AUSTRALASIAN ANTARCTIC EXPEDITION

1911-14.

UNDER THE LEADERSHIP OF SIR DOUGLAS MAWSON, O.B.E., B.E., D.Sc., F.R.S.

SCIENTIFIC REPORTS.

SERIES B.

VOL. I.

TERRESTRIAL MAGNETISM.

PART I.

FIELD SURVEY AND REDUCTION OF MAGNETOGRAPH CURVES.

BY

ERIC NORMAN WEBB, D.S.O., M.C., A.C.S.E. (N.Z.), A.M.INST.C.E.

CHIEF MAGNETICIAN TO THE EXPEDITION.

PART II.

ANALYSIS AND DISCUSSION OF MAGNETOGRAPH CURVES.

BY

CHARLES CHREE, M.A., Sc.D., LL.D., F.R.S.,

SUPERINTENDENT OF THE KEW OBSERVATORY.

WITH TWENTY-TWO TEXT ILLUSTRATIONS, EIGHTEEN PLATES, AND ONE-HUNDRED-AND-TWENTY TABLES.

PRICE: THIRTY SHILLINGS.

Printed by Alfred James Kent, Government Printer, Phillip-street, Sydney.—1925.

ISSUED MARCH, 1925

AUSTRALASIAN ANTARCTIC EXPEDITION

1911-14.

UNDER THE LEADERSHIP OF SIR DOUGLAS MAWSON, O.B.E., B.E., D.Sc., F.R.S.

SCIENTIFIC REPORTS.

SERIES B.

VOL. I.

TERRESTRIAL MAGNETISM.

PART I.

FIELD SURVEY AND REDUCTION OF MAGNETOGRAPH CURVES.

BY

ERIC NORMAN WEBB, D.S.O., M.C., A.C.S.E. (N.Z.), A.M.Inst.C.E.
CHIEF MAGNETICIAN TO THE EXPEDITION.

PART II.

ANALYSIS AND DISCUSSION OF MAGNETOGRAPH CURVES.

BY

CHARLES CHREE, M.A., Sc.D., LL.D., F.R.S.,
SUPERINTENDENT OF THE KEW OBSERVATORY,

WITH TWENTY-TWO TEXT ILLUSTRATIONS, EIGHTEEN PLATES, AND ONE-HUNDRED-AND-TWENTY TABLES.

Printed by Alfred James Kent, Government Printer, Phillip-street, Sydney.—1925

ISSUED MARCH, 1925.

A—6624

EDITORIAL PREFACE.

The publications issued as Series B of these reports deal with the physical data and will constitute, in all, five volumes, namely, two on Terrestrial Magnetism and kindred subjects, and three relating to Meteorology.

In this present volume Mr. Eric Norman Webb, D.S.O., M.C., A.C.S.E., &c., deals with the Field Observations, and Dr. Charles Chree, M.A., Sc.D., F.R.S., &c., submits an analysis of the Magnetograph Records and a discussion, complete save for the special subject of Magnetic Storms which will appear in the second volume of this series.

The publication of these Scientific Reports has been most seriously hampered, both directly and indirectly, by the fact of the world war breaking out almost directly upon the return of the Expedition in the year 1914. Thus vanished prospective sources of revenue for the publication fund. Also most of the expedition staff enlisted for service abroad. After the intervention of years of war, and with nothing in the nature of an adequate publication fund, it has been found a slow and tedious work to reorganise the undertaking.

Fortunately for this volume the Chief Magnetician, Eric Norman Webb, before enlisting, made adequate arrangements and put matters in train for the reduction of the magnetograph curves during his absence in France. Upon release from service, after serving with distinction as Major in the Royal Australian Engineers, he prepared the general report forming Part I of this volume.

The value of this contribution to the subject of Terrestrial Magnetism is very greatly enhanced by the fact that the discussion of the magnetograph curves was undertaken by Dr. Charles Chree, the foremost authority on such matters. As Dr. Chree had dealt with the similar records of both Scott expeditions it was most desirable that he should analyse these also, and it is to Sir William Napier Shaw, Sc.D., F.R.S., &c., at that time Director of the Meteorological Office, London, that we are indebted for the arrangement eventually made. Our warmest thanks are due to Dr. Chree for undertaking this tedious work and seeing it through to a triumphant conclusion, notwithstanding delays and difficulties arising principally from the fact that the curve reductions and the final publication were being undertaken on the other side of the world.

From the drafting of the scientific programme of work in the preparatory stages of the Expedition to the printing of this report, Professor C. Coleridge Farr, D.Sc., of University College, Christchurch, has fathered the magnetic section of the expedition, rendering most valuable assistance.

In his report Mr. Webb refers to the important work performed by Dr. Coleridge Farr and Mr. H. F. Skey, B.Sc., superintendent of the Magnetic Observatory, Christchurch, in connection with the reduction of the curves carried out at University College, Christchurch, under their jurisdiction by twelve lady students under the direction of Miss B. Smith. These "Magnetic" ladies, locally known as the "Mawson Club," did their work so well that in checking over the tables Dr. Chree discovered but few inconsistencies needing attention.

The cost of the computations, which were effected on a most reasonable basis, was defrayed by moneys derived from two sources. The first amount was portion of a sum of £500 voted by the New Zealand Government towards the preparation for publication of the physical data secured by the expedition. This money was made available largely through the energetic representation of Professors Coleridge Farr and Charles Chilton, D.Sc., &c., and other good friends of the cause. Further most necessary assistance came in the form of grants from the Royal Society of London, in the obtaining of which thanks are due especially to Professor Sir Arthur Schuster, D.Sc., F.R.S., &c., of Manchester University. Apart from payments to the actual computers no disbursements whatever have been made to those who have so selflessly worked in this cause.

In the preparation for the work of Field Observation and in the equipment for the same, the Expedition was very greatly assisted by the Department of Terrestrial Magnetism, Carnegie Institution of Washington, and more particularly to Dr. L. A. Bauer, the Director of that institution, and world recognised authority in that branch of Terrestrial Magnetism. We also owe much to Mr. P. Baracchi and Dr. J. M. Baldwin of the Melbourne Observatory, and Mr. E. Kidson, M.Sc., who, at that time, was conducting a magnetic survey of Australia on account of the Carnegie Institution, for material help afforded in those busy days of preparation prior to the departure of the Expedition to the South.

Almost all the field instruments used were received on loan from the Carnegie Institution, and, with the exception of several noted in the text as lost, were eventually returned to Washington. The Eschenhagen Magnetographs, following an arrangement with the Australasian Association for the Advancement of Science, became their property at the expiration of the expedition and are at present loaned by the Association to the Melbourne Observatory.

No preface to this work would be adequate without eulogistic reference to the magneticians of the Expedition staff. At the Western Antarctic Base, located on a floating and constantly moving glacial sheet, Mr. Alec L. Kennedy, B.E., did his best in the face of very limited facilities and even more limited assistance. Neither at the Base Station nor on the sledging journeys did he lose any chance of obtaining useful magnetic data.

At the main Antarctic Base, Mr. Eric N. Webb laboured indefatigably under what were probably the most difficult conditions ever presented to any magnetician. The special circumstance was that of the abnormality of the Adelie Land climate.

The Expedition records show that the velocity and frequency of the wind, and the volume of the drift snow in that area are altogether phenomenal. Indeed, so far as I am aware, they collectively constitute a record unapproached by any other known locality on the earth's surface. The average wind velocity during the whole two years of occupation, as recorded by the Robinson Cup Anemometer, was approximately 50 miles per hour. Such winds, accompanied by low temperatures and deluges of flying snow, made the matter of Field Observations and even Base Station work problems of great difficulty entailing much personal sacrifice.

Further, the magnetician's duties throughout the autumn and the winter months at Cape Denison were not without an element of real danger, for no matter what the weather happened to be, Webb and his assistants carried out the daily programme unflinchingly. In that long, dark polar winter period it frequently happened that for days together, in a hurricane of wind, the drift snow flew so thick that one had to progress from the Living Hut to the Magnetograph House or the Absolute Hut rather by sense of feel than by sight. There were many occasions when, even in the daylight hours, one's hand held at arm's length would have been invisible. Under such conditions and with prevailing off-shore winds reaching velocities of over 100 miles per hour (Cup Anemometer) the journey between the Living Hut and Magnetograph House, a distance of about 350 yards, on a course dangerously close to the open sea water was a serious undertaking.

Under more favourable circumstances the erection of guide lines between the Living Hut and the observing stations would have been feasible and have eliminated the main element of danger. At Cape Denison, however, such volumes of drift snow were frequently deposited over the landscape in the space of an hour that the use of guide ropes was out of the question. In the worst weather, Webb and his assistant on leaving the Living Hut made their way as best they could, largely on hands and knees, maintaining a definite course on the wind until reaching the rocky ridge at the northern end of which the Absolute Hut and Magnetograph House were situated. Then by a process of groping along and recognising the rock outcrops, principally by their shape judged by feel, the goal would be eventually reached.

I had at all times the highest admiration for the enthusiasm, energy, resource, and skill with which Eric Webb prosecuted his observations. His effort and the measure of the success achieved in the face of the extraordinary difficulties presented were magnificent. This very creditable performance is also shared by Captain Robert Bage, B.E., R.A.E., who carried on the Base Station work through the second year, and whom we regret to record was killed in the Gallipoli campaign.

As regards Field Observations, it will be noted that data covering a wide range of territory have been secured. When plans for the Expedition were laid, it was anticipated that an even larger sphere would have been explored by sledge journeys, for it was expected that a long sledging season would have been available and that even winter sledging would have been feasible.

As things turned out, however, the remarkable climatic conditions put an end to our more ambitious field programme and severely curtailed sledging operations. Any but the shortest journeys were found impracticable before November, and the date of completion of all sledging journeys and final relief by the S.Y. *Aurora* was fixed for 15th January, in order to give time for the subsequent deliverance of the Western Base Party in Queen Mary Land. Had more time been available for the southern sledging party (Bage, Webb, and Hurley) enhanced results would have accrued for, after a splendidly executed journey, they had to turn on their tracks when very close to that magnetically interesting locality, the Magnetic Pole. Nevertheless, the fine series of magnetic determinations, secured by Webb, considered in conjunction with the observations made by Sir Edgeworth David's party of Sir Ernest Shackleton's British Antarctic Expedition, 1907–09, and the extensive magnetic data resulting from both British Expeditions under the leadership of Captain Robert Falcon Scott, R.N., now leaves no further doubt as to the exact location of the South Magnetic Pole, a quest which figured prominently in the scientific programme of this Australasian Antarctic Expedition.

All the field notebooks, magnetograph records, and manuscript of the expedition used in the compilation of this report are henceforth to be retained at the Mitchell Library, Macquarie-street, Sydney, where they are in safe keeping and available for reference.

DOUGLAS MAWSON.

AUSTRALASIAN ANTARCTIC EXPEDITION.

SCIENTIFIC RESULTS.

TERRESTRIAL MAGNETISM.

CONTENTS.

PART I.

FIELD SURVEY AND REDUCTION OF MAGNETOGRAPH CURVES.

BY

ERIC NORMAN WEBB, D.S.O., M.C., A.C.S.E. (N.Z.), A.M.INST.C.E.

WITH ELEVEN PLATES AND TWENTY TEXT FIGURES.

CHAPTER I.

INTRODUCTORY REMARKS.

Chapter III.

OBSERVATORY WORK.

Chapter IV.

ABSOLUTE OBSERVATIONS AND BASE-LINE VALUES.

Chapter V.

REDUCTION OF MAGNETOGRAPH CURVES.

PART II.

ANALYSIS AND DISCUSSION OF MAGNETOGRAPH CURVES.

BY

CHARLES CHREE, M.A., Sc.D., LL.D., F.R.S.

CHAPTER VI.

PRELIMINARY REMARKS.

CHAPTER VII.

RESULTS OF CURVE MEASUREMENTS AND THEIR DISCUSSION.

CHAPTER VIII.

VECTOR DIAGRAMS AND FOURIER ANALYSIS.

CHAPTER IX.

ABSOLUTE DAILY RANGES—DAILY MAXIMA AND MINIMA.

CHAPTER X.

COMPARISON OF THE ADELIE LAND DATA WITH DATA FROM CAPE EVANS.

LIST OF TABLES.

PART I.

LIST OF TABLES—*continued.*

TEXT ILLUSTRATIONS.

PART I.

PART II.

PLATES.

PART I.

Plate I.

The Magnetic Station, Caroline Cove, viewed from the beach, looking east. Carnegie Institution field service tent. Magnetician, A. L. Kennedy, on the right of the tent; E. N. Webb recording within. Note the tussock grass slopes mantling the basic volcanic rock of the neighbourhood. A group of royal penguins are interested spectators, and in the foreground are long strands of coarse kelp cast upon the beach. (*Photo. by* D. Mawson.)

Plate II.

Fig. 1. Magnetic Station at Caroline Cove, Macquarie Island. View looking west. (*Photo. by* D. Mawson.)

Fig. 2. View looking south from the North End (Wireless Hill), Macquarie Island. The North End Spit is seen joining Wireless Hill to the main mass of the Island visible in the distance. The triangular white spot at the south end of the spit is the "magnetic" tent (at Station A). (*Photo. by* J. F. Hurley.)

Plate III.

Fig. 1. Magnetometer, as adopted by the Department of Terrestrial Magnetism, Carnegie Institution of Washington. (*Photo. by* F. Wild.)

Fig. 2. A. L. Kennedy observing with the Lloyd-Creak Dip-Circle, on the Shackleton Shelf-Ice, adjacent to "The Grottoes"—the name adopted by the Western Base Party for their Winter Quarters Hut. (*Photo. by* C. A. Hoadley.)

Fig. 3. The Kew, Land Pattern Dip-Circle. E. N. Webb operating the Declinometer. Under such chilly conditions no opportunity was lost for keeping the finger-tips warm. (*Photo. by* J. F. Hurley.)

Fig. 4. The Entrance to the Magnetograph House. The lower section of the door (which was made in two halves) was not opened during the winter, for it became blocked by packed drift snow. The scour of the wind kept the upper section fairly free from accumulations of snow. In this picture, taken on a fine spring day, E. N. Webb is seen climbing out through the upper half of the doorway. (*Photo. by* J. F. Hurley.)

Plate IV.

Fig. 1. The Magnetograph House, Cape Denison, viewed from the south-east, early in the autumn of 1912, before the thick lagging of stones became choked with packed drift snow. Part of the sloping roof of the hut itself is seen rising above the stone wall, and is observed to be lagged outside with sacks, sheep-skins, &c. The entrance is on the north side at the west corner. (*Photo. by* J. F. Hurley.)

Fig. 2. The North Face of the Magnetograph House, showing the door at the western corner. View taken in midsummer, January, 1913. Note the cowl of the ventilator above. On this side the protecting wall of rocks is comparatively scanty, for the destructive winds come from the south. Furthermore, in winter high banks of compacted snow accumulate and lag this lee side. The figure in the view is observer W. H. Hannam. (*Photo by* J. G. HUNTER.)

PLATE V.

Fig. 1. The Interior of the Magnetograph House; view looking towards the east. In the foreground, on the right, is to be seen the illuminating lamp, and on the left the box containing sensitized recording paper. The three different sections of the instrument recording respectively H, D and I are so alligned in this photo. that the first of the three obscures the view of the other two. The black, tarred paper lining the walls of the hut is seen to be encrusted with ice, accumulated chiefly as condensation from the observers' breath. The principal accumulation is above, where the walls and roof were less sufficiently lagged. Magnetician E. N. Webb is in attendance. (*Photo. by* J. F. HURLEY.)

Fig. 2. Schmidt Planimeter used in the reduction of the Magnetograph Curves. (*Photo. supplied by* H. F. SKEY.)

PLATE VI.

Fig. 1. Erecting the Framework of the Magnetograph House, to be seen in the distance, February, 1912. View across the bend of the Boat Harbour, looking east. Weddell Seals in the foreground. (*Photo. by* X. MERTZ.)

Fig. 2. View looking East across the Boat Harbour, Cape Denison, showing the rocky ridge on which the Magnetograph House and Absolute Hut were erected. The locations where each was subsequently built are marked on the plate, where M indicates the former and A the latter. (*Photo. by* J. F. HURLEY.)

PLATE VII.

A view taken on the Bay Ice (frozen sea surface) at Cape Denison, looking south over the frozen Boat Harbour to the rising slopes of the inland ice sheet. The dark peaked mound to the right of the foot of the "Wireless" mast is portion of the roof of the Winter Quarters Hut protruding from the snow drift. The rectangular-shaped structure 50 yards to the left of the base of the mast is the Transit House for astronomical observations. The Ice Cave (Station B) is indicated by a bull's eye on the slopes near the horizon, just to the right of the top of the mast. The black specks well up on the ice slopes to the right of the mast are men walking up from the Hut to the Ice Cave. Photo. taken on one of the very rare calm occasions in Spring, 1912. (*Photo. by* D. MAWSON.)

Plate VIII.

Fig. 1. C. T. Madigan excavating a pit in compact névé ice for the purpose of magnetic observations. By throwing the excavated material to windward a very fair protection against the wind can be secured. An incident on the Eastern Sledge Journey. (*Photo. by* A. L. McLean.)

Fig. 2. Station 1E, at "Cathedral Grotto," the Eleven-mile Cave. E. N. Webb observing with the dip-circle on the plateau ice protected by a pit-and-screen shelter. September, 1912; temperature –25°F., and wind velocity 60 miles per hour. (*Photo. by* A. L. McLean.)

Plate IX.

Fig. 1. The Rigorous Weather Conditions at Cape Denison are illustrated by this photograph. In the winter a coating of ice quickly forms around the face. In "thick" weather the entire face quickly becomes covered with a mask of ice. (*Photo. by* J. F. Hurley.)

Fig. 2. Station 7 on the Antarctic Ice Plateau, 70° 36·7′ S. Lat. and 148° 14′ E. Long.; 301 miles S.S.E. from Winter Quarters, Cape Denison. The nearest station to the Magnetic Pole, occupied 21st December, 1912. R. Bage standing near the tent, E. N. Webb observing in the distance behind a pit-and-screen shelter. (*Photo.* by J. F. Hurley.)

Plate X.

Fig. 1 and 2. Field Service "Magnetic" Tent of the Department of Terrestrial Magnetism, Carnegie Institution. A. L. Kennedy makes observations on the Shackleton Ice Shelf, Queen Mary Land. (*Photos. by* M. H. Moyes.)

Fig. 3. "Magnetic" Igloo for absolute-observations and continuous visual records at "The Grottoes," Shackleton Ice Shelf, Queen Mary Land. (*Photo. by* C. A. Hoadley.)

