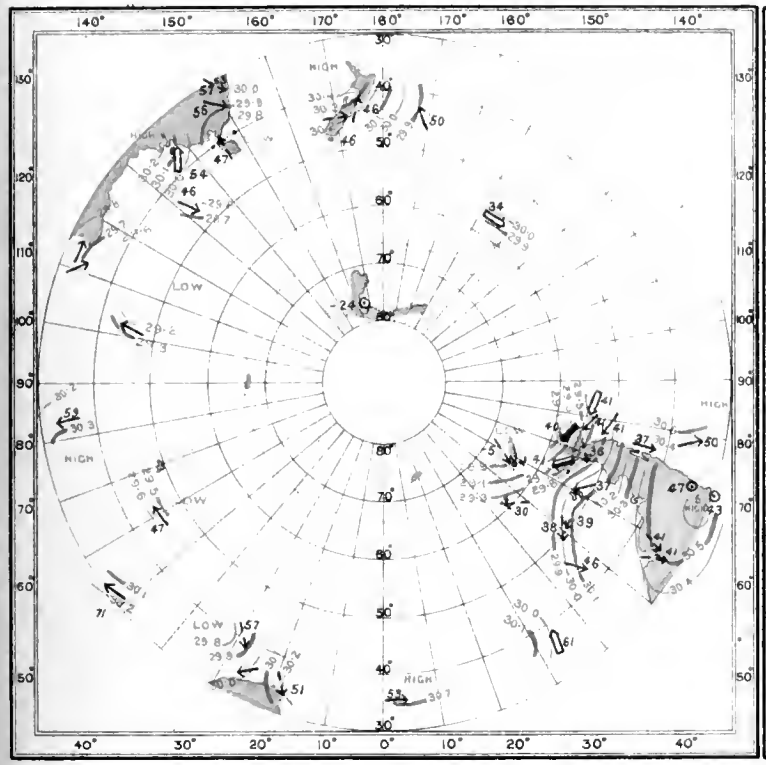
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JULY 15



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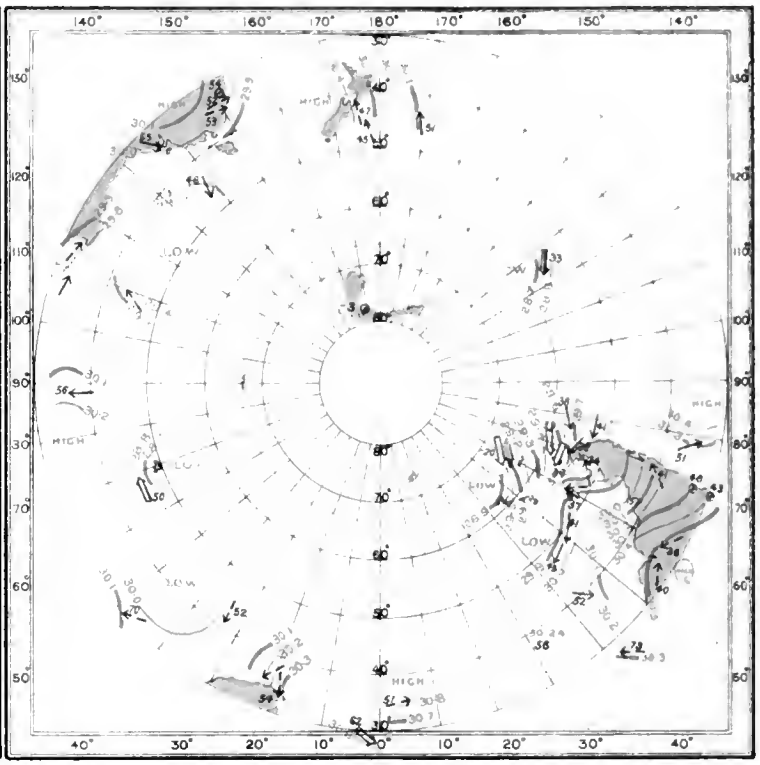

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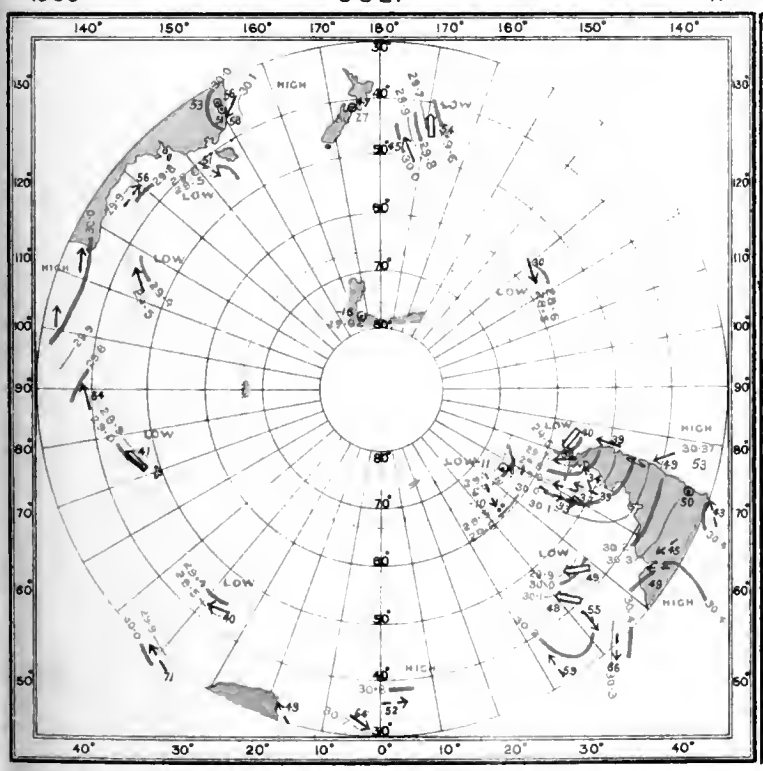

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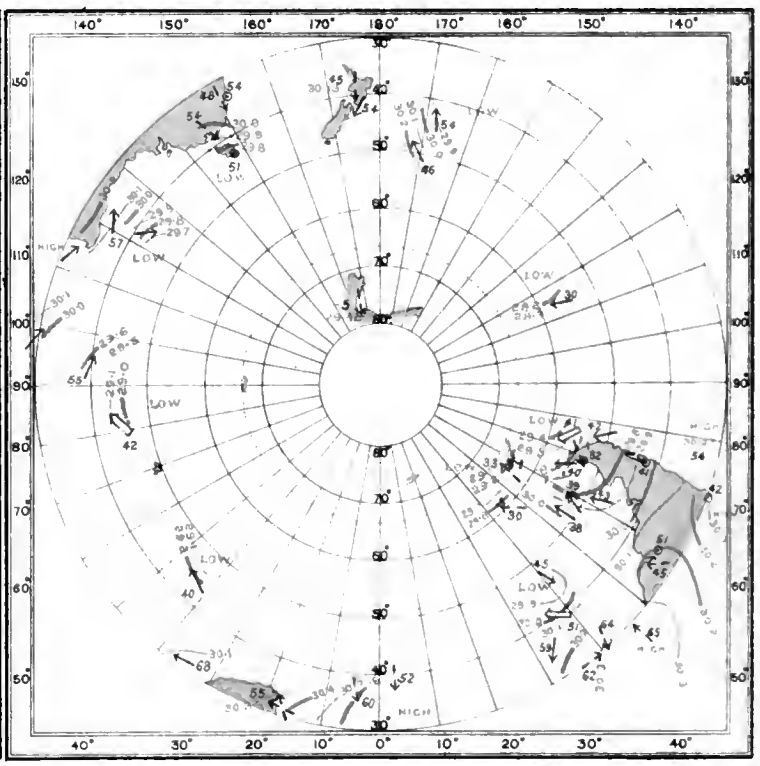


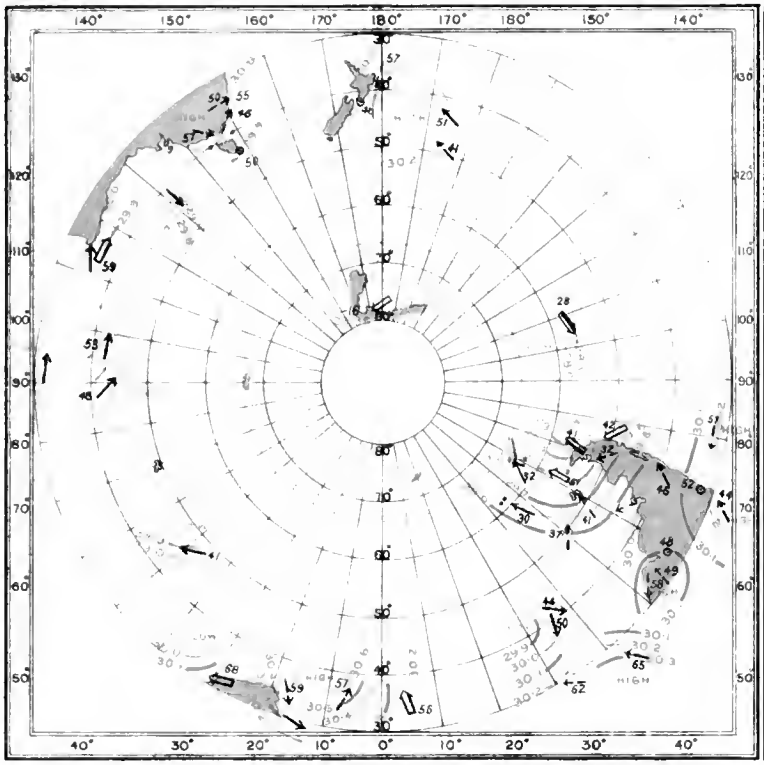
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JULY 19



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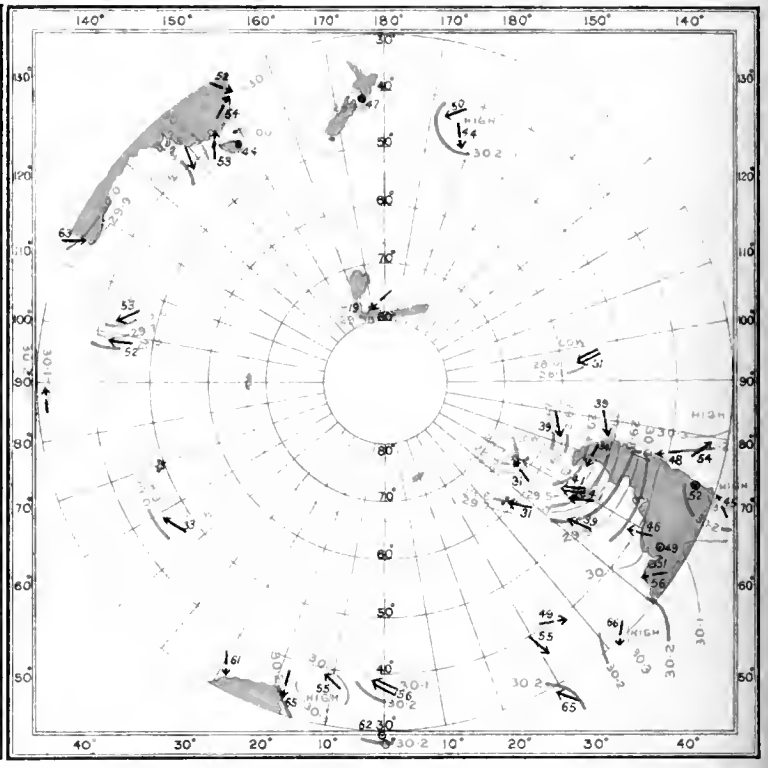

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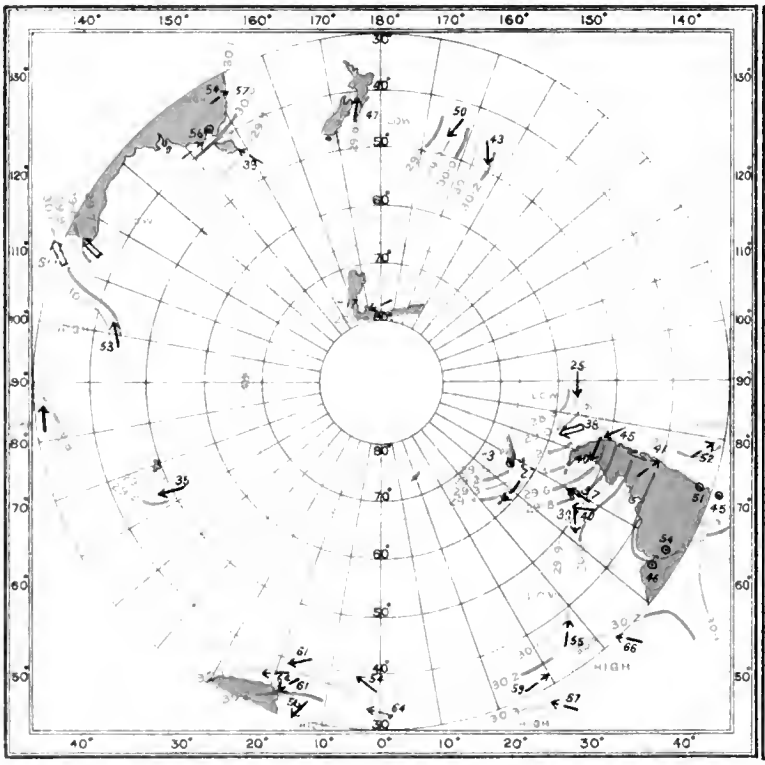

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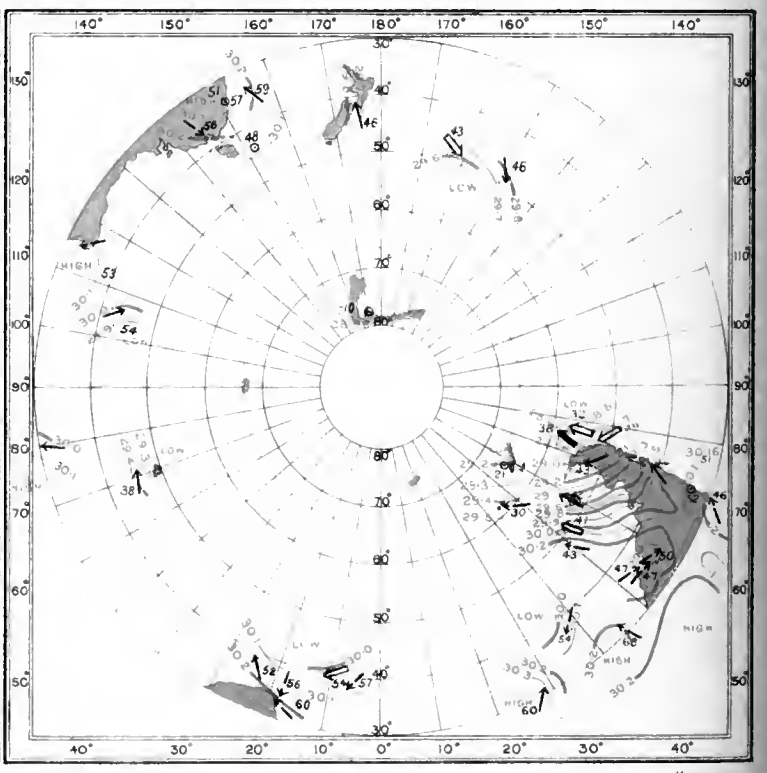


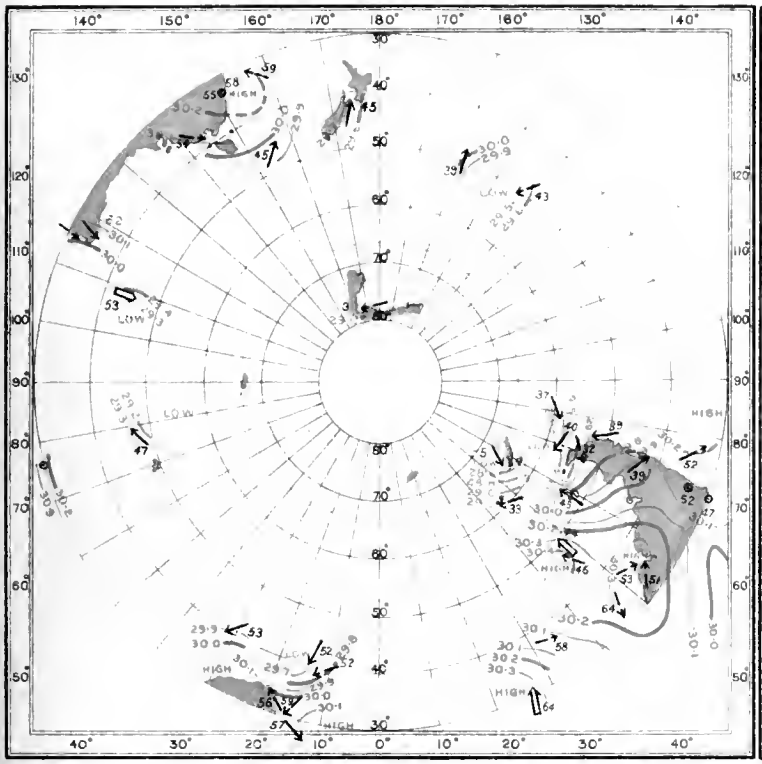
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 JULY 23



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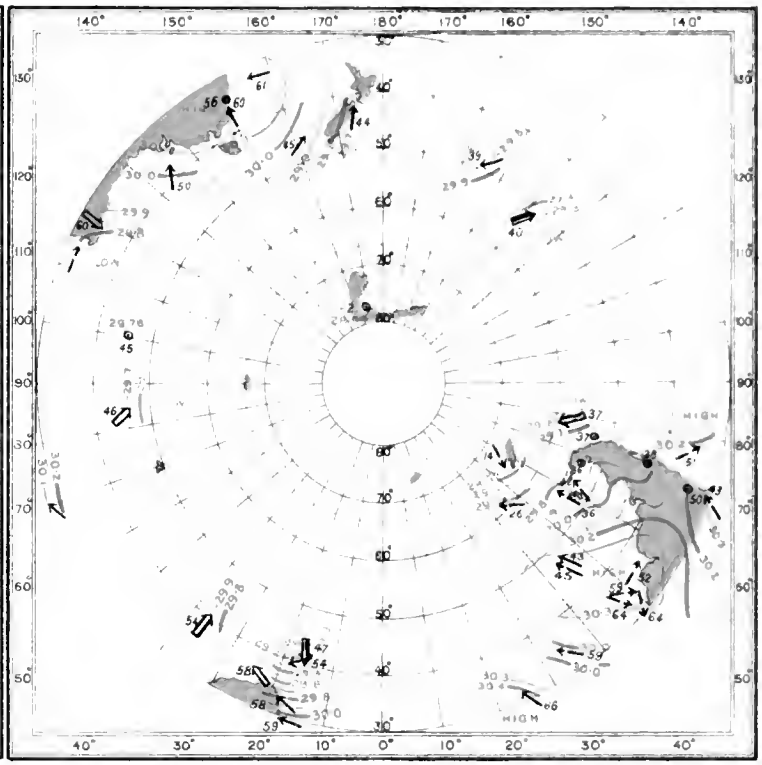

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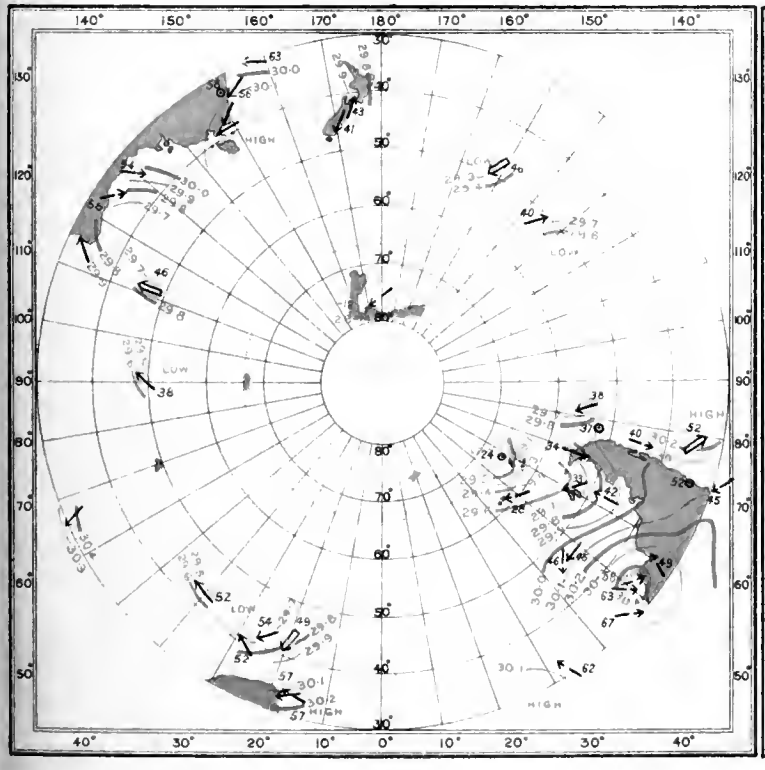

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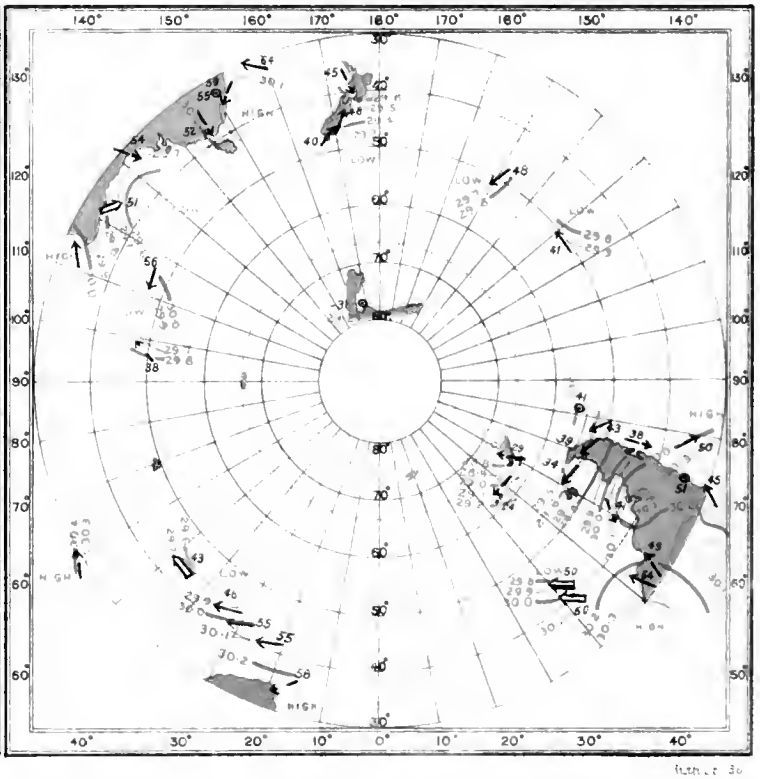


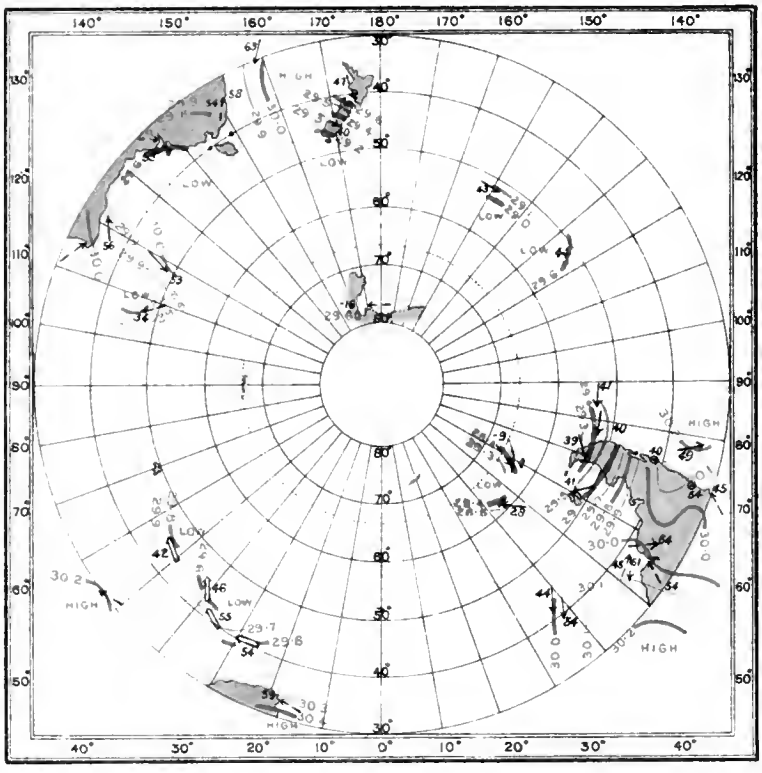
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 JULY 27



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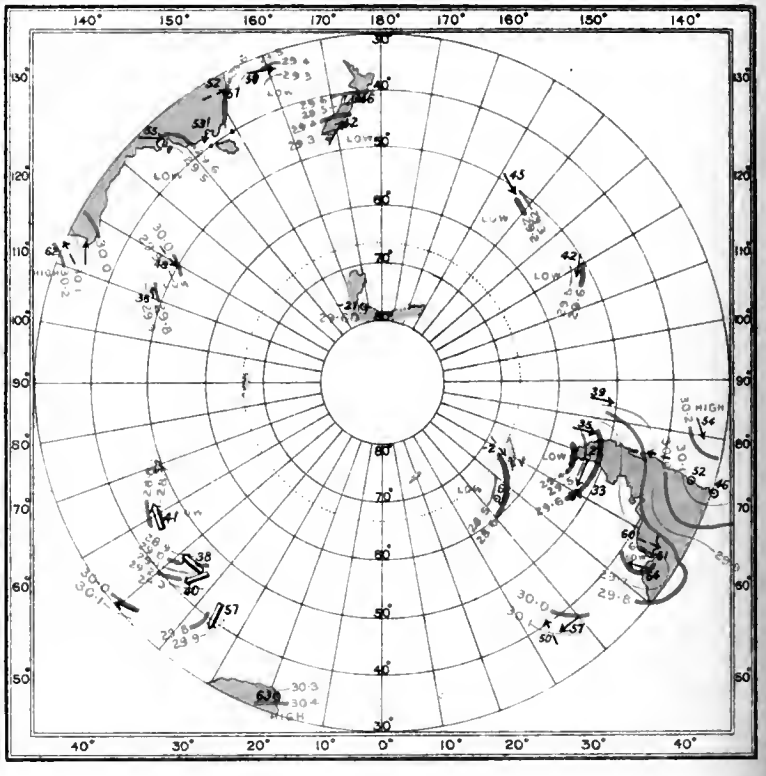

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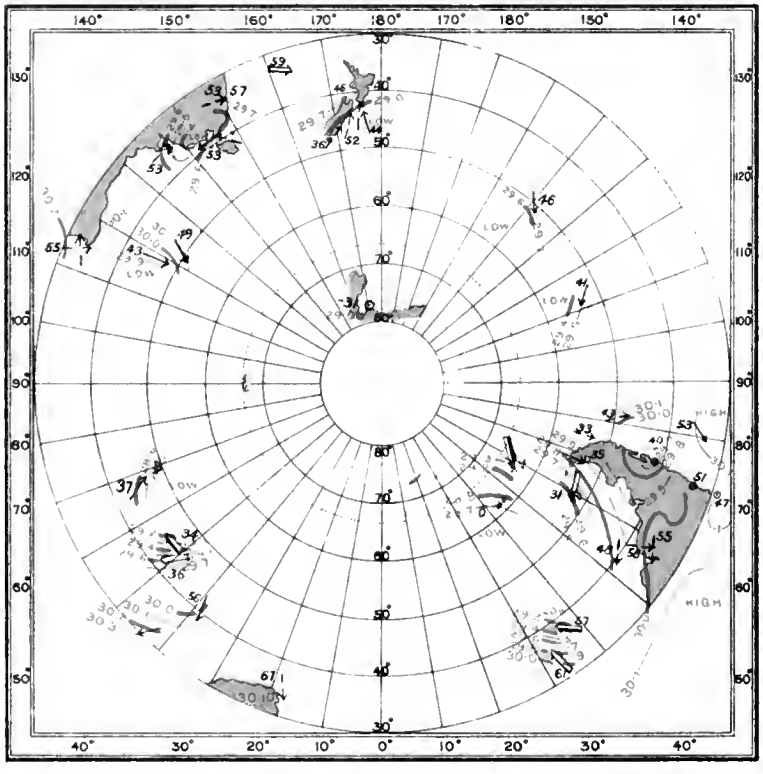

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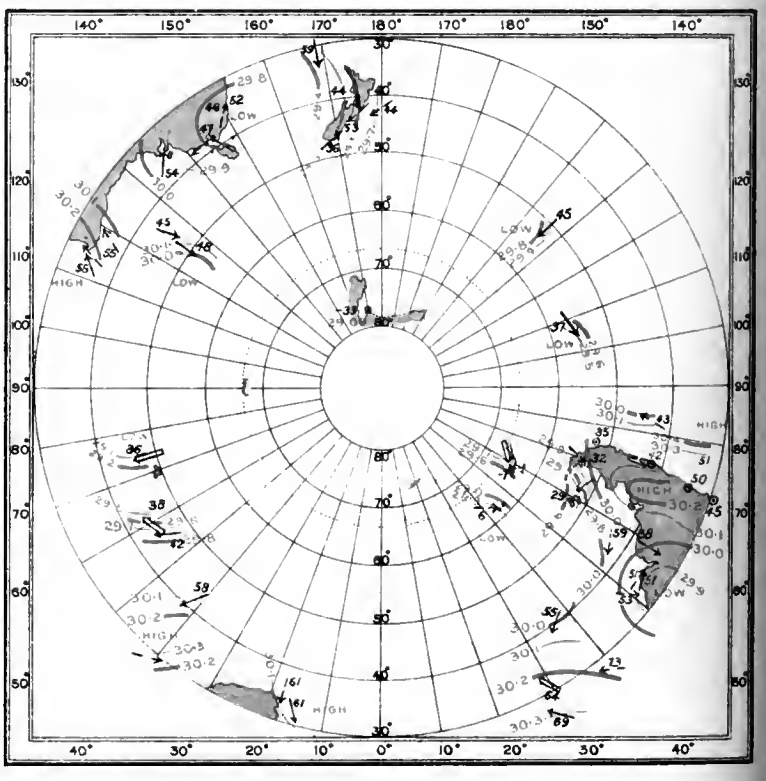


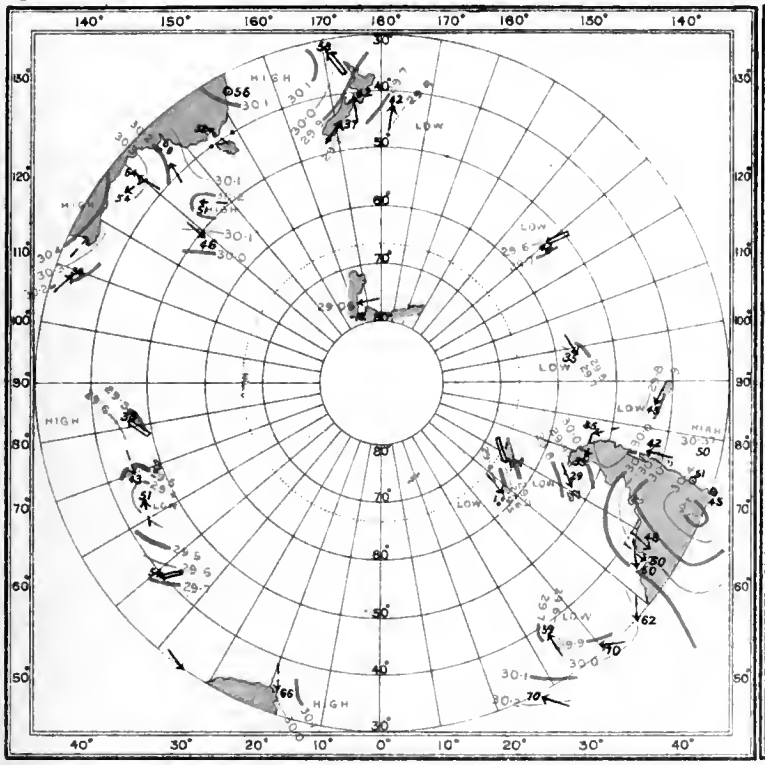
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 JULY 31



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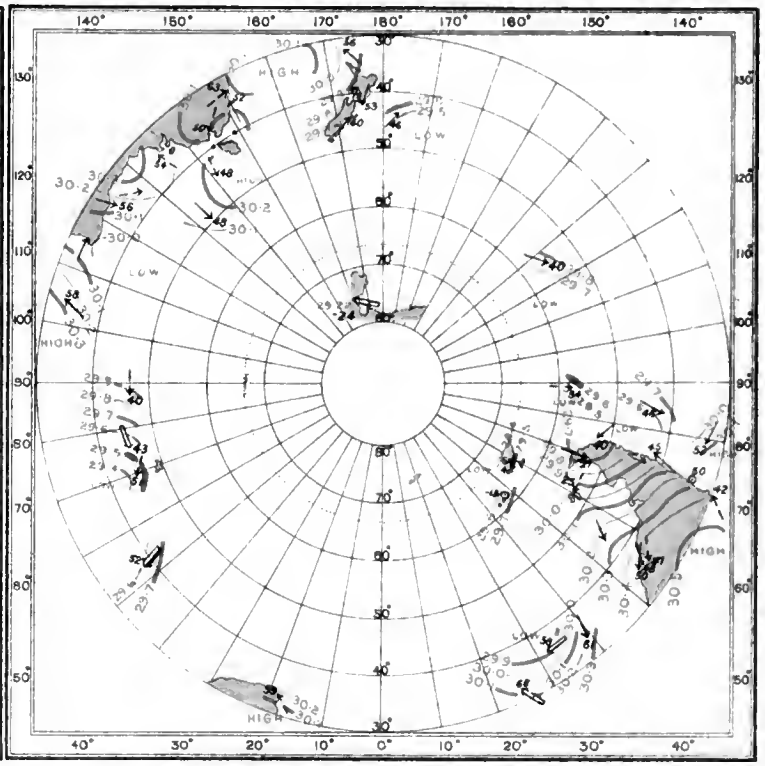

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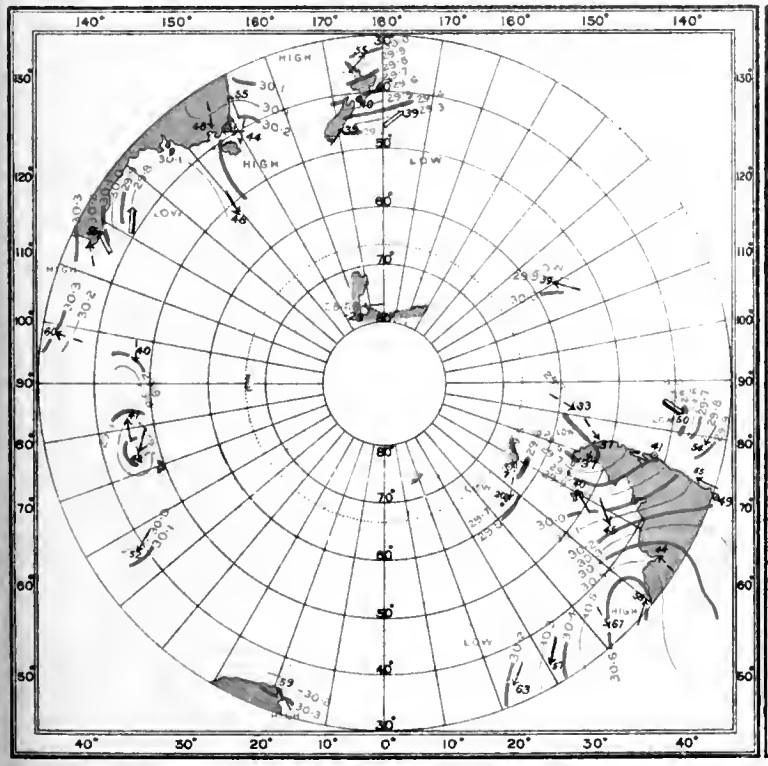

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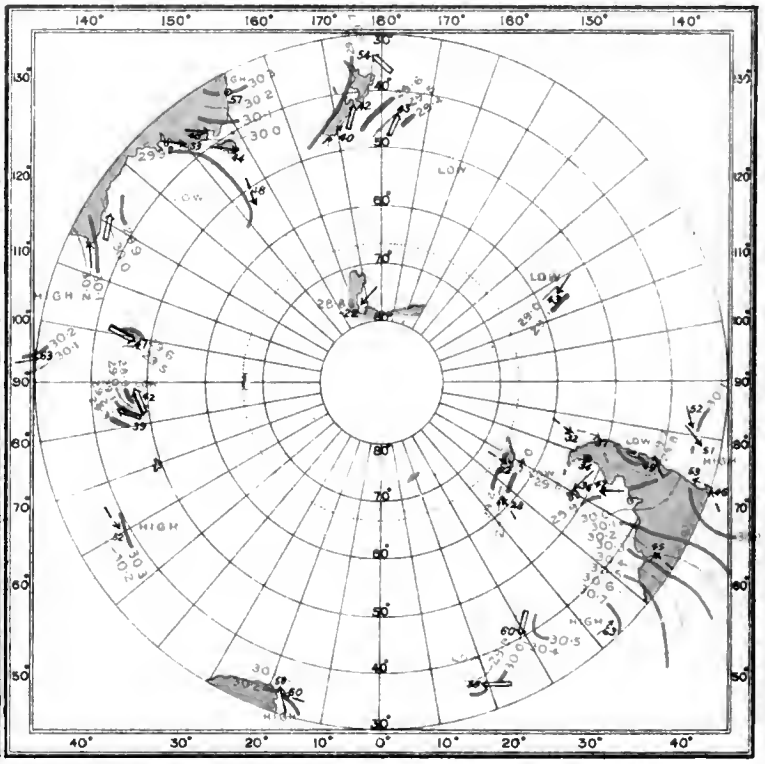


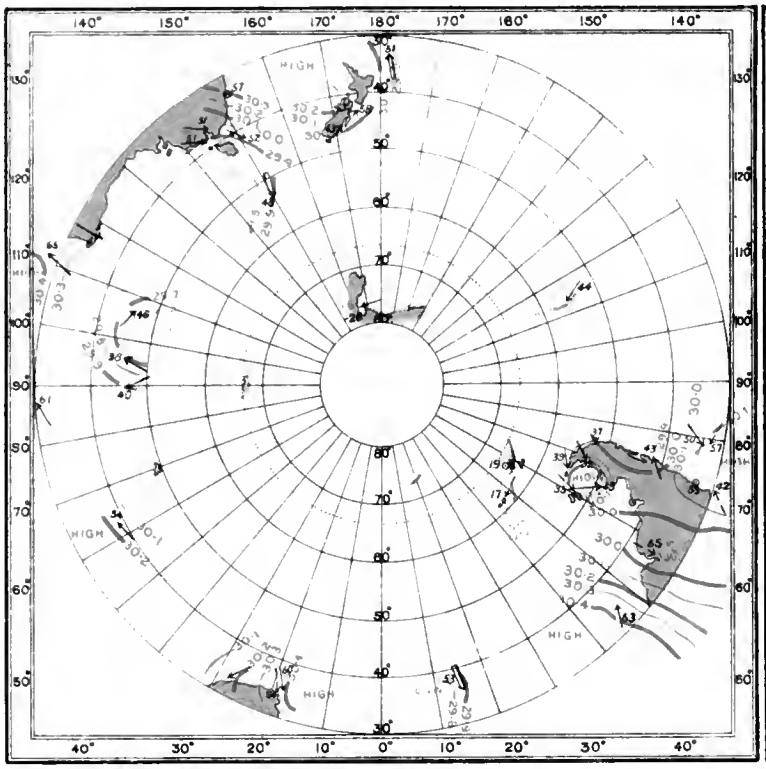
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

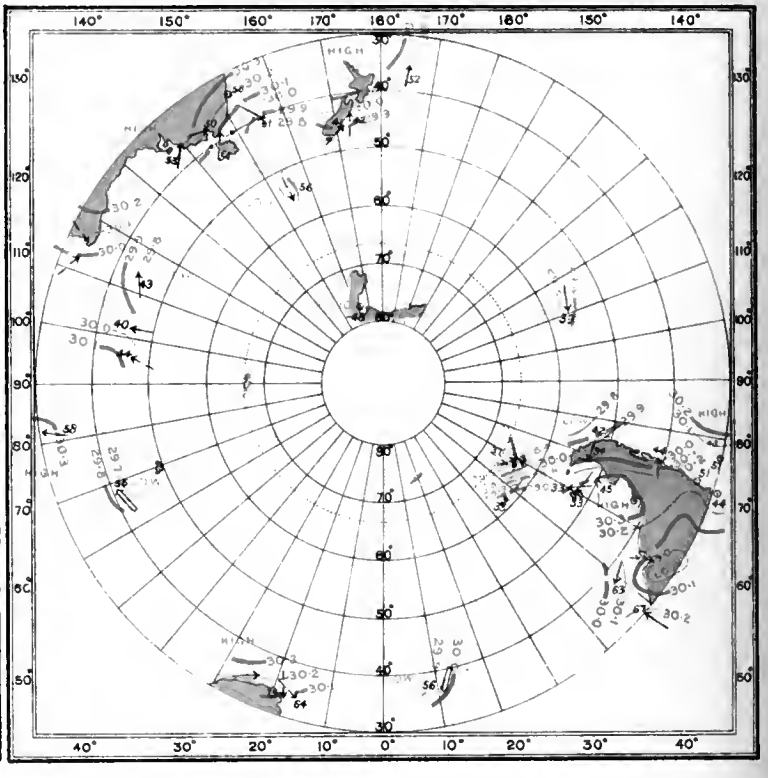
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 AUGUST 4



1903 AUGUST 5



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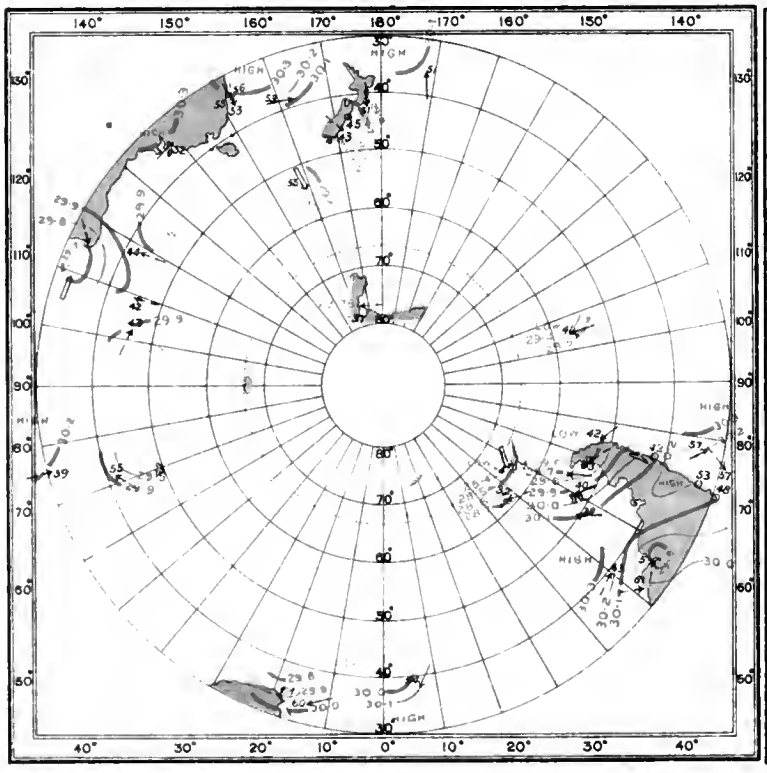

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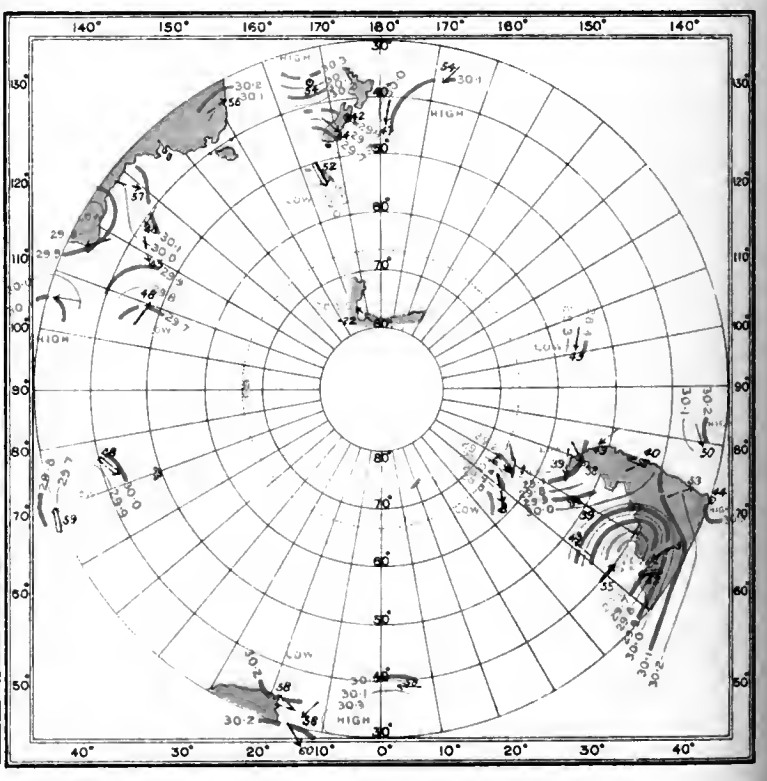


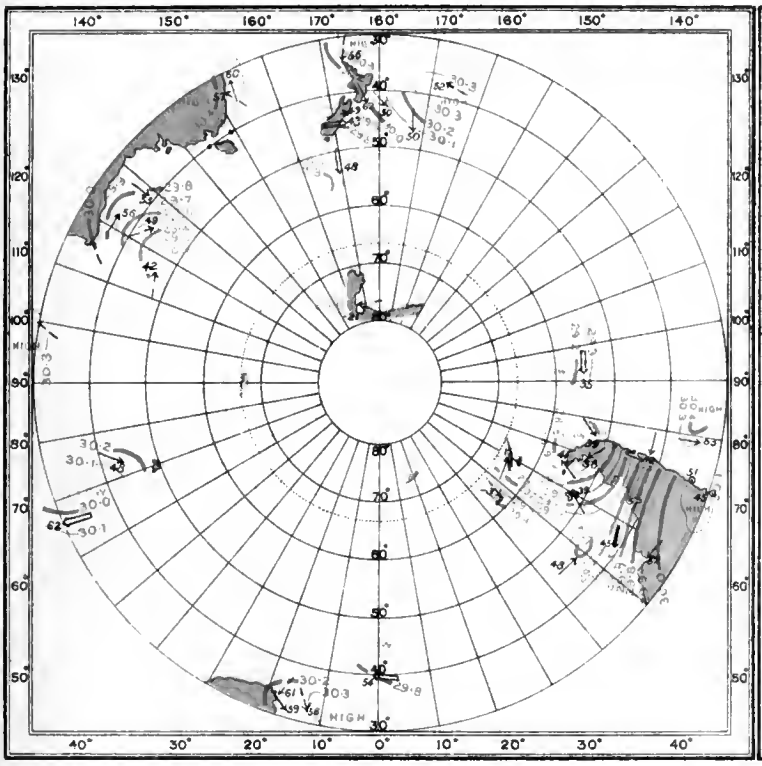
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 AUGUST 8



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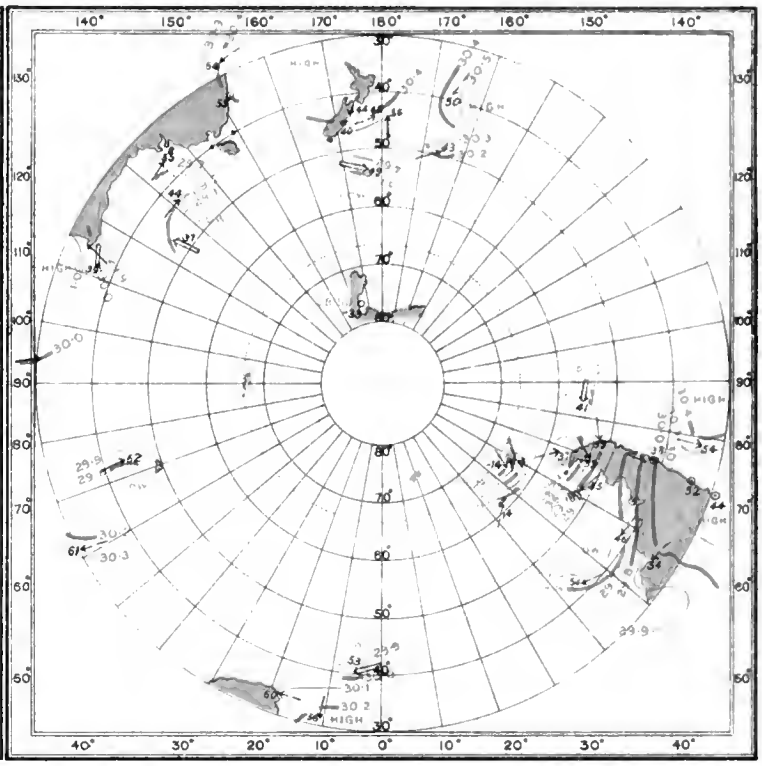

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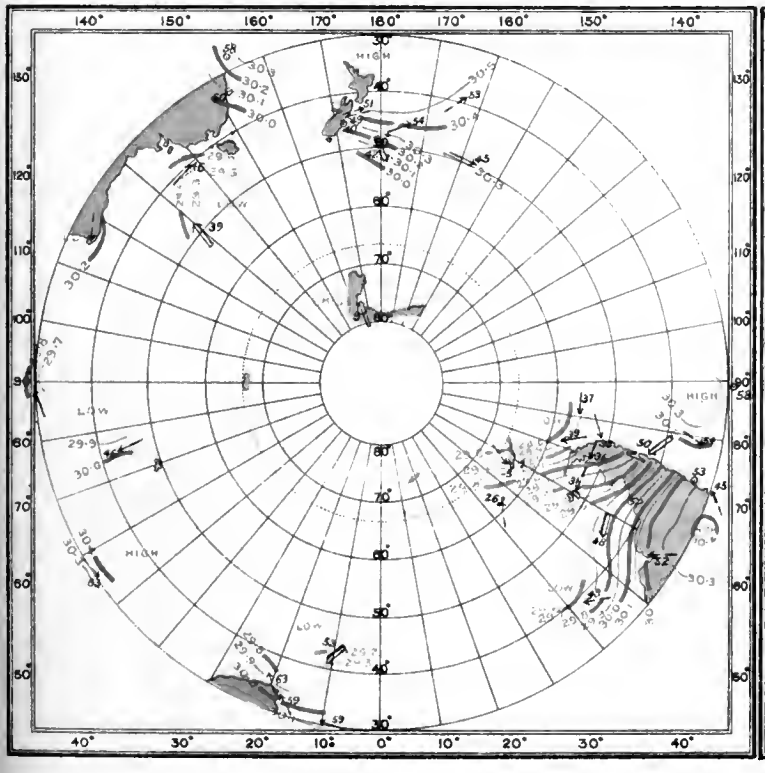

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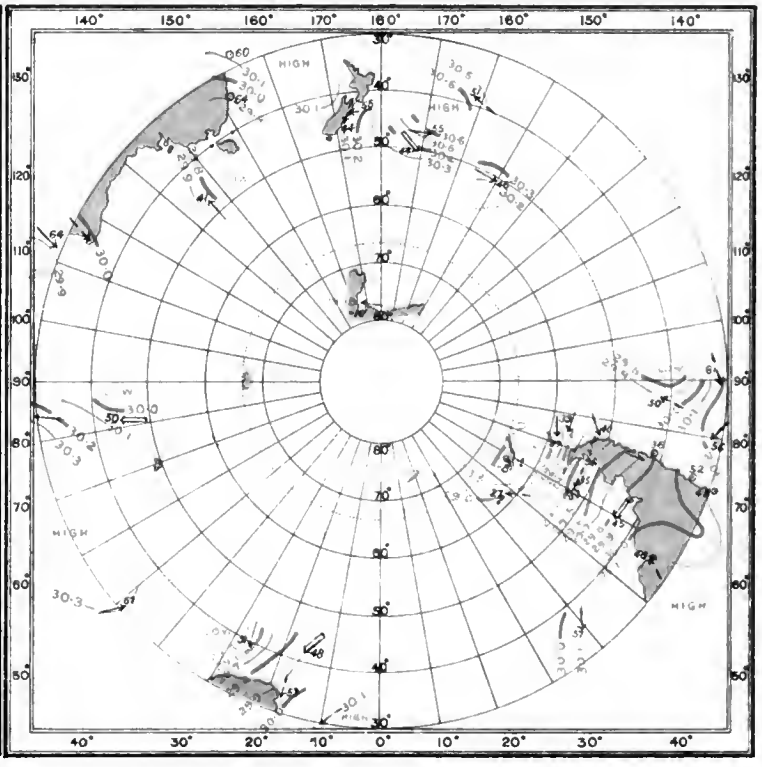


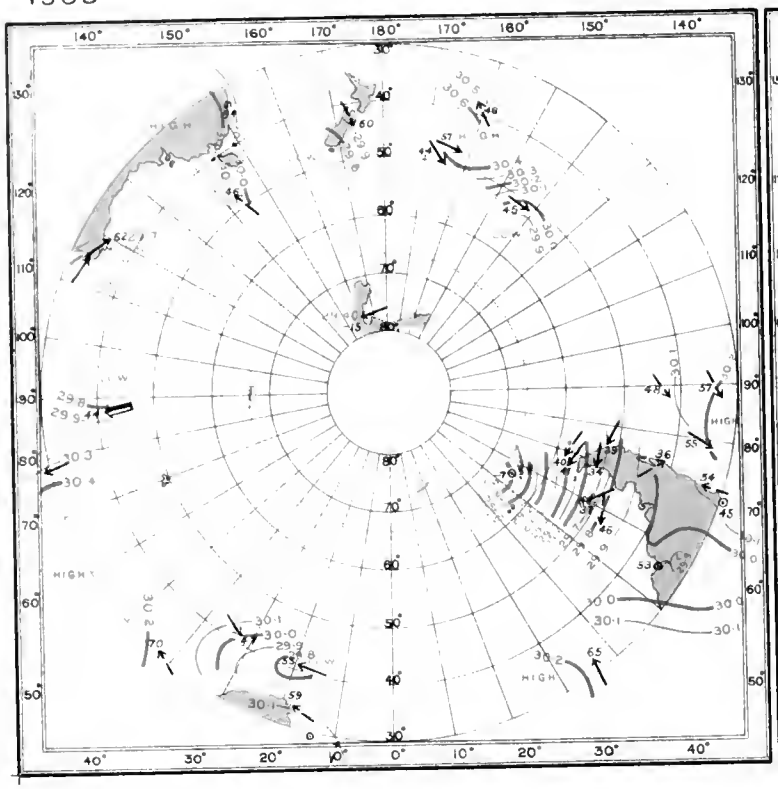
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 AUGUST 12



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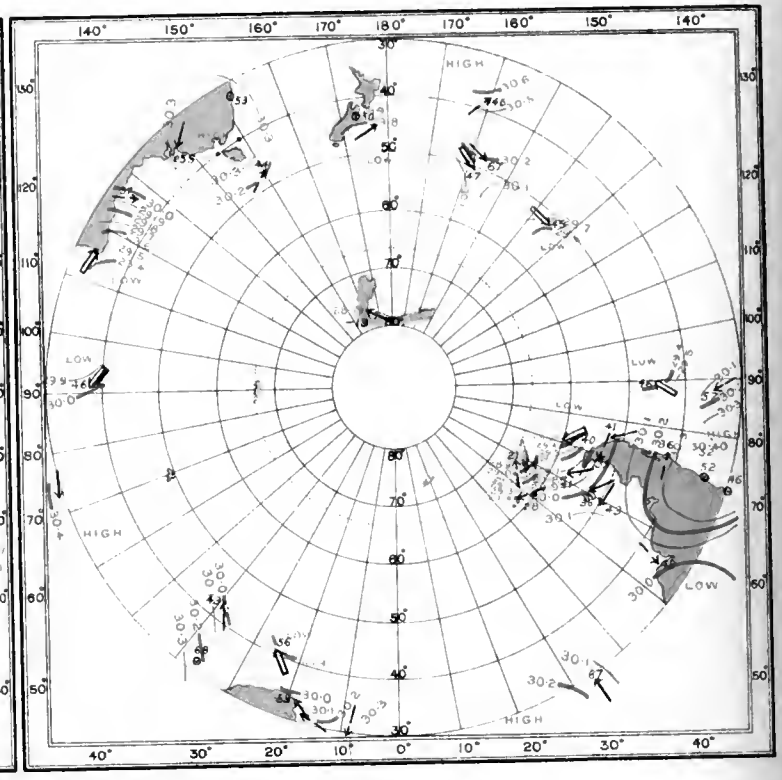

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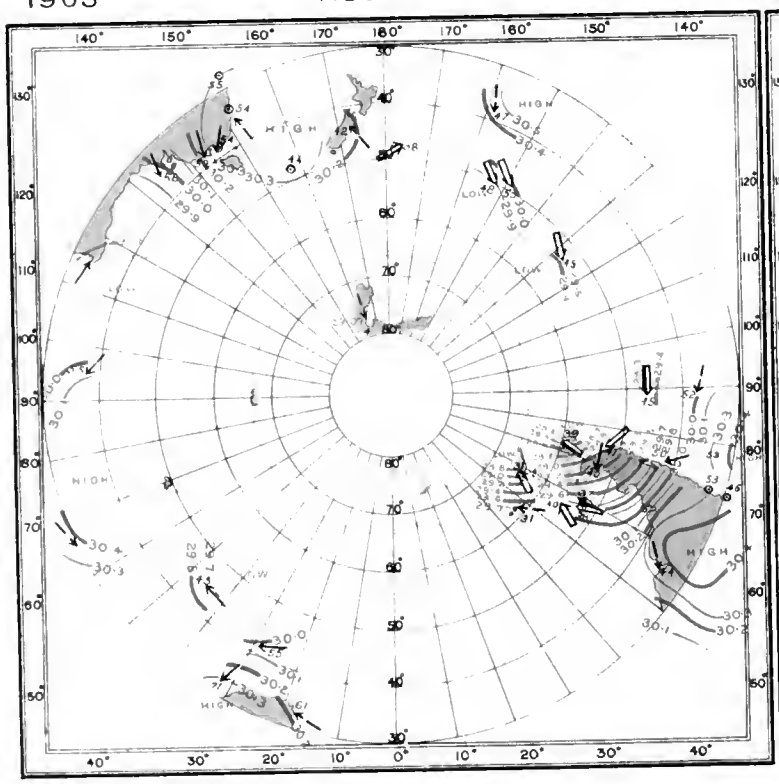

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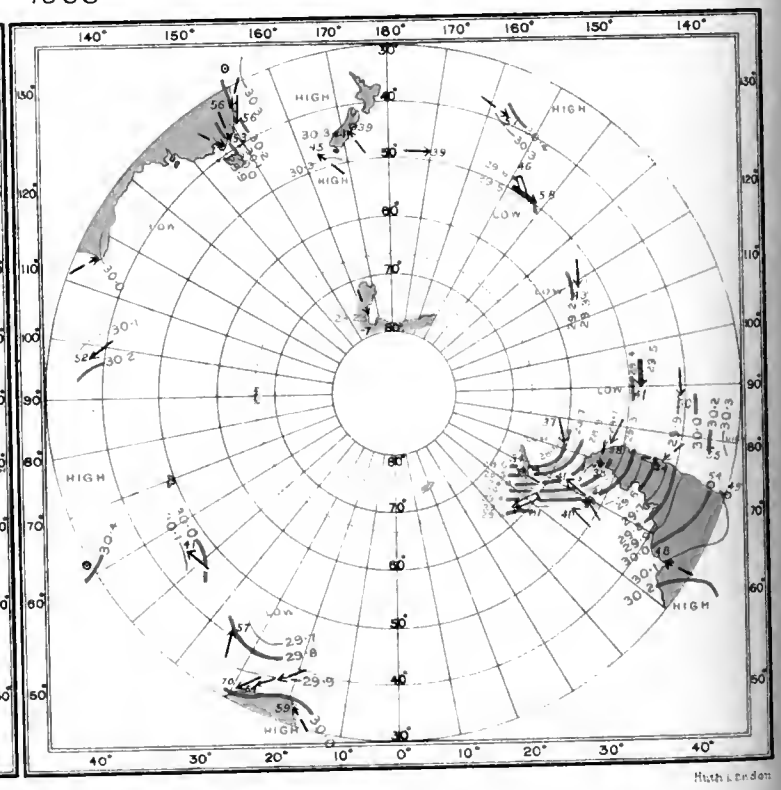


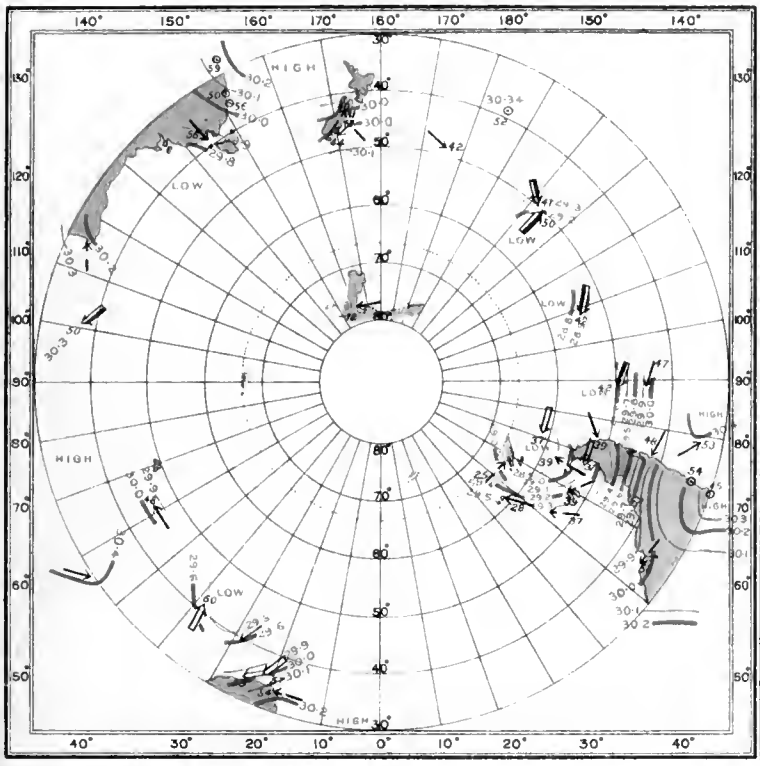
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 AUGUST 16



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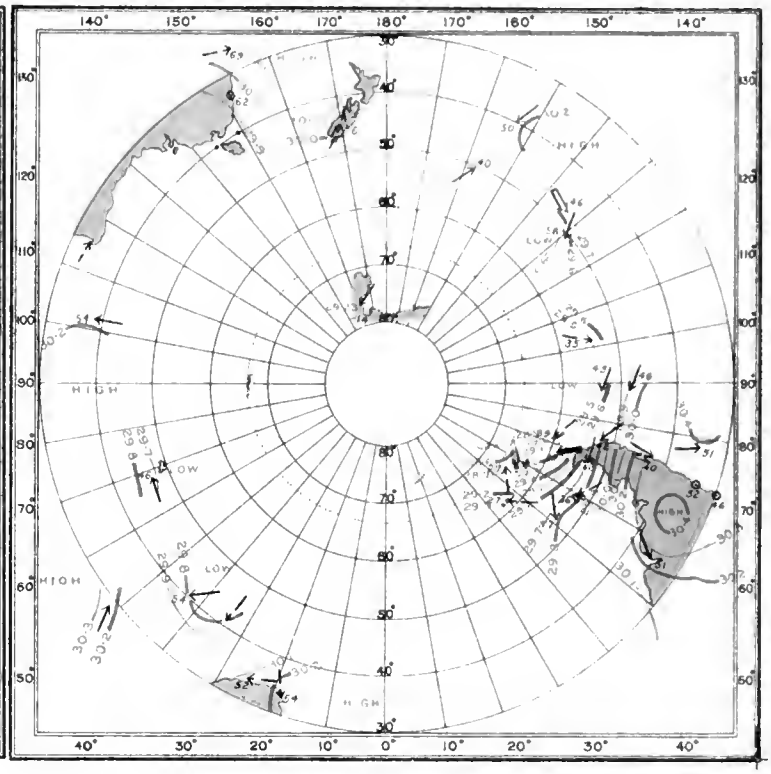

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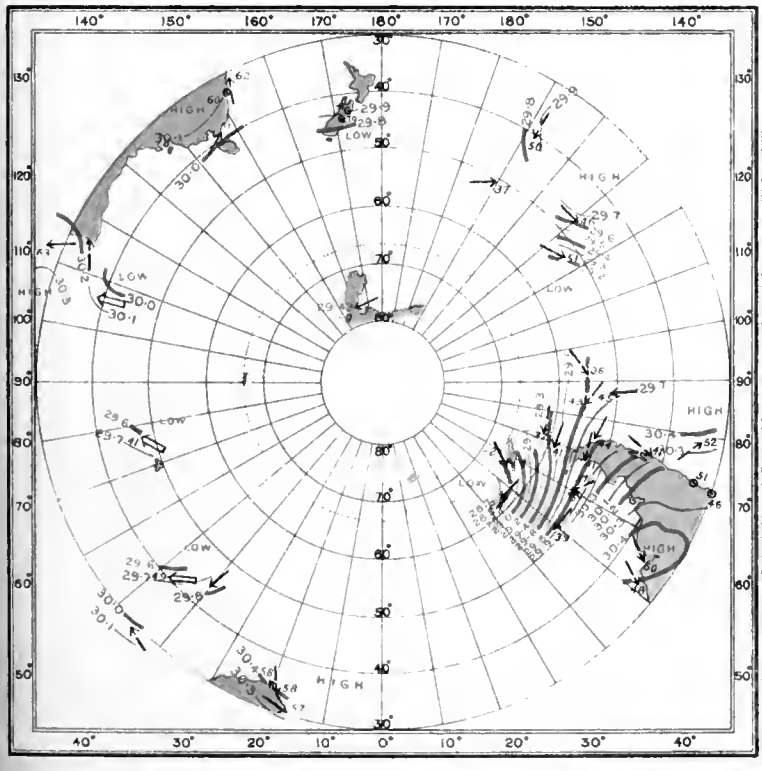

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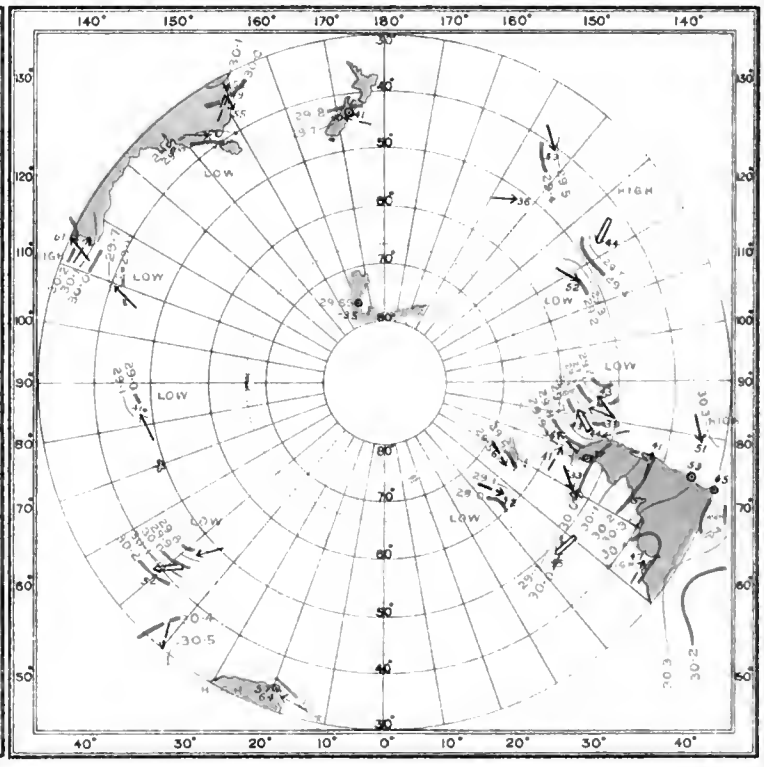


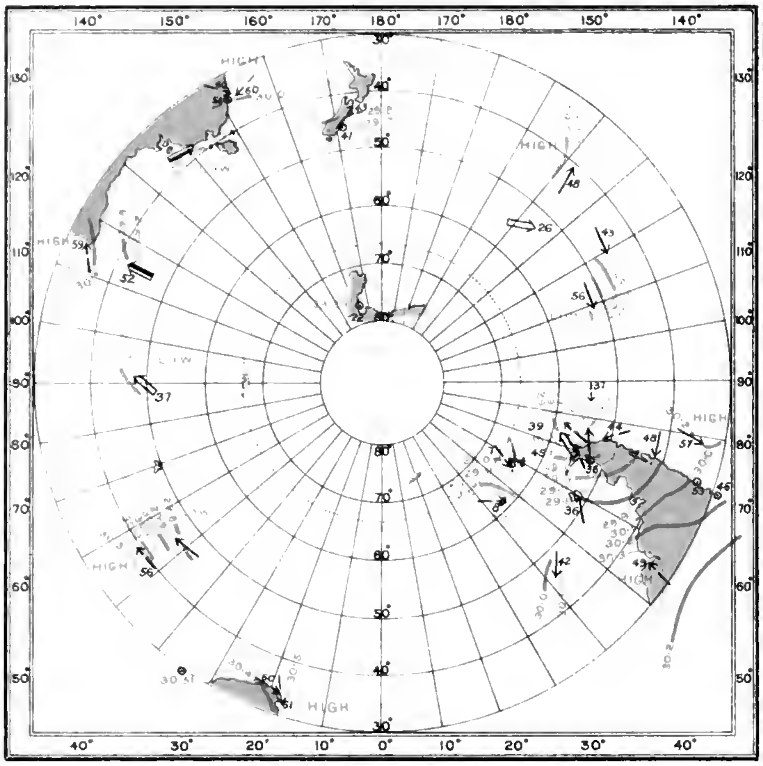
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1903 AUGUST 20



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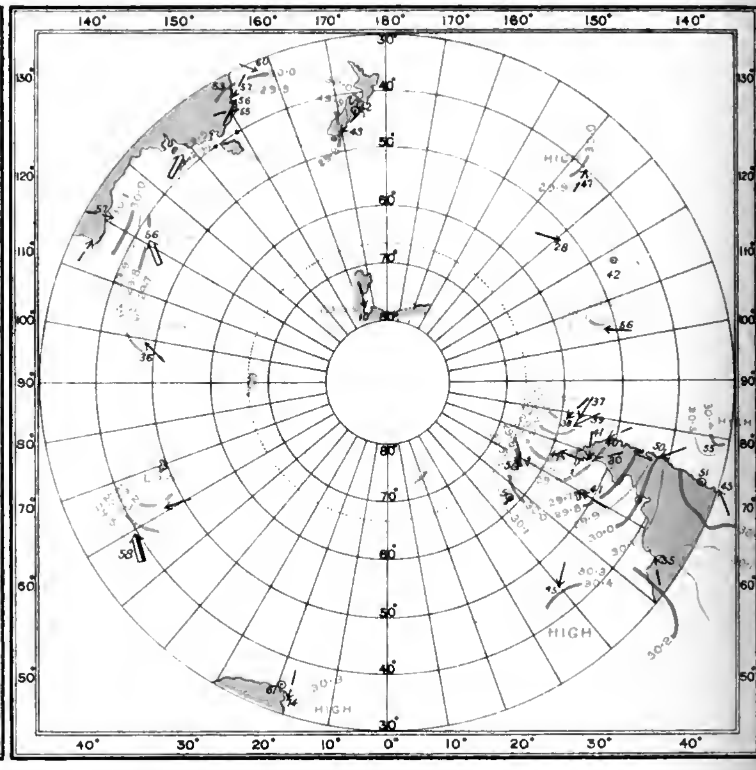

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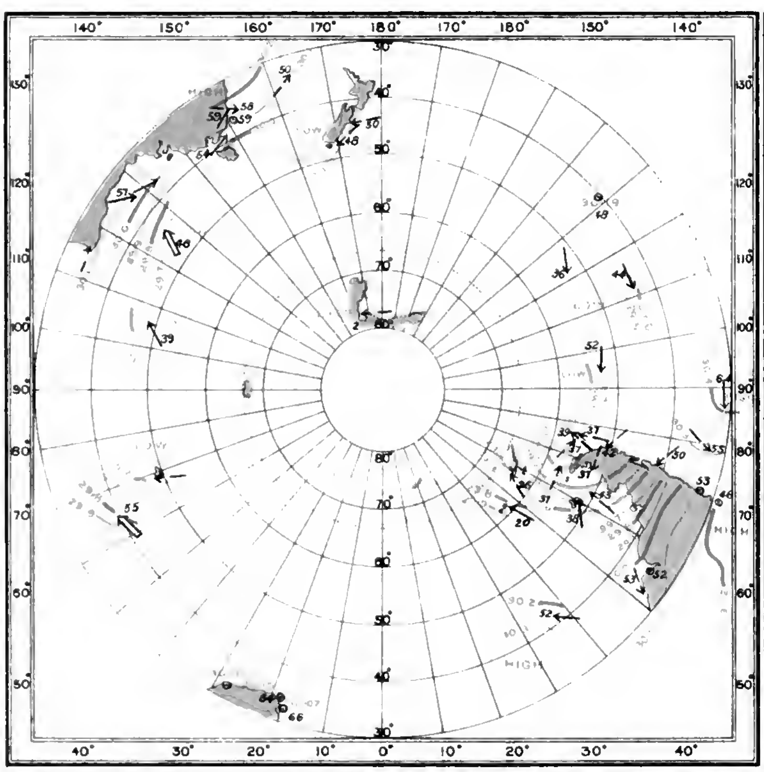

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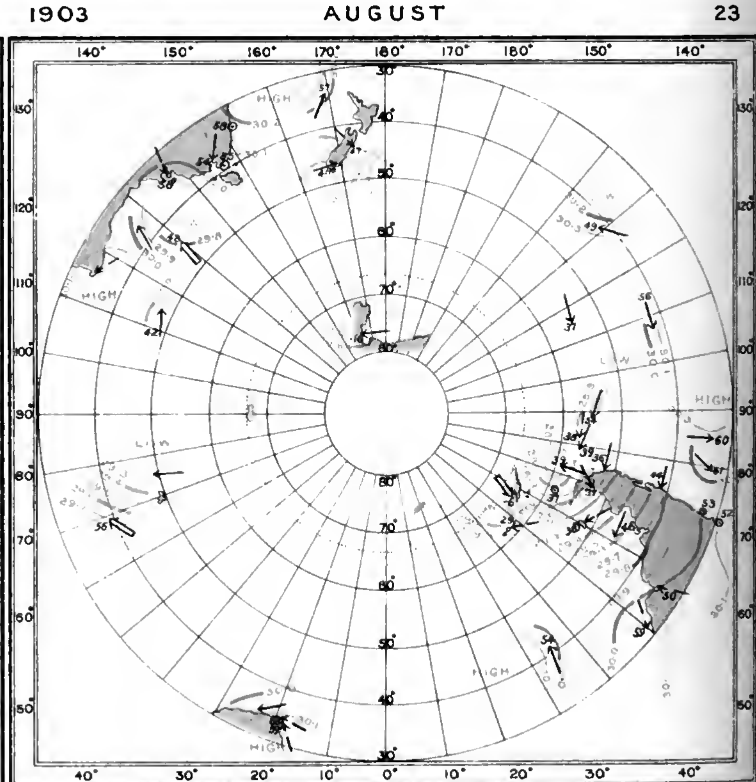

Huth, London

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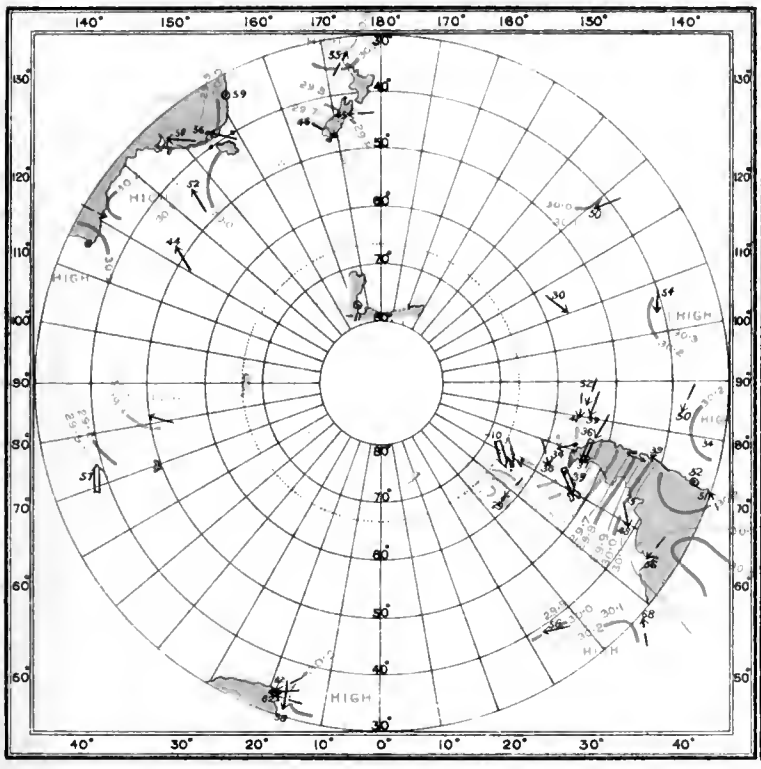
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 AUGUST 24



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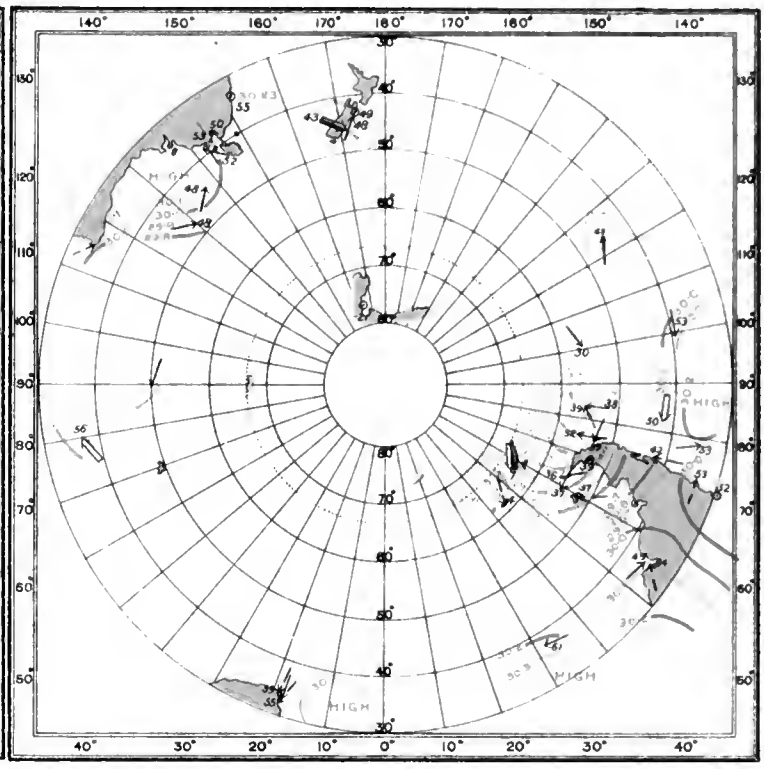

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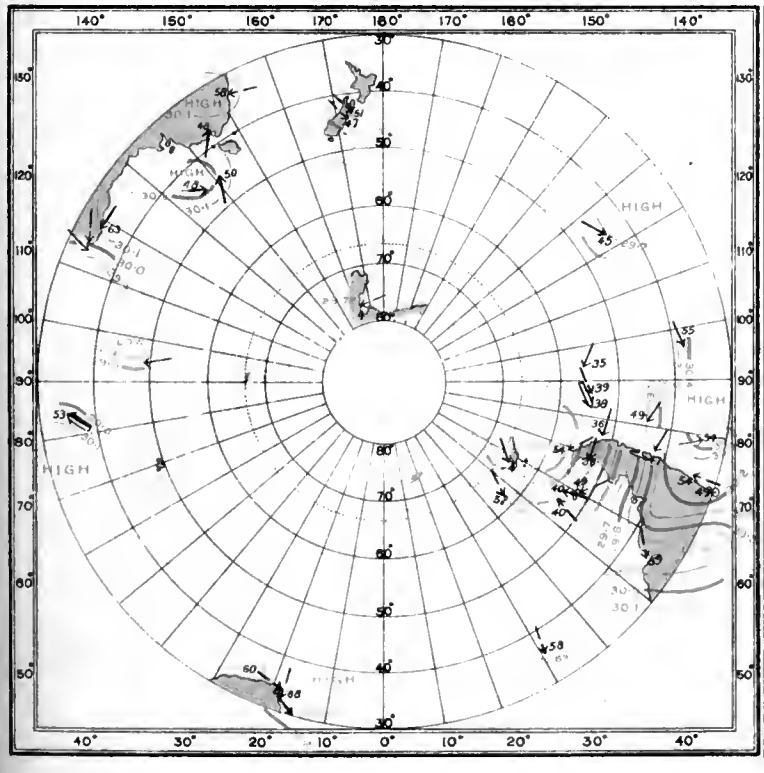

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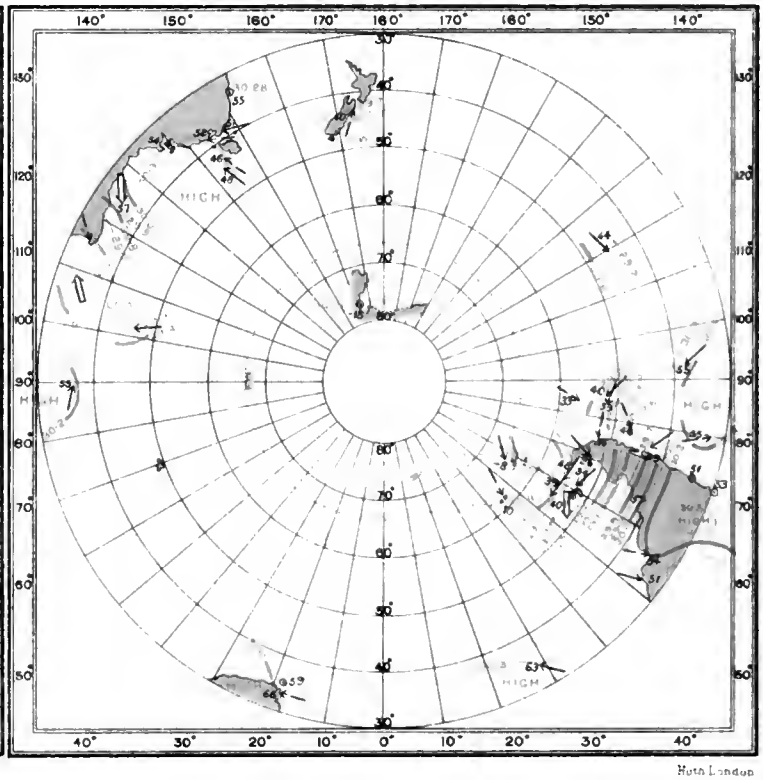


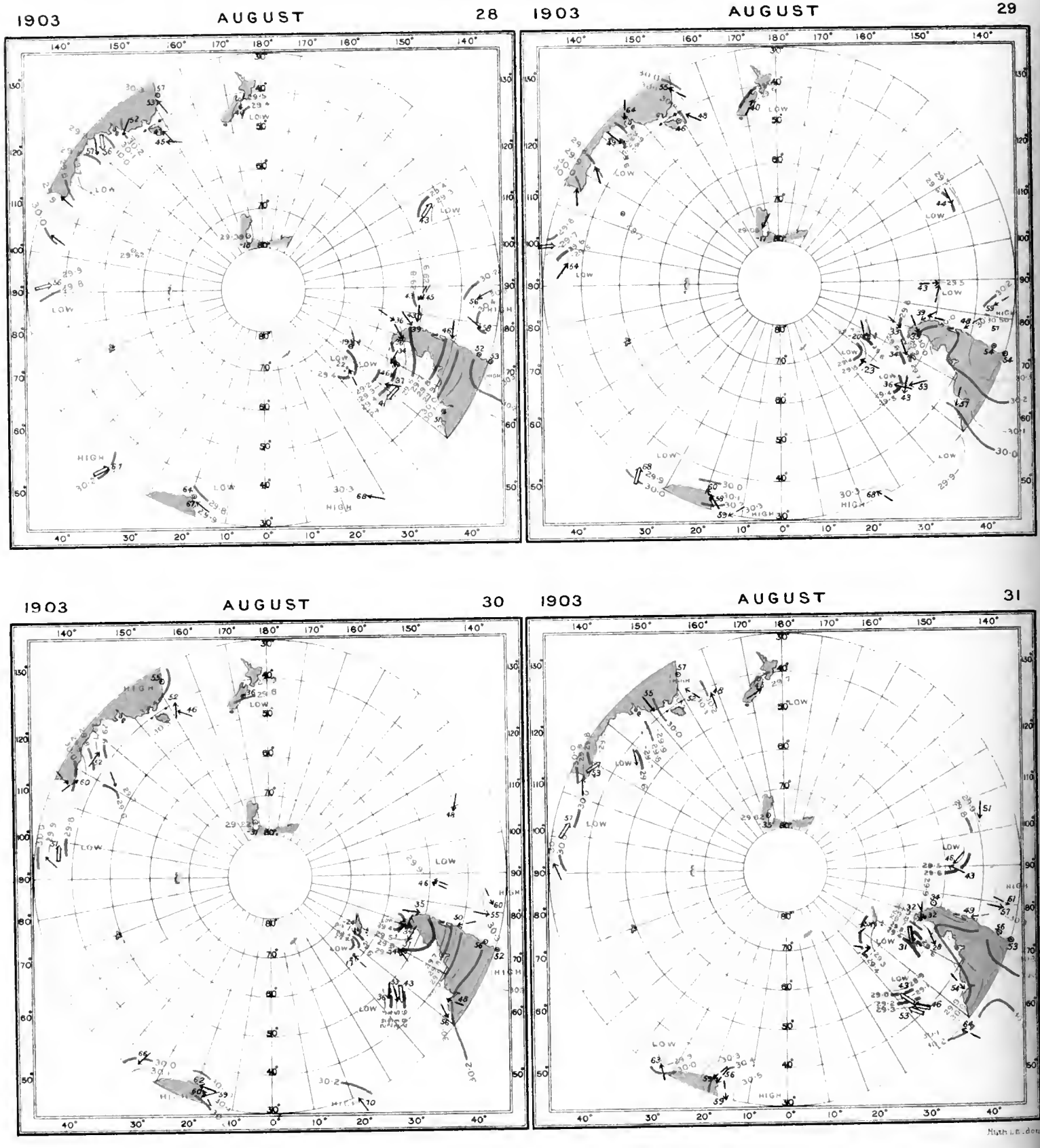
Huth London

For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T

WITH WINDS AND AIR TEMPERATURES



For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

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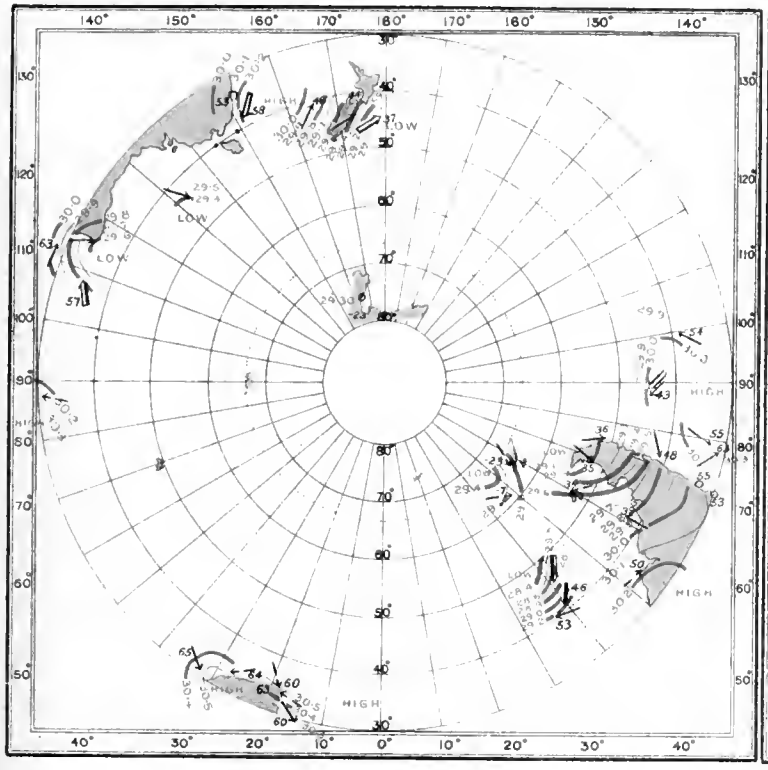

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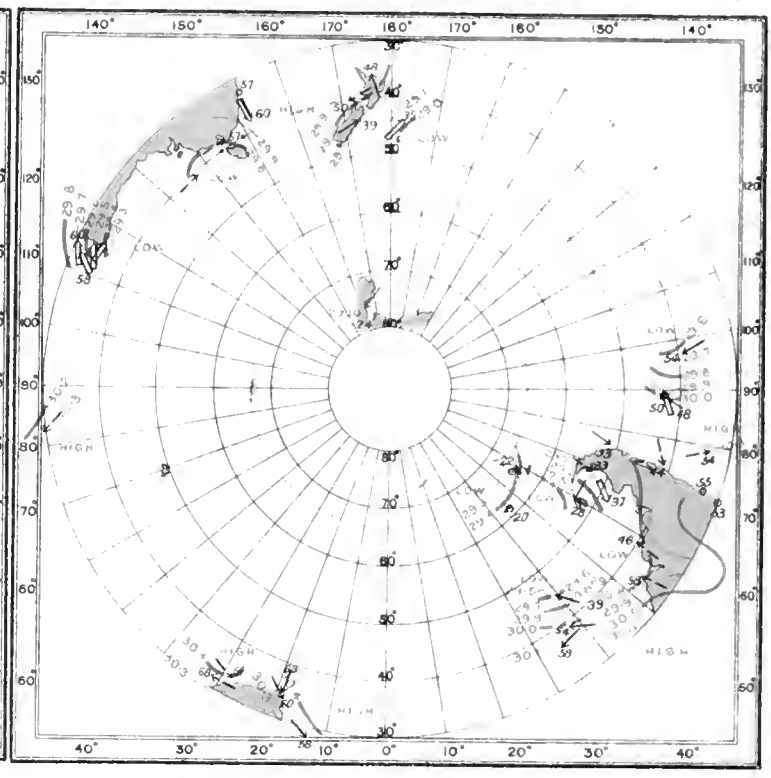