Fig. 4. A. L. Kennedy excavating his instruments after collapse of his "Magnetic" Igloo during a blizzard. (*Photo. by* A. D. Watson.)

Plate XI.

The vicinity of "The Grottoes," Shackleton Ice Shelf, Queen Mary Land. In the foreground, on the left, is the "Magnetic" Igloo (partly buried). From it extends a line of bamboo poles carrying a guide line (very useful in thick weather) to the living hut. The pyramidal roof of the latter is seen projecting from the névé surface. (*Photo. by* F. Wild.)

PART II.

Plate XII.

Westerly Declination Diagrams, Cape Denison, Adelie Land.

Plate XIII.

Horizontal Force* Diagrams, Cape Denison.

Plate XIV.

Vertical Force Diagrams, Cape Denison.

Plate XV.

Inclination Diagrams, Cape Denison.

Plate XVI.

North, West and Vertical Components for all Days, Cape Denison.

Plate XVII.

Vector Diagrams derived from the North, West, and Vertical Diurnal Inequalities, Cape Denison.

Plate XVIII.

Graphic Comparison of Diurnal variations at Cape Denison, Adelie Land, and at Cape Evans, McMurdo Sound, Winter 1912.

---

*Note that the ordinate scale in Tables XIII, XIV, XVI, XVII, and XVIII is in terms of gamma, though the heiroglyphic printed in the actual tables in some cases more nearly resembles the letter "V."

TERRESTRIAL MAGNETISM.

PART I.

FIELD SURVEY AND REDUCTION OF MAGNETOGRAPH CURVES.

BY
ERIC NORMAN WEBB, D.S.O., M.C., A.C.S.E. (N.Z.), A.M.INST.C.E.,
Chief Magnetician to the Expedition.

CHAPTER I.

INTRODUCTORY REMARKS.

1. ACKNOWLEDGEMENTS.

UPON return of the Australasian Antarctic Expedition in the year 1914, the tedious work of reduction of the magnetograph curves was undertaken at Christchurch, New Zealand. This decision was influenced by several circumstances, such as facilities made available at the Christchurch Observatory, and the fact that I, myself, was engaged at the time at the Canterbury University College; also the assistance and interest in the work afforded by Professor C. C. Farr, D.Sc., of Canterbury University College, and Mr. H. F. Skey, B.Sc., Director of the Magnetic Observatory, Christchurch.

It was arranged that the tabulated data thus derived from the reduction of the curves would then be forwarded to London for analysis and discussion by the eminent magnetician, Dr. Charles Chree, F.R.S., &c., Superintendent of the Kew Observatory.

During the latter part of 1914 and during 1915, the work of scaling curves and preparation of data for the reduction was proceeded with, but in September of the latter year, as that portion of the reduction which it was essentially desirable should be carried out by the actual observer had been completed, I enlisted with the Royal Australian Field Engineers for the period of the war.

The supervision and direction of the work of reduction of the magnetograph curves, which was carried on under great disabilities during the war, was undertaken by Professor C. C. Farr and Mr. H. F. Skey. So that, for the organisation and control of many aspects of the reduction work, as well as for the elucidation of many points uncompleted by me, this publication is under a large debt of gratitude to these two gentlemen.

For the carrying out of the tedious and arduous work of scaling, converting to arithmetical values, meaning, &c., equally warm expressions of gratitude are due to Miss B. Smith, M.A., and other Physics students of Canterbury College, who so enthusiastically gave up their spare time for the purpose.

The collection and compilation of the data comprising the first part of this work has been carried out by the writer since the conclusion of the war and parallel with the claims of everyday business. Hence, one cause of delay in bringing this publication to a final issue will be at least partly understood.

The A.A.E. has to acknowledge a very great debt for the assistance afforded by Dr. L. A. Bauer, Director of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, whose generous loan of instruments, &c., greatly assisted the organisation of the magnetic work by E. Kidson, M.A., M.Sc. (O.B.E., Capt. R.E.), Observer of the Carnegie Institution; Dr. J. M. Baldwin, Assistant Director (later Director) of Melbourne Observatory; and Mr. P. Baracchi, until recently Director of Melbourne Observatory, who collectively trained the Expedition observers, carried out intercomparisons and supplied invaluable advice.

I welcome this opportunity to record the warmest appreciation of the untiring and conscientious effort of the late Capt. R. Bage, B.E., Royal Aust. Engineers, who conducted the magnetic observatory in Adelie Land so successfully during the last nine months in the face of many severe handicaps; (Lieut.) A. L. Kennedy, B.E., who conducted the magnetic work at the Western Base (Queen Mary Land), despite much of difficulty and discouragement, also deserves specially warm commendation. To (Capt.) C. T. Madigan, M.A., B.E., (Capt.) F. H. Bickerton, M.C., Mr. G. Dovers, and Mr. W. H. Hannam, who carried out various programmes of observational work, and to (Capt.) J. F. Hurley, and other members of the Expedition who assisted in innumerable ways, and whose whole-hearted co-operation was the key to success, I tender humble and grateful thanks.

Lastly, I would express my indebtedness to, and appreciation of, "*Dux Ipse*," Sir Douglas Mawson, K.B., O.B.E., B.E., D.Sc., F.R.S., whose conception, organisation, sustained sympathy and enthusiasm made possible whatever was accomplished.

2. Extent of Programme in Terrestrial Magnetism.

The Australasian Antarctic Expedition's programme of proposed observations in Terrestrial Magnetism, as in most other pertinent branches of science, was a large one. In fact, it was perhaps as ambitious as any.

As a member of Sir Ernest Shackleton's Expedition, Sir Douglas Mawson, in company with Professor Sir T. W. E. David, F.R.S., and Dr. A. F. Mackay, had made a journey—then a record for unsupported man-haul sledging—to the South Magnetic Polar Area in 1907, approaching the Area from the east and south. It was therefore natural that on the Expedition which he had organised, Dr. Mawson should wish to extend the magnetic survey in the vicinity of the South Magnetic Pole. This factor actually influenced the formation of the plans of the Expedition considerably, so that it was determined to place the Main Base as nearly as circumstances would allow directly north of the Magnetic Polar Area (Fig. 1 and 2). Here a magnetic observatory was to be established, and from this base a journey was to be made to the Magnetic Pole and also both east and west along the coast, as complete a magnetic survey as possible being carried out by all parties. In addition, one or two other bases were to be established further along the coast to the west, and these also were to make complete determinations of terrestrial magnetic force.

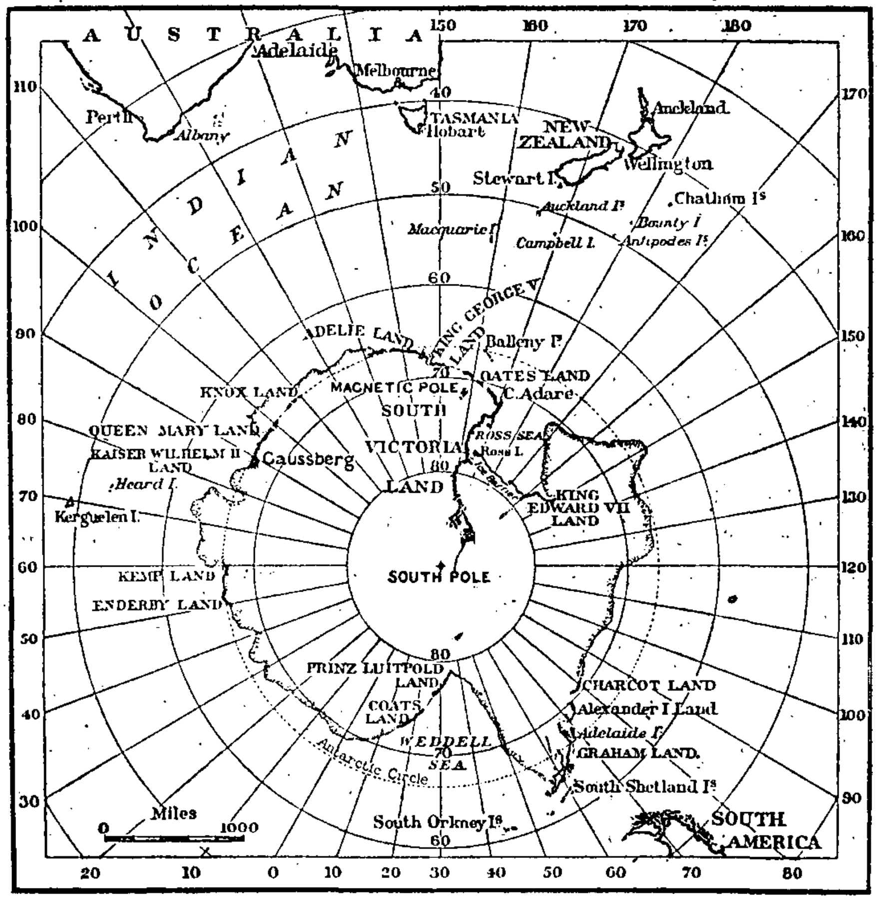


Fig. 1.—The South Pole Regions.

Thus the Magnetic programme comprised (*a*) an extensive scheme of Field Survey work, and (*b*) the conduct of an Observatory with self-recording magnetographs. The work in both phases was likely to present both unusual phenomena and unusual difficulties.

3. Training of Observers.

For the training of observers in field observational work the Expedition is extensively indebted to the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, D.C., U.S.A., and particularly to Mr. E. Kidson, of the staff of that institution.

In 1911, through the instrumentality of Dr. L. A. Bauer, Director of the Department of Terrestrial Magnetism, Carnegie Institution, I was appointed an observer on the staff of the Institution for purposes of training with a view to conducting magnetic survey work in the Antarctic later. A period of five months was spent with Mr. Kidson assisting with the magnetic survey of Australia and becoming familiar with, and proficient in, the methods of the Carnegie Institution.

I then proceeded to Melbourne Observatory and Hobart to receive instruction in the conduct of a magnetic observatory and in the setting-up and running of magnetographs under the tuition of Dr. J. M. Baldwin, then First Assistant, now Director of Melbourne Observatory. During some five weeks at Hobart, the Expedition magnetographs were unpacked and completely set up in a cellar at the University. Several curves were obtained, and I was thoroughly initiated into the routine and various operations.

In Hobart Mr. A. L. Kennedy was coached and practised in field observations, and afterwards took charge of the work of the Western Base. Kennedy also had further practice and instruction during the occupation of stations on Macquarie Island and before leaving the Main Base at Commonwealth Bay.

At the Main Base during the winter and early spring several members of the party were instructed and practised in the taking of magnetic observations.

Mr. W. H. Hannam was trained to carry out magnetometer observations, and to conduct the routine of the magnetographs while I was absent on field survey work.

Mr. C. T. Madigan received training in the conduct of observations for declination and dip, and subsequently handed in a very useful series of results.

Mr. F. H. Bickerton was coached in the use of a "declinometer," for the construction of which he was largely responsible. This instrument, in conjunction with a small sextant, was intended for determination of declination, and was used quite successfully by Bickerton subsequently on a sledging journey.

Lieut. R. Bage, R.A.E., was also trained both in the conduct of absolute observations (magnetometer only) and in all magnetograph operations and routine. From the 8th February, 1912, onwards, the magnetographs were conducted by Bage entirely and, despite several extra handicaps, the results speak for themselves and for Bage's ability and care.

4. Field Instruments.

The field instruments used by the Expedition were supplied on loan mainly by the Carnegie Institution. This portion consisted of the following :—

Two theodolite magnetometers complete, Carnegie Institution pattern, made by Bausch and Lomb. (See Plate III, fig. 1.)

One dip-circle, Kew land pattern, made by Dover. (See Plate III, fig. 3.)

One Lloyd-Creak dip-circle, sea pattern, as modified by Dept. Ter. Magnetism, Carnegie Institution. (See Plate III, fig. 2.)

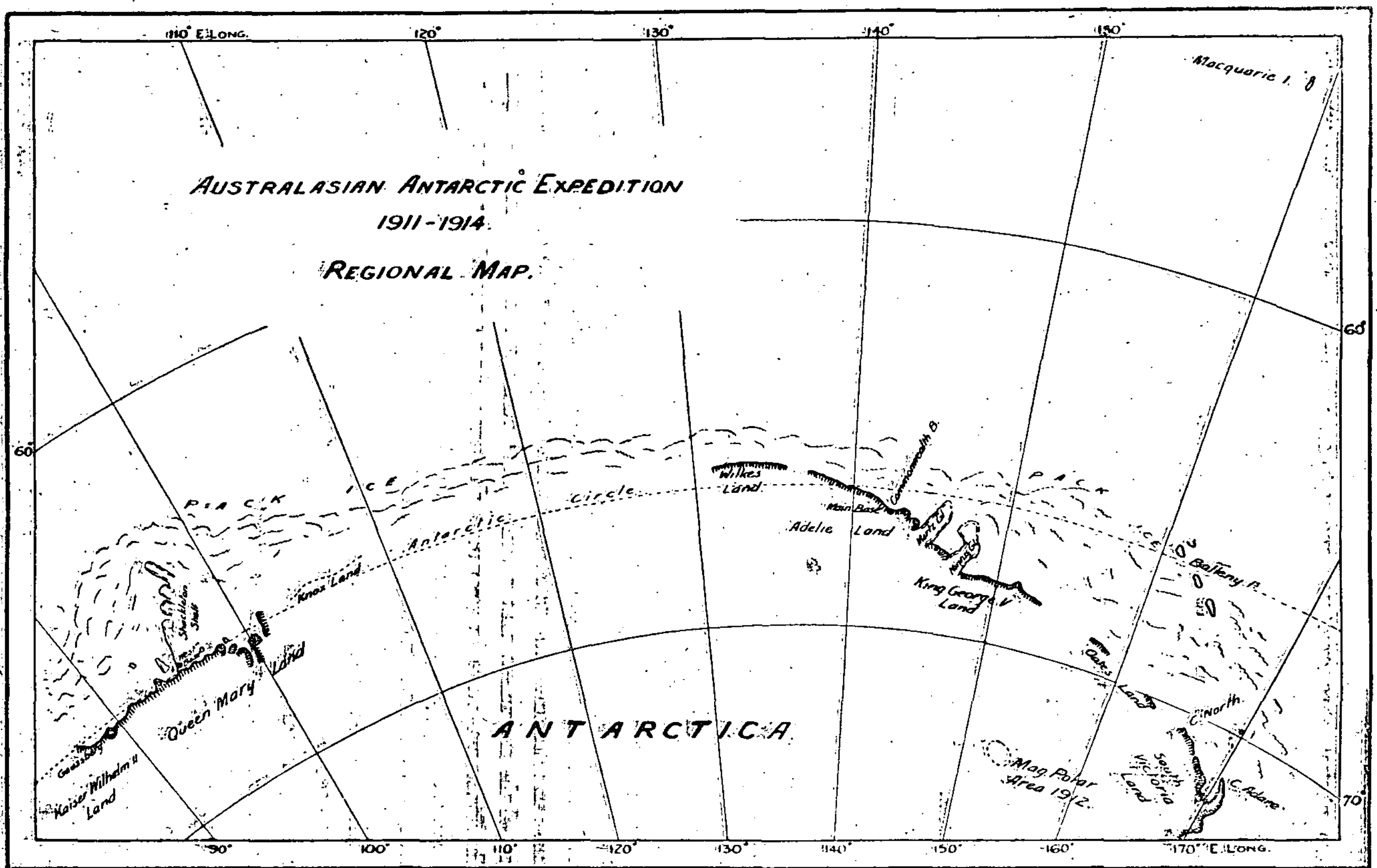


Fig. 2. The Sphere of the Australasian Antarctic Expedition.

Also as accessories—

Two pocket chronometers, one watch, and one observing tent complete. (See Plate II, fig. 1.)

The magnetometers Nos. 6 and 9 were of the standard field type used by the Carnegie Institution, and were arranged for setting up either a four-inch theodolite or the magnetometer, on the one set of legs. (See "Land Magnetic Observations, 1905–1910," by C.I.W., for full description and illustrations.) In the magnetometer the magnet was suspended by a fine phosphor-bronze ribbon in lieu of the silk suspension commonly used in the Kew pattern instrument.

Provision of a more efficient and satisfactory lamp for illuminating the suspended magnet is the only recommendation one can make for betterment of these instruments.

The land-pattern dip-circle, No. 178, was furnished with four dip-needles and two total-intensity needles, with the necessary fittings for deflection experiments. In addition, a declinometer trough-needle was provided, so that this dip-circle was almost a universal instrument. Actually it gave very good results in the Antarctic, the only improvement that might be suggested being the provision of a removable glass front which could be more easily wiped when fogged by condensation and freezing of moisture from the observer's breath.

In the Antarctic the head belonging to the dip-circle tripod was fitted to the legs of the theodolite (Cary three-inch) carried subsequently by the Southern Party. This had several advantages (*a*) of considerably reducing both weight and bulk, (*b*) increasing compactness and handiness, and thus reducing the time of observation, (*c*) so reducing the height of the instrument that it could be accommodated in the ordinary sledging tent. The fitting was made by screwing a zinc nut to fit the thread of the theodolite legs and riveting the tripod head on to the nut. This made a very satisfactory, firm job, and was ensured entirely non-magnetic.

The Lloyd-Creak circle, No. 169, was furnished with four dip-needles and four intensity needles and the necessary deflection fittings. It was fitted with a declinometer trough-needle, and, as it also had a telescope fitted to the vertical vernier arms, it constituted a universal instrument.

The chronometer watches proved satisfactory, but at times suffered somewhat from the extremes of temperature to which they were exposed. They were compared daily with the standard chronometers and always before and after observations.

In addition to the instruments loaned by the Carnegie Institution, a number of theodolites, chronometers and half-chronometer watches formed part of the general equipment of the Expedition. A land type dip-circle was loaned by Christchurch (N.Z.) Observatory. This latter is designated B12 in the tabulated results.

This latter instrument was made by Barrow, and was furnished with two dip-needles only, so that no intensity measurements were possible with it. During the first winter in the Antarctic, a large trough-needle was fitted to this dip-circle and standardised as a declinometer, but, on account of a defective pivot, this needle proved unsatisfactory and declinations for combining with the dips obtained with this instrument were secured by means of a two-inch compass needle attached to a Cary three-inch theodolite.

The theodolites comprised the following :—

One six-inch by Cary with micrometers for use at Main Base for time and latitude determinations, &c. This instrument gave good results, but showed that micrometers are entirely unsuitable for use in high latitudes, where it is necessary to work in very low temperatures and relatively high winds. The micrometer screws, though fitted with non-conducting covers, froze to one's fingers, or were so stiff that at times it became almost impossible to work them.

Several three-inch theodolites with the telescope overhung on one end of the axis and with the vertical circle on the other. These were by Cary, very compact and robust, and thus eminently suited to sledging requirements.

Several three-inch theodolites of standard transit type by Negretti and Zambra. These were made largely of aluminium, in order to reduce weight for sledging, but were not so compact or robust as the Cary instruments. Actually they proved rather fragile for sledging conditions. They were fitted with four-inch trough-needles, which gave very good determinations of declinations.

A twenty-inch transit telescope also was installed at the Main Base, and with this, in conjunction with wireless time signals, the longitude was ultimately fixed very accurately.

During the winter, a form of declinometer was contrived by Bickerton in collaboration with Mr. P. Correll, who acted as Mechanician to the Expedition. This consisted of a trough-needle about four inches long mounted on an alidade carrying two verniers for reading horizontal angles to about 10 minutes of arc; and sighting vanes for laying on the sun, or on a mark. The alidade arms moved over a graduated circle of nine inches diameter, the graduations being cut in an aluminium plate. This instrument was used in conjunction with a sextant with an artificial horizon, and by combining altitude-time and time-azimuth observations, quite useful results were obtained.

Six standard chronometers were kept in action at the Main Base and two at the Western Base. Of the six, four were mean time and two sidereal clocks. All chronometers were intercompared and corrections on G.M.T. computed by previously determined rates and an approximate assumed longitude every morning about 9 a.m. L.M.T. observations were made periodically as weather permitted. By this means clock rates were pretty thoroughly checked.

The chronometers were kept on a shelf towards the centre of the living hut where the temperature was fairly even, and kept very good rates.

For carrying time on sledging journeys, specially made half-chronometer watches were provided, these being carefully rated against standard chronometers before and after, and checked as possible while sledging. These proved only tolerably satisfactory, consistent rates seldom being secured over extended periods of more than a week or so.

5. Methods of Observation.

The methods and procedures adopted for Field Observations were those laid down by the Department of Terrestrial Magnetism of the Carnegie Institution. (For full description see *Land Magnetic Observations*, 1906–1910, by C.I.W.) These, in brief, were as follows :—

(a) *Complete Station with Magnetometer and Dip-Circle.*

1. Azimuth and longitude—eight settings on sun.
2. Declination—four readings magnet erect and four magnet inverted, reading mark before and after.
3. Oscillations—mean of ten determinations of time for fifty swings.
4. Deflections at two distances 35 c.m. and 40 c.m., two sets of determinations at each distance.
5. Oscillations—repeat 3.
6. Declination—repeat 2.
7. Latitude—including circum-meridian computation.
8. Dip with two or four needles—eight readings of each needle before change of polarity, eight readings of each needle after. Magnetic meridian determined with declinometer trough-needle.
9. Azimuth and longitude as before but with sun on other side of meridian.
10. Round of angles to prominent objects, sketch and description of station.

(b) *Complete Station with Dip-Circle and Theodolite.*

1. Azimuth and longitude (theodolite).
2. Declination with declinometer attachment.
3. Dip with two or four needles, one polarity.
4. Loaded dip.
5. Deflections.
6. Loaded dip.

7. Dip with two or four needles after change of polarity.
8. Declination as in 2.
9. Latitude (theodolite).
10. Azimuth and longitude as in 1; but with sun on other side of meridian (theodolite).
11. Round of angles to prominent objects, sketch and description of station.

Alternatively, in very high magnetic latitudes 3 and 7 were to be extended to complete determinations of dip in two planes at right angles, from which the true dip and meridian could be computed.

This, however, was only resorted to at the farthest south station as, in all cases, the trough-needle gave very good determination of the magnetic meridian.

(c) Dip and Declination only—Dip-Circle and Theodo e.

1. Azimuth and longitude.
2. Declination.
3. Dip with two needles.
4. Latitude.

(d) Declination only with improvised Declinometer and Sextant.

1. Time—altitude to correct watch to L.M.T. and for longitude (sextant).
2. Time—azimuth settings on sun against time of watch to determine azimuth of mark.
3. Declination.
4. Latitude.

(c) and (d) were adapted from the Carnegie Institution methods.

The following conventions have been adhered to throughout in recording field observations :—

(a) All bearings are referred to the *south* point through west and north

(b) Easterly declinations are written with + sign (0°-180°) , westerly with — sign.

(c) Dips with south end down are written with — sign; with north end down + sign.

6. Standardisation of Instruments.

All the Carnegie Institution instruments supplied were compared with standard instruments in Washington within nine months of leaving for the Antarctic, and, in addition, careful intercomparisons between the Expedition outfit and that of Mr. E. Kidson, of the Carnegie Institution, were made at Hobart immediately before departure of the Expedition. Mr. Kidson's instruments had previously been intercompared with the Melbourne Observatory equipment, so that complete control was thus obtained At each intercomparison, observations were carried out simultaneously and stations were interchanged. At Hobart the grounds of Government House were used for the purpose, while, in Melbourne, the intercomparisons were carried out at the Observatory.

On return, the instruments (excepting one dip-circle, which had to be abandoned) were again intercompared at Melbourne, while the dip-needles of the abandoned dip-circle were tested in Washington. An unsuccessful attempt to recover both this and the Christchurch circle, which also had to be abandoned on account of very adverse conditions met with on the Eastern Coastal Journey, was made the following spring by a party under Dr. Mawson's leadership. However, so much snow had fallen and accumulated in the interval that both caches were lost to sight.

It was unfortunate that no comparisons were possible with the dip-circle used on the sledge journey south to the vicinity of the Magnetic Polar Area, as no control of the intensity constants was obtained subsequent to the intercomparisons at Hobart prior to departure.

Instruments other than the abovenamed were standardised at the Absolute Hut Station at the Main Base, this being mainly for declination instruments.

7. Recording Sheets, Summaries, Instrumental Constants, &c.

In addition to the instruments, &c., the Carnegie Institution supplied a complete selection and stock of printed recording forms for all field observations, and these were used throughout. The great advantage of these forms was that they ensured uniformity, considerably facilitated booking and computation, and ensured the omission of nothing.

Copies of *General Directions for Magnetic Observations*, notes regarding methods of observation under the conditions likely to be met, tables to facilitate computing, and constants of the various instruments were also supplied in duplicate.

Theodolite Magnetometer, No. 6.—Scale value, one division = 1·48′.

Deflection distances at 20°C., 30·0124 c.m., 35·0073 c.m., and 40·0077 c.m.; temperature coefficient, 0·00046 per degree centigrade; induction coefficient, μ = 4·47; distribution coefficients, P = + 13·61, Q = − 351·5; logarithm of moment of inertia of long magnet and stirrup system at 20°C. = 2·38517; correction for observed declinations is + 0·2′ to be applied algebraically. The correction to observed horizontal intensity determined in November, 1911, was + 0·00081 H; the correction determined at Melbourne in April, 1913, was + 0·00071 H. Since the first value resulted from comparisons with two instruments and the last from comparisons with one instrument, the first value is given the weight of two against the weight of one for the second; accordingly the weighted mean adopted is + 0·00078 H.

Theodolite Magnetometer, No. 9.—Scale value, one division = 1·48′.

Deflection distances at 25°C., 30·0155 c.m., 35·010 c.m., and 40·011 c.m.; temperature coefficient, 0·00044 per degree centigrade; induction coefficient, μ = 4·03; distribution coefficients, P = + 15·01, Q = − 468; logarithm of moment of inertia of long magnet and stirrup system at 20° C. = 2·38019. The corrections as determined at Washington, and confirmed by observations in November, 1911 and 1913, are in declination + 0·7′, and in horizontal intensity − 0·00018 H.

Barrow Dip-Circle, B 12.—Results obtained with needles 1 and 2 are accepted without correction for dips between 86° and 89° S.

Lloyd-Creak Dip-Circle, No. 169, was a universal instrument for reconnaissance work, and was fitted with a small astronomical telescope, and a long compass needle mounted in a closed case with a glass cover for declination observations, as well as an arrangement for determining values of total intensity. All astronomical observations on the Eastern Sledge Journey were made with this dip-circle.

The agate bearings for the needle pivots had been designed originally for use on board ship, the knife edges of the land pattern being replaced by jewel cup-bearings in which the needle pivots rested. To overcome the increased friction of these cups, a small brass pointer on top of the circle was agitated by means of a corrugated ivory scraper. Difficulty was experienced in keeping these agate cups free from frost, which formed inevitably as soon as one's hand was inserted into the case, and the needles could not be induced to swing freely. The Carnegie Institution decided in 1914 that "this instrument was found generally an unsatisfactory type for polar work, owing to the formation of frost in the jewel bearings; for this reason it was also necessary to reject the observations for total intensity made with this instrument." (p. 18, *Land Magnetic Observations*, 1911–1913.) The dip-circle is described on p. 7 in *Land Magnetic Observations*, 1905–1910. The long trough-compass case, which was attached to the top of the circle was fitted with sight vanes. Using these sight vanes, in conjunction with the telescope attachment for far distant objects, rounds of angles were read rapidly and referred to the magnetic meridian by reading the horizontal circle setting for magnetic north. Apart from the jewel cup-bearings mentioned above, No. 169 proved itself a very satisfactory and handy instrument.

Corrections for dips between 68° and 78° south are, needle No. 5, +0·2′, needle No. 6, +0·6′, applied algebraically. Corrections to declination, (*a*) when mark read by telescope −3·8′, (*b*) when mark read by peep sights −2·2′, the latter correction being obtained from observations made during the Expedition on 6th and 7th August, 1912.

Dover Dip-circle, No. 178.—The corrections adopted for the various needles and dips are indicated in the following tabulation:—

Dip,	No. 1.	No. 2.	No. 7.	No. 8.
— 62°	— 3·0	— 3·8	— 3·6	— 4·4
— 65°	— 3·7	— 3·1	— 3·6	— 3·3
— 70°	— 3·8	— 1·7	— 2·6	— 2·7
— 75°	— 2·5	— 0·7	— 1·5	— 3·5
— 80°	— 1·0	— 0·2	— 1·2	— 2·9
— 85°	+ 0·9	— 0·3	— 1·1	— 2·5
— 90°	— 0·3	0·0	+ 0·1	+ 0·2

The correction for values resulting from needle No. 3 deflected by No. 4 is +2·0′ for dips between 62° and 90° south.

The logarithm of the total intensity constant for needle-pairs 3 and 4 adopted for all observations is 9·55301.

Values of declination observed with the compass attachment require a correction of —2·5′.

Miscellaneous.—Values obtained with the three-inch Cary theodolite on the Eastern Sledge Journey are accepted without correction.

Declinations obtained with the improvised declinometer are also accepted without correction: The degree of accuracy in both cases is of a considerably lower order than that obtaining with the use of either magnetometer or dip-circle compass attachment.

All corrections are based on the provisional International Magnetic Standards of the Department of Terrestrial Magnetism of the Carnegie Institution.

Chapter II.

FIELD RESULTS.

1. Macquarie Island.

The S.Y. "Aurora" finally left Hobart on 2nd December, 1911, and, after a stormy passage, made a landfall on the south-west corner of the rocky Subantarctic land, Macquarie Island. (See map Fig. 3.) A party went ashore at Caroline Cove, the only approach to a harbour on the west coast, and a set of magnetic observations was secured.

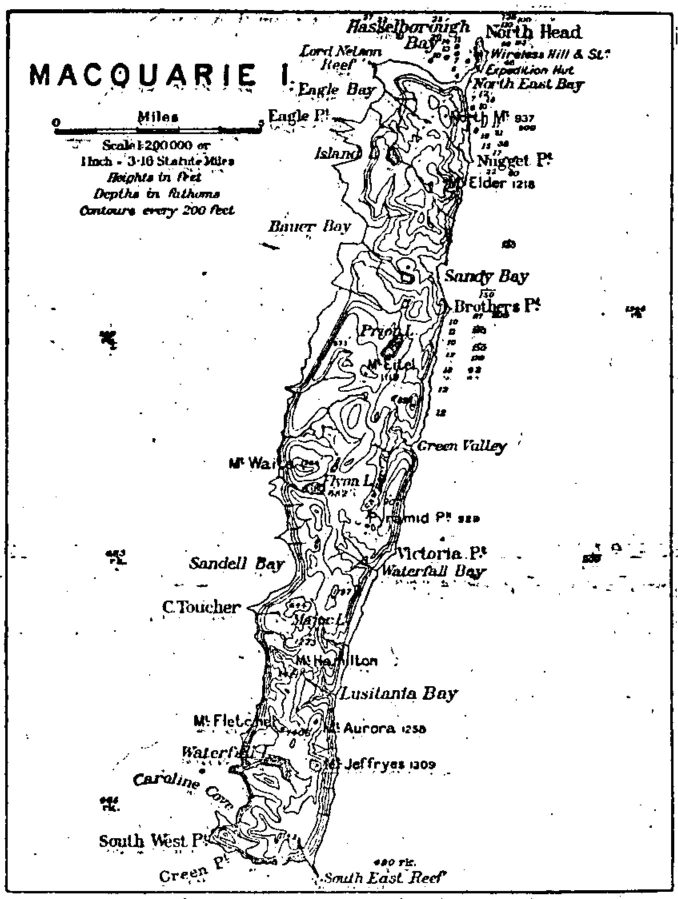
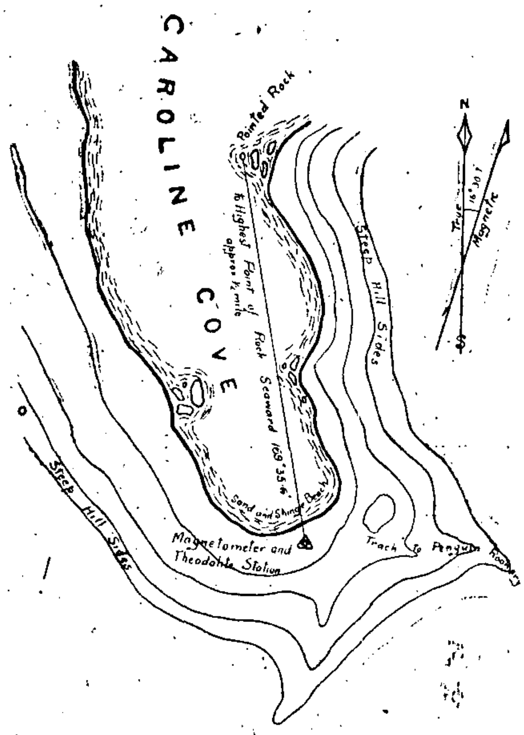


Fig. 3.—Map of Macquarie Island.

Caroline Cove.—The station occupied is shown in the sketch plan herewith, Fig. 4, and photographs (Plate I and Plate II, fig. 1). It was placed on a somewhat peaty bench above a sand and shingle beach, at the foot of steep hills. It was about 100 feet from the seashore, about 10 feet above sea-level, and about 82 feet from two large iron boiling-down pots abandoned by sealers. At the entrance to Caroline Cove are several reefs and isolated rocks, and the true bearing from the magnetic station of the most seaward pointed rock on the right of the inlet mouth was 169° 35·6′.



Magnetic Station
CAROLINE COVE, MACQUARIE ISLAND
Lat. 54° 46·5′ S; Long 158° 47′ E.
Occupied Decr 11th 1911
Approx. to Scale
Fig. 4.

North End.—At the north end of the island one complete main station, designated A, and three subsidiary declination stations, B, C, and D, were occupied. The general disposition of the stations, together with their relation to the surrounding features is shown in the accompanying sketch plan, fig. 5, and by the photograph, Plate II, fig. 2.

Station A is at the junction with the mainland of a sandy and boggy spit, which connects the high semi-detached promontory, Wireless Hill, with the mainland to the south. It is 199 feet west of the shore line; 160·5 feet east of the north-east corner of the newer of two sealers' huts standing under shelter of a rocky ridge, which extends north-eastward into the spit; 179 feet south-south-west of south-west corner of corrugated iron shed, used as a digester-house by the sealers. The station is marked by a wooden peg, 3 inches by 2 inches in section, set with the top just beneath the surface. True bearings:—Nearest corner of new wooden hut, 82° 10·4′; south-west corner of digester-house, 191° 23·0′; nearest mast of wireless station, 206° 19·9′; pointed rock off coast in Hasselborough Bay, 236° 02·3′; Sugarloaf Rock at Finger and Thumb (Nugget Point) distant about 3,400 yards, 354° 56·9′.

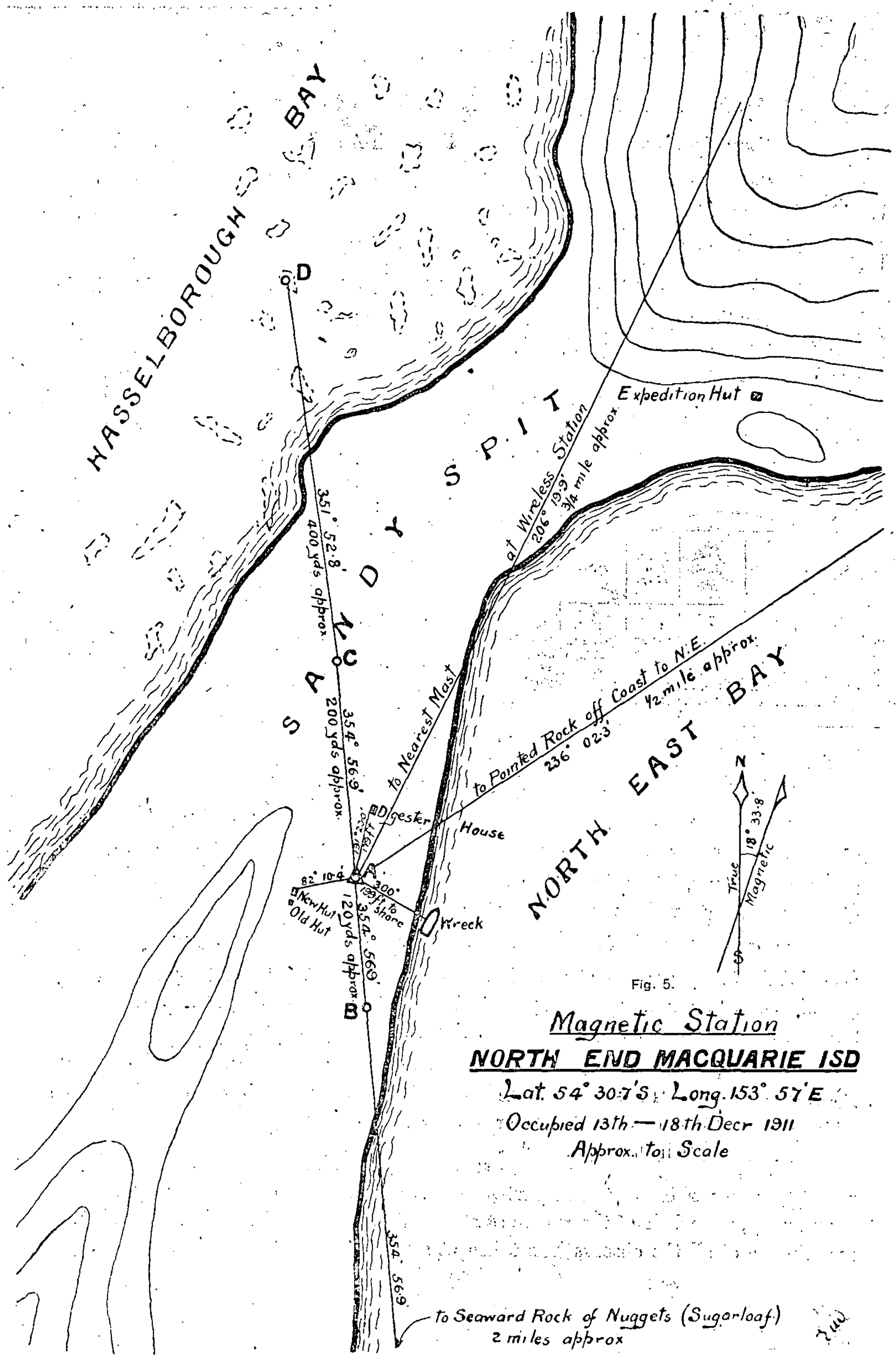


Fig. 5.