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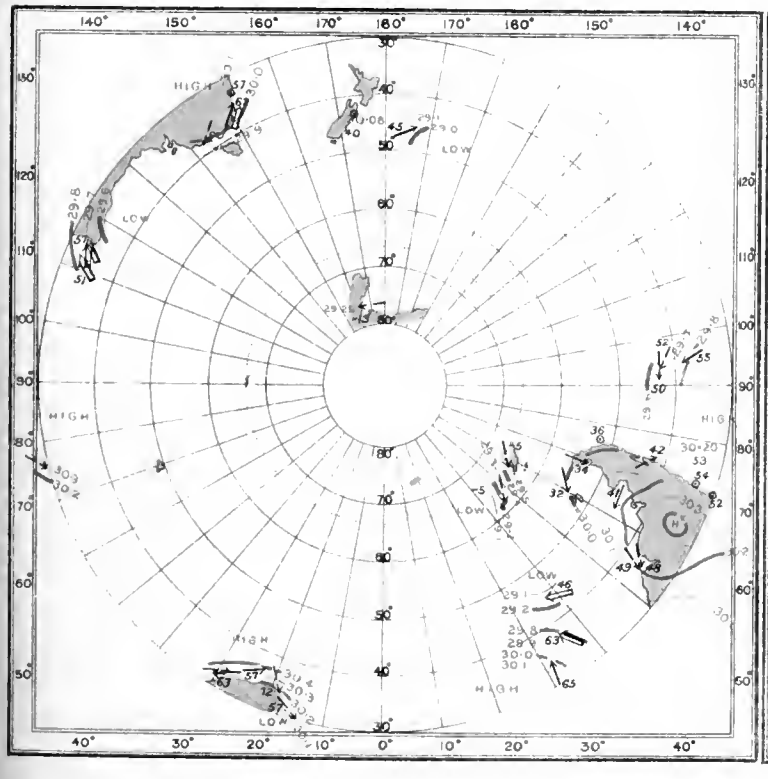

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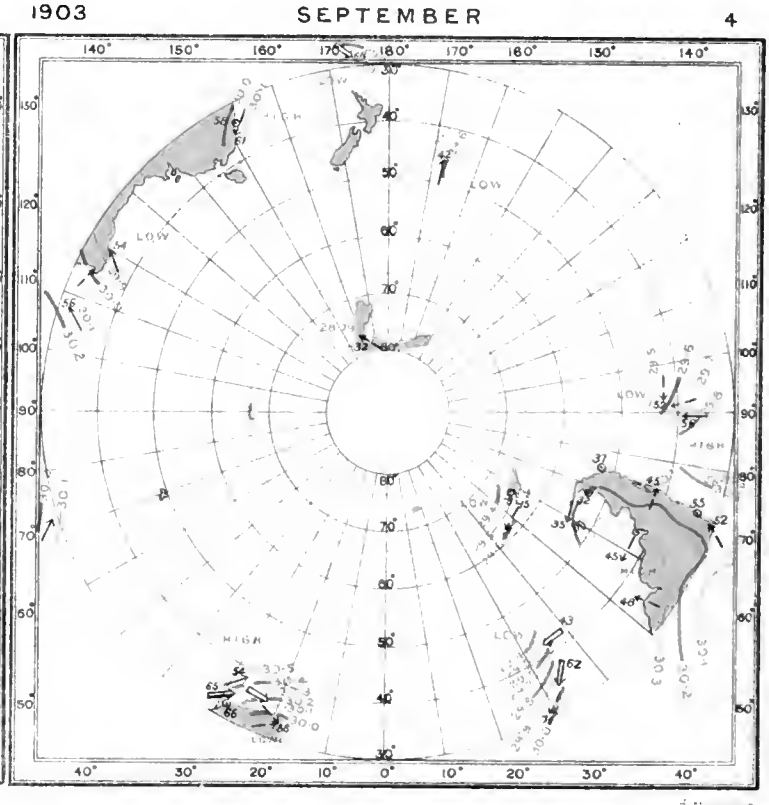

For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

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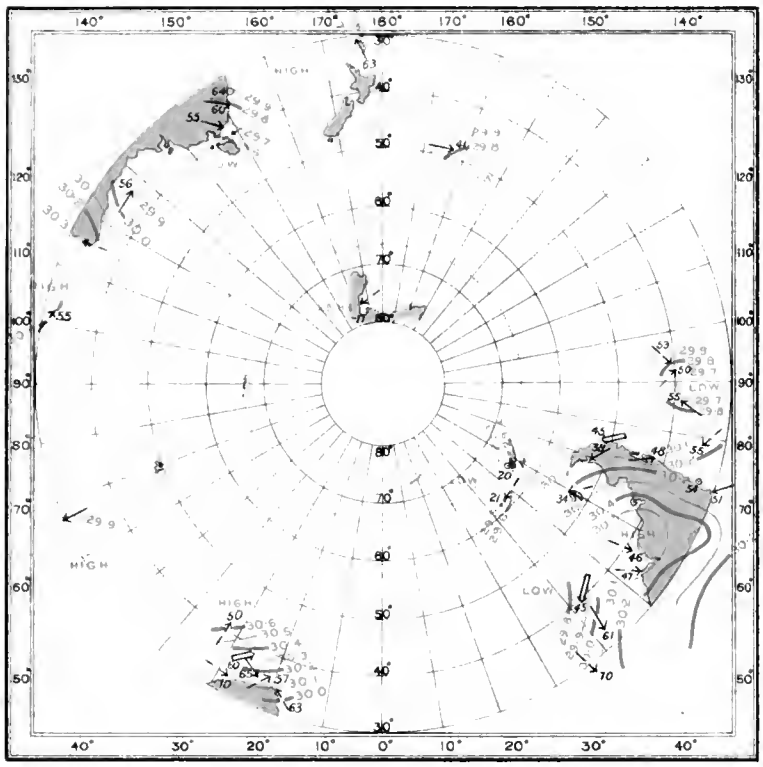

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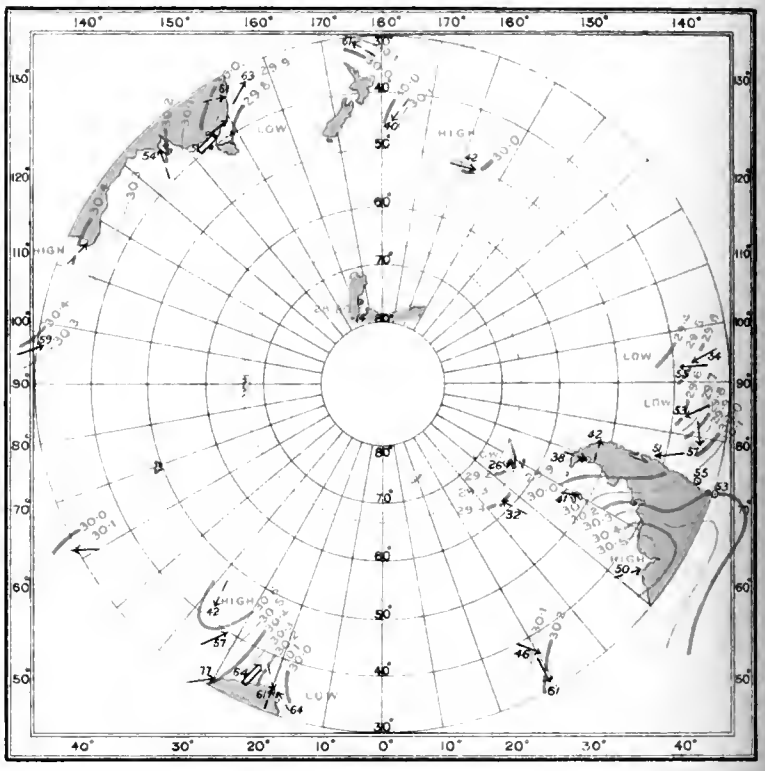

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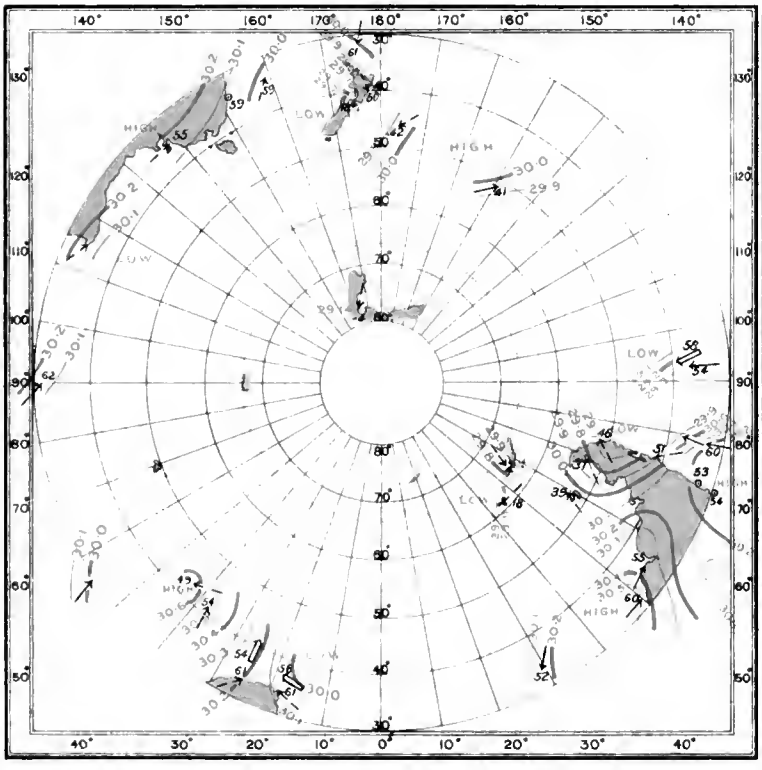

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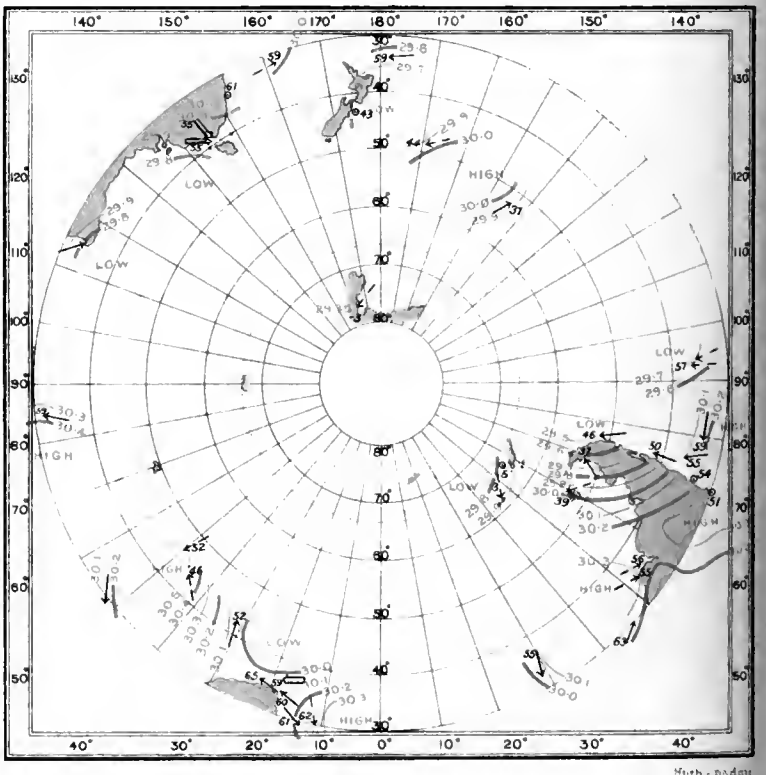


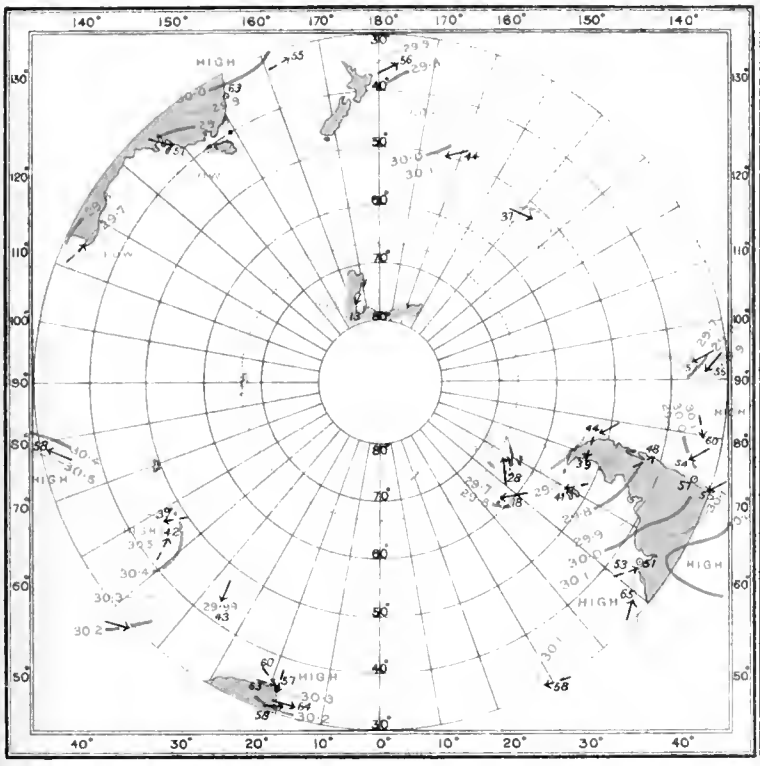
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 SEPTEMBER 9



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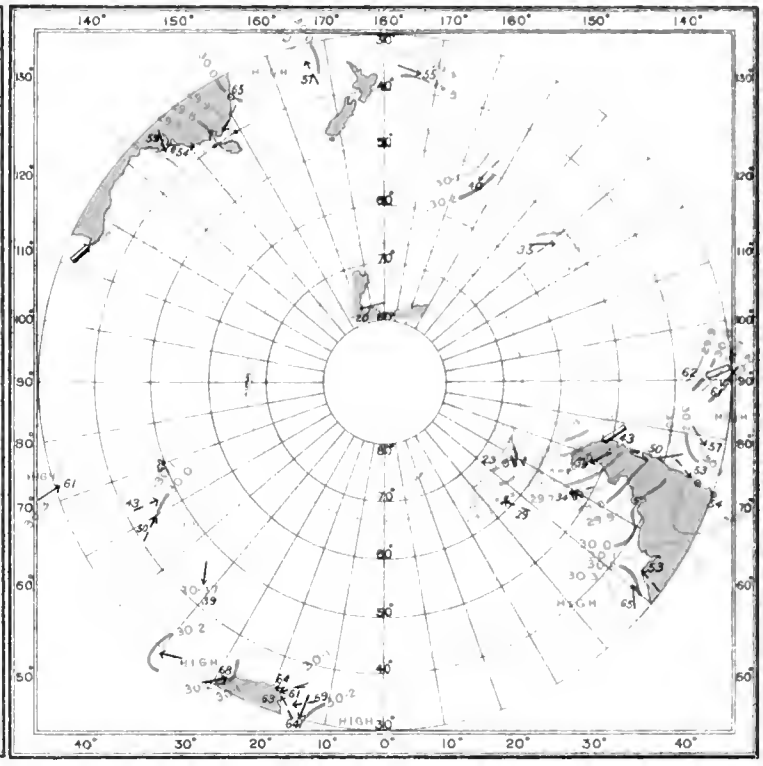

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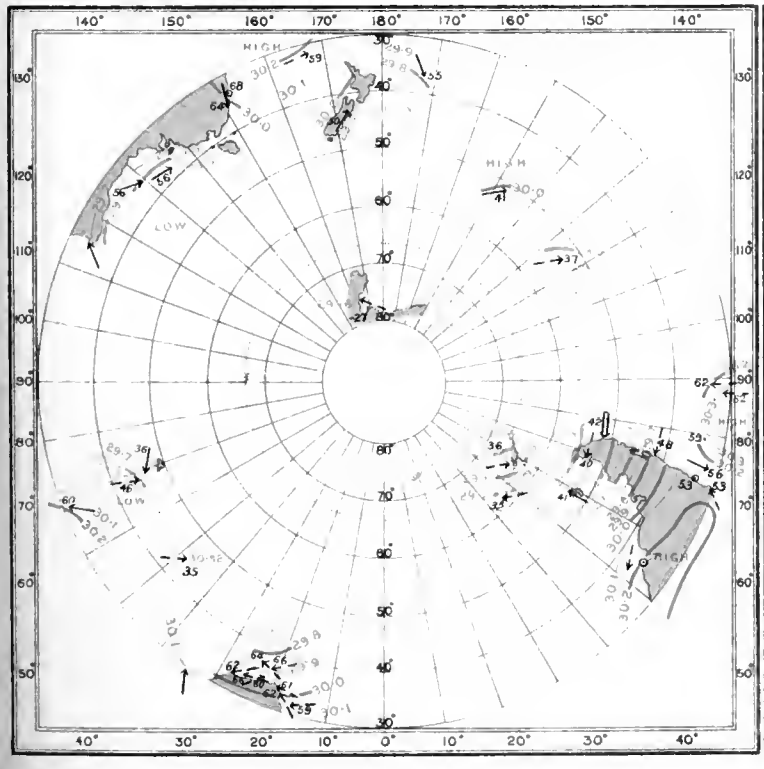

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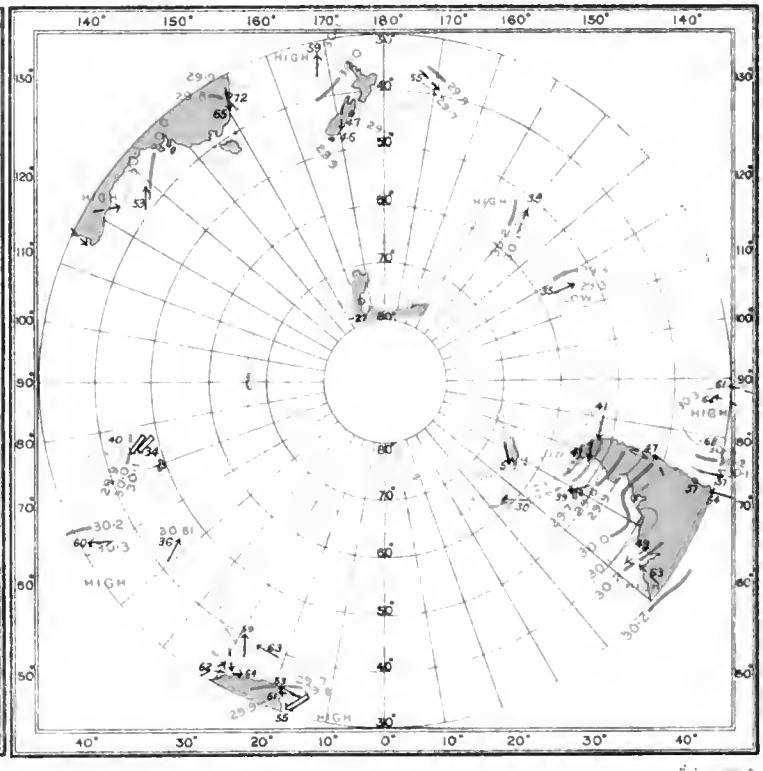

For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

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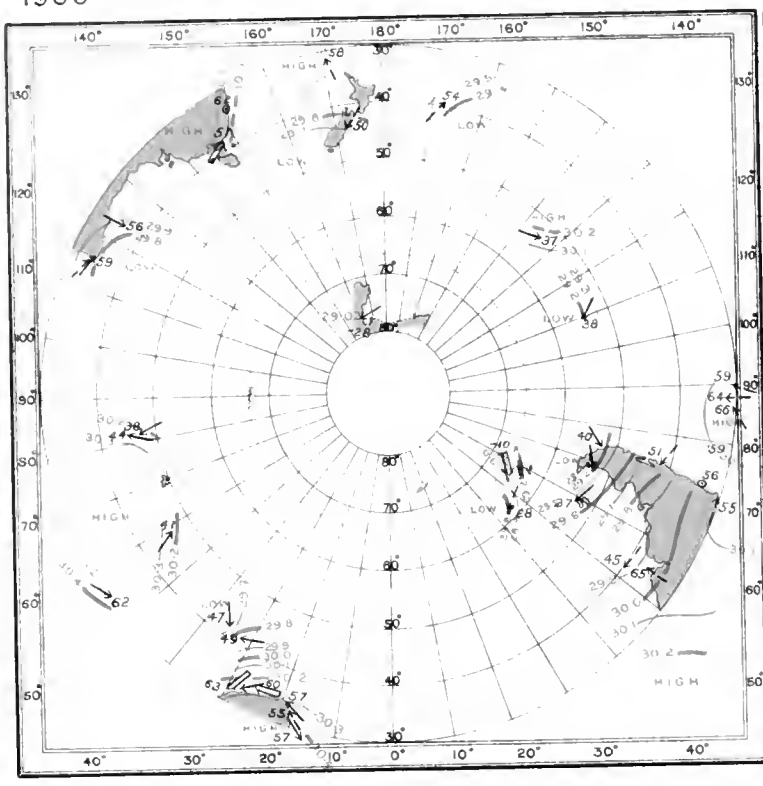

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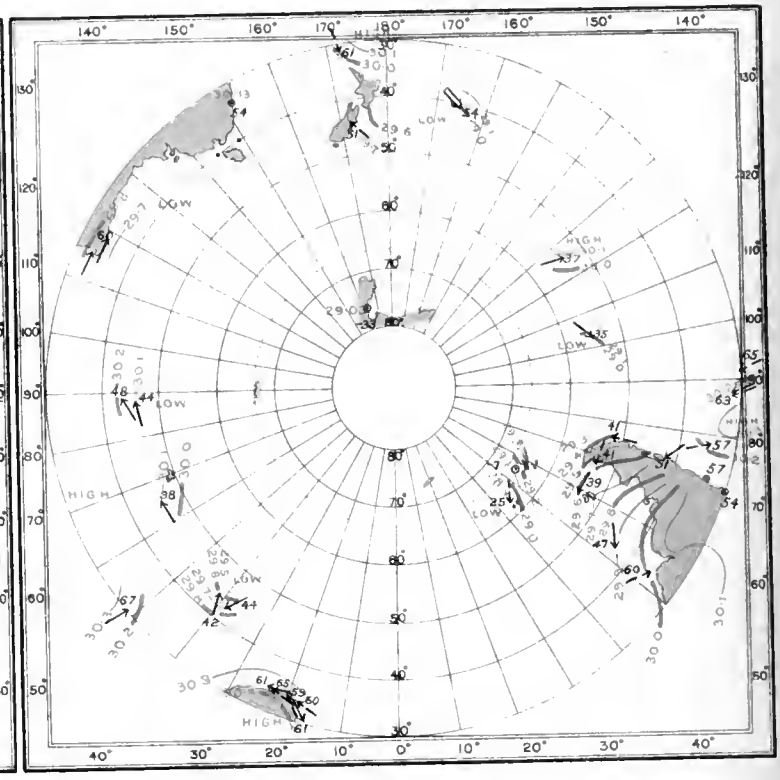

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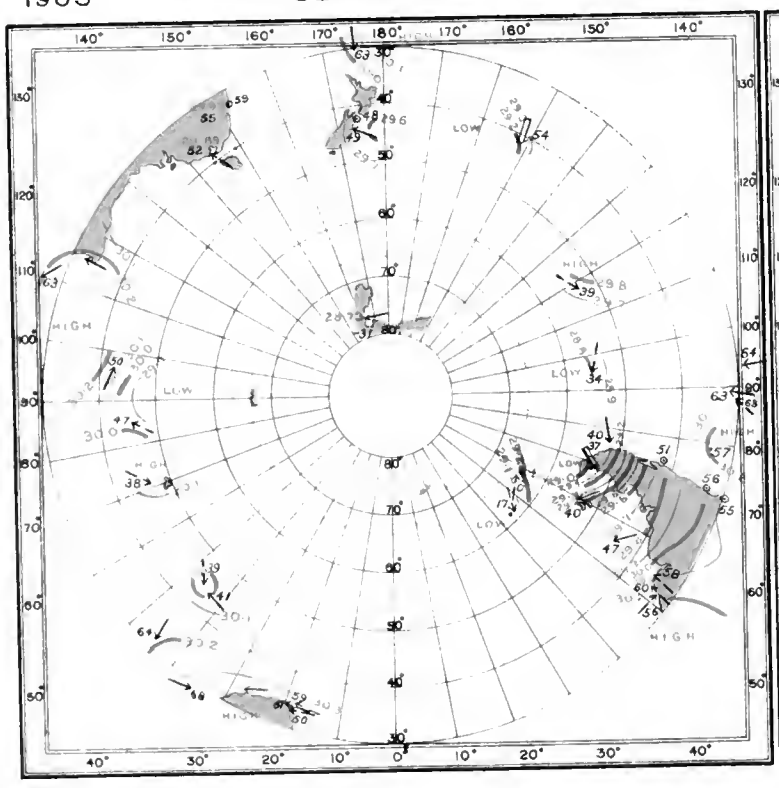

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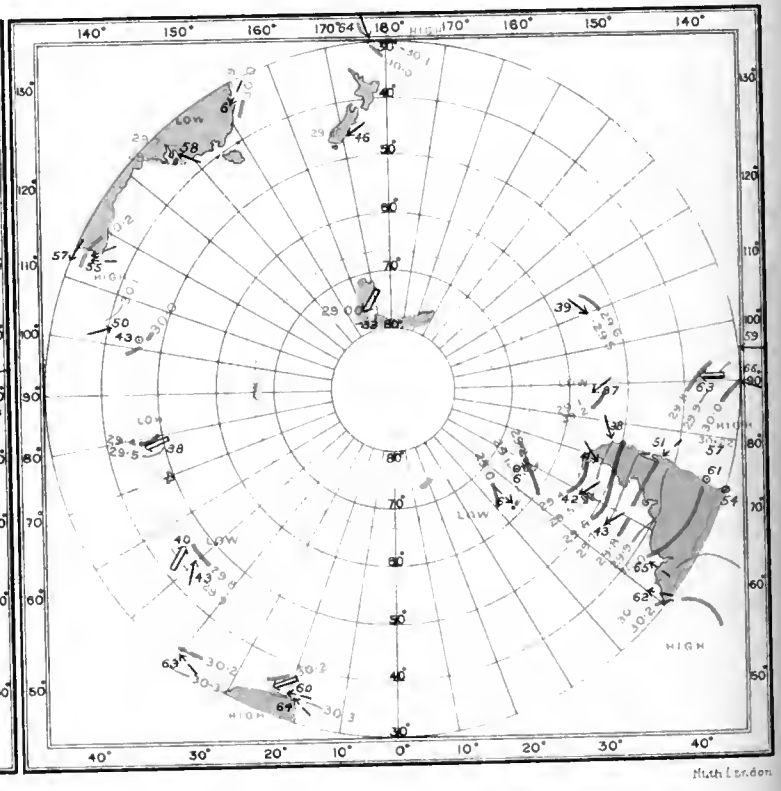

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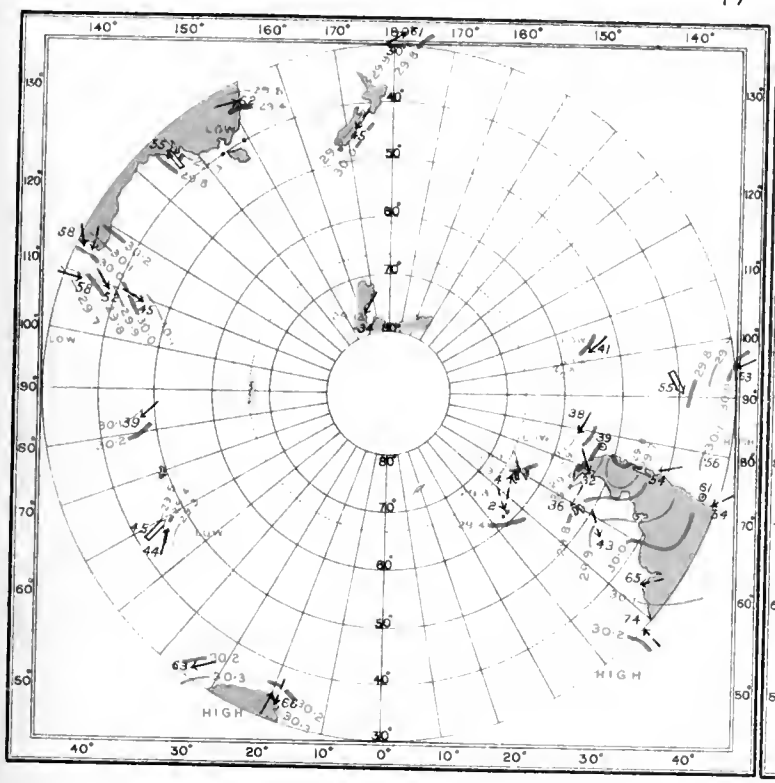
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 SEPTEMBER 17



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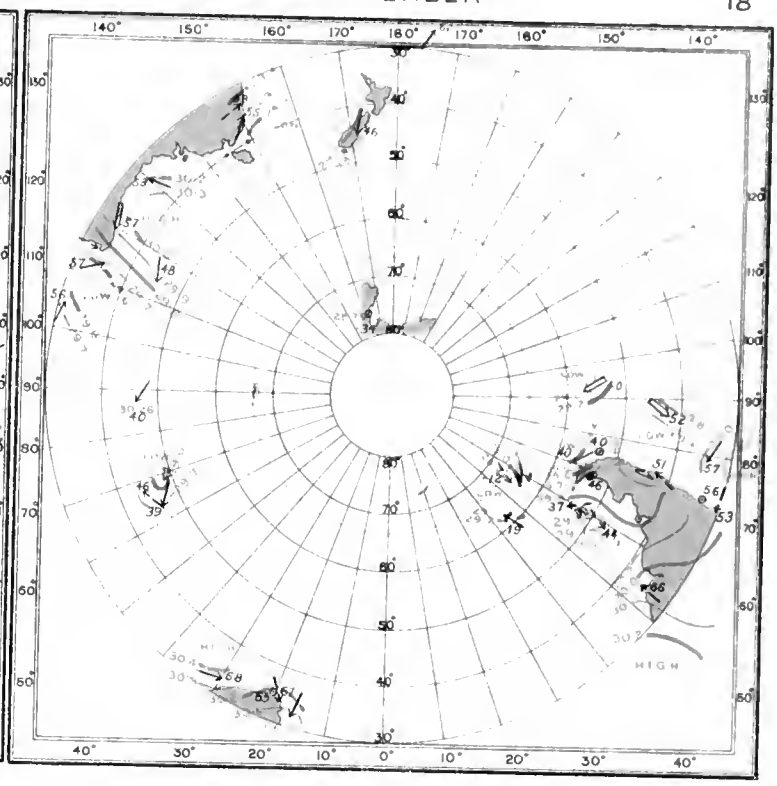

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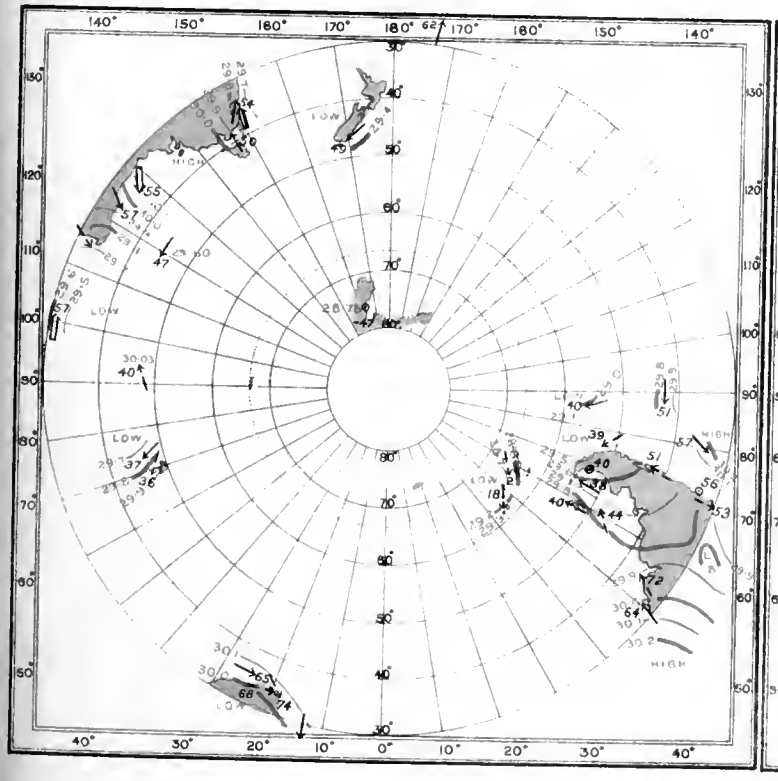

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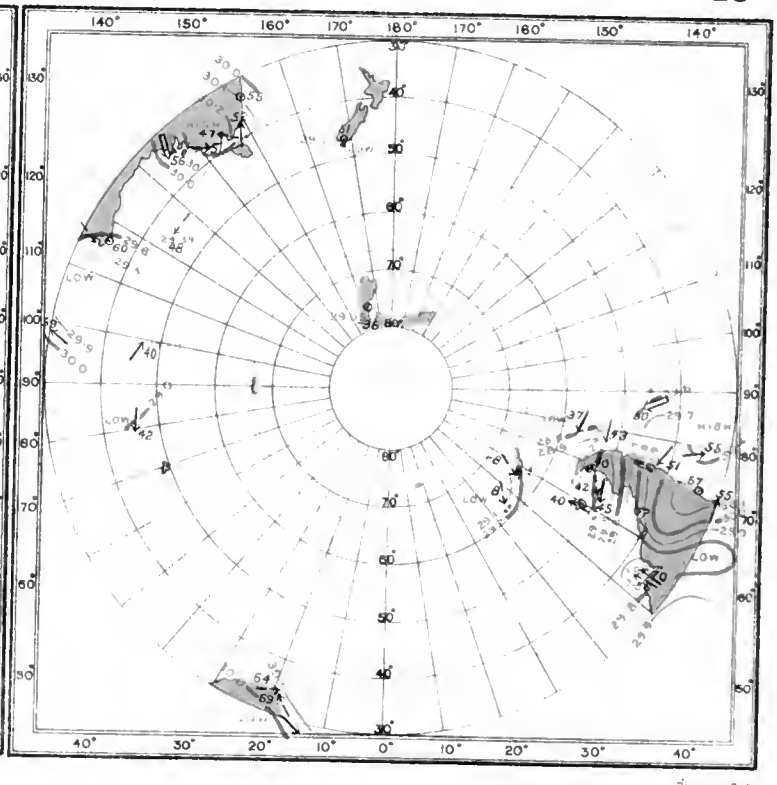


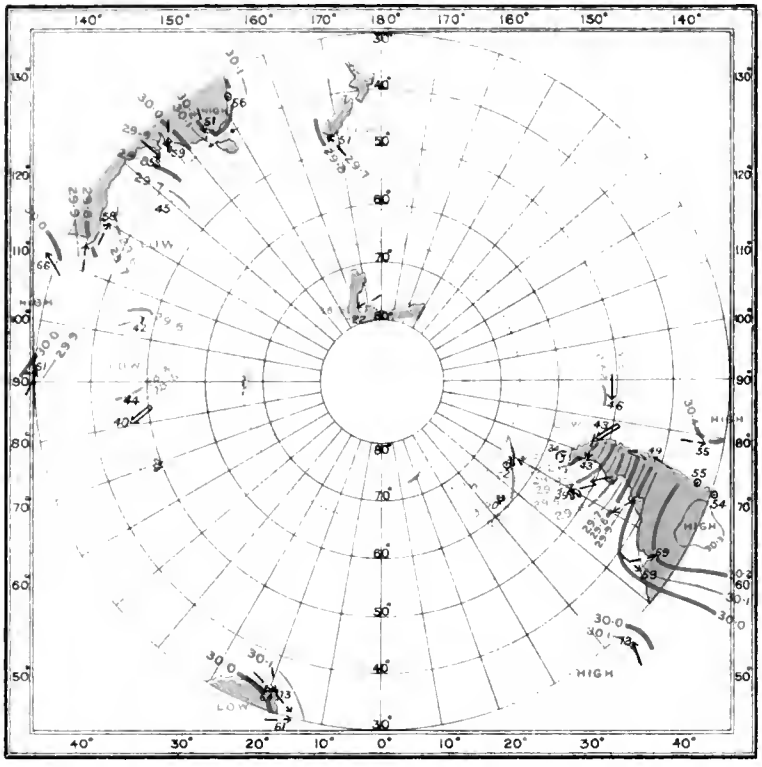
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1903 SEPTEMBER 21



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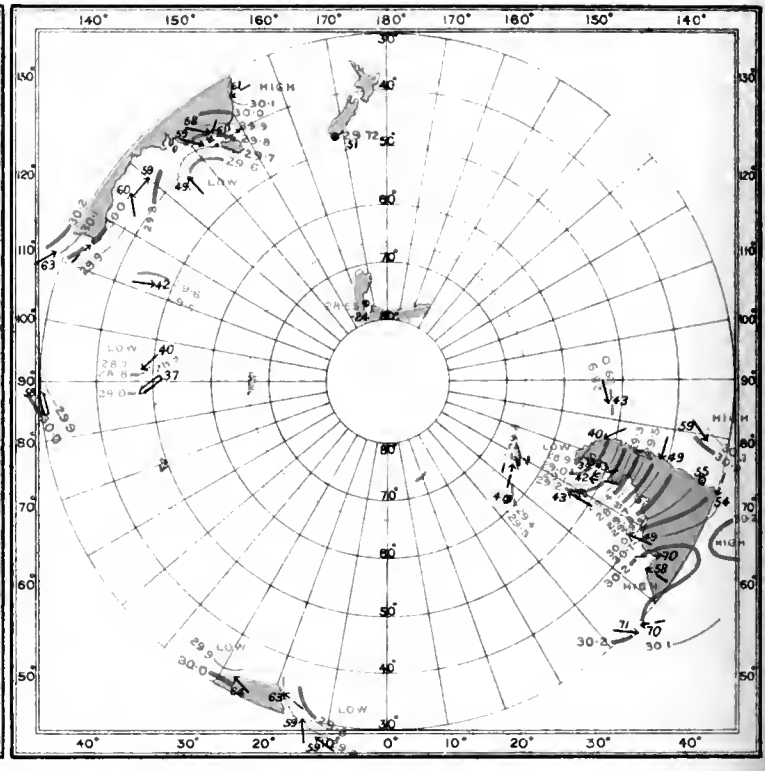

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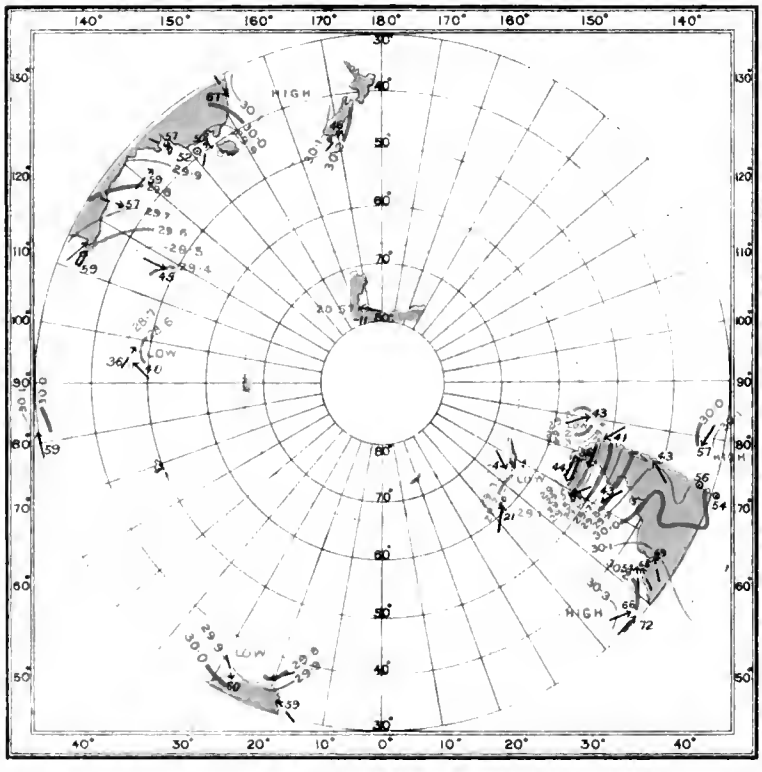

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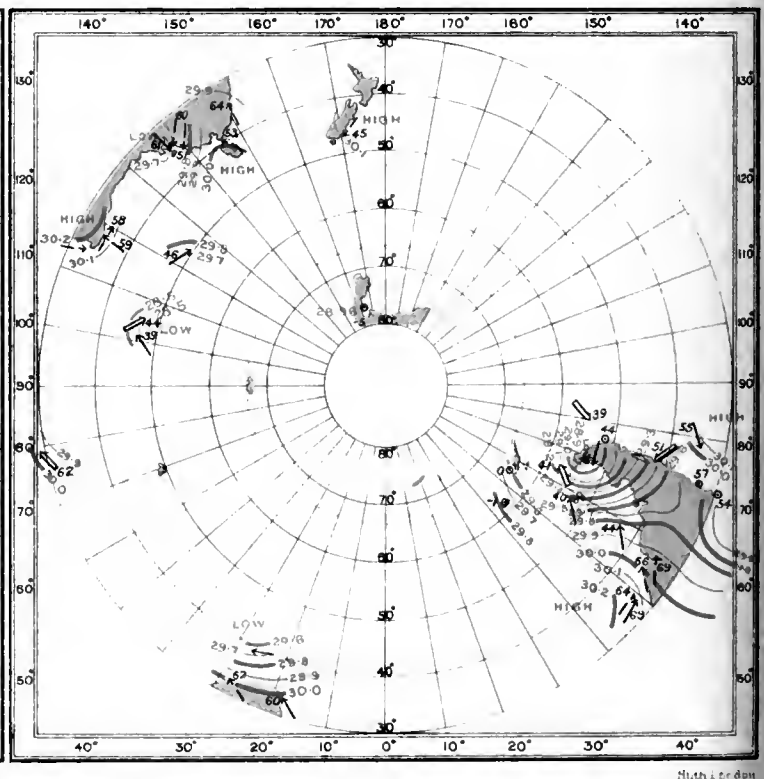


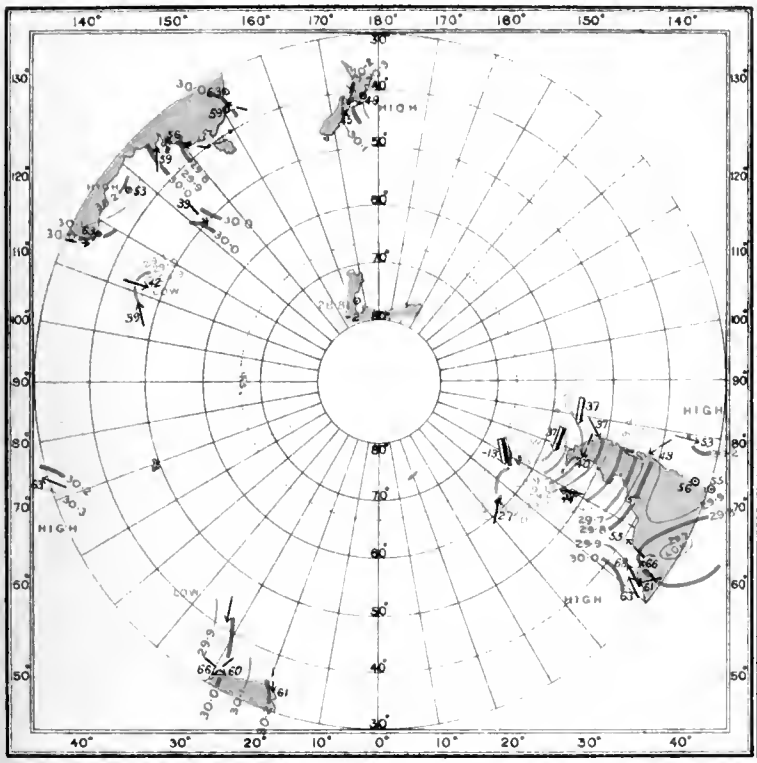
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 SEPTEMBER 25



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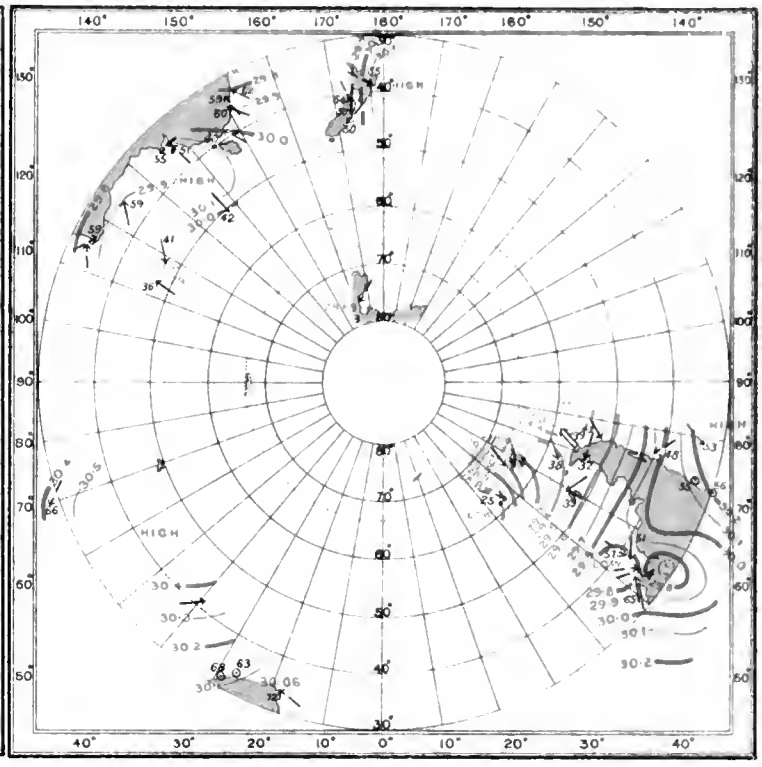

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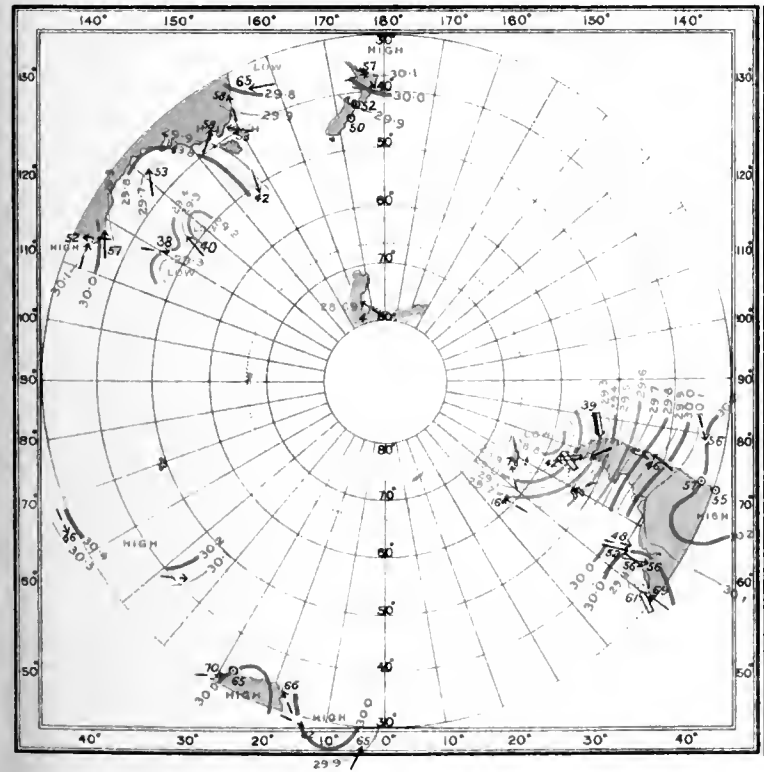

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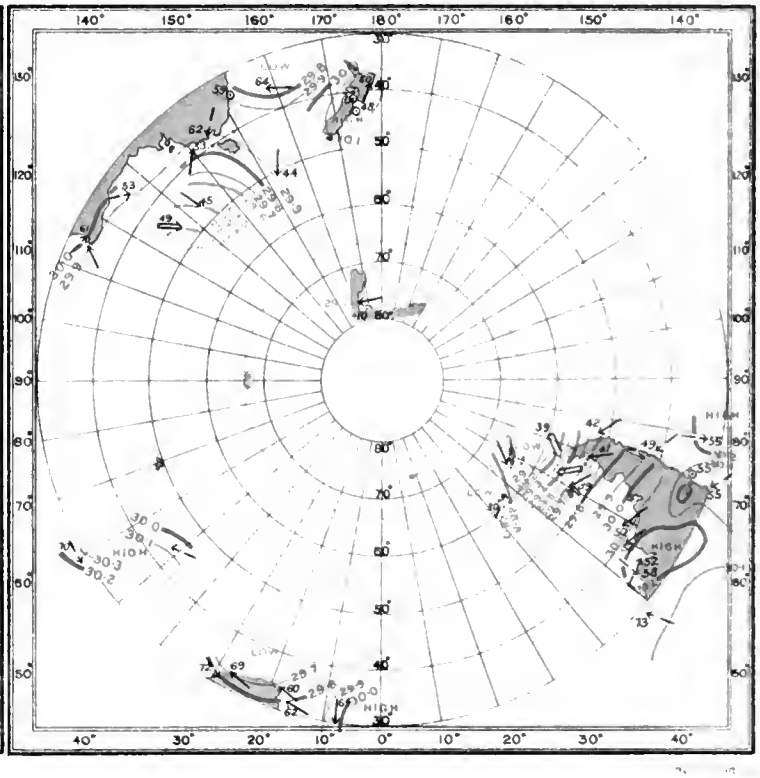


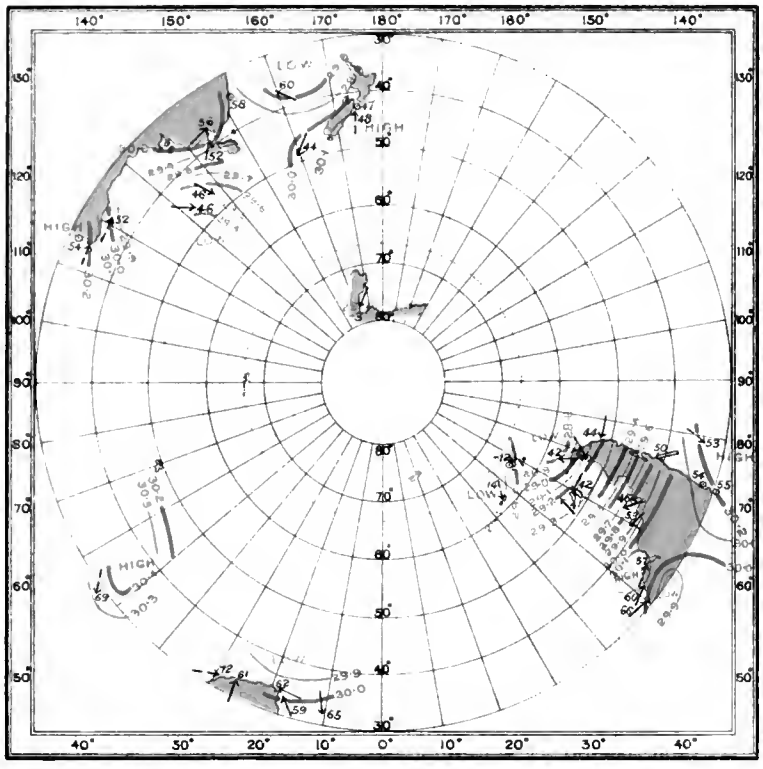
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 SEPTEMBER 29



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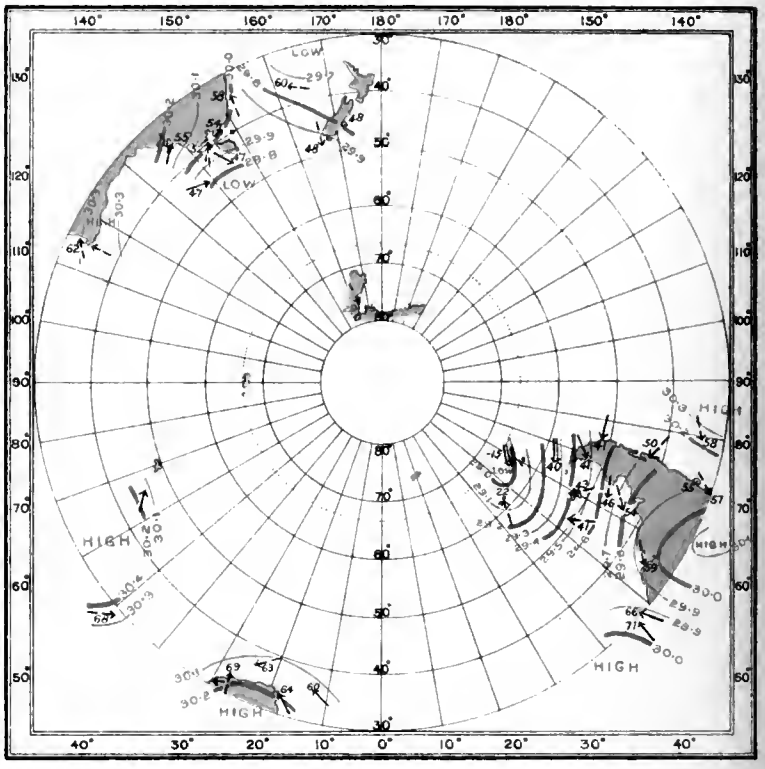

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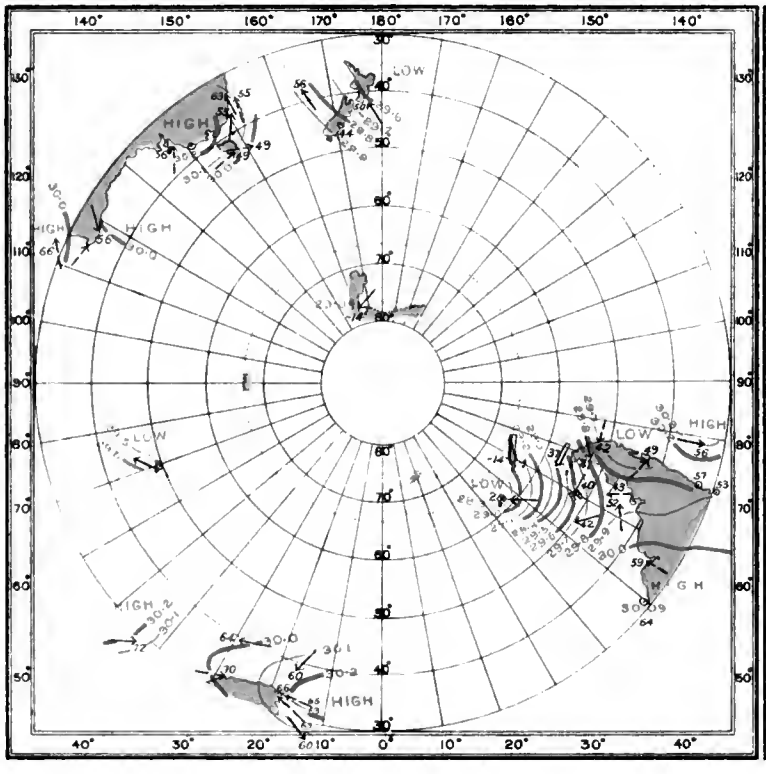

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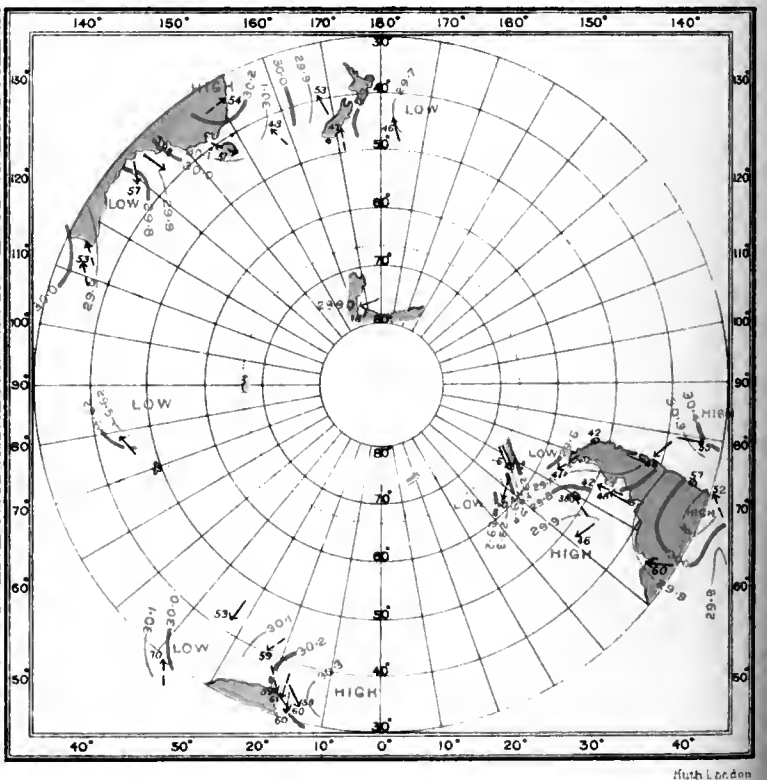

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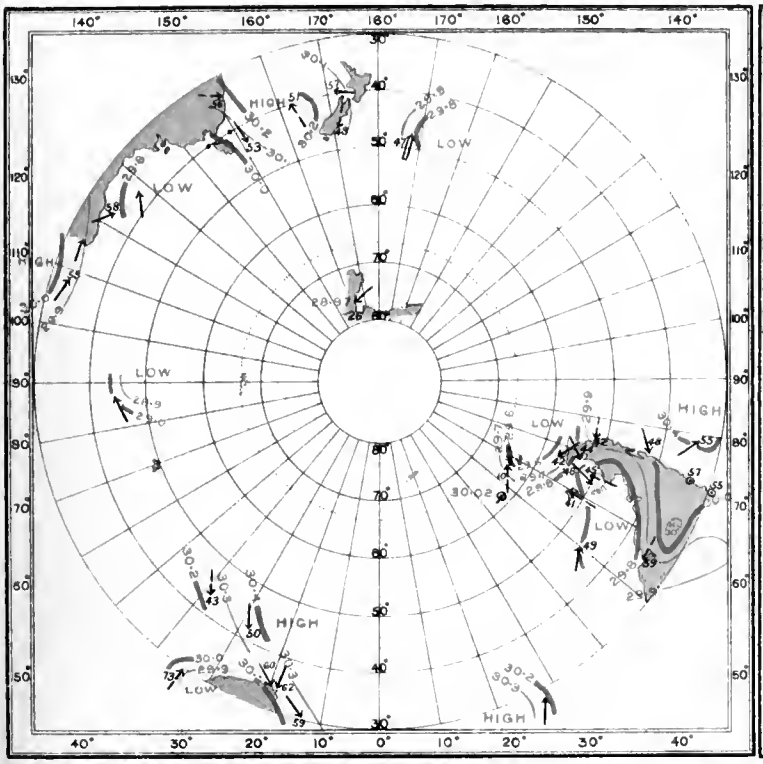
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES.

1903 OCTOBER 3



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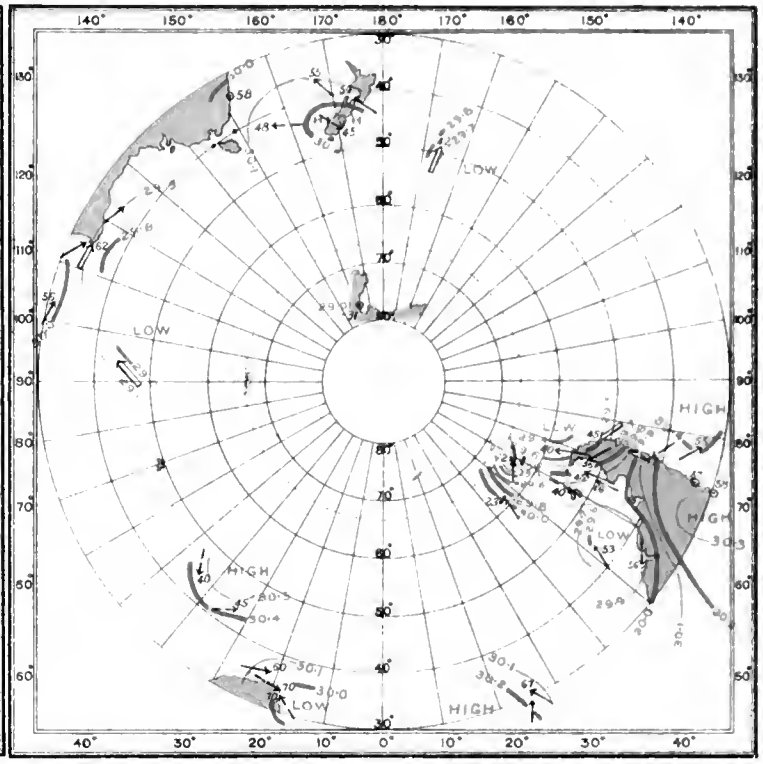

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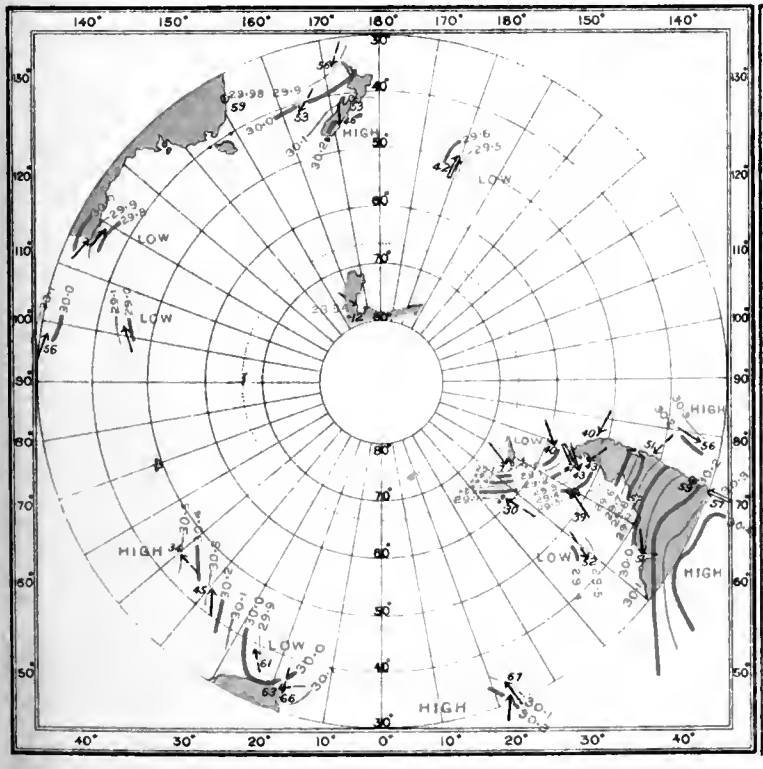

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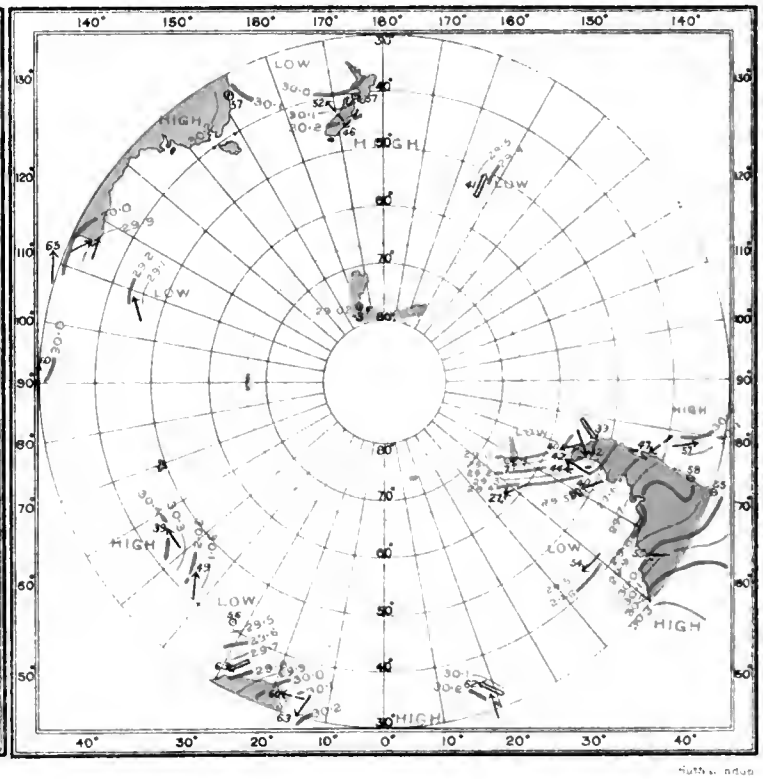


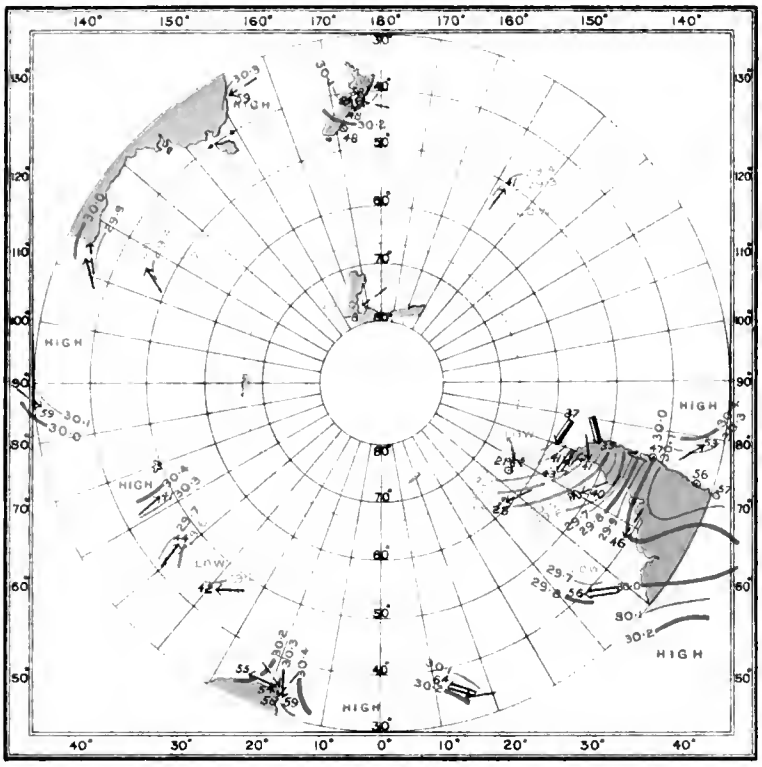
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1903 OCTOBER 7



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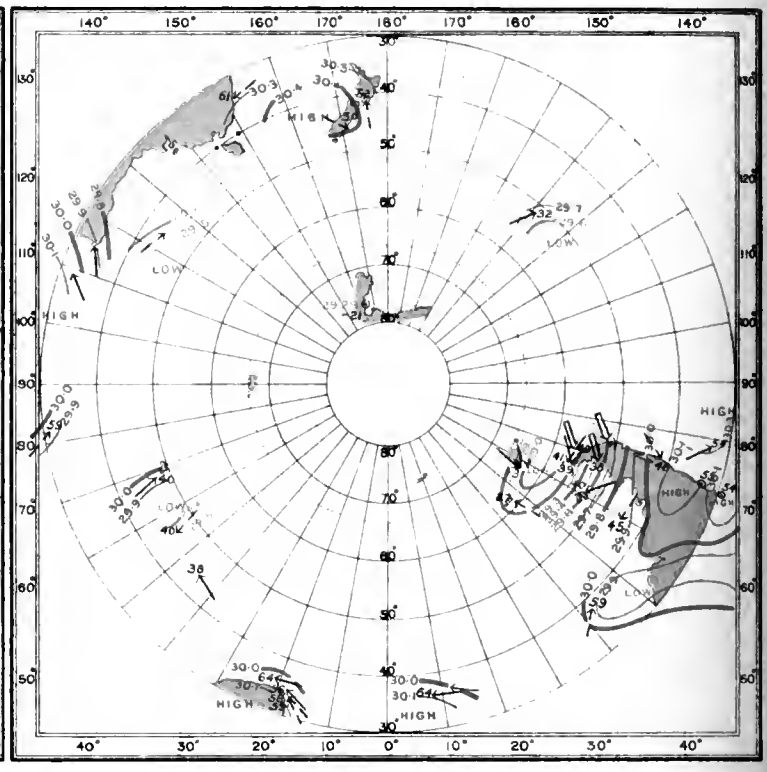

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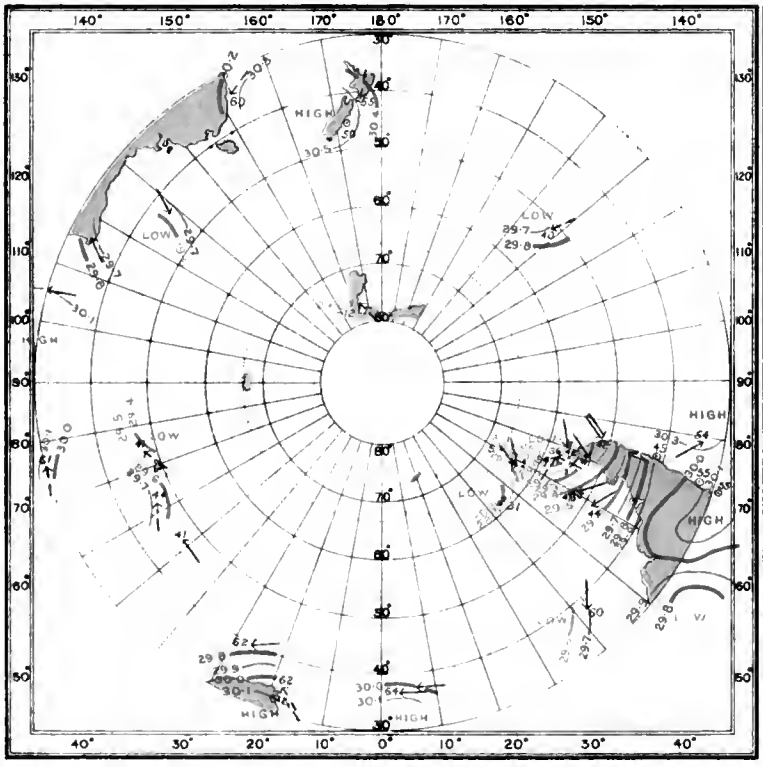

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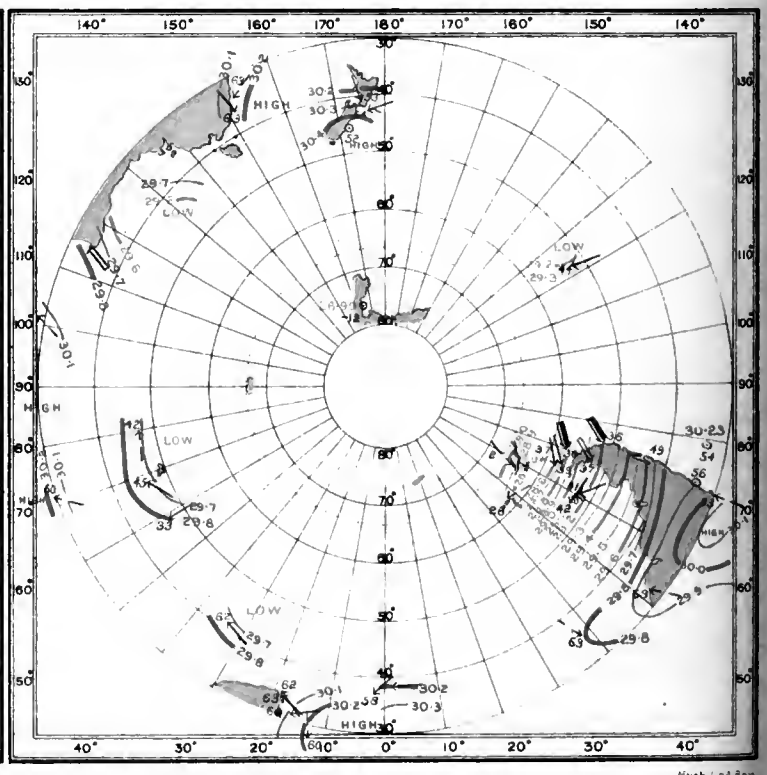

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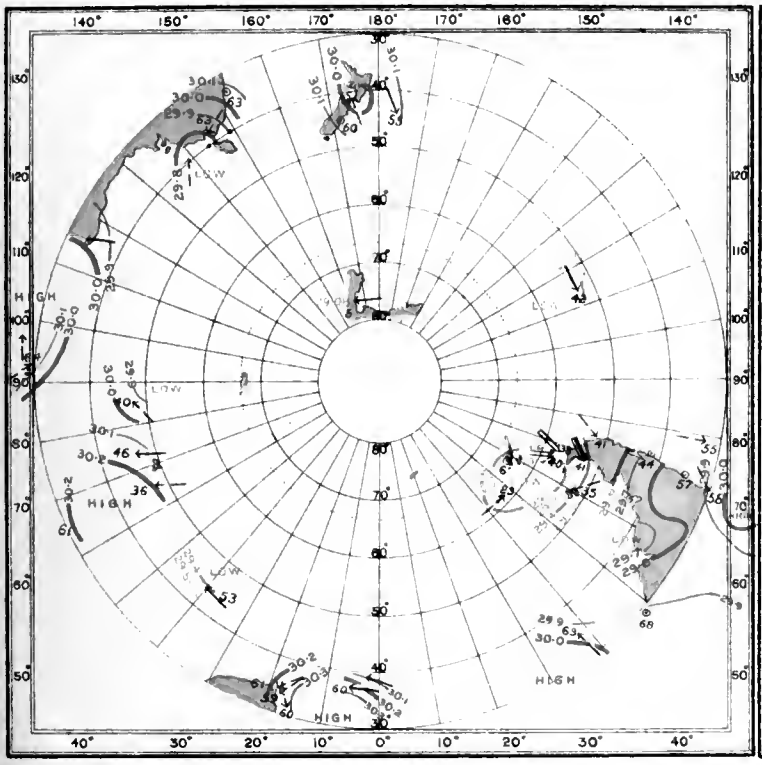
INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 OCTOBER 11



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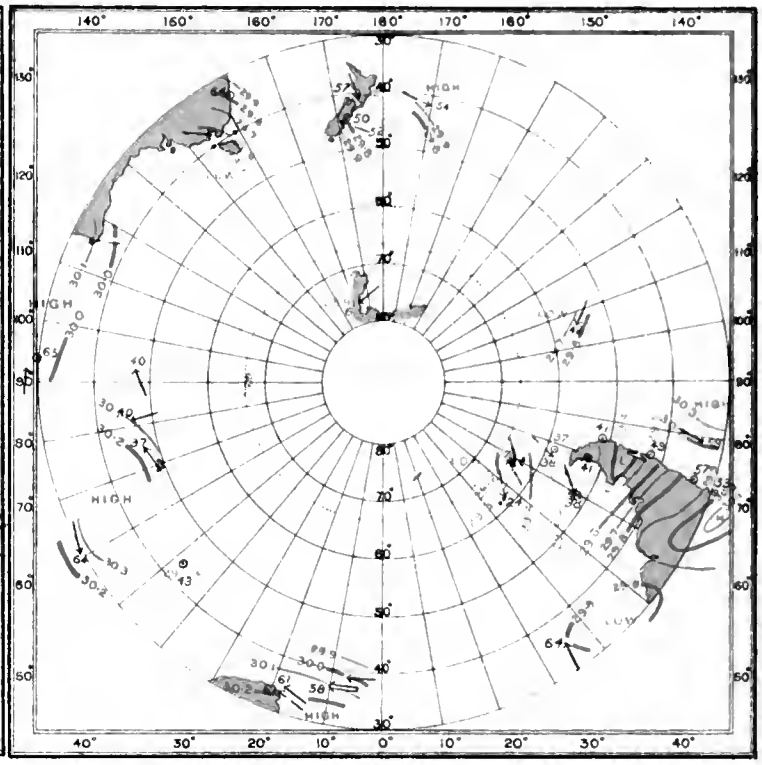

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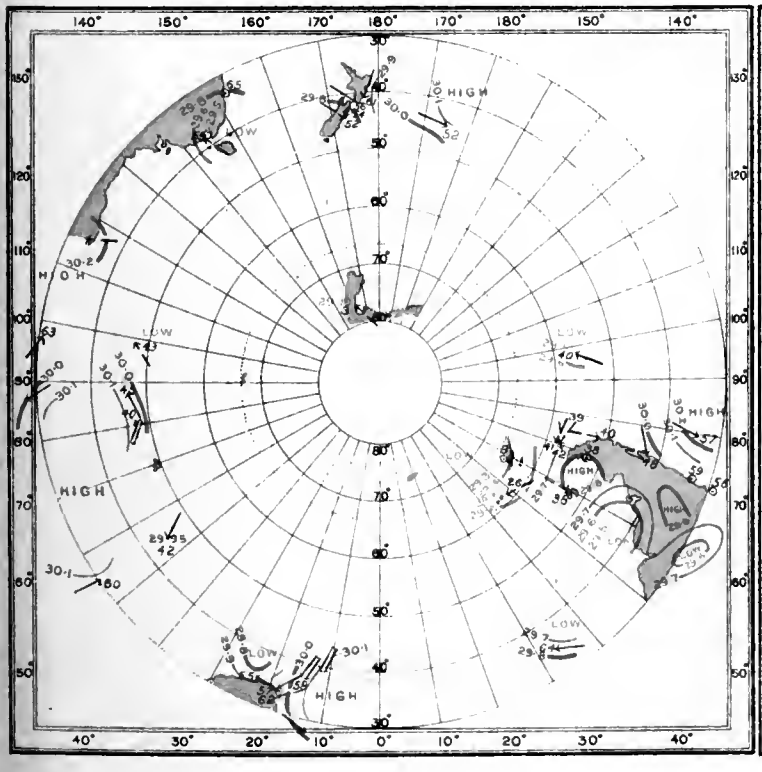

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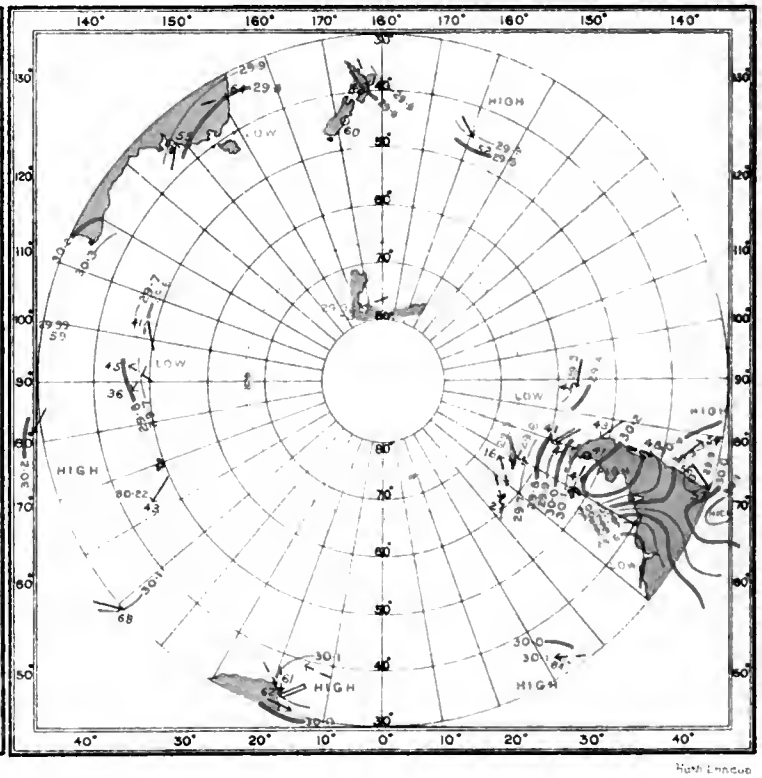


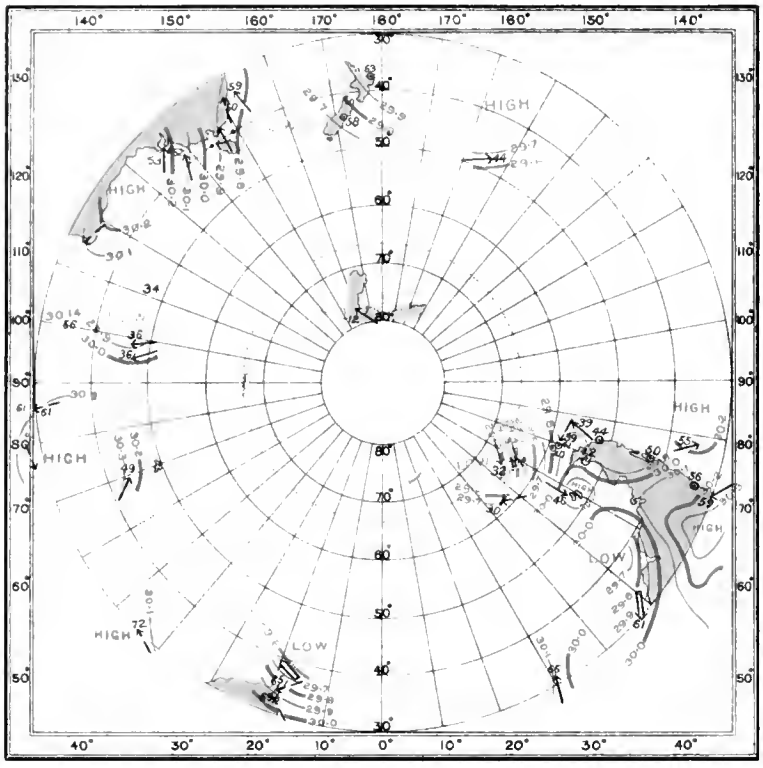
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1903 OCTOBER 15



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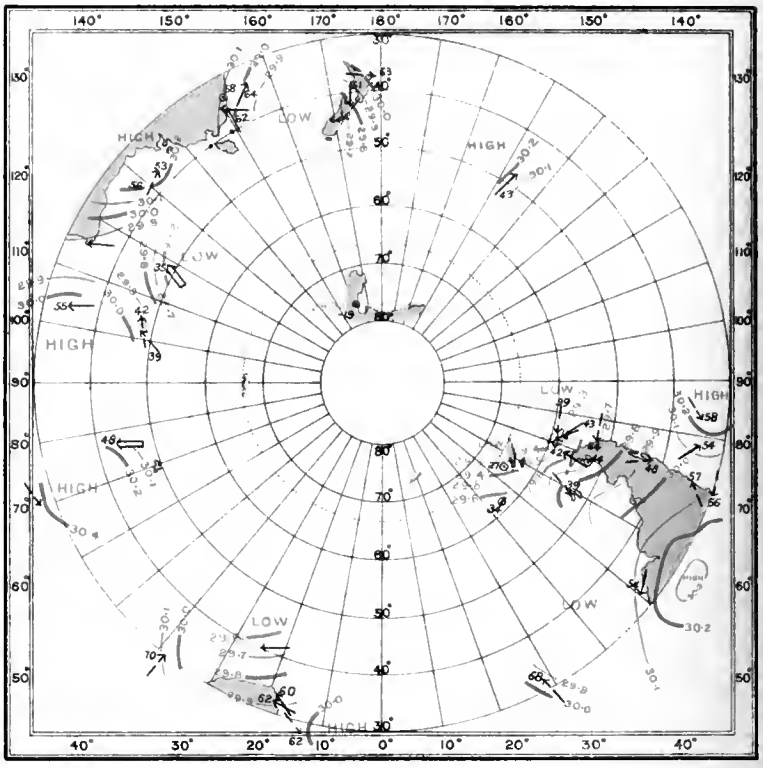

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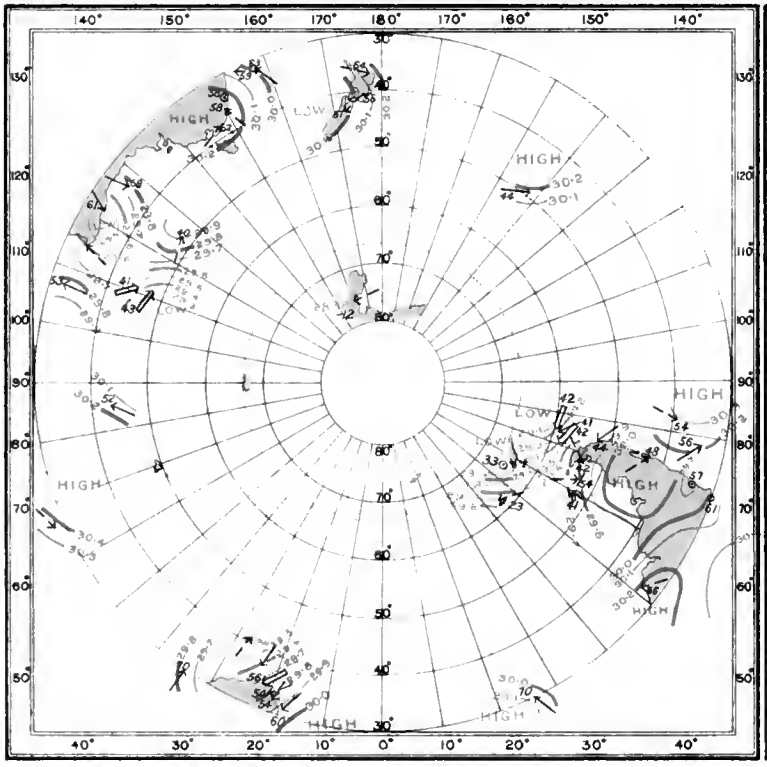

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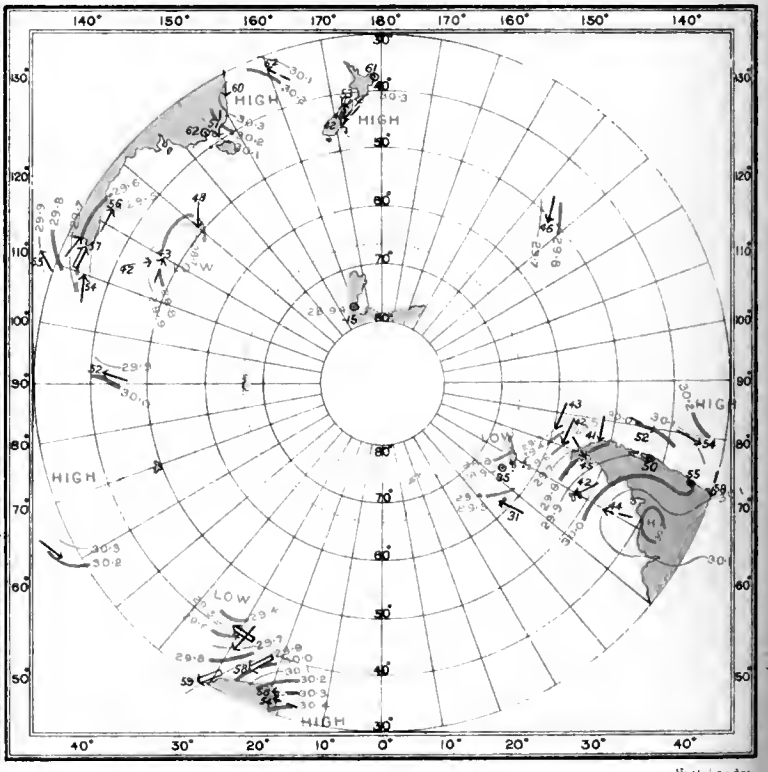

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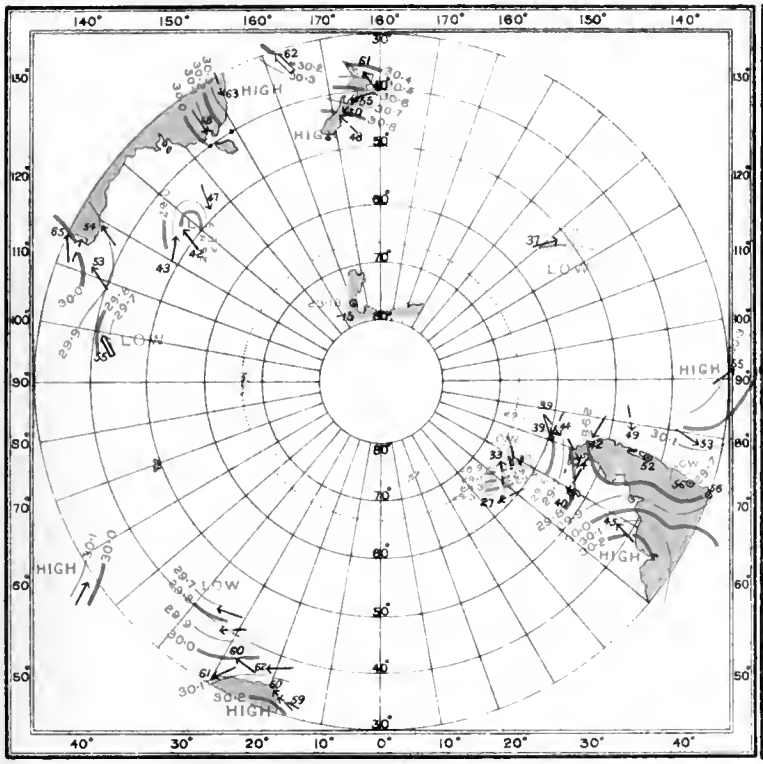
INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 OCTOBER 19