Magnetic Station
NORTH END MACQUARIE ISD
Lat. 54° 30.7' S., Long. 153° 57' E.
Occupied 13th — 18th Decr 1911
Approx. to Scale

Station B is about 120 yards south of A, in the direction of Sugarloaf Rock.

Station C is 220 yards north of A, in line with A and Sugarloaf Rock.

Station D is on a rock 200 yards from shore, and about 400 yards from C, from which it bears 171° 52·8′ true.

The results for Macquarie Island are given in Table I.

The rock formation throughout the island is dominantly composed of basic igneous formations—gabbro, serpentine, tachylite, and palagonite. This fact, together with the results from the several stations, points to the locality being but little disturbed magnetically.

TABLE I.

Observational Results.

Macquarie Island.

Station.	Latitude.	Long. East of Gr.	Date.	Declination. Local Mean Time.	Declination. Value.	Inclination. L.M.T.	Inclination. Value.	Hor. Intensity. L.M.T	Hor. Intensity. Value.	Instruments. Mag'r.	Instruments. Dip-Circle.	Obs'r.
	° ′	°	1911.	h. h. h.	° ′	h. h.	° ′	h. h.	Γ			
North End Isthmus, *A* ...	54 30·7 S.	158 57	Dec. 13...	9·2, 11·7 ...	18 33·8 E.	14·4 ...	77 50·0 S.	10·0, 11·2	·13986	9	178·12	W & K
North End Isthmus, *B* ...	54 30·7 S.	158 57	Dec. 15...	10·4, 10·7 ...	18 07·8 E.	......	......	......	......	169	......	ENW
North End Isthmus, *C* ...	54 30·7 S.	158 57	Dec. 16...	11·8, 12·2 ...	18 24·9 E.	......	......	......	......	169	......	ALK
North End Isthmus, *D* ...	54 30·7 S.	158 57	Dec. 18...	12·6	18 25·6 E.	......	......	......	......	169	......	ENW
Caroline Cove	54 46·5 S.	158 47	Dec. 11...	13·0	16 30·7 E.	15·2 ...	77 56·4 S.	13·6 ...	·13578	9	178·12	ENW

2. COMMONWEALTH BAY, ADELIE LAND.—THE MAIN BASE STATION.

After searching along the pack-ice for a week or so, a fairly suitable landing-place was found on the shores of Adelie Land on 8th January, 1911. This was a small rocky promontory, later named Cape Denison, jutting out northwards into a bay some 40 miles across, to which the name Commonwealth Bay was attached.

At Cape Denison, which became the Main Base of the Expedition, and was occupied for two years, five stations in all were occupied as shown in the sketch plan herewith, fig. 6, and illustrated by Plate VI, figs. 1 and 2, and Plate VII. These are referred to in Table II as Commonwealth Bay A, B, C, D, and E.

Station A was the Absolute Hut station, at which determinations of the magnetic elements were made periodically for the purpose of standardising the magnetographs which operated during a total period of more than 18 months.

The location of this station and of B, C, D, and E, is discussed at length in the report on the working of the magnetographs and on general conduct of the magnetic observatory, the whole of the results at station A being given in Table XII, while the mean value of all the observations taken at station A is that given in Table II.

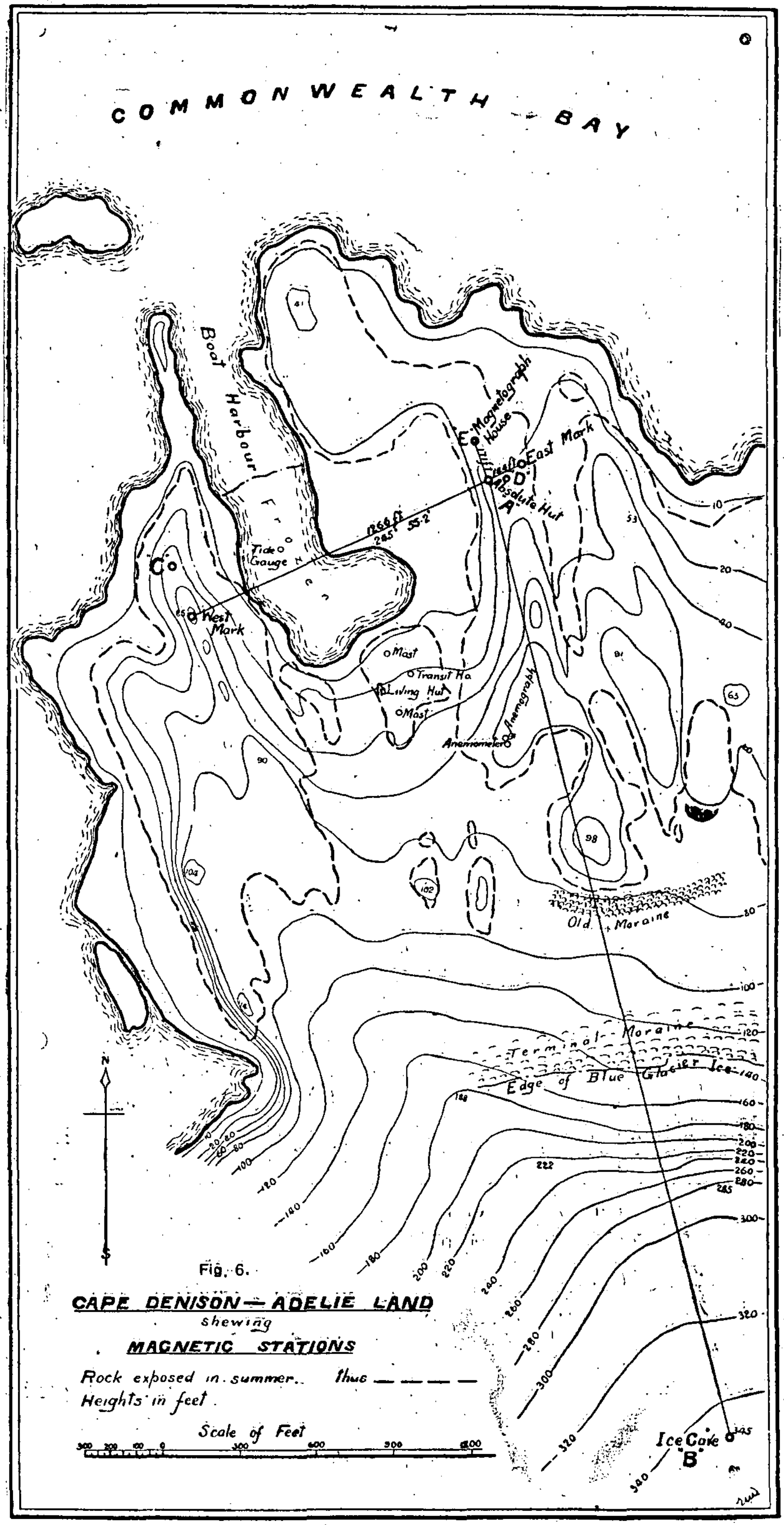


Fig. 6.

CAPE DENISON—ADELIE LAND
shewing
MAGNETIC STATIONS

Rock exposed in summer. thus — — — —
Heights in feet.

Scale of Feet
300 200 100 0 300 600 900 1200

Station B was a cave excavated in the blue ice of the glacier a few degrees east of south, and distant 3,849 feet from A, and about 300 feet above it. (See Plate VII.) The cave was about 1,700 feet from, and 160 feet above, the nearest outcropping sign of the terminal moraine.

It was desired to have a station as nearly as possible free from any merely local disturbance, and was originally intended to attain this object by occupying a station well out on sea ice when the sea should freeze over. However, during the thirteen months of my residence at Cape Denison, on account of the constancy and violence of the wind and despite 60° (F.) of frost, the sea never froze over for longer than three days, and then not sufficiently for our purpose. In consequence, it was hoped that the ice cave would provide a practically undisturbed station. The results of observations are given in Table II.

Station C was occupied in 1912 before the "Aurora" left the Main Base, after landing the stores, &c., for the party. It was situated on a rock ridge a few degrees south of west from station A, about 1,260 feet distant from, and about 20 feet higher than, A. Declination only was observed, and the result is given in Table II.

Station D was a dip-circle station, about 130 feet east of station A. Inclination only was observed. (See Table II.)

Station E.—A determination of H. only was made at the magnetograph-house site, station E, a few degrees west of north and 171 feet distant from station A. (See Plate IV, fig. 1, and results in Table II.)

TABLE II.

Observational Results.

Cape Denison, Commonwealth Bay, Adelie Land.

Station.	Latitude.	Long. East of Gr.	Date.	Declination.		Inclination.		Hor. Intensity.		Instruments.		Obs'r.
				Local Mean Time.	Value.	L.M.T.	Value.	L.M.T.	Value.	Mag'r.	Dip-Circle.	
	° ′	° ′	1912.	h. h. h.	° ′	h. h.	° ′	h. h.	Γ.			
A.	67 00·0 S.	142 40	......	....	6 32·0 W.	......	87 21·6 S.	......	·03099	9	178·12378	...
B.	67 00·7 S.	142 40	Aug. 2...	15·6	1 22·4 W.	......	......	16·3, 17·2	·03071	9	......	ENW
			Aug. 9...	15·2, 16·6 ...	1 11·2 W.	16·8 ...	87 24·9 S.	......	......	178	178·12	ENW
			Aug. 12...	15·4	1 21·8 W.	16·5 ...	87 23·9 S.	16·5 ...	·*03063*	178	178·123	ENW
C.	67 00·0 S.	142 40	Jan. 18...	16·5	4 41·5 E.	......	......	......	......	9	......	ENW
D.	67 00·0 S.	142 40	Feb. 5...	....	......	15·2 ...	87 24·0 S.	......	......	...	178·12	ENW
E.	67 00·0 S.	142 40	Mar. 14...	....	......	......	......	14·7, 17·1	·03105	9	......	ENW

3. EASTERN COASTAL SLEDGE JOURNEY FROM MAIN BASE STATION.

In the summer of 1912–13 a number of very useful stations were occupied by C. T. Madigan, with a Cary three-inch theodolite, carrying a two-inch compass-needle, and the Barrow dip-circle (B12). (See Plate VIII, fig. 1.) The larger portion of this journey was across fast sea-ice, five of the eight groups of observations being on this sea-ice and, therefore, most probably undisturbed, or only slightly so. No gear for deep sounding was carried, so that determinations of depth were seldom possible. By comparison with soundings further west, the depths to sea bottom at stations 3, 4, 5, 9 and 10 would probably be about 100 fathoms, while, at 6, 7, 8 depths would probably be over 200 fathoms. Of the others, two were on the Mertz Glacier Tongue, and one on the top of Mt. Murchison. The results are given in Table IIIa and on the map figured on page 37.

Station 1, on top of Mt. Murchison, at an elevation of 1,860 feet above sea-level. This station was about 10 miles from the coast and on the north-western edge of Mertz Glacier. Five miles south-west of it stands Aurora Peak, and these two prominences appear to form bulwarks against the eroding action of the glacier. There was no rock outcrop at Mt. Murchison, but at Aurora Peak there was a considerable one. The rock was a "highly quartzose gneiss, with black bands of schist running through it," while "the boulders all weathered a bright red and were much pitted where ferruginous minerals were leached out." The underlying rock of Mt. Murchison was probably much the same in character.

Stations 2 *and* 13.—The next were a series of observations at two stations designated Nos. 2 and 13 in Table IIIa. Of these, No. 2 was about eleven miles on a bearing 10° S. of E. from Mt. Murchison, and No. 13 about 1 mile north of 2. Both were well out on the Mertz Glacier, which is probably afloat at this point, and about 200 feet above sea-level.

Stations 3 *and* 4 constituted the first group of observations on the floe-ice. Both declination and dip were determined at 3, and D again determined at 4. Both stations were about 14 miles off-shore.

Station 5 was placed on a high portion of the western edge of the Ninnis Glacier Tongue, 22 miles off-shore and 170 feet above sea-level.

Station 6 was on the sea-ice off the eastern side of Ninnis Glacier Tongue, 45 miles from the nearest point on the coast.

Stations 7 *and* 8 on the same sea-ice, and some 35 miles off-shore.

D was observed at 7, and I at 8 which was 3 miles on a bearing S. 6° E. from 7.

Stations 9, 10 *and* 11.—This group of stations was occupied on the sea-ice in the region of Horn Bluff, which is a cliff 1,000 feet high by about 5 miles long, consisting of a sill of basic igneous rock (columnar dolerite) some 600 feet thick on the face, overlying a sandstone which showed bands of carbonaceous shales and coal. The three stations were on a bearing E. 13° N. from Horn Bluff, No. 9 being 17½ miles, and Nos. 10 and 11, 12½ and 4¼ miles distant respectively. Dip observations were made with two needles at 9, and D was observed at both 10 and 11.

Station 12.—One other set of observations was secured close to another large coastal outcrop of rock at Penguin Point, about 14 miles S. by E. from stations 3 and 4. This rock was a coarse-grained granite, rising precipitously 250 to 300 feet above sea-level, and then more slowly for about a mile at which the plateau-ice over-rode it. The station, No. 12, was on the sea-ice about 100 yards from the foot of the cliffs. A sounding between this station and the cliffs gave 8 fathoms.

Owing to exceedingly difficult conditions, which nearly brought the sledgers to an untimely end, the dip-circle carried by this party had to be "dumped" to reduce weight to the absolute minimum, and thus no subsequent intercomparisons could be made.

The observations made on this journey were well carried out, and, considering the calibre of the declination instrument, yielded extremely uniform and consistently good results. The degree of accuracy attainable was somewhat lower than that with a good trough-needle, but the observer is to be complimented on the results actually secured.

4. Western Sledge Journey, Adelie Land.

Two sets of observations for declination only were made on this journey by F. H. Bickerton (Table IIIa).

Station 1 was about 128 miles west-by-north from the Main Base, about 7 miles from the coast, and at an elevation of some 2,000 feet.

Station 2 was about 28 miles west-south-west from the Main Base, some 22 miles from the nearest coast line, and at about 2,800 feet elevation.

No rock outcrop was seen on this journey, and there was probably considerable thickness of ice overlying the rock foundation. Thus the stations are probably undisturbed.

TABLE IIIa.

Observational Results.

Station.	Latitude.	Long. East of Gr.	Date.	Declination.		Inclination.		Hor. Intensity.		Instruments.		Obs'r.
				Local Mean Time.	Value.	L.M.T.	Value.	L.M.T.	Value.	Mag'r.	Dip Circle.	
	° ′	° ′	1912.	h. h. h.	° ′	h. h.	° ′	h. h.	Γ.			
Eastern Coastal Sledge Journey from Main Base Station.												
1	67 19·0 S.	144 16	Nov. 21...	11·8, 17·3 ...	21·0 W.	15·2 ...	87 51·6 S.	......	......	Cary	B1	CTM
2	67 23·8 S.	144 42	Nov. 25...	11·7	9·3 W.	......	......	......	......	Cary	......	CTM
3	67 24·4 S.	145 50	Nov. 28...	....	......	17·4 ...	88 06·0 S.	......	......	...	B12	CTM
			Nov. 29...	7·2	6·7 W.	......	......	......	......	Cary	......	CTM
4	67 24·4 S.	146 02	Nov. 29...	11·7	7·8 W.	......	......	......	......	Cary	......	CTM
5	67 32·6 S.	147 17	Dec. 2...	8·2	3·2 E.	10·6 ...	87 43·9 S.	......	......	Cary	B12	CTM
6	67 38·2 S.	148 31	Dec. 12 ...	8·2, 11·9 ...	5·8 E.	11·5 ...	87 53·5 S.	......	......	Cary	B1	CTM
7	67 48·6 S.	148 48	Dec. 15...	8·0	4·9 W.	......	......	......	......	Cary	......	CTM
8	67 51·2 S.	148 49	Dec. 15...	....	......	14·1 ...	88 03·0 S.	......	......	...	B1	CTM
9	68 18·9 S.	150 27	Dec. 19...	....	......	11·3 ...	88 17·0 S.	......	......	...	B12	CTM
10	68 19·9 S.	150 16	Dec. 19...	18·0	16·1 E.	......	......	......	......	Cary	......	CTM
11	68 21·5 S.	149 57	Dec. 20...	12·0	15·2 E.	......	......	......	......	Cary	......	CTM
			1913.									
12	67 36·0 S.	149 05	Jan. 1...	8·6	11·4 W.	10·9 ...	88 14·3 S.	......	......	Cary	B12	CTM
13	67 24·5 S.	144 39	Jan. 6...	18·1	11·8 W.	17·2 ...	88 13·6 S.	......	......	Cary	B1	CTM
Western Sledge Journey, Adelie Land.												
			1912.									
1	66 43 S.	138 45	Dec. 30...	21·3	22 45 W.	......	......	......	......	Decl.	......	FHB
			1913.									
2	67 11 S.	141 44	Jan. 11...	20·1	10 23 W.	......	......	......	......	Decl.	......	FHB

5. Sledge Journey across King George Land.

Simultaneously with the Eastern Coastal Sledge Journey, Dr. (now Sir Douglas) Mawson took a series of observations for declination in the same region, but on an inland route. These observations were made with a Negretti and Zambra three-inch transit theodolite, to which a trough, declinometer-needle, four inches long, was attached. Geographic meridian was obtained from alt-azimuths and noon culminations. The results are given in Table IIIb, and are plotted on the map on page 37.