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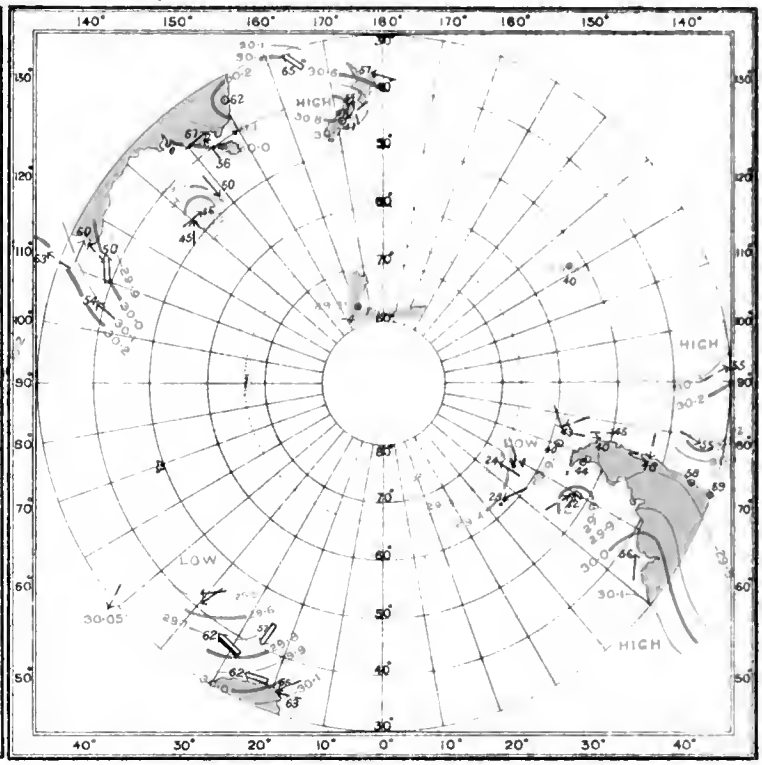

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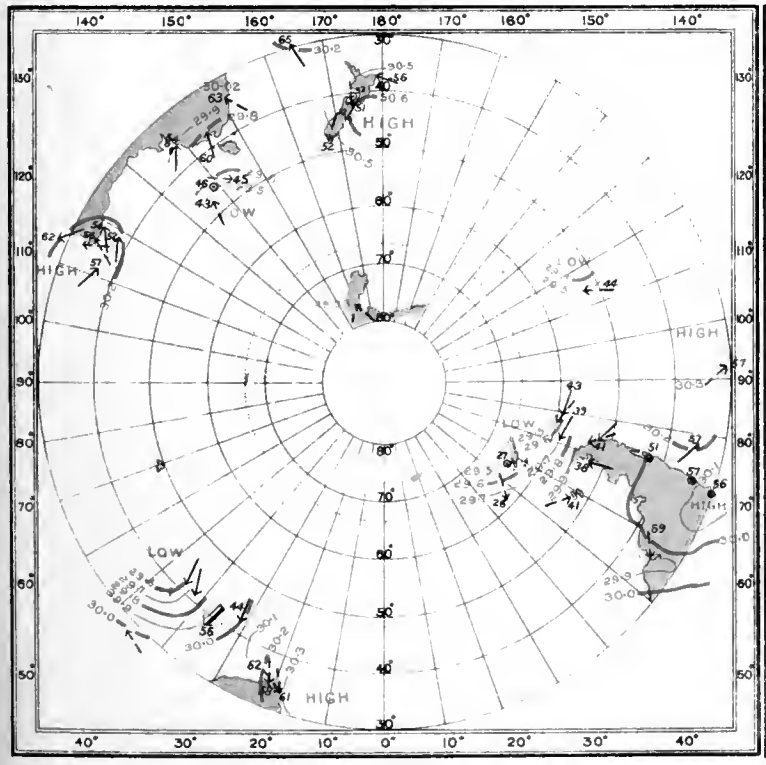

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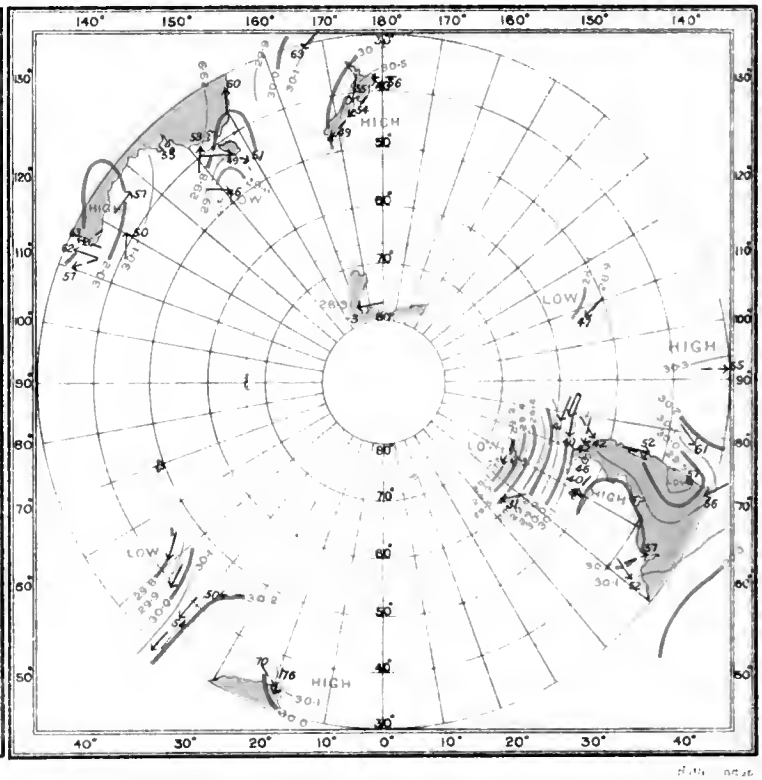

For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

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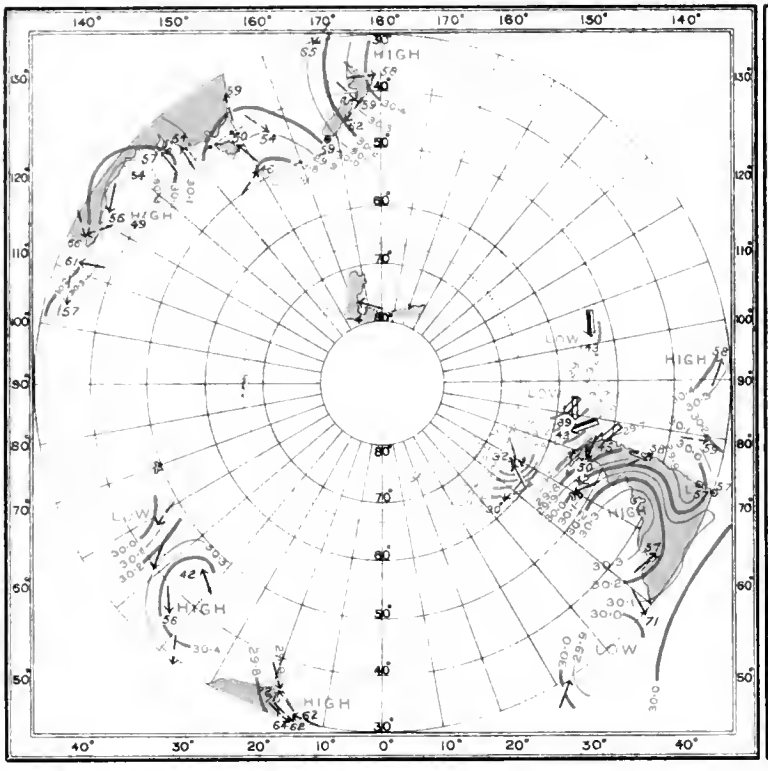

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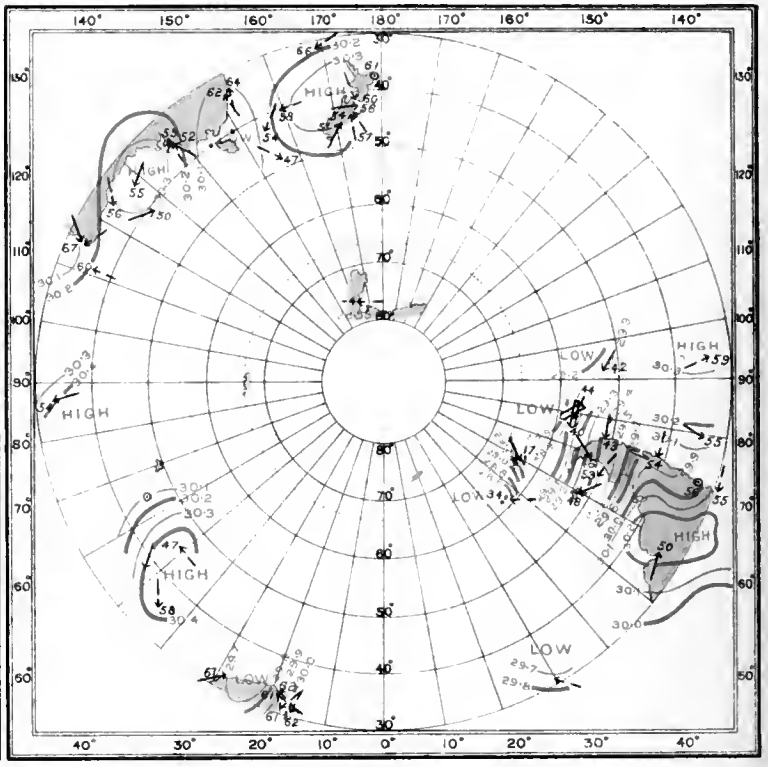

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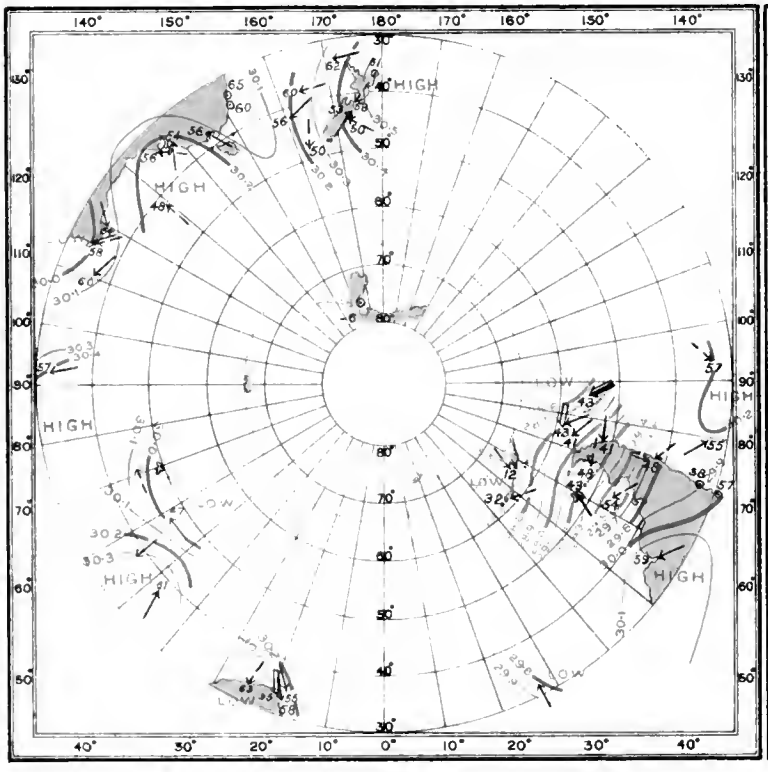

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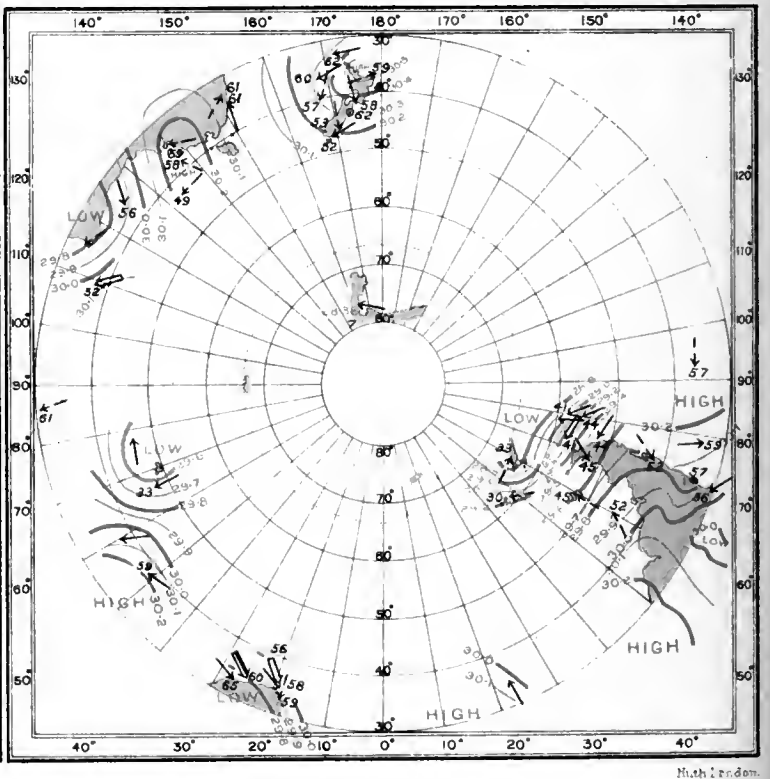

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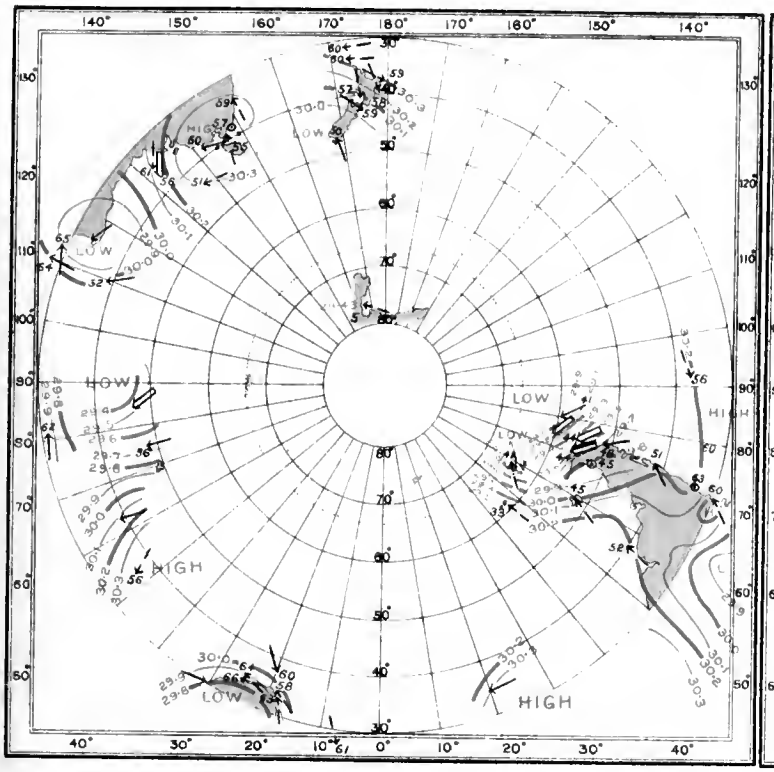
INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 OCTOBER 27



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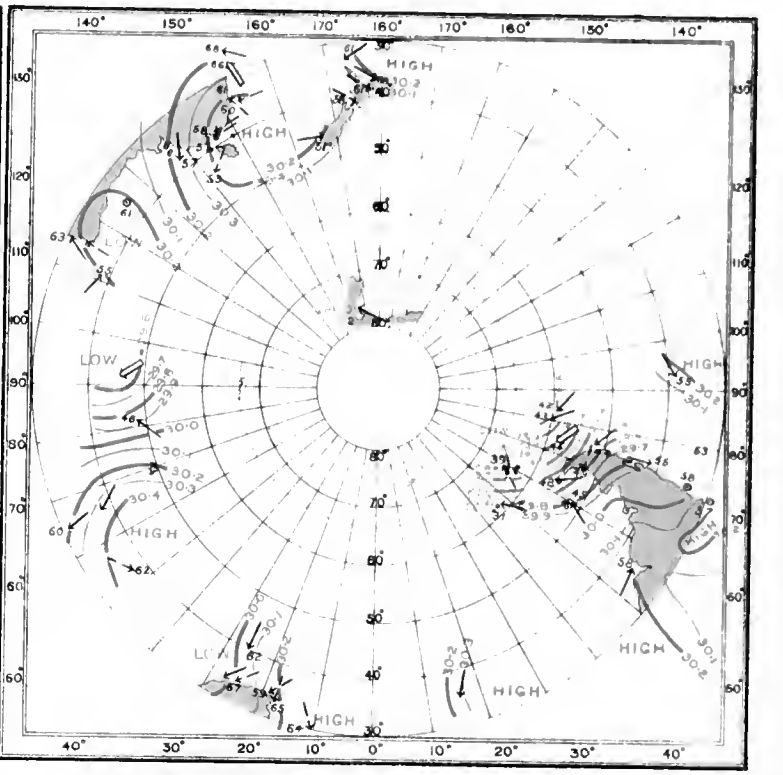

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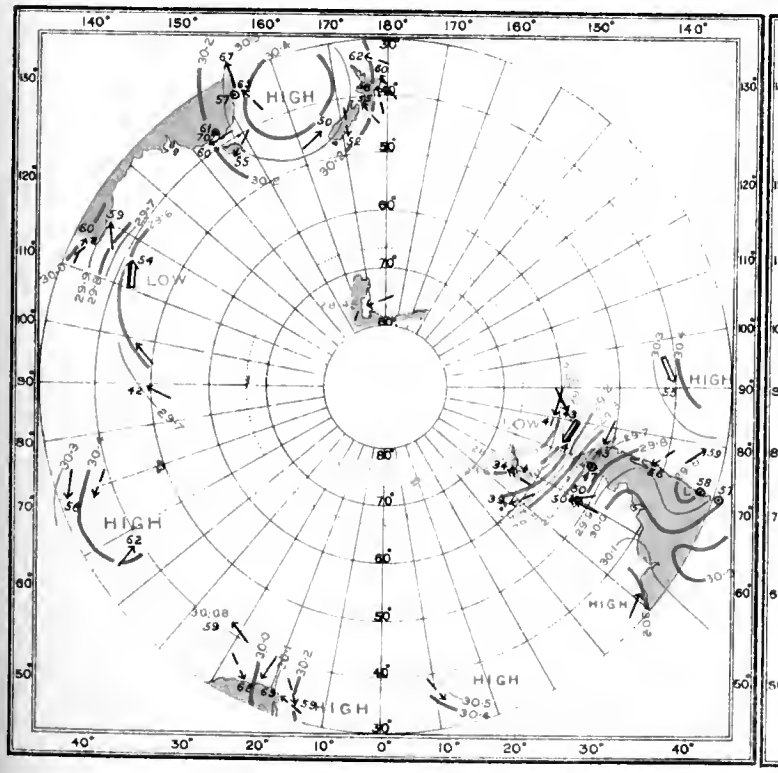

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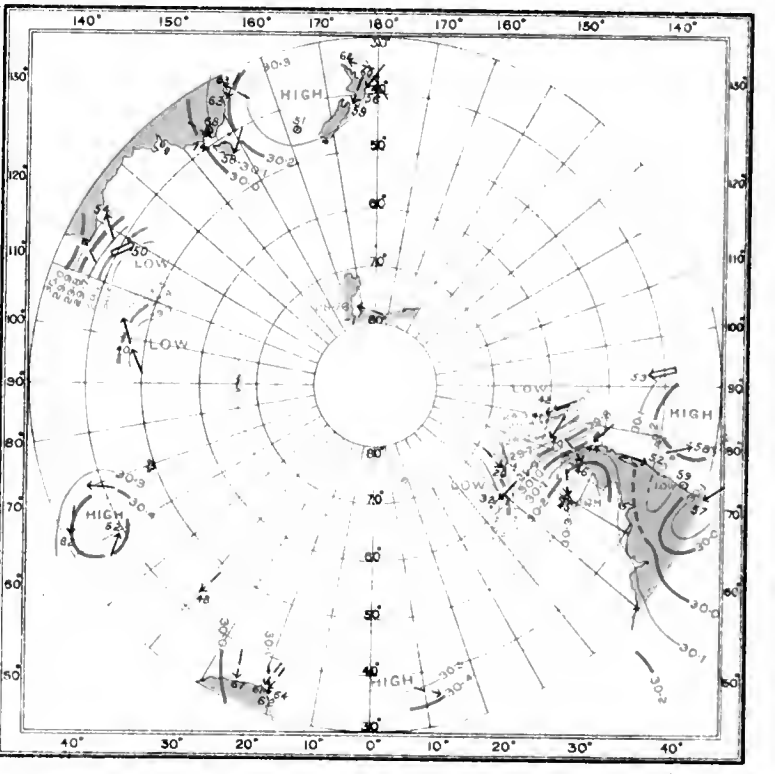


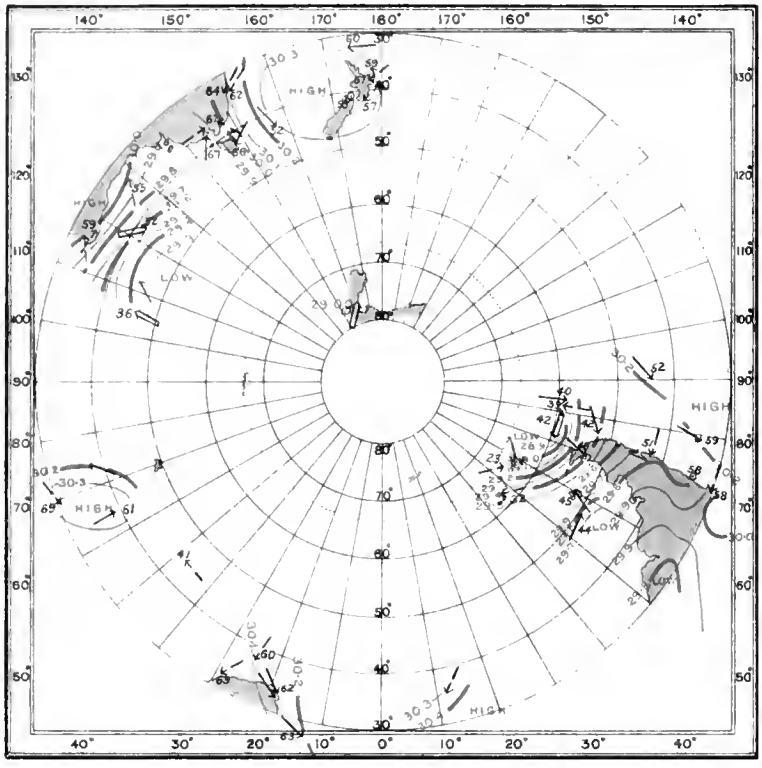
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1903 OCTOBER 31



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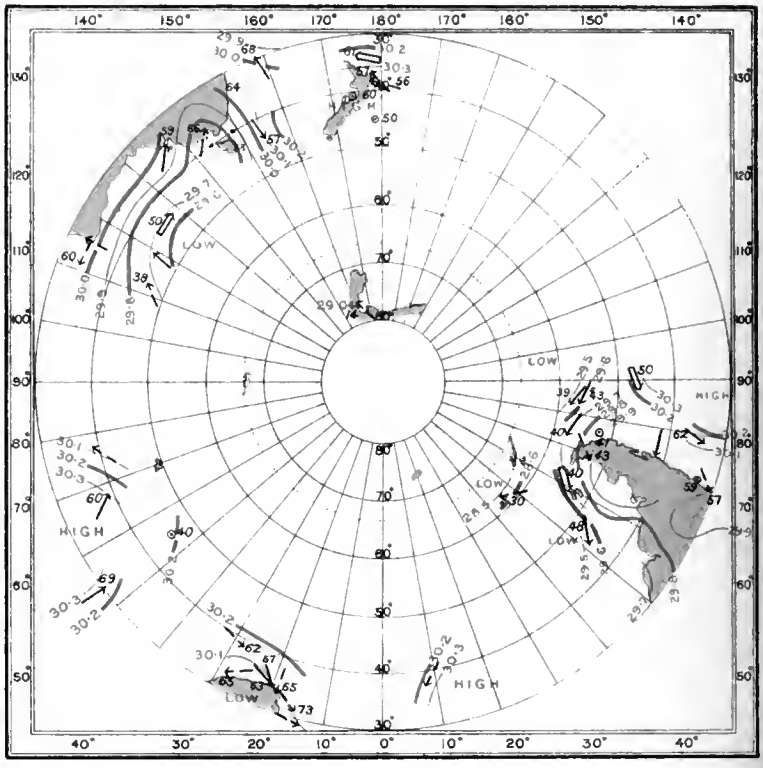

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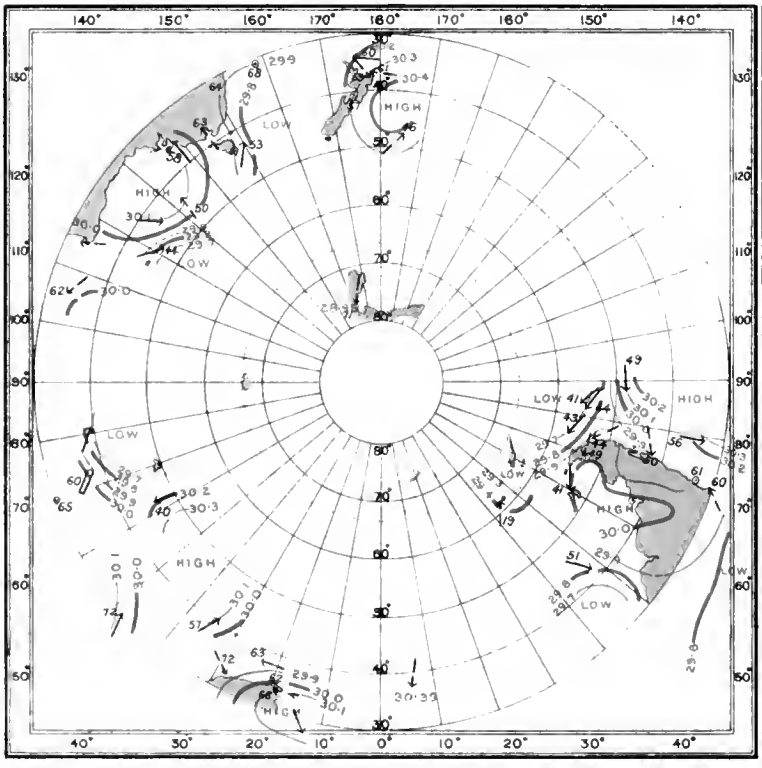

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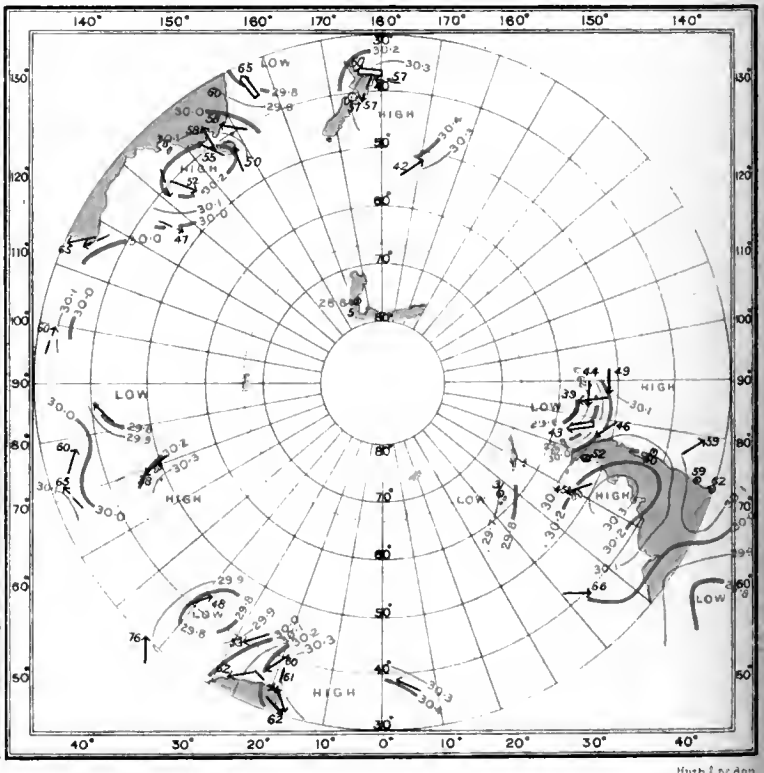

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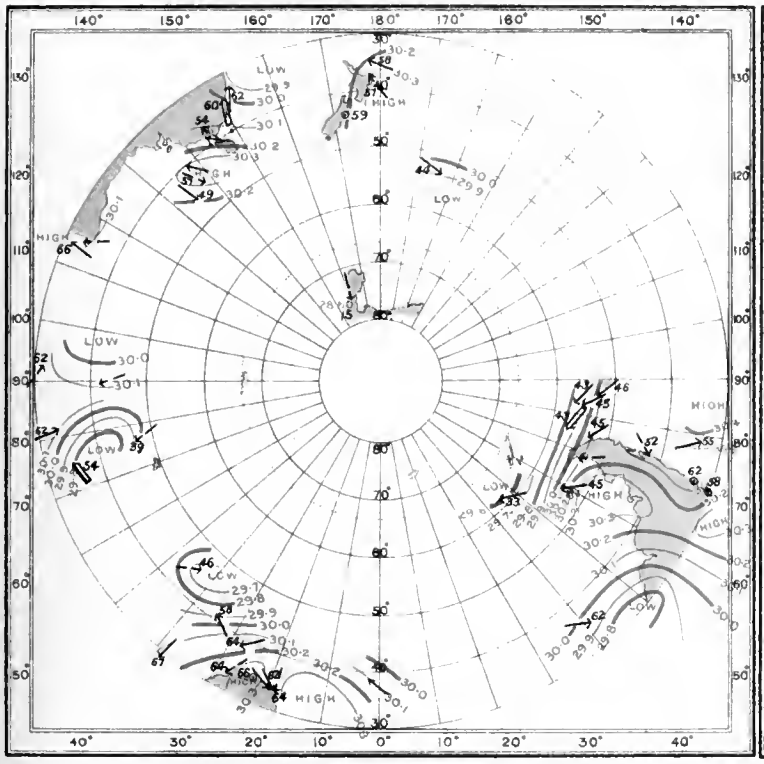
INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 NOVEMBER 4



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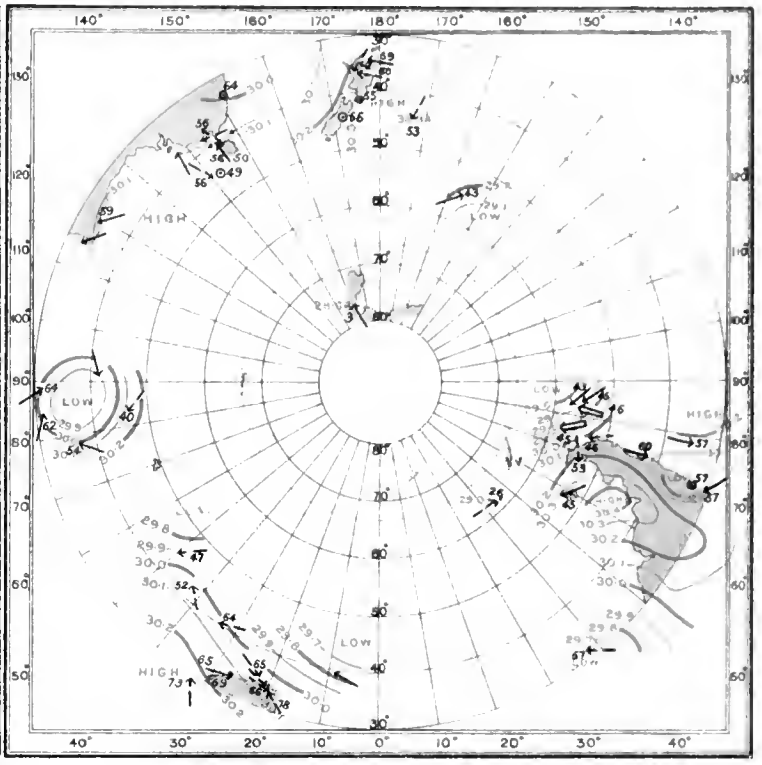

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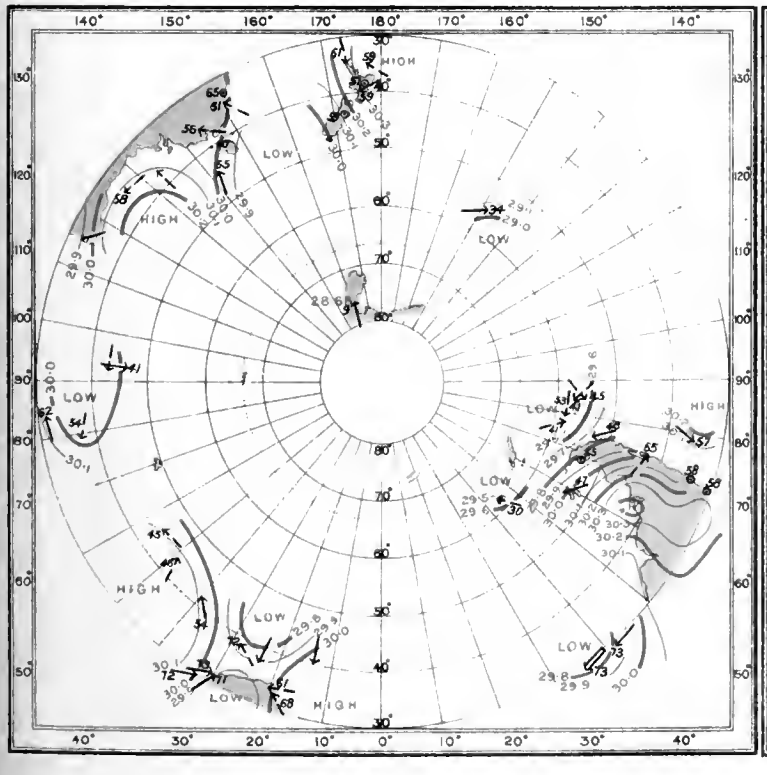

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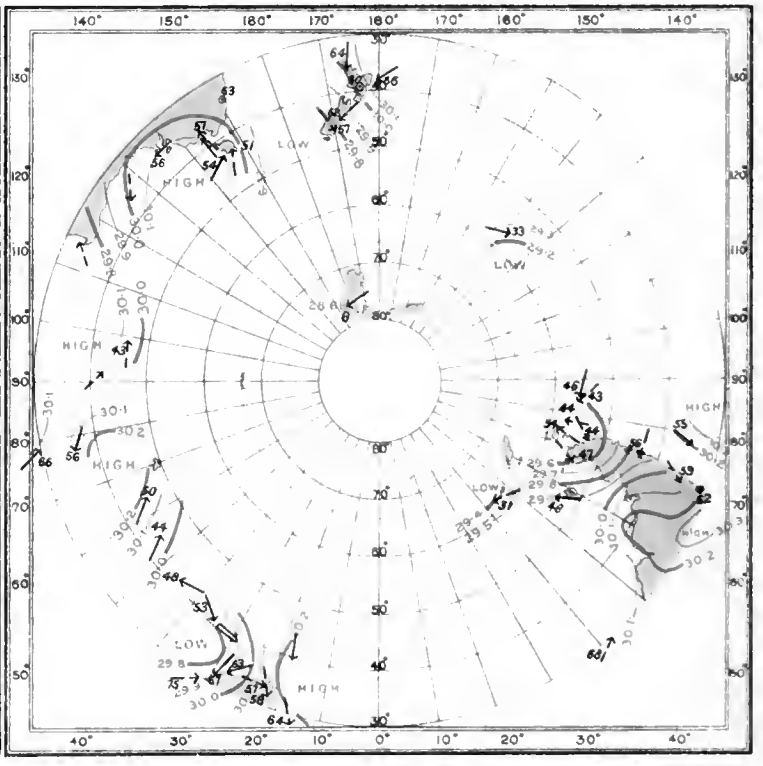


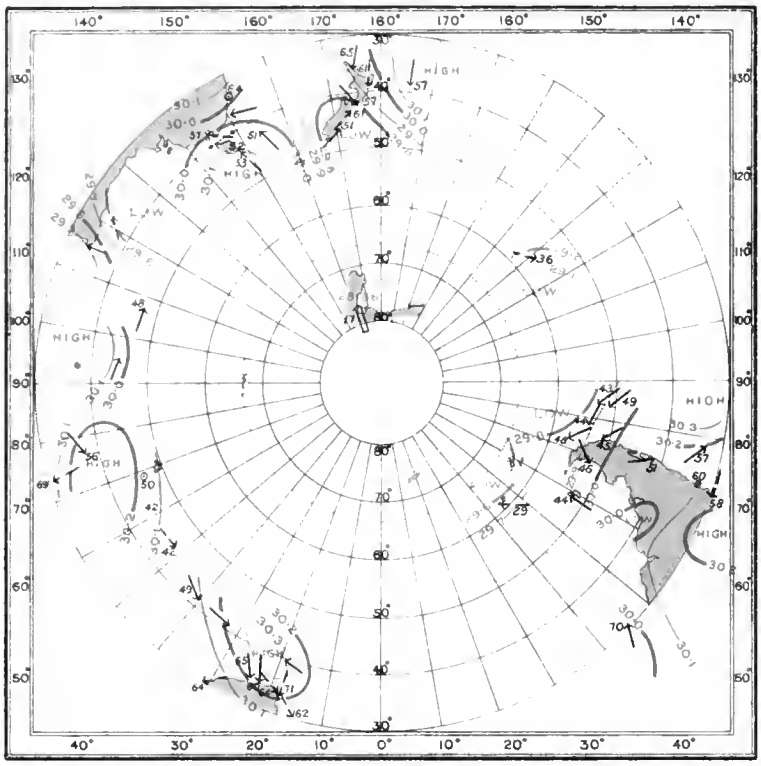
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 NOVEMBER 8



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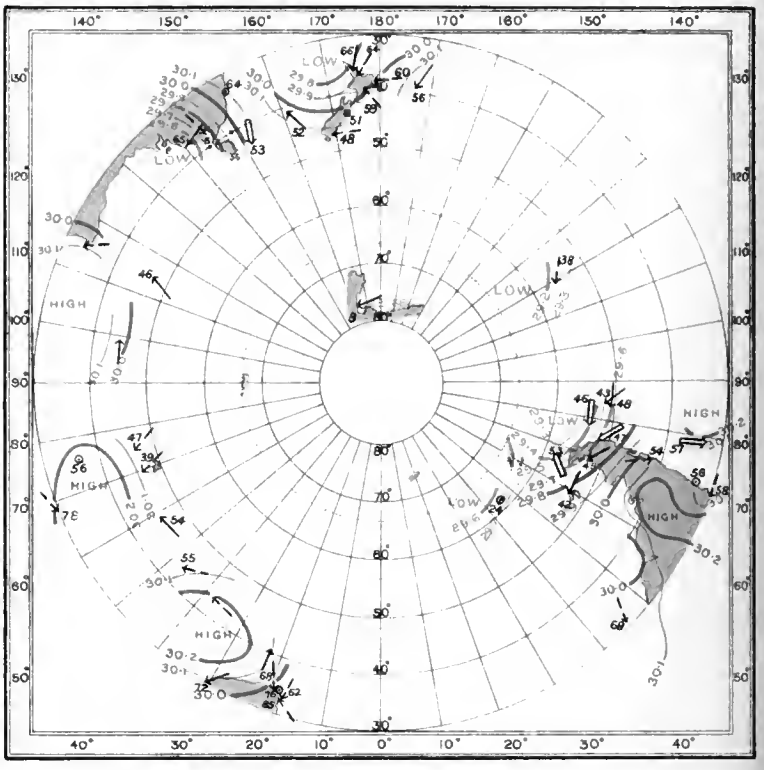

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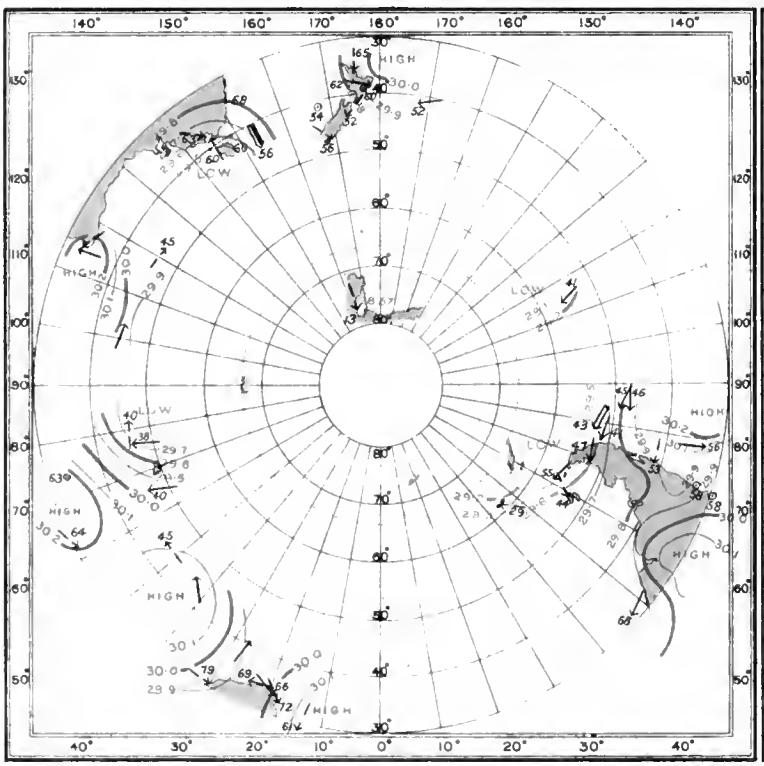

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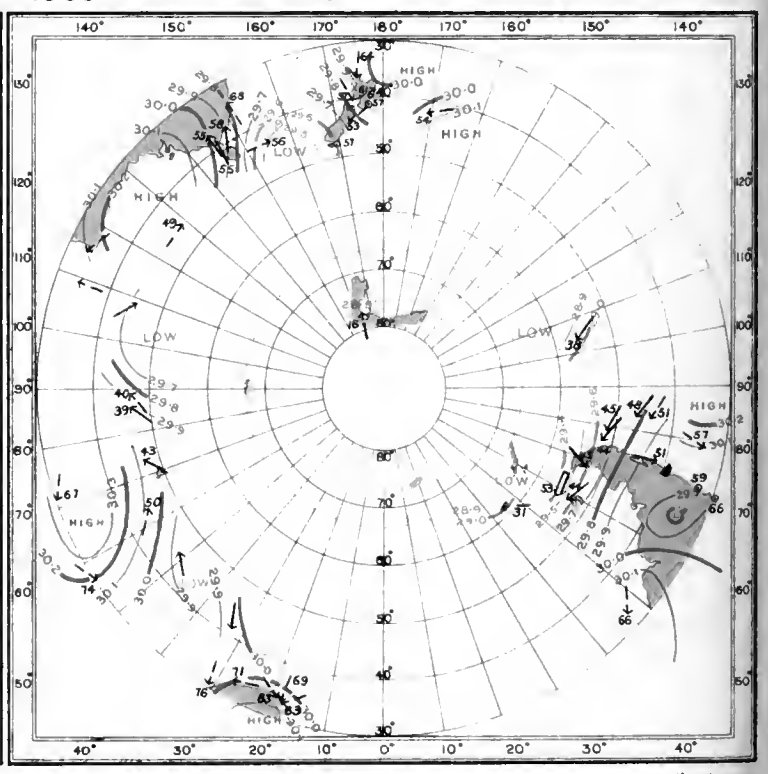


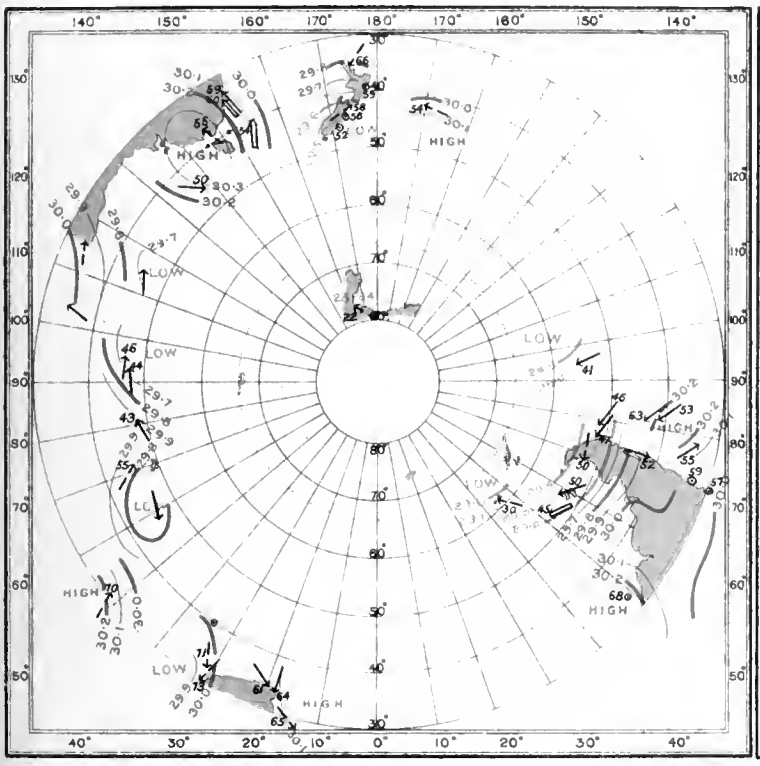
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 NOVEMBER 12



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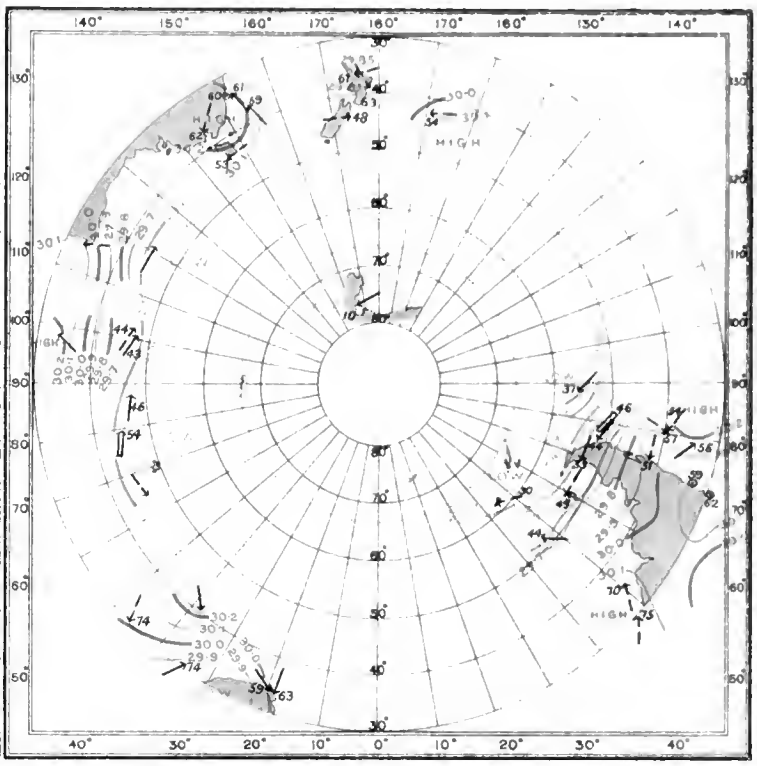

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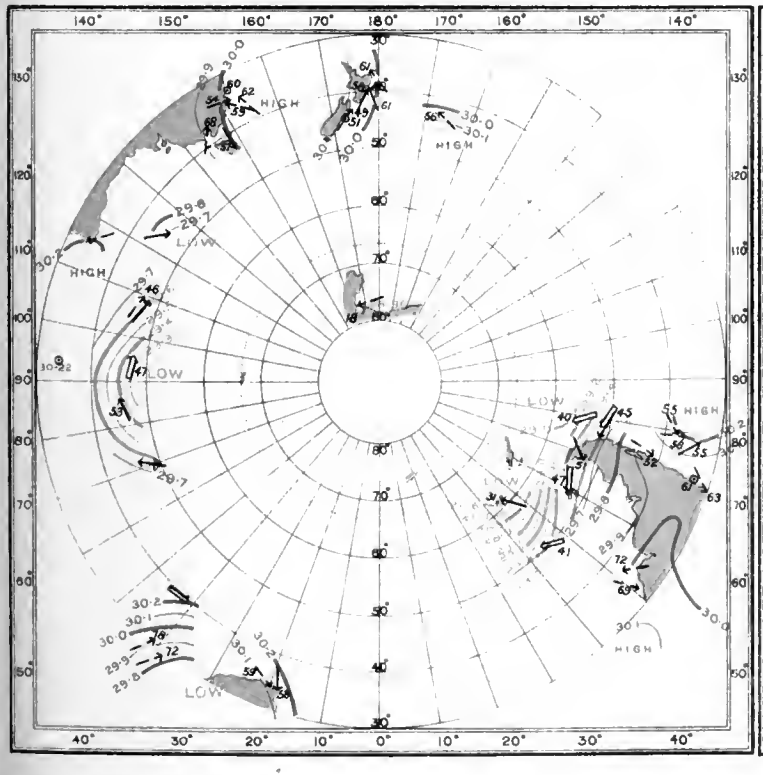

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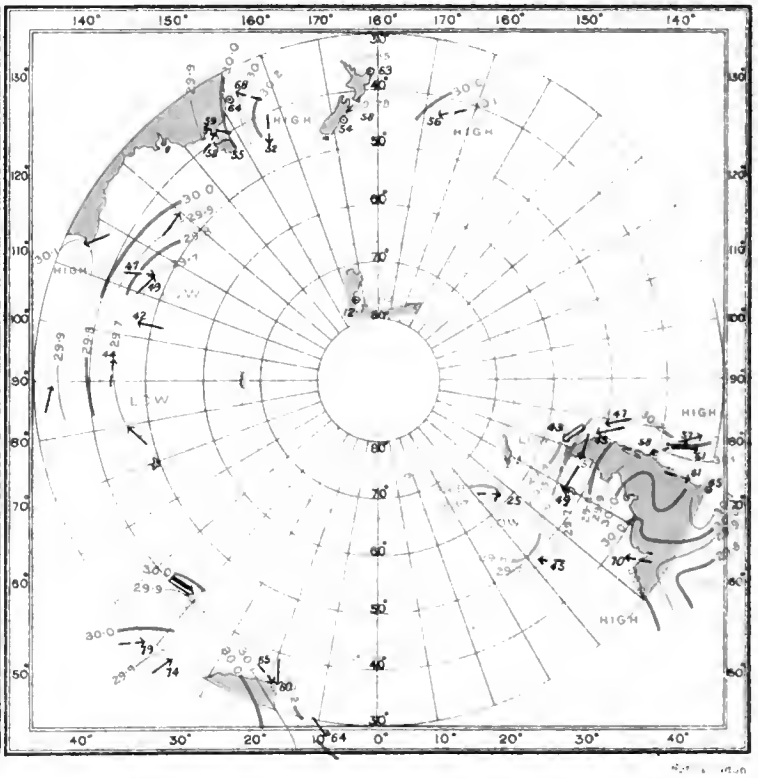


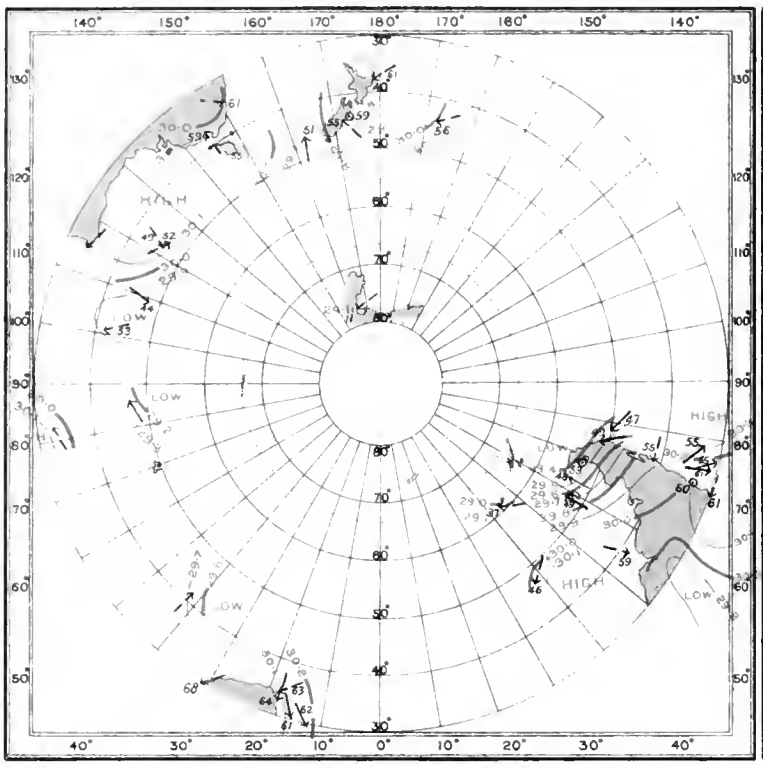
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 NOVEMBER 16



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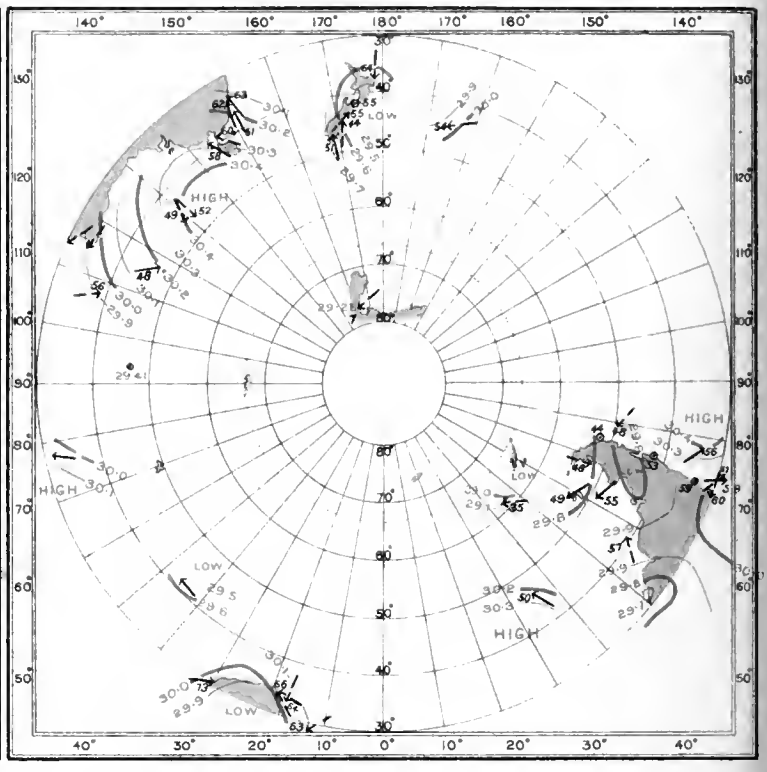

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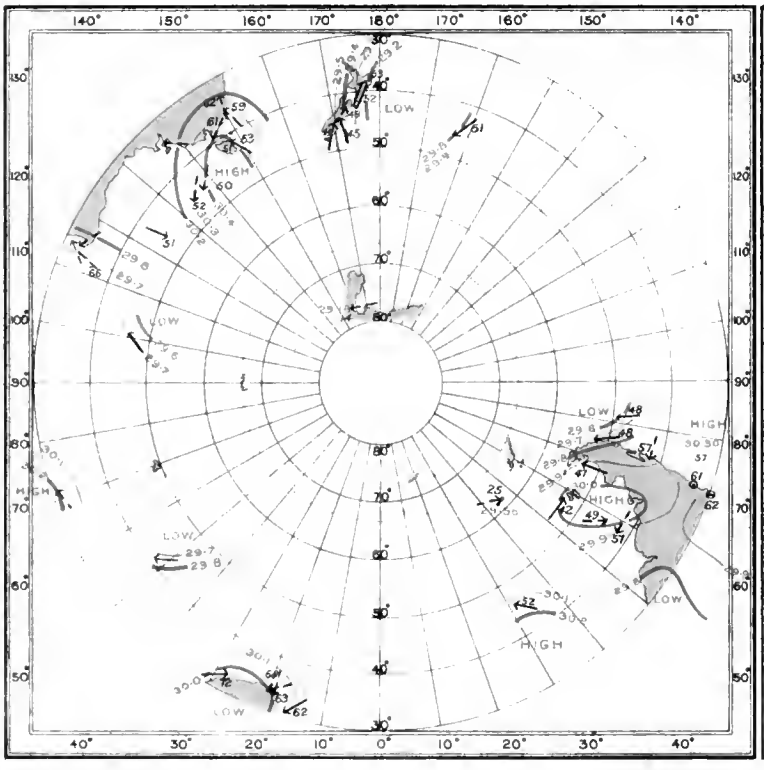

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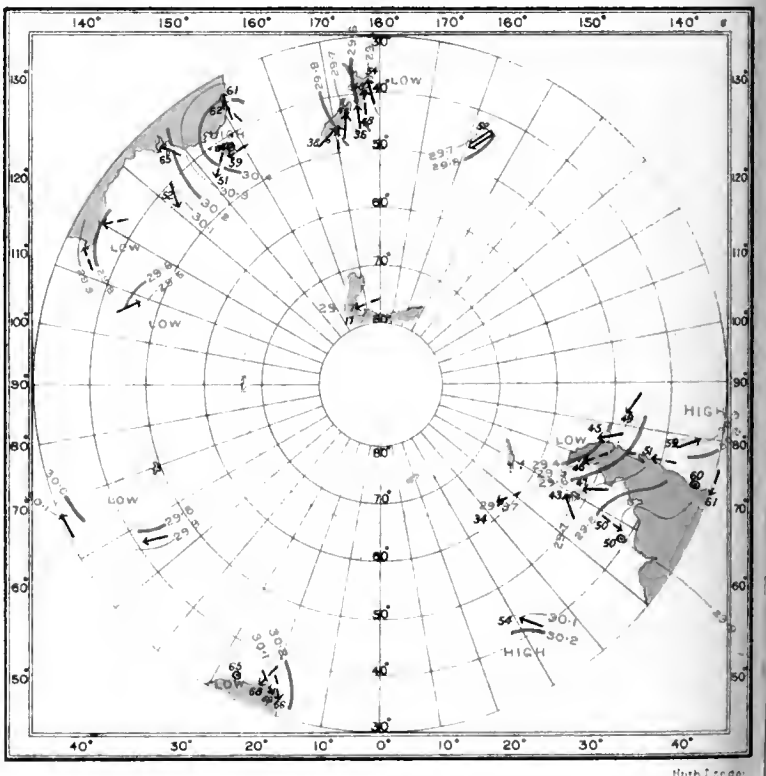


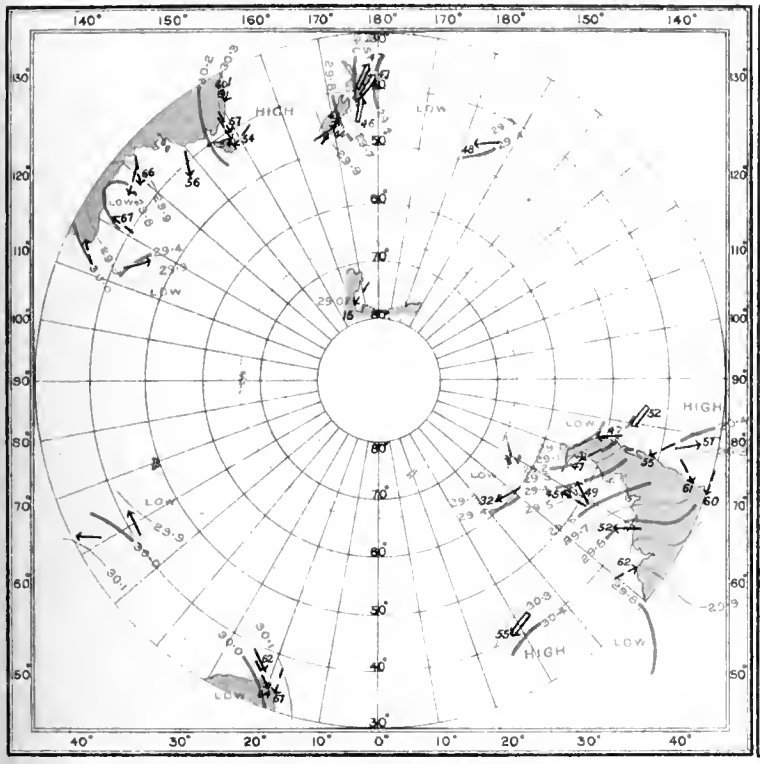
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 NOVEMBER 20



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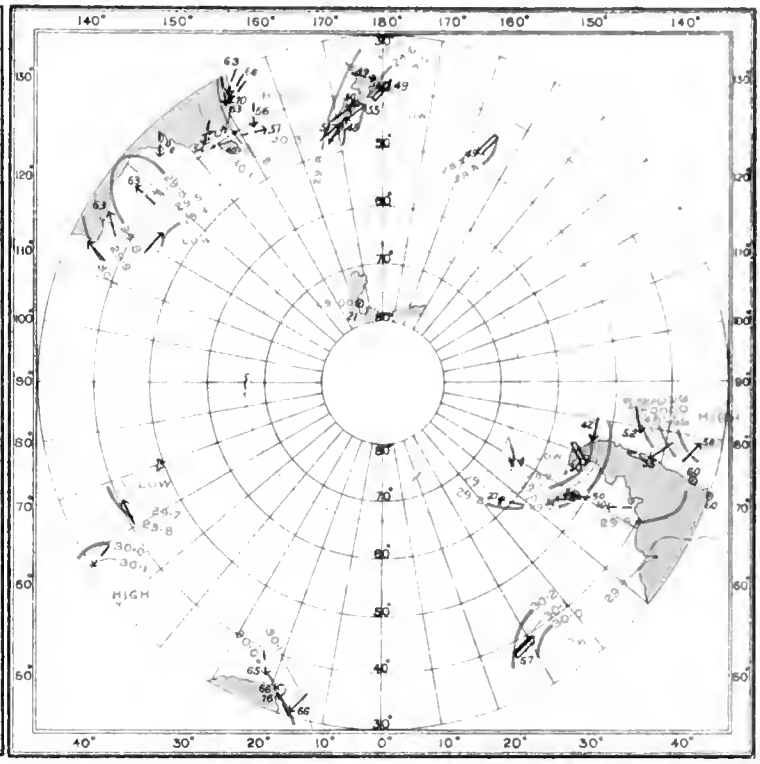

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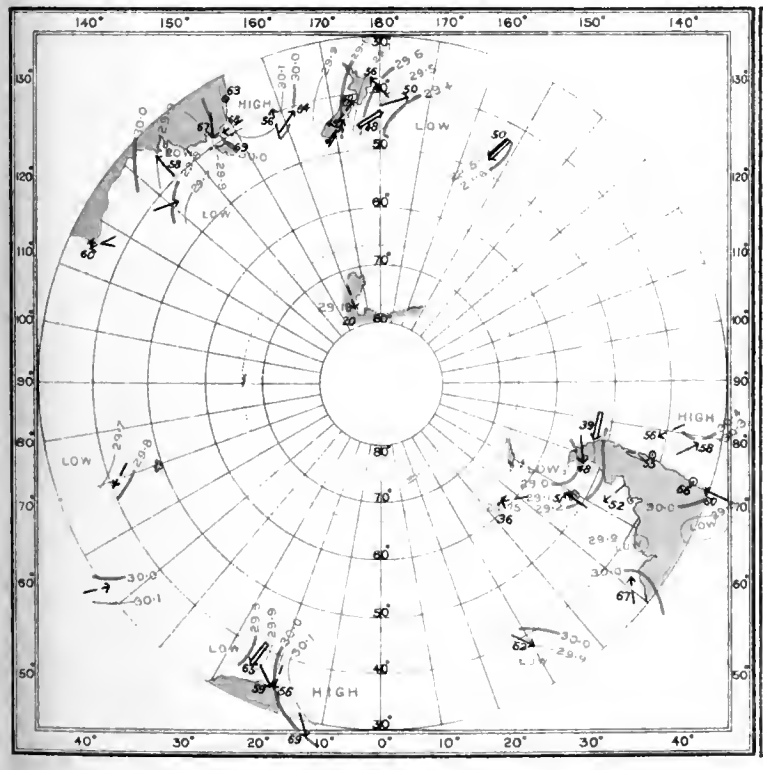

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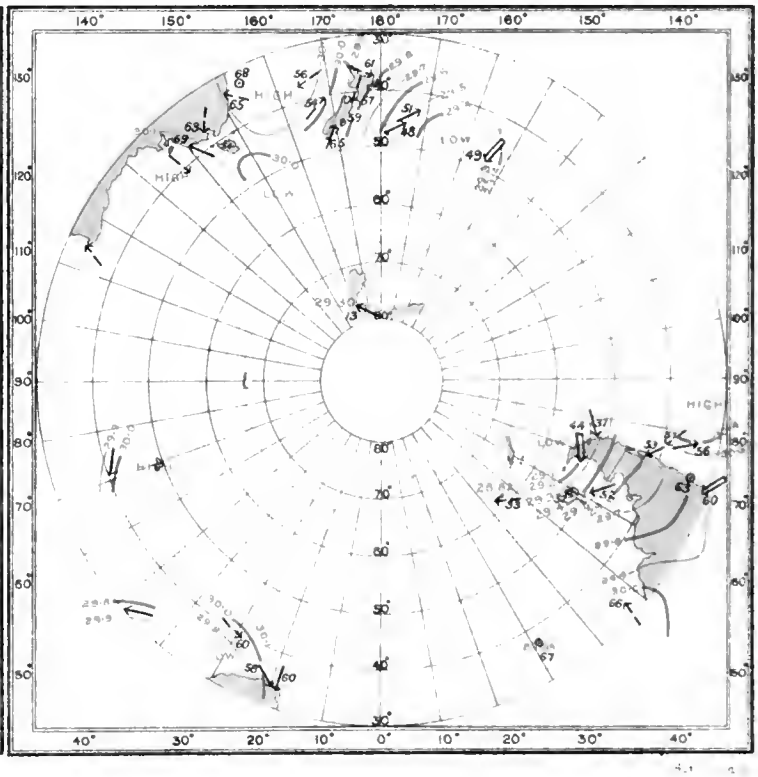


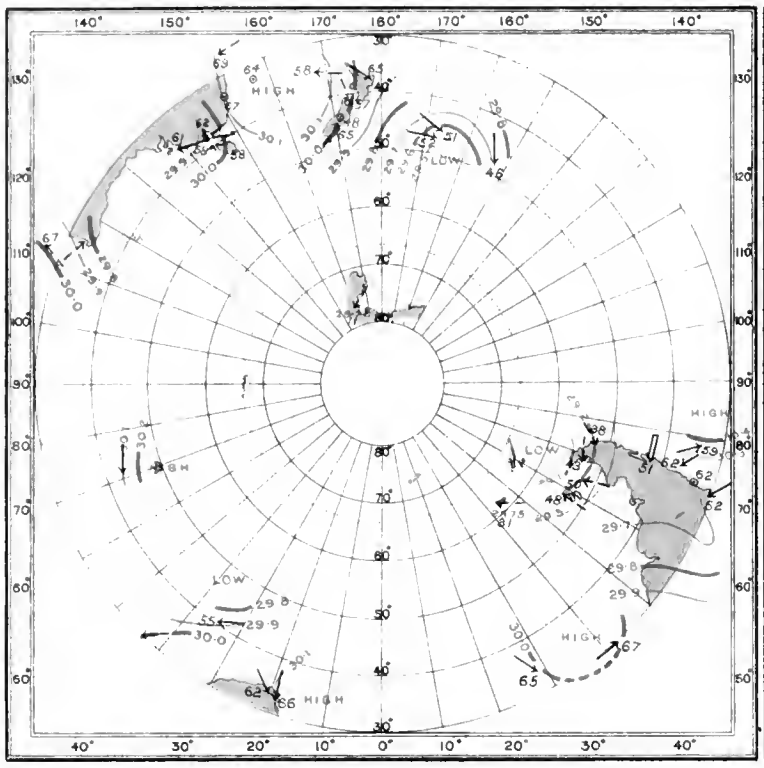
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 NOVEMBER 24



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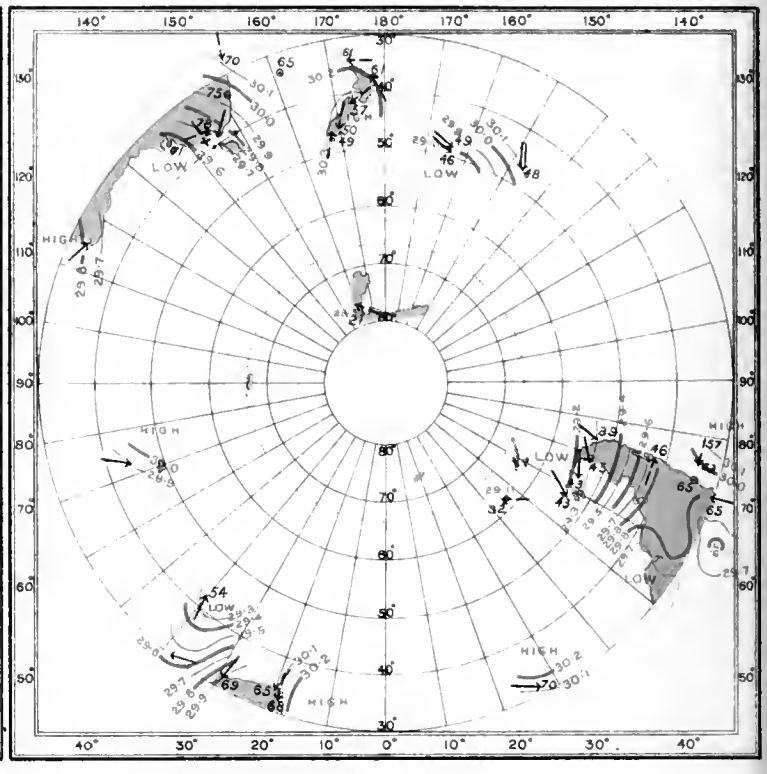

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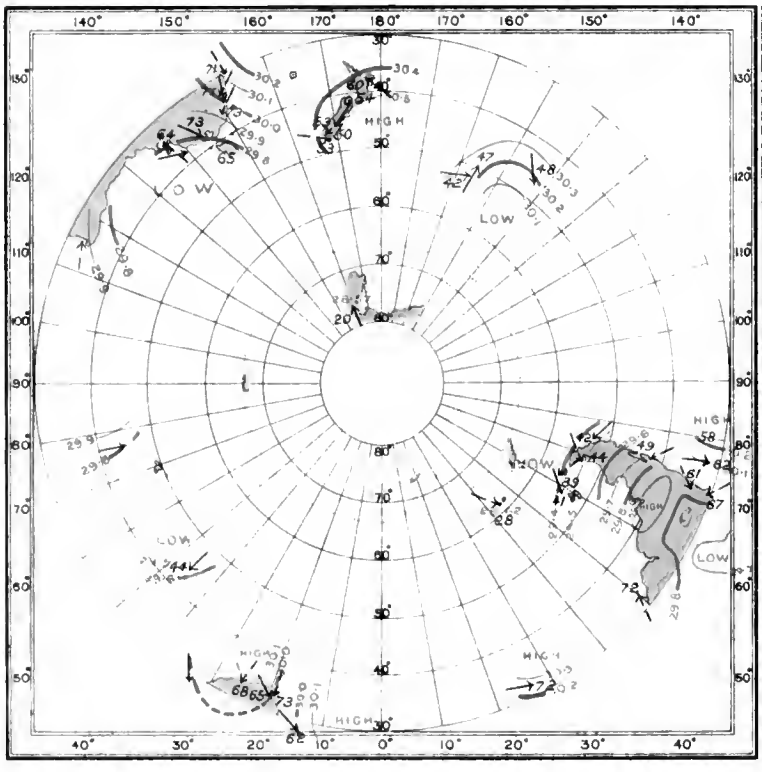

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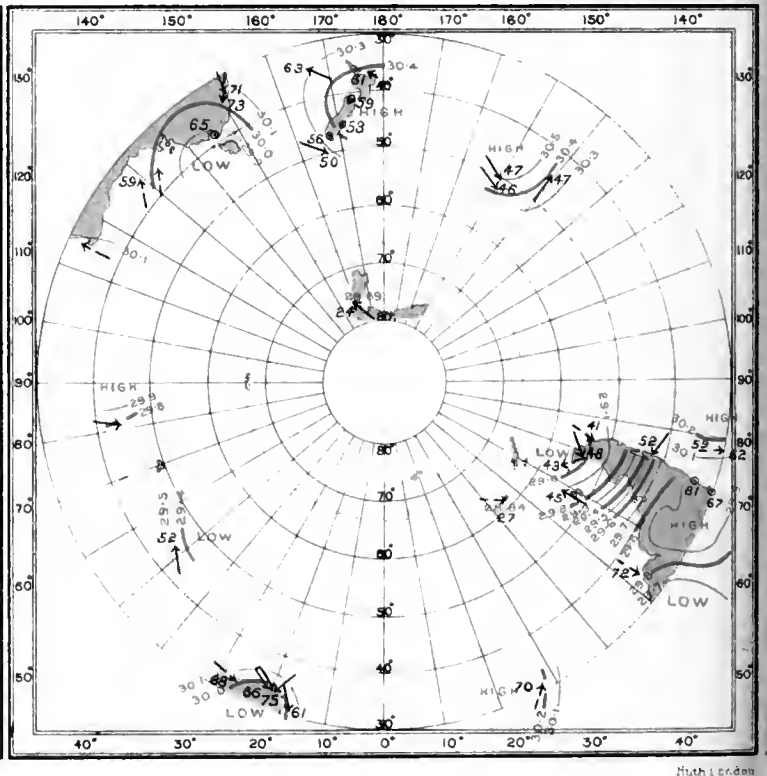


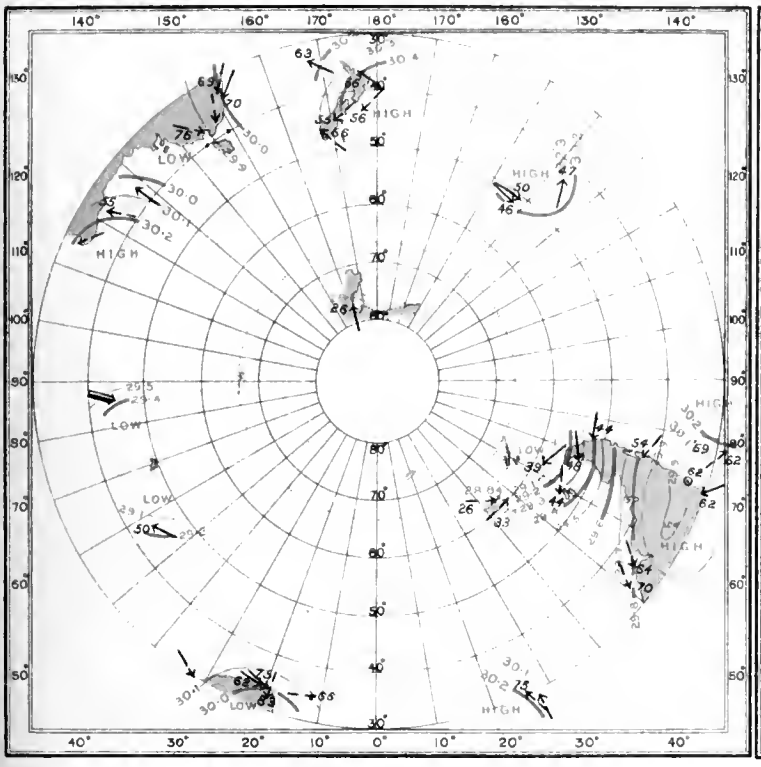
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 NOVEMBER 28



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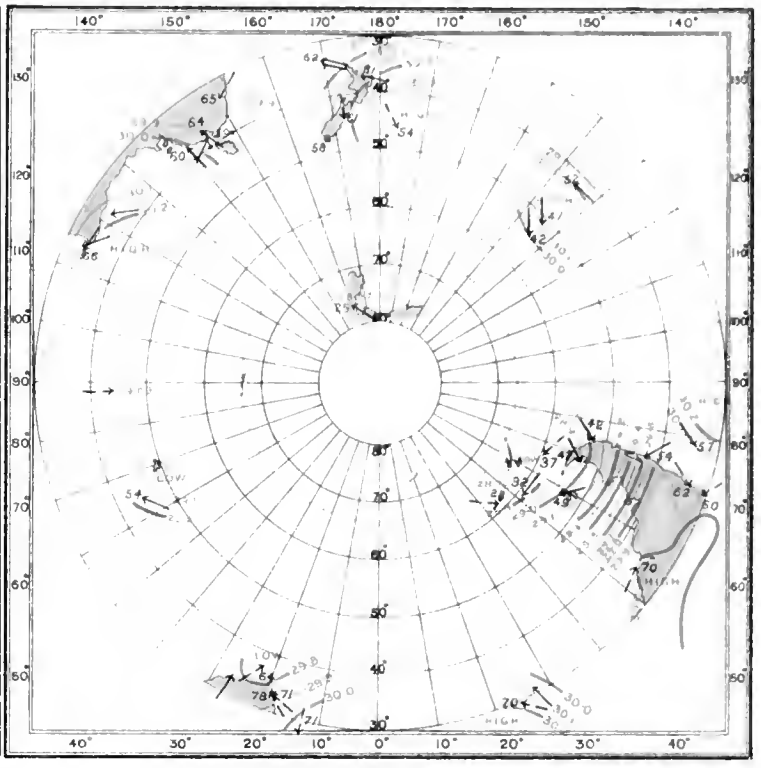

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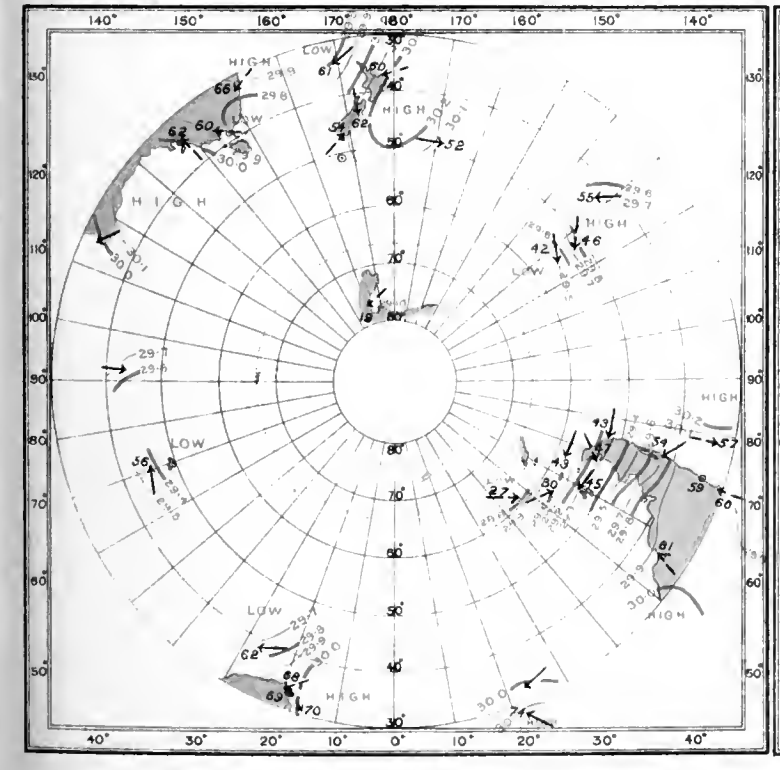

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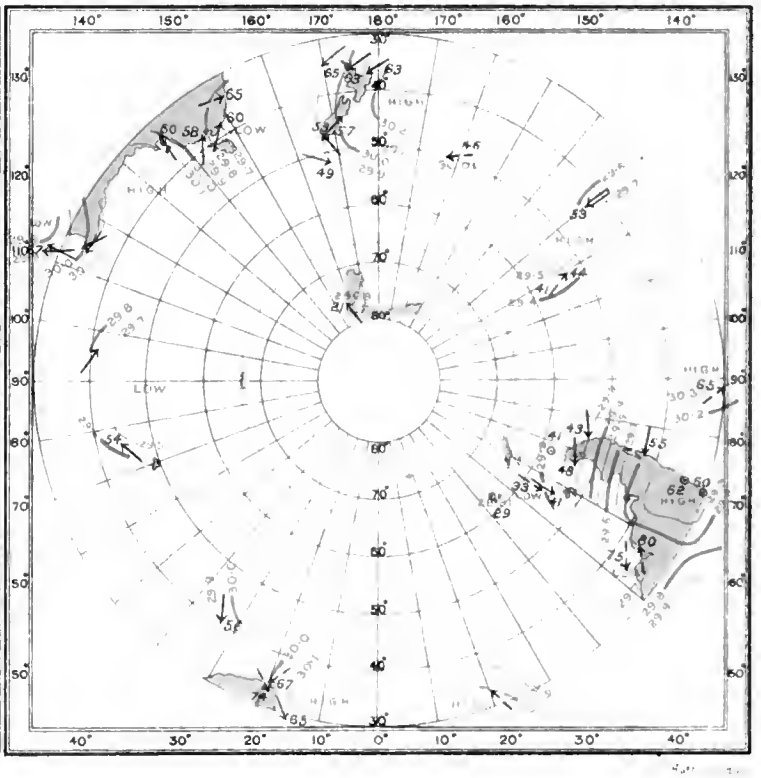


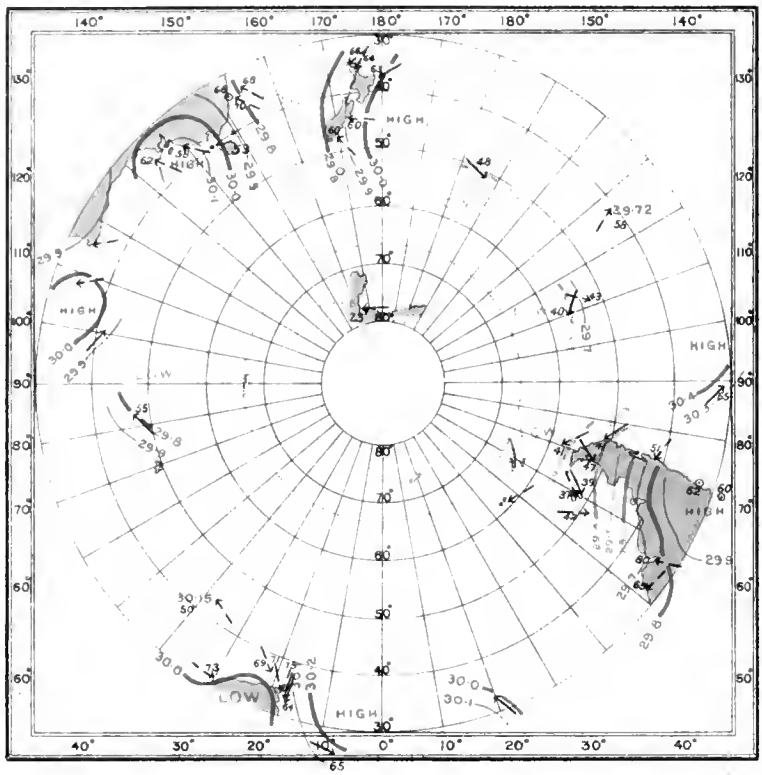
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1903 DECEMBER 2



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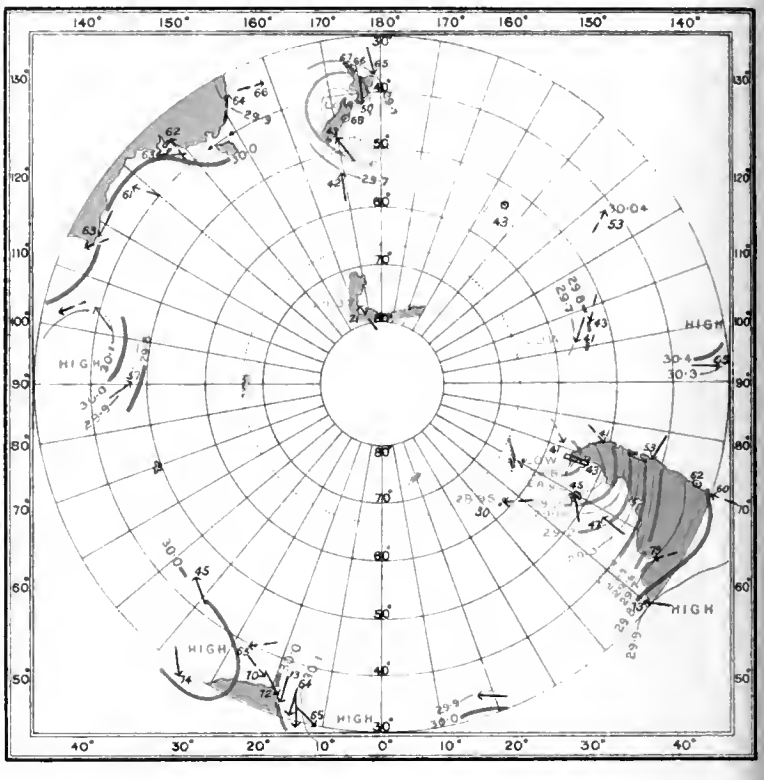

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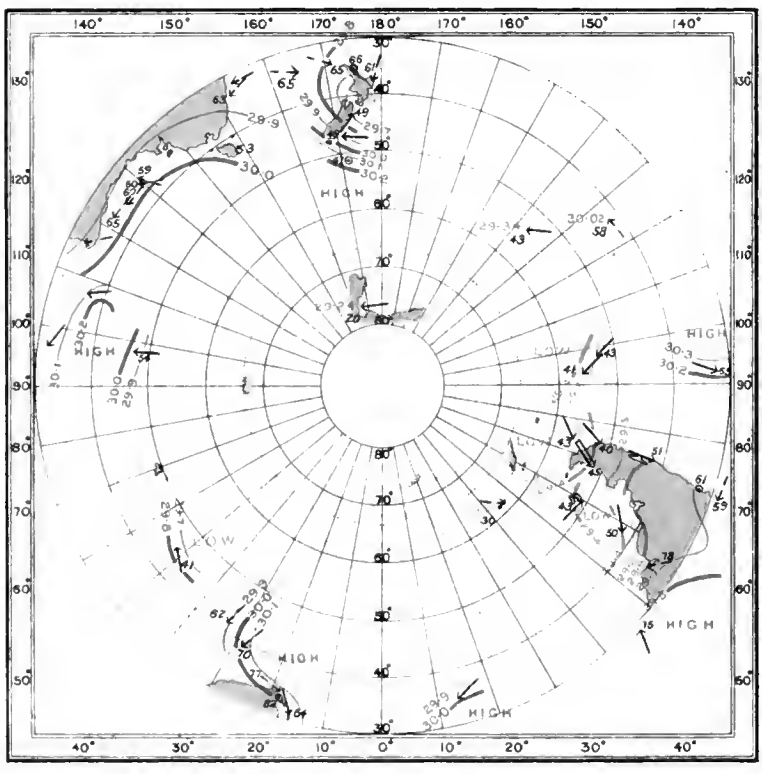

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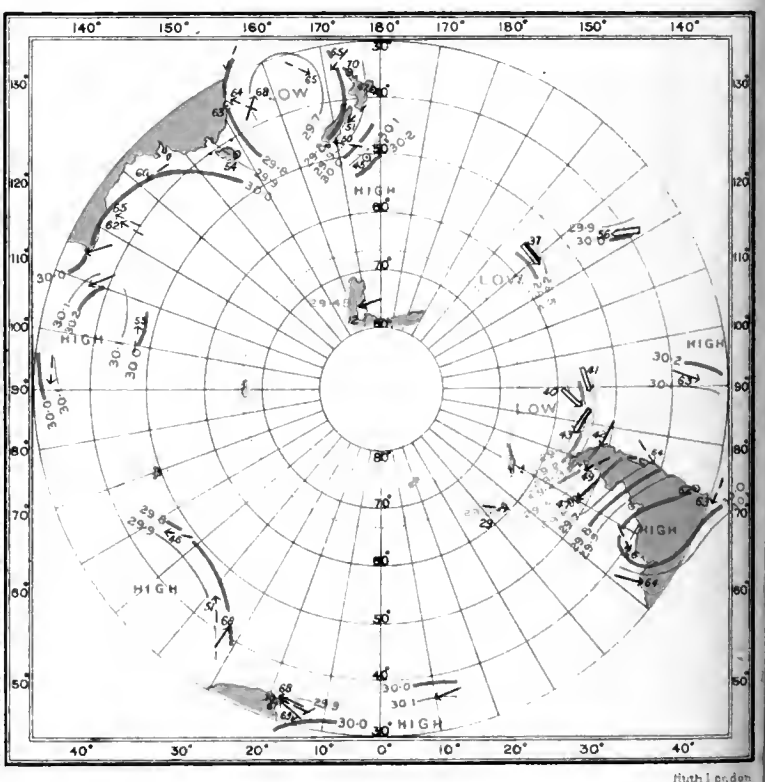