These values of D must be considered in conjunction with those obtained by the Eastern Coastal Party, and the same remarks regarding country rock formation are pertinent. The close agreement between the two series of observations, after making due allowance for difference in location, is extremely gratifying, and, besides indicating a tolerably undisturbed area, this fact also testifies to careful work on the part of both observers.

These results, which were preserved by Dr. Mawson during the terrible experiences of his lonely return journey, after losing first one and then the other of his companions, form a very welcome and valuable addition to the Expedition's observational results in terrestrial magnetism.

Station 1 was on the inland ice-cap south-east of Madigan Nunatak, and at an elevation of 2,450 feet above sea-level.

Station 2 was in a depression of the ice-cap to the west of Mt. Murchison, at an elevation of about 1,000 feet above sea-level. The rocky foundation underlying the ice-cap was probably at no great depth in this locality.

Station 3.—On the inland ice-cap, south of Cape Hurley, about 1,000 feet above sea-level. At this spot probably several hundreds of feet of ice overlying granite rock.

Stations 4 *and* 5.—On the ice-cap, about 2,000 feet above sea-level, south-west of Penguin Point.

Station 6.—On the undulatory glacier ice of the Ninnis Glacier, south of Dixson Island, at an elevation of about 1,000 feet. There would be not less than 600 feet of ice at this spot.

Stations 7, 8 and 9.—On the slopes of the inland ice-sheet, south of Buckley Bay. In all probability 600 feet to 1,000 feet of ice overlying the rocky basement in this locality.

Station 10.—About 2,000 feet above sea-level, south of Horn Bluff. The underlying rock is dolerite, with a capping of 900 to 1,000 feet of ice.

Stations 11 *and* 12.—On the coastal slopes of the ice-cap, south of Cook Bay, at elevations of 1,200 feet and 2,350 feet respectively; the former probably much nearer to the rocky basement than the latter.

TABLE IIIb.

Observational Results.

Sledge Journey across King George Land.

Station.	Latitude.	Longitude East.	Date.	Declination.		Instrument.	Observer.
				Local Mean Time.	Value.		
	° ′	° ′	1912.	h.	°		
1 ...	67 14 S.	143 31	Nov. 18 ...	12·0	6·0 W.	N & Z	DM
2 ...	67 18 S.	144 2	Nov. 19 ...	12·0	11·5 W.	N & Z	DM
3 ...	67 40 S.	145 8	Nov. 23 ...	17·5	8·4 W.	N & Z	DM
4 ...	67 43 S.	145 24	Nov. 24 ...	12·0	14·0 W.	N & Z	DM
5 ...	67 50 S.	145 40	Nov. 24 ...	17·5	11·0 W.	N & Z	DM
6 ...	68 14 S.	146 14	Nov. 27 ...	12·0	4·5 W.	N & Z	DM
7 ...	68 25 S.	147 35	Dec. 1 ...	17·5	0·7 W.	N & Z	DM
8 ...	68 33 S.	147 50	Dec. 2 ...	12·0	2·1 E.	N & Z	DM
9 ...	68 37 S.	148 6	Dec. 3 ...	19·0	3·0 E.	N & Z	DM
10 ...	68 38 S.	149 41	Dec. 9 ...	17·5	7·7 E.	N & Z	DM
11 ...	68 41 S.	151 7	Dec. 12 ...	17·5	18·8 E.	N & Z	DM
12 ...	68 56 S.	151 44	Dec. 14 ...	17·7	23·9 E.	N & Z	DM

6. SOUTHERN SLEDGE JOURNEY—TOWARDS THE MAGNETIC POLE.

One of the foremost aims of the Expedition was to secure as complete as possible magnetic survey of the South Magnetic Polar Area, and, to attain this, a party under R. Bage sledged southward in an endeavour to carry a line of magnetic field stations as far as practicable across the Polar Area. I was the chief observer of this party, but was ably assisted by both R. Bage and J. F. Hurley.

The instrumental outfit consisted of dip-circle 178, Cary three-inch theodolite, two watches, thermometers, hypsometer, aneroid, prismatic compass, sledge-meter and sun-compass.

In all, nine main stations were occupied, at seven of which full sets were obtained with four dip and two intensity-needles and declinometer, at one with two dip-needles, D observations only being made at the other one. In addition to these main stations, very approximate values of D and I were observed at twenty-three other stations.

Station 1E was only $11\frac{1}{4}$ miles almost due south of the Main Base, but at an elevation of nearly 2,000 feet. A complete dip-circle set was obtained here in September, the instrumental work being carried out in the open behind a breakwind, the temperature at the time being—20° Fah., while the wind blew 60 m.p.h. (See Plate VIII, fig. 2.)

Station 1 was about 30 miles from the Main Base on a bearing S. 10° E. and 3,415 feet up. D was the only magnetic element determined, as it was intended to reoccupy this station on the return journey, but completion of the observations subsequently became impossible.

Station 2, at $67\frac{1}{2}$ miles, elevation 2,220 feet, was in a wide depression at the head of the Mertz Glacier. Astronomical and D observations were made in the open behind a breakwind, while I and intensity observations were made in the tent about 80 yards to east of D station. Two needles only were used for dip.

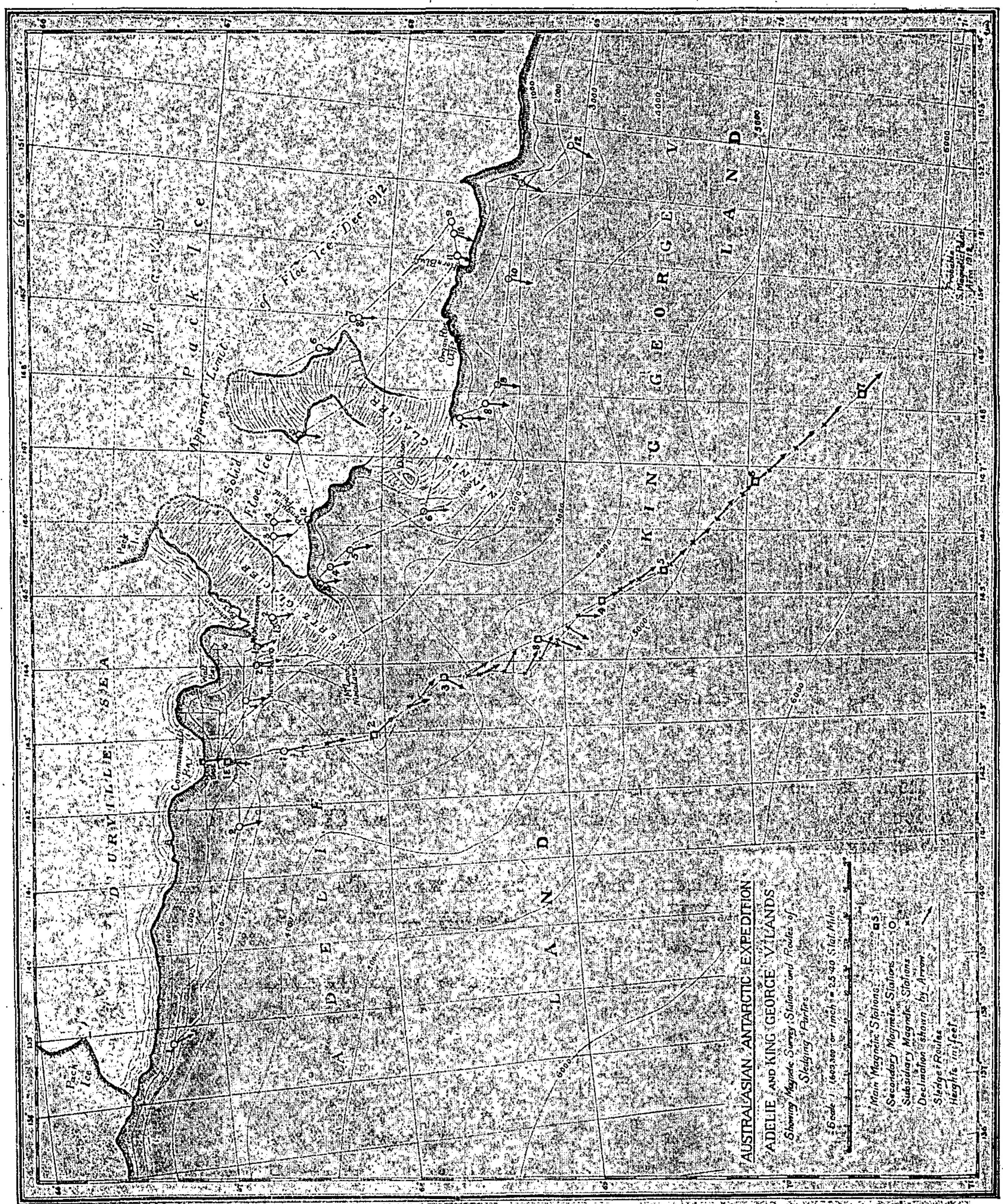

AUSTRALASIAN ANTARCTIC EXPEDITION
ADELIE AND KING GEORGE V LANDS
D'URVILLE SEA
Commonwealth Bay
ADELIE LAND
KING GEORGE V LAND

Fig.-7.

Station 3, on rising ground at the head of Mertz Glacier, at elevation 2,750 feet. Complete D, I and F. This station is some 13 miles east by south from a prominence about 500 feet above the average surface of the plateau. No rock showed through the ice and névé, but the feature appeared to be caused by the existence of a rocky prominence very near the névé surface, possibly only a few hundred feet below. The ice surface was there intersected with huge crevasses up to 120 feet wide, bridged almost completely with snow.

Station 4, height 4,700 feet, was about 25 miles on a bearing S. 31° E. from station 8. Here complete magnetic observations were made, but, on account of constantly overcast weather, no astronomical sets were secured. Approximate declination was obtained by means of the "sun-compass," which was a sun-dial computed for the average latitude and declination, and by which the course was normally maintained. As the party was snowed up at this station for two days, the opportunity was seized to secure a continuous observation of the declination with the declinometer. Although the dip was 89° 08·5′, nevertheless good settings were obtained with the declinometer when handled carefully. The instrument was set up in the tent and the members of the party observed in "shifts" the remaining two living in an ice cave excavated for the purpose. The resulting curve of variation, together with the corresponding declination curve from the magnetograph at Commonwealth Bay, is shown in the figure herewith.

Station 5, height 4,930 feet, was some 25 miles on a bearing south by east from station 4. Complete observations were made.

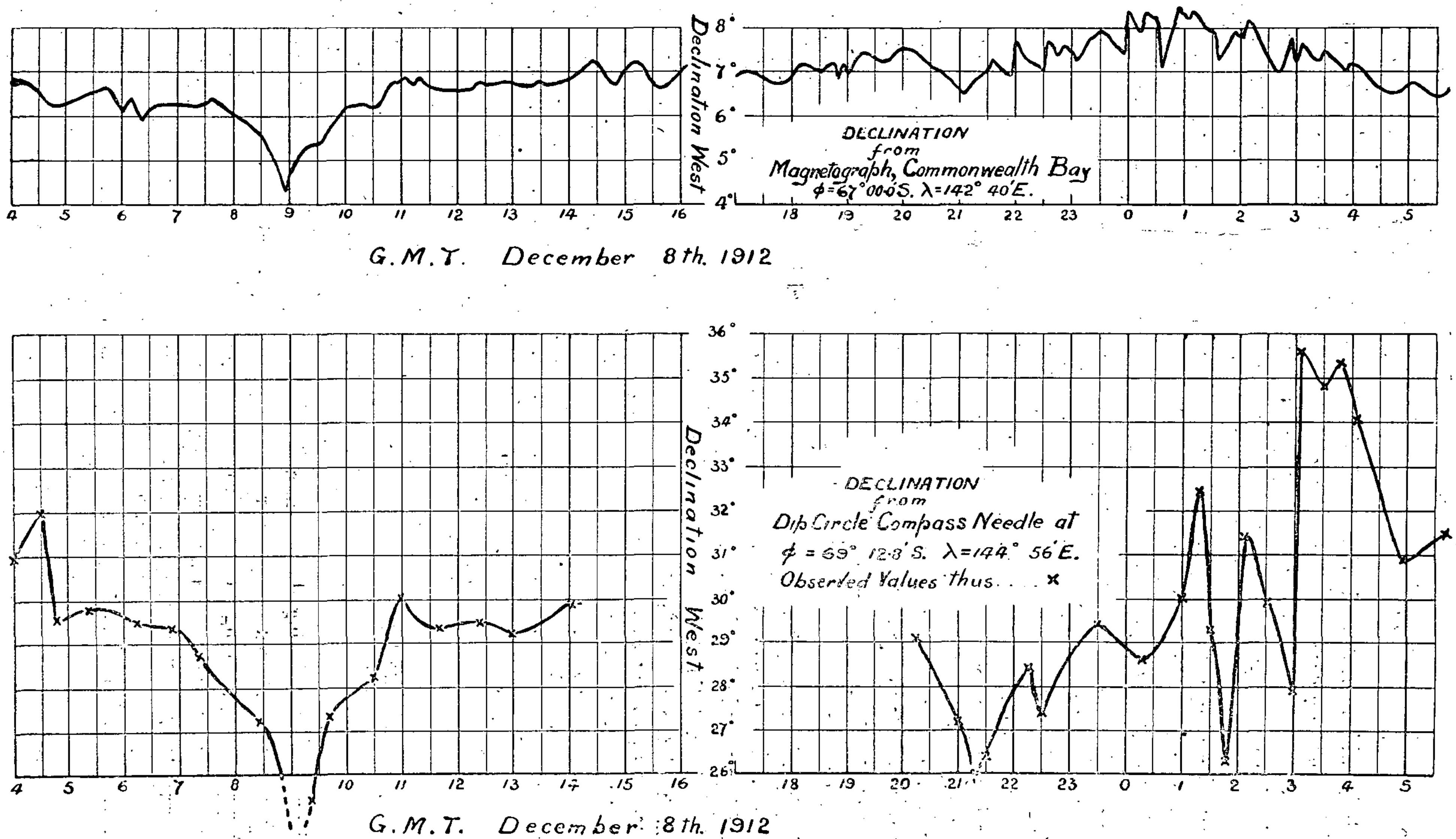
Stations 6 *and* 7.—From station 5 on for 100 miles to 7, a course of approximately S. 45° E., was followed over undulating surface, the plateau rising steadily to 5,400 feet at station 6 and to 5,830 feet at station 7. The maximum height recorded was 5,900 feet about 8 miles before the extreme station. Very exhaustive observations were made at station 7, dip being determined in two directions at right angles with each of four needles and computed for the meridian. (See Plate IX, fig. 2.) The maximum dip obtained was 89° 43·3′.

The geographical locations of stations with the results of observations are given in Table IIIc. In Table IIId will be found the approximate values of D and I observed at twenty-three intermediate stations.

Text illustration No. 9 on page 41 shows a section of the plateau along the line of the main stations, while above are plotted severally the Declination, Dip, and Total Force, a fair line being drawn through the points where possible. This series of diagrams is most instructive, more particularly when studied in conjunction with the map, Fig. 7, showing the area surveyed by the Main Base party of the Expedition.

It will be observed that the line of southern stations crosses over the head of the Mertz Glacier in latitude 68° S. between stations 2 and 8, and crosses the head of Ninnis Glacier in latitude 69° S. between stations 8 and 4. Although at the time, the party was not aware of the existence of these glaciers, considerable evidence was

Fig. 8.—CURVES of D. at 134-Mile Camp, compared with Magnetograph Records at Base Station, 8th December, 1912.



noted, which confirmed the relation subsequently. The configuration of the plateau surface as indicated by the section (page 41) and also as noted generally, substantially supports this conclusion. There is thus abundant evidence of very considerable unconformity in the rock surface beneath the ice-cap up to station 4; with indication of a particularly dense bed rock about station 8. Over the 100 miles from stations 5 to 7, however, the plateau rises steadily and evenly, and may be assumed capped with a considerable thickness of ice.

The variation of the magnetic elements is both startling and illuminating. All the stations up to 4 are disturbed to some extent, and several of them considerably so. The largest disturbance appears to occur about No. 3, near which there are changes of declination of 80° in 11 miles, and 90° in 22 miles, while there is a reversal of the dip amounting to 24′ in 11 miles. A second severe disturbance occurs in the vicinity of the high ground referred to previously as having been encountered some 13½ miles to the west of station 8. One other extraordinary disturbance occurs at station 1E, where a large increase in H is evident. It is subject for remark that there is little disturbance of D. In view of the interest attaching to this area, it is to be regretted that station No. 1 could not be completed.

These disturbances would appear to be due to the existence in the areas indicated of subglacial mountains containing paramagnetic ores relatively close to the plateau surface. The effect of these anomalies on one endeavouring to follow the magnetic meridian may be imagined.