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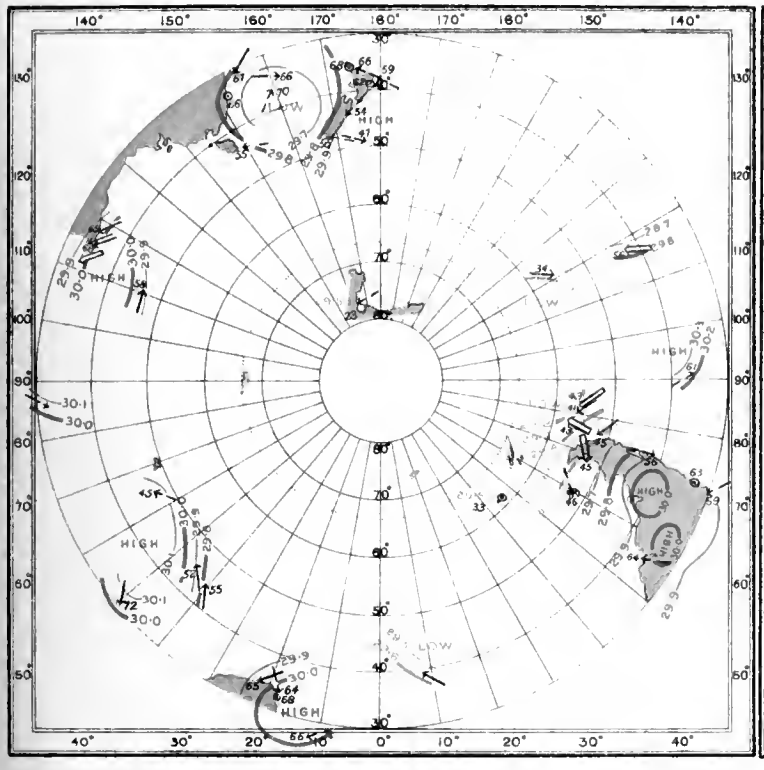
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 DECEMBER 6



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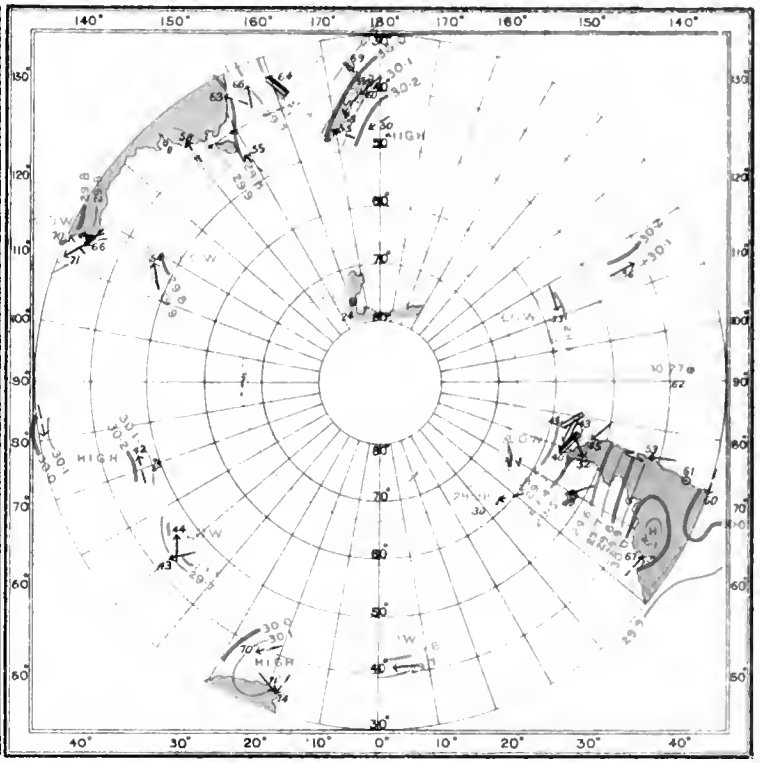

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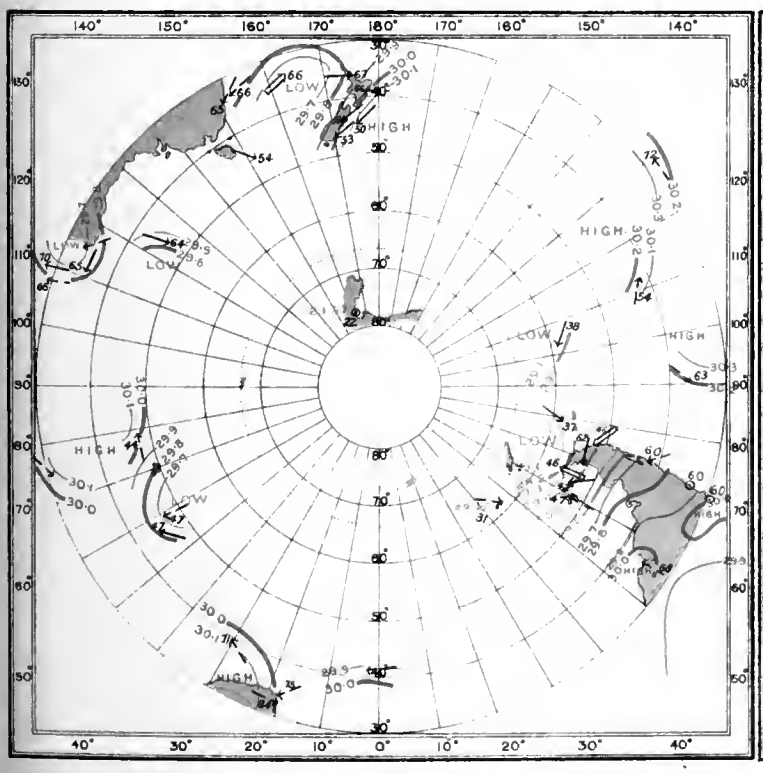

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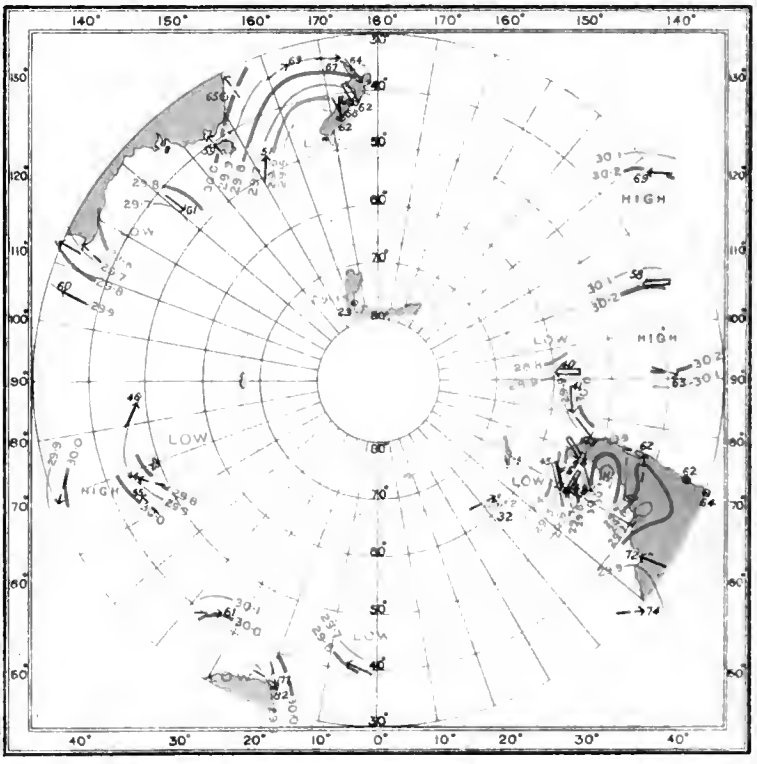


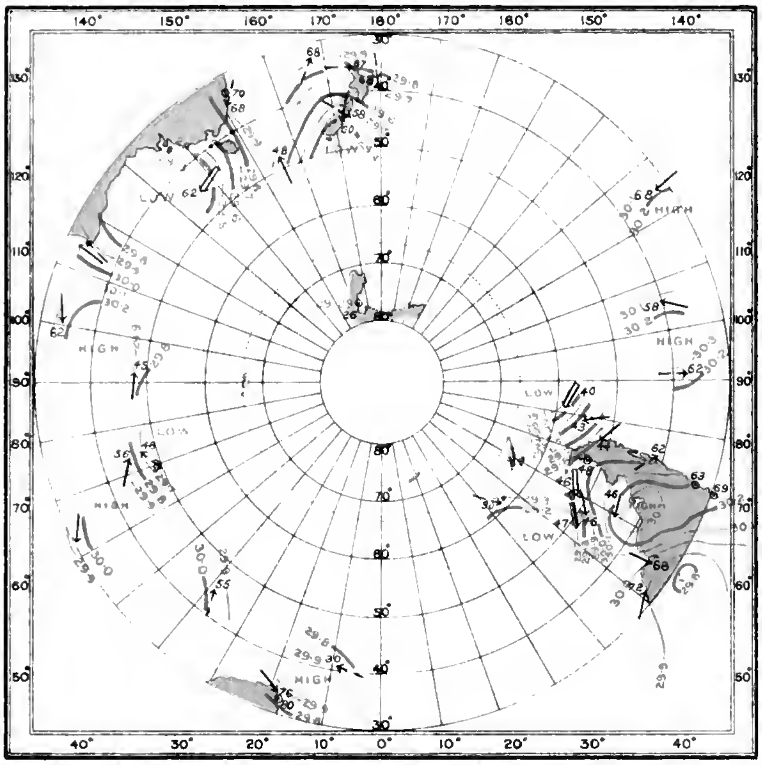
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1903 DECEMBER 10



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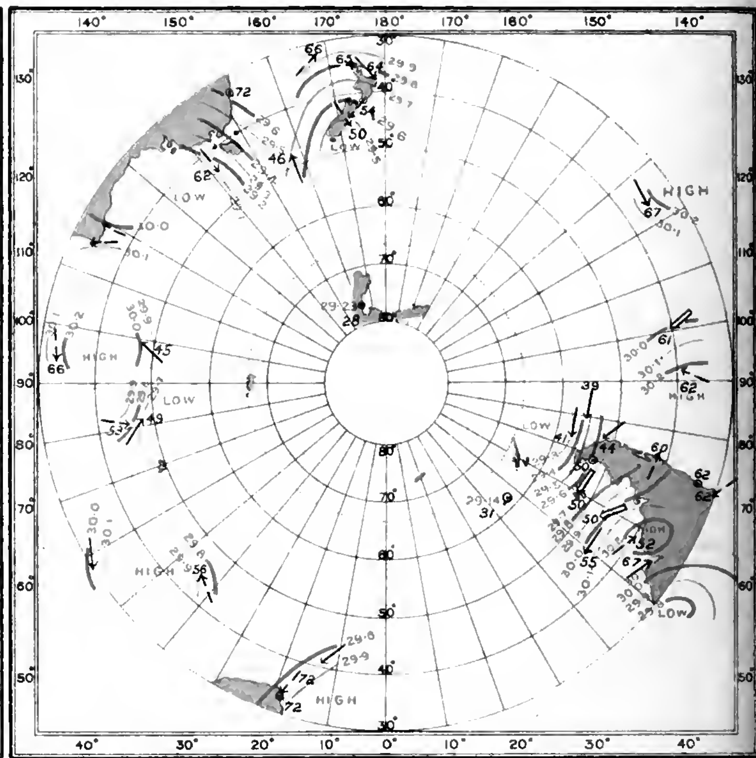

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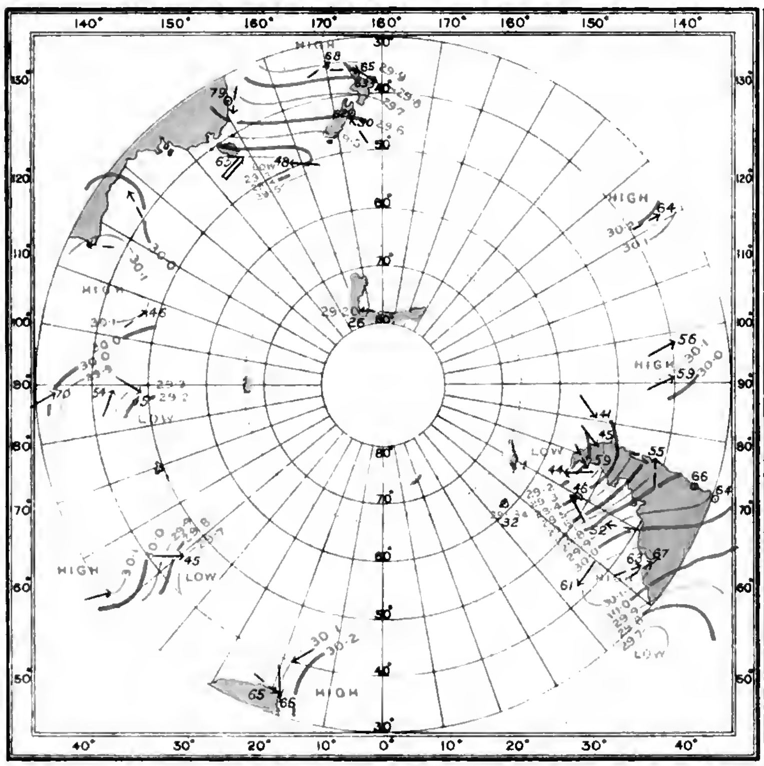

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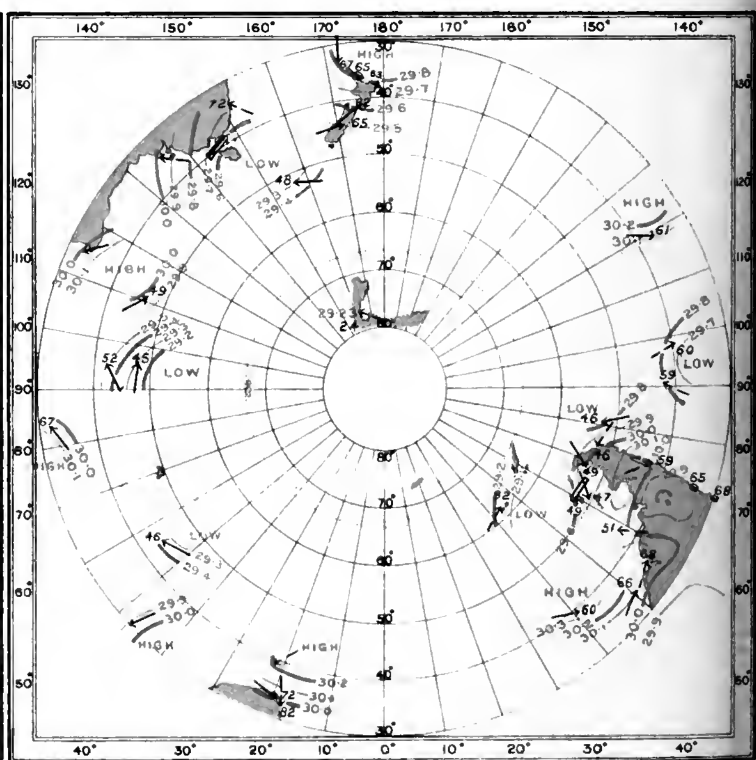


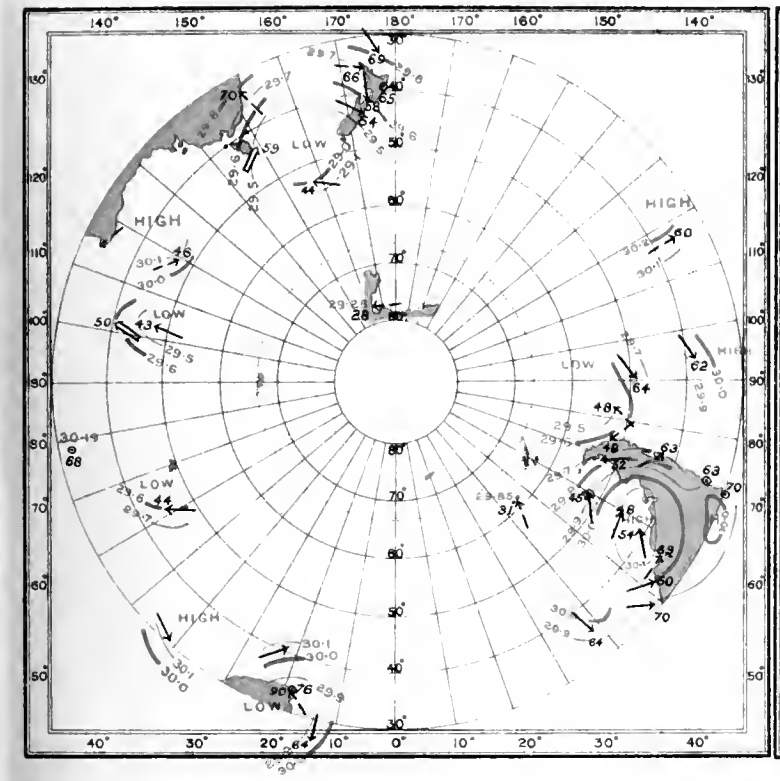
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 DECEMBER 14



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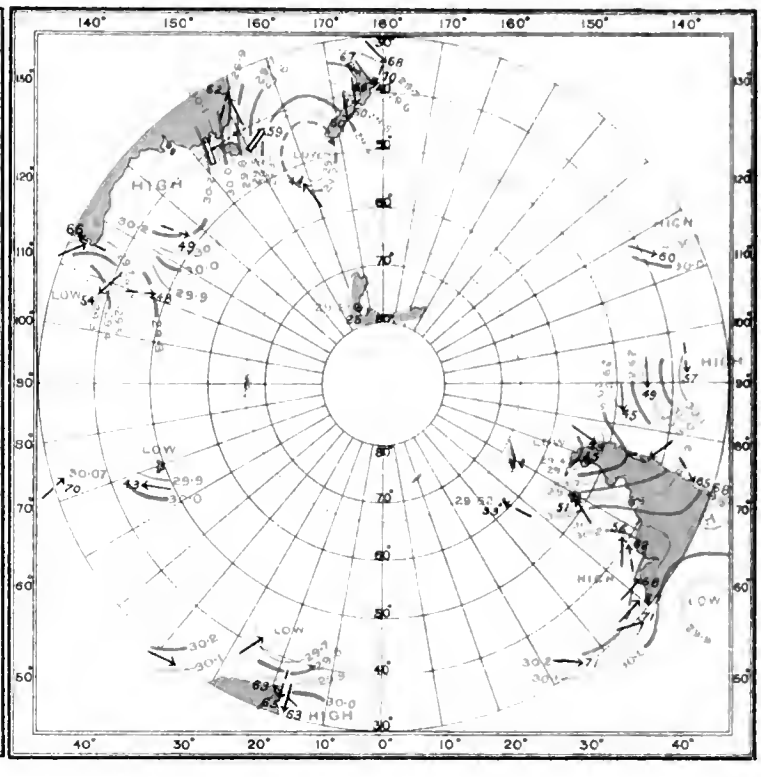

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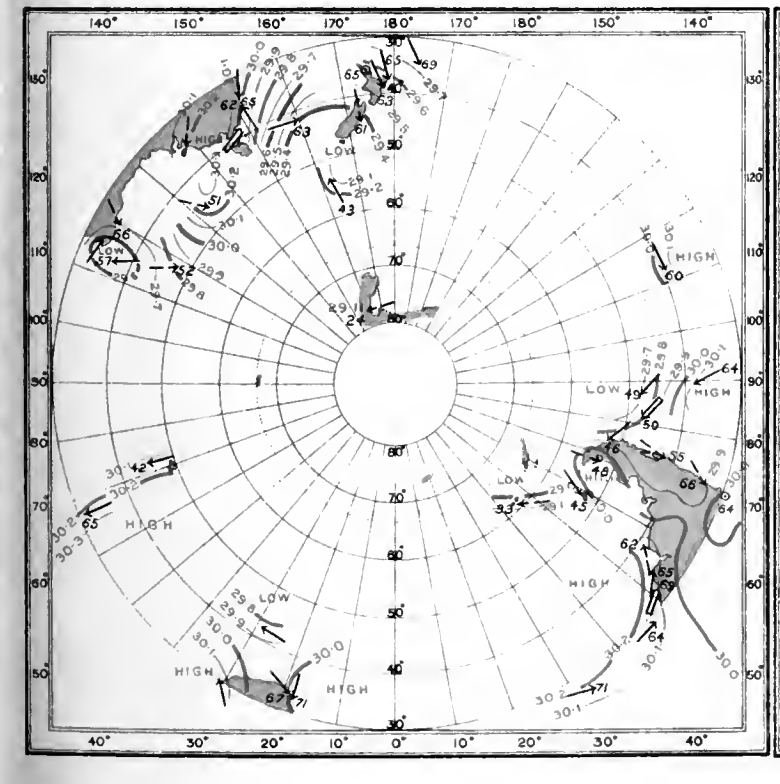

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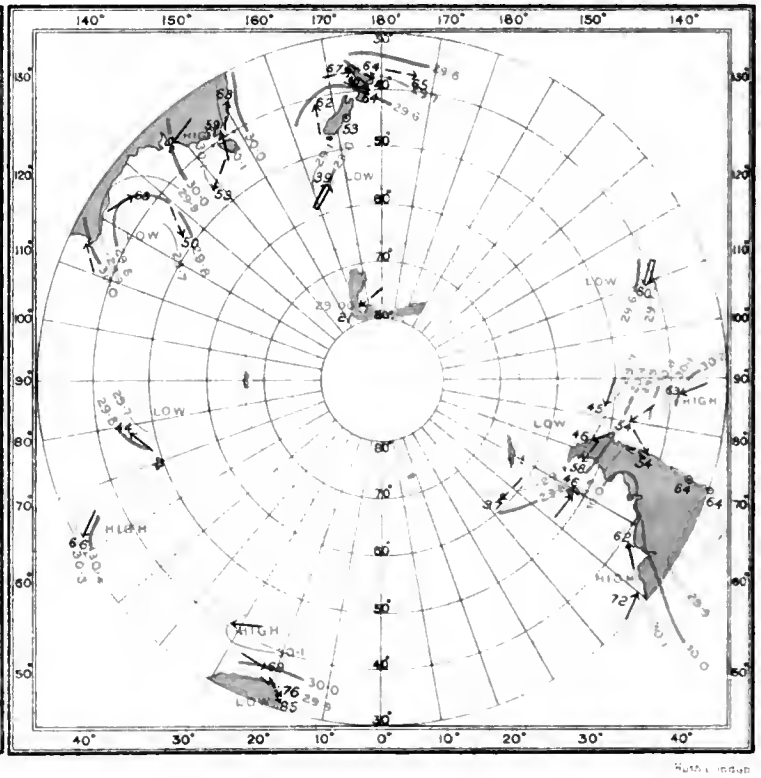


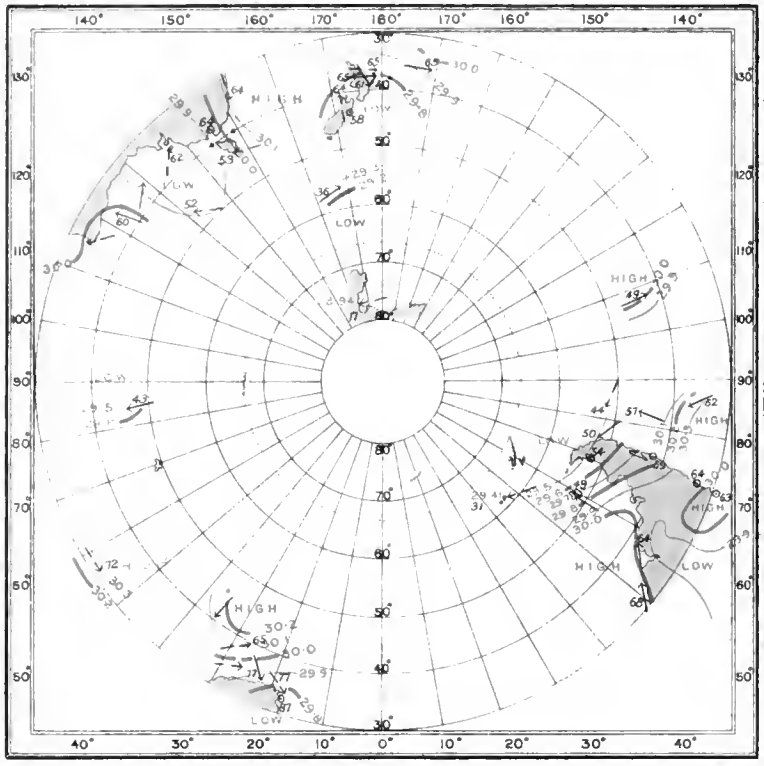
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 DECEMBER 18



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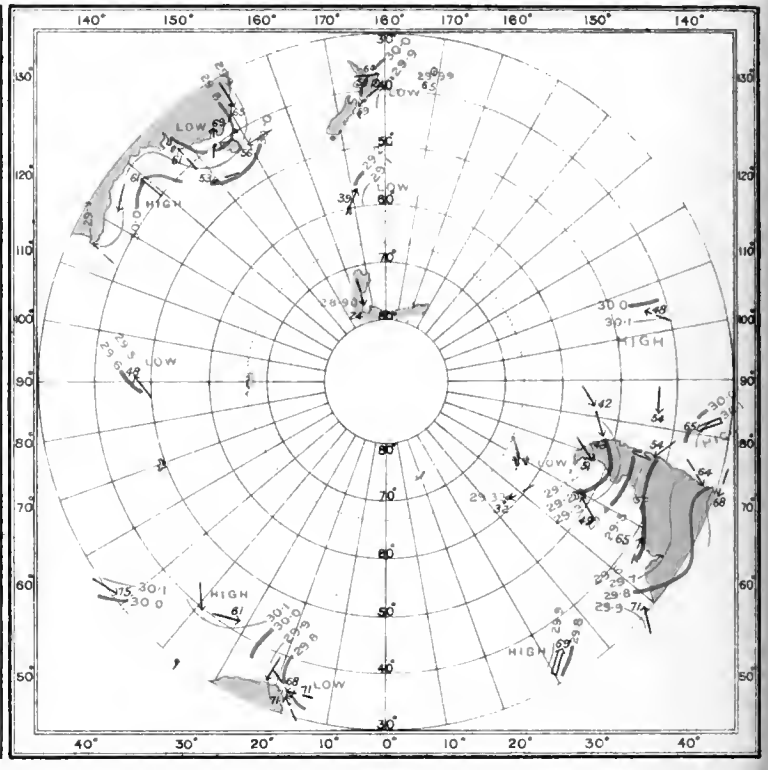

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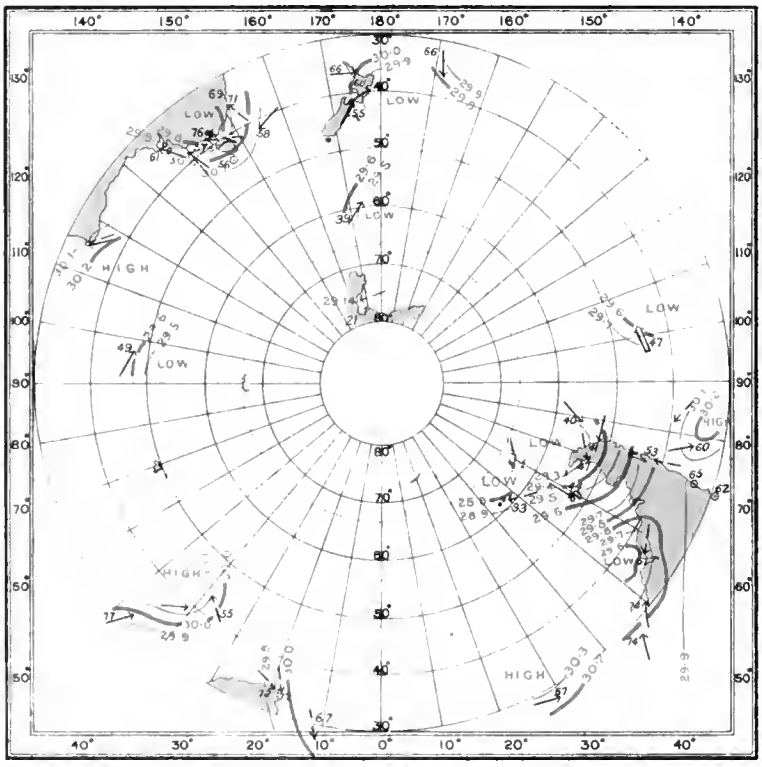

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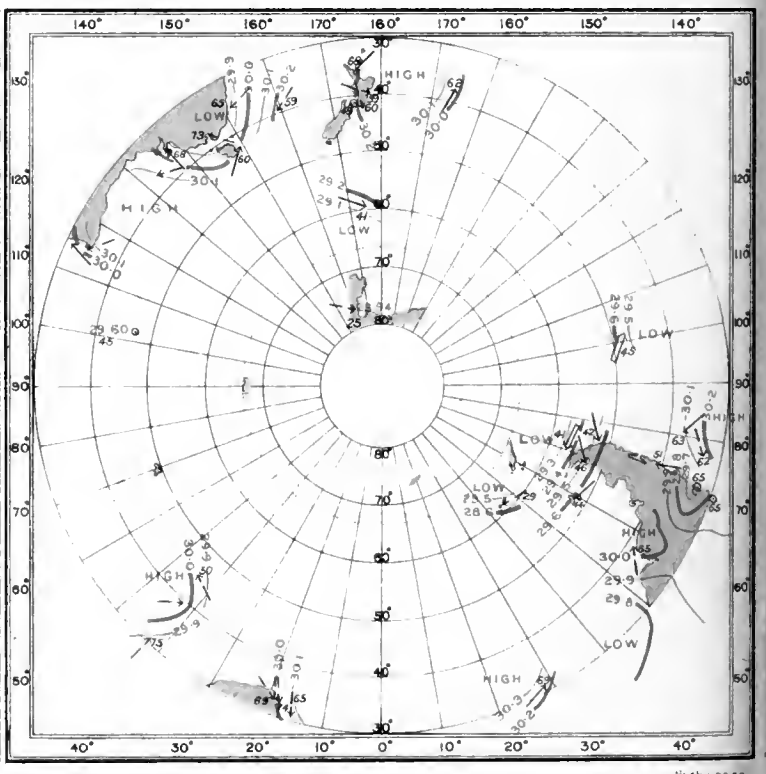


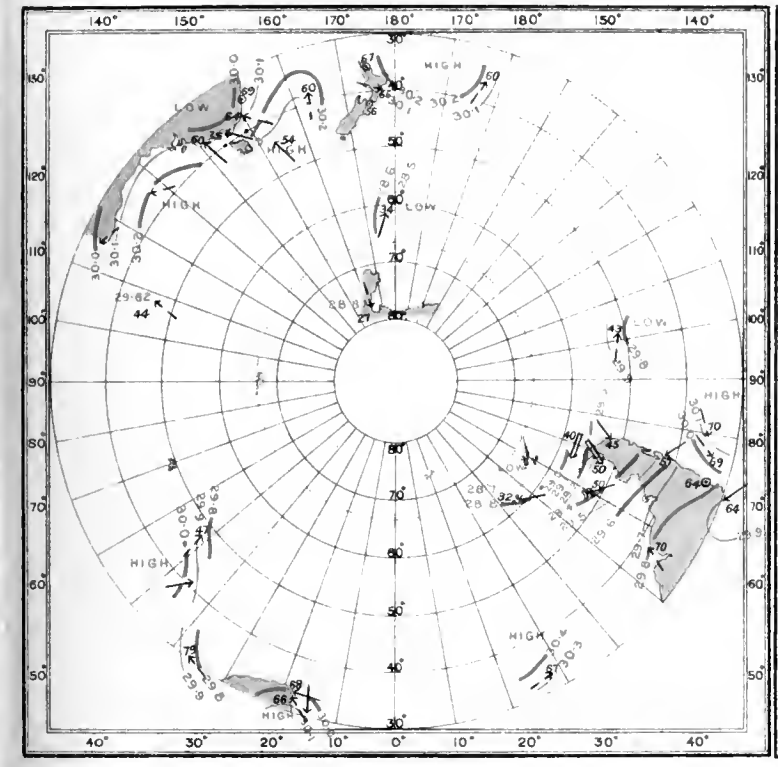
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1903 DECEMBER 22



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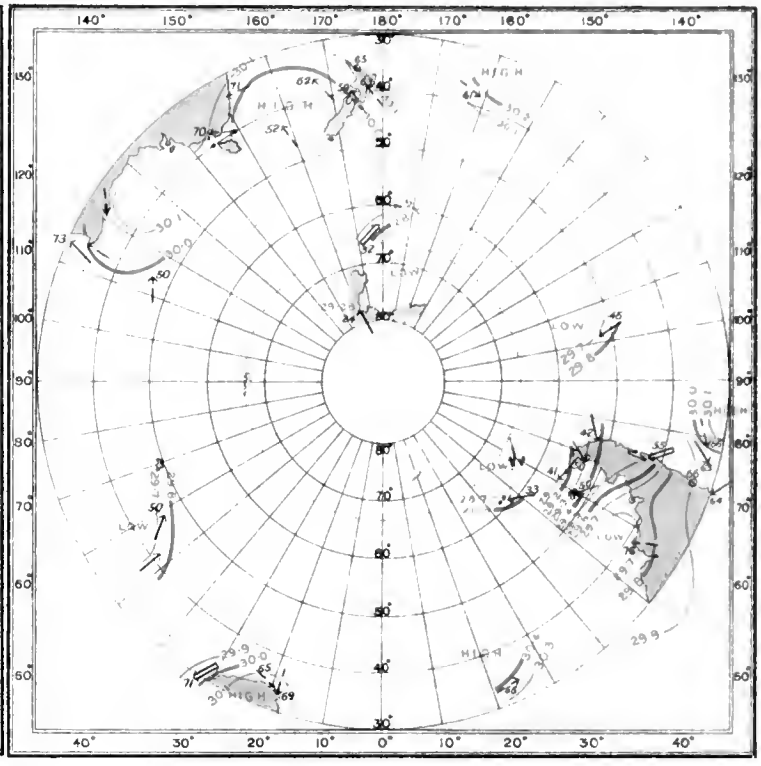

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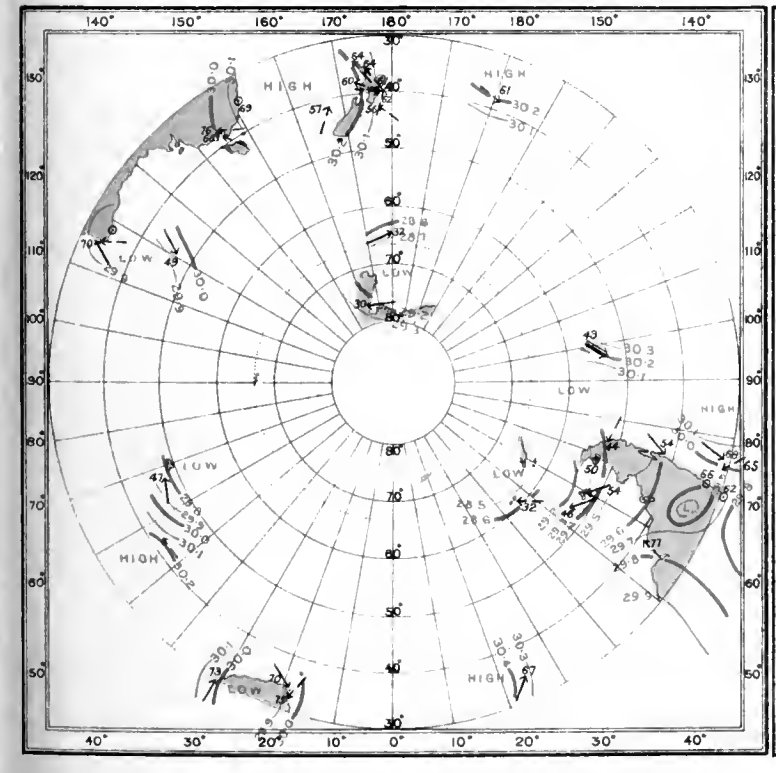

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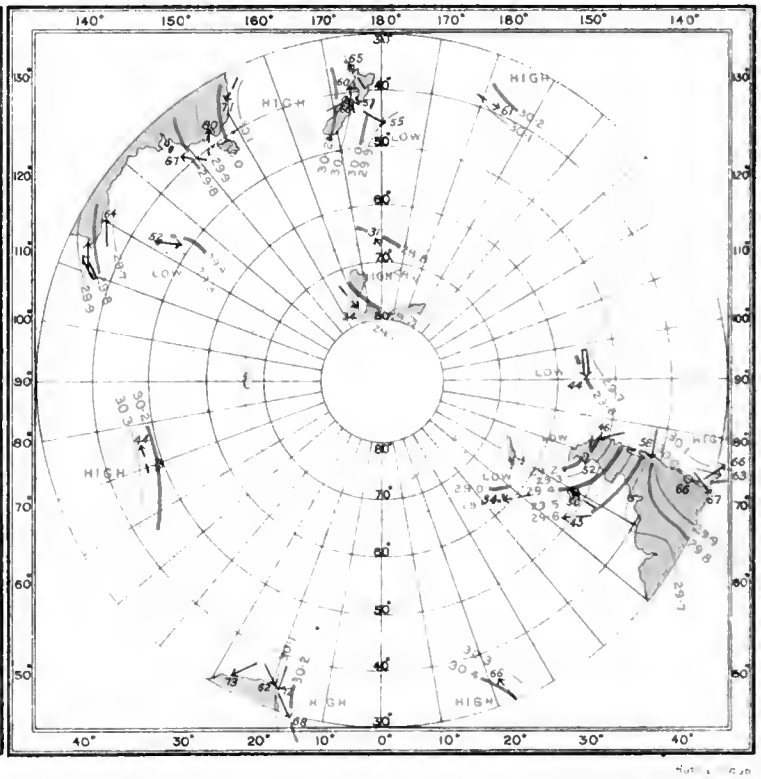


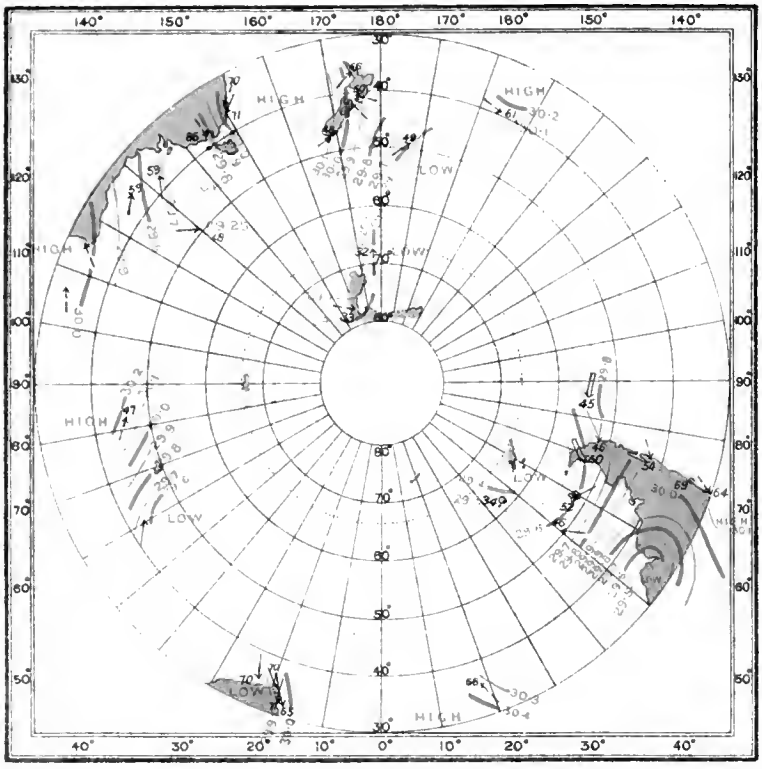
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1903 DECEMBER 26



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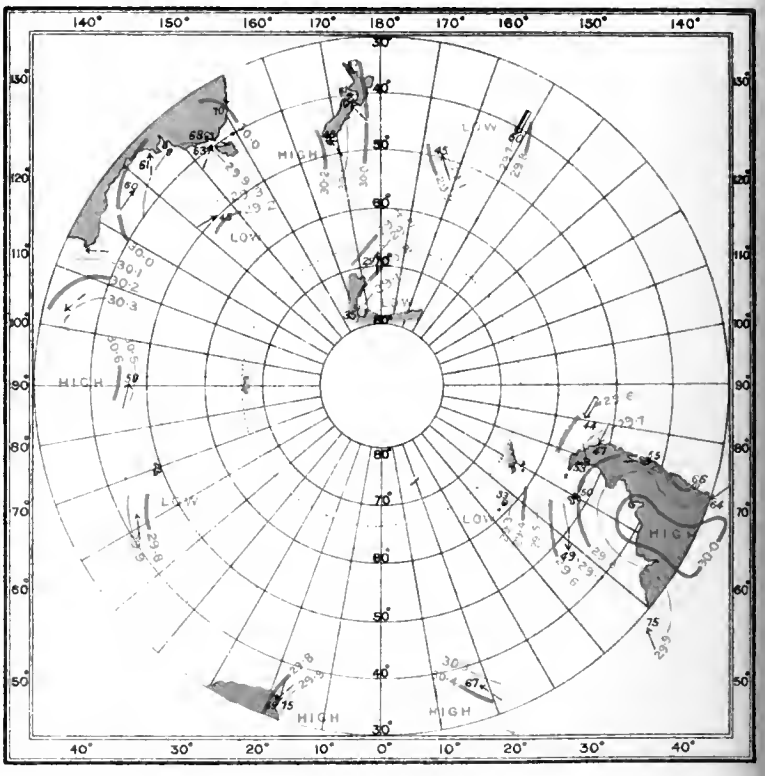

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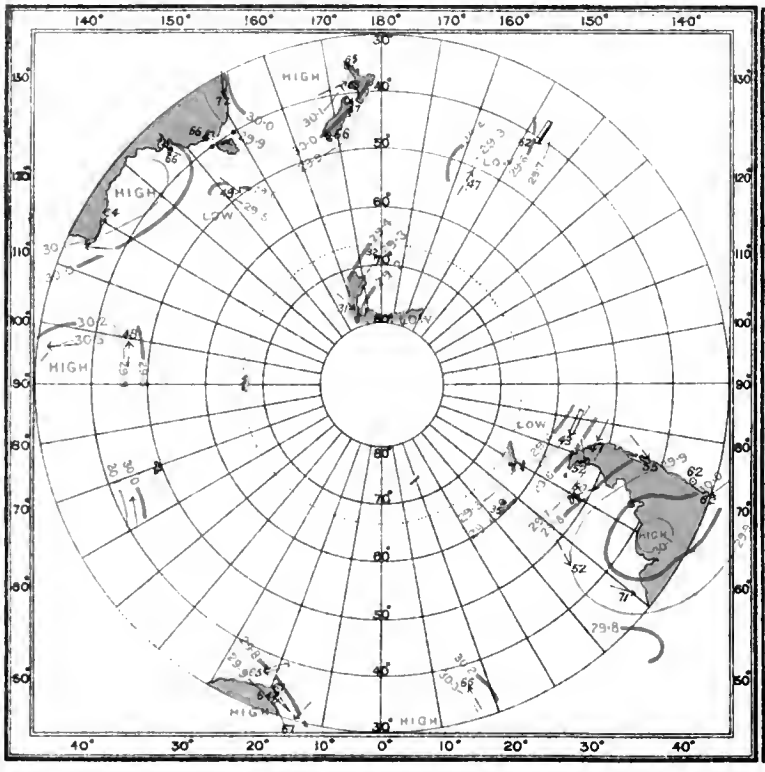

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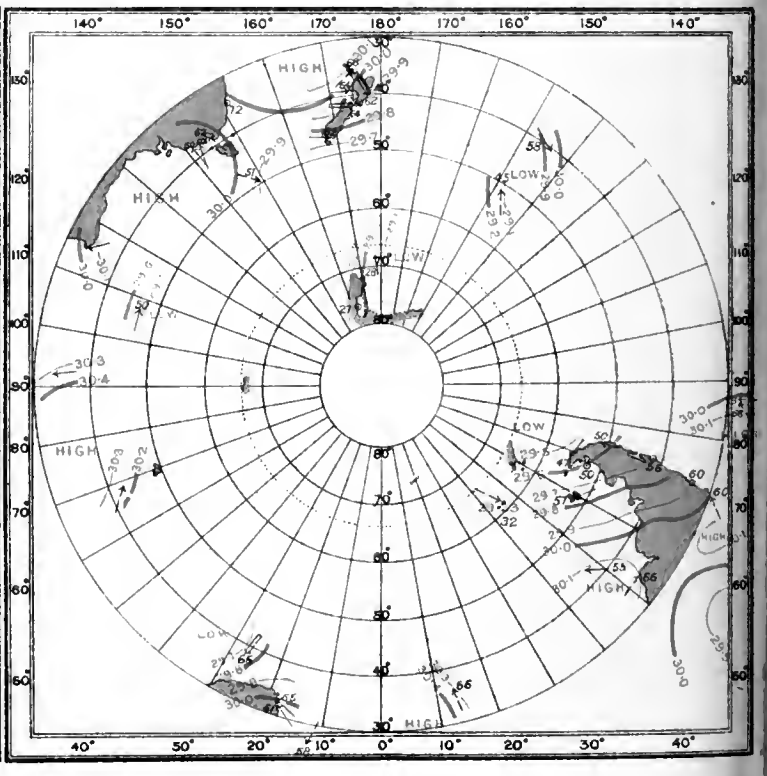


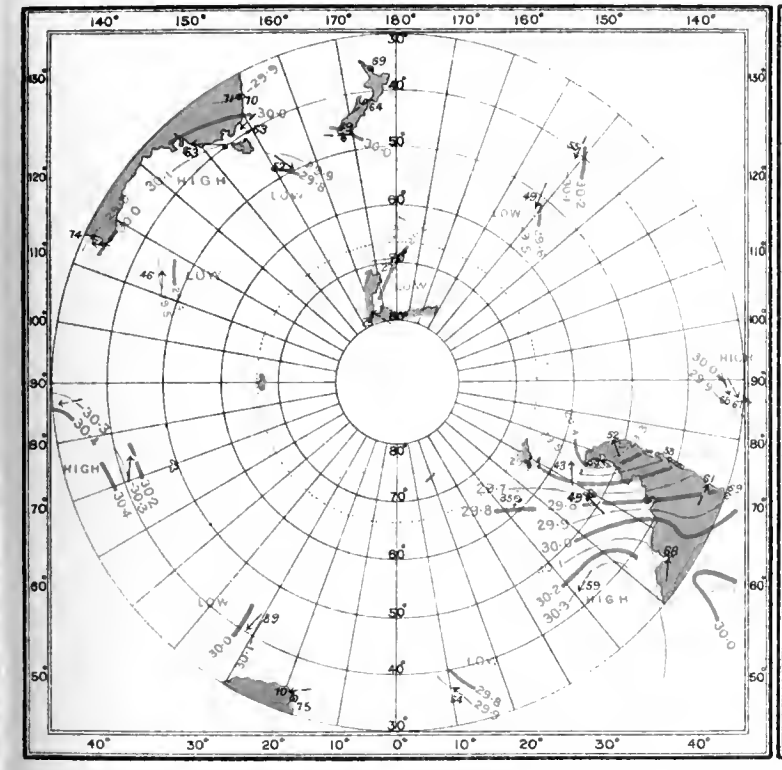
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1903 DECEMBER 30



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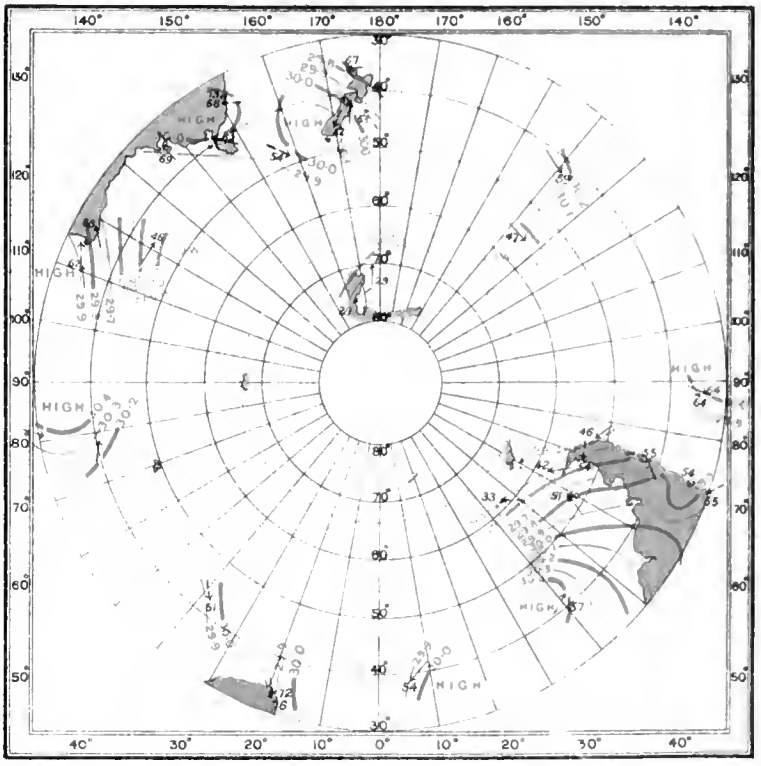

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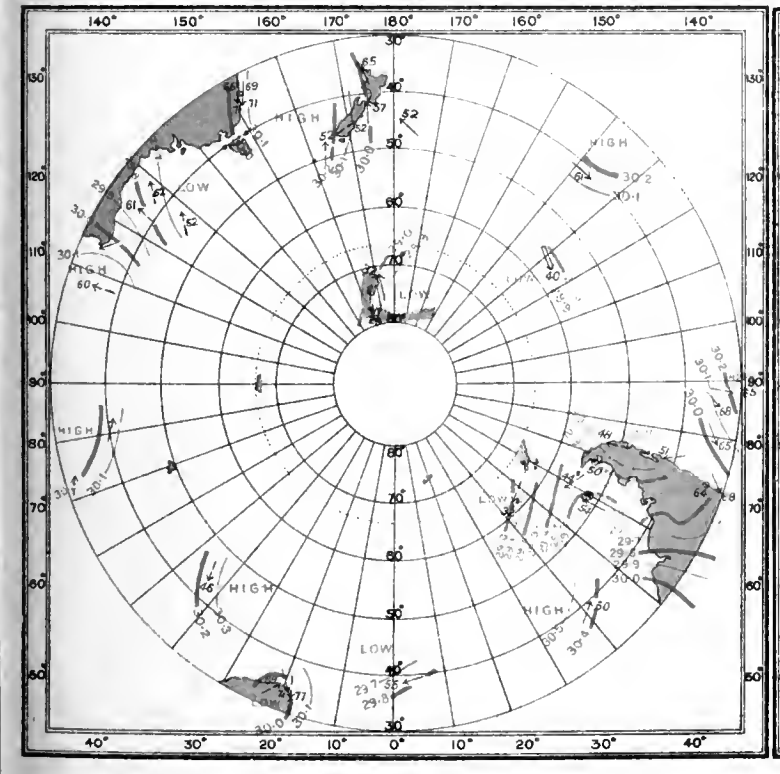

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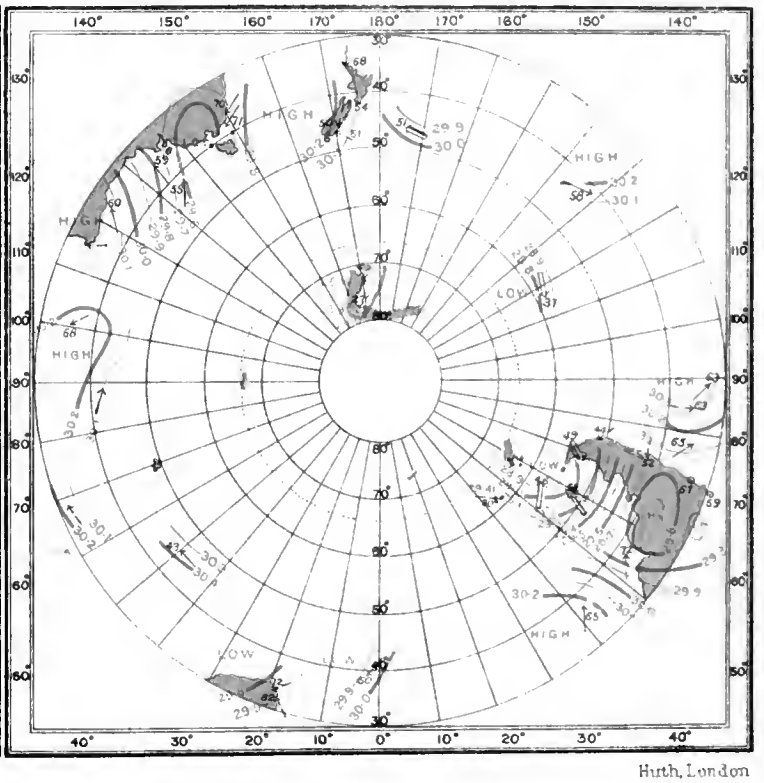

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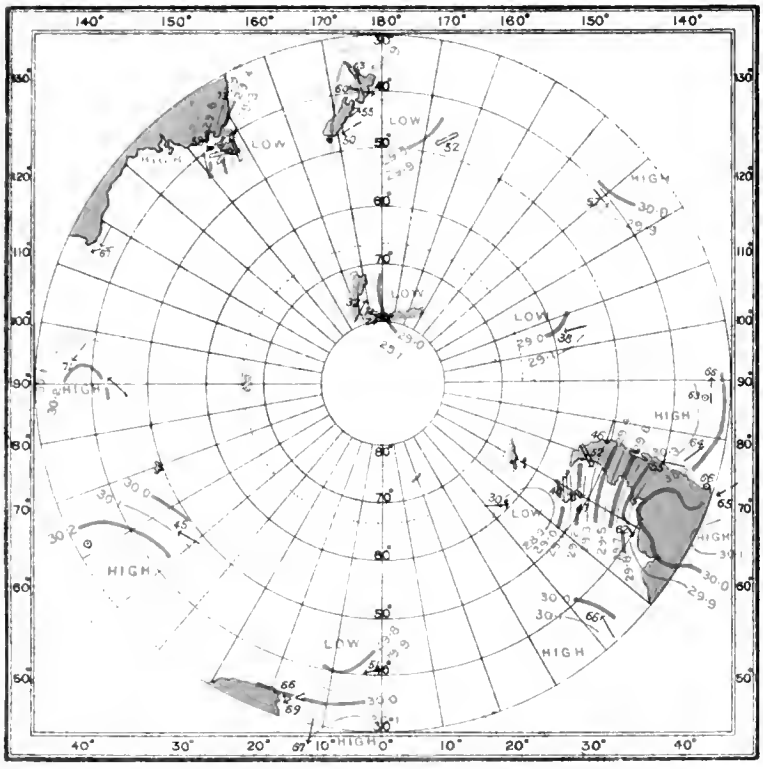
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 JANUARY 3



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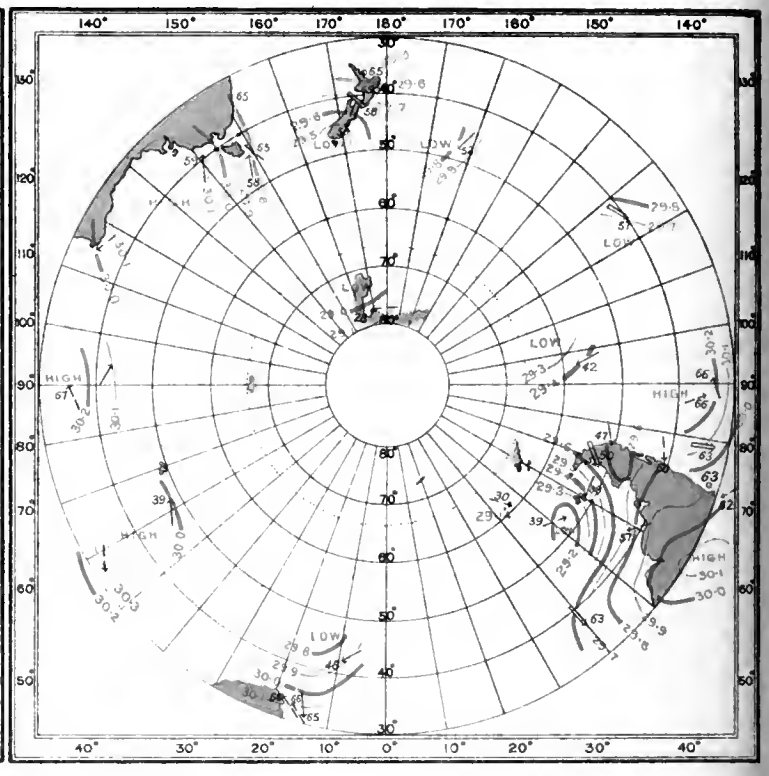

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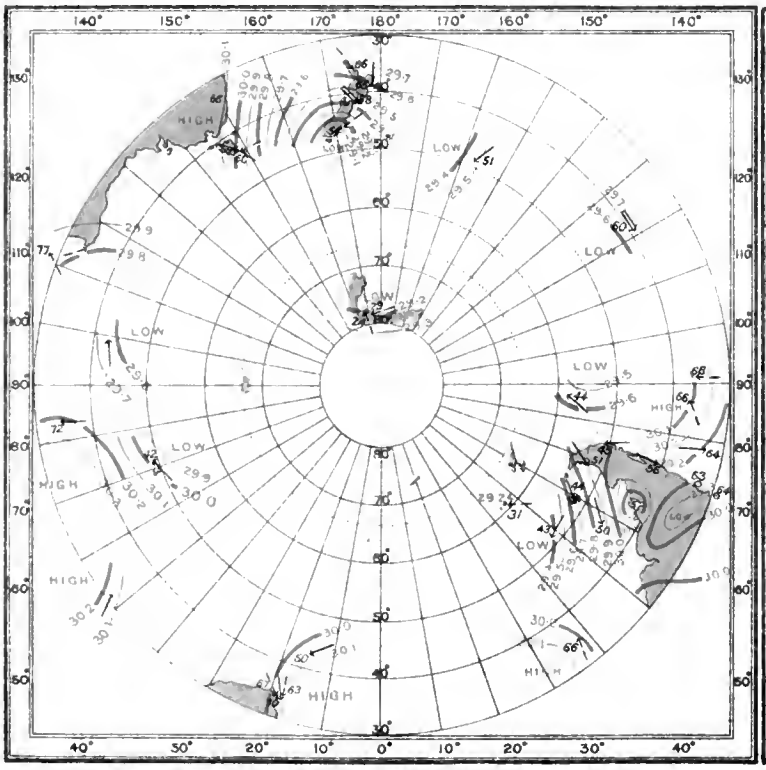

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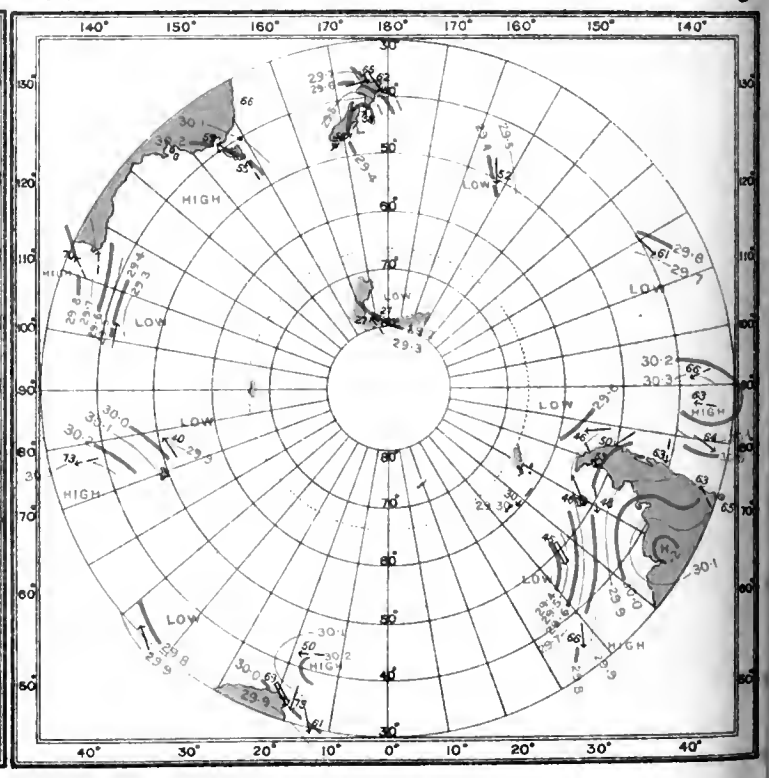


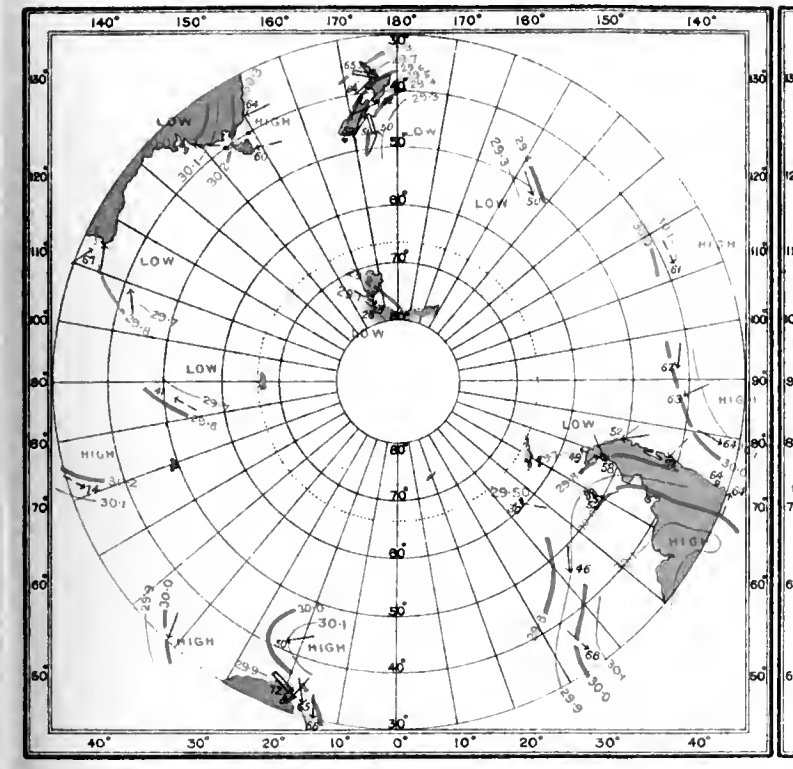
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1904 JANUARY 7



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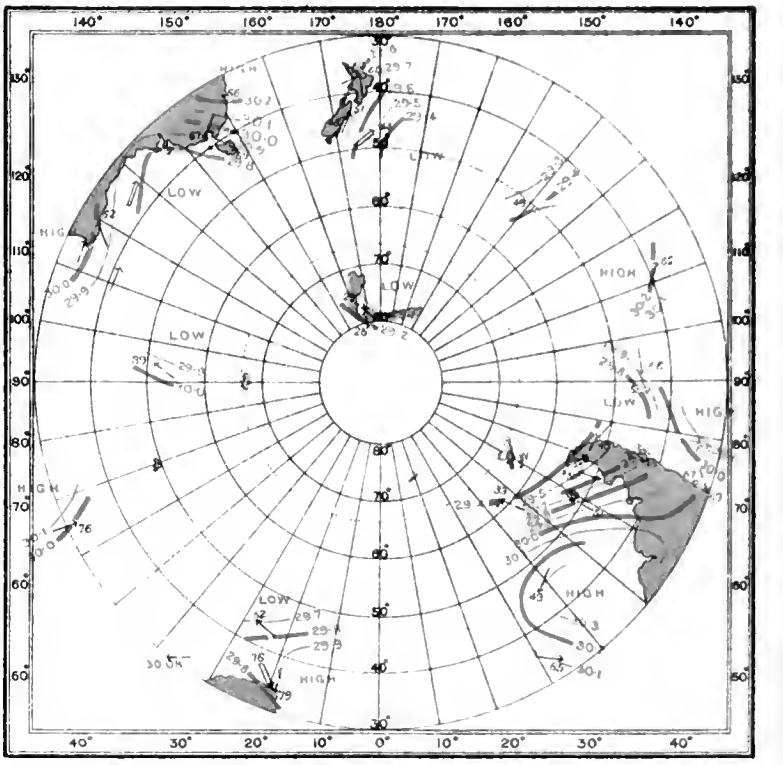

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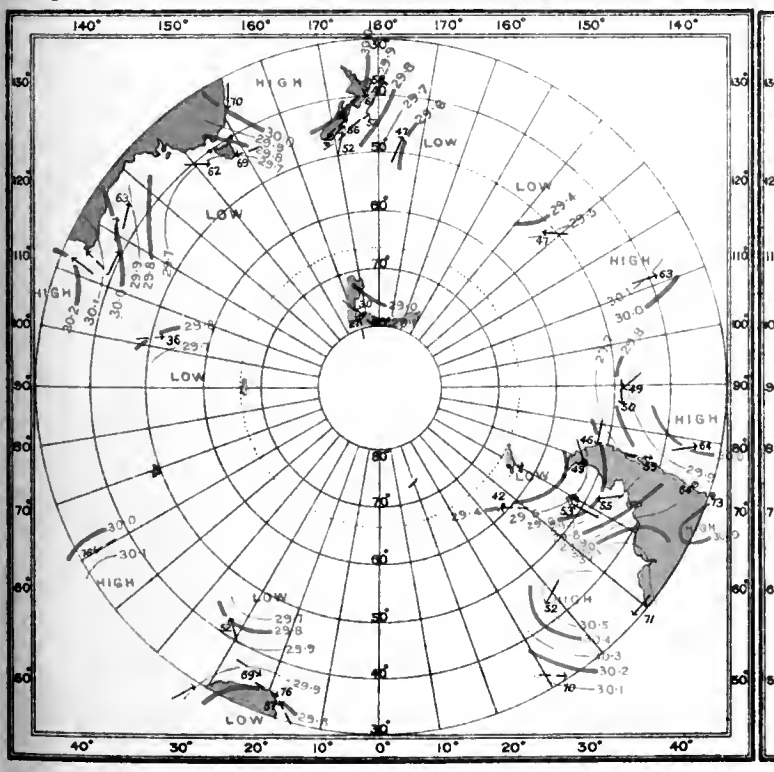

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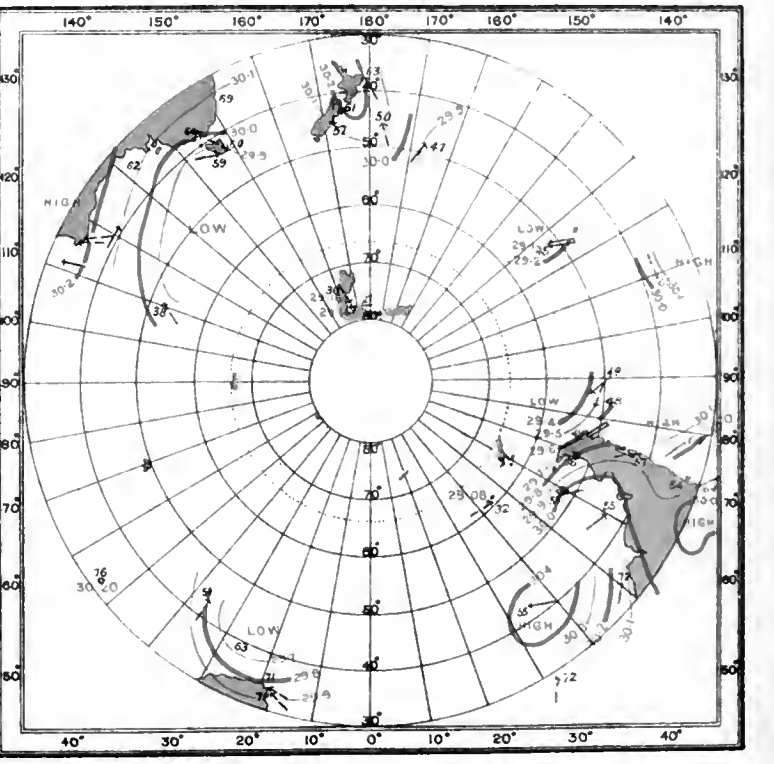

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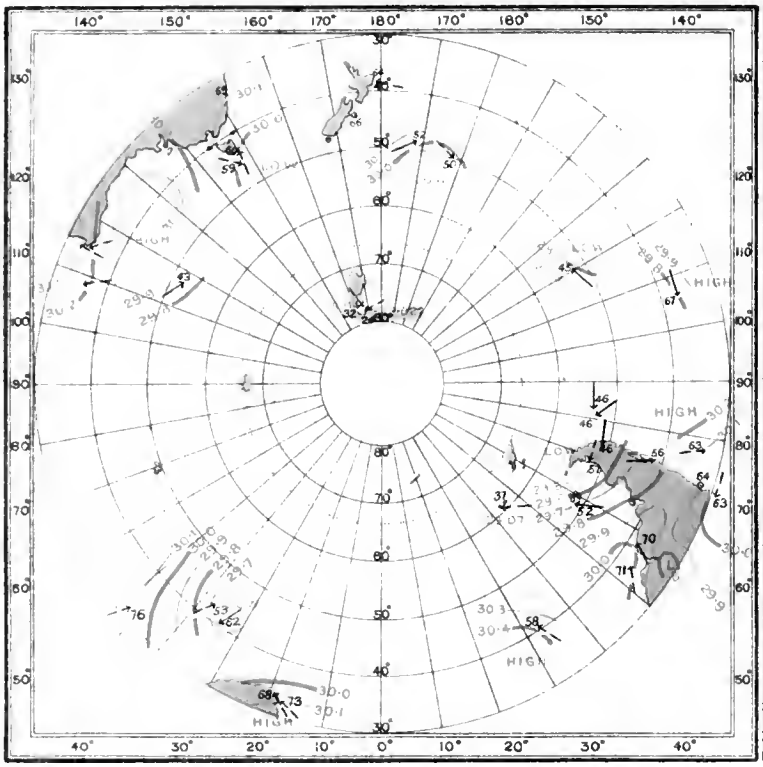
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

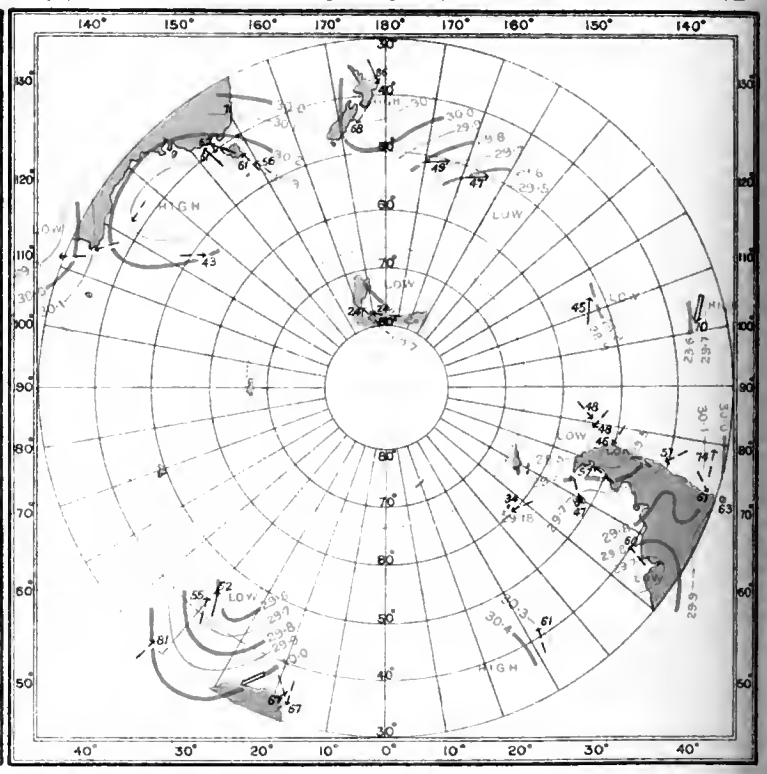
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 JANUARY 11



1904 JANUARY 12



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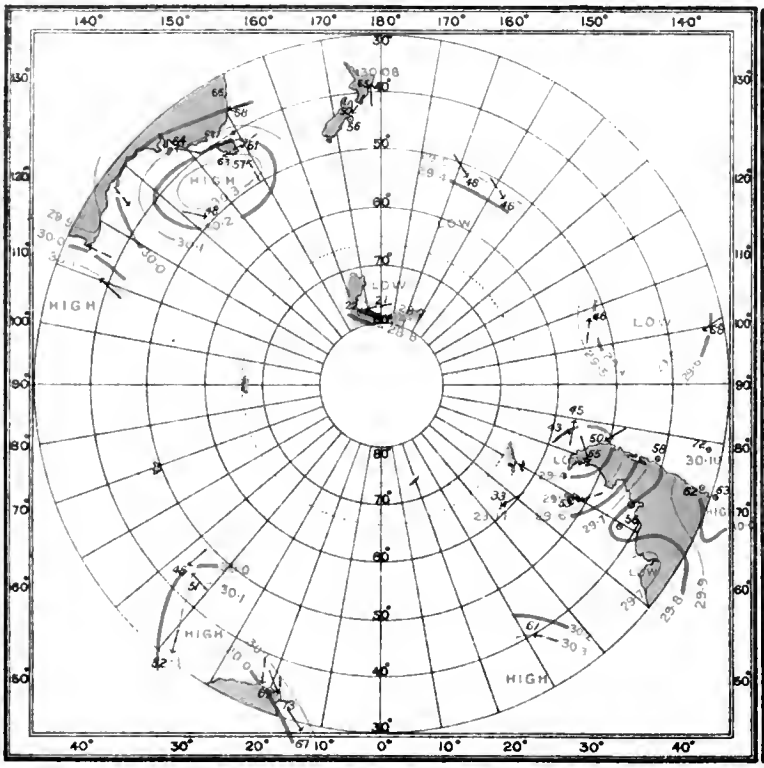

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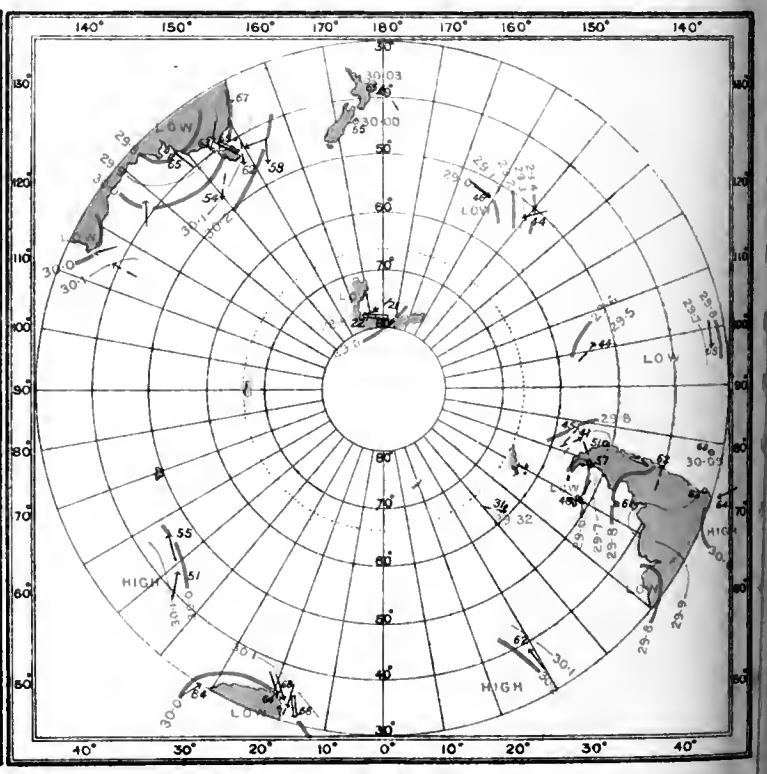


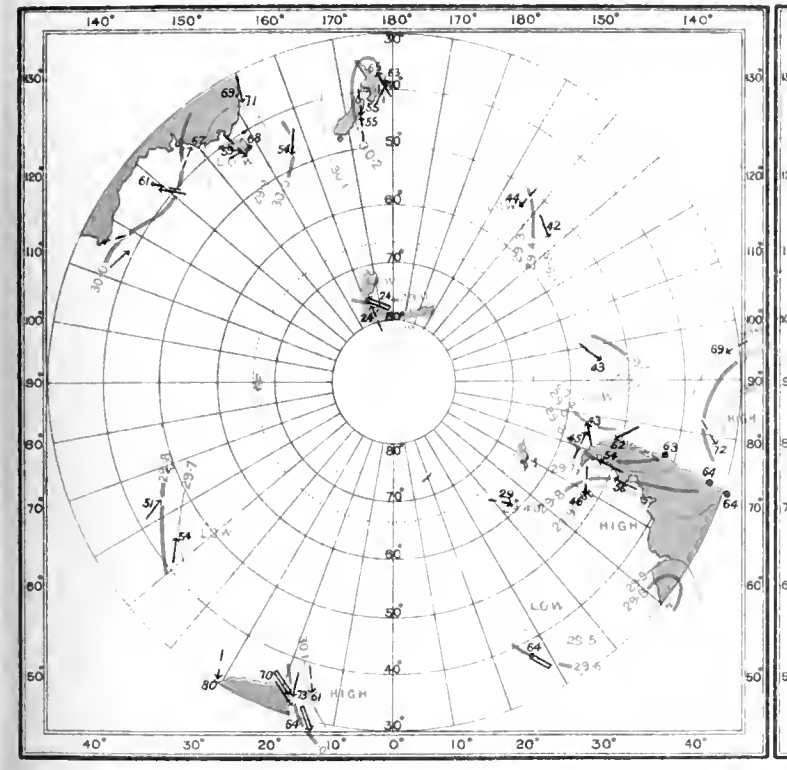
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1904 JANUARY 15



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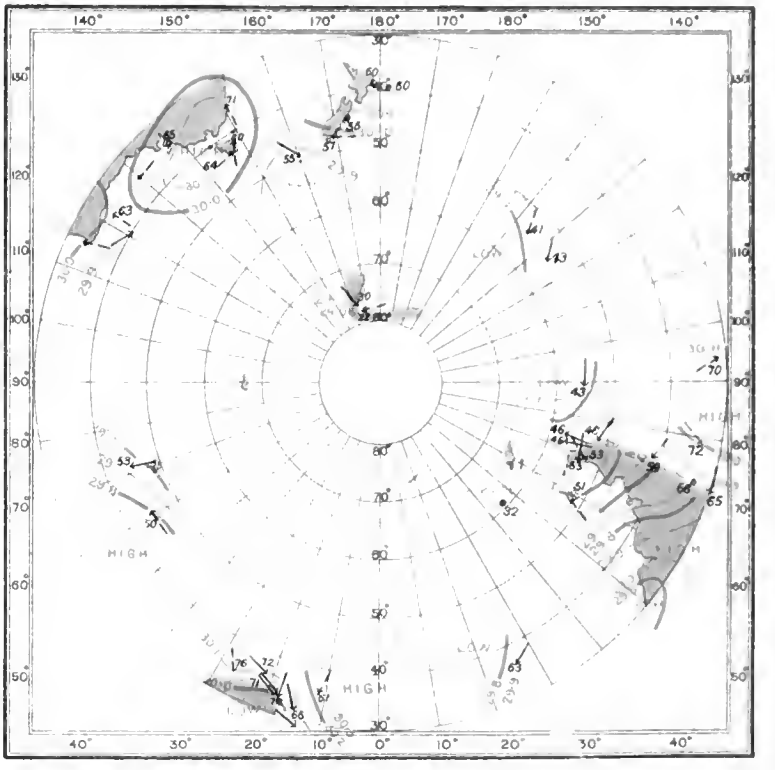

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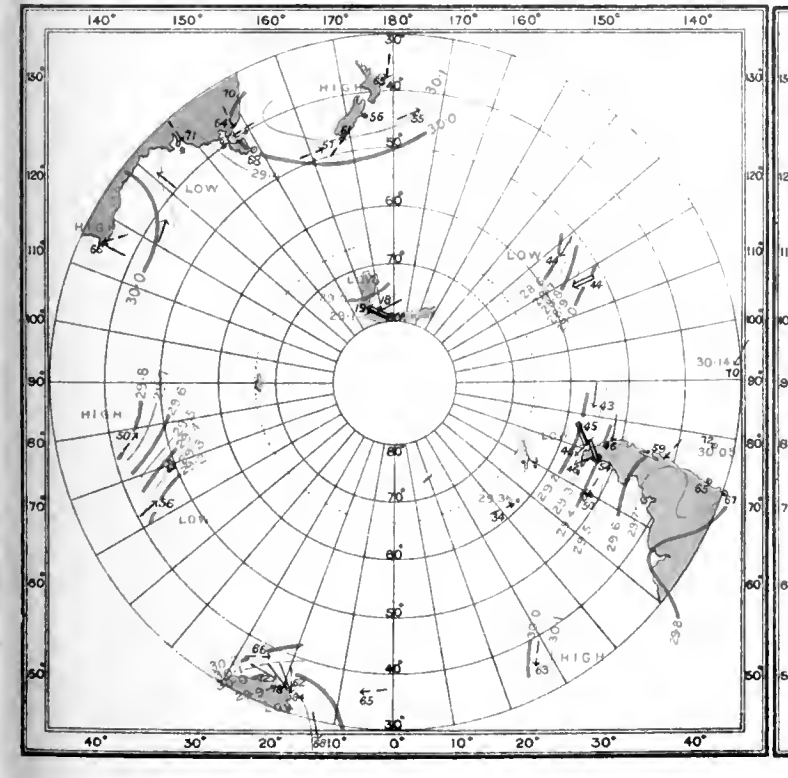

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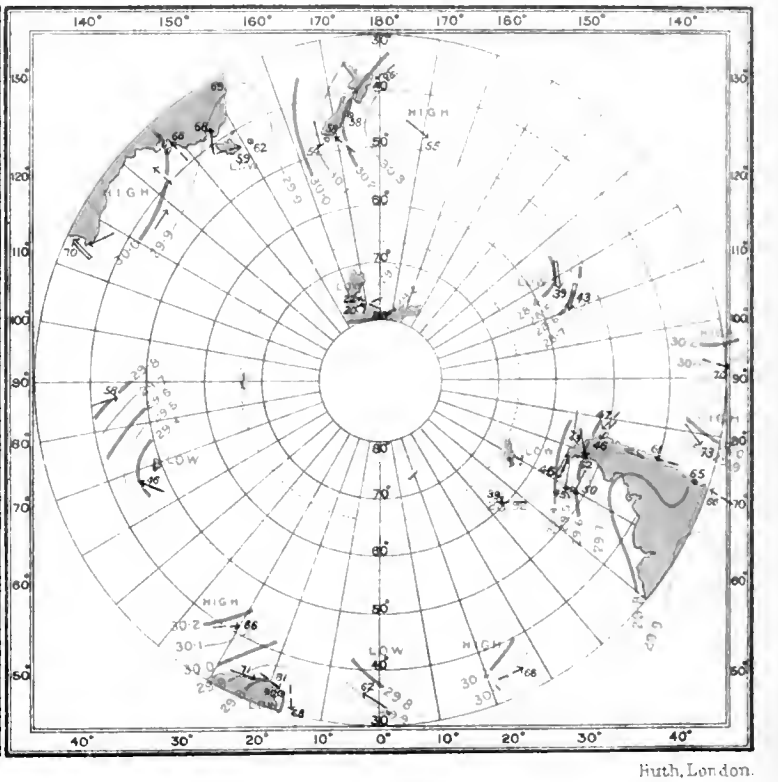


Huth, London.

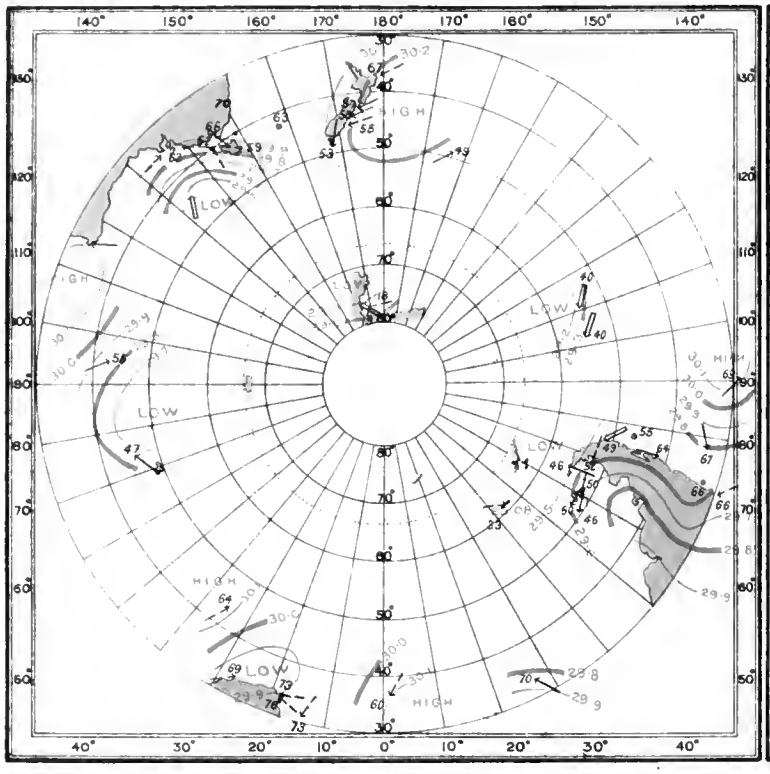
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 JANUARY 19



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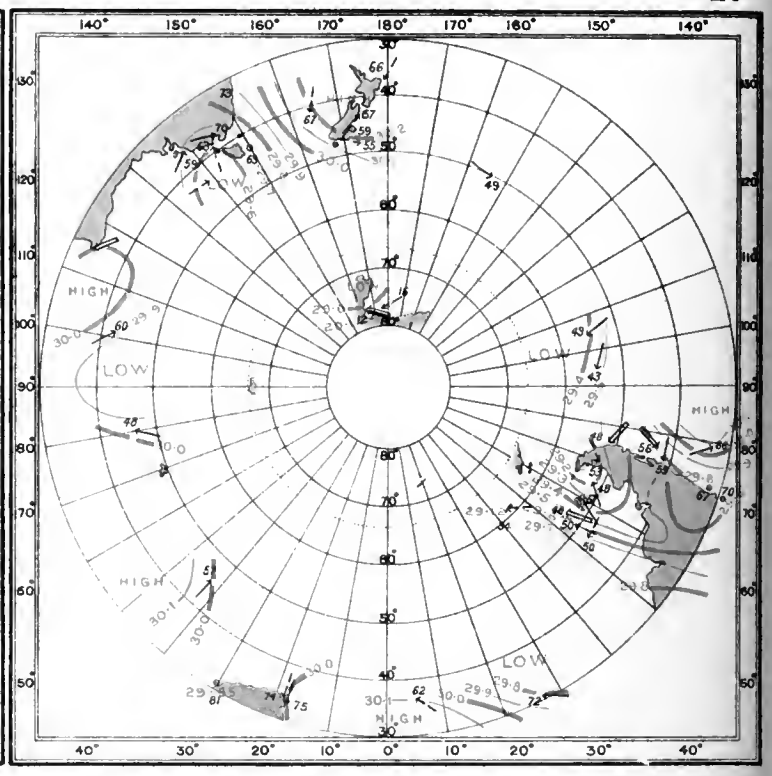

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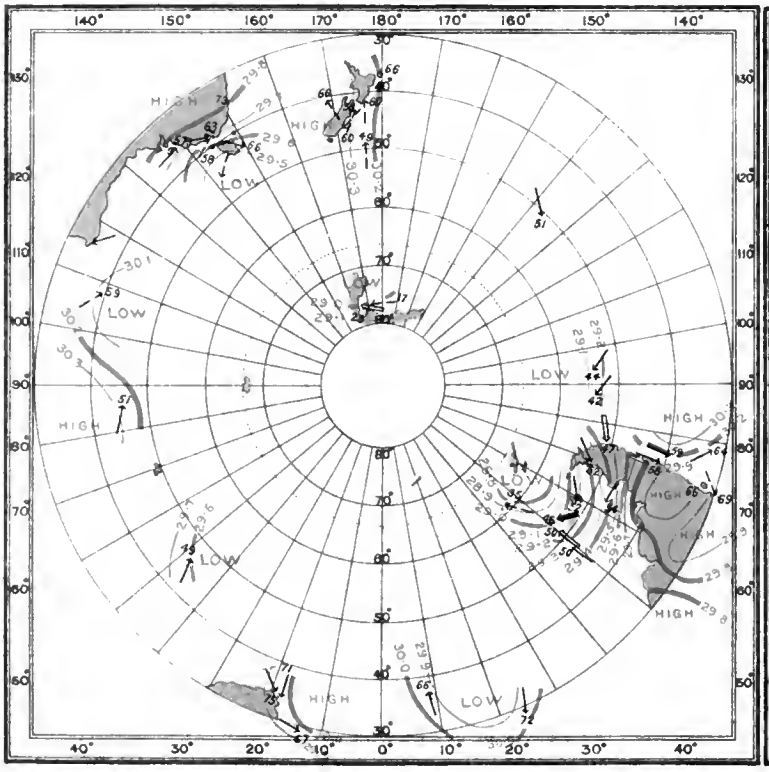

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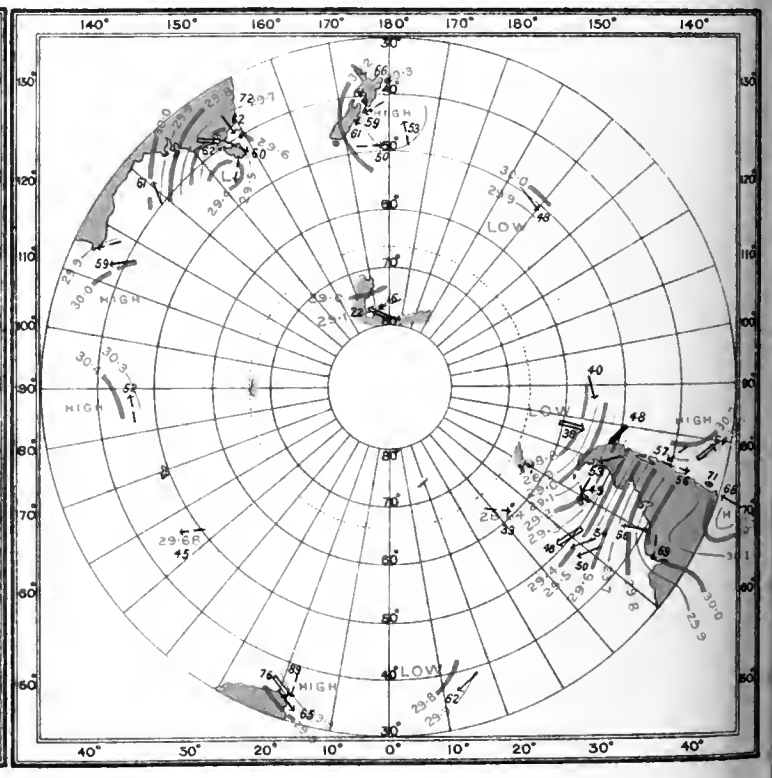


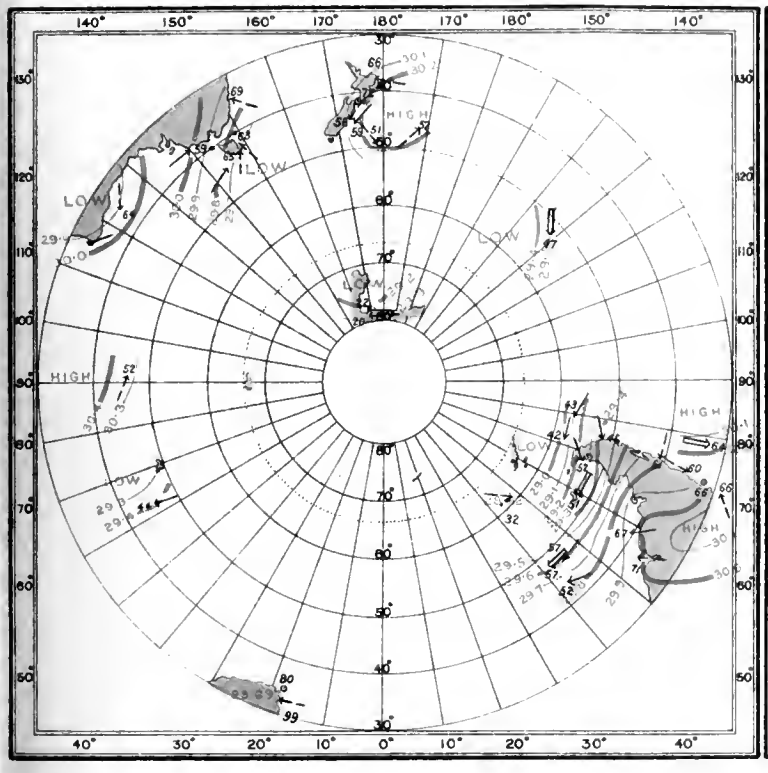
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 JANUARY 23



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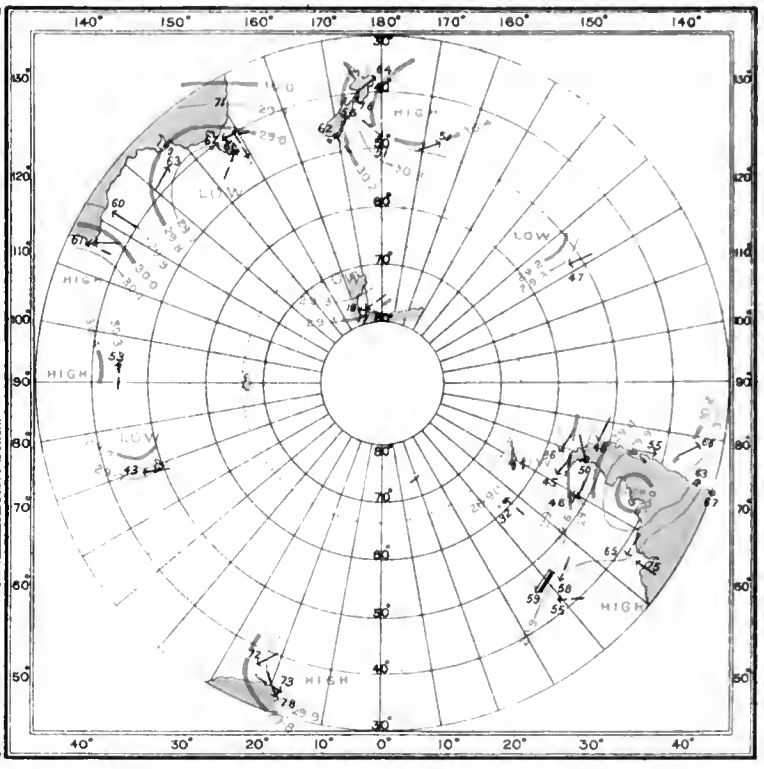

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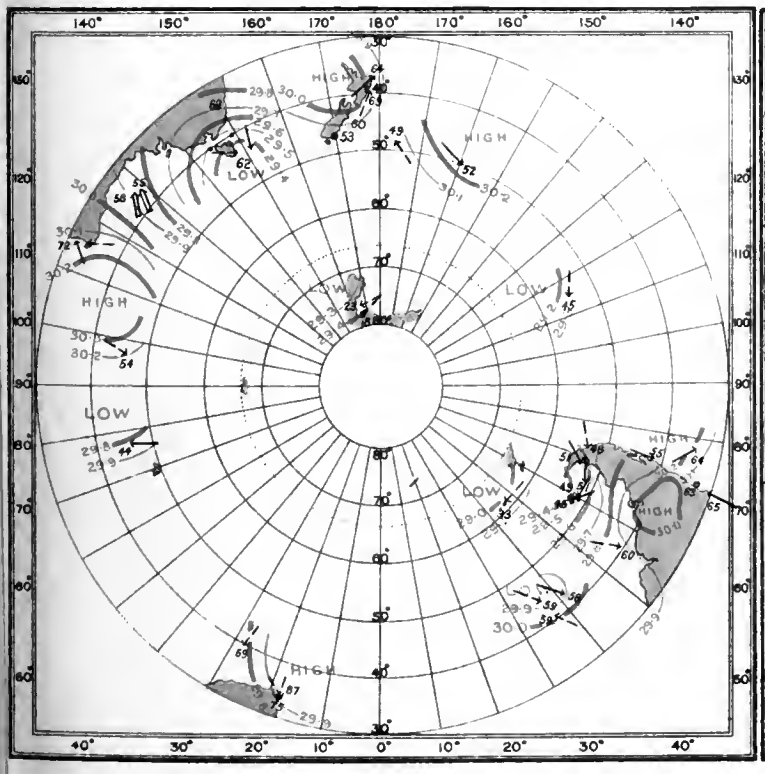

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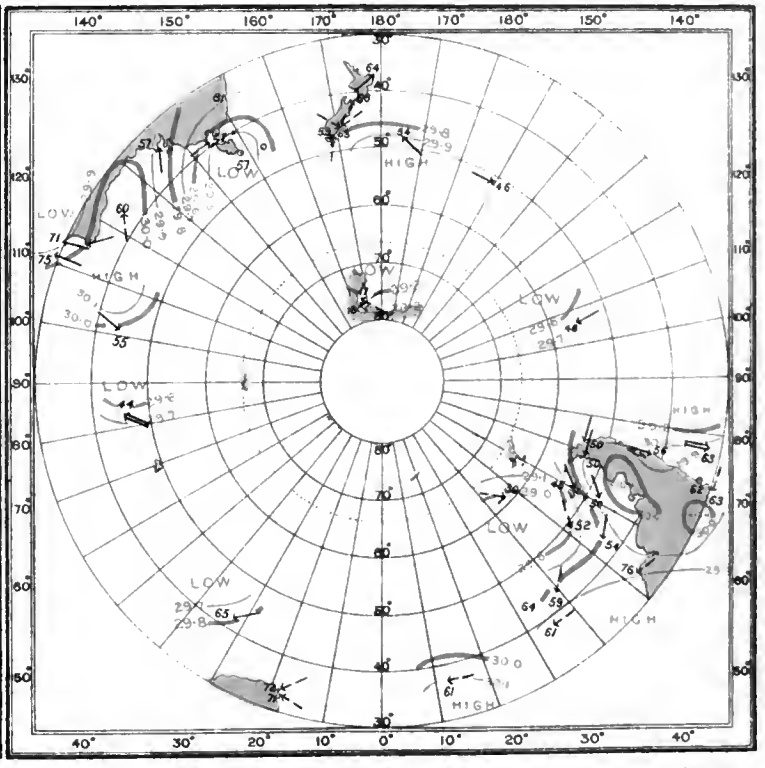

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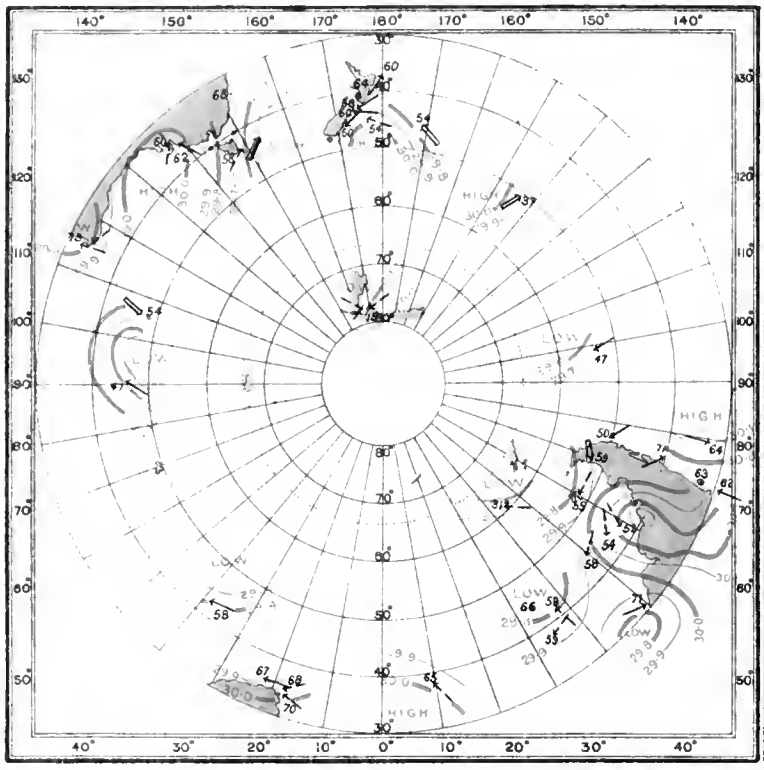
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 JANUARY 27



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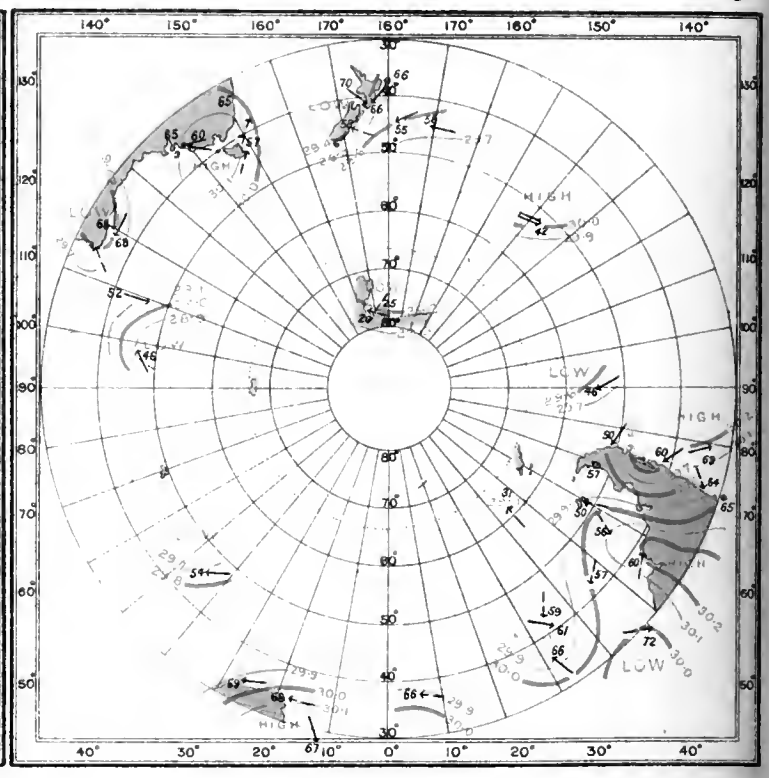

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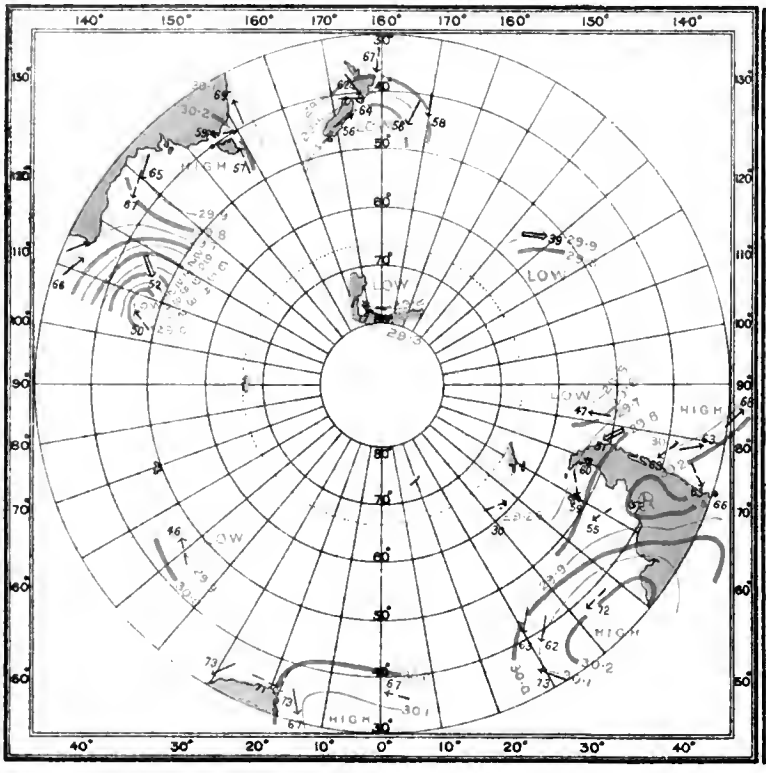

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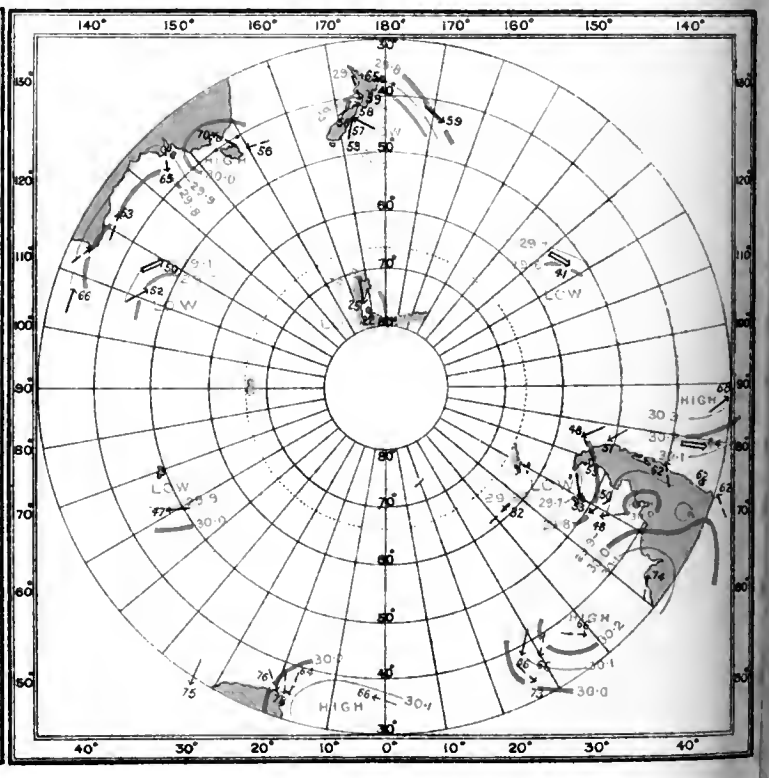


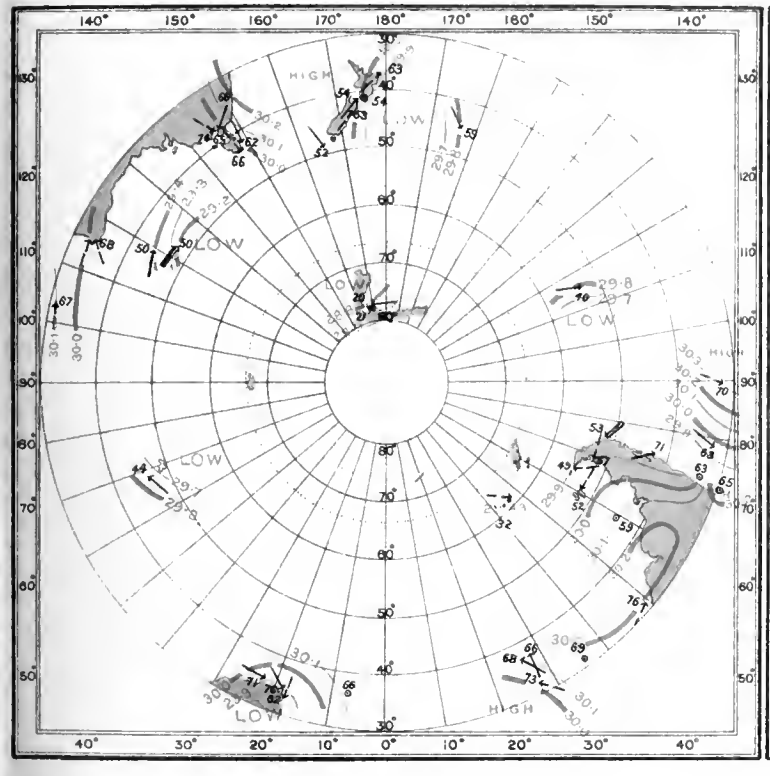
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1904 JANUARY 31



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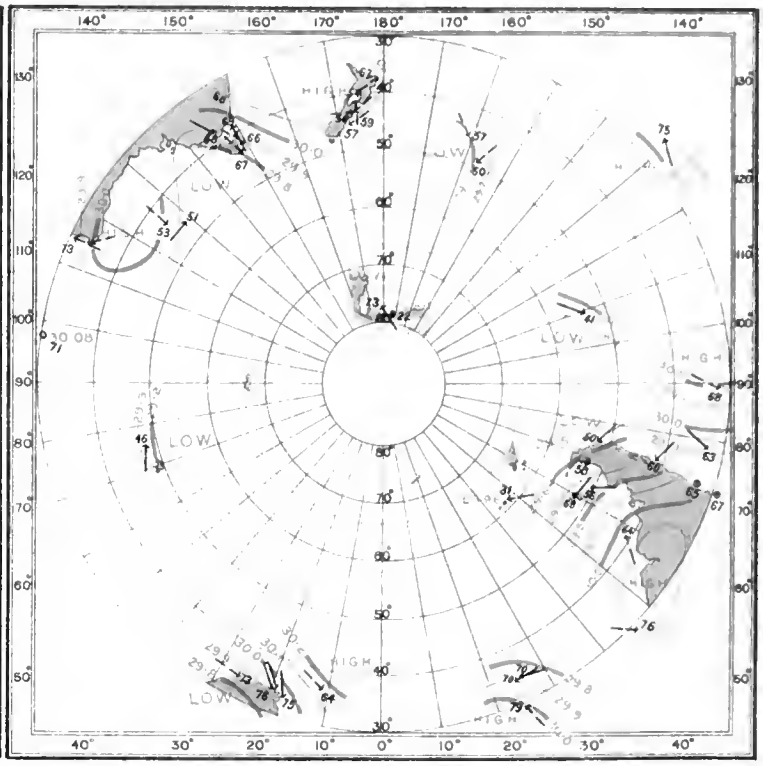

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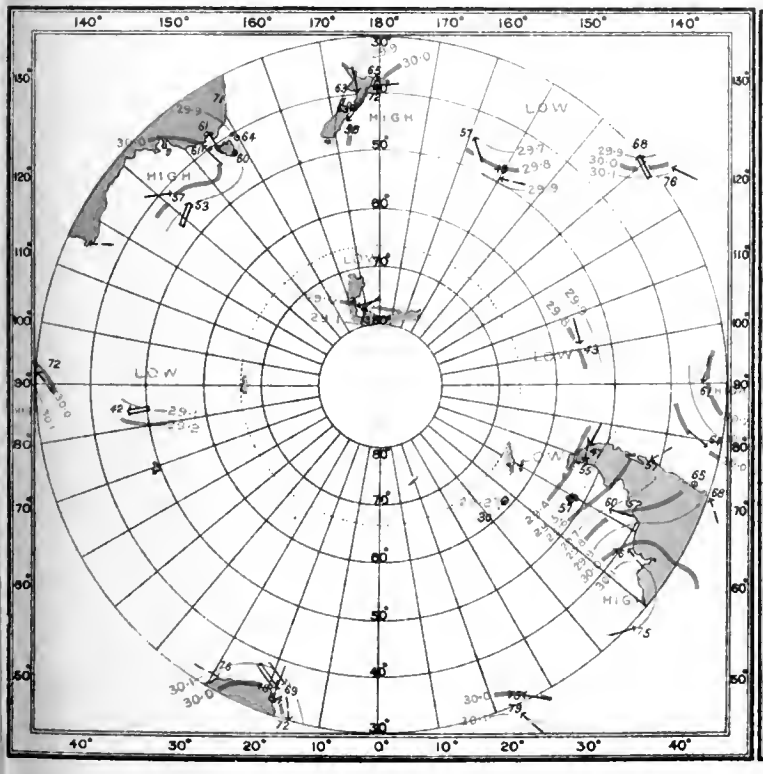

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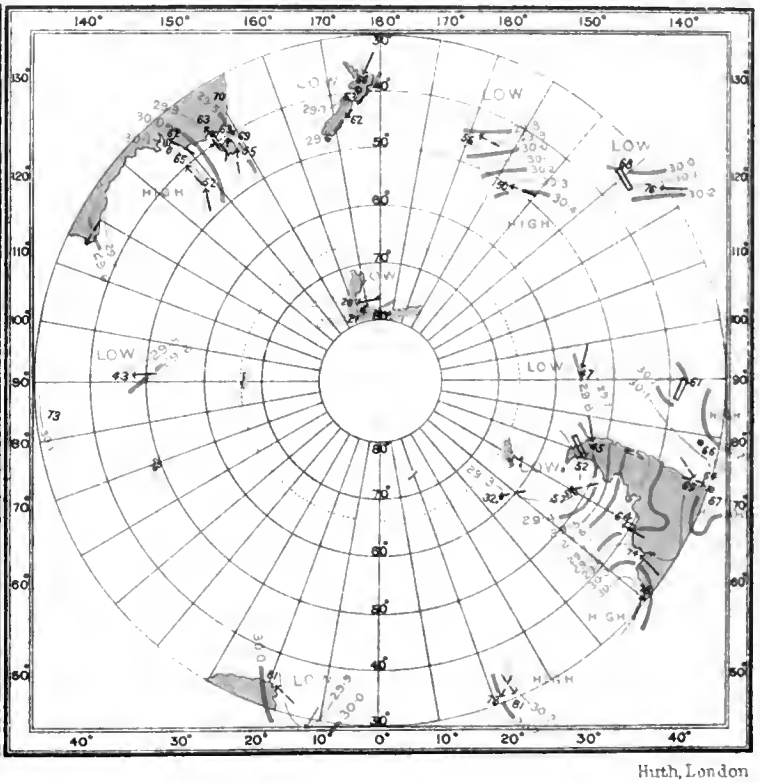

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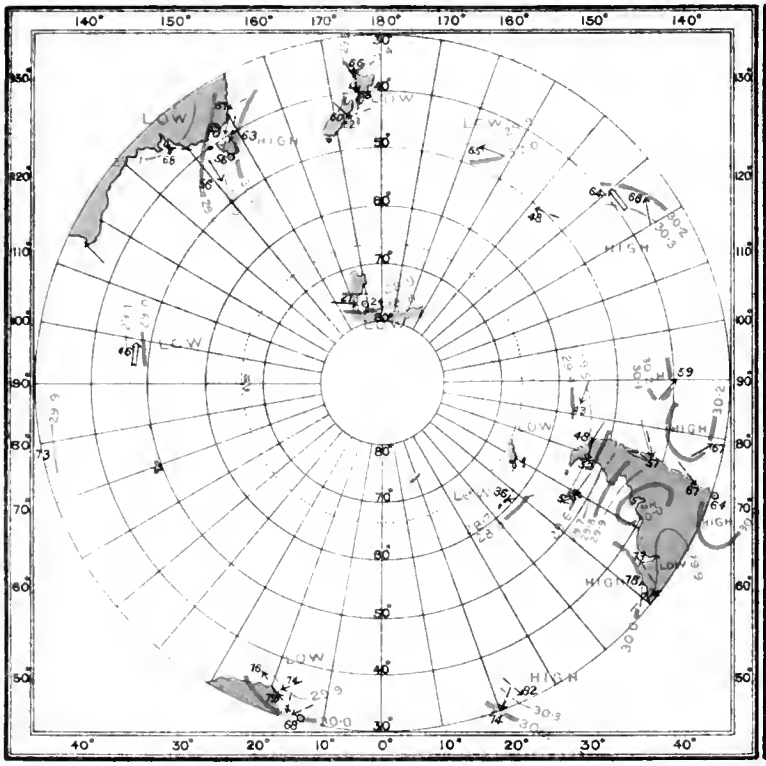
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 FEBRUARY 4



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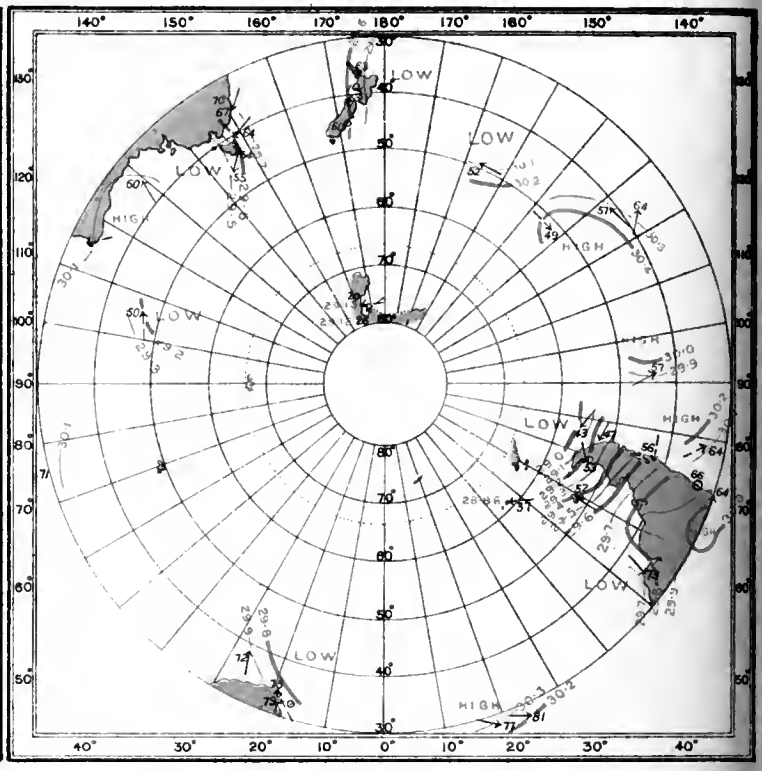

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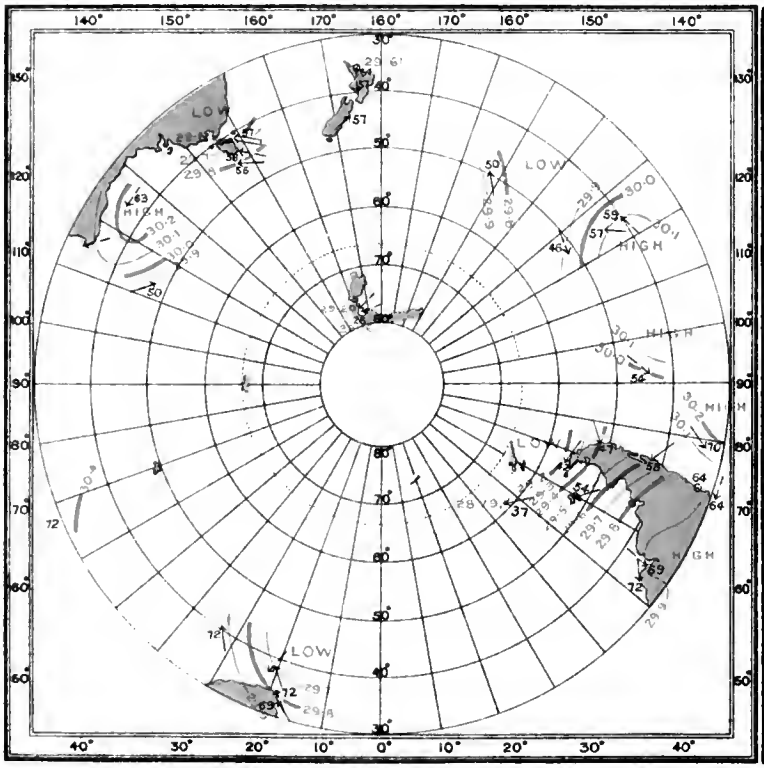

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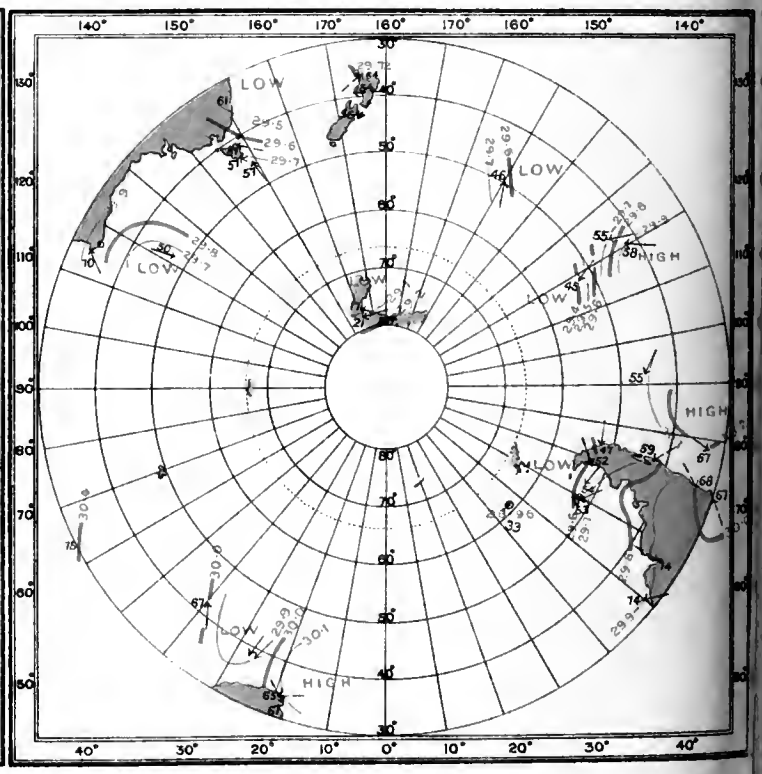


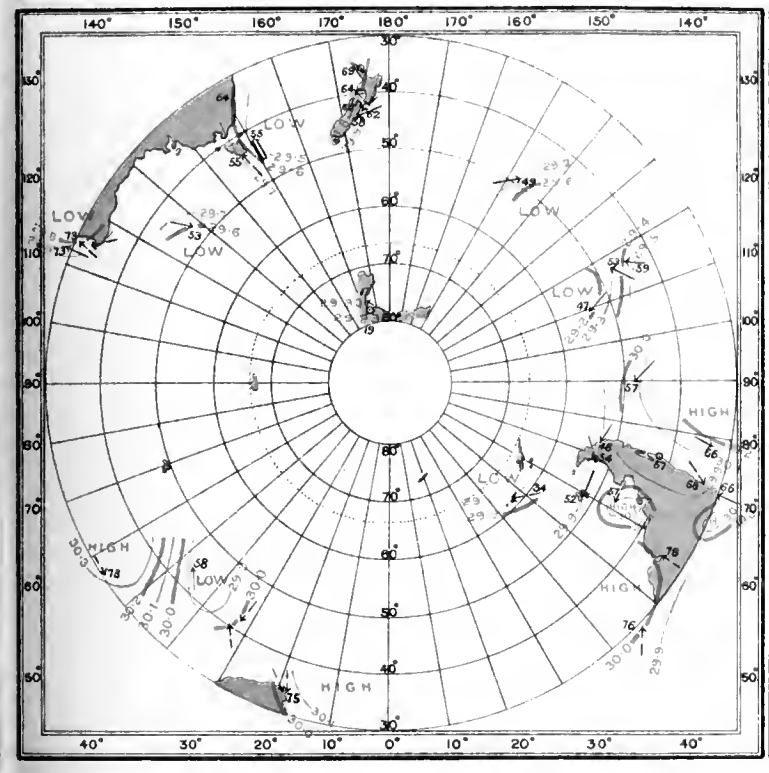
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1904 FEBRUARY 8



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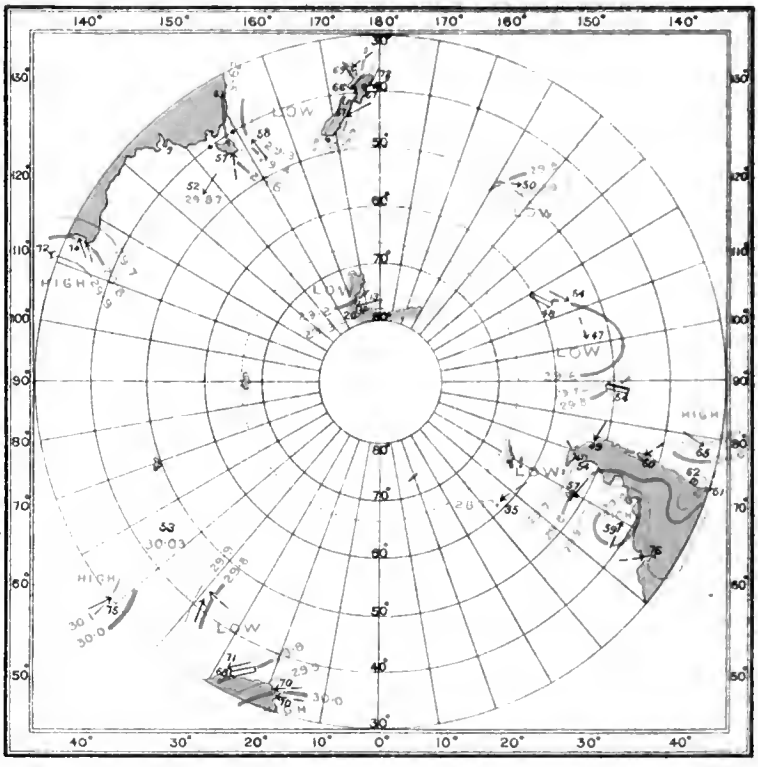

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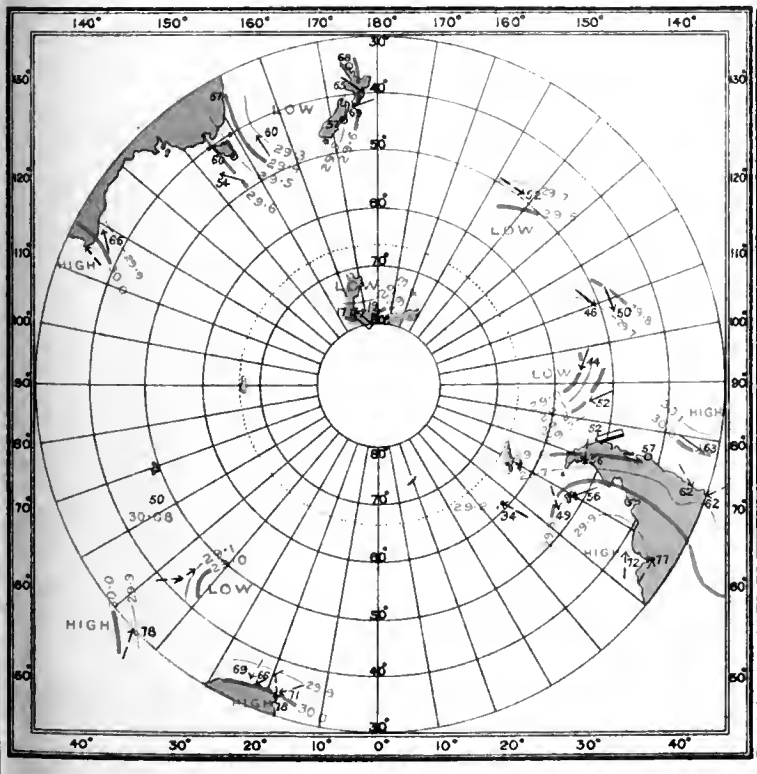

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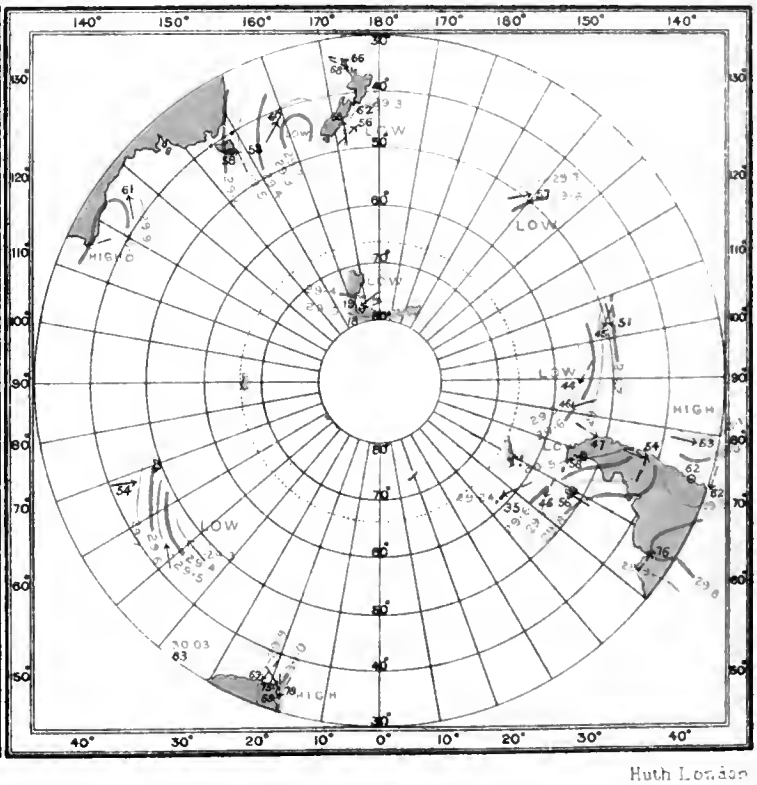

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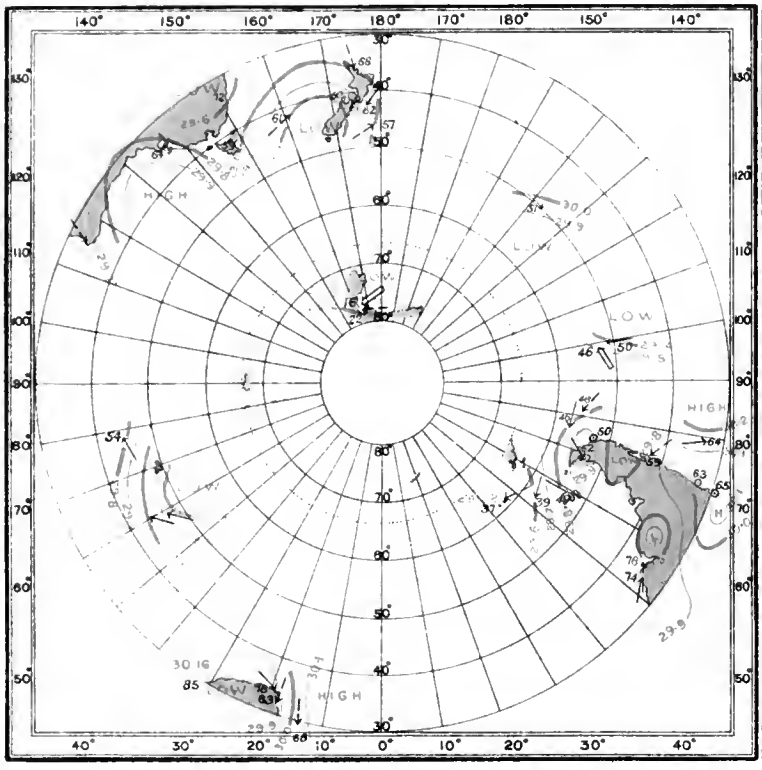
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 FEBRUARY 12



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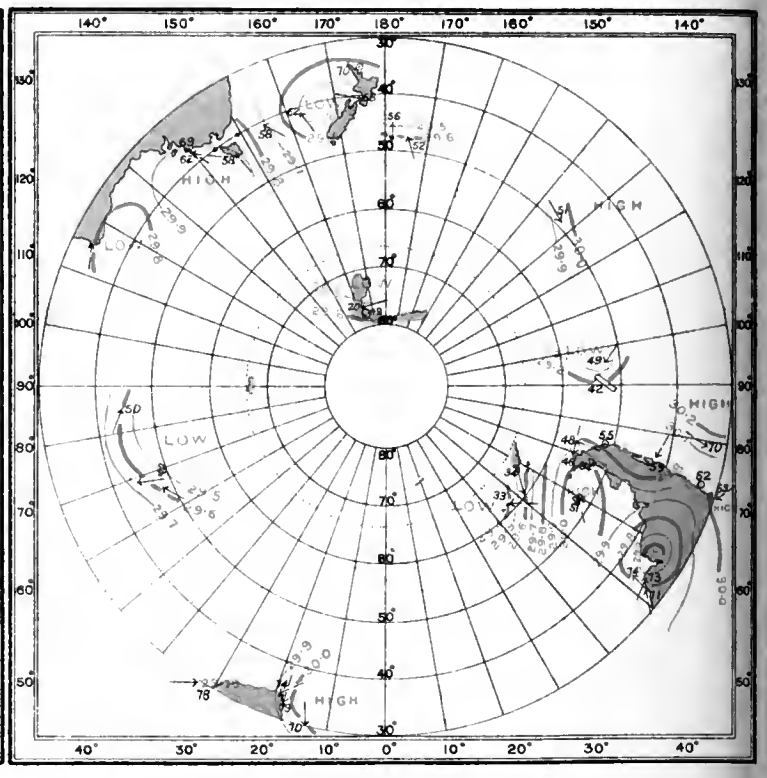

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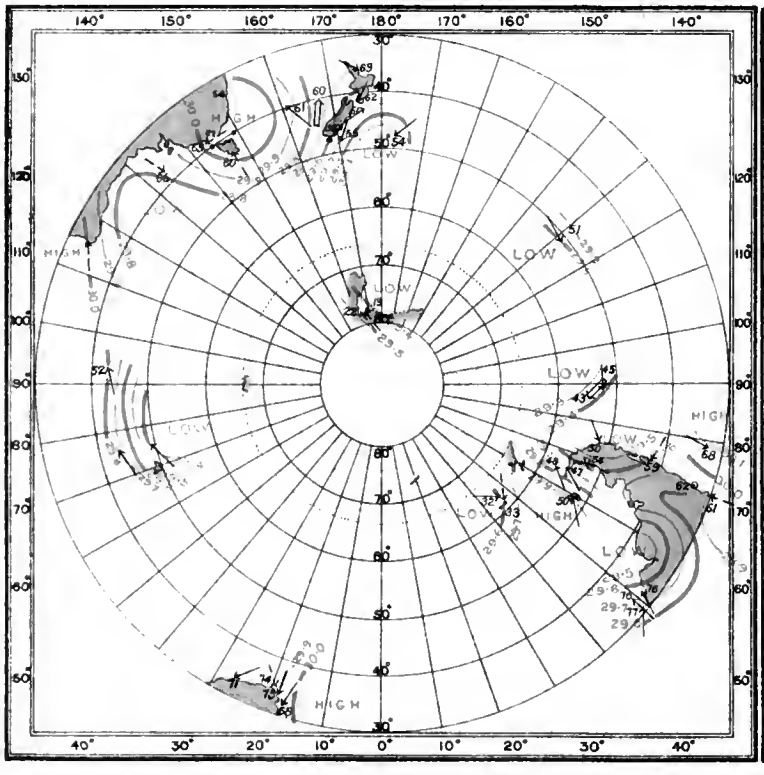

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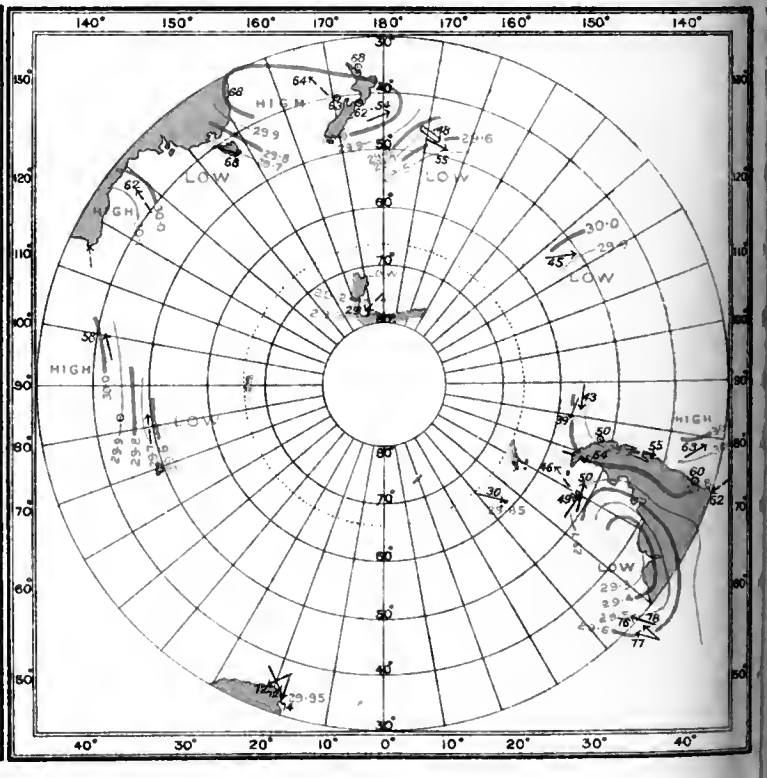


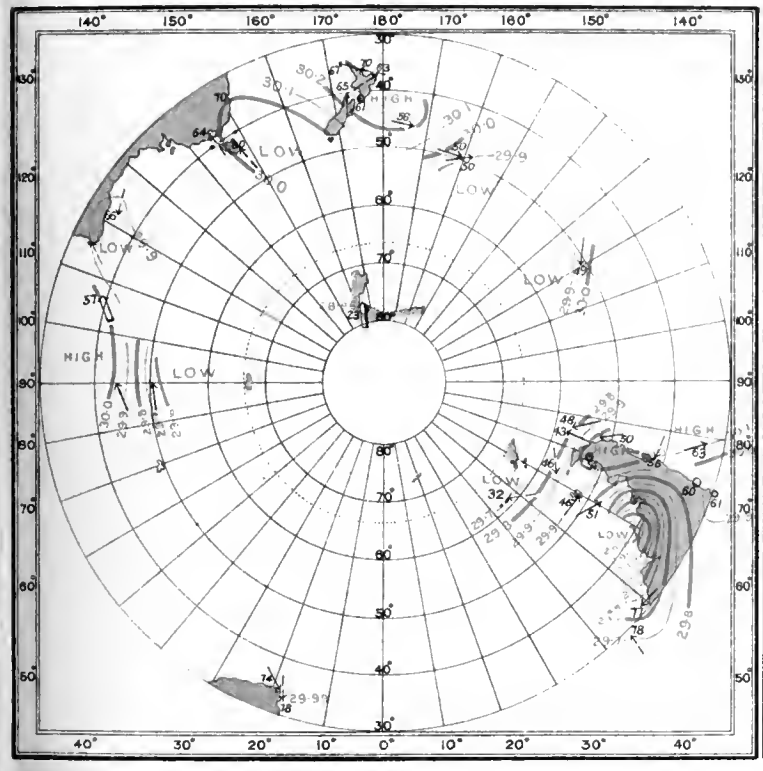
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 FEBRUARY 16



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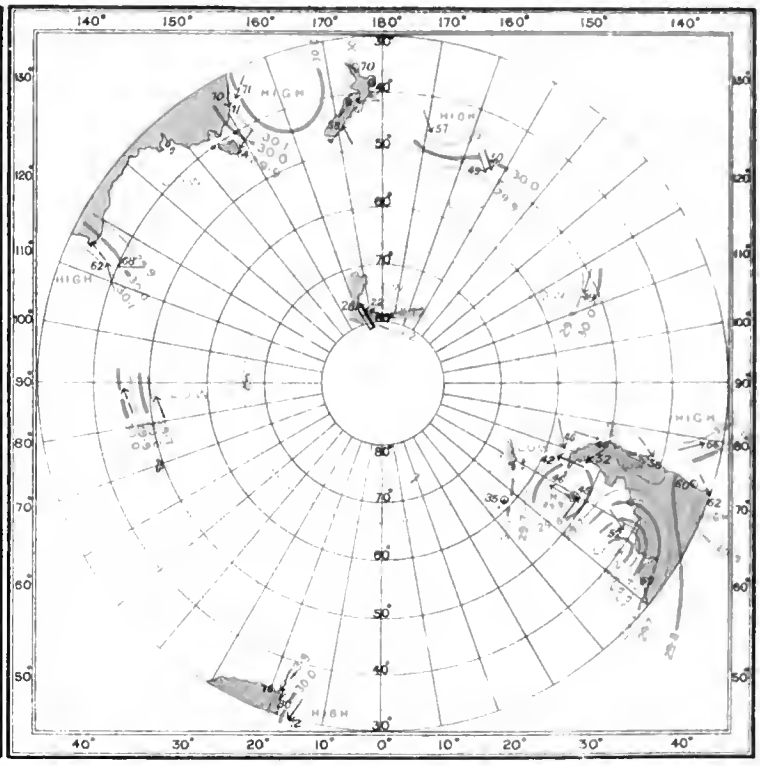

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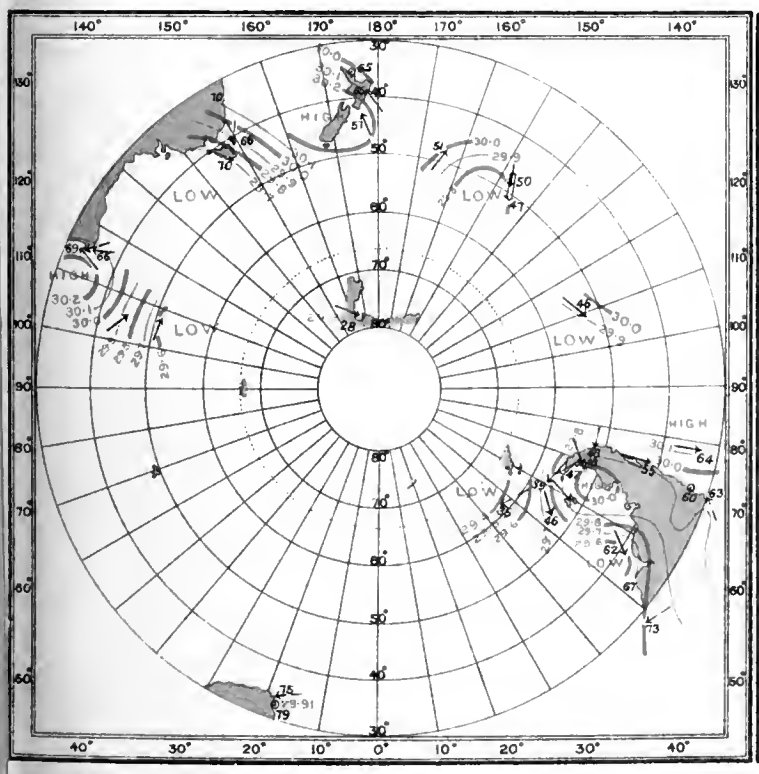

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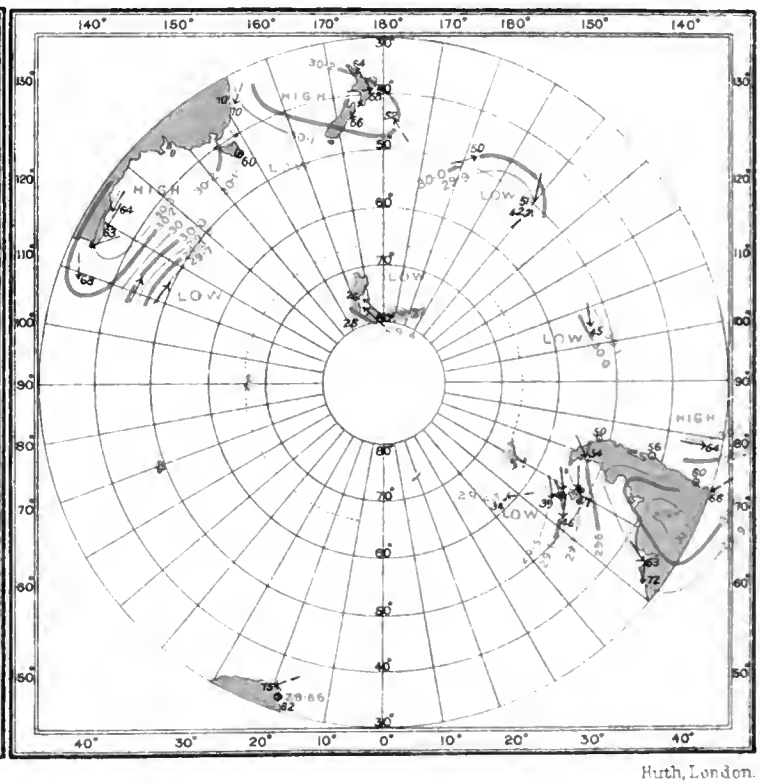


Huth, London.

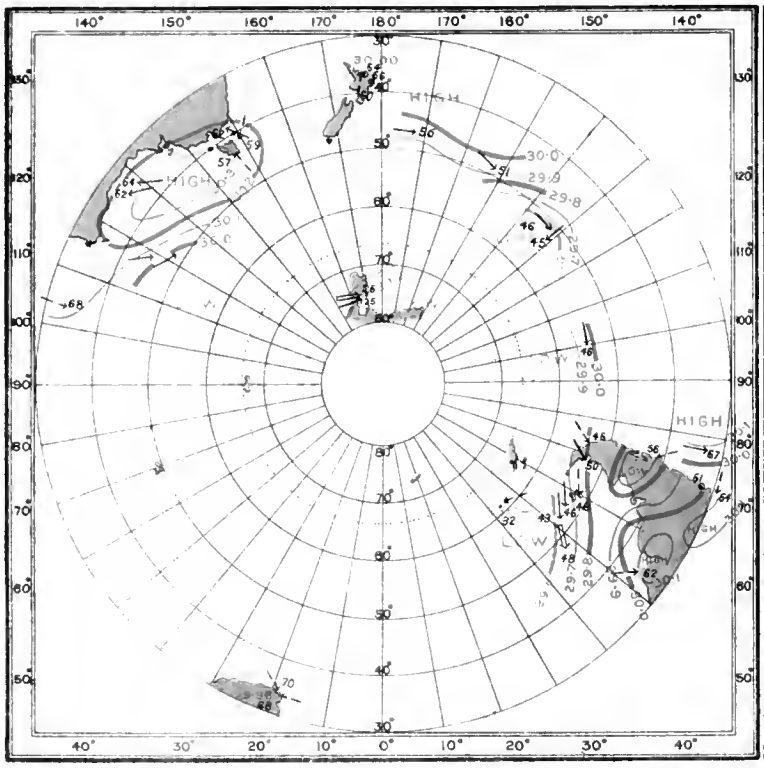
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 FEBRUARY 20



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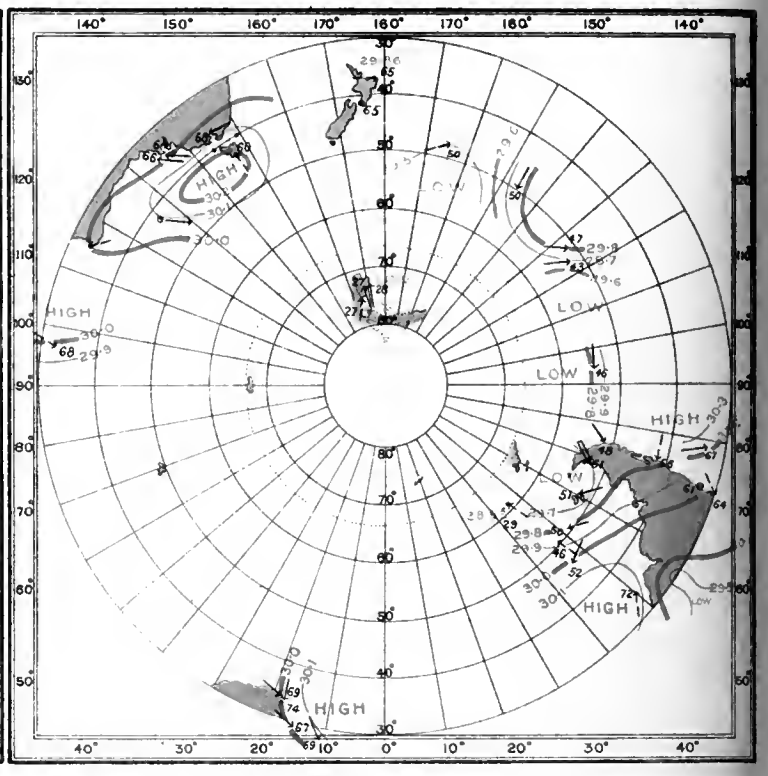

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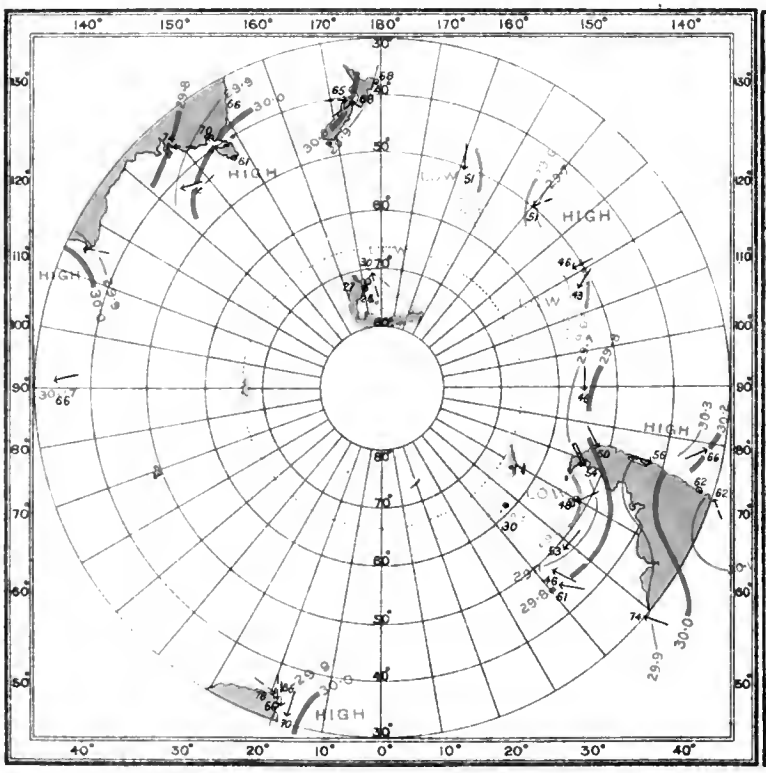

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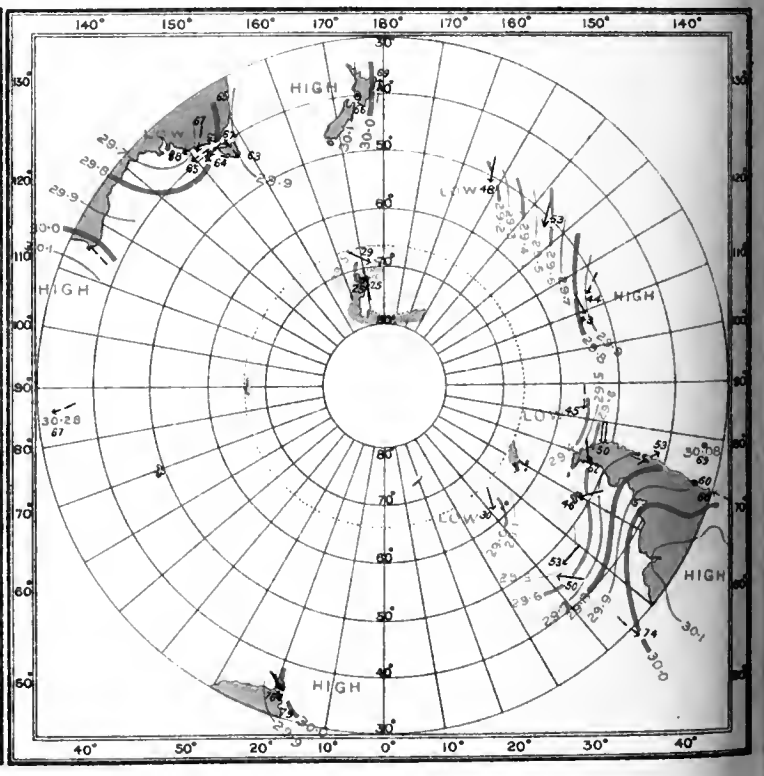


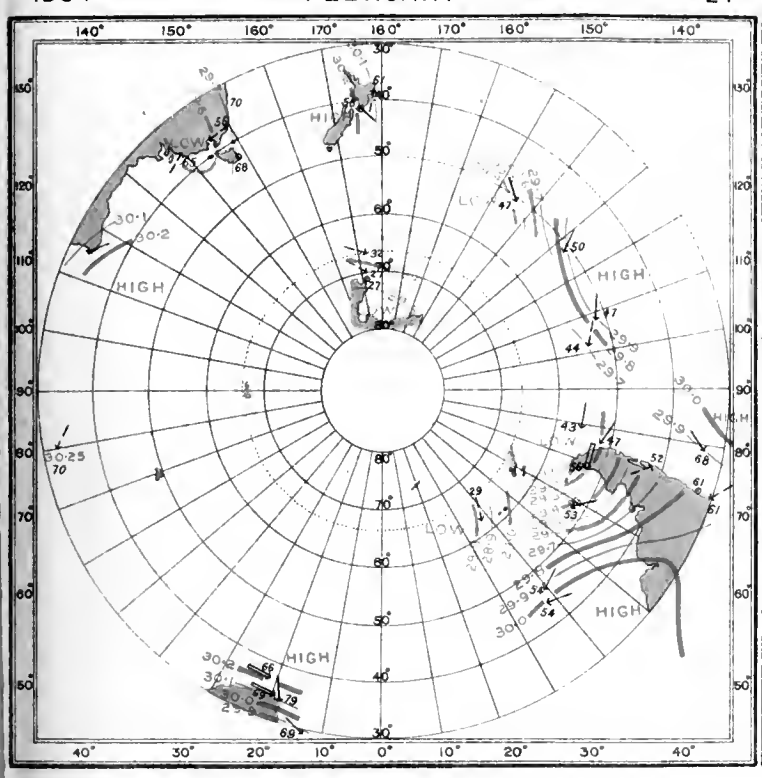
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES.

1904 FEBRUARY 24



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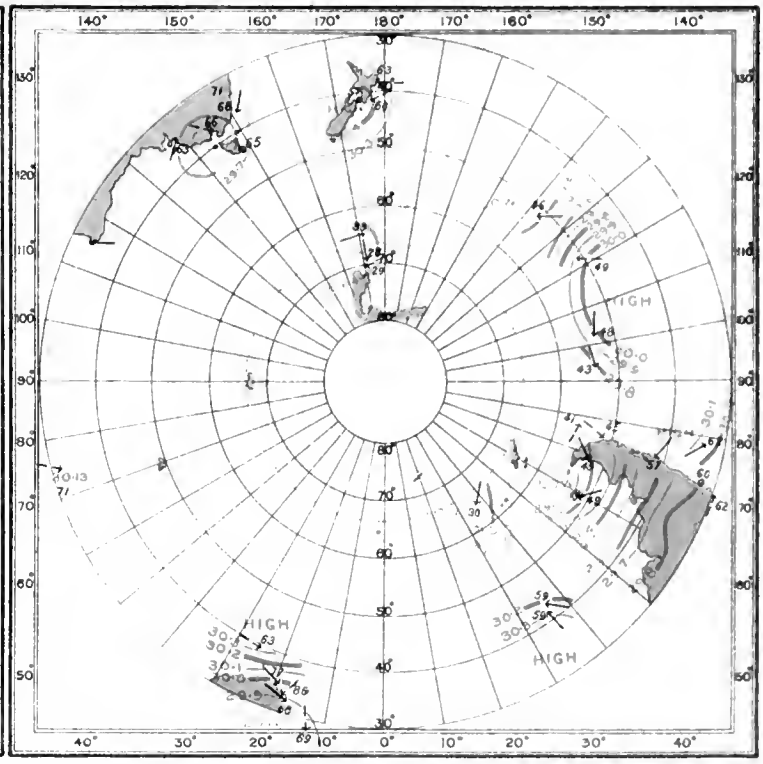

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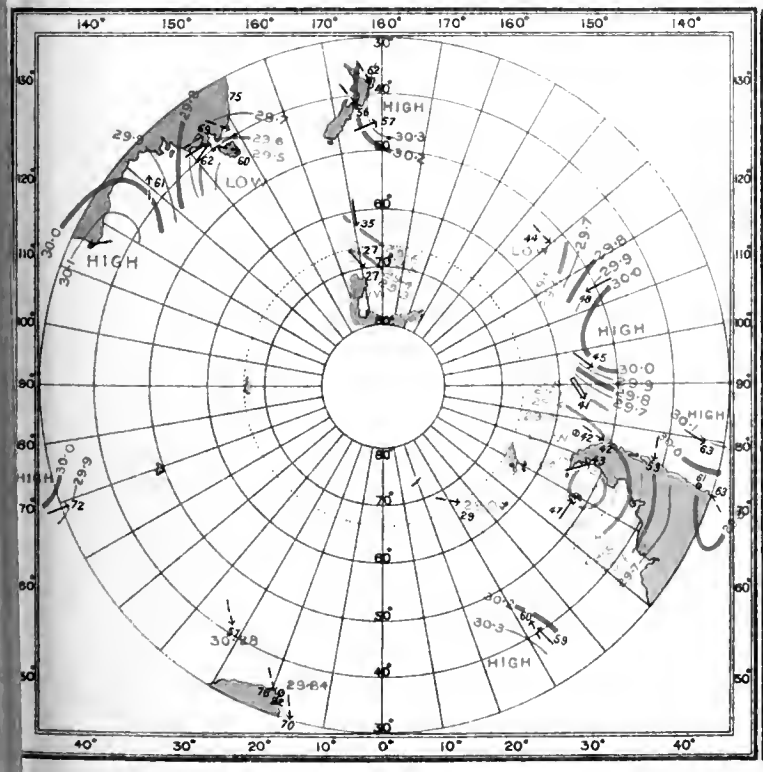

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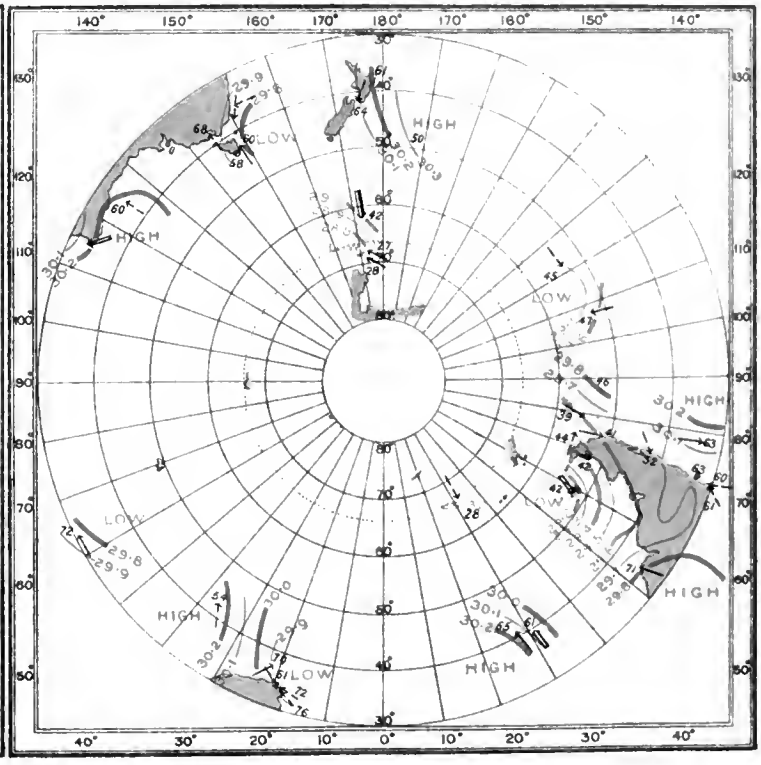


Ruth Lenson

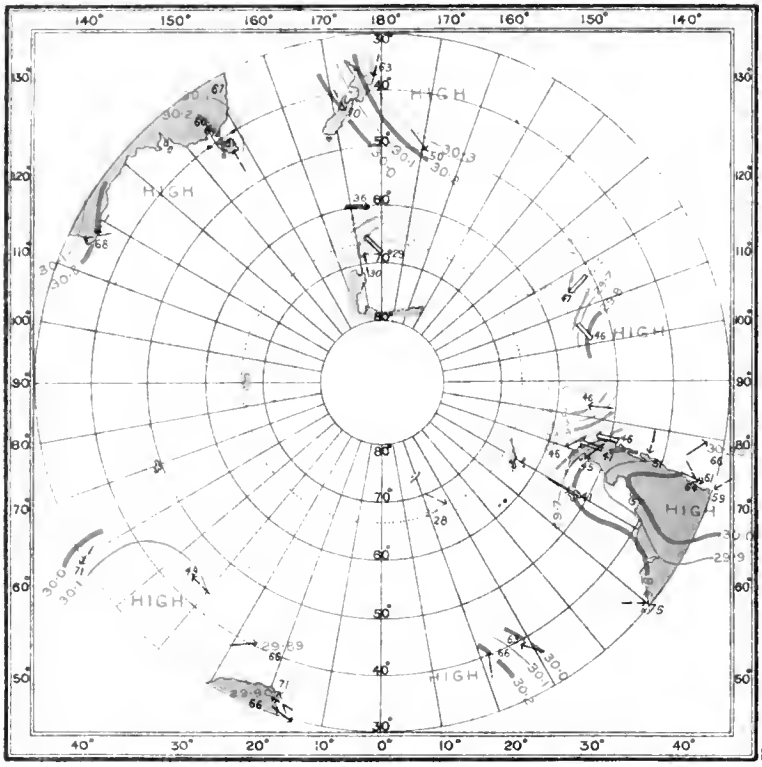
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 FEBRUARY 28



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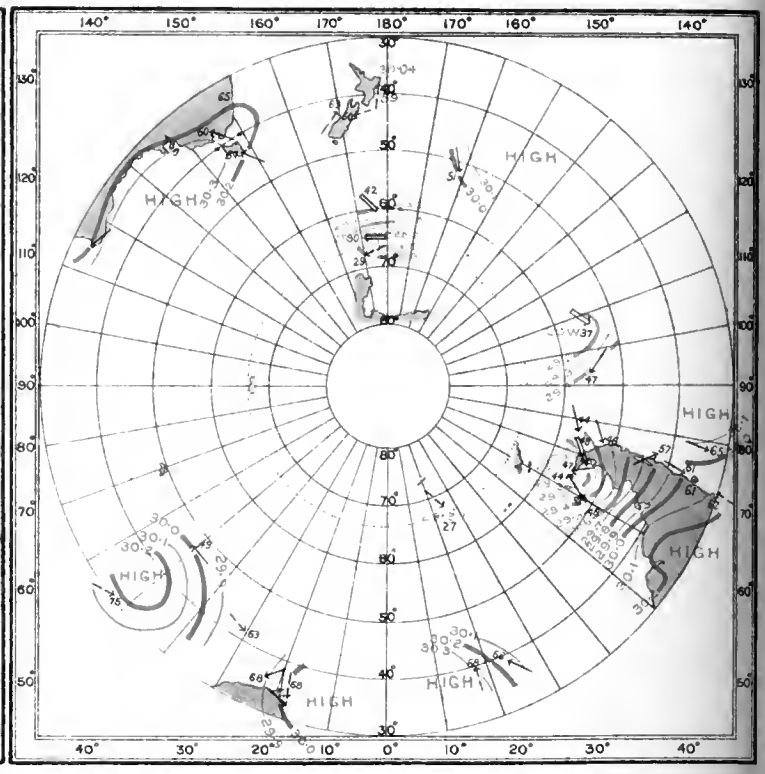
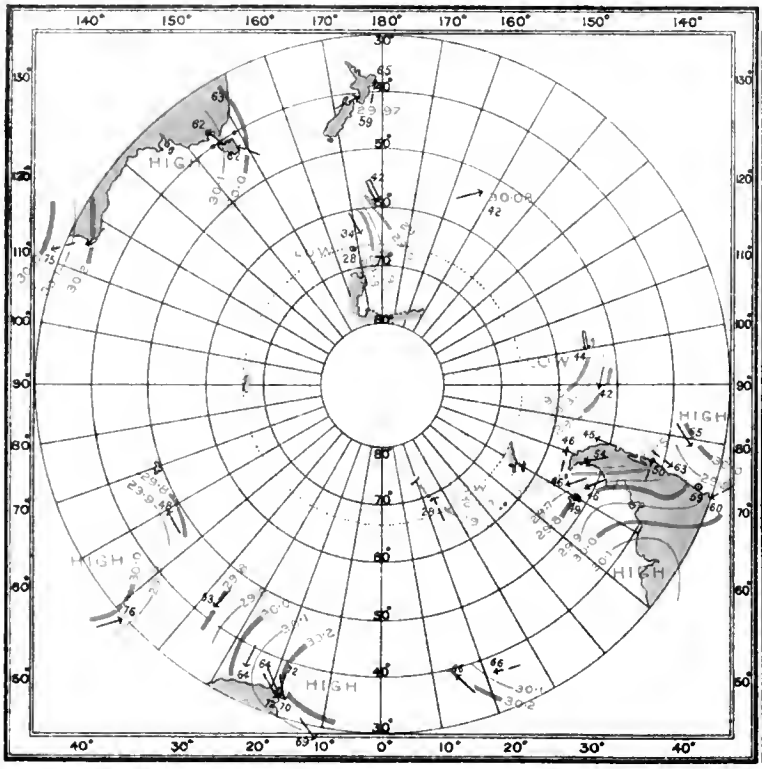
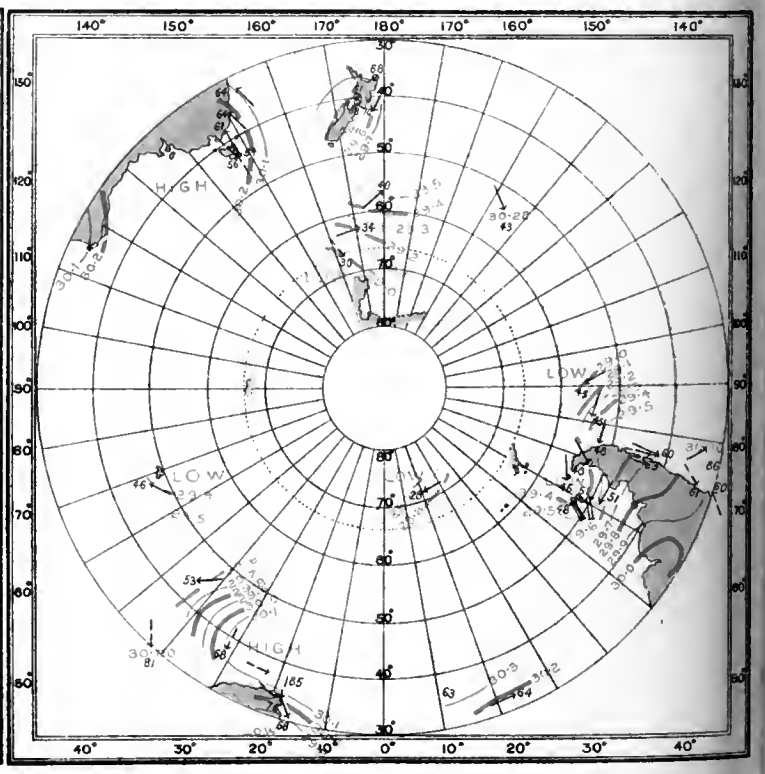


1904 MARCH 1



1904 MARCH 2



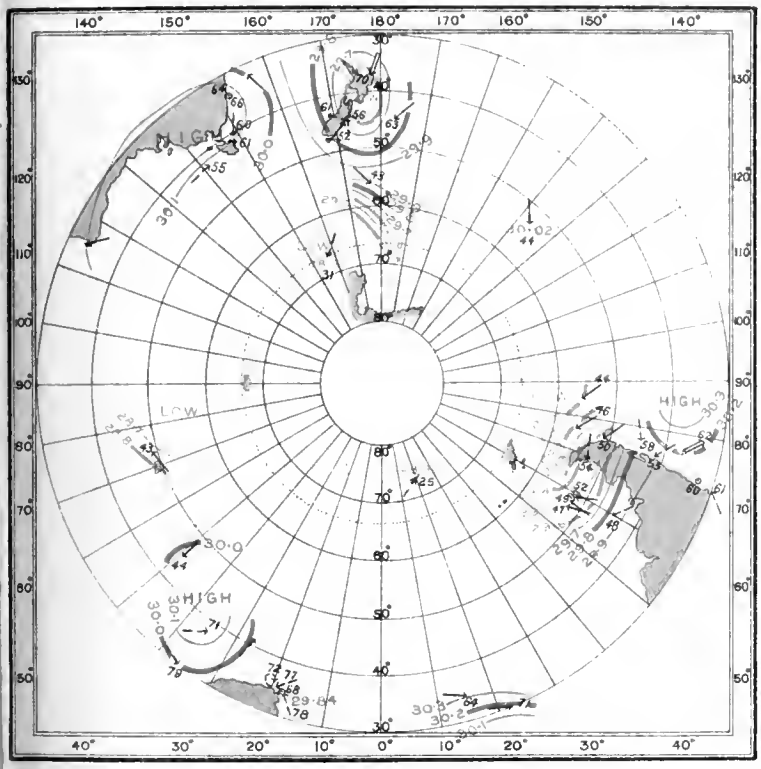
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

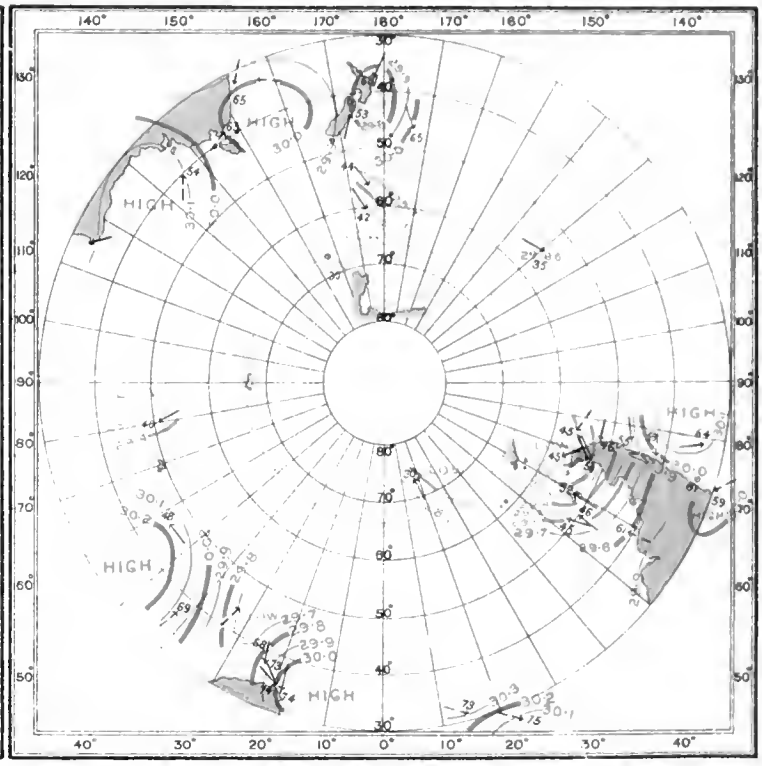
SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

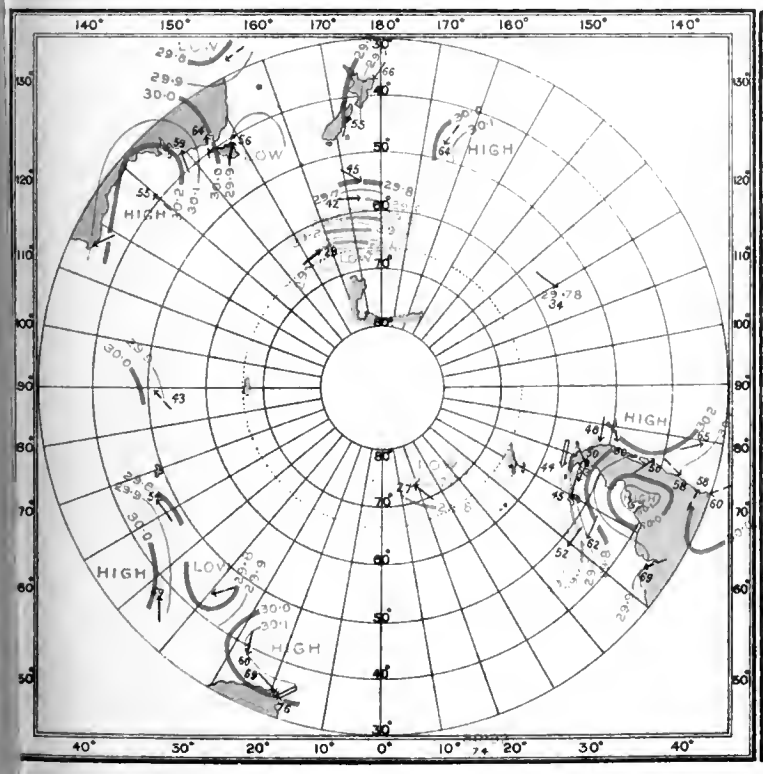
1904 MARCH 3



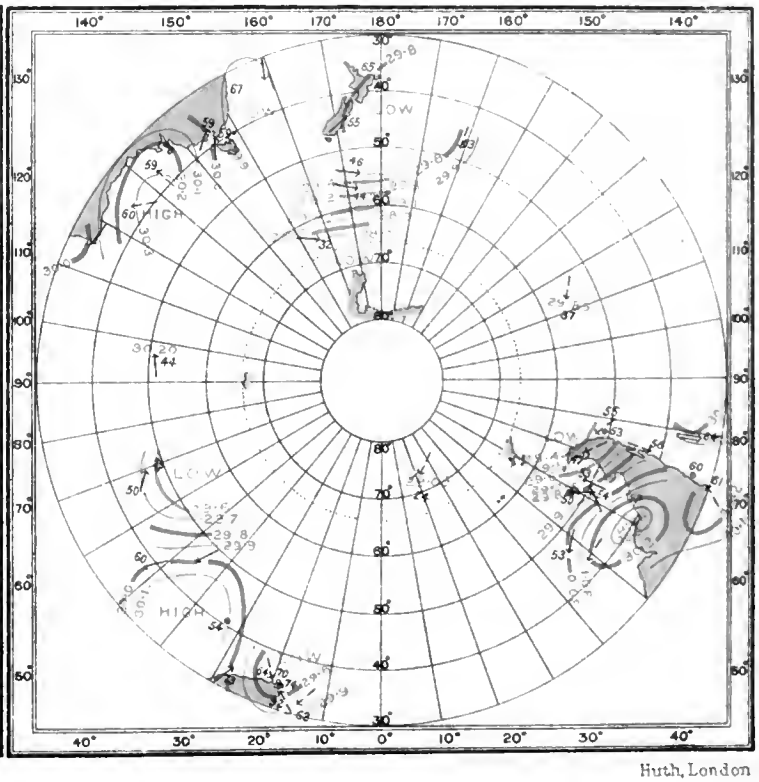
1904 MARCH 4



1904 MARCH 5



1904 MARCH 6



Huth, London

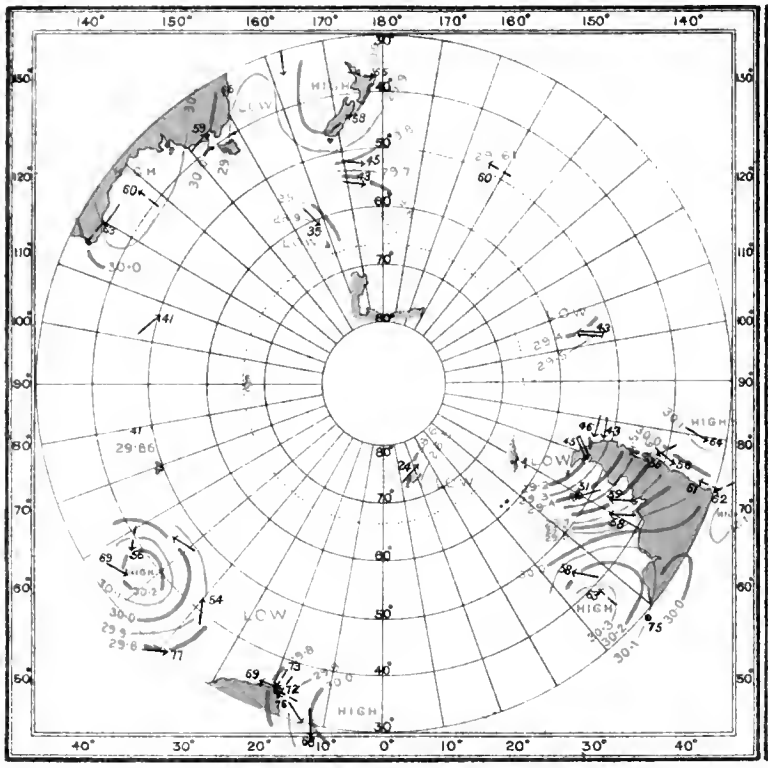
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 MARCH 7



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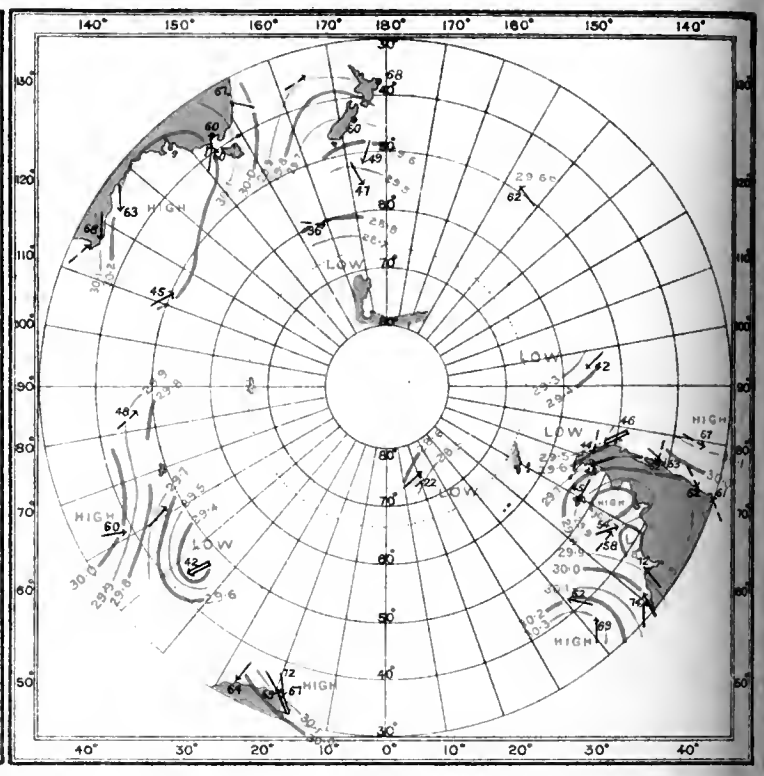
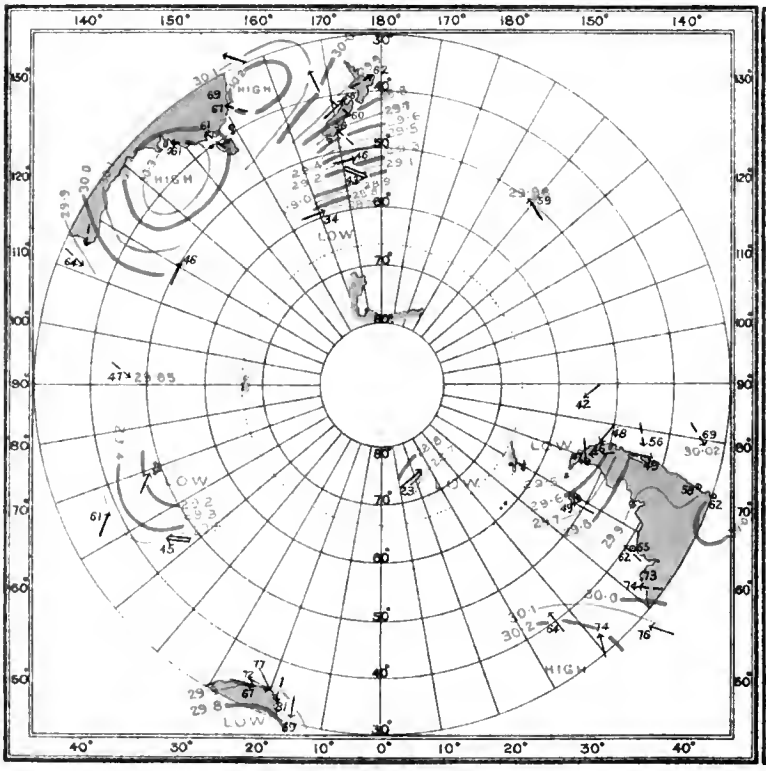
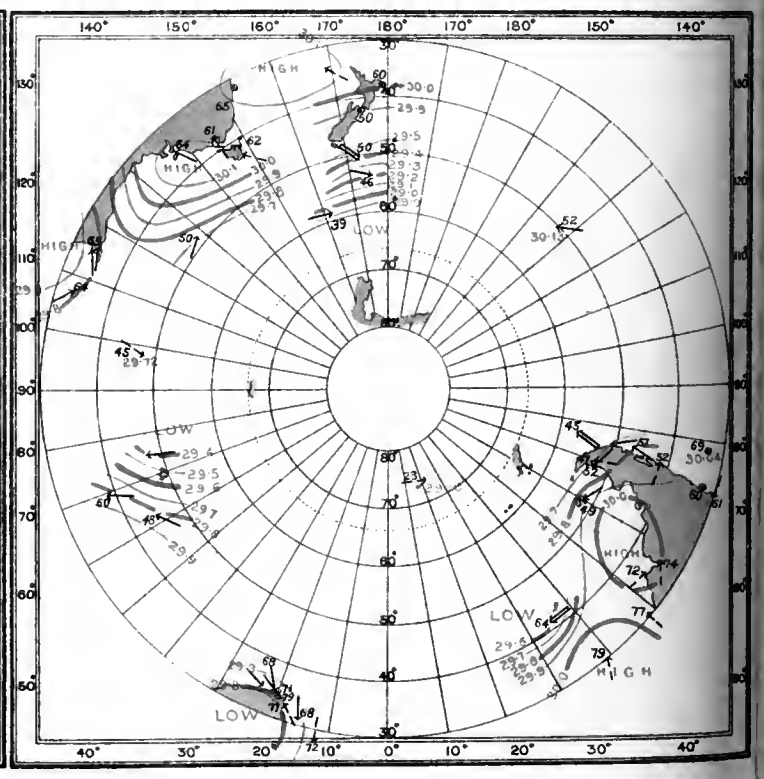


1904 MARCH 9



1904 MARCH 10



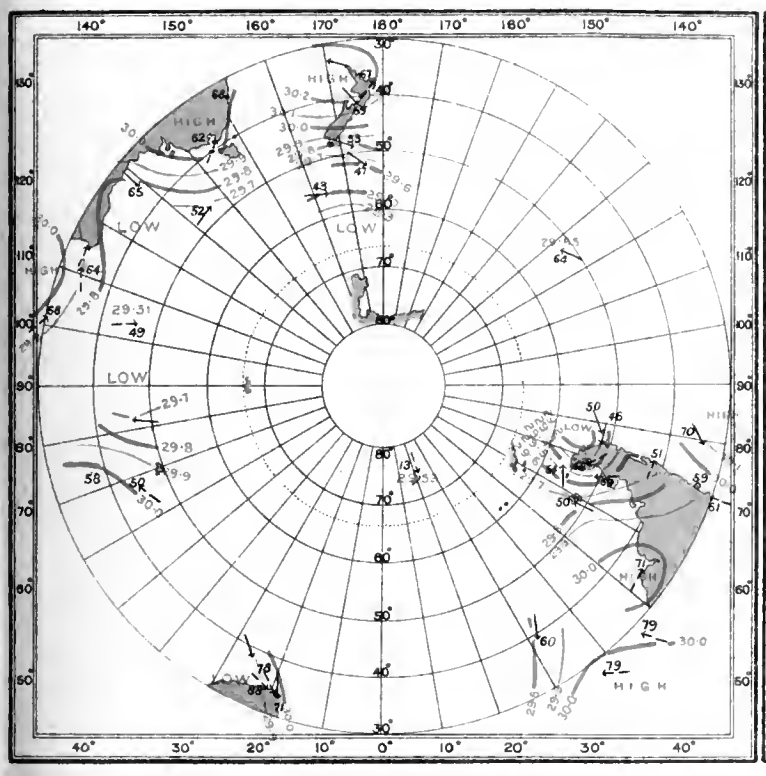
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T.