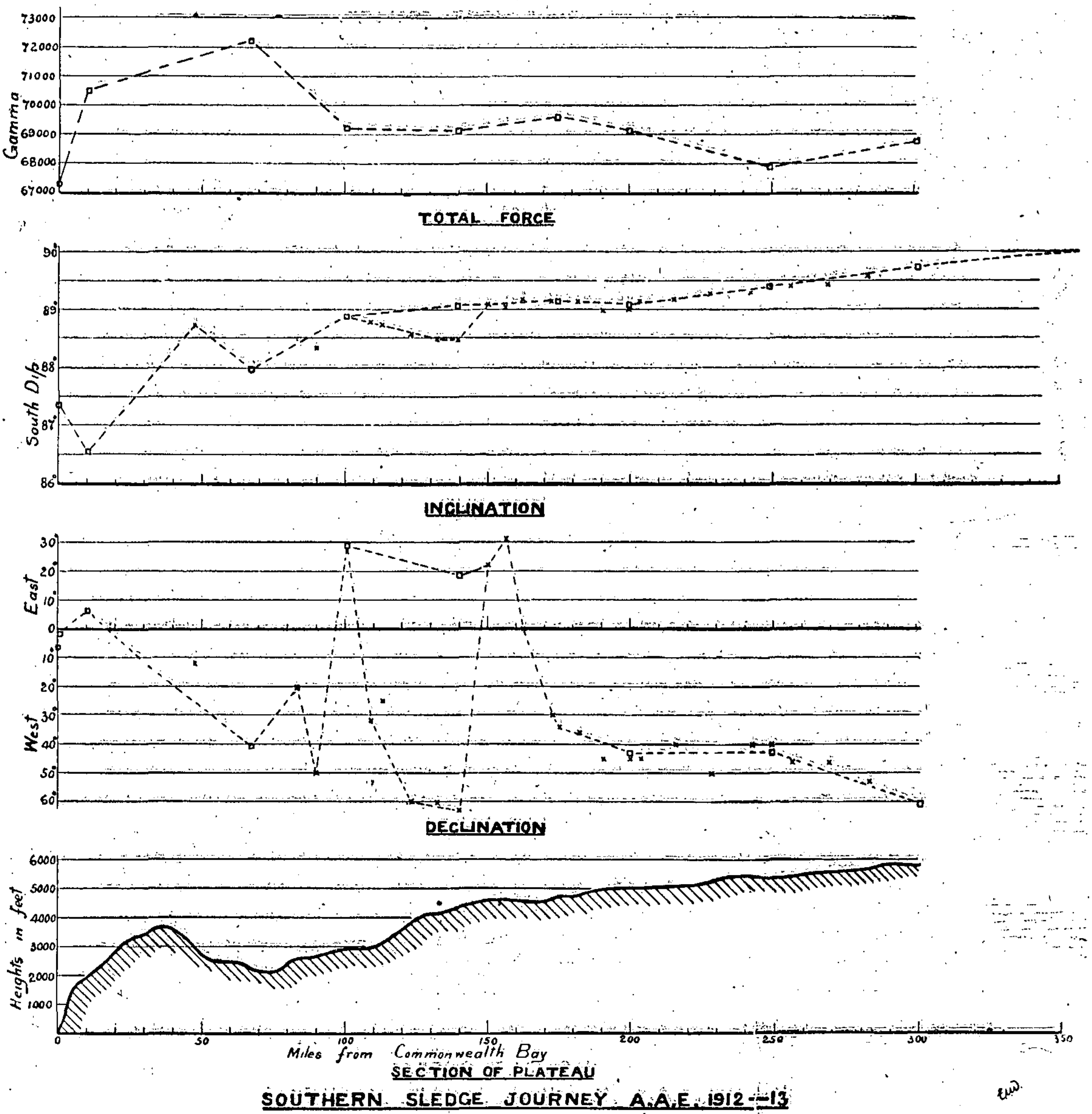
From station 5 to the extreme point of the journey, station 7, remarkably even values of the magnetic elements were obtained. The dip increases steadily and uniformly at 0·37′ to the mile, while for such a high dip the declination also is surprisingly uniform. In consequence, this area may be accepted as substantially undisturbed and the nearest position of vertical dip calculated as some 50–60 miles south-east of station 7 about latitude 71° S., longitude 150·3° E.

TABLE IIIc.

Observational Results.

Southern Sledge Journey.

Station.	Latitude.	Long. East of Gr.	Date.	Declination.		Inclination.		Hor. Intensity.		Instruments.		Obs'r.
				Local Mean Time.	Value.	L.M.T.	Value.	L.M.T.	Value.	Mag'r.	Dip-Circle.	
	° ′	° ′	1912.	h. h.	° ′	h. h.	° ′	h. h.	Γ.			
1E	67 08·8 S.	142 40	Sept. 14...	14·5	6 37·3 E.	17·2 ...	86 33·6 S.	......	......	*178*	178·12	ENW
			Sept. 15...	....	......	12·1 ...	86 31·0 S.	12·1 ...	*·04285*	*178*	178·3	ENW
1	67 26·6 S.	142 47	Nov. 17...	18·4	11 27·9 W.	......	......	......	......	*178*	......	ENW
2	67 56·5 S.	142 58	Nov. 21...	19·9	40 26·3 W.	......	......	......	......	178	......	ENW
2A	67 56·5 S.	142 58	Nov. 22...	....	......	17·1 ...	87 59·1 S.	17·1 ...	·02540	178	178·123	ENW
3	68 20·1 S.	143 48	Nov. 28...	....	......	17·4 ...	88 52·8 S.	17·5 ...	·01353	178	178·12378	ENW
4	69 12·8 S.	144 56	Dec. 7...	....	......	18·7 ...	89 08·5 S.	18·8 ...	·01143	178	178·12378	W,B,H
			Dec. 9...	15·6	31 W.	......	......	......	......	178	......	ENW
5	69 33·5 S.	145 22	Dec. 27...	18·6	43 06·2 W.	21·4 ...	89 05·7 S.	21·5 ...	·01092	178	178·12378	ENW
6	70 02·7 S.	146 46	Dec. 17...	19·2	40 21·1 W.	......	......	......	......	178	......	ENW
			Dec. 24...	15·8, 16·6 ...	43 56·8 W.	16·8 ...	89 24·9 S.	16·9 ...	·00693	178	178·12378	ENW
7	70 36·7 S.	148 14	Dec. 21...	16·2	50 30·4 W.	16·2, 18·8	89 43·3 S.	18·8 ...	·0034	178	178·12378	ENW
8	68 51·7 S.	144 20	Dec. 30...	19·7, 20·1 ...	18 03·9 E.	21·2 ...	89 02·8 S.	21·3 ...	·01110	178	178·12378	ENW



..—FiG 9 graphs showing topographical section of the Plateau, and value of the various magnetic elements observed on the southern sledging journey.

Table IIId.

Determinations of Declination and Dip.

Southern Sledge Journey.

Station Distance by Sledgemeter.	Latitude South.	Long. East of Gr.	Date.	Local Mean Time.	Declination.	Inclination South.	Station Distance by Sledgemeter.	Latitude South.	Long East of Gr.	Date.	Local Mean Time.	Declination.	Inclination South.
miles.	° ′	° ′	1912	h.	°	° ′	miles.	° ′	° ′	1912.	h.	°	° ′
47·36	67 40	142 50	Nov. 19...	14·0	12 W.	88 44	181·91	69 19	145 01	Dec. 11...	13·5	34 W.	89 09
83·68	68 08	143 21	Nov. 26...	12·8	20 W.	......	190·40	69 25	145 14	Dec. 12...	12·0	36 W.	88 59
90·11	68 12	143 30	Nov. 26...	18·0	50 W.	88 20	199·57	69 34	145 22	Dec. 13...	20·0	45 W.	89 01·5
109·11	68 28	143 49	Nov. 30...	13·5	32 W.	88 47	203·28	69 36	145 25	Dec. 14...	13·0	45 W.	89 09
113·17	68 31	143 49	Dec. 1...	13·8	25 W.	88 45	215·34	69 43	145 47	Dec. 14...	23·0	40 W.	89 11
123·43	68 40	143 50	Dec. 2...	13·0	60 W.	88 35	228·00	69 51	146 11	Dec. 16...	13·0	50 W.	89 17·5
132·30	68 47	143 49	Dec. 3...	12·2	60 W.	88 30	242·11	69 58	146 33	Dec. 16...	23·5	40 W.	89 18·0
140·28	68 53	144 02	Dec. 4...	12·8	63 W.	88 29·5	249·00	70 03	146 46	Dec. 17...	20·0	40 W.	89 23·5
150·23	68 58	144 18	Dec. 5...	13·0	22 E.	89 08	256·25	70 07	146 56	Dec. 18...	00·5	46 W.	89 25
156·43	69 02	144 30	Dec. 5...	17·0	31 E.	89 02·5	269·23	70 16	147 17	Dec. 18...	23·7	46 W.	89 26·5
162·17	69 05	144 41	Dec. 5...	23·0	...	89 11	283·17	70 25	147 42	Dec. 20...	12·2	53 W.	89 35·2
172·46	69 12	144 51	Dec. 7...	12·0	30 W.	89 09							

7. The Western Base Station—Queen Mary Land.

At a distance of 1,250 miles to the west of the Main Base station was established the Western Antarctic Base of the Expedition. There, on account of the limited resources of the party, the scientific programme was less ambitious than that at the Main Base. Nevertheless A. L. Kennedy, the magnetician of the party, was able to secure valuable data during the winter months in the vicinity of the winter quarters, "The Grottoes," and during the following summer, by sledge journeys, magnetic determinations were extended for a distance of over 300 miles in an east and west direction in Queen Mary Land and Kaiser Wilhelm Land. The data set forth below from the Western Base station has been computed and tabulated by Mr. Kennedy.

This station was situated about 100 feet above sea-level on a floating sheet of glacier ice (shelf-ice) extending pontoon-wise out from the coast of Queen Mary Land. A sounding half a mile distant gave a depth of 220 fathoms, and the nearest sure sign of land was about 14 miles away to the south. As it was intended to carry out continuous observations of declination with a magnetometer during pre-arranged two-hour terms synchronously with the Commonwealth Bay magnetographs and observations in lower latitudes, this constituted a semi-permanent station.

The magnetometer, No. 6, was first set up in the observing tent, provided as for use in normal latitudes, but this proved useless against the wind and snow of the Antarctic (Plate X, figs. 1 and 2.) In consequence, a snow igloo was built and roofed with canvas. This proved very successful during the winter and spring, although liable to rapid dissipation during summer in that latitude, 66° 20′ S. (Plate X, figs. 3 and 4.)

The very considerable difficulties of observing at semi-permanent Antarctic stations were in this instance much aggravated by the absence of suitable accommodation, exceedingly high winds and heavy snow, the absence of any land features to give shelter or assist movements to and fro, and the progressive movement of the shelf-ice formation carrying the station. Means had to be improvised for illuminating the mark at night and in thick snow drift, as well as for guiding the observer from point to point in the "pea soup" thick snow drift that prevailed. The relation of the magnetic igloo to the living hut and to other fixtures at "The Grottoes," is indicated on the plan, Fig. 10, page 44.

The results of the Absolute-Observations are given in Table IV, while some of the continuous visual observations of D are plotted in figures 11 and 12 on pages 45 and 46.

Table IV.

Observational Results.

Western Base Station, Queen Mary Land.

Latitude 66° 19·9′ S.; longitude 95° 02′ E.

Date.	Declination.		Inclination.		Hor. Intensity.		Moment "m."	Instruments.		Obs'r.
	Local Mean Time.	Value.	L.M.T.	Value.	L.M.T.	Value.		Mag'r.	Dip-Circle.	
1912.	h. h. h.	° ′	h. h.	° ′	h. h.	Γ.				
June 13...	14·9, 22·2 ...	66 01·9 W.	....	....	....	......	....	6	......	ALK
June 16...	0·2	66 00·9 W.	....	....	....	......	....	6	......	ALK
June 17...	21·1	66 03·3 W.	....	....	....	......	....	6	......	ALK
June 29...	....	....	17·9 ...	77 52·1 S.	....	......	....	...	169·56	ALK
July 2...	21·2	65 58·5 W.	....	....	....	......	....	6	......	ALK
July 4...	....	....	....	....	21·2 ...	·12692	555·4	6	......	ALK
Aug. 2...	15·7	65 56·3 W.	....	....	16·0 ...	·12956	....	6	......	ALK
Aug. 5...	12·3, 16·5 ...	66 00·2 W.	....	....	13·5, 15·6	·12932	560·8	6	......	ALK
Aug. 6...	15·6	66 19·1 W.	16·7 ...	77 57·4 S.	....	......	....	*169*	169·56	ALK
Aug. 7...	15·8 16·2 ...	65 54·6 W.	21·1 ...	77 56·3 S.	....	......	....	*169*	169·56	ALK
Aug. 8...	....	....	16·2 ...	78 04·1 S.	....	......	....	...	169·56	ALK
Aug. 13...	14·4	65 59·2 W.	....	....	....	......	....	6	......	ALK
Aug. 30...	13·2	65 56·6 W.	....	....	....	......	....	*169*	......	ALK
Aug. 31...	13·8	66 03·7 W.	14·0 ...	77 54·3 S.	....	......	....	*169*	169·56	ALK
Sept. 3...	21·8	65 59·6 W.	....	....	....	......	....	6	......	ALK
1913.										
Jan. 21...	16·4	65 55·7 W.	....	....	....	......	....	6	......	ALK
Jan. 22...	12·9, 17·7 ...	66 03·2 W.	....	....	15·4, 17·0	·12957	560·2	6	......	ALK
Jan. 24...	11·6, 15·2 ...	65 56·9 W.	....	....	11·8 ...	·12954	....	6	......	ALK
Jan. 27...	11·9, 12·1 ...	66 08·7 W.	....	....	....	......	....	6	......	ALK
Jan. 28...	10·7	66 08·8 W.	....	....	11·5 ...	·12908	559·5	6	......	ALK
Jan. 30...	10·8	66 06·0 W.	....	....	11·6, 14·6	·12960	557·8	6	......	ALK

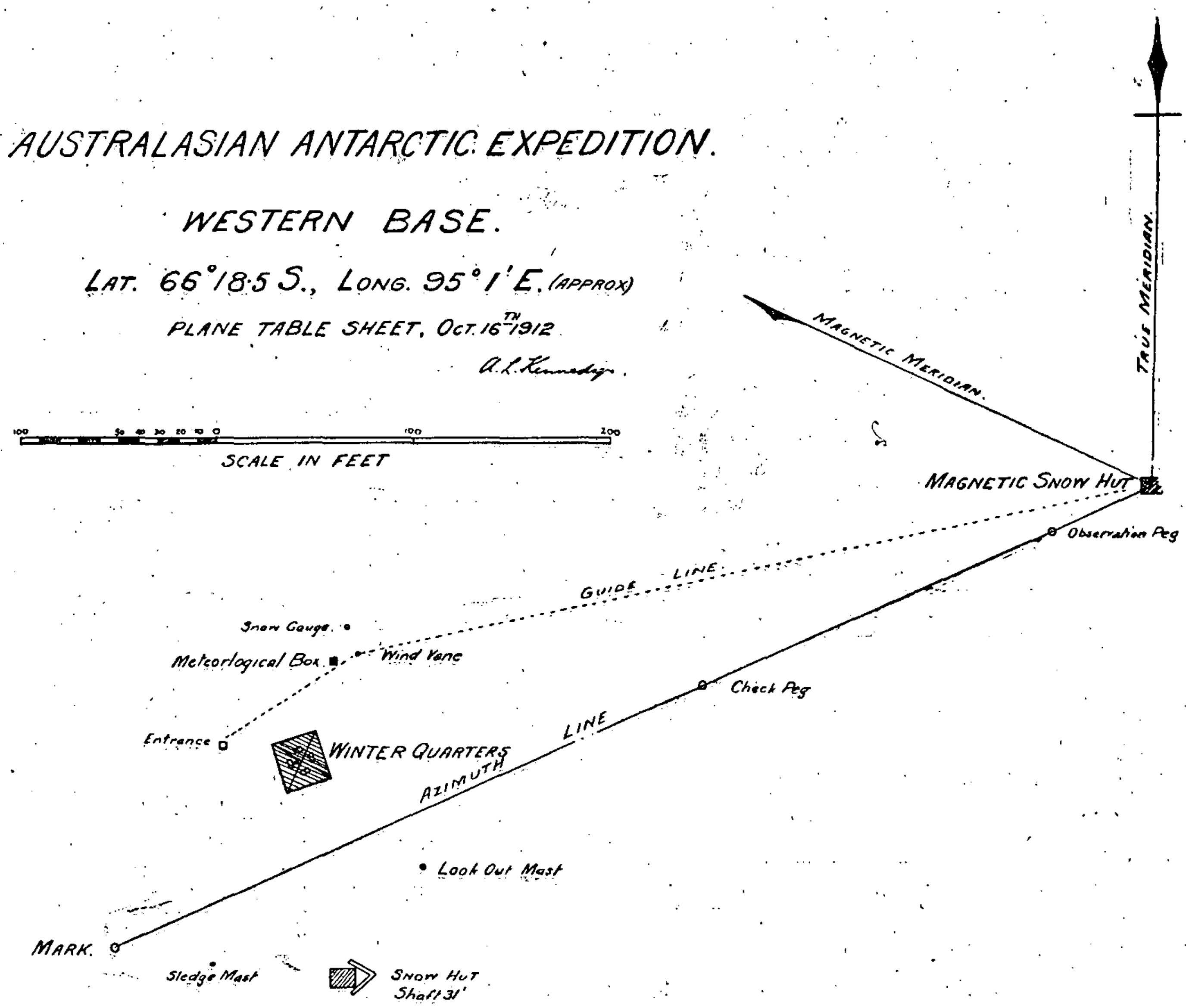


Fig. 10.—Plan of the Lay-out at "The Grottoes," Queen Mary Land.

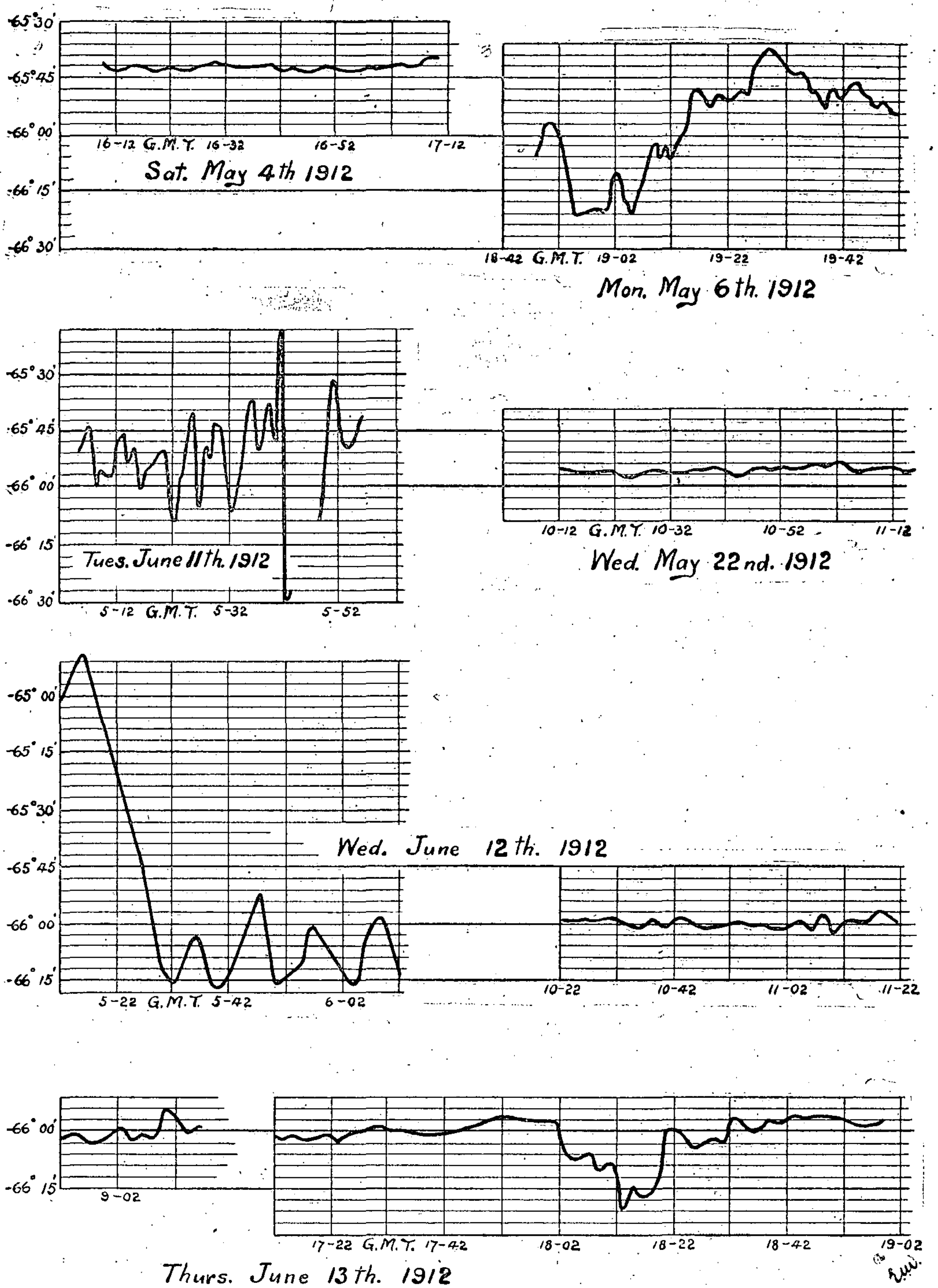


Fig. 11.—Declination at "The Grottoes" (Western Base Station), Queen Mary Land.
Curves from Magnetometer Visual Observations, by Mr. A. L. Kennedy.