WITH WINDS AND AIR TEMPERATURES

1904 MARCH 11



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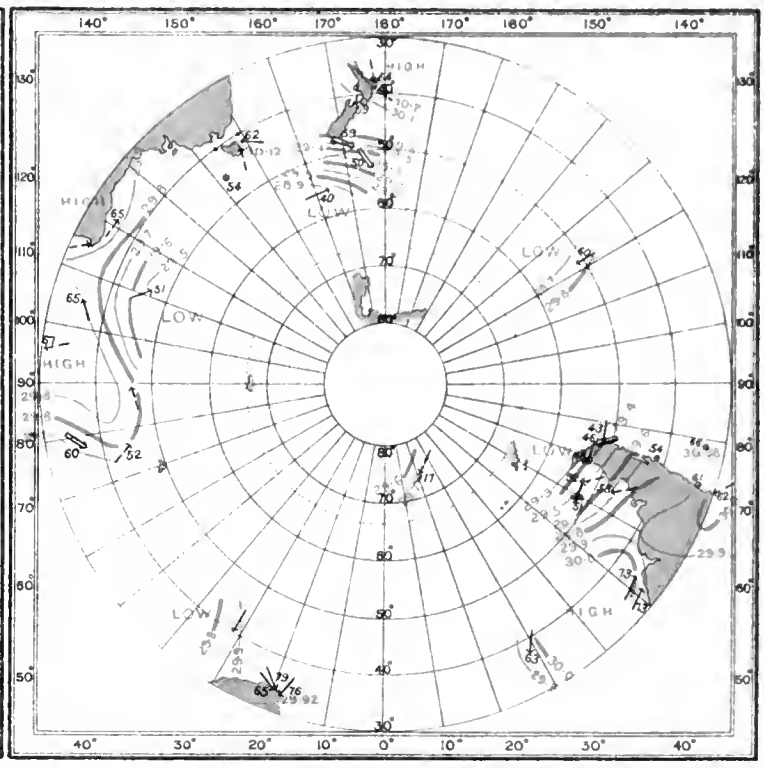

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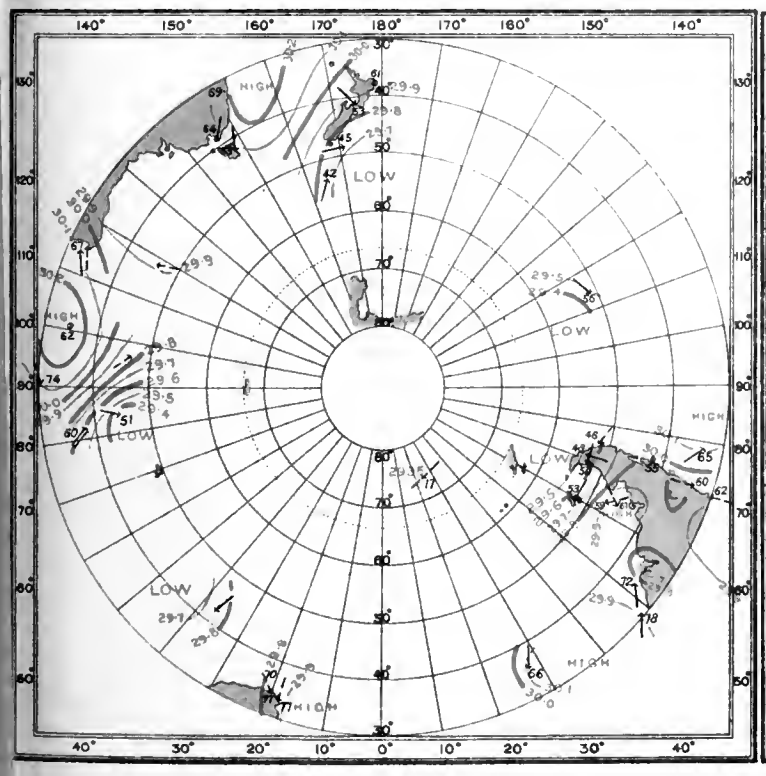

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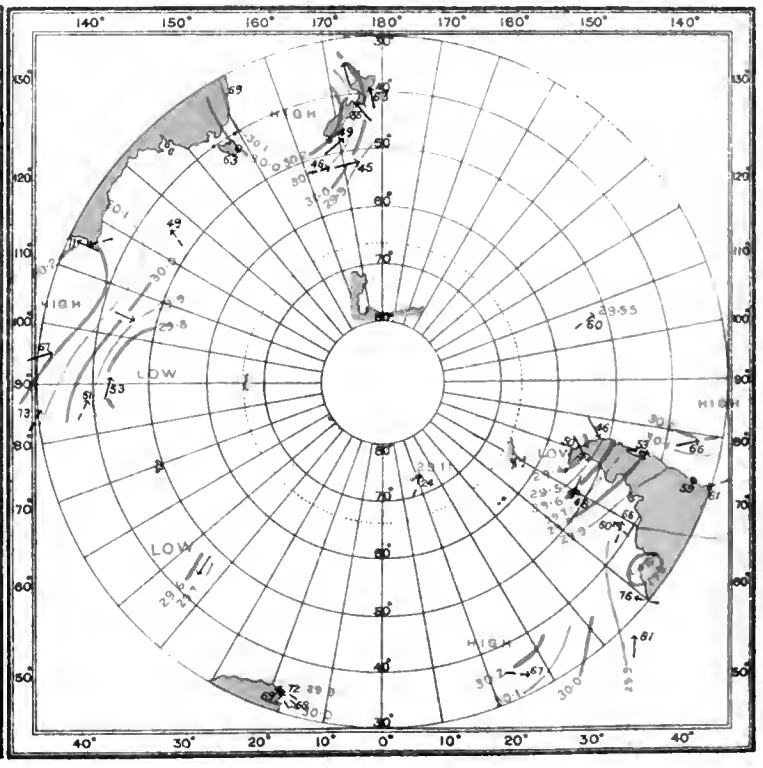

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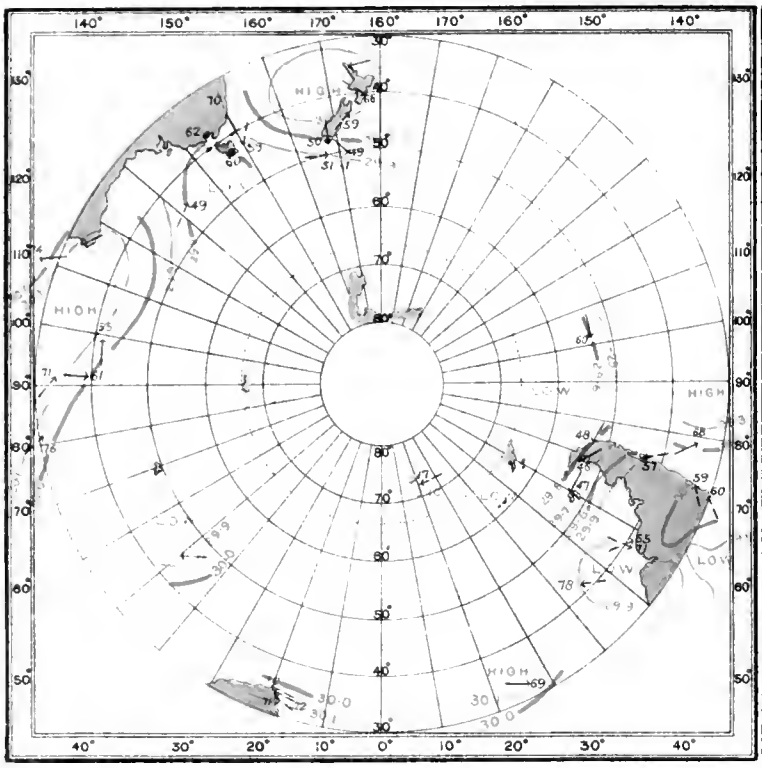
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 MARCH 15



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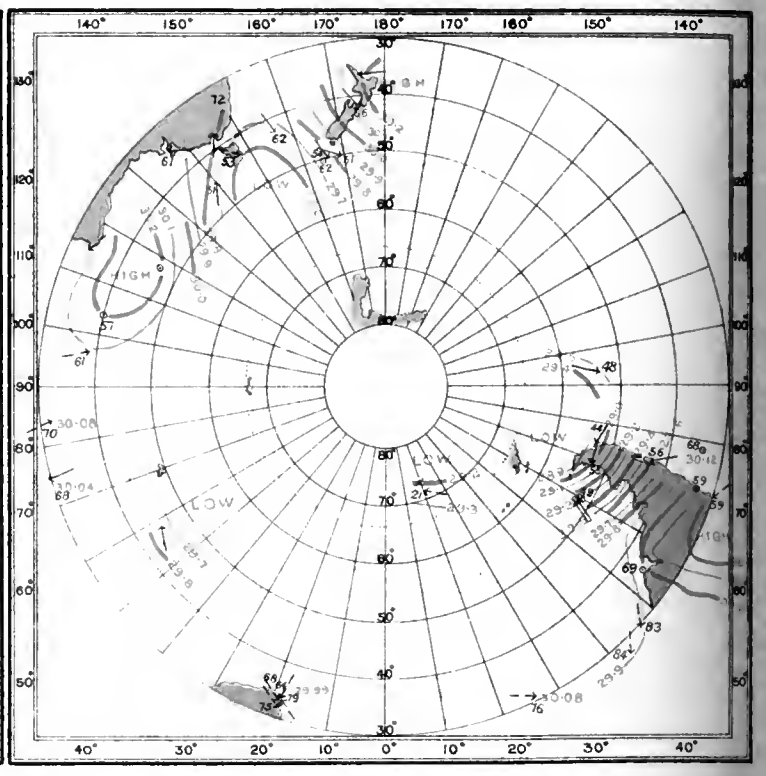

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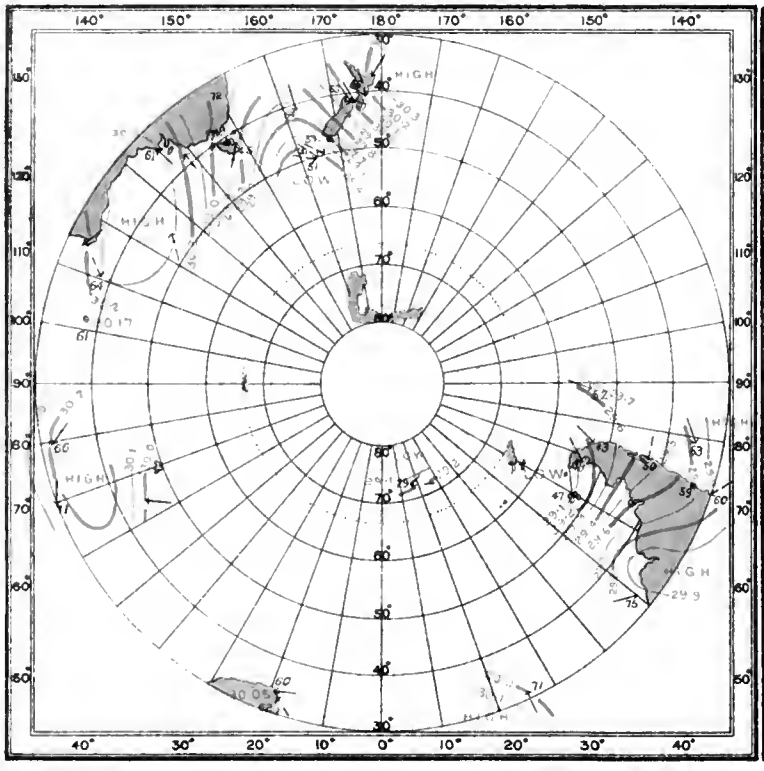

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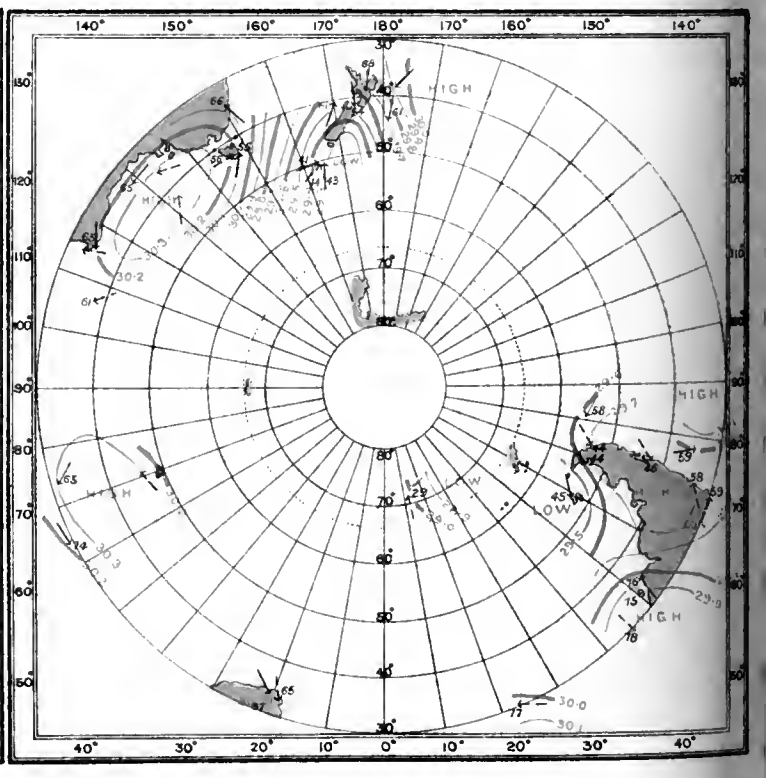


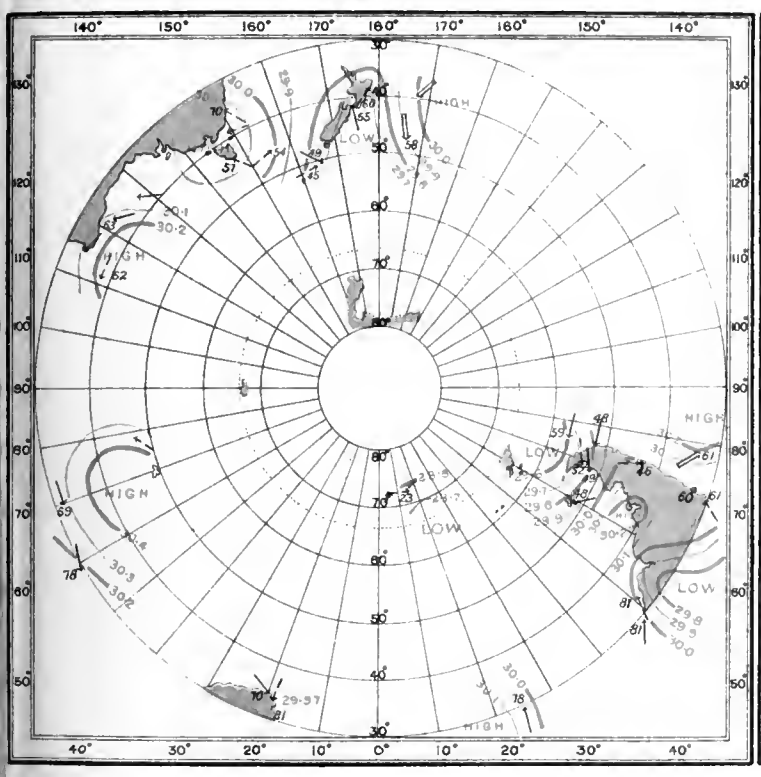
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES

1904 MARCH 19



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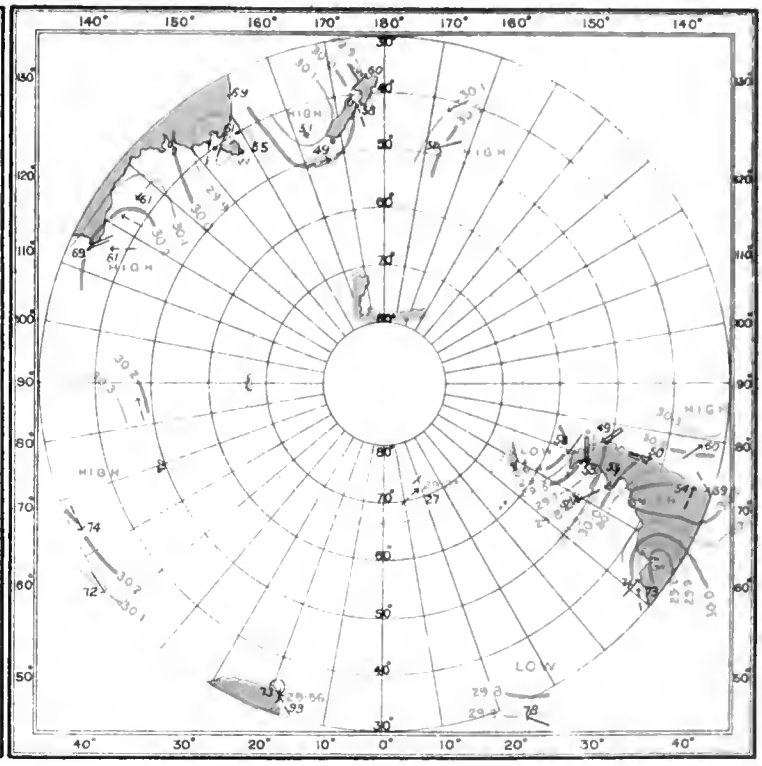

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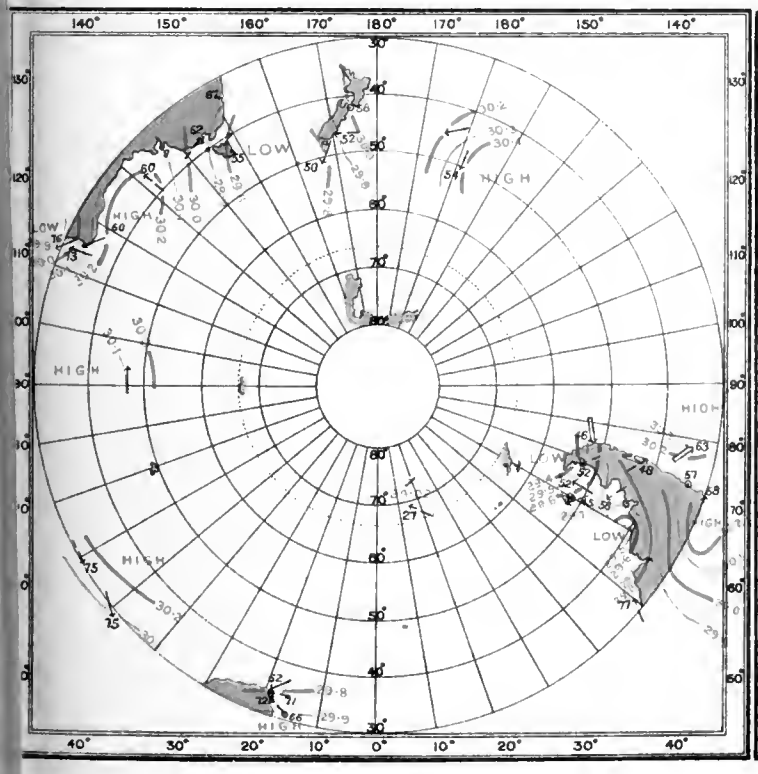

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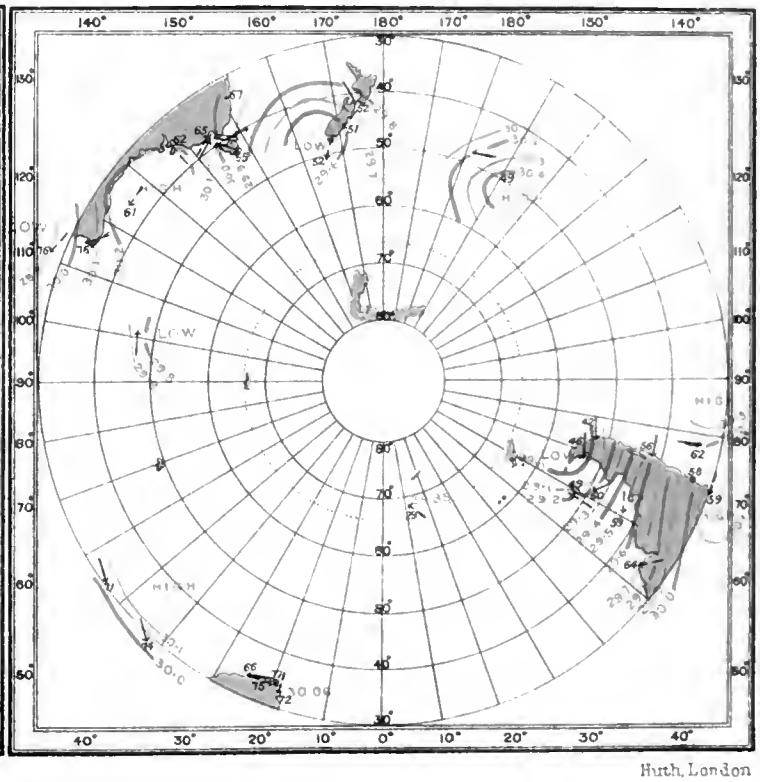

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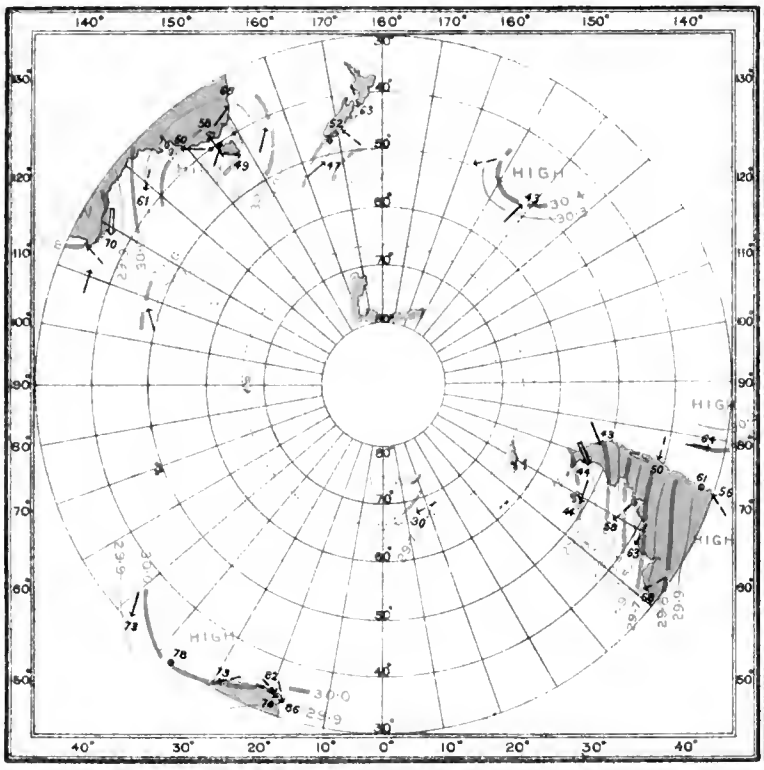
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G.M.T.

WITH WINDS AND AIR TEMPERATURES.

1904 MARCH 23



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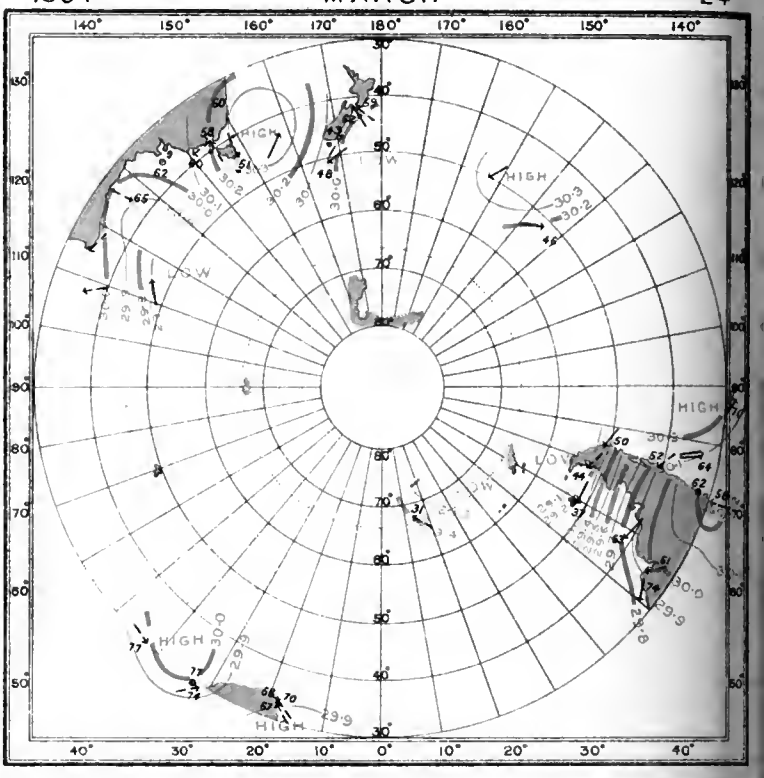

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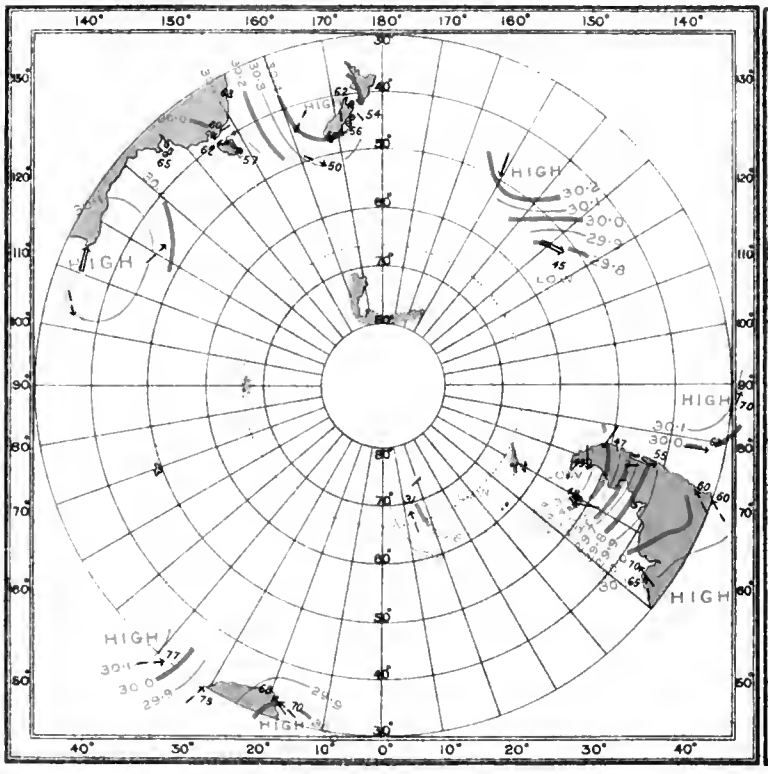

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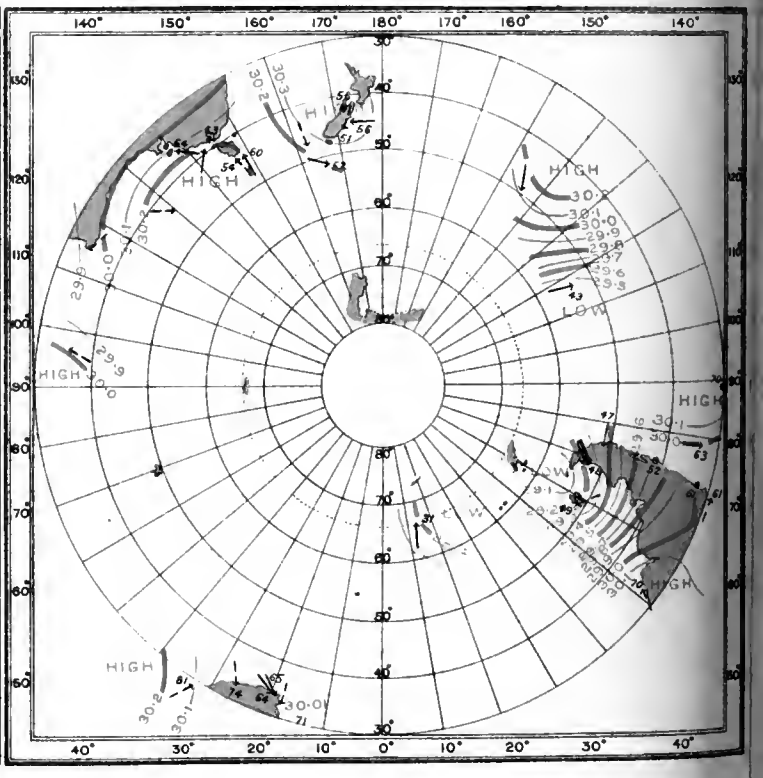
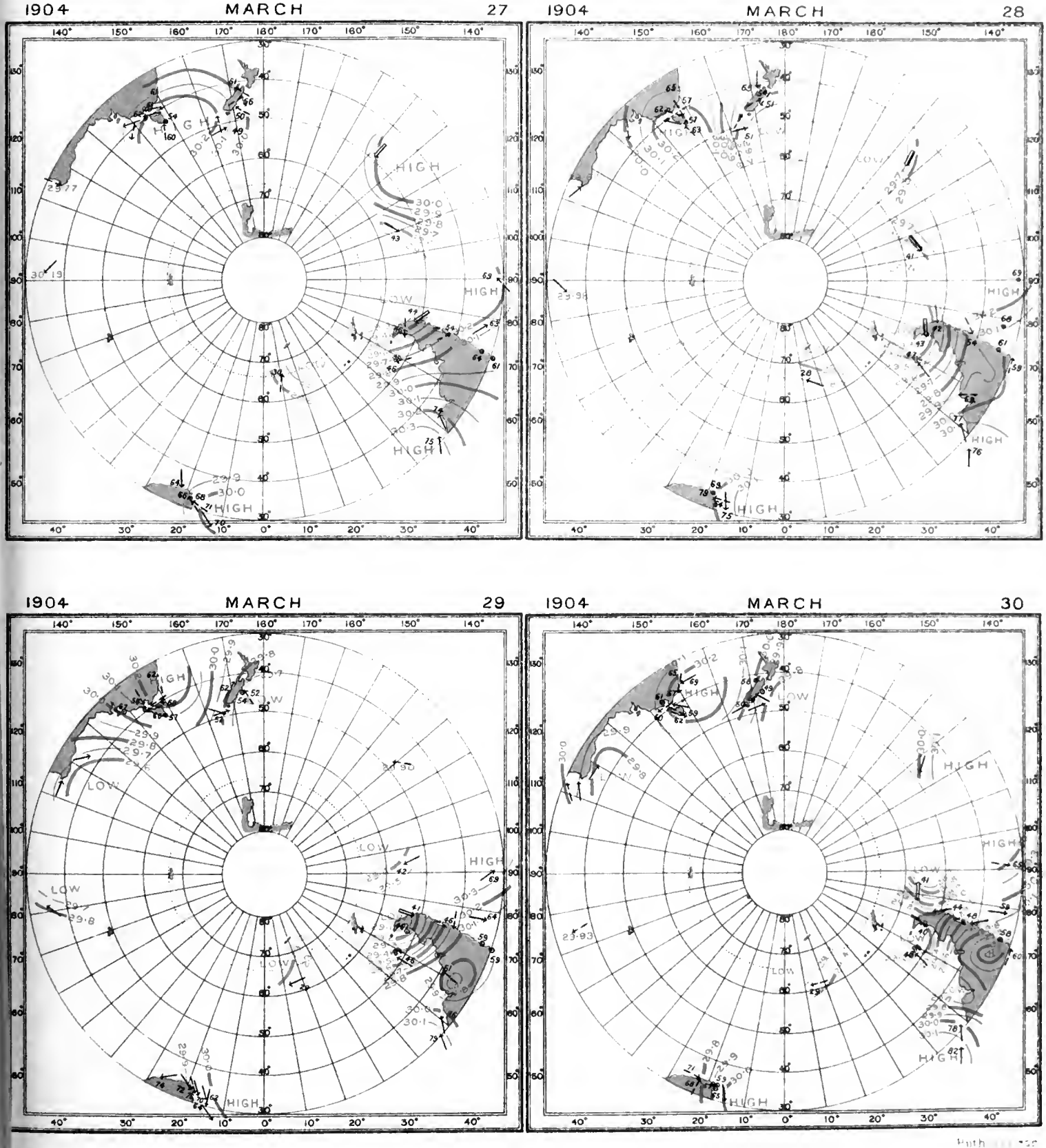


For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES



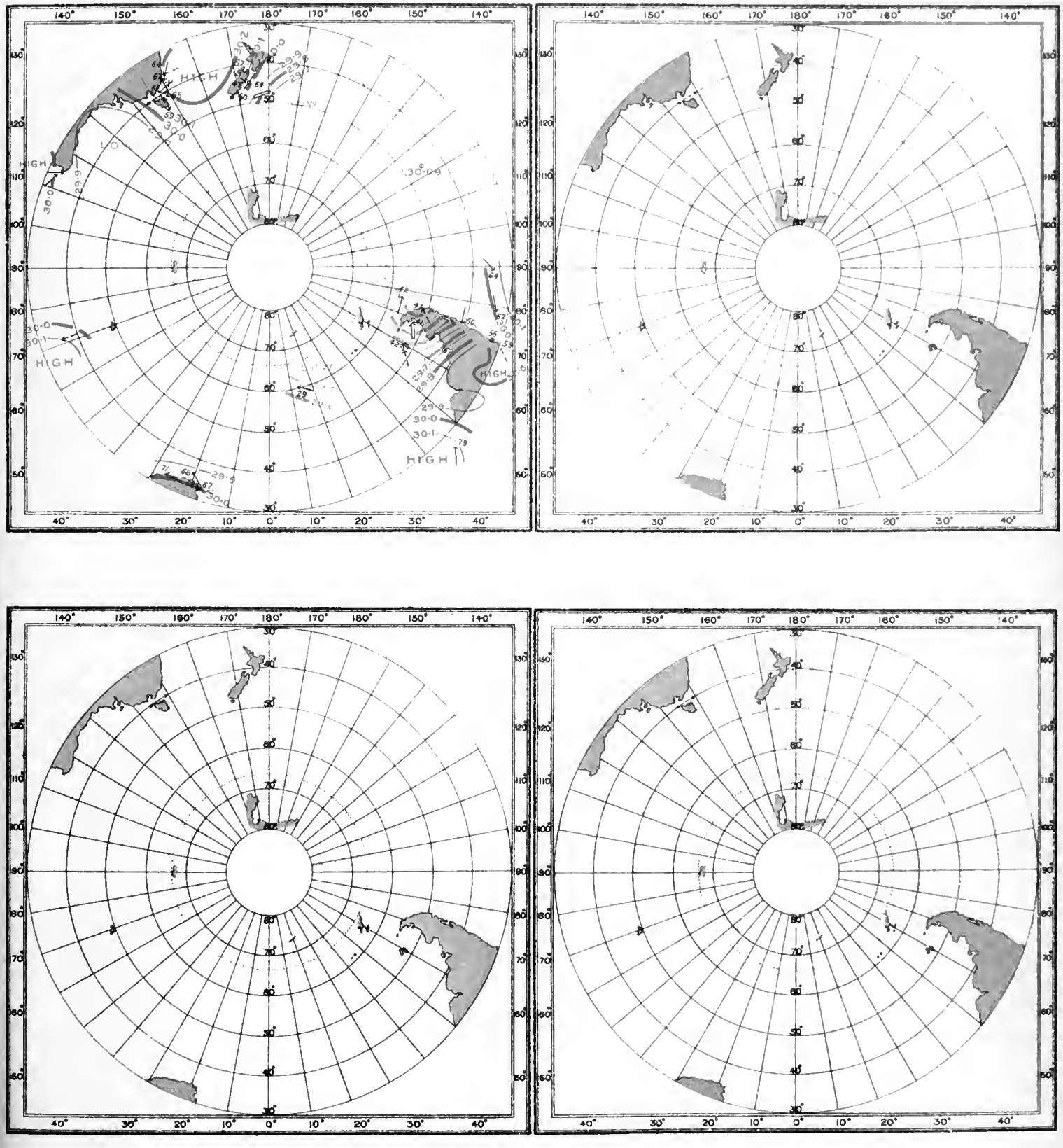
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

SYNCHRONOUS CHARTS OF SEA-LEVEL PRESSURE FOR NOON G M T

WITH WINDS AND AIR TEMPERATURES

1904 MARCH 31



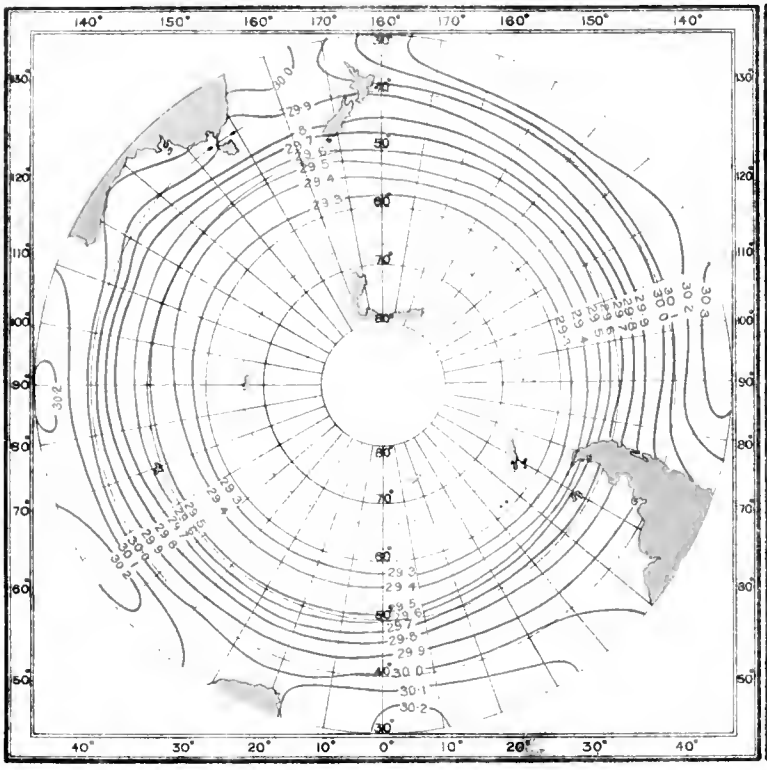
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

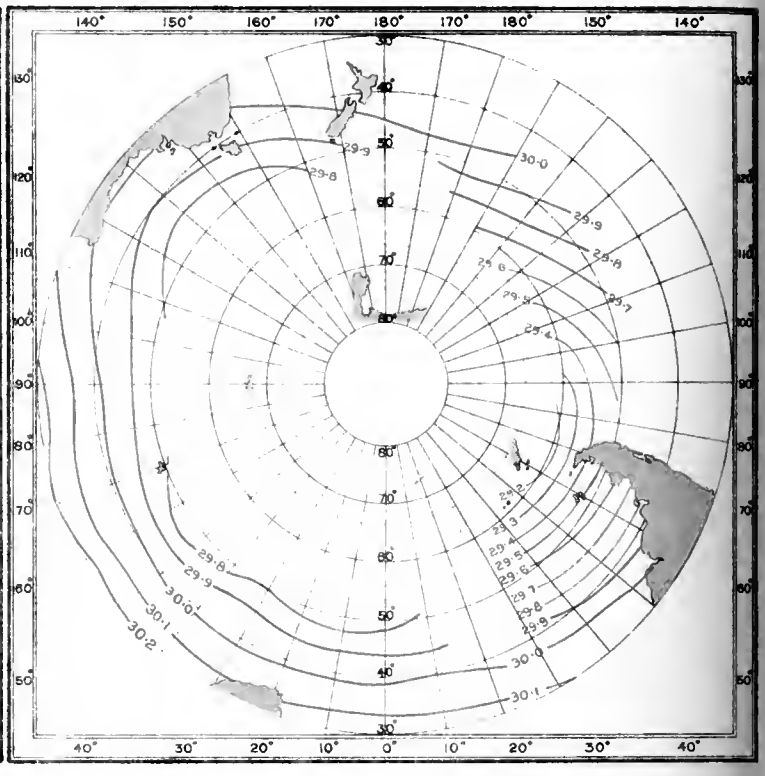
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

OCTOBER

NORMAL PRESSURE.

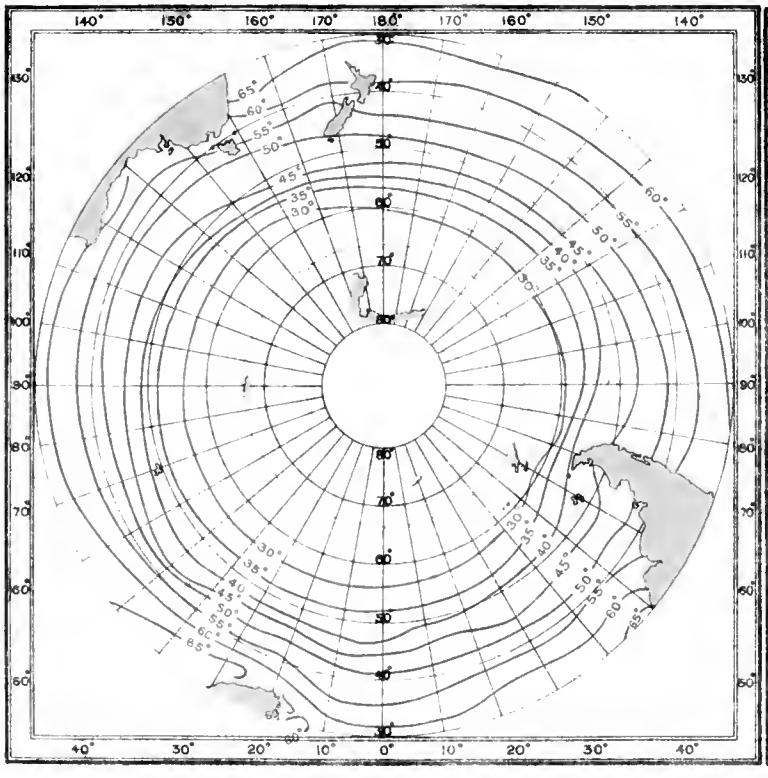


MEAN PRESSURE, NOON, G.M.T. 1901.

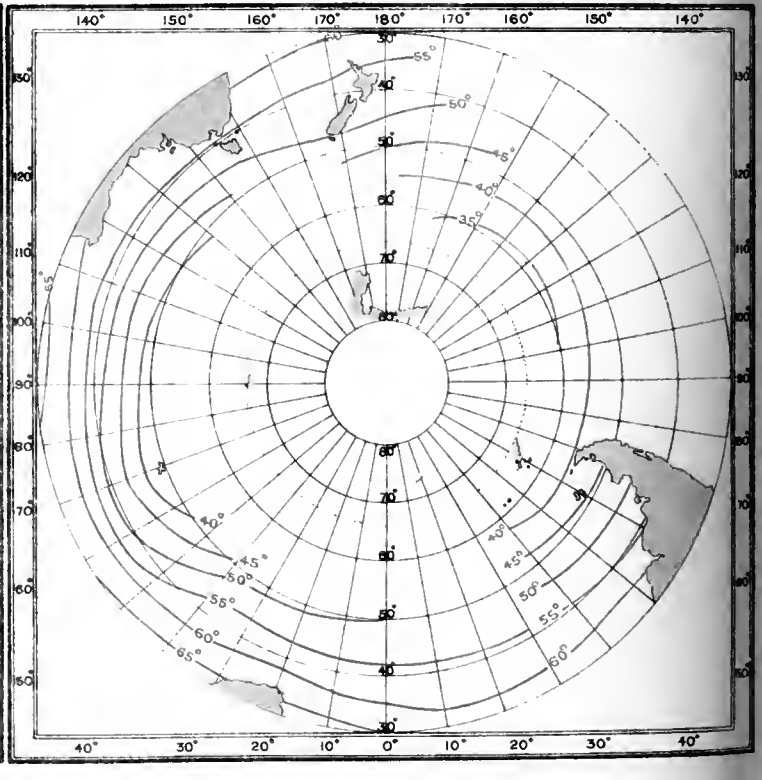


OCTOBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1901.



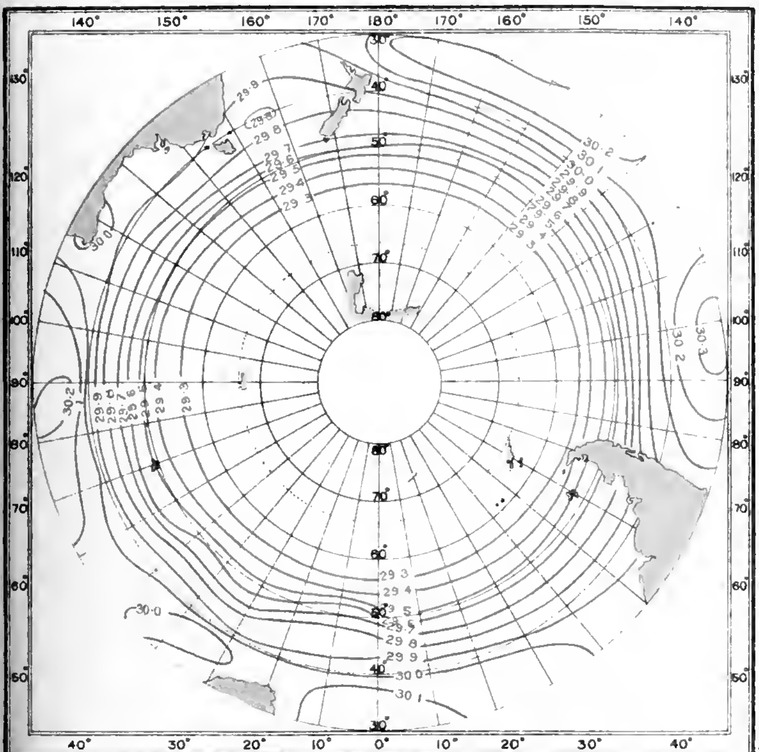
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

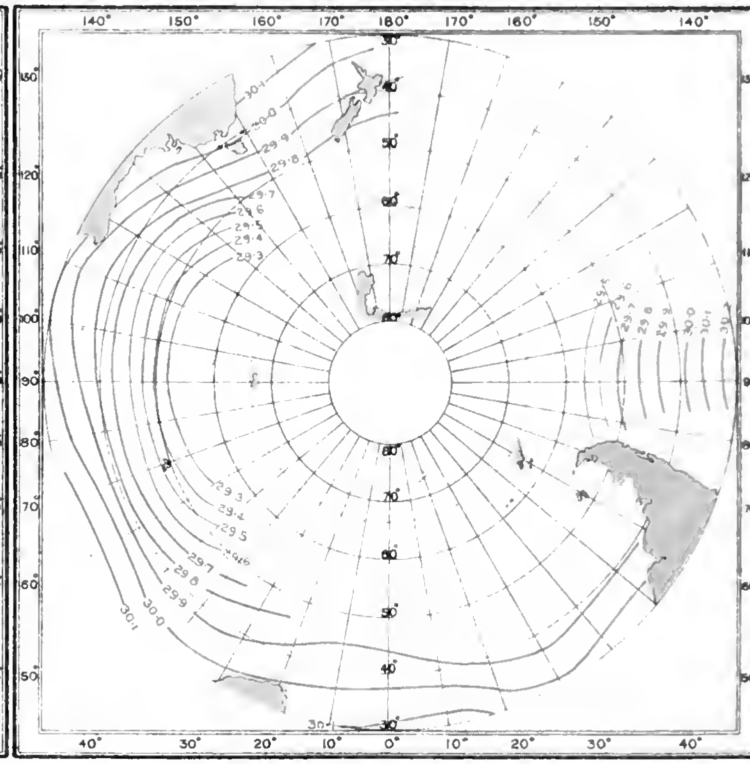
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

NOVEMBER

NORMAL PRESSURE.

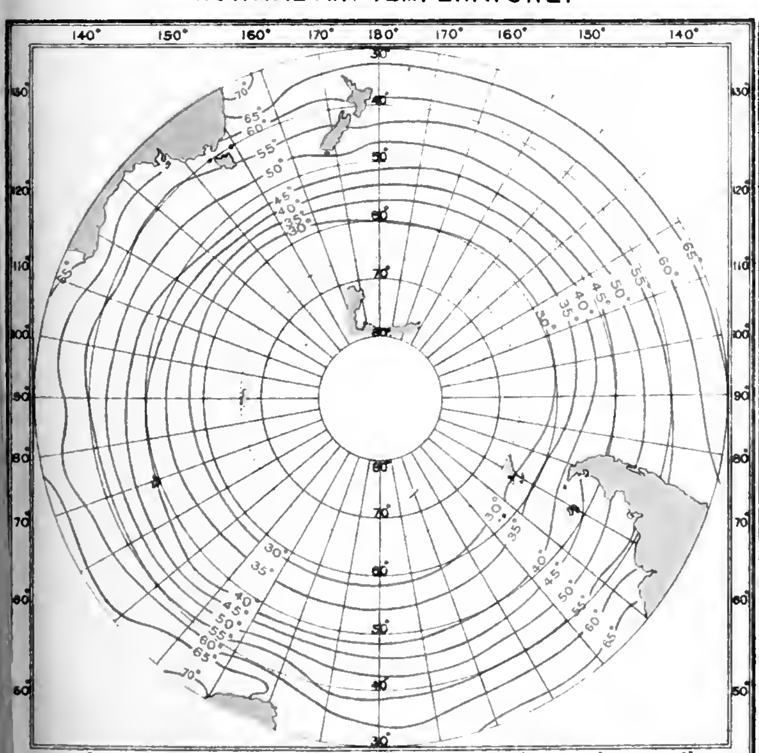


MEAN PRESSURE, NOON, G.M.T. 1901.

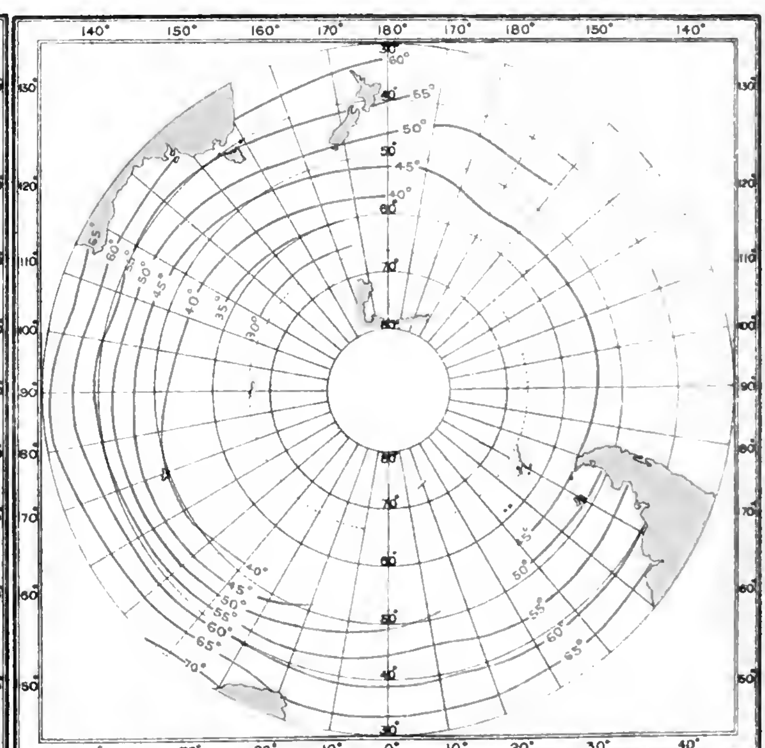


NOVEMBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1901



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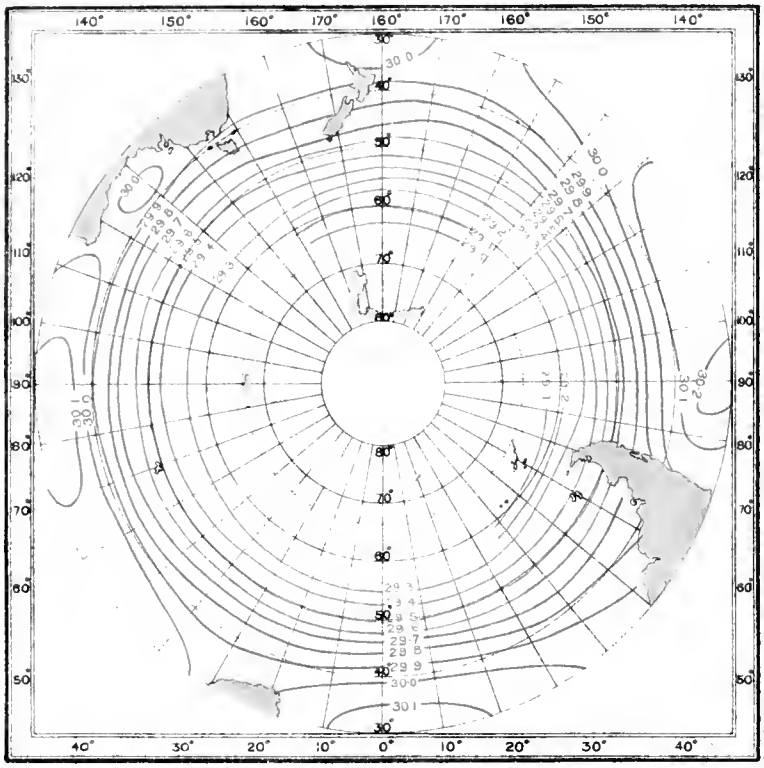
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

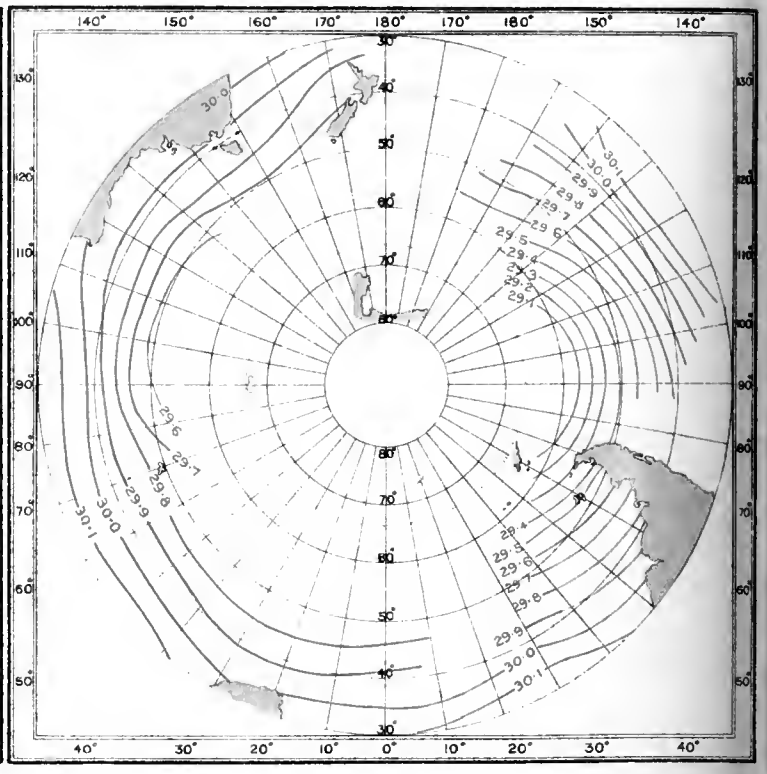
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

DECEMBER

NORMAL PRESSURE.

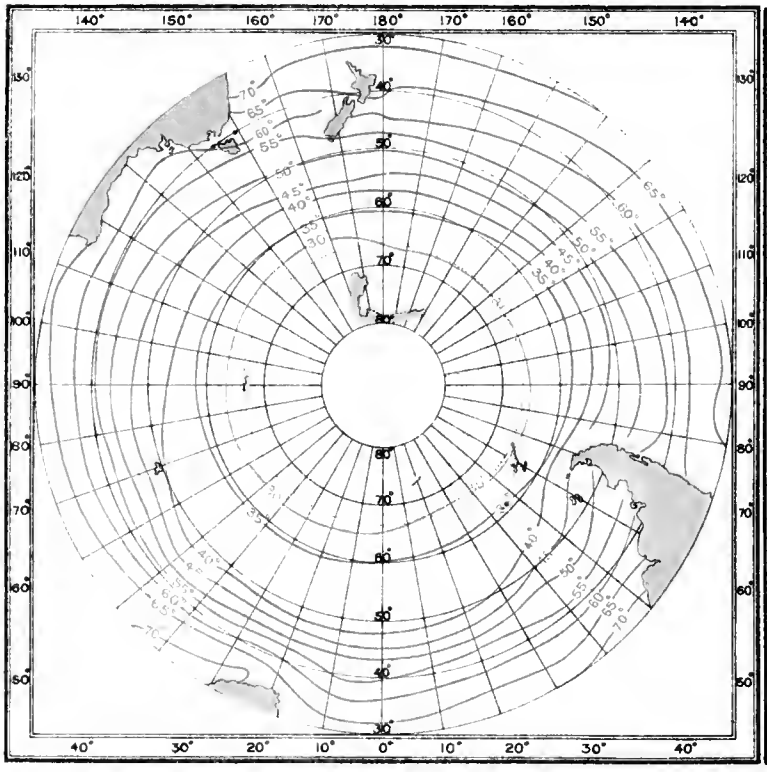


MEAN PRESSURE, NOON, G.M.T. 1901

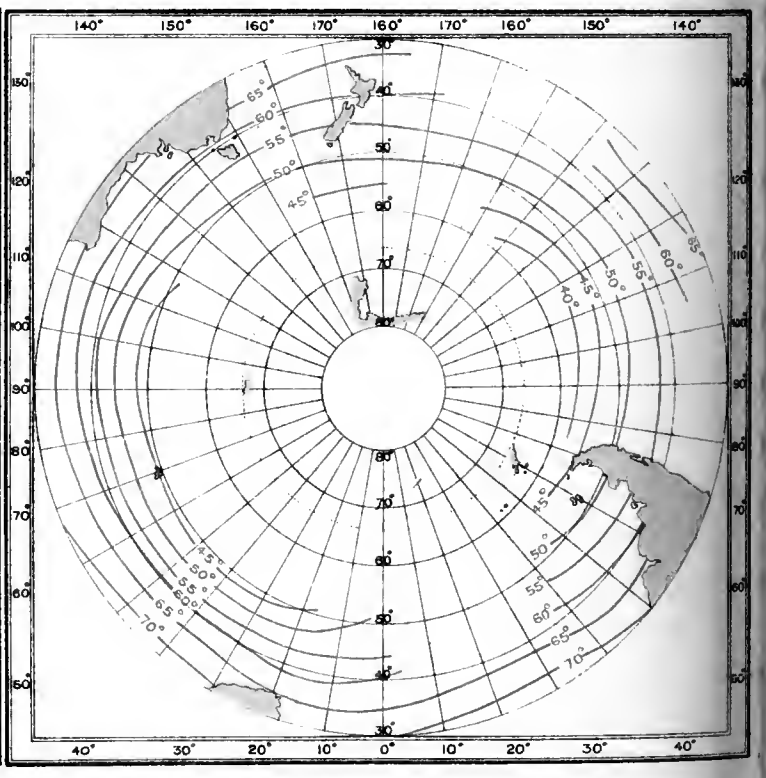


DECEMBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1901



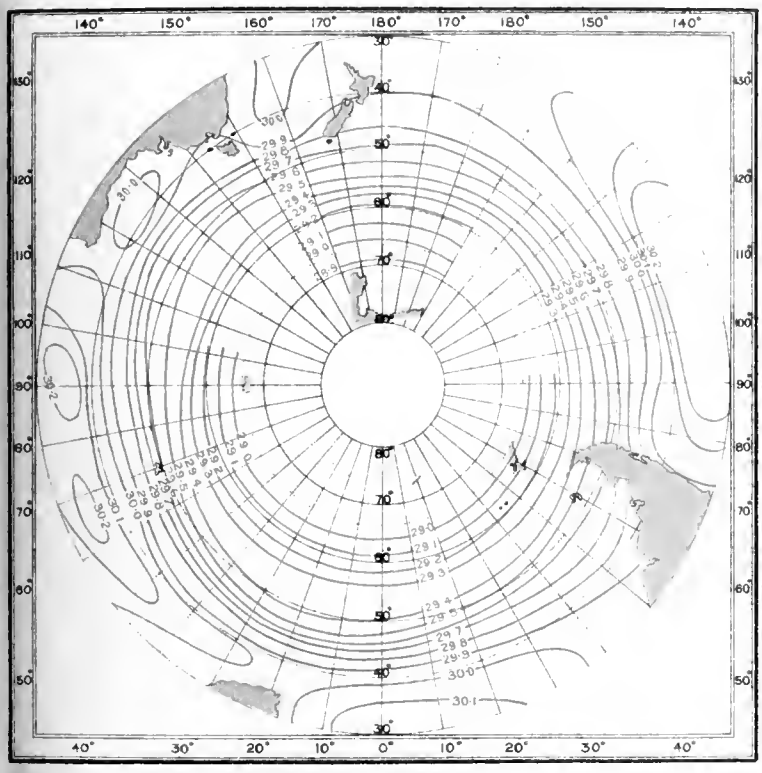
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

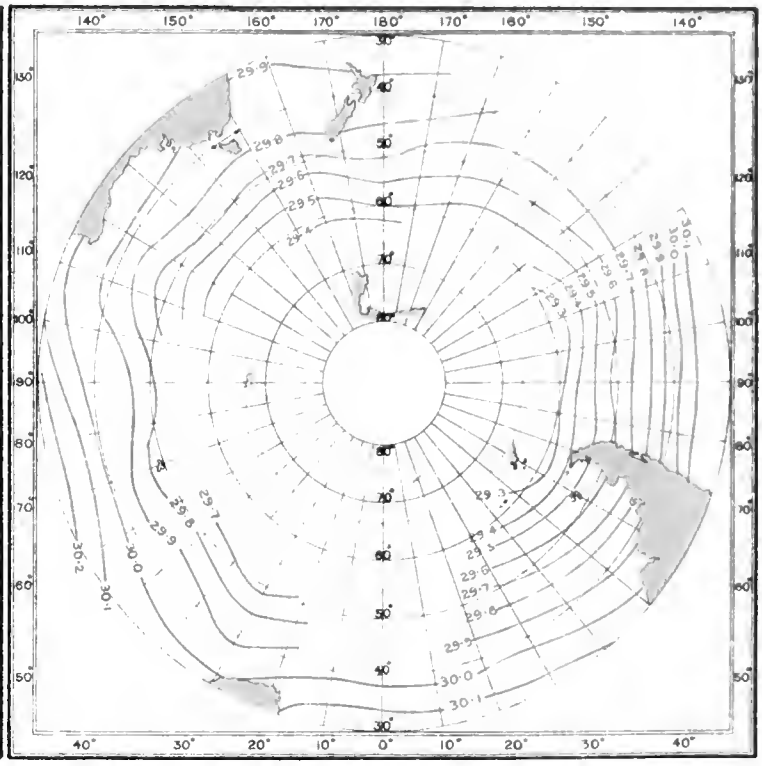
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

JANUARY

NORMAL PRESSURE.

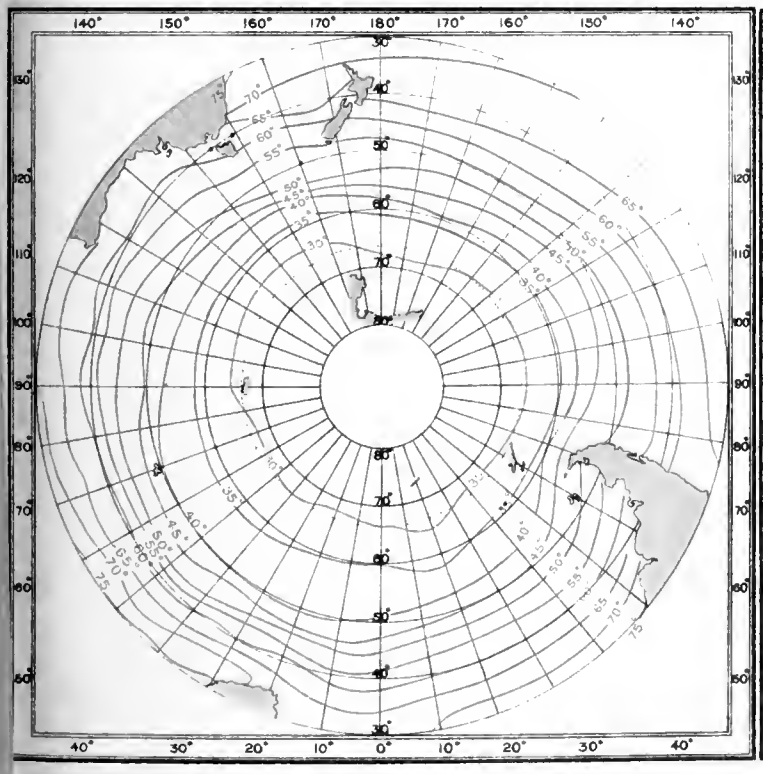


MEAN PRESSURE, NOON, G.M.T. 1902.

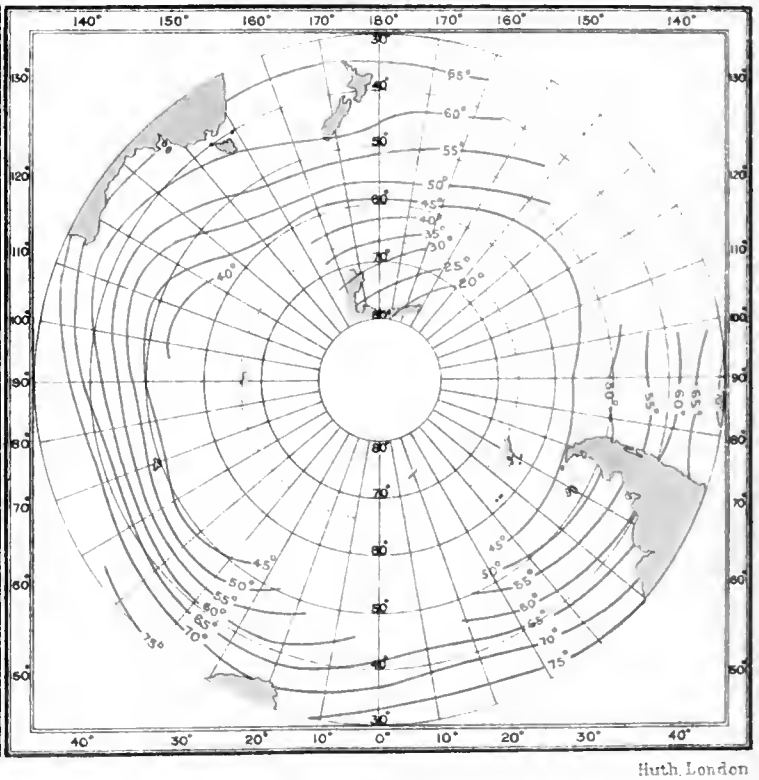


JANUARY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



Huth, London

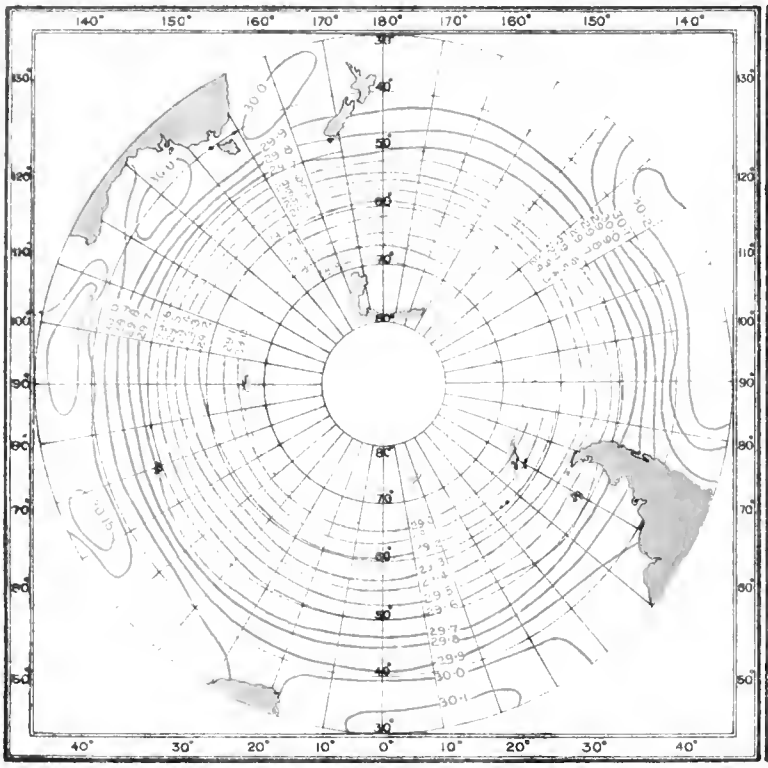
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

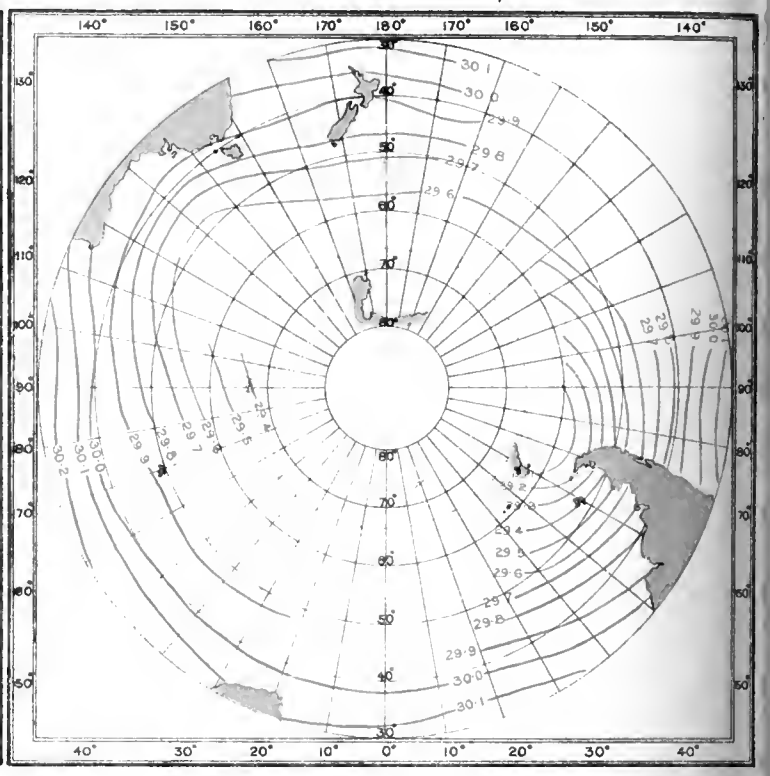
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

FEBRUARY

NORMAL PRESSURE.

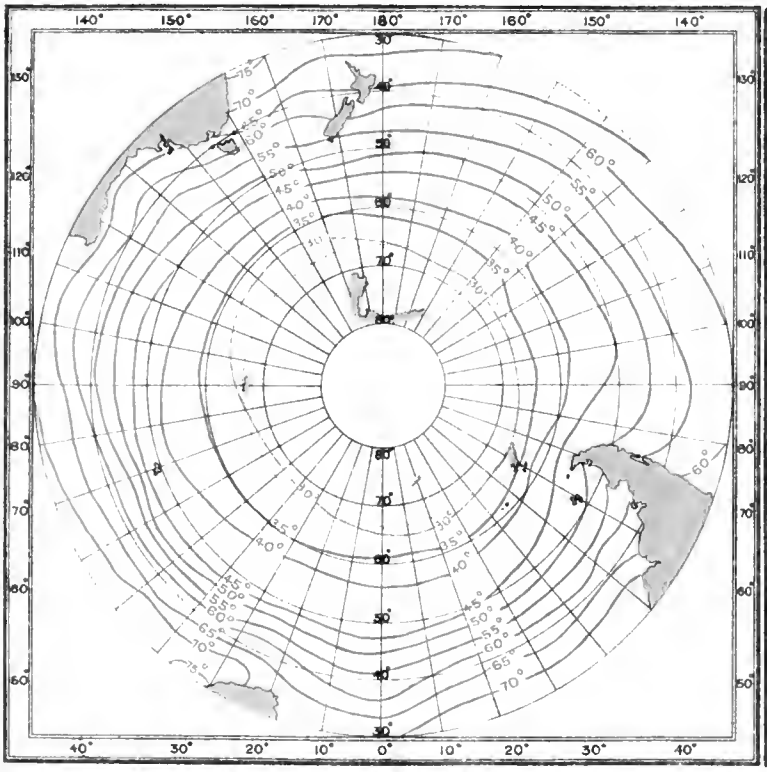


MEAN PRESSURE, NOON, G.M.T. 1902.

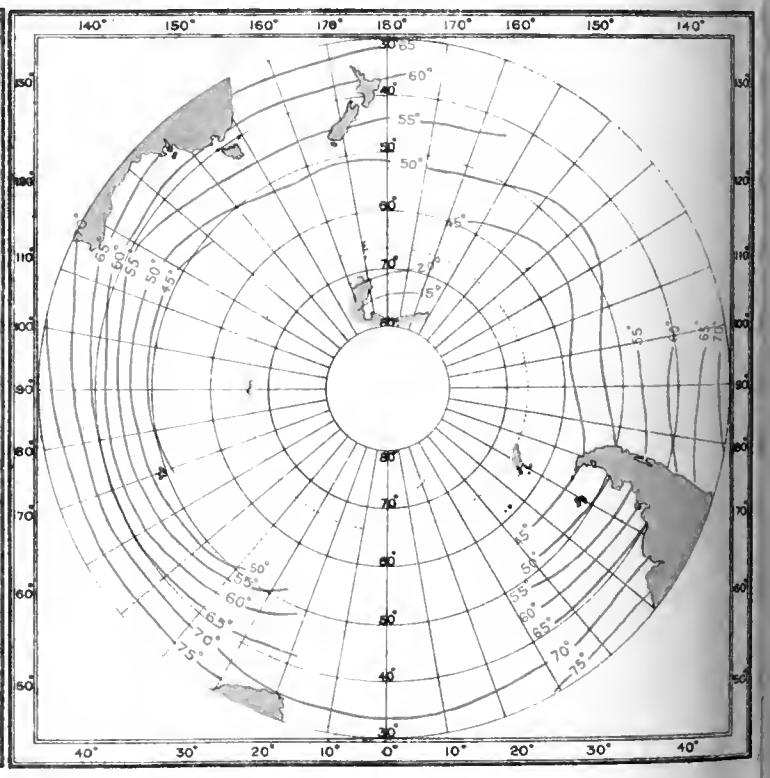


FEBRUARY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



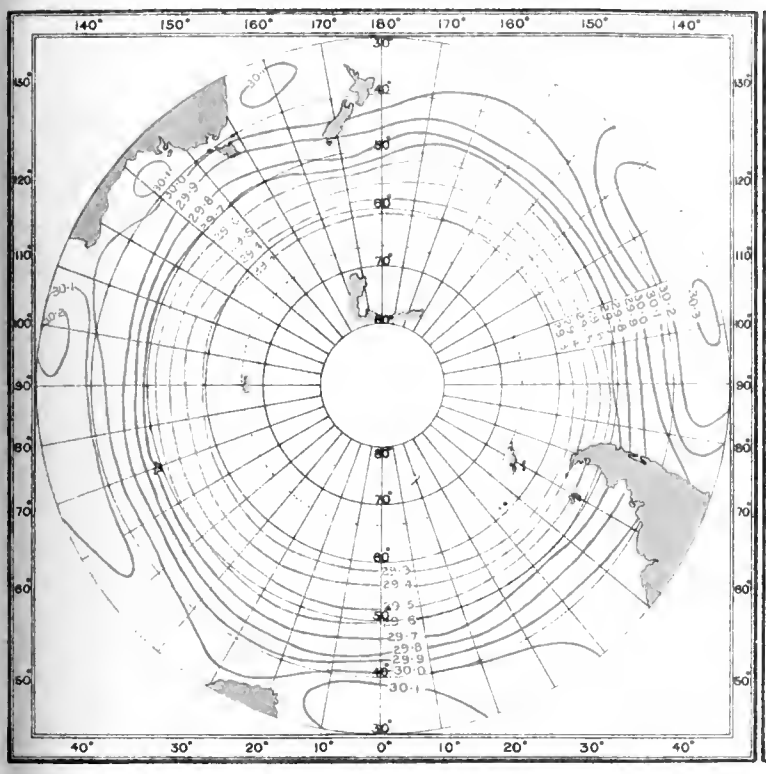
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

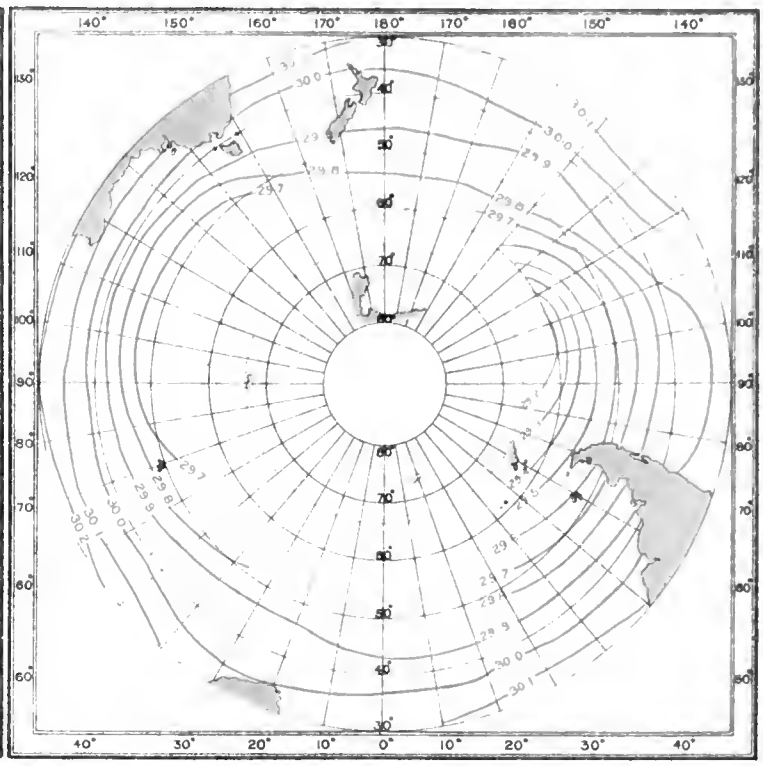
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

MARCH

NORMAL PRESSURE.

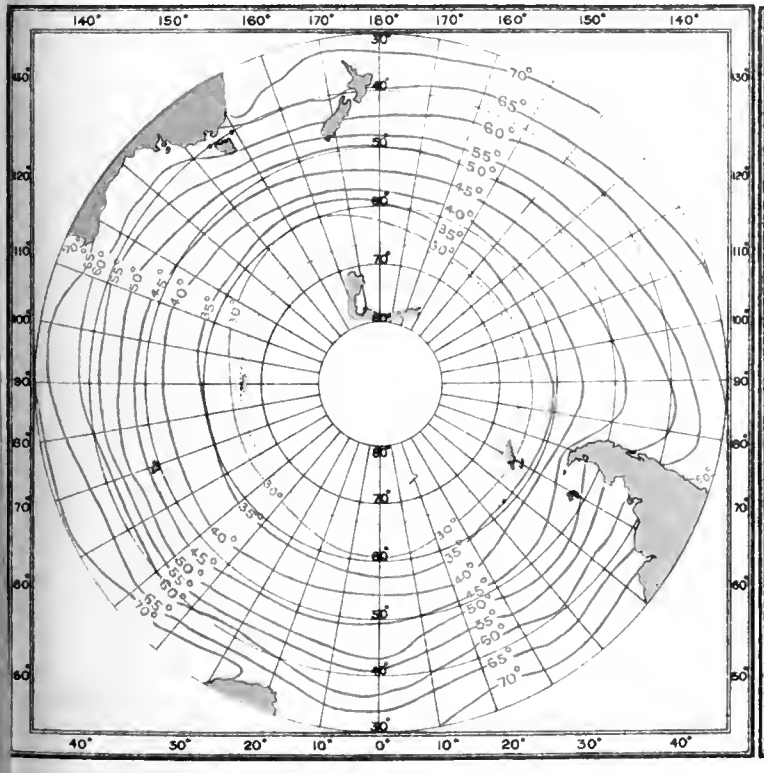


MEAN PRESSURE, NOON, G.M.T. 1902.

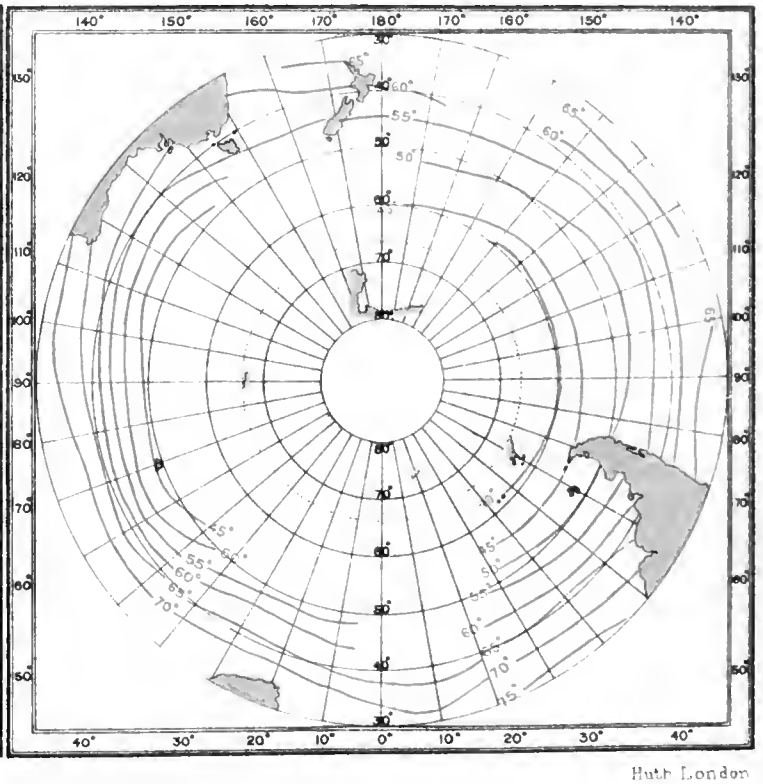


MARCH

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



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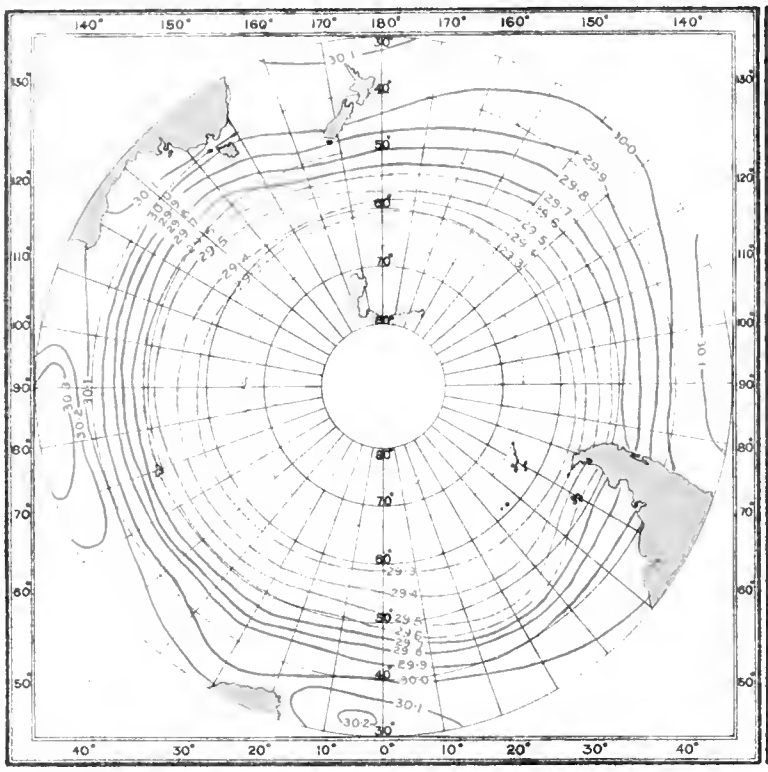
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

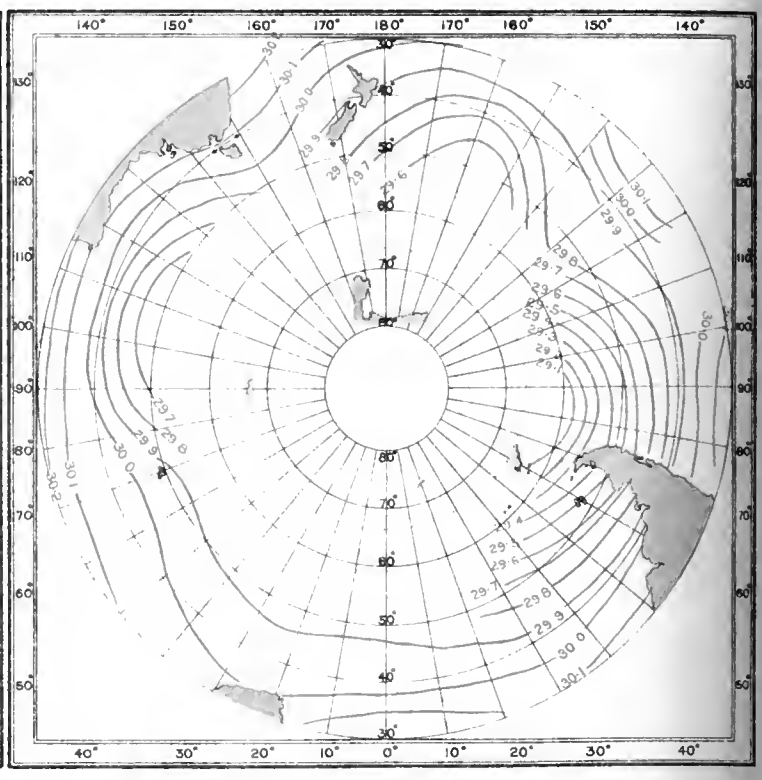
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

APRIL

NORMAL PRESSURE.

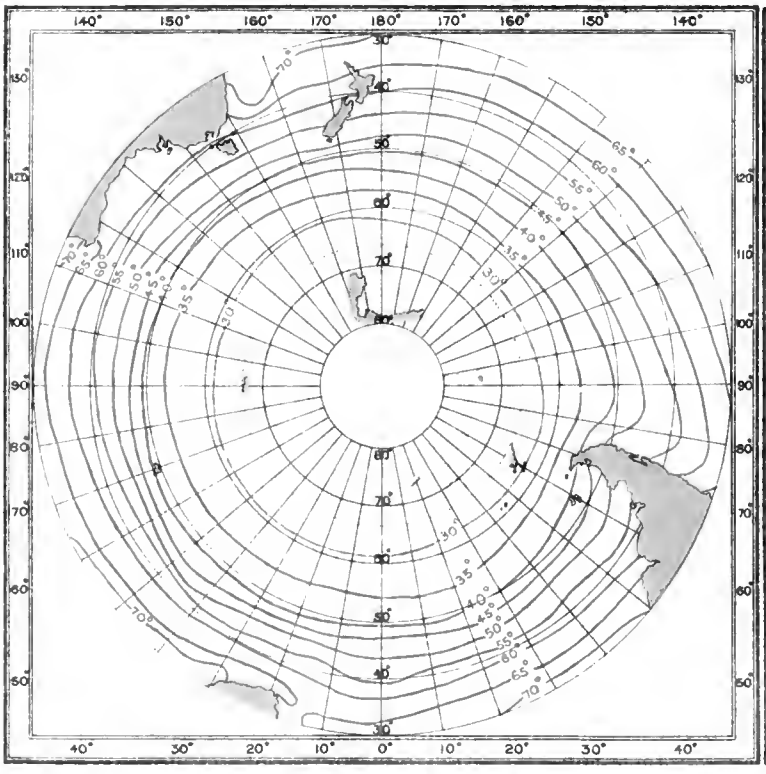


MEAN PRESSURE, NOON, G.M.T. 1902.

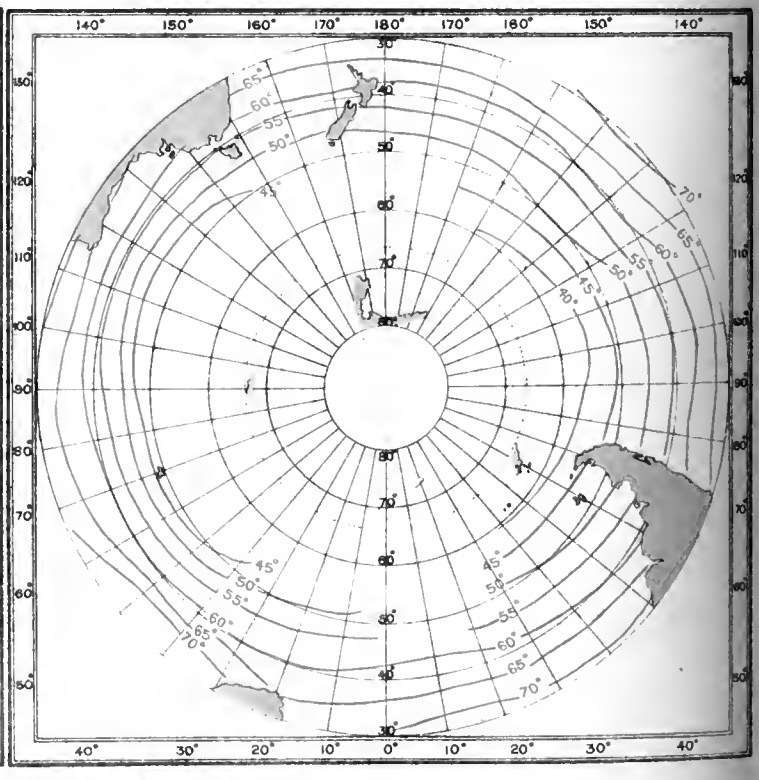


APRIL

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



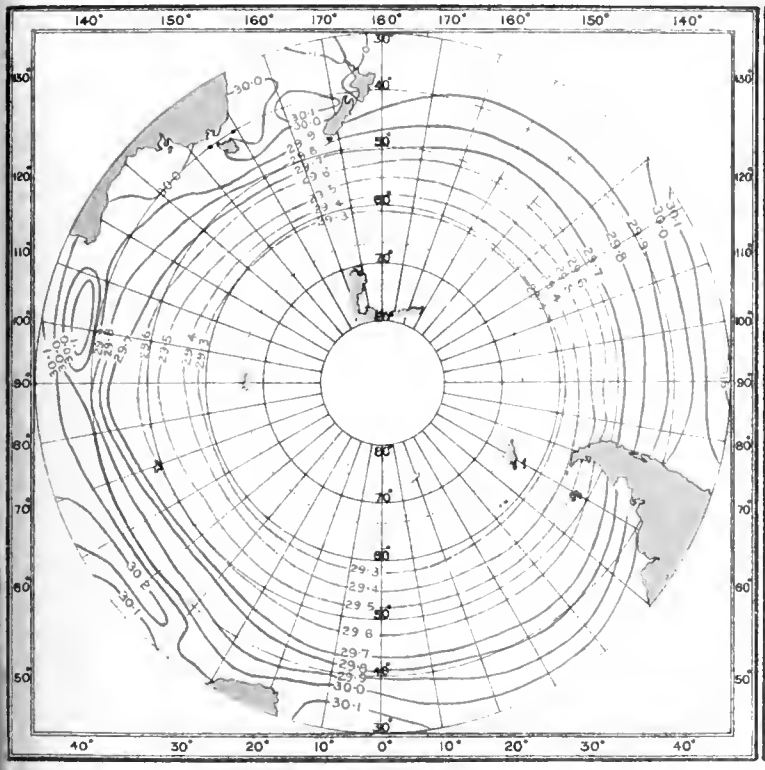
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

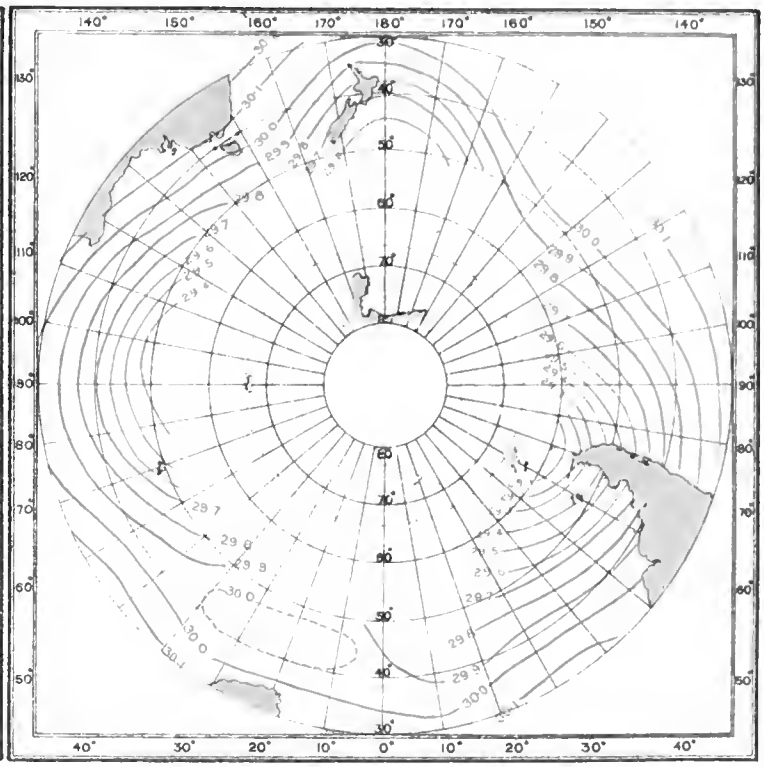
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

MAY

NORMAL PRESSURE.

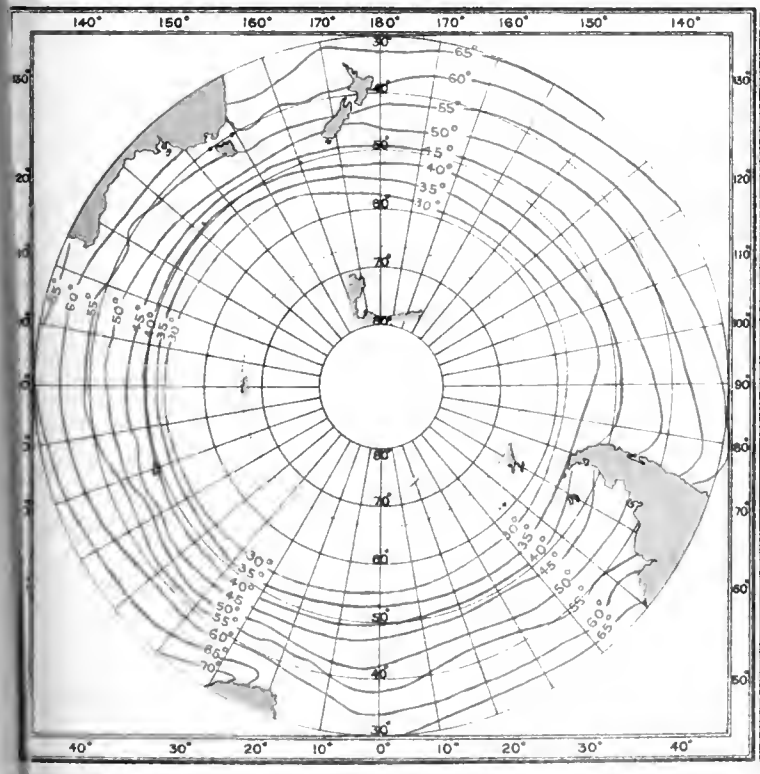


MEAN PRESSURE, NOON, G.M.T. 1902.

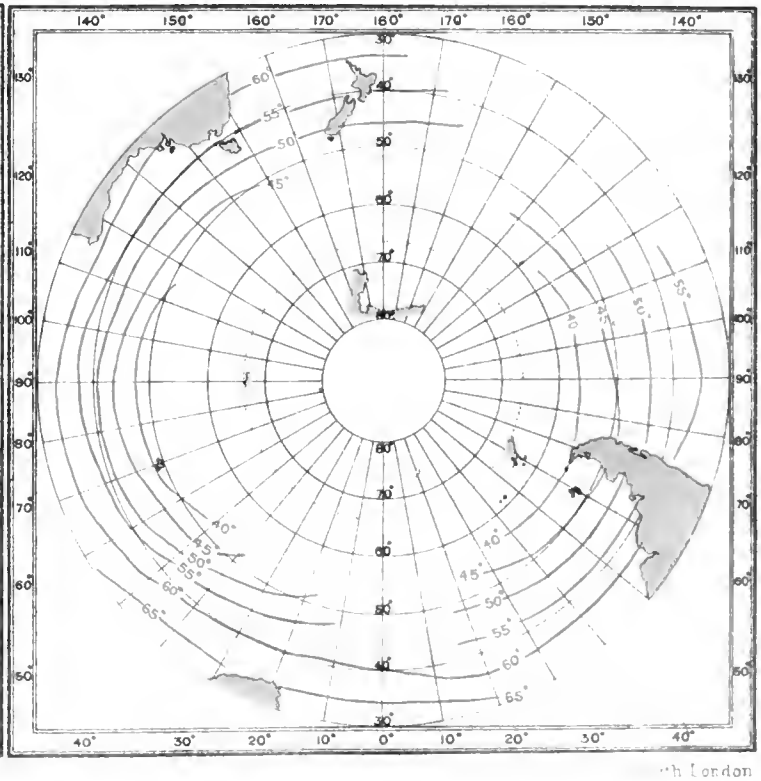


MAY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



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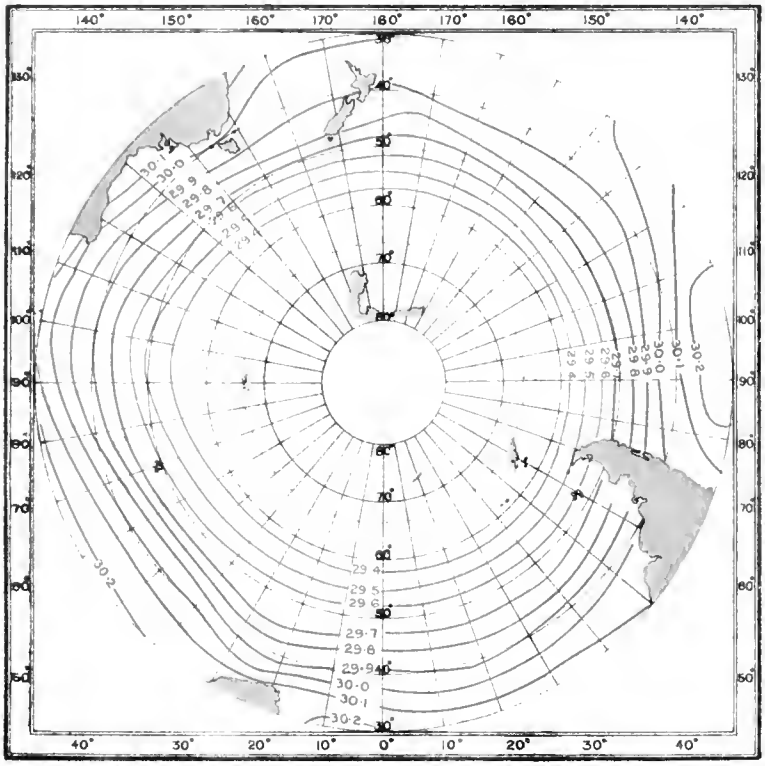
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

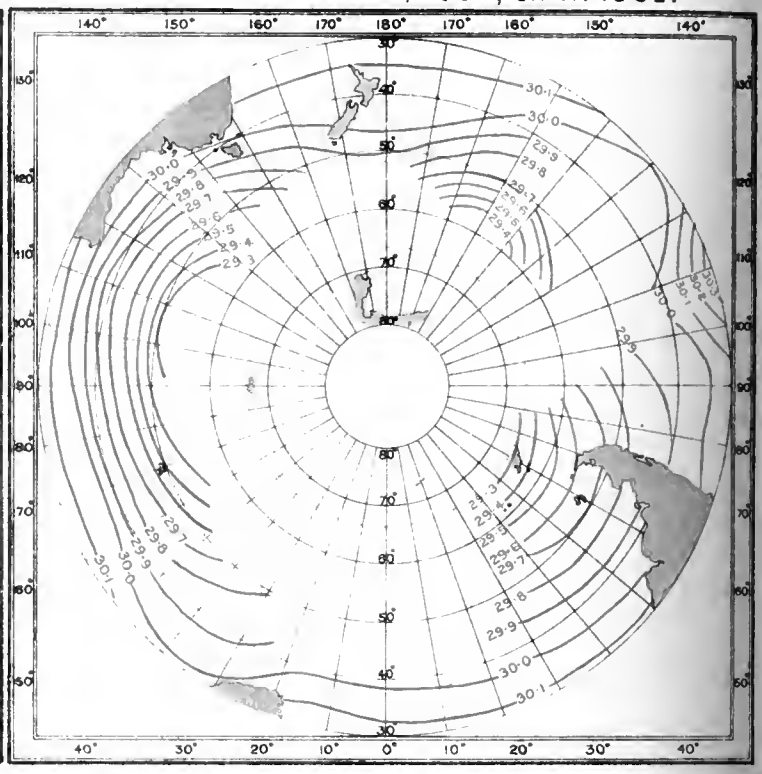
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

JUNE

NORMAL PRESSURE.

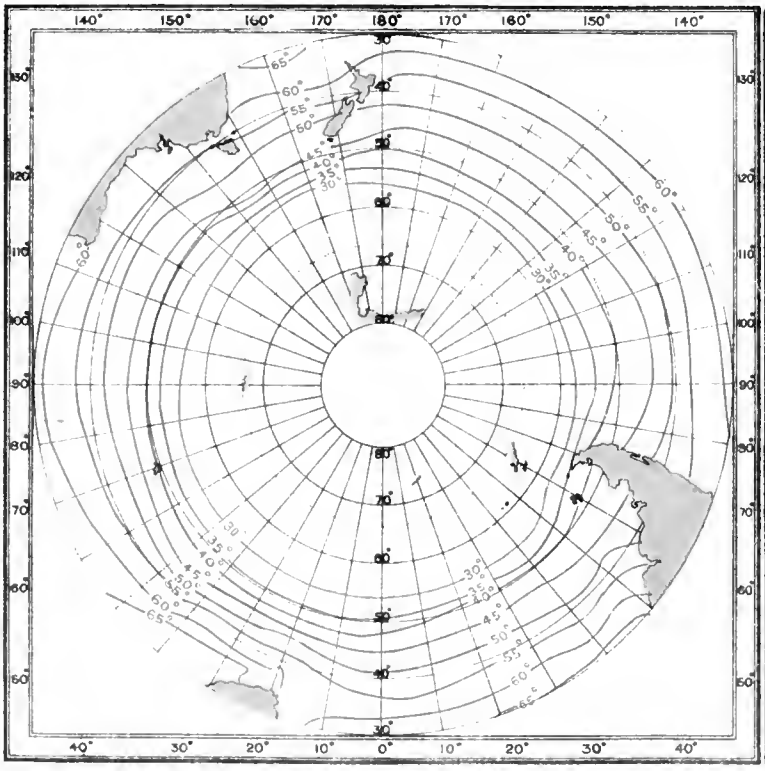


MEAN PRESSURE, NOON, G.M.T. 1902.

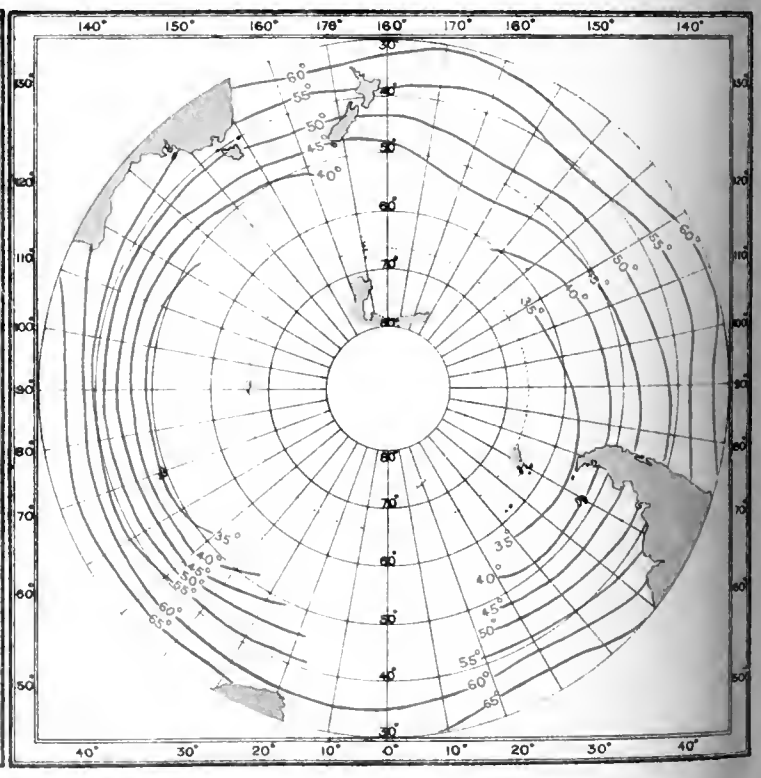


JUNE

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



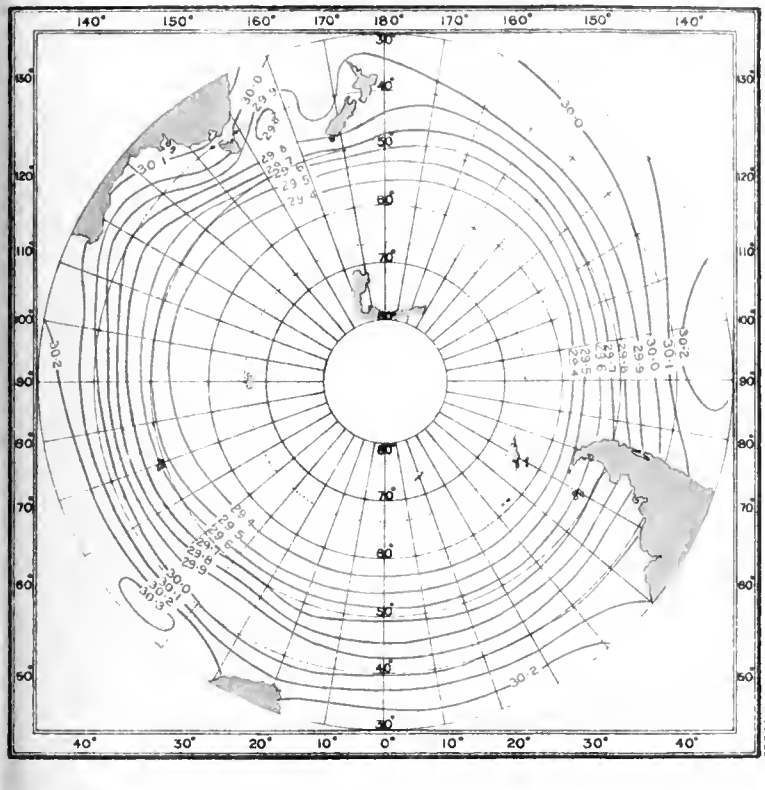
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

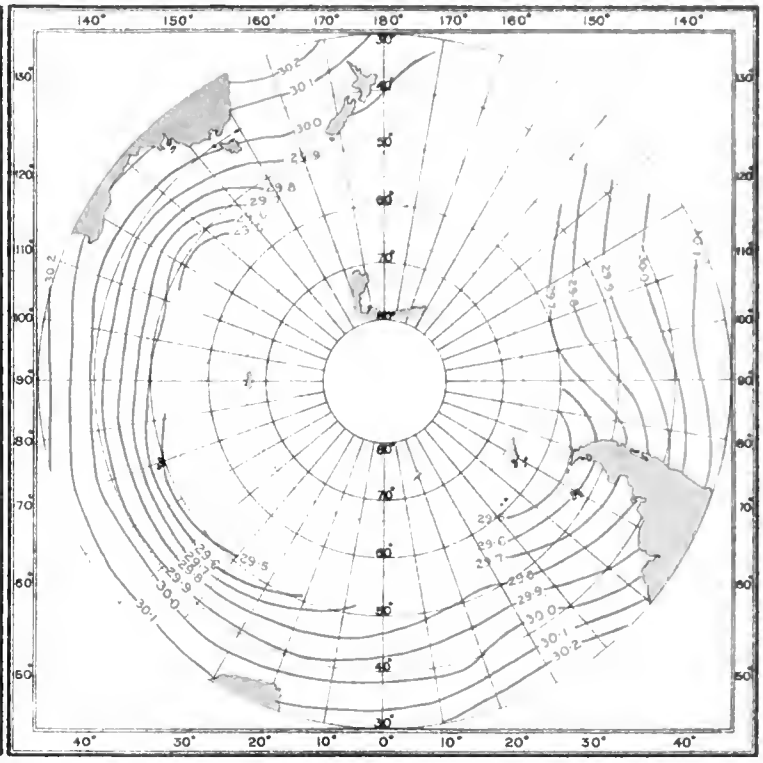
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

JULY

NORMAL PRESSURE.

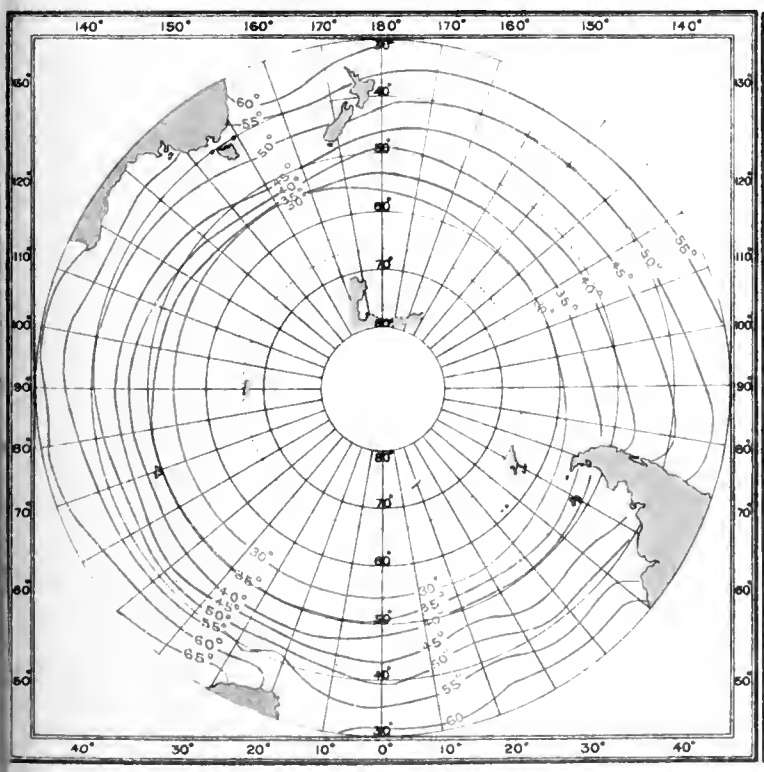


MEAN PRESSURE, NOON, G.M.T. 1902.

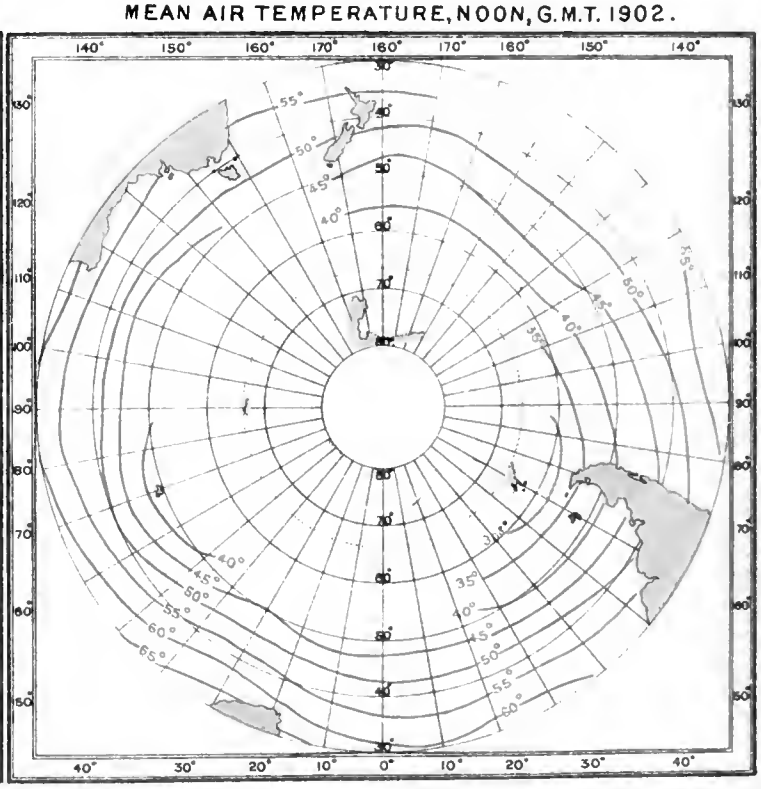


JULY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



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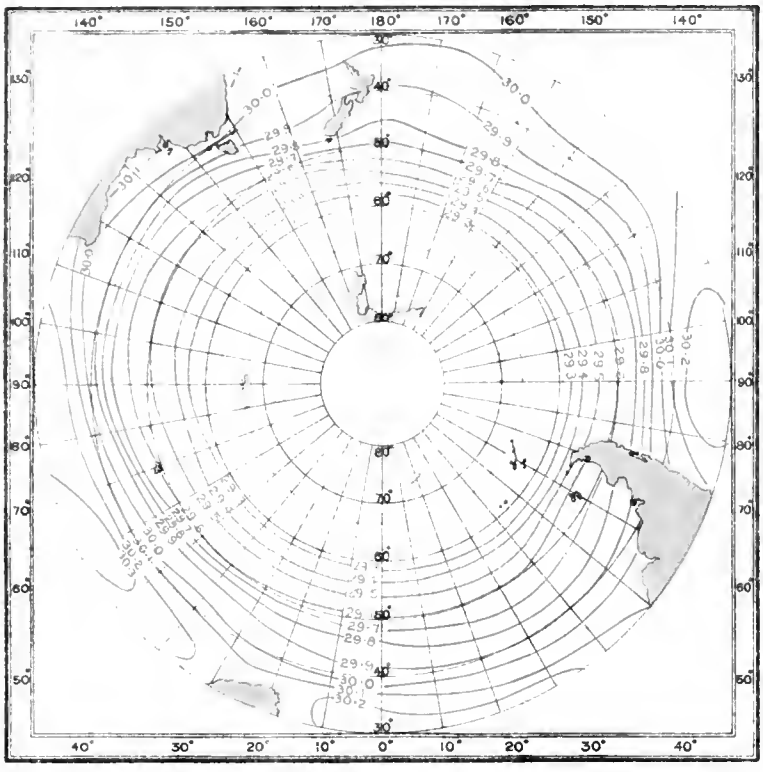
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

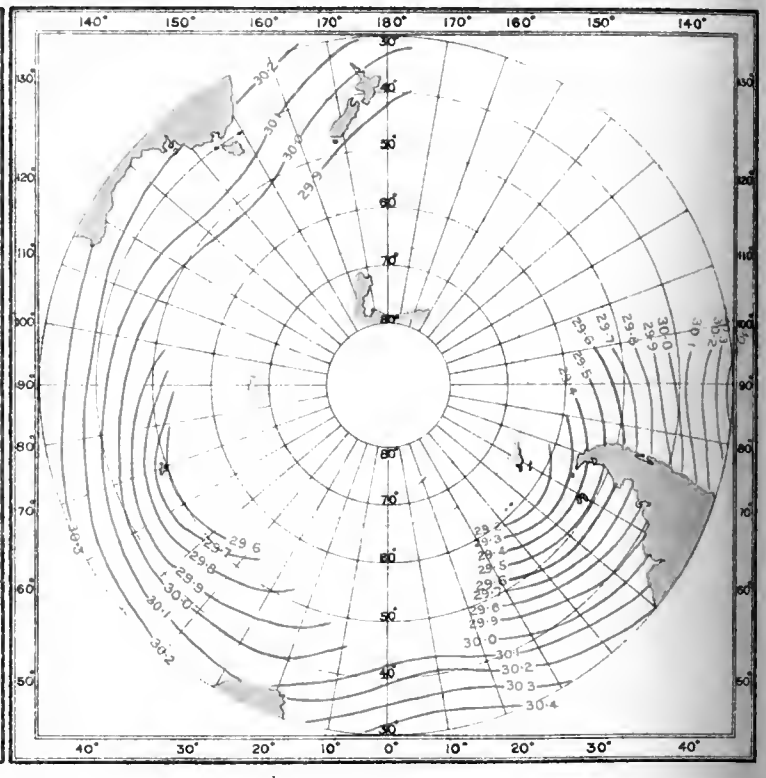
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

AUGUST

NORMAL PRESSURE.

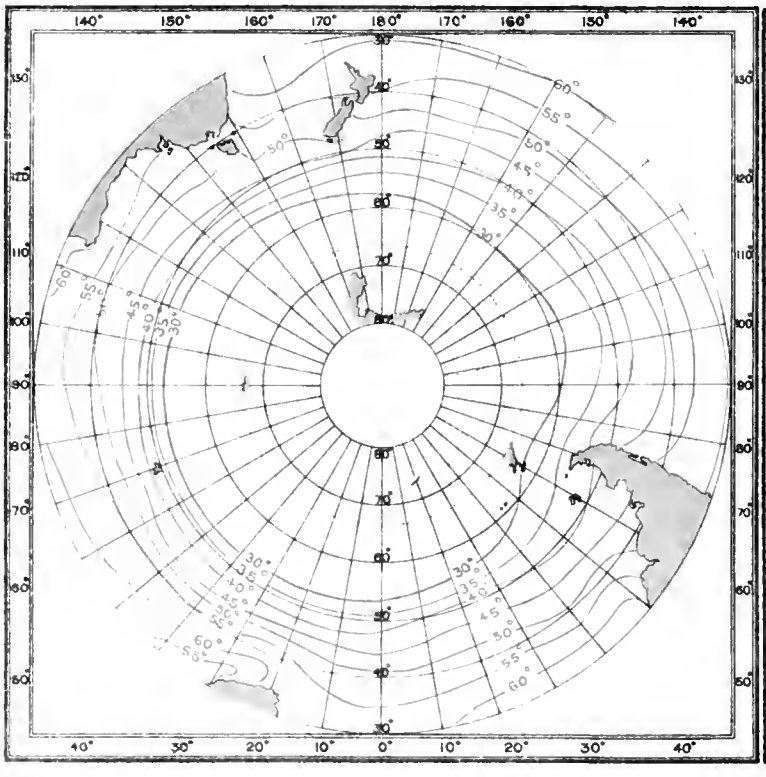


MEAN PRESSURE, NOON, G.M.T. 1902.

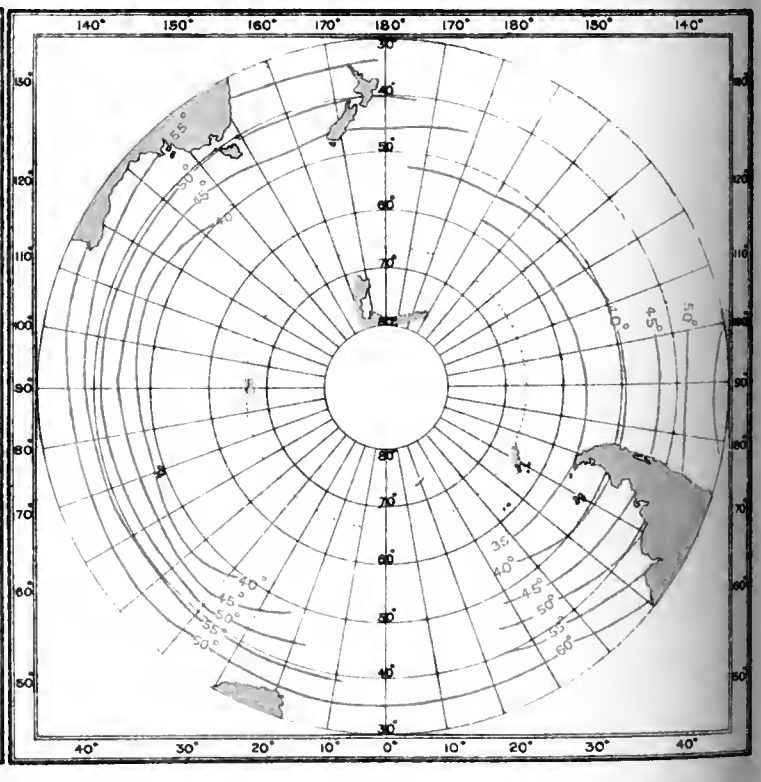


AUGUST

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



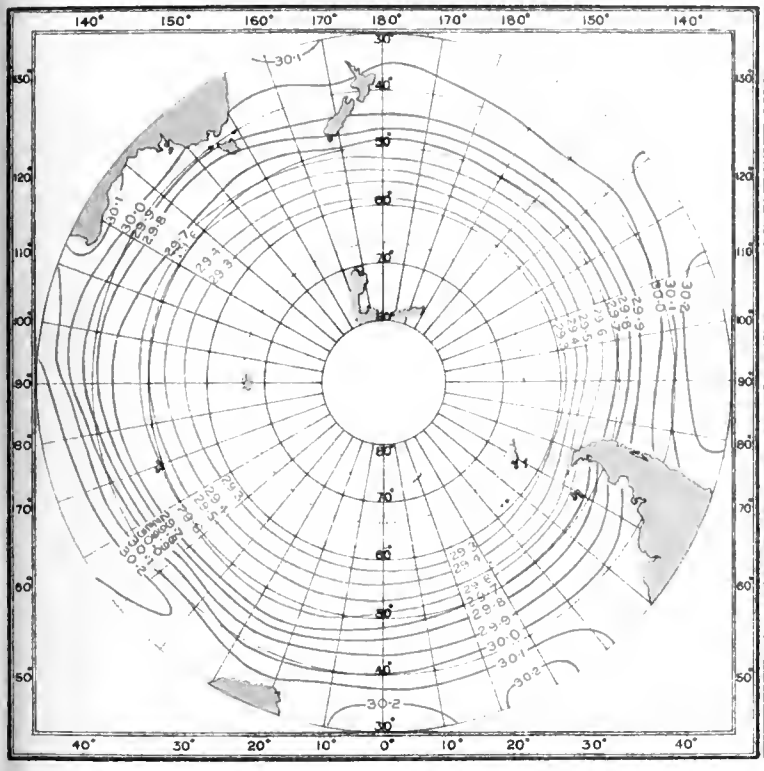
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

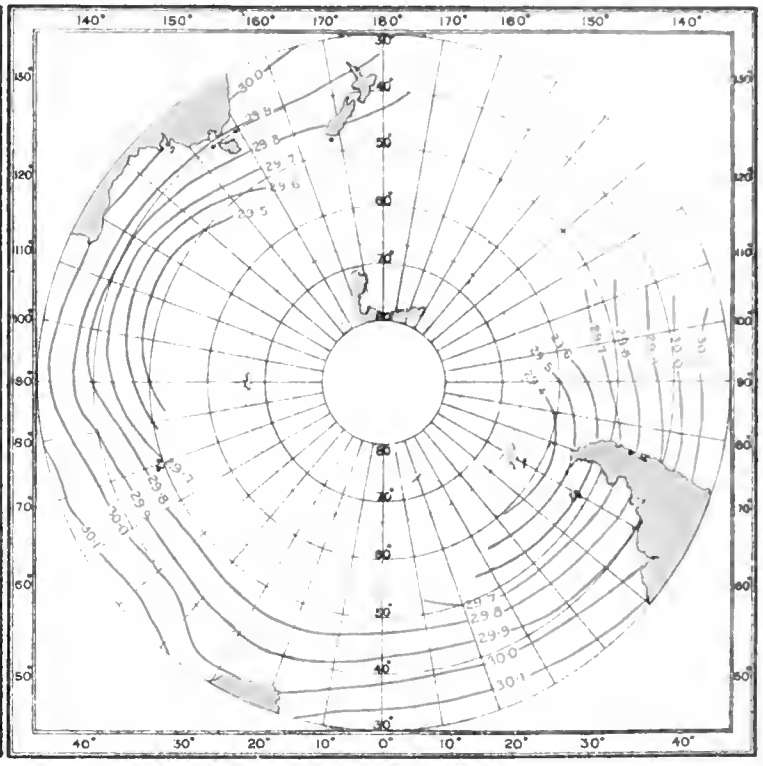
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

SEPTEMBER

NORMAL PRESSURE.

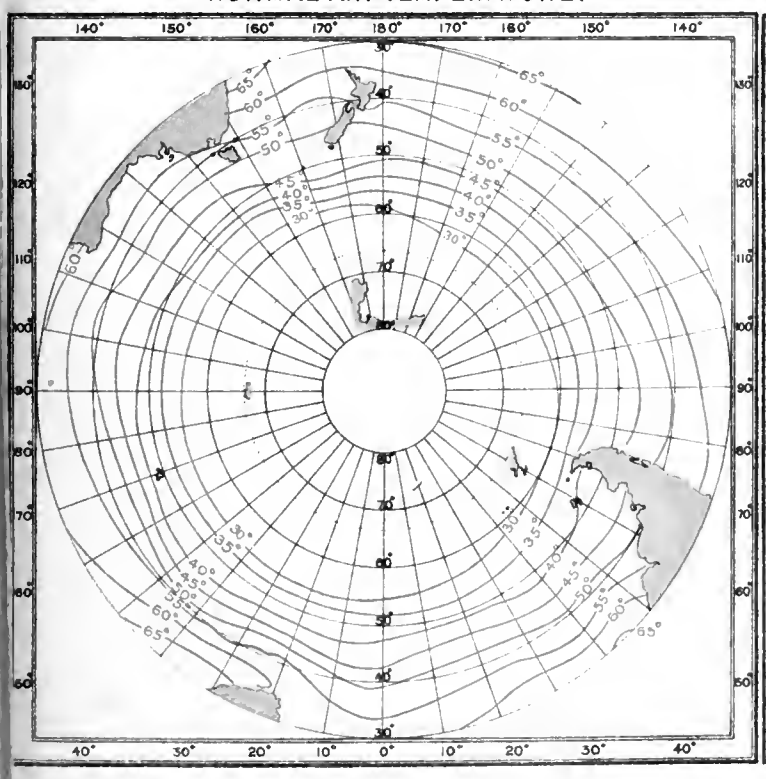


MEAN PRESSURE, NOON, G.M.T. 1902.

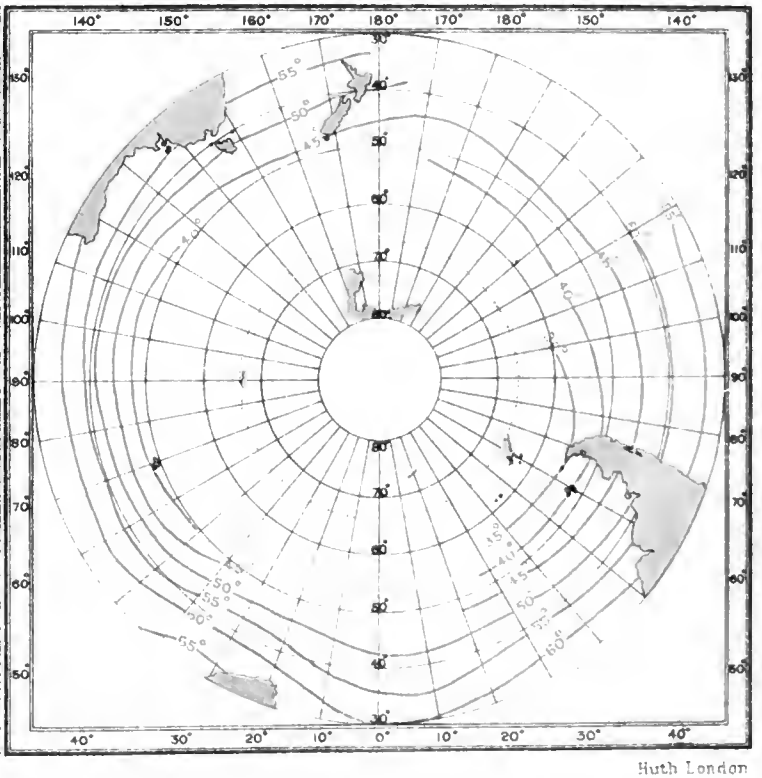


SEPTEMBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



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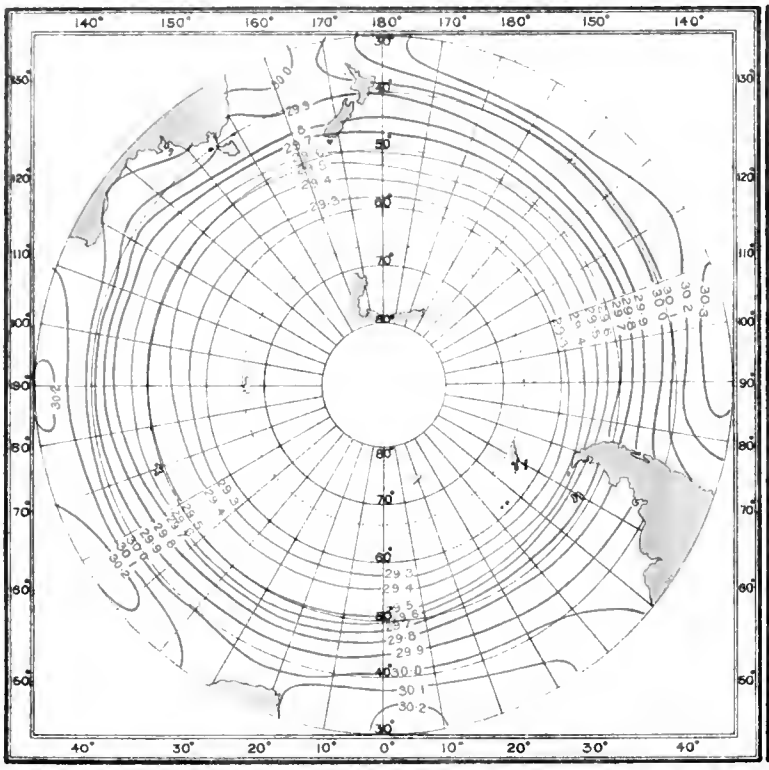
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

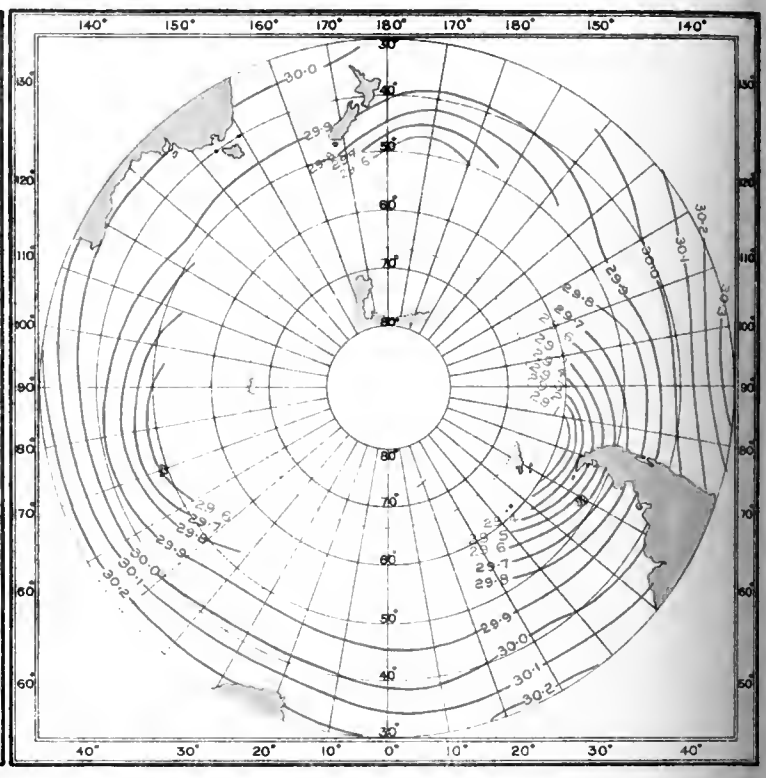
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

OCTOBER

NORMAL PRESSURE.

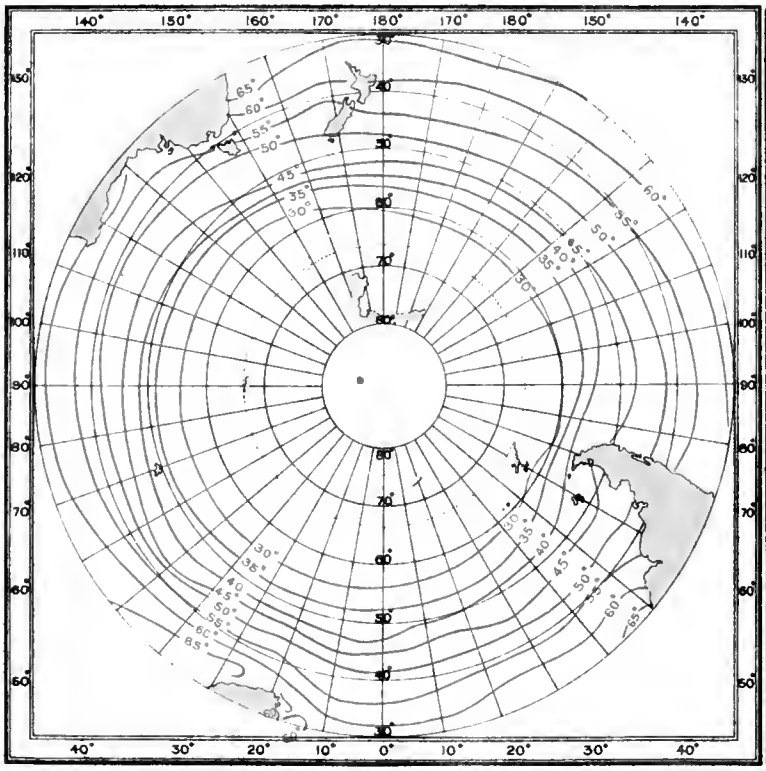


MEAN PRESSURE, NOON, G.M.T. 1902.

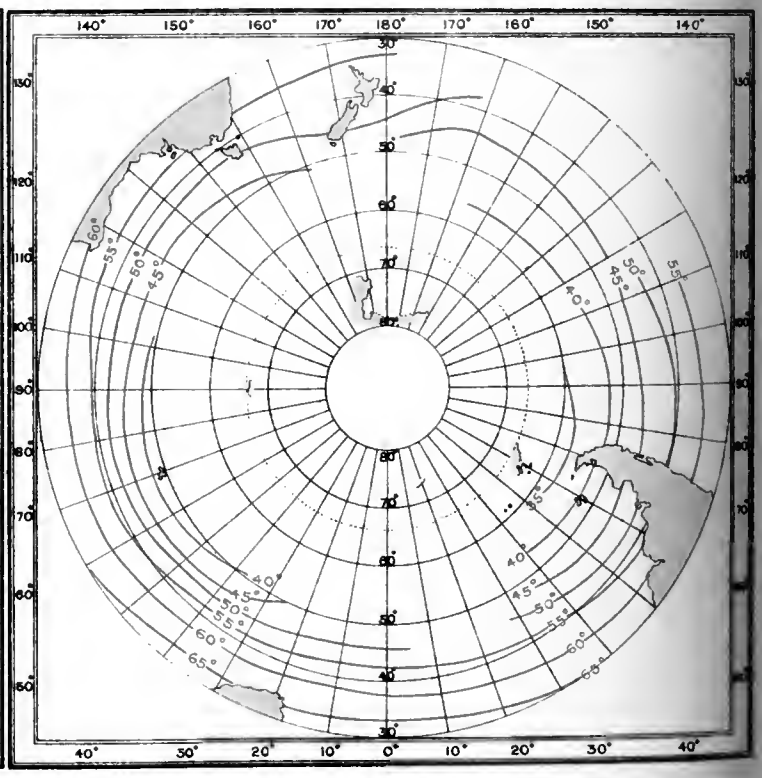


OCTOBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



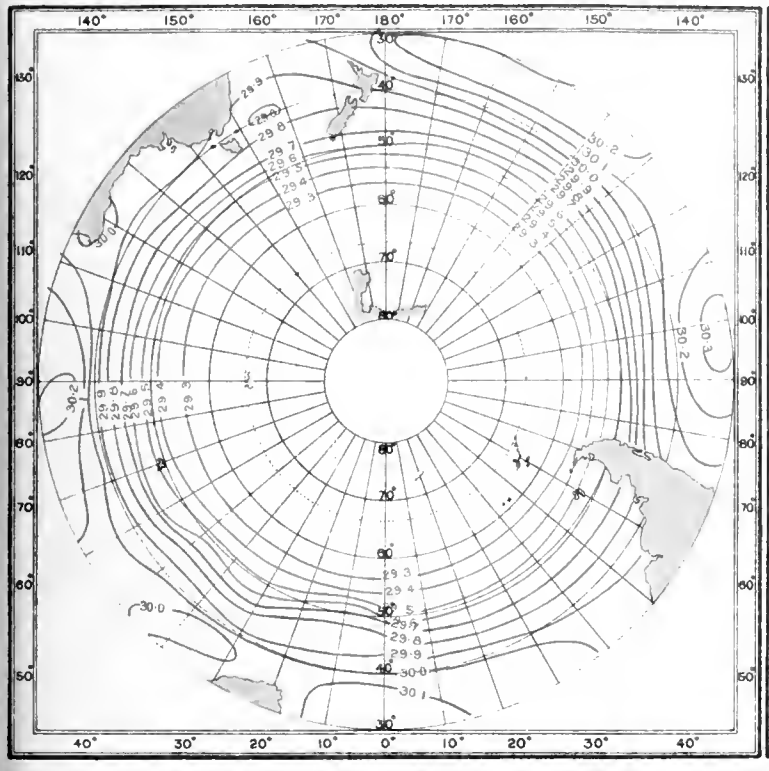
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

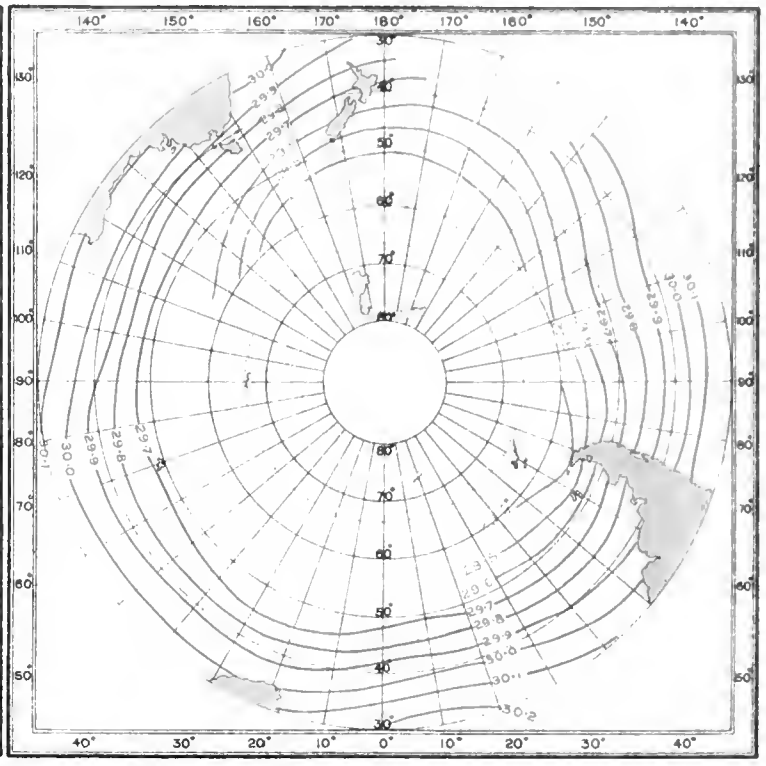
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

NOVEMBER

NORMAL PRESSURE.

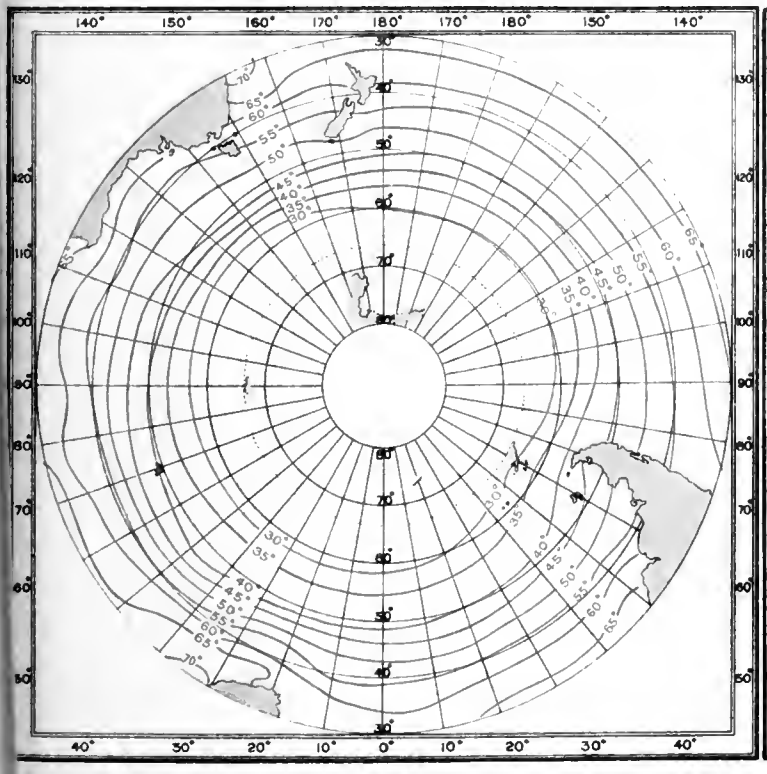


MEAN PRESSURE, NOON, G.M.T. 1902.

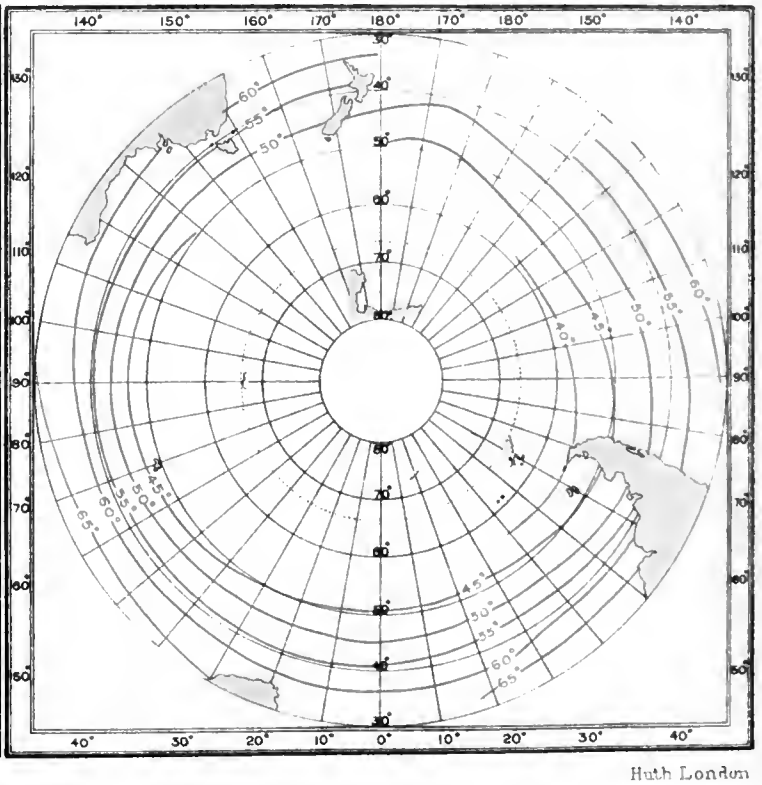


NOVEMBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



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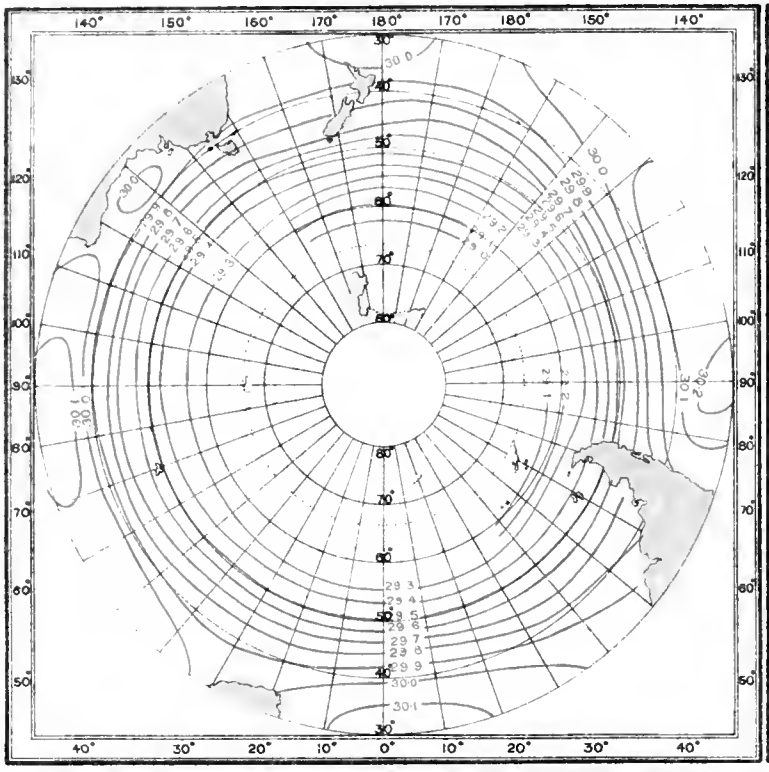
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

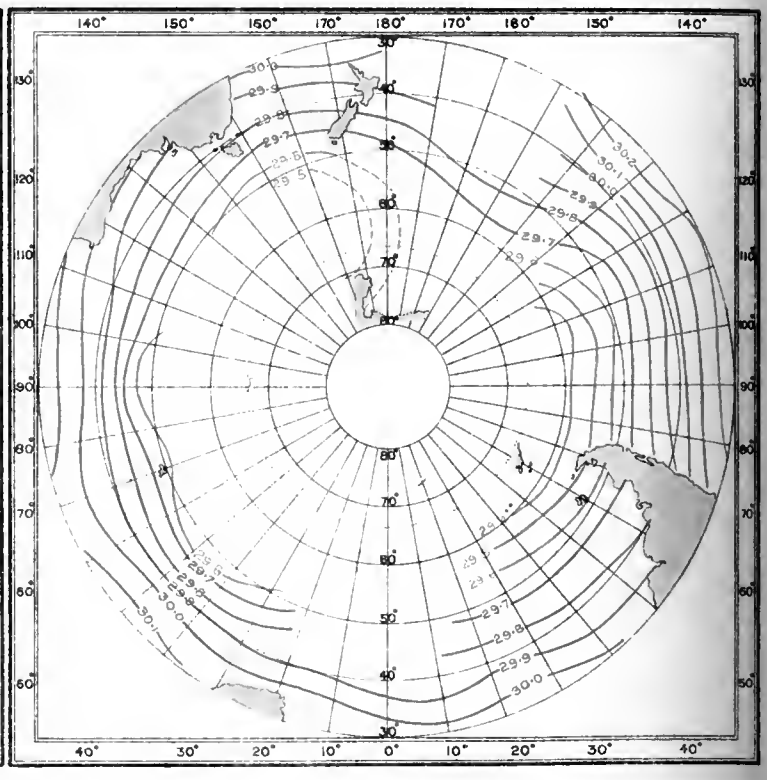
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

DECEMBER

NORMAL PRESSURE.

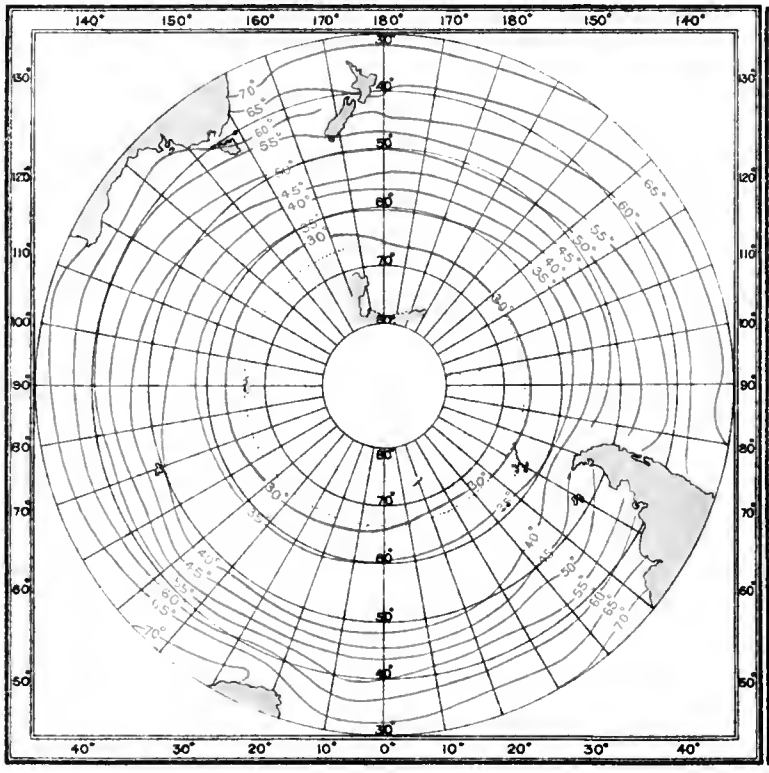


MEAN PRESSURE, NOON, G.M.T. 1902.

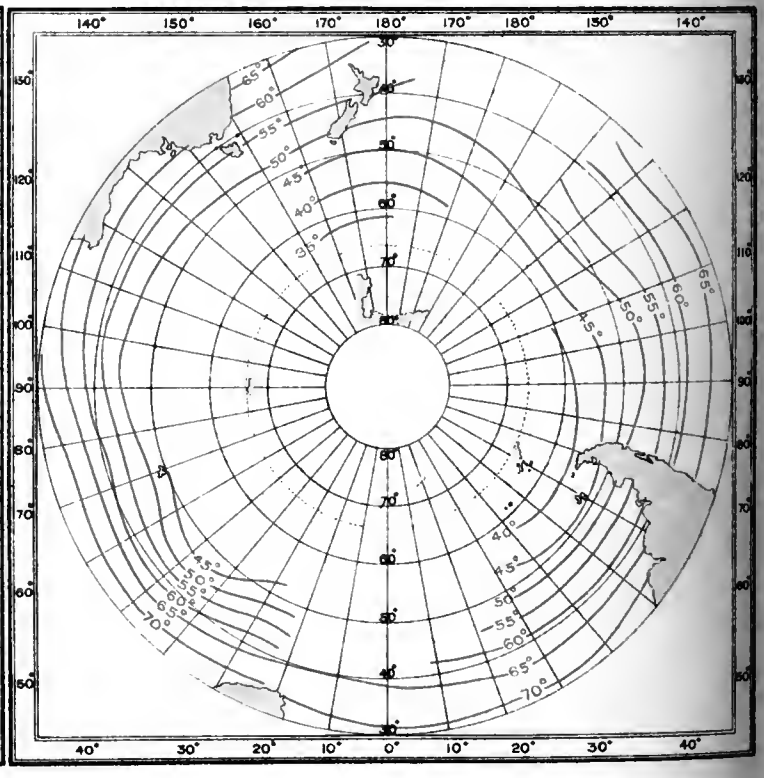


DECEMBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1902.



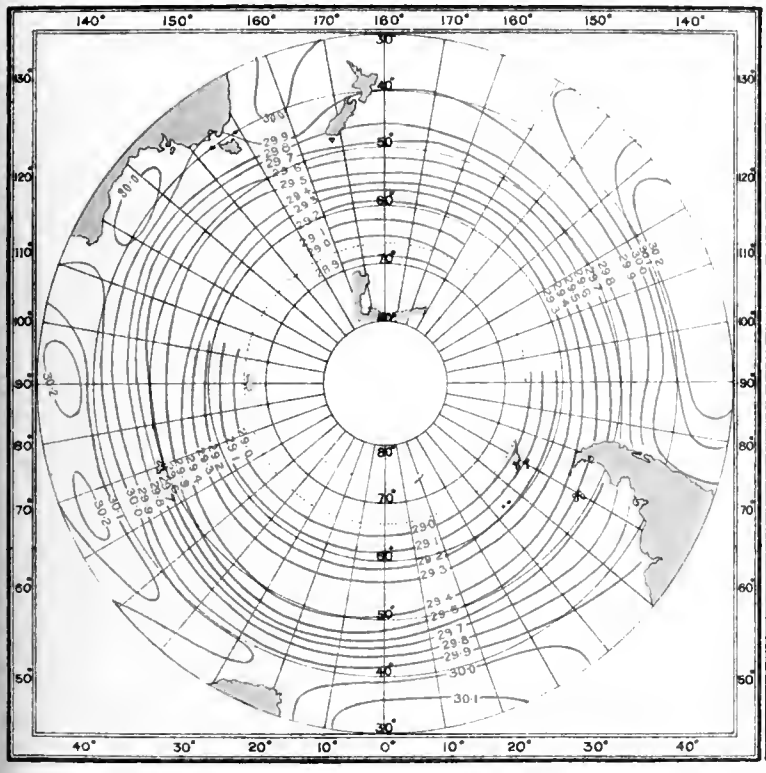
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

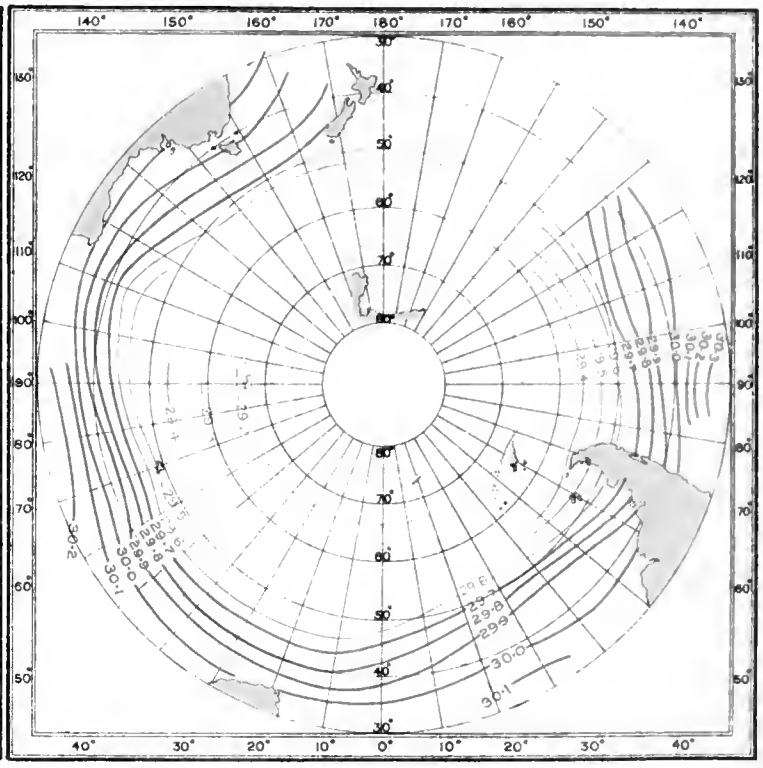
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

JANUARY

NORMAL PRESSURE.

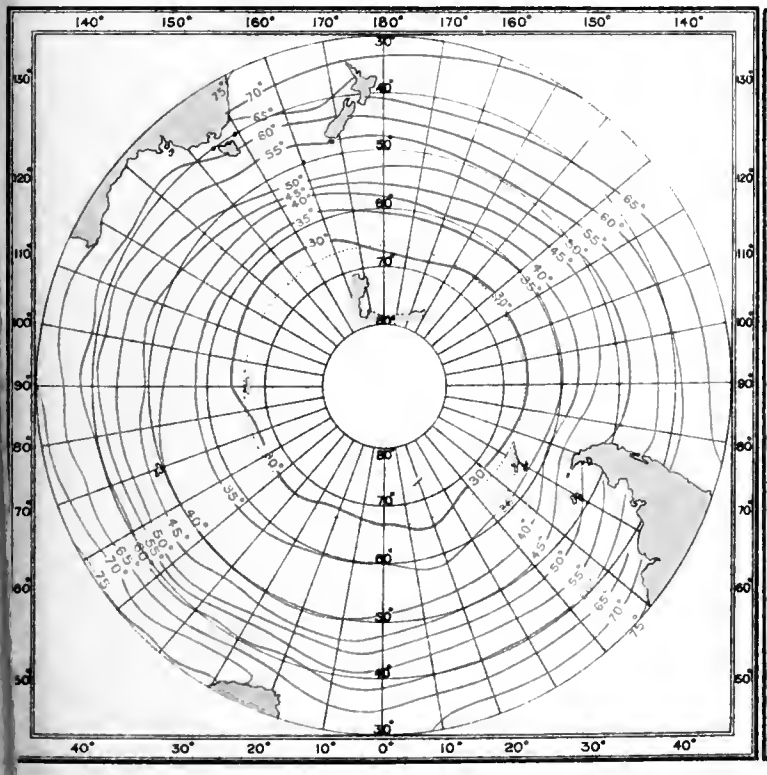


MEAN PRESSURE, NOON, G.M.T. 1903.

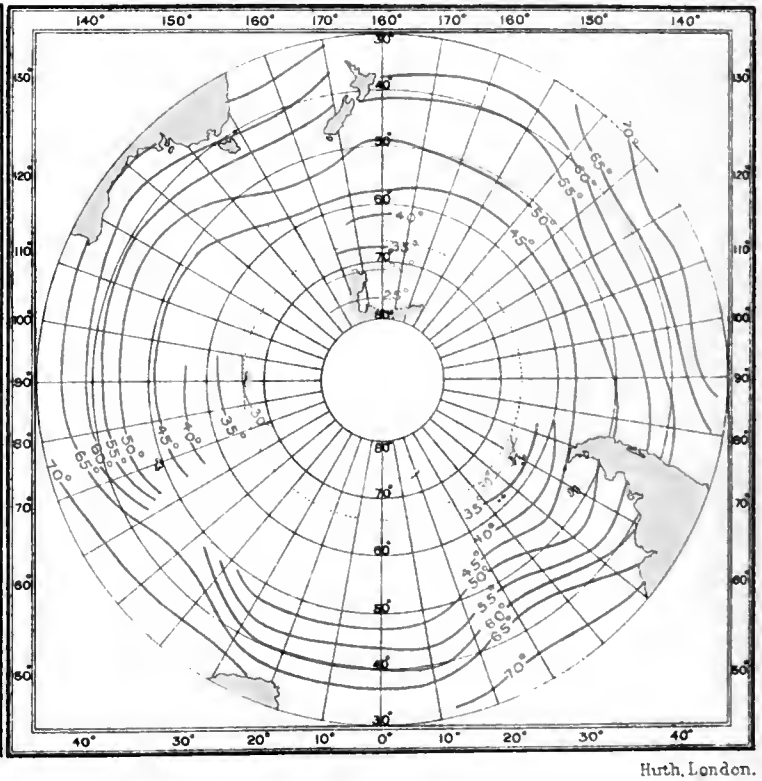


JANUARY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



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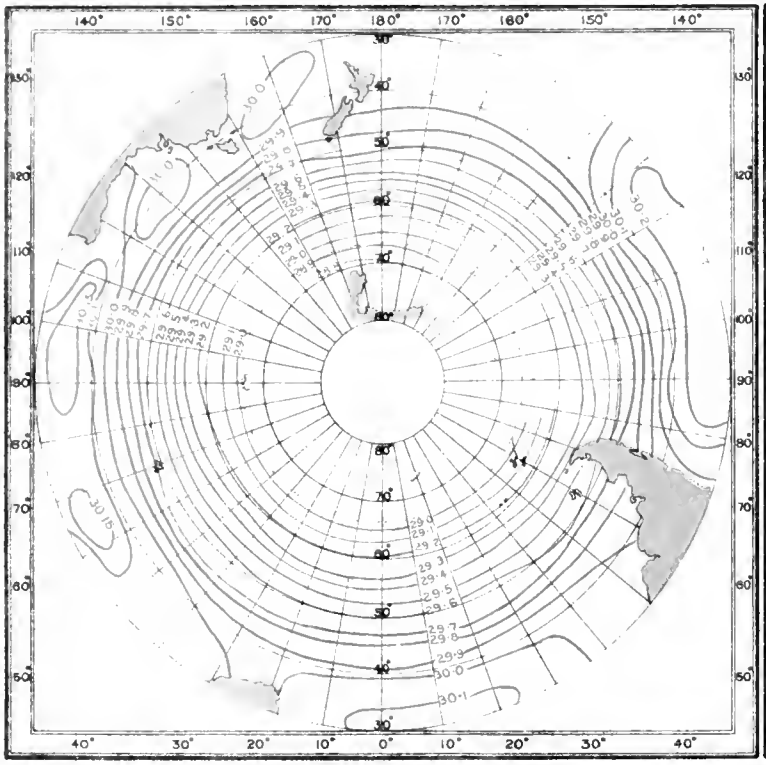
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

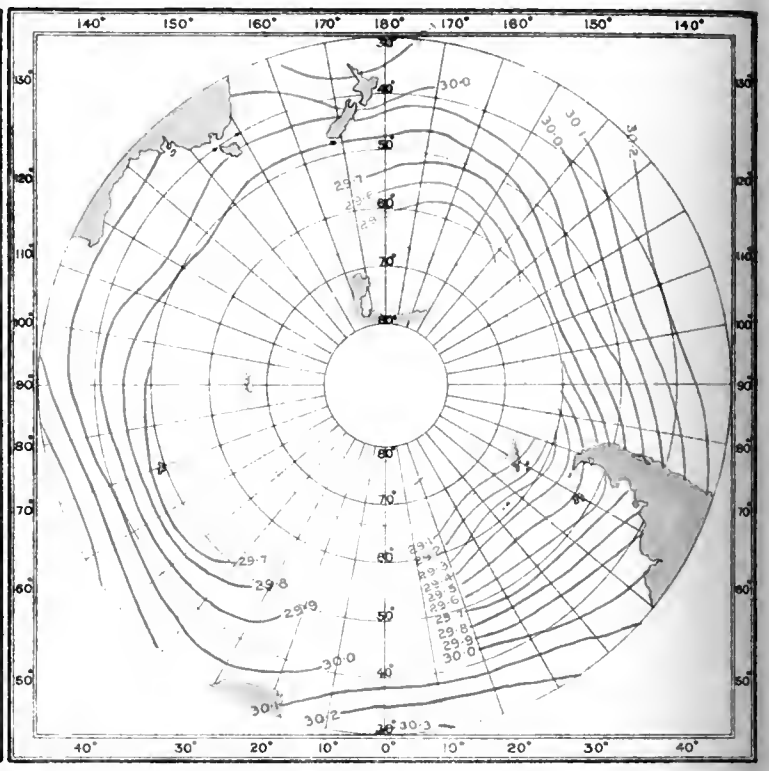
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

FEBRUARY

NORMAL PRESSURE.

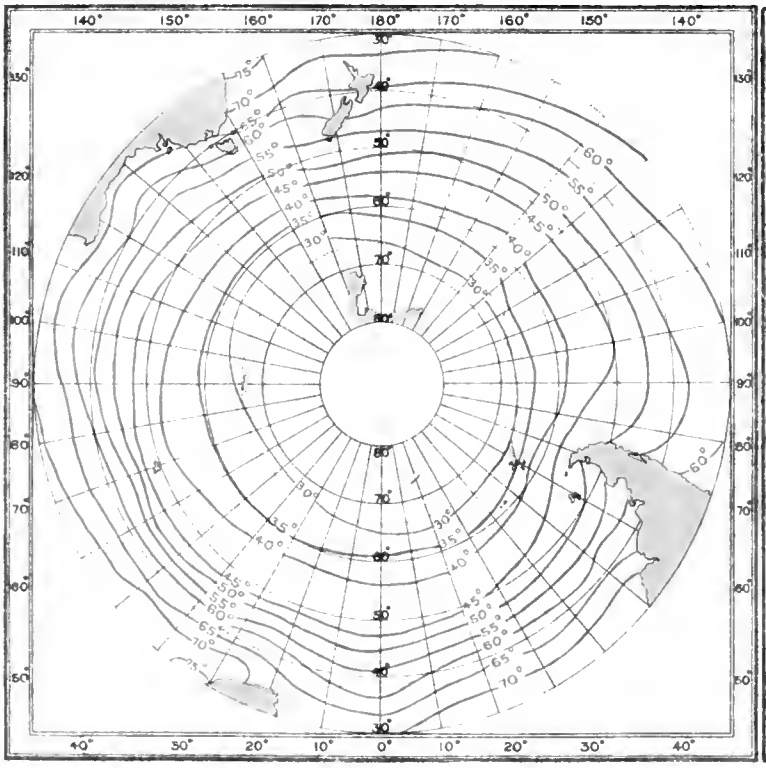


MEAN PRESSURE, NOON, G.M.T. 1903.

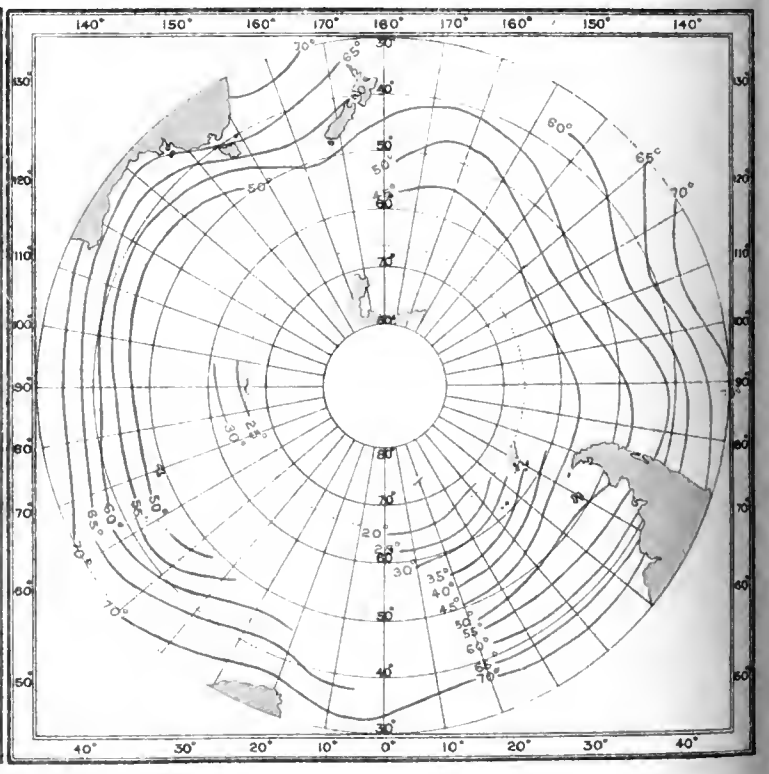


FEBRUARY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



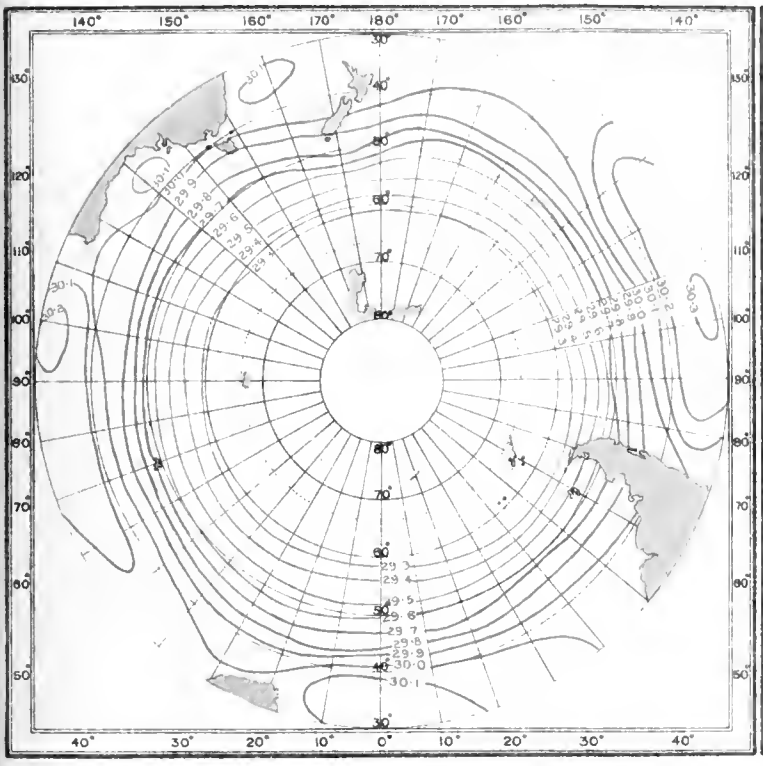
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

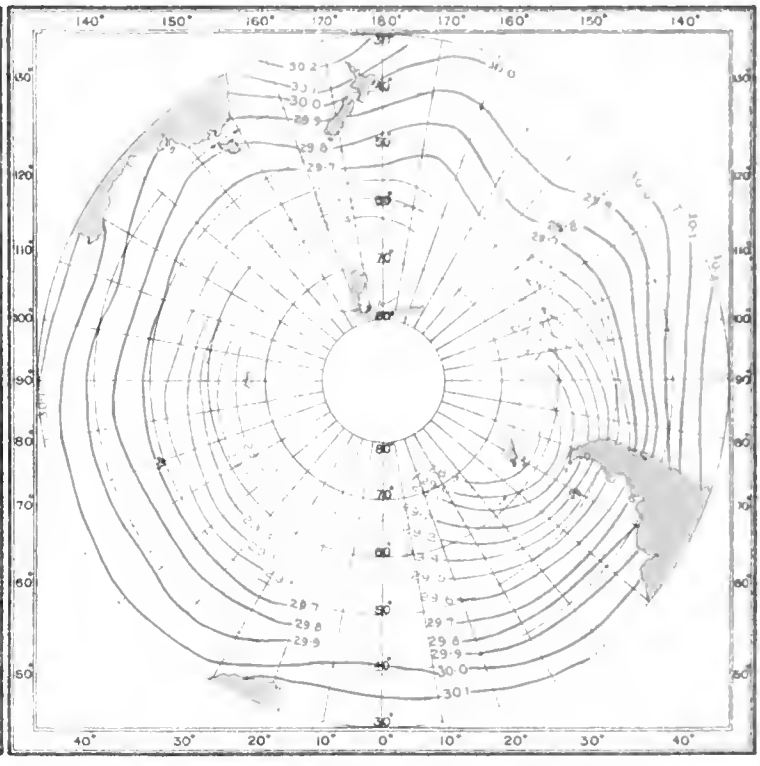
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

MARCH

NORMAL PRESSURE.

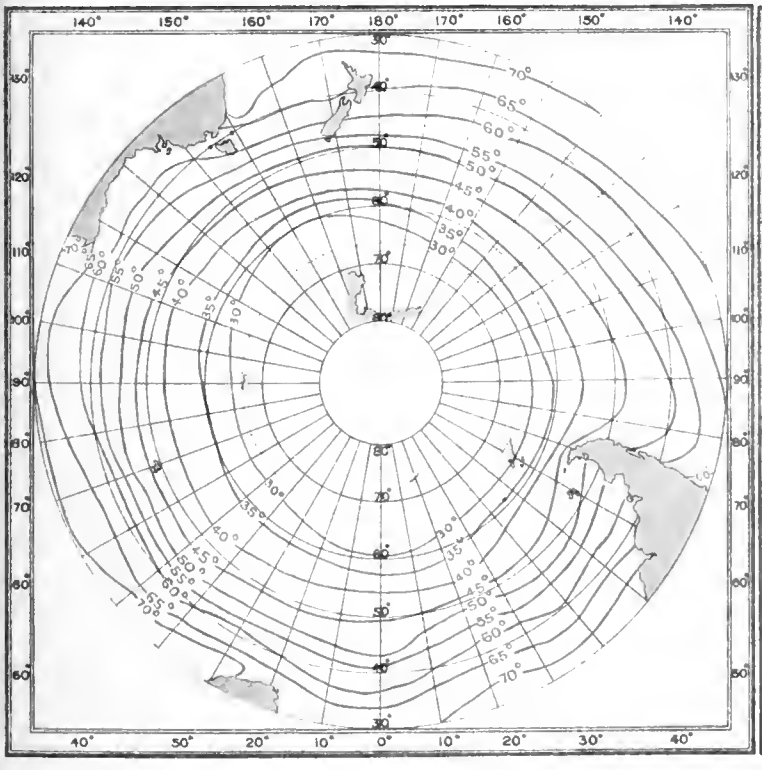


MEAN PRESSURE, NOON, G.M.T. 1903.

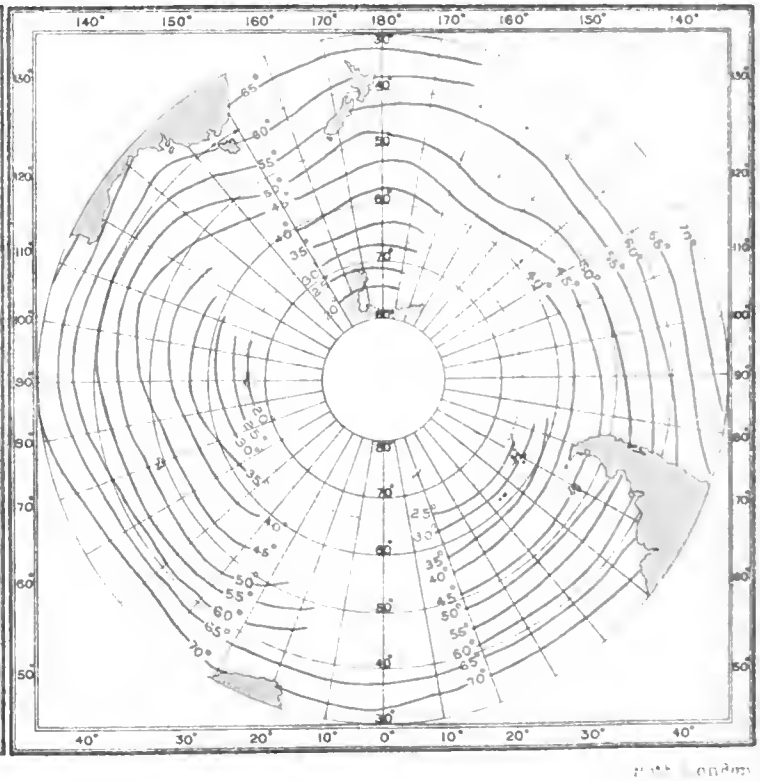


MARCH

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



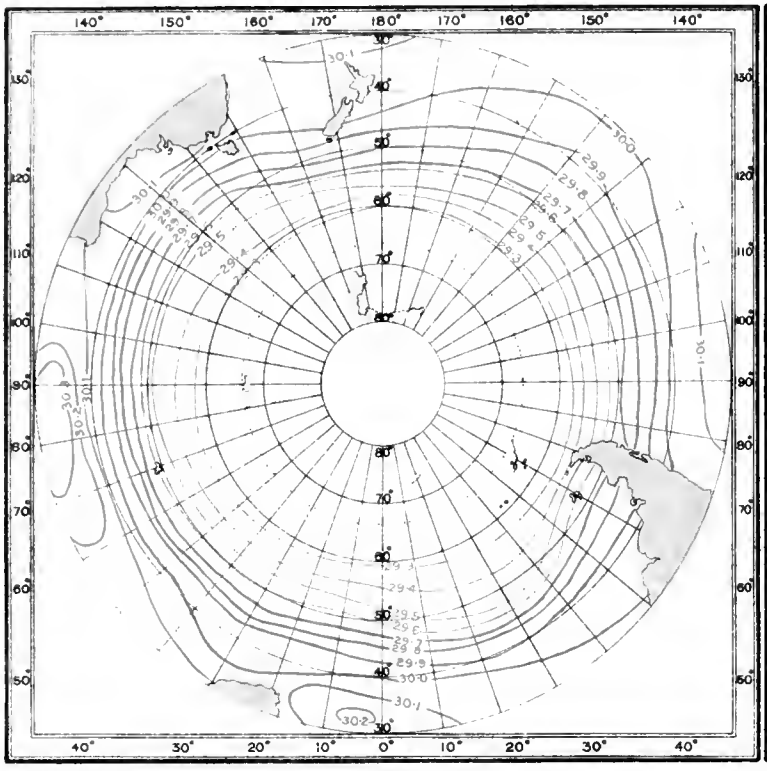
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

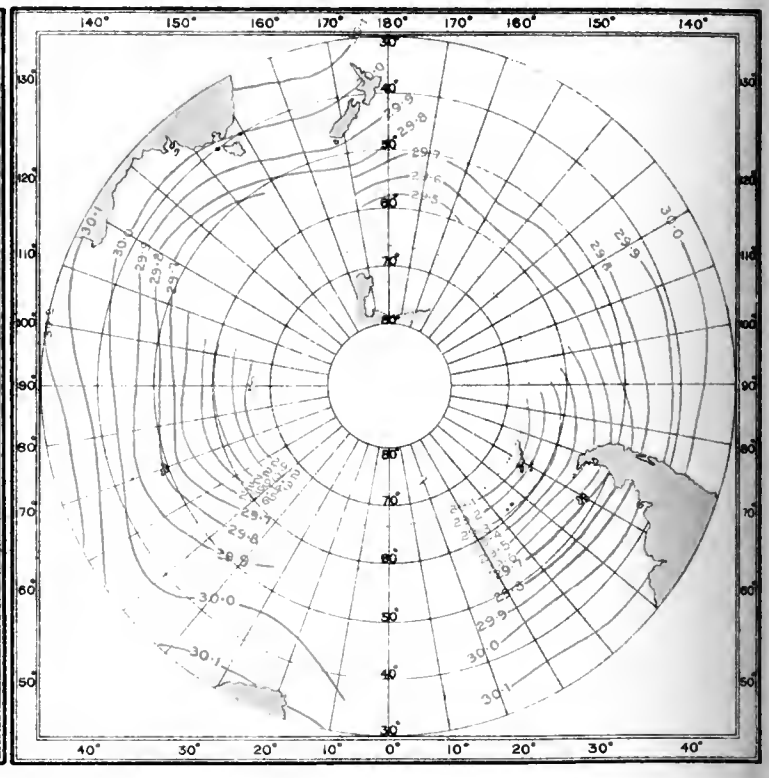
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

APRIL

NORMAL PRESSURE.