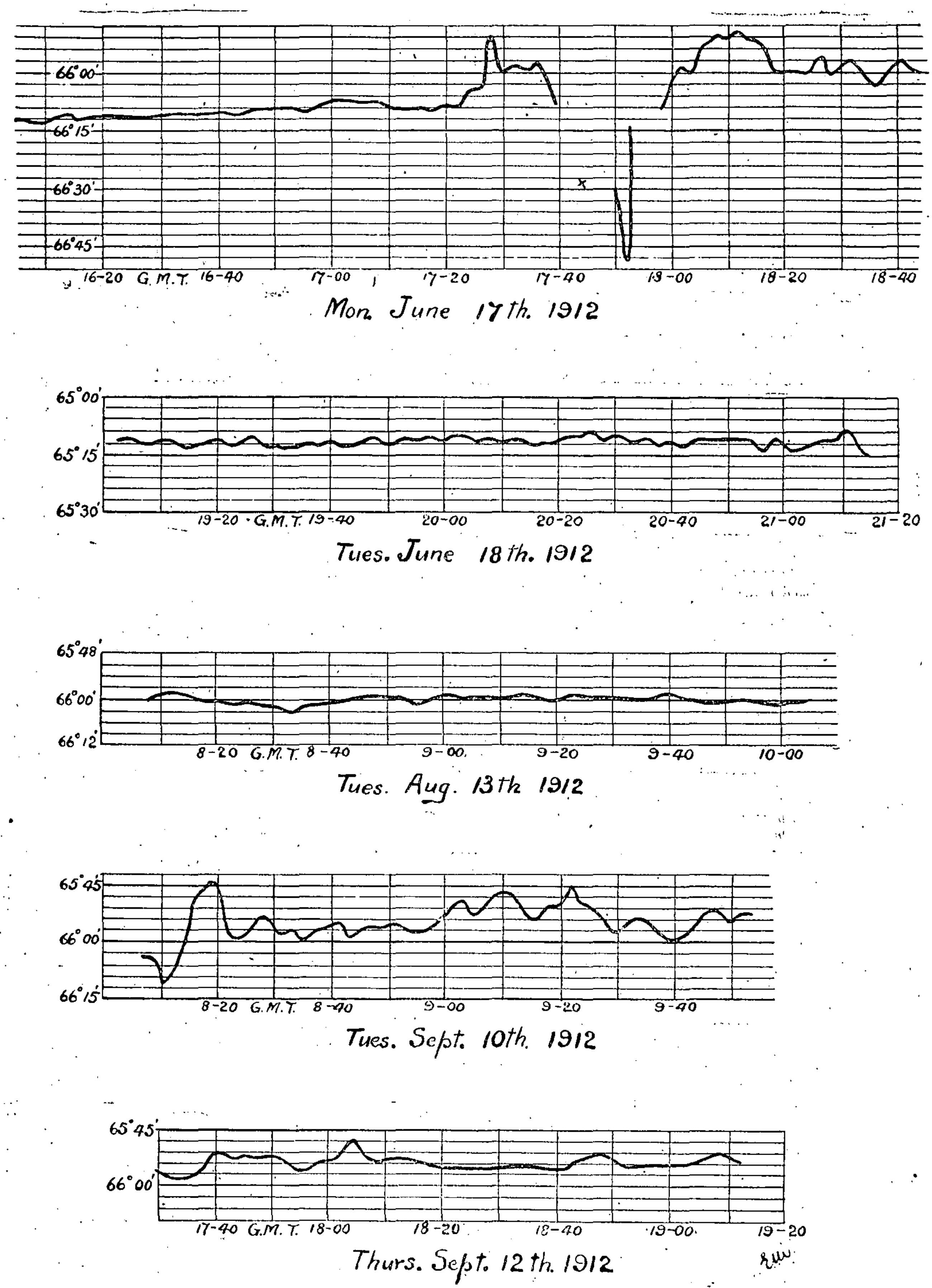


Fig. 12.—Declination at "The Grottoes" (Western Base Station).
Curves from Magnetometer Visual Observations, by Mr. A. L. Kennedy.

8. Sledge Journey into Queen Mary Land.

In the summer season, 1912–13, A. L. Kennedy, as a member of a sledging party under Mr. Frank Wild, occupied a number of stations along the coast of Queen Mary Land. The instrument used was a Lloyd-Creak dip-circle, with universal attachment, No. 169, of the Department of Terrestrial Magnetism, Carnegie Institution. Time was kept by Royal Geographical Society's chronometer watch, No. 1/1214, by Blockley.

Station 1.—On crevassed shelf-ice, 2,000 feet north-west of the highest point of the Hippo Nunatak, and probably 200 feet above sea-level. True bearings (from north): Centre of Triplets Rocks, on northern cape of David Island, 15 miles, 76° 47′; eastern point of Hippo Nunatak, 1,500 feet, 110° 32′; highest point of Nunatak, 2,000 feet, 136° 09′.

Station 2.—On shelf-ice, $3\frac{1}{2}$ miles south of the Hippo Nunatak, and 2 miles west by south of the eastern extremity of Delay Point.

Station 3.—On shelf-ice, about 1 mile north of Cape Charcot. True bearings (from north): Highest point of the Hippo Nunatak, 8 miles, 277° 53′; centre of Delay Point outcrop, 7 miles, 228° 29′; north-eastern extremity of Cape Charcot outcrop, $1\frac{1}{2}$ miles, 160° 43′.

Station 4.—On the sloping surface of the land ice, towards the east point of Cape Gerlache. True bearings (from north): Cape Jones, 18 miles, 133° 00′; summit of Mt. Barr Smith, 44 miles, 173° 30′.

Station 5.—Amongst moving and broken shelf-ice at the foot of Denman Glacier. No permanent marks were visible from this point.

Station 6.—Amongst moving and broken shelf-ice at the foot of Denman Glacier. True bearings (from north): Highest point o Watson Bluff, $6\frac{1}{2}$ miles, 187° 29·6′; centre of Triplets Rocks on northern cape of David Island, 10 miles, 245° 33·6′; centre of Hippo Nunatak, 24 miles, 251° 39·6′.

Station 7.—On the sloping surface of the mainland ice-sheet, approximately in range between Possession Rocks to north and Mt. Barr Smith to south. True bearings (from north): Highest point of Watson Bluff, 30 miles; 355° 31·8′; Cape Jones, 16 miles, 46° 26′.

The shelf-ice formation referred to in connection with the above stations is about 600 feet thick and afloat. The land ice sheet is at least equally thick.

The data from these stations is comprised in Table Va.

TABLE Va.

Observational Results.

Sledge Journey into Queen Mary Land.

Station	Latitude South.	Longitude East.	Date.	Declination West.		Inclination South.		Observer.
				L.M.T.	Values.	L.M.T.	Values.	
	° ′	° ′	1912.	h. m.	° ′	h. m.	° ′	
1 ...	66 25·0	98 03	Nov. 7...	10 21	68 01	11 48	78 23	ALK
				12 30	67 47			
2 ...	66 28·9	98 02	Nov. 11...	17 05	69 48	....	....	ALK
3 ...	66 26·7	98 21	Nov. 13...	17 31	67 56	....	....	ALK
4 ...	66 31·8	98 55	Nov. 17...	11 45	69 32	....	....	ALK
5 ...	66 20·4	99 02	Nov. 27...	16 25	67 45	....	....	ALK
6 ...	66 20·4	98 52	Dec. 7...	13 20	68 10	....	....	ALK
7 ...	66 51·3	98 53	Dec. 14...	19 00	68 34	....	....	ALK

9. SLEDGE JOURNEY ACROSS KAISER WILHELM LAND.

Whilst A. L. Kennedy was making the foregoing observations travelling eastward from Winter Quarters, G. Dovers, as cartographer to a sledge party under Dr. S. E. Jones, made a number of useful determinations of declination in Kaiser Wilhelm Land. His equipment consisted of a Cary three-inch theodolite and chronometer watch (R.G.S., 2/1,128, Blockley). Watch checks were obtained at "The Grottoes" on leaving, at Gauss Berg, accepting the longitude fixed by the Gauss Expedition, and at 'The Grottoes" on return.

Station 1 was situated about 850 feet above sea-level on the land-ice slopes close to the coast, just south-east of Haswell Island.

Station 2 was about 1,500 feet above sea-level on the land ice-slopes, south-west of Haswell Island, and some 7 miles from the coast.

Station 3.—On the slopes of the land ice-cap between Cape Filchner and Gauss Berg, some 18 miles from the nearest point on the coast, and 2,580 feet above sea-level. This station was first occupied on 20th December, and reoccupied on 29th December, 1912.

Station 4.—Situated immediately at the foot of Gauss Berg, on the south side. This station was occupied for two days, during which time three determinations of declination were made.

Station 5.—On the land-ice slopes south of Haswell Island, about 2,000 feet above sea-level.

The results of these observations form Table Vb.

Fig. 13 on page 49 is a map of the Western Base prepared by Mr. A. L. Kennedy, with entries upon it of the magnetic declinations as determined by himself and Dovers. It will be noted that all determinations are in general agreement, excepting Dovers' station 1, which is about 5° out of the mean position for that locality. The

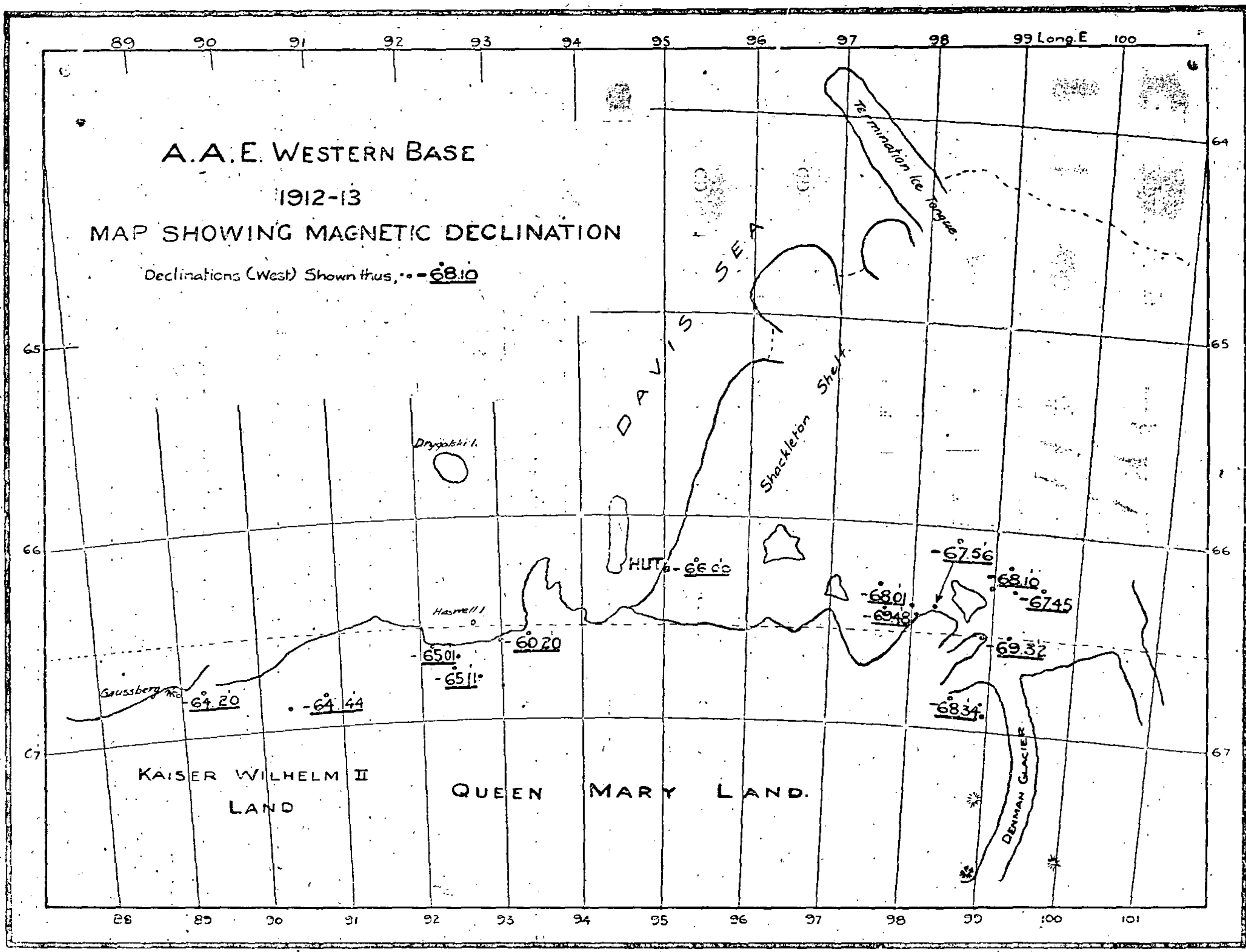


Fig. 13. Field map, Kaiser Wilhelm Land and Queen Mary Land.

calculations have been checked and are not in error, so that it would appear that there is a strong local magnetic influence in the neighbourhood. The distribution of the island chain off the coast at this spot suggests that a special rock formation strikes under the land-ice in the neighbourhood of station 1, which circumstance may exert a local magnetic influence accounting for the reading recorded.

TABLE Vb.

Observational Results.

Sledge Journey across Kaiser Wilhelm Land.

Station.	Latitude South.	Longitude East.	Date.	Declination West. L.M.T.	Declination West. Values.	Observer.
	° ′	° ′	1912.	h. m.	° ′	
1	66 35·4	93 00	Dec. 3	17 30	60 19	GD
2	66 41·5	92 30	Dec. 12	18 06	65 08	GD
3	66 53·7	90 20	Dec. 20	17 06	64 42	GD
			Dec. 29	9 00	64 47	GD
4	66 47·6	88 50	Dec. 24	17 12	64 08	GD
			Dec. 25	9 00	64 34	GD
			Dec. 25	17 00	64 18	GD
			1913.			
5	66 41·3	92 45	Jan. 9	17 06	65 11	GD

10. British Antarctic Expedition, 1907–09 — Magnetic Results.

During this Expedition a party under Professor (now Sir) T. W. Edgeworth David, K.B.E., C.M.G., D.S.O., B.A., D.Sc., F.R.S., made a sledge journey from Cape Royds in McMurdo Sound, along the coast northward, and then inland to the vicinity of the South Magnetic Pole. Douglas Mawson (now Professor Sir Douglas Mawson), was cartographer to the party, and undertook a series of observations of declination and inclination, the results of which have not previously been published.

The instruments used were a three-inch theodolite (by Cary), having a short compass-needle attached, but which was not in all cases used for the determination of the magnetic meridian; a two and a half-inch Brunton prismatic compass; a six-inch trough-needle; and a Lloyd-Creak dip-circle for inclination and total intensity observations.

The geographical meridian was obtained from the bearings of known objects (fundamentally from the fixtures of Mt. Erebus, Mt. Lister, and Mt. Melbourne, determined by the British National Antarctic Expedition of 1901–04) or from noon culmination of the sun as fixed by the time of local apparent noon.

The magnetic meridian was determined by settings of the theodolite compass, excepting at stations near the Magnetic Pole, when the special long trough-needle was employed.

Complete observations for I were made with one needle (both polarities) at five stations, a half set with one needle without reversing polarity at station No. 6 (D station, No. 15), and one hurried reading of one end of the needle without reversing polarity at each of two other stations.

Some observations for total force were also made, but, as owing to an accident, the deflecting weights became mixed with a resulting uncertainty regarding the constants, it is concluded safest to omit these determinations entirely.

The results are given in Tables VIa and VIb, and are plotted on the map appearing on page 55.

It may be remarked that the value of I found for Cape Royds agrees very well with values determined by other observers in the vicinity of McMurdo Sound.

TABLE VIa.

British Antarctic Expedition, 1907–09.—Observations in Terrestrial Magnetism.

Recorder: D. MAWSON.

Declination.