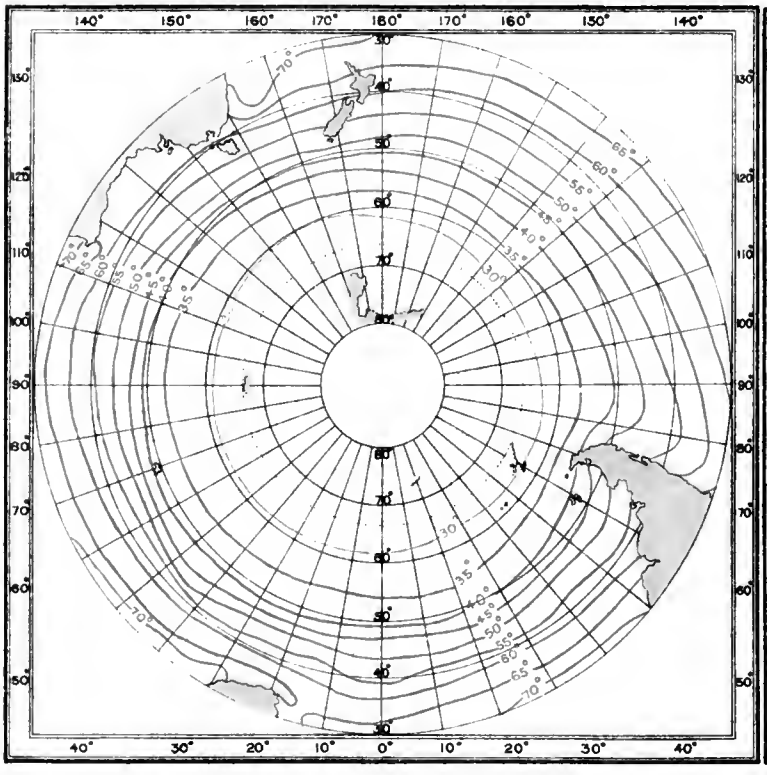


MEAN PRESSURE, NOON, G.M.T. 1903.

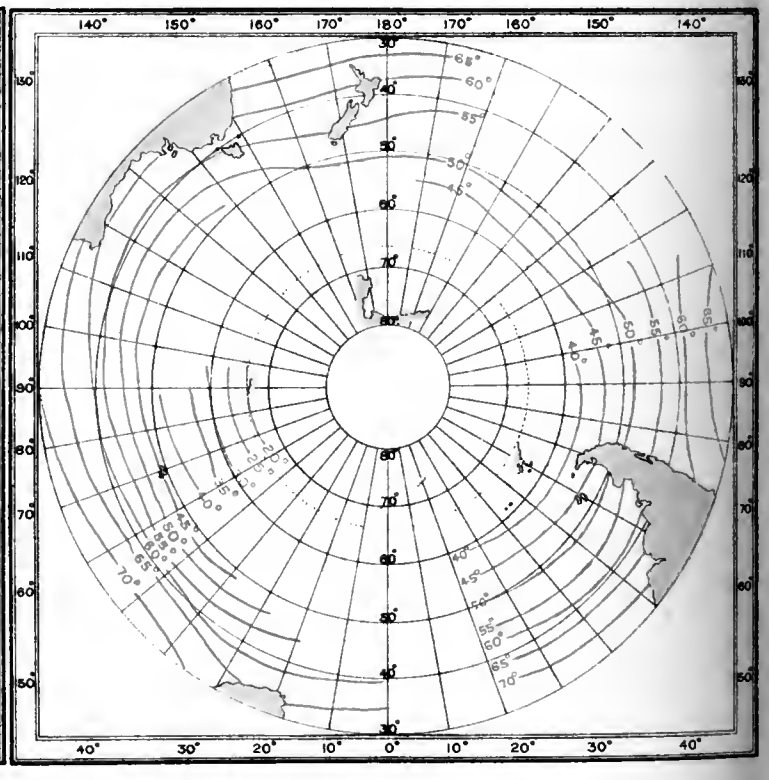


APRIL

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



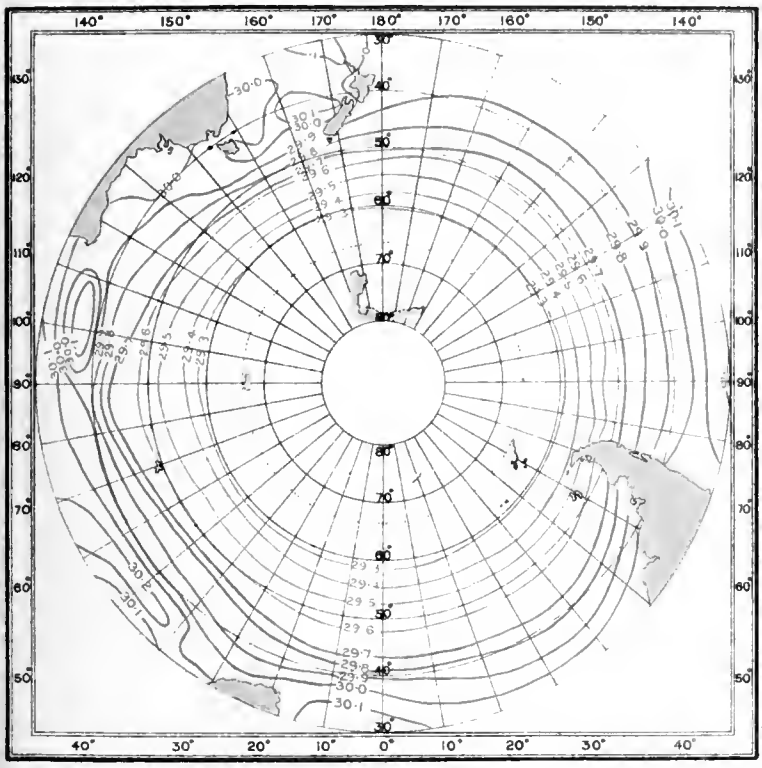
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

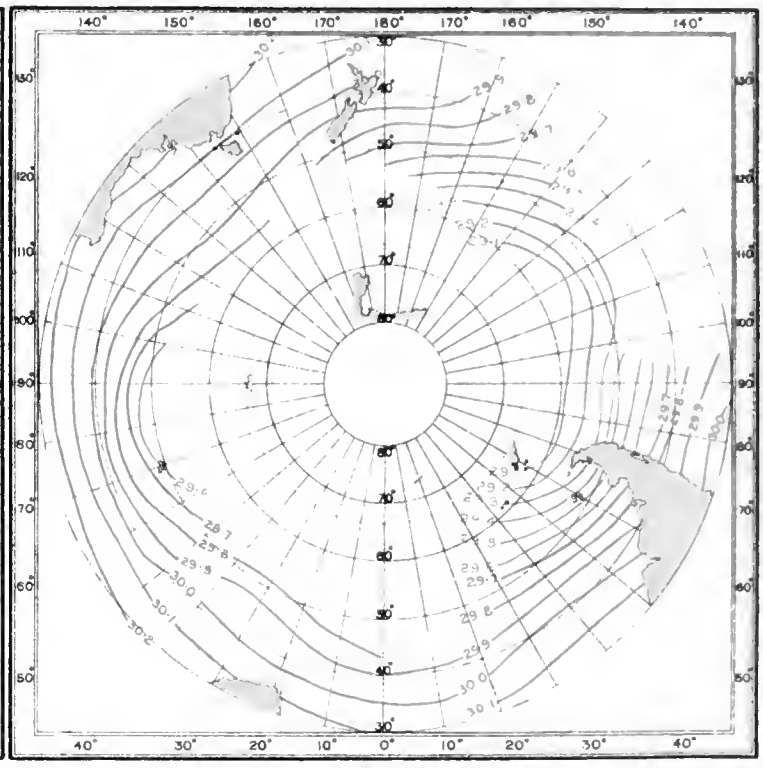
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

MAY

NORMAL PRESSURE.

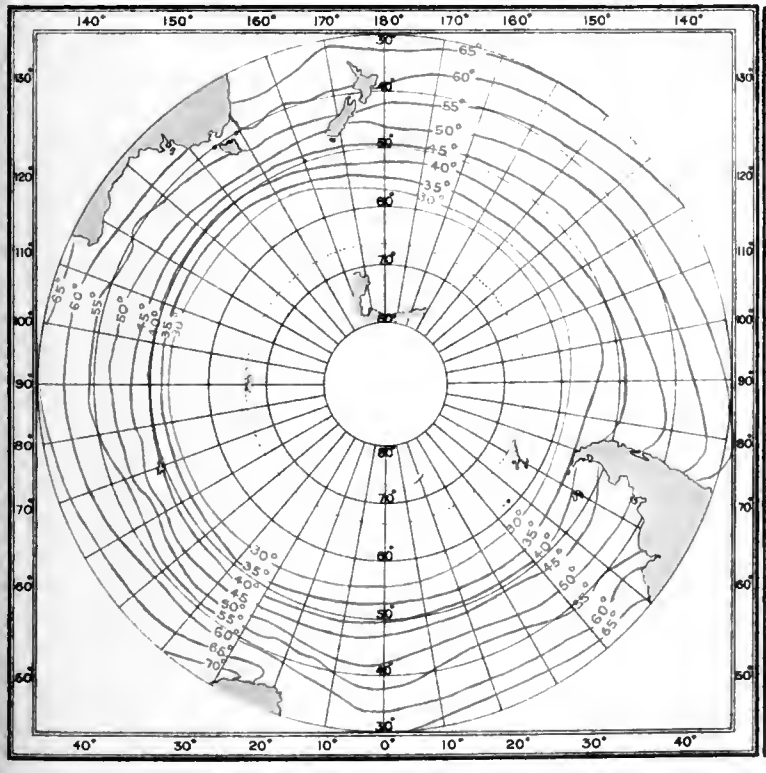


MEAN PRESSURE, NOON, G.M.T. 1903.

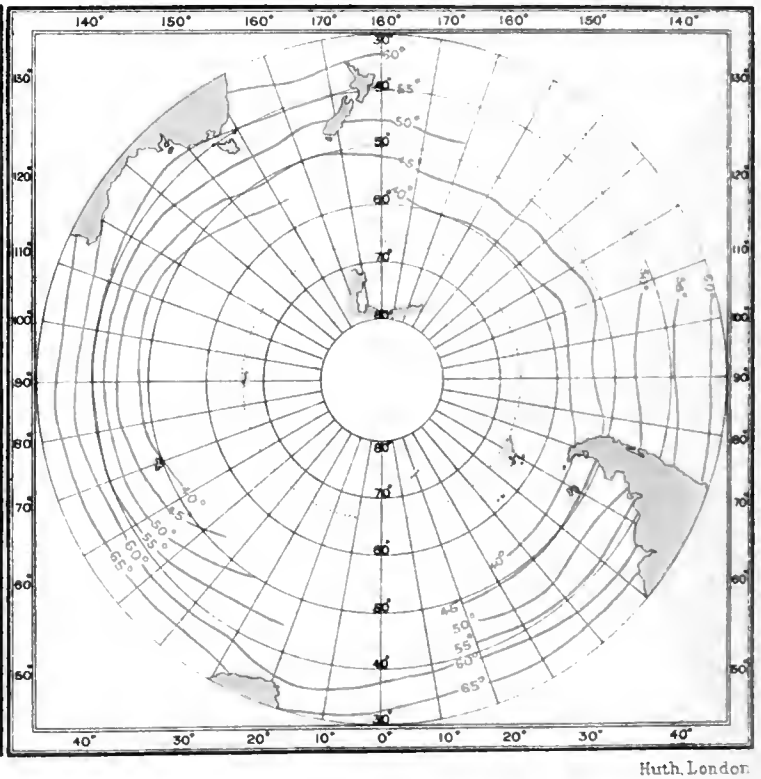


MAY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



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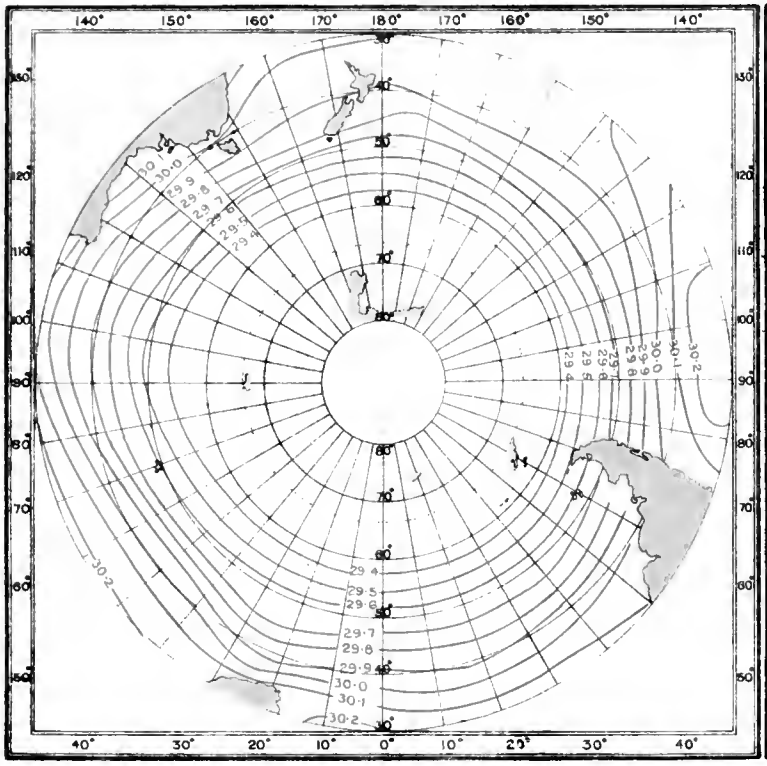
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

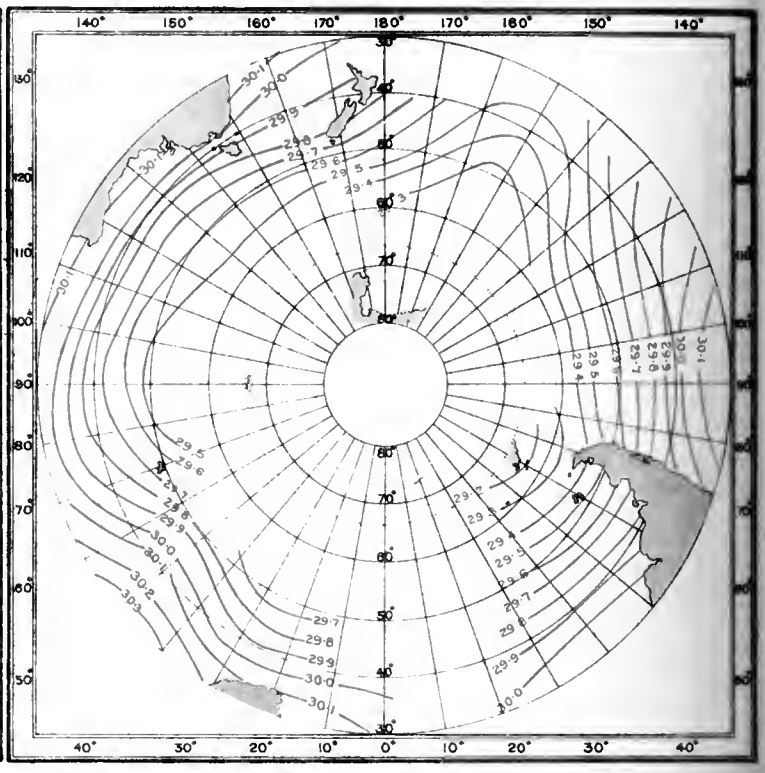
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

JUNE

NORMAL PRESSURE.

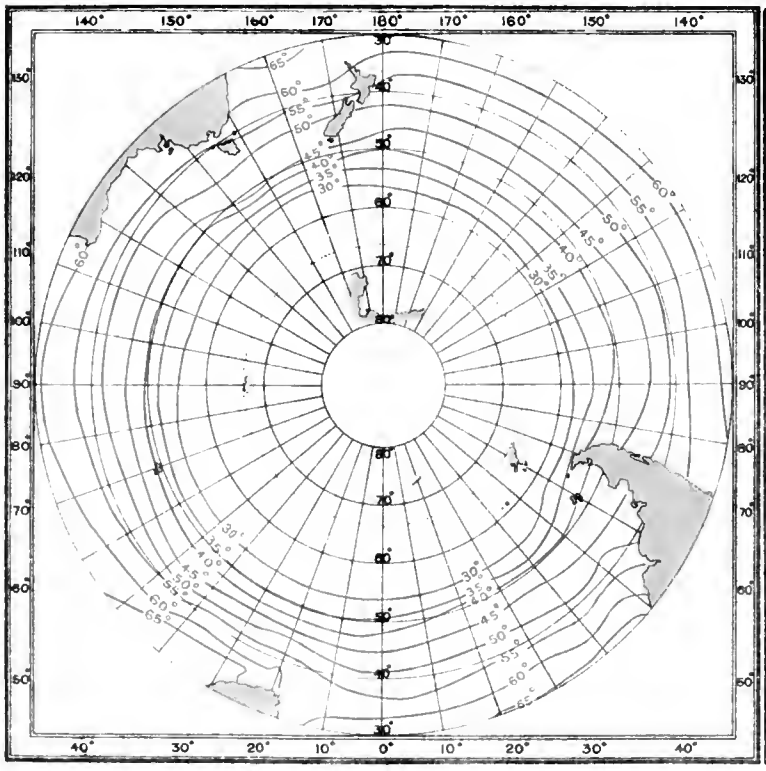


MEAN PRESSURE, NOON, G.M.T. 1903.

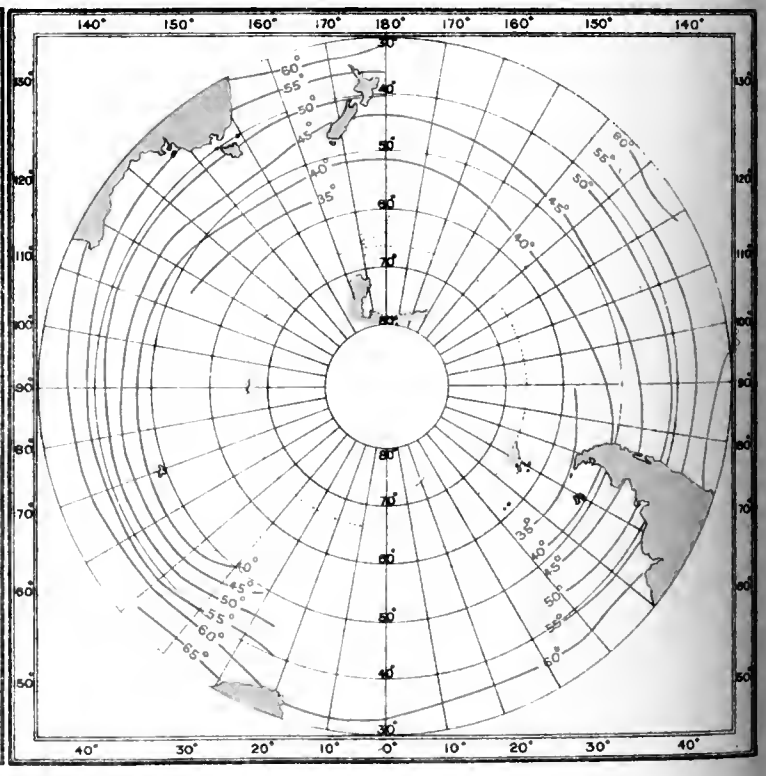


JUNE

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



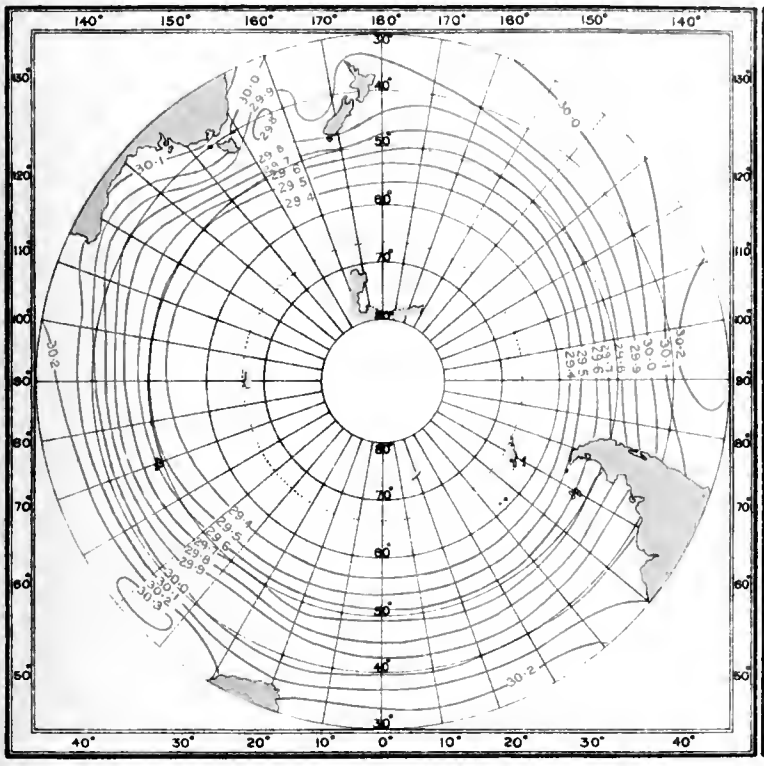
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

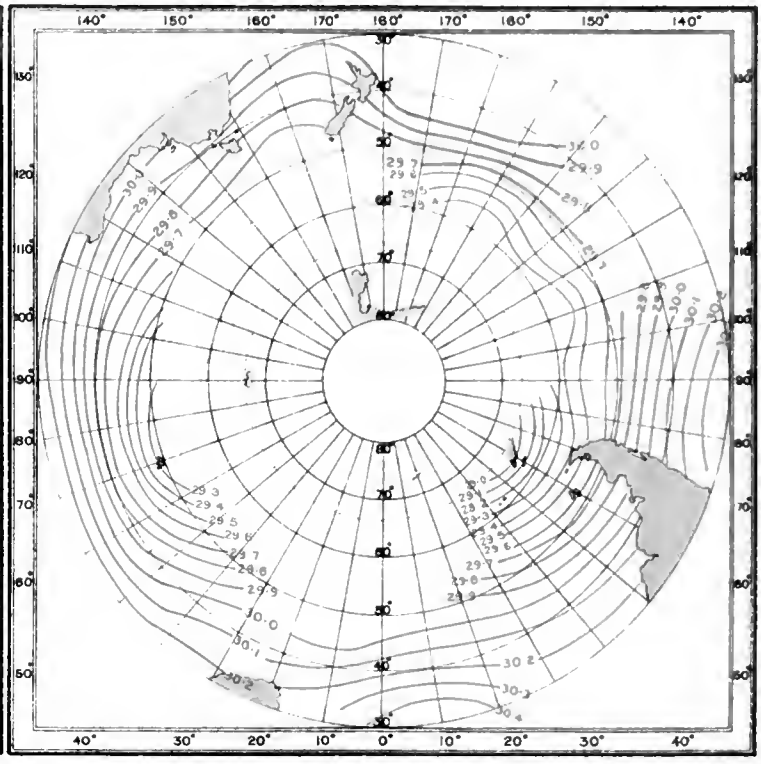
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

JULY

NORMAL PRESSURE.

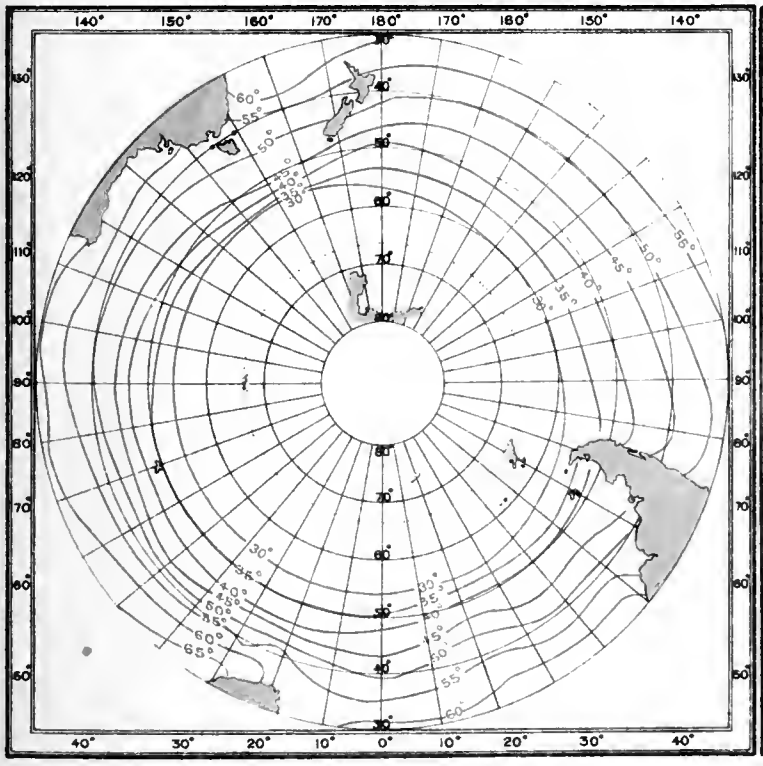


MEAN PRESSURE, NOON, G.M.T. 1903.

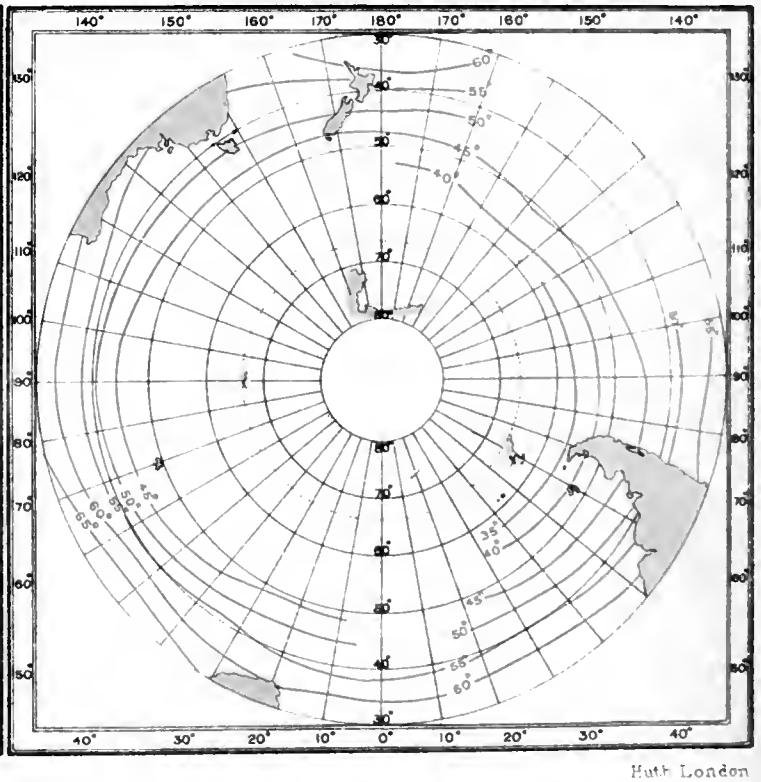


JULY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



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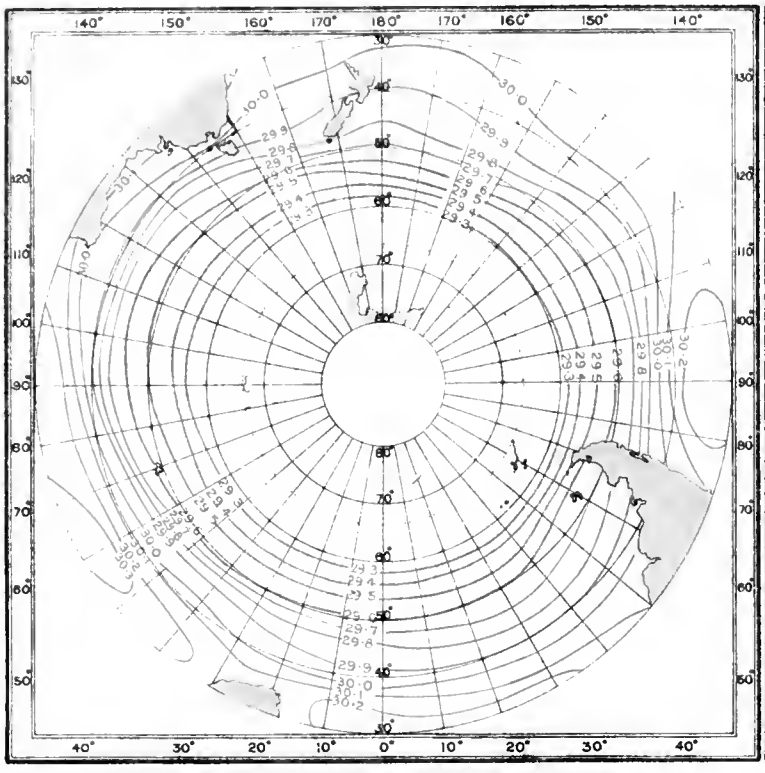
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

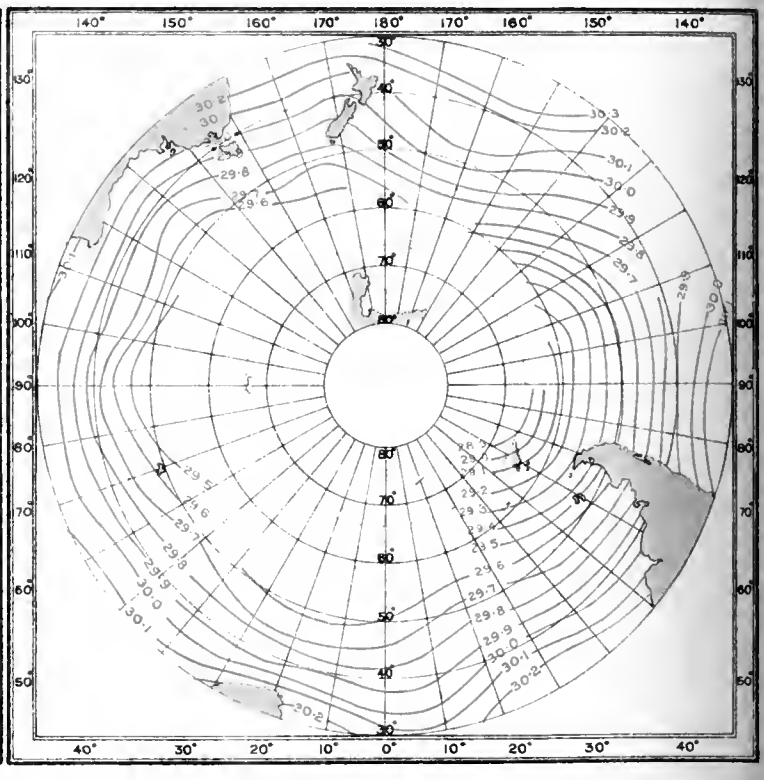
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

AUGUST

NORMAL PRESSURE.

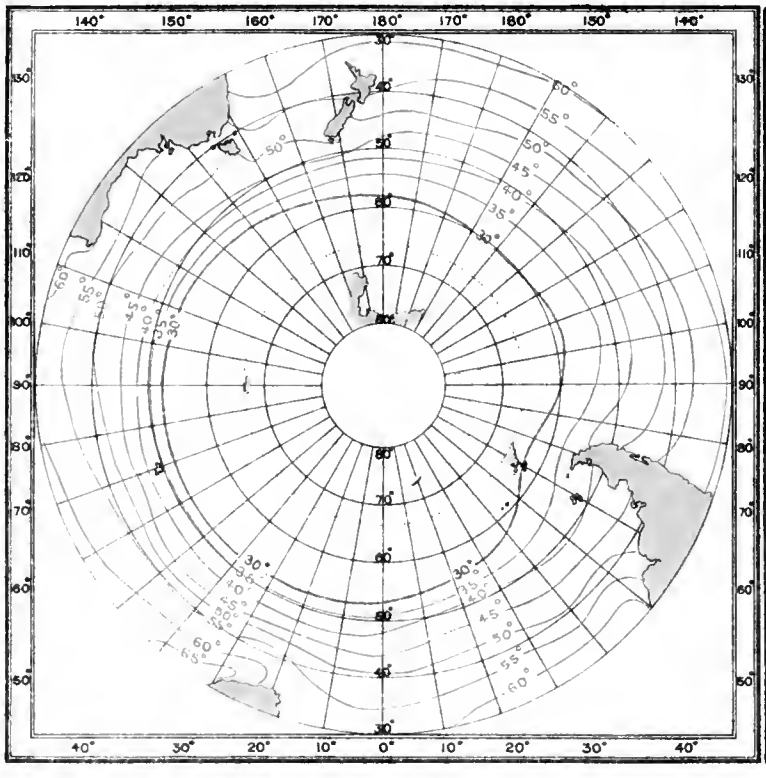


MEAN PRESSURE, NOON, G.M.T. 1903.

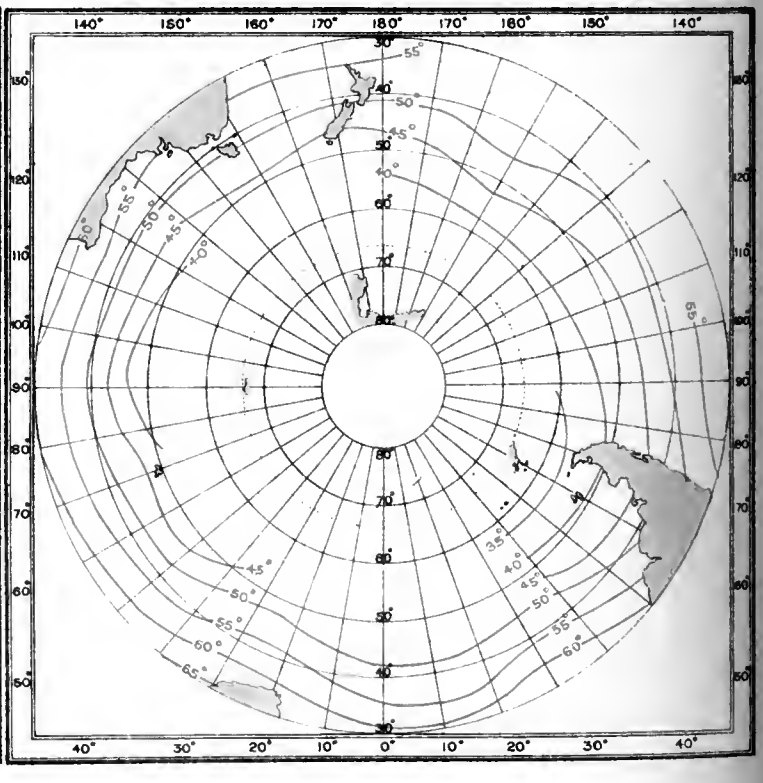


AUGUST

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



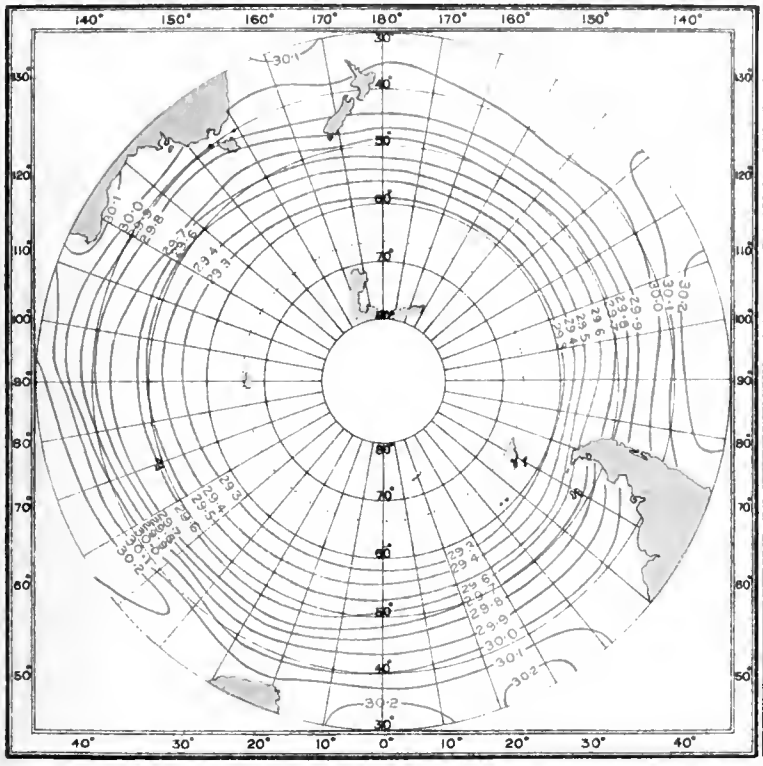
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

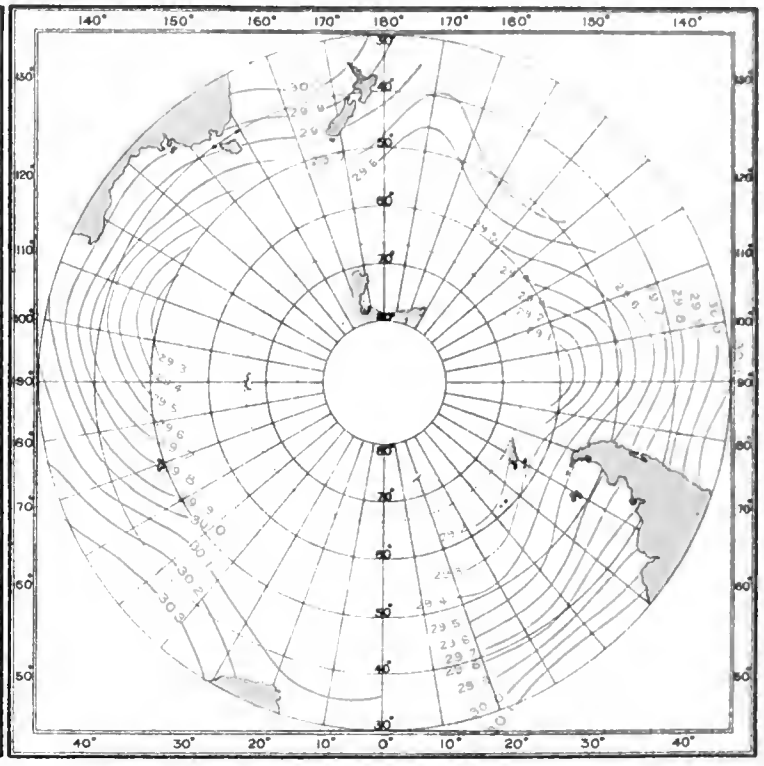
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

SEPTEMBER

NORMAL PRESSURE.

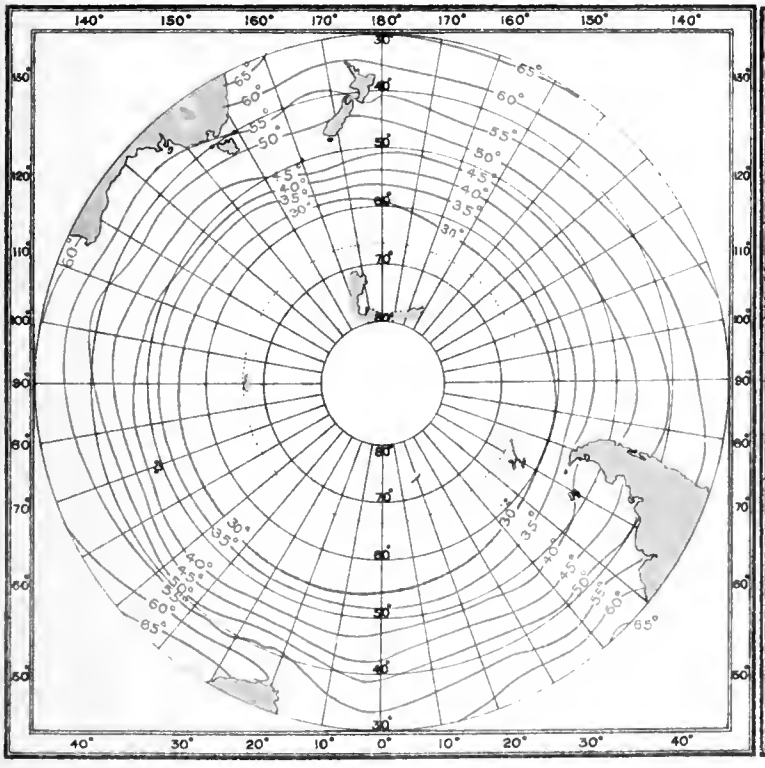


MEAN PRESSURE, NOON, G.M.T. 1903.

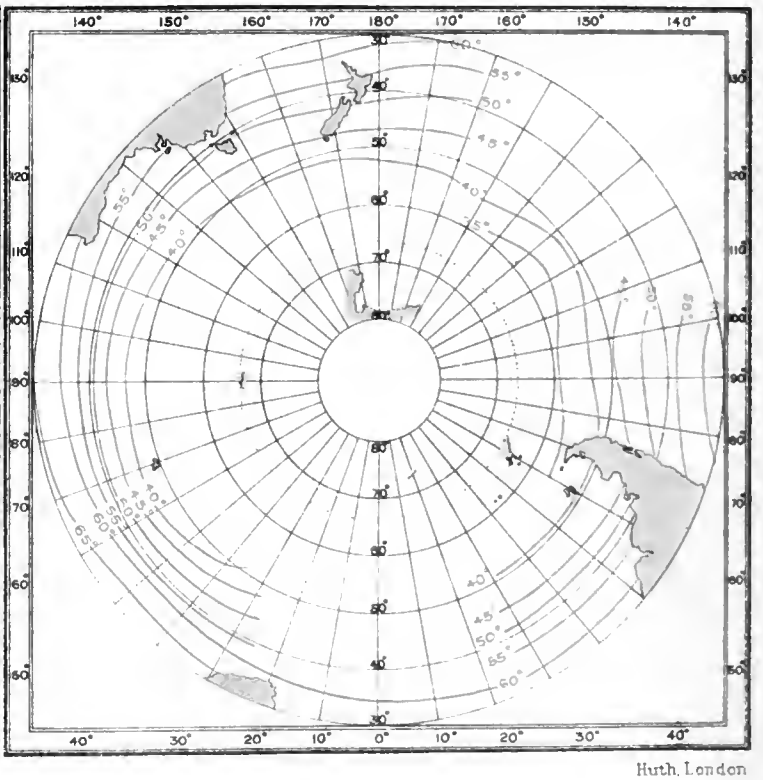


SEPTEMBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



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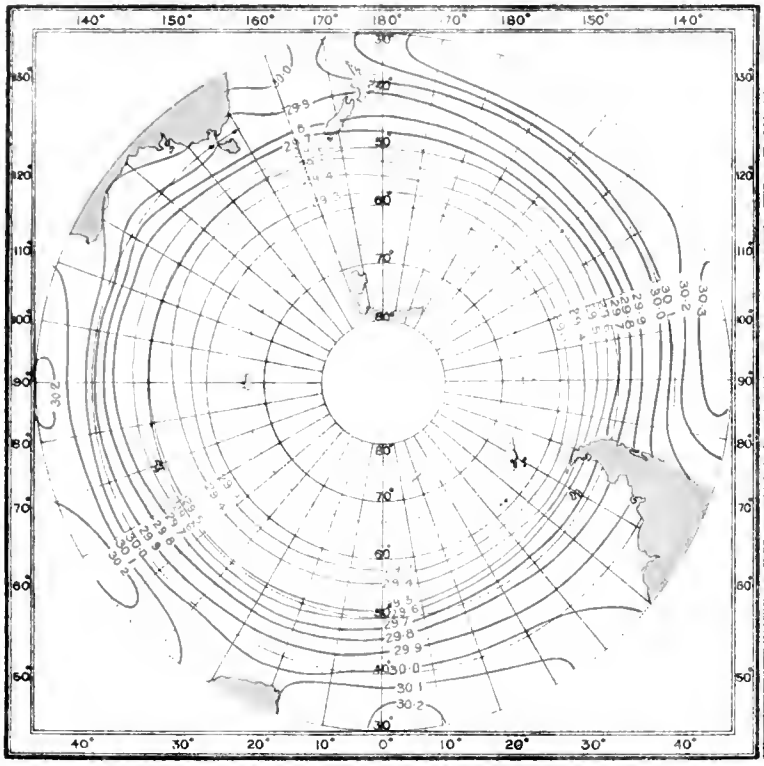
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

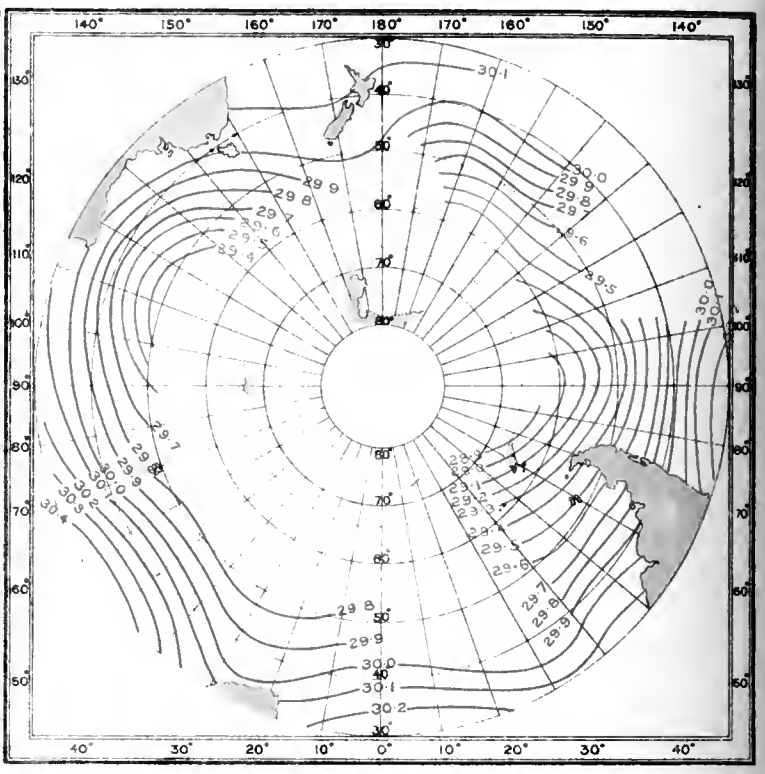
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

OCTOBER

NORMAL PRESSURE.

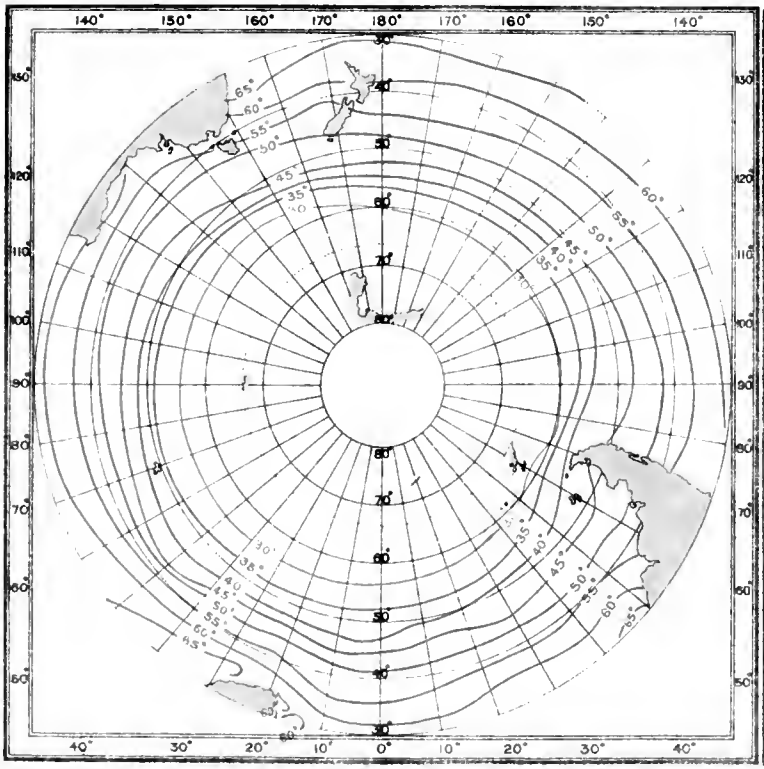


MEAN PRESSURE, NOON, G.M.T. 1903.

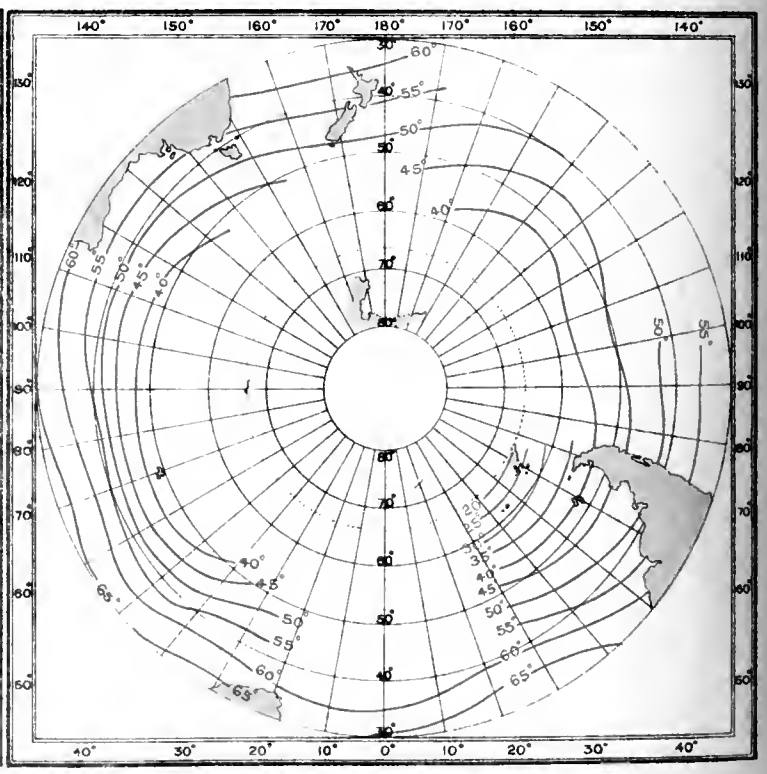


OCTOBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



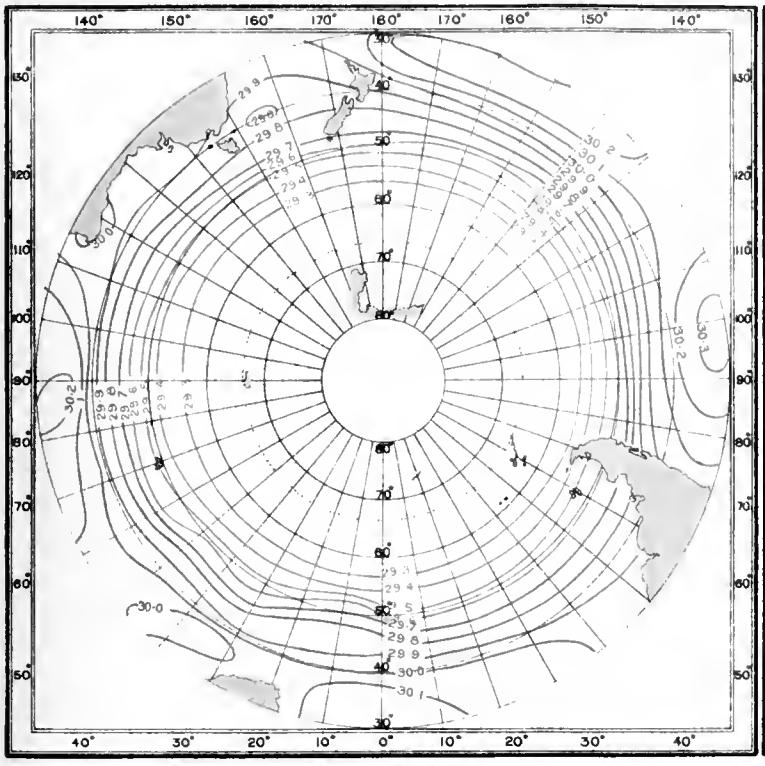
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

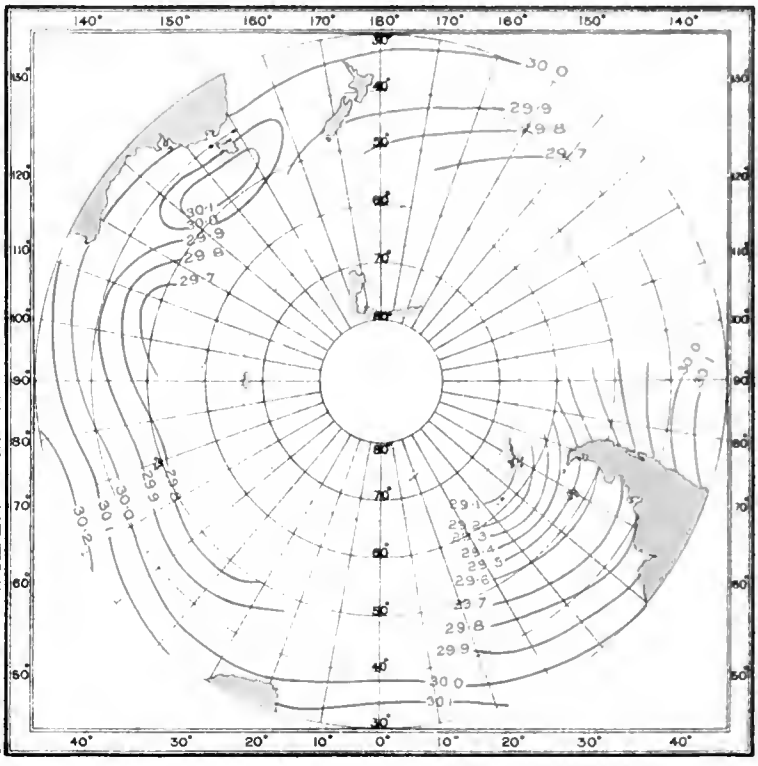
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

NOVEMBER

NORMAL PRESSURE.

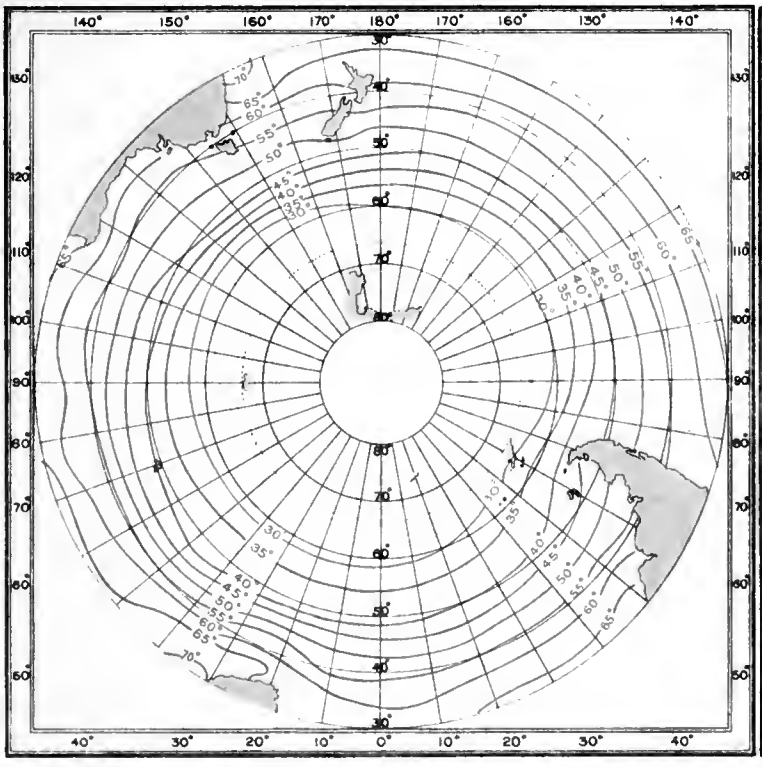


MEAN PRESSURE, NOON, G.M.T. 1903.

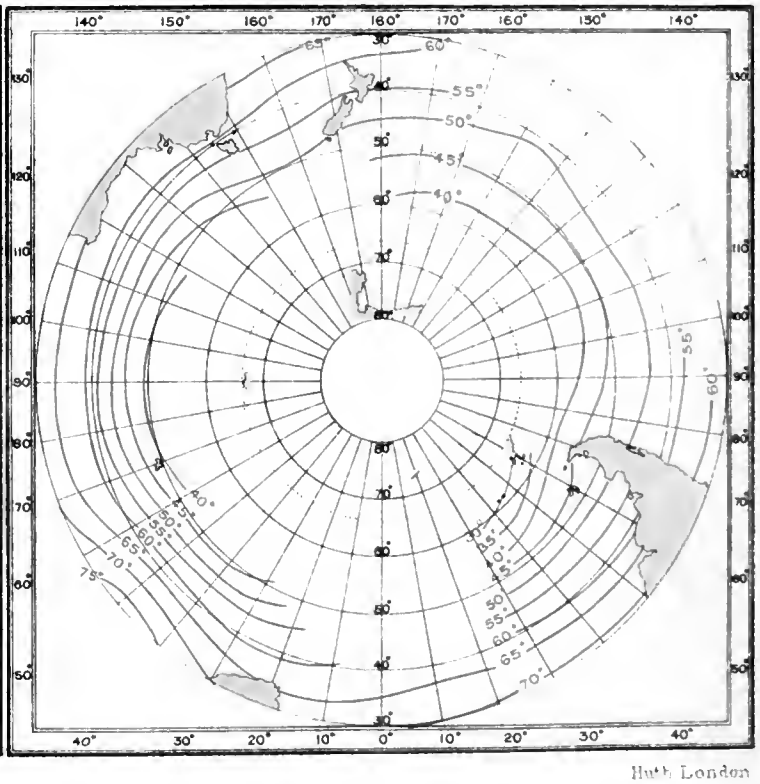


NORMAL AIR TEMPERATURE.

NOVEMBER



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



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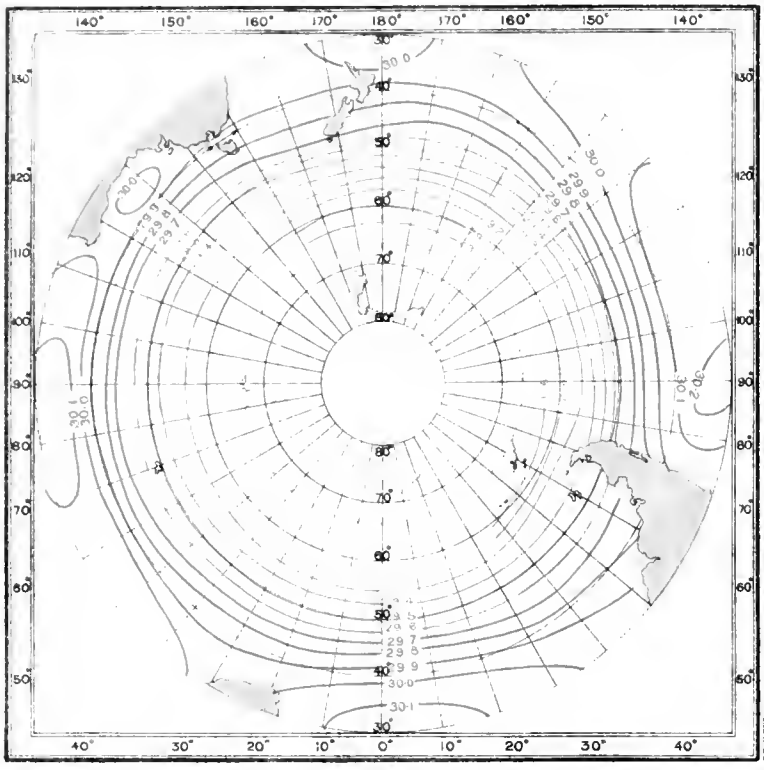
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

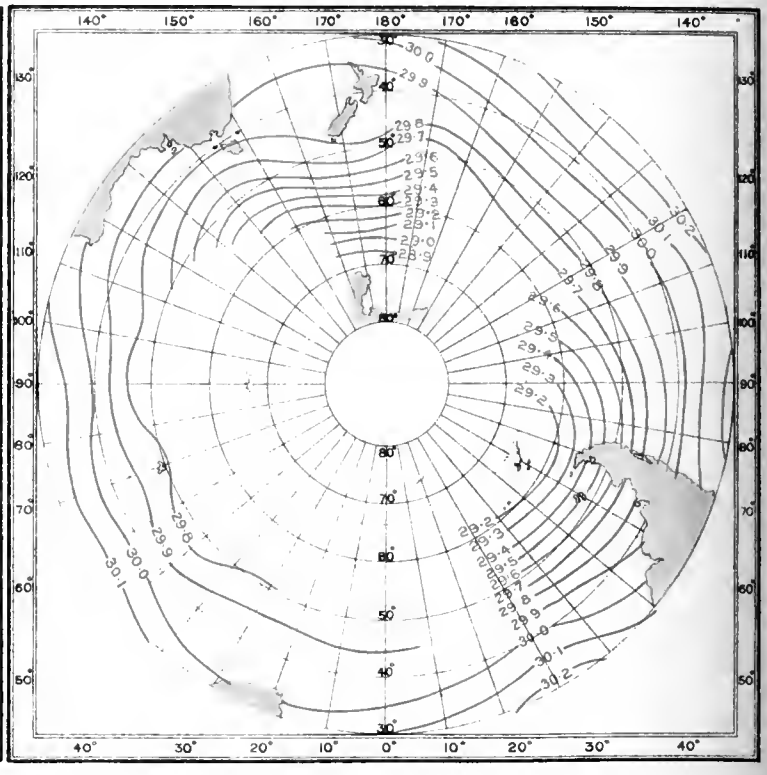
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

DECEMBER

NORMAL PRESSURE.

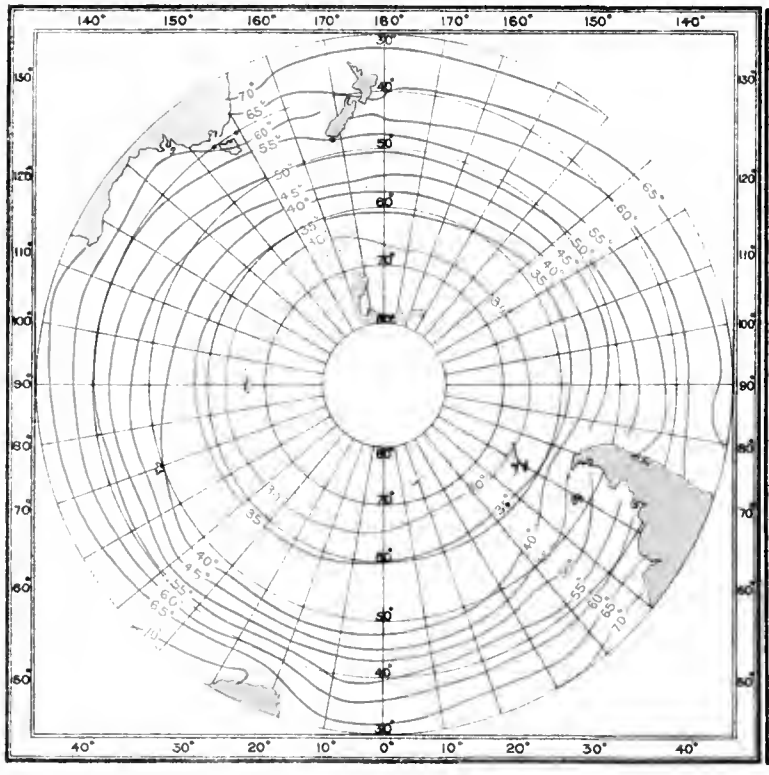


MEAN PRESSURE, NOON, G.M.T. 1903.

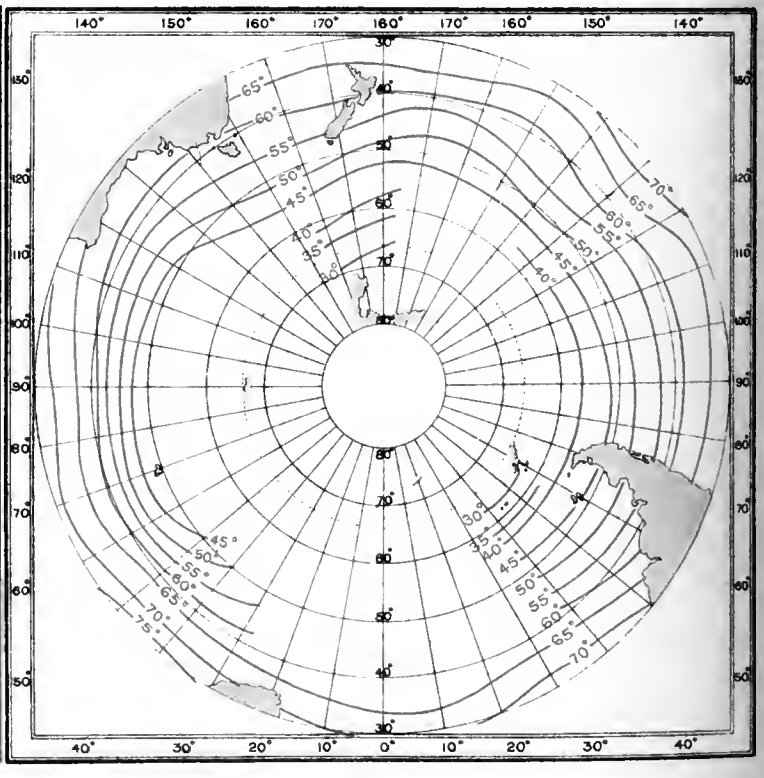


DECEMBER

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1903.



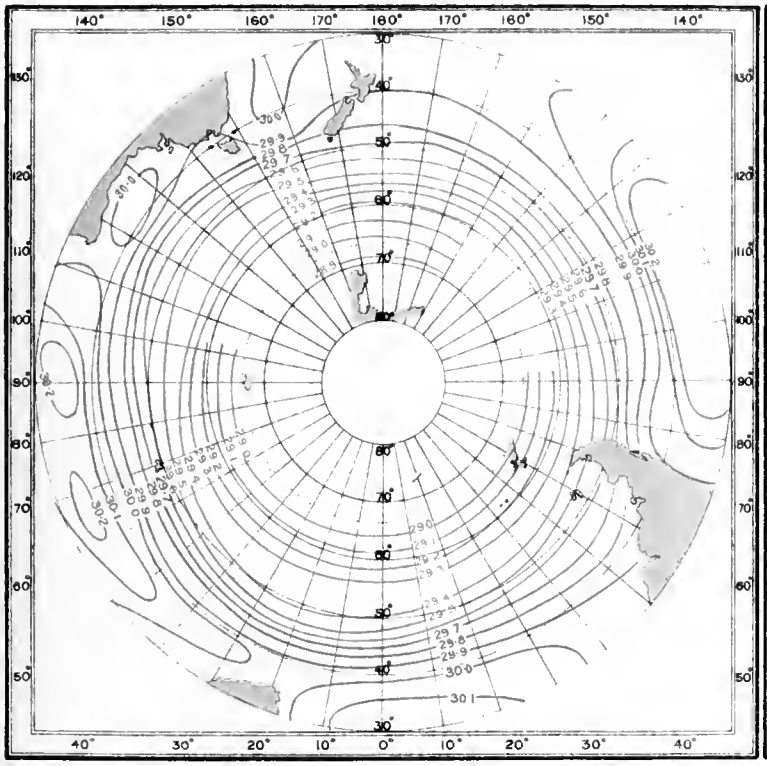
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

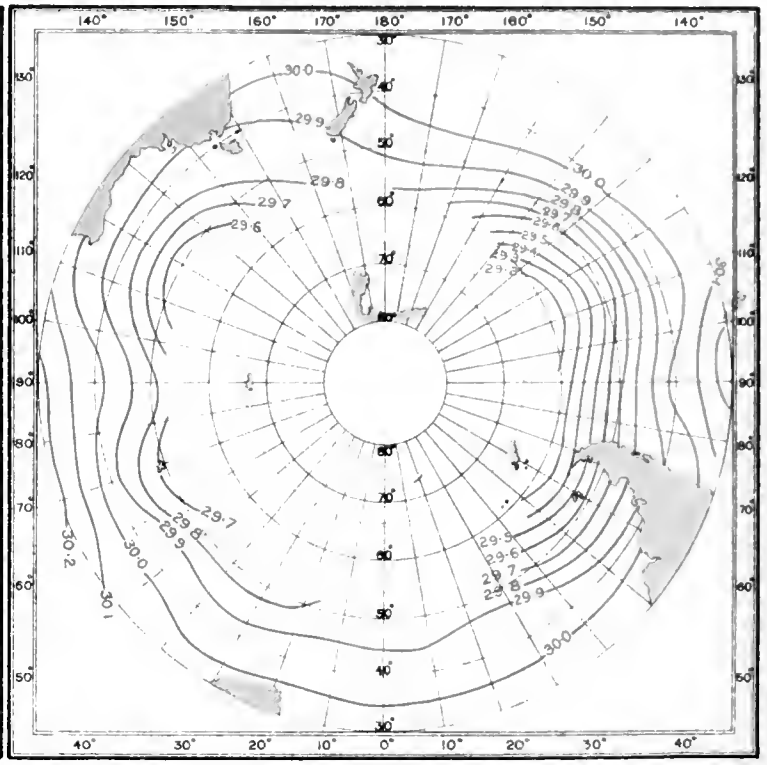
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

JANUARY

NORMAL PRESSURE.

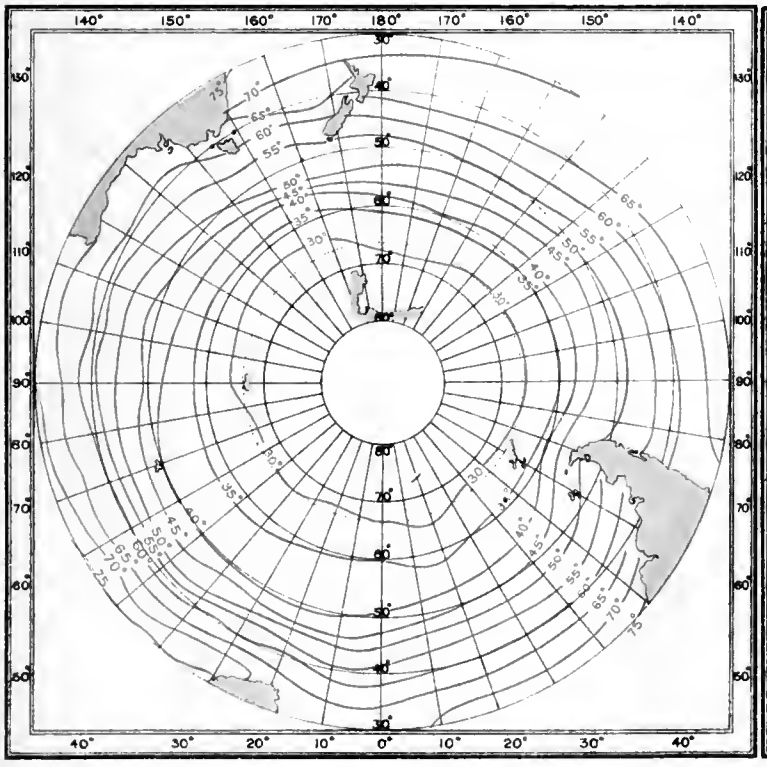


MEAN PRESSURE, NOON, G.M.T. 1904.

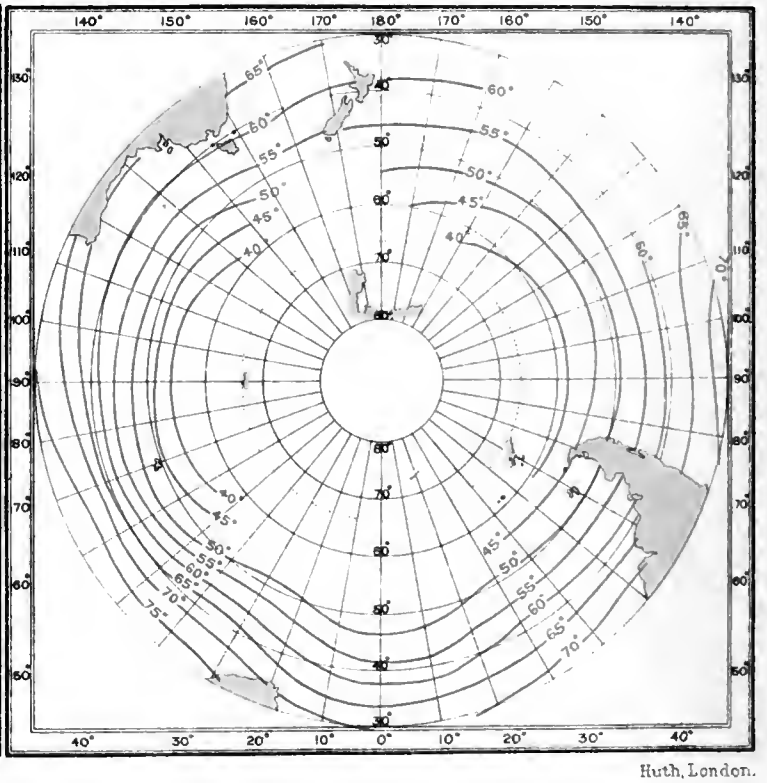


JANUARY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1904.



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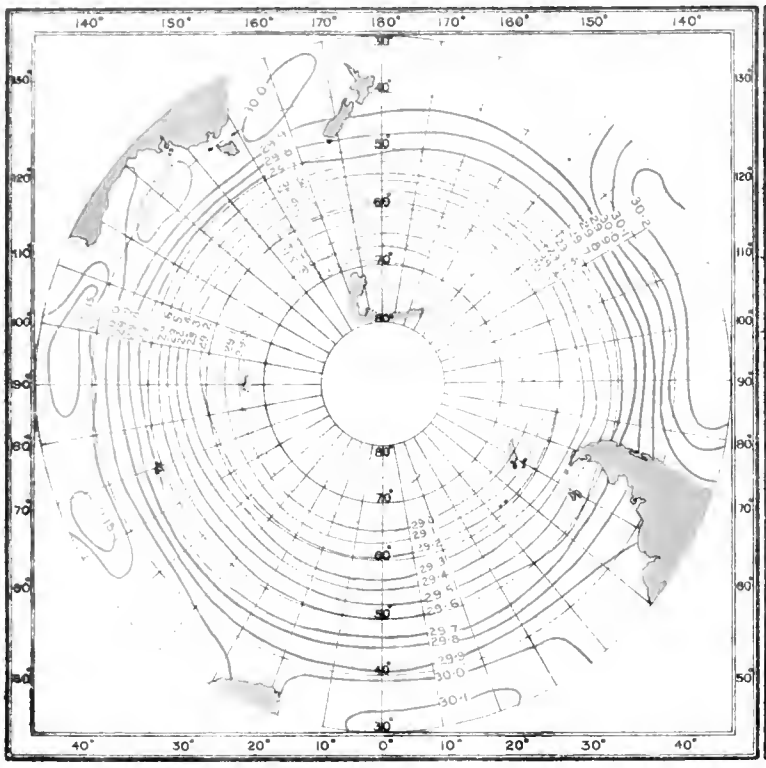
For explanation see Key map

INTERNATIONAL ANTARCTIC CO-OPERATION.

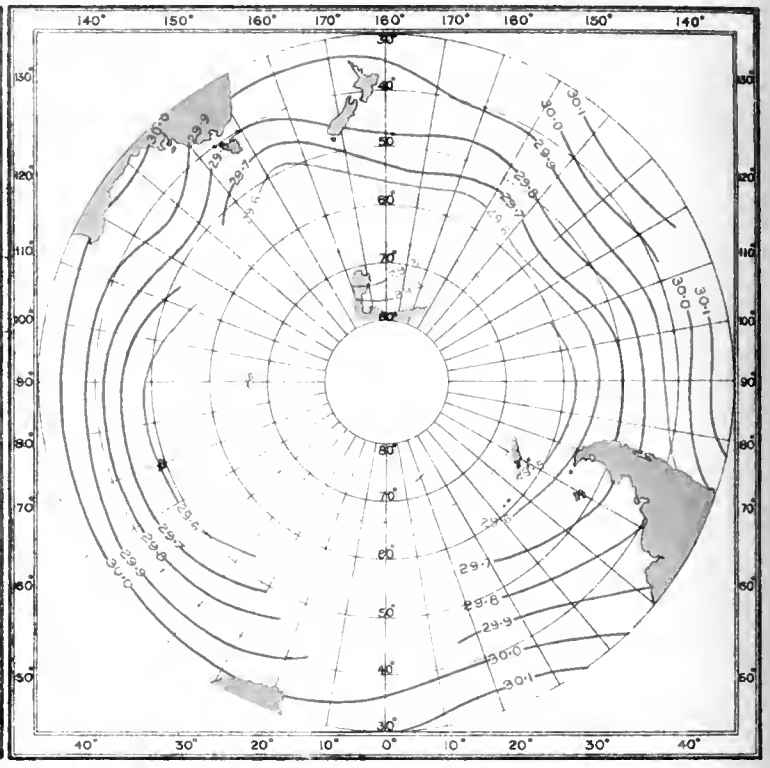
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

FEBRUARY

NORMAL PRESSURE.

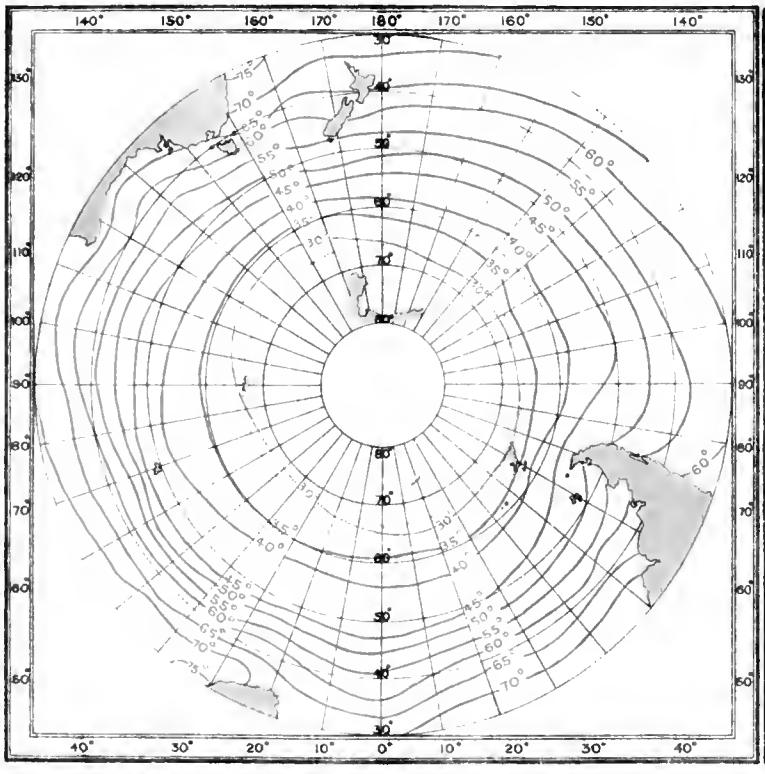


MEAN PRESSURE, NOON, G.M.T. 1904.

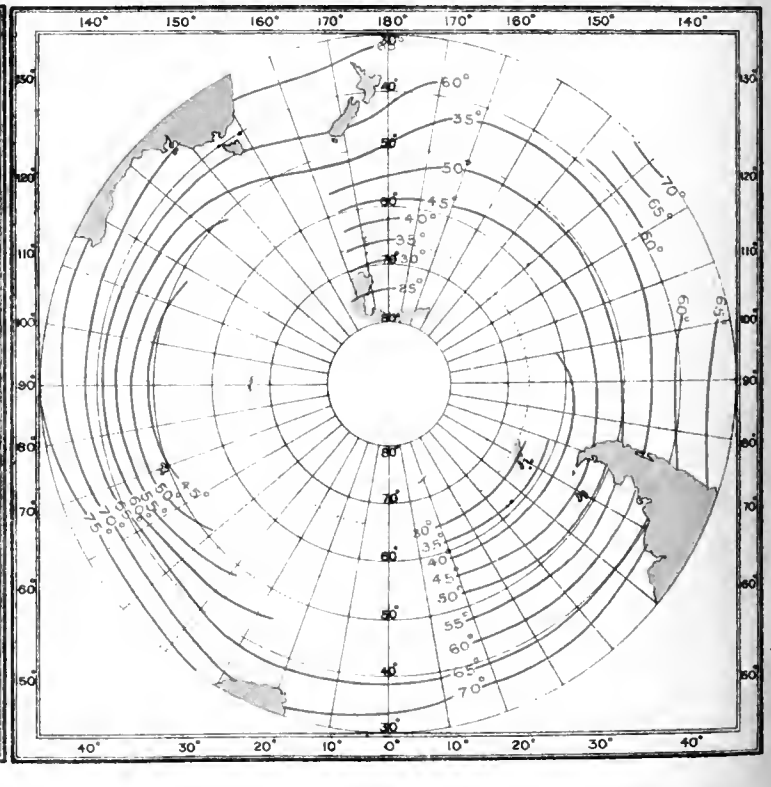


FEBRUARY

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1904.



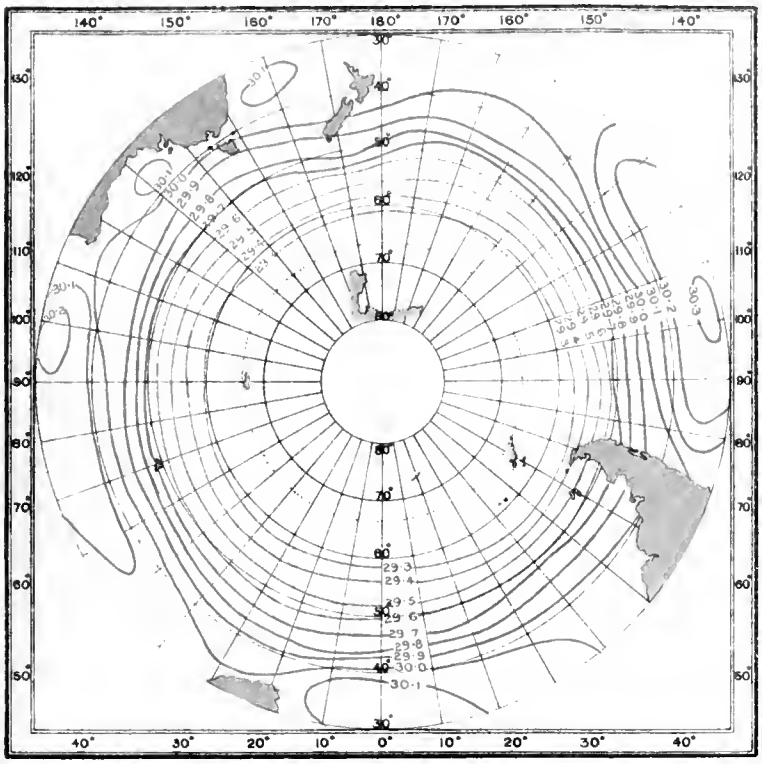
For explanation see Key map.

INTERNATIONAL ANTARCTIC CO-OPERATION.

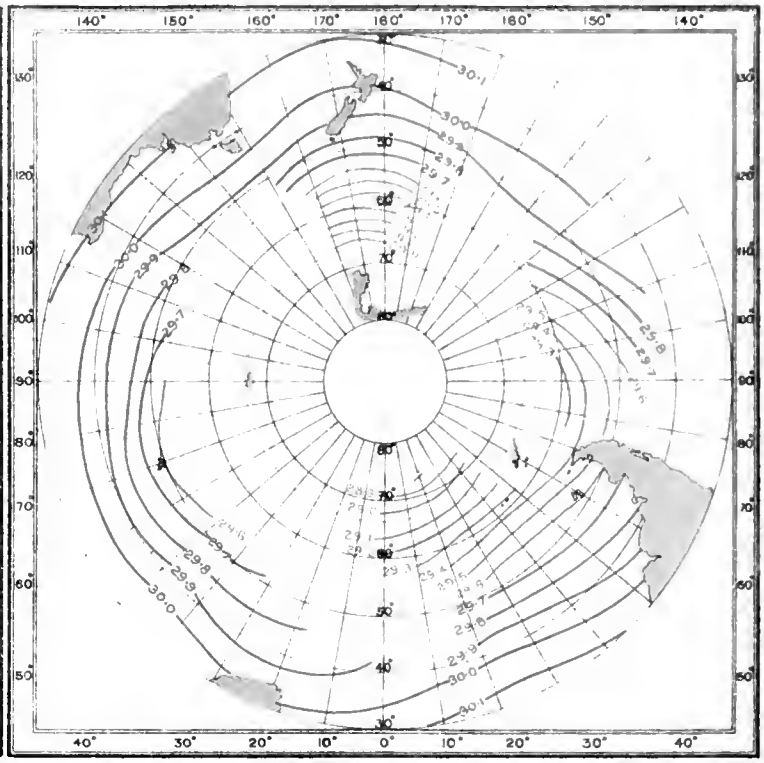
CHARTS OF MEAN SEA LEVEL PRESSURE AND AIR TEMPERATURE.

MARCH

NORMAL PRESSURE.

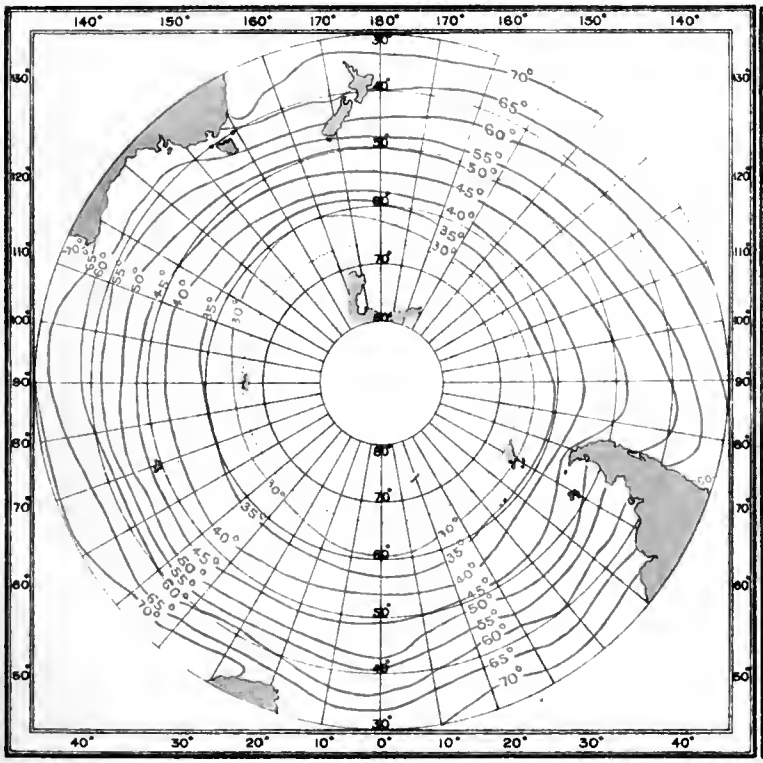


MEAN PRESSURE, NOON, G.M.T. 1904.

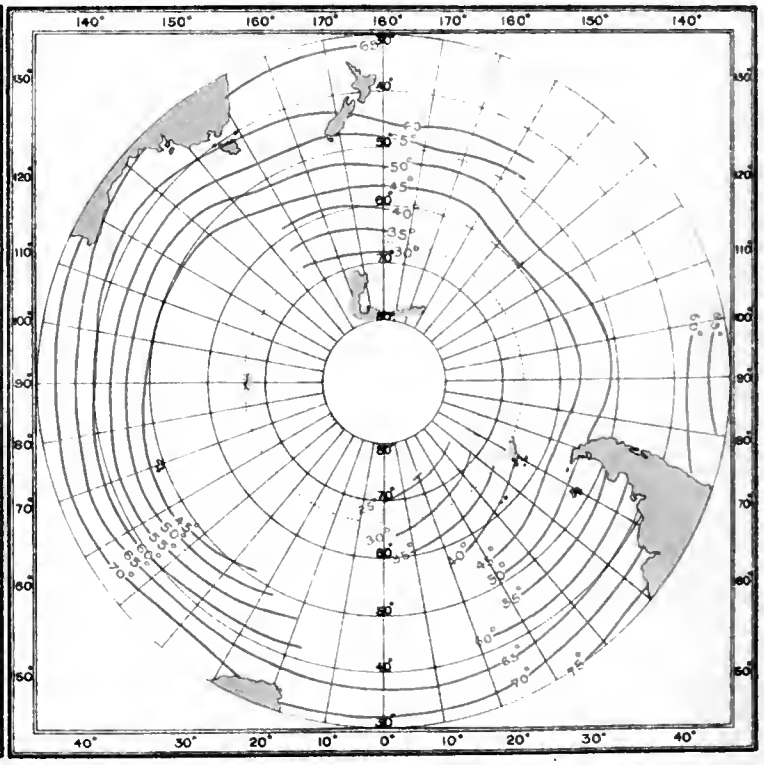


MARCH

NORMAL AIR TEMPERATURE.



MEAN AIR TEMPERATURE, NOON, G.M.T. 1904.



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For explanation see Key map.