Station.	Date.	Time.	Latitude. South.	Longitude East of Gr.	Declination East.	Remarks.
	1908.		° ′	° ′	° ′	
1 ...	Oct. 8...	Noon ...	77 43	165 24	152 40	Stations were located by bearings with three-inch Cary theodolite on three of following known points, Mounts Erebus, Lister, Melbourne, and Discovery, and Beaufort Island, considered in conjunction with latitude determinations in process of trigonometrical survey of the Ross Sea coast. True meridian obtained from same bearings. Magnetic meridian obtained from the mean of several readings of the theodolite compass. All stations on floating ice over deep water, at a distance from the land.
2 ...	Oct. 19...	2 p.m. ...	77 21	163 56	157 45	
3 ...	Oct. 25...	11 a.m. ...	77 01	163 14	158 00	
4 ...	Oct. 28...	Noon ...	76 48	163 02	153 00	
5 ...	Nov. 11...	Noon ...	76 14	163 10	151 00	
6 ...	Nov. 16...	Noon ...	75 56	163 16	150 20	
7 ...	Dec. 1...	Noon ...	75 28	163 17	144 15	
8 ...	Dec. 11...	Noon ...	75 21	163 47	141 00	
9 ...	Dec. 29...	Noon ...	74 38	160 55	140 41	Stations located by noon latitudes and dead reckoning course being steered by prismatic compass and measured by sledge-meter. True meridian obtained from sun's culmination. Magnetic meridian obtained from mean of several readings of compass-needle. Theodolite compass superseded by special trough-needle; and finally by specially sensitive prismatic compass-needle. All stations on the inland ice-cap with every probability of at least several hundred feet of ice between the instrument and bed-rock.
	1909.					
10 ...	Jan 1...	Noon ...	74 17	159 51	147 00	
11 ...	Jan. 3...	Noon ...	74 03	159 15	143 10	
12 ...	Jan 7...	Noon ...	73 42	158 17	137 00	
13 ...	Jan. 10...	Noon ...	73 22	157 06	142 00	
14 ...	Jan. 12...	Noon ...	73 02	156 20	142 00	
15 ...	Jan. 13...	Noon ...	72 53	156 04	145 00	
16 ...	Jan. 15...	Noon ...	72 25	155 16	135 app.	

On 14th and 15th January the movement of the prismatic compass, which had proved to be a specially sensitive instrument, was found to be so feeble as to afford no reliable reading. But it is recorded that in the late afternoon of the latter day, at the end of the journey in latitude 72° 25′ S. and longitude 155° 16′ E., it was observed to be again more sensitive pointing in a general north-west direction, but dead-beat over a considerable arc.

TABLE VIb.

British Antarctic Expedition, 1907–09.—*Observations in Terrestrial Magnetism.*

Recorder: D. MAWSON.

Inclination.

Station.	Date.	Latitude.	Longitude.	Inclination. L.M.T.	Inclination. Value.	Remarks.
	1908.	° ′	° ′	hour.	° ′	
1. ...	Sept. 22...	77 32	166 09	14·0 ...	86 15·8	On sea-ice ¼-mile west of Cape Royds.
2. ...	Nov. 11...	76 14	163 10	12·0 – 13·0	87 02·9	D station, No. 5, on sea-ice.
3. ...	Dec. 1...	75 28	163 17	8·0 ...	87 29·8	D station, No. 7, on sea-ice.
4. ...	Dec. 28...	74 47	161 29	14·5 – 15·5	87 48·8	On ice-cap, elevation 4,050 feet.
5. ...	Dec. 31...	74 27	160 17	13·5 – 14·5	87 54·5	On ice-cap, elevation 5,400 feet.
...	1909.					
6. ...	Jan. 13...	72 53	156 04	14·0 ...	....	On ice-cap, elevation 7,500 feet. Half-set only. Polarity not reversed. D station, No. 15.
7. ...	Jan. 15...	72 42	155 46	a.m.	89 45	Hurried observations. One end of needle read at one setting only.
8. ...	Jan. 15...	72 37	155 36	p.m.	89 48	

In the later stages of this sledge journey it was realised that the Magnetic Pole was situated a considerable distance to the north-west of the location assigned to it by the British Antarctic Expedition, 1901–04. As a consequence, with the food supply on hand and the time available, the possibility of locating the Pole with exactitude vanished for, to do so, observations through the polar area to beyond on the far side would be necessary. In view of the anxious situation of the party at the time, therefore, no effort was made to secure a high degree of accuracy in the case of stations 7 and 8. Furthermore, these latter hasty readings were made after the instrument had become invaded with drift snow as a result of a blizzard a few days previously, and there was some uncertainty as to how completely all the ice had been removed from the parts. It should, therefore, be understood that the determinations at stations 7 and 8 above are to be accepted as indications only, and are of a different order entirely from the others.

At stations 1 and 6 both ends of the needle were read at each setting, and at Stations 1 and 5 polarity of the needle was reversed, a total of sixteen readings being made in each case.

11. SOUTH MAGNETIC POLE.

With the acquisition of this data from the B.A.E., 1907–09, I am tempted to discuss at greater length the location of the South Magnetic Pole, to which end the map on page 55 has been prepared. This shows the declinations and dips observed by the A.A.E., 1912–13, and B.A.E., 1907–09, and some of the D and I results obtained by Captain Scott's Expedition in 1911–12, as published in the report on Terrestrial Magnetism by Dr. C. Chree. (For the sake of clearness some of the A.A.E Southern Journey results have been omitted.)

The A.A.E. and Scott Expedition values are sufficiently close in time to be regarded as relating to the same epoch.

However, having regard to the secular variation in I, deduced by Dr. Chree as probable at Cape Evans, *i.e.*, decreasing by about 2·5′ per annum, the 1908–09 inclination values must be decreased by approximately 10″ (or 0·2°) to bring them in line with the others.

Regarding the magnitude of the secular change in I, further indications can be had from comparison of the 1902–03 determinations of the British National Antarctic Expedition with those of the Scott Expedition of 1911–12. Unfortunately, no stations in or near McMurdo Sound were reoccupied exactly, but four 1911–12 stations were sufficiently close to each of four 1902–03 stations to afford comparable results. The mean of these comparisons gives approximately 1·5′ as the annual decrease in I Incidentally Dr. Chree found from the magnetograph results of 1902–03 an increase in H at the rate of 150 γ per annum. This approximates to 7·3′ decrease of dip which, while agreeing in sign, is much too great in magnitude possibly to be correct.

The correction discussed above is further supported, if not absolutely confirmed numerically, by the secular variation of D at Cape Adare obtained from comparison of values observed in 1899–1900, with those obtained in 1911–12, which indicated an increase in D of 54′ per annum, or 3·6° in four years.

Using the increase in I per mile established by the Southern Party, A.A.E., over the last stage as 0·376′, a decrease of 10′ in I would correspond to a movement of the Magnetic Pole of 27 miles. Since over a period of ten years at McMurdo Sound there was a very small change in D, this movement evidently took place in a north-west direction. Cape Adare is approximately 400 miles from the Magnetic Pole, so that a change in D of 3·6° would correspond to a displacement of the Pole of 25 miles relative to Cape Adare, or 35 miles in a north-west direction. Hence, as remarked before, this is independent evidence of the direction and magnitude of the movement of the Magnetic Pole between 1908 and 1912.

On the map, Fig. 14, isoclinic lines have been sketched in together with the location of the South Magnetic Polar Area for the epoch 1912. Apart from the fixation of this area by the very exhaustive observations of the Southern Party, A.A.E. (Tables IIIc and IIId), it is established by the independent results of the Scott Expedition, 1911–12, and of Mawson on the opposite side of the Polar Area in 1908–09.

The following table (VII) has been prepared showing the average rate of increase in dip between a series of stations and the estimated position of the Magnetic Pole as determined above, and also between some individual stations. Several values have been included from both the British National Antarctic Expedition of 1901–04, and Scott's British Antarctic Expedition of 1910–13, and the bulk of the stations lie on opposite sides of the Pole, roughly along the major axis of the isoclinals as drawn in the map, Fig. 14. The rates of increase in I, therefore, are, for the most part, directly comparable.

This table shows conclusively that, over the range of I considered and at least in the direction of the major axis of the isoclinal lines, the rate of increase in I decreases towards the Pole.

TABLE VII.

Rates of Increase in Inclination.

Position of South Magnetic Pole, 1912:—71° 10′ S., 150° 45′ E.

Station A.	Latitude S.	Longitude East of Gr.	Approx. Dist. from S. Mag. Pole.	Mean Value of I. at Station A.	Av. Increase in I. per mile bet. Stations A. & B.	Station B.
	° ′	° ′	Stat. miles.	° ′	′	
A.A.E., Macquarie Island Station.	54 38·6	158 52	1,165	77 53·2	0·624	S. Mag. Pole.
A.A.E., West Base	66 19·9	95 01	1,260	77 56·8	0·574	S. Mag. Pole.
A.A.E., Main Base	67 00·0	142 40	352	87 21·6	0·459	S. Mag. Pole.
A.A.E., Main Base	67 00·0	142 40	352	87 21·6	0·544	A.A.E., Station No. 5.
A.A.E., Main Base	67 00·0	142 40	352	87 21·6	0·493	A.A.E., Station No. 7.
A.A.E., No. 5* ...	69 33·5	145 22	170	89 05·7	0·318	S. Mag. Pole.
A.A.E., No. 5* ...	69 33·5	145 22	170	89 05·7	0·376	A.A.E., Station No. 7.
A.A.E., No. 7* ...	70 36·7	148 14	71	89 43·3	0·235	S. Mag. Pole.
A.A.E., No. 8* ...	67 51·2	148 49	235	88 03	0·498	S. Mag. Pole.
B.A.E., 1912 ...	76 54	169 39	525	86 18	0·423	S. Mag. Pole.
B.A.E., 1908 ...	77 32	166 09	496	86 15·8	0·418	φ = 74° 27′, λ = 160° 17′ E.
B.A.E., 1908 ...	74 27	160 17	262	87 54·5	0·585	φ = 72° 53′, λ = 156° 04′ E.
B.A.E., 1908 ...	72 53	156 04	122	89 10	0·410	S. Mag. Pole.
B.A.E., 1908 ...	77 32	166 09	496	86 15·8	0·452	S. Mag. Pole.
N.A.E., 1902 ...	79 30	176 00	642	84 48	0·610	φ = 78° 16′, λ = 169° 00′ E.
N.A.E., 1902 ...	78 16	169 00	524	86 00	0·535	φ = 77° 51′, λ = 166° 45′ E.
N.A.E., 1902 ...	77 51	166 45	480	86 23	0·452	S. Mag. Pole approx. φ = 72·1°, λ = 152°.
N.A.E., 1902 ...	79 30	176 00	642	84 48	0·486	S. Mag. Pole approx. φ = 72·1°, λ = 152°.

* Refers to Stations occupied by the Southern Sledging Party of the Australasian Antarctic Expedition.

The dimensions adopted for the Polar Area are based on the approximate mean range of D and H at Commonwealth Bay, *i.e.*, 2·5° and 170γ (or, say, 8·5′ of dip) respectively. These correspond to about 15 and 23 miles, which have been taken as the minor and major axes of the Area, and it will be noted that these proportions agree generally with those of the isoclinals. The former of these is further supported by the average range of about 5·5° obtained at station No. 4, 180 miles from the Pole, during the continuous visual observations on 8th December, 1912. Delimitation of the Polar Area in this way is, of course, purely arbitrary, since it depends on the assumption that the change in I at the Pole is the same as that at Commonwealth Bay besides selecting arbitrarily the particular range to be represented.

Regarding the values recorded for stations 7 and 8 in Table VIb, these, considered by themselves, can carry no weight towards fixing the position of the Magnetic Pole. The observer's note states that one end of the needle only was read hurriedly, and polarity was not reversed. In addition, it is generally accepted by competent observers that a Lloyd-Creak circle tends to give high dips and is a difficult instrument from which to obtain good results under the best conditions. Hence, the possibility of error in each case is so large that little importance can be attached to the values read.

In the light of later knowledge, therefore, the probable position of the Magnetic Pole Area for the year 1909 is that indicated by dotted lines on the map, Fig. 14.

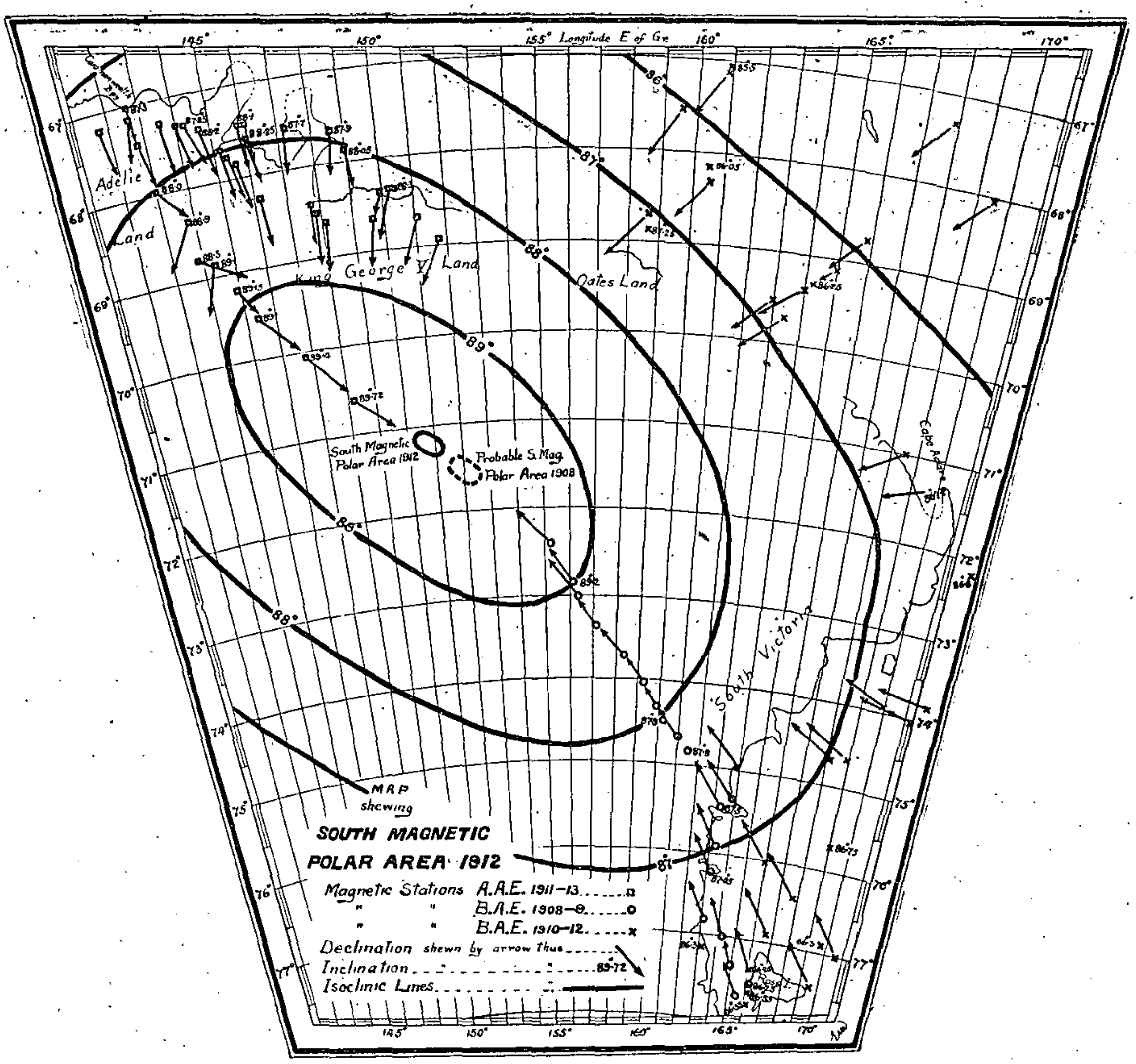


Fig. 14.—Map of the South Magnetic Polar Area, 1912, showing Declinations and Dips.

The point reached by sledge journey that year was in all probability outside the Magnetic Pole Area, using the term in its restricted sense as the area occupied by the Pole in its diurnal perigrination.

In the volume on *Physical Observations of the National Antarctic Expedition* 1901–04, Commander L. W. P. Chetwynd publishes Charts II and III, indicating the position of the Magnetic Pole as deduced independently from consideration of D and I results obtained by the Expedition. The location given is 72° 51′ S., 156° 25′ E., or 167 miles from the position shown in the map, Fig. 14. Accepting a secular variation in I as high as 2·5′ per annum, the movement of the Pole in the intervening ten years would be only 68 miles; or, taking the secular variation in D. at Cape Adare as +54′ and accepting the direction of movement to have been north-west, the magnitude would then be 90 miles.

Since the values of D and I, on which Commander Chetwynd's charts were based, were confined almost exclusively to one side of the Magnetic Polar Area, there is room for considerable uncertainty in conclusions regarding location of the Pole which may be drawn from such values alone. Moreover, it will be patent from Commander Chetwynd's own Chart II, as well as from that now submitted on page 55, that location by intersection of magnetic meridians is of little account unless a large number of determinations on at least three sides of the Magnetic Polar Area are available.

CHAPTER III.

OBSERVATORY WORK.

1. MAGNETOGRAPHS.

The magnetographs were of the Eschenhagen type, made in 1911 by Otto Toepfer and Son, of Potsdam. Declination, horizontal intensity and vertical intensity variometers (D, H and V) with the usual recording apparatus and accessories, were supplied, and also a strong aluminium frame with legs on which to mount the variometers.

The whole equipment was unpacked and set up at the University, Hobart, under the direction of Dr. J. M. Baldwin, of Melbourne Observatory. The instruments were adjusted, and several magnetograms taken off.

It was proposed that in the Antarctic the magnetographs should be installed either in a hut or an ice cave, and that the legs of the variometer-stand and recording apparatus be set up on wooden blocks frozen into the floor. Because the Main Base had to be placed so far north (latitude 67° S.), the difficulties of establishing the observatory were much increased. It was found impossible to set up either within or upon ice, because the thaw in summer would, it was anticipated, be too great. On the other hand, the rocky area at Cape Denison—the vicinity of the Main Base—was so uneven that it was almost impossible to find a reasonably flat area of rock sufficiently large to admit of setting up the magnetographs within a quarter-mile radius of the living hut. In addition, the high winds constantly charged with snow which were known to prevail in those latitudes, rendered it imperative that the observatory be not very far removed from the living quarters.

Ultimately a site was selected some 350 yards north-north-east from the living hut, on rock consisting of gneiss and mica schist. (See Plates IV and VI.) The site was very uneven, and much labour was required to clear it sufficiently to admit the preparation of recesses into which to insert the legs of the instrument. Explosives had to be resorted to and were very effective in removing large semi-detached rocks.

2. MAGNETOGRAPH HUT.

Materials for a wooden hut in which to house the magnetographs had been transported from Hobart, and this was erected next. The building (see Fig. 15, page 58, and Plates IV and V) consisted of a wooden framework with tongued and grooved lining-boards both outside and in. Under each timber-lining a layer of tarred builder's paper was placed, and every effort was made to ensure both this and the timber-boarding as continuous and free from open joints as possible. However, in order to reduce space and weight, the tongued and grooved timber had been specified as light as seemed prudent, and, in consequence, had suffered much in transit. Hence, effort was concentrated on making the paper covering as impervious to wind as possible.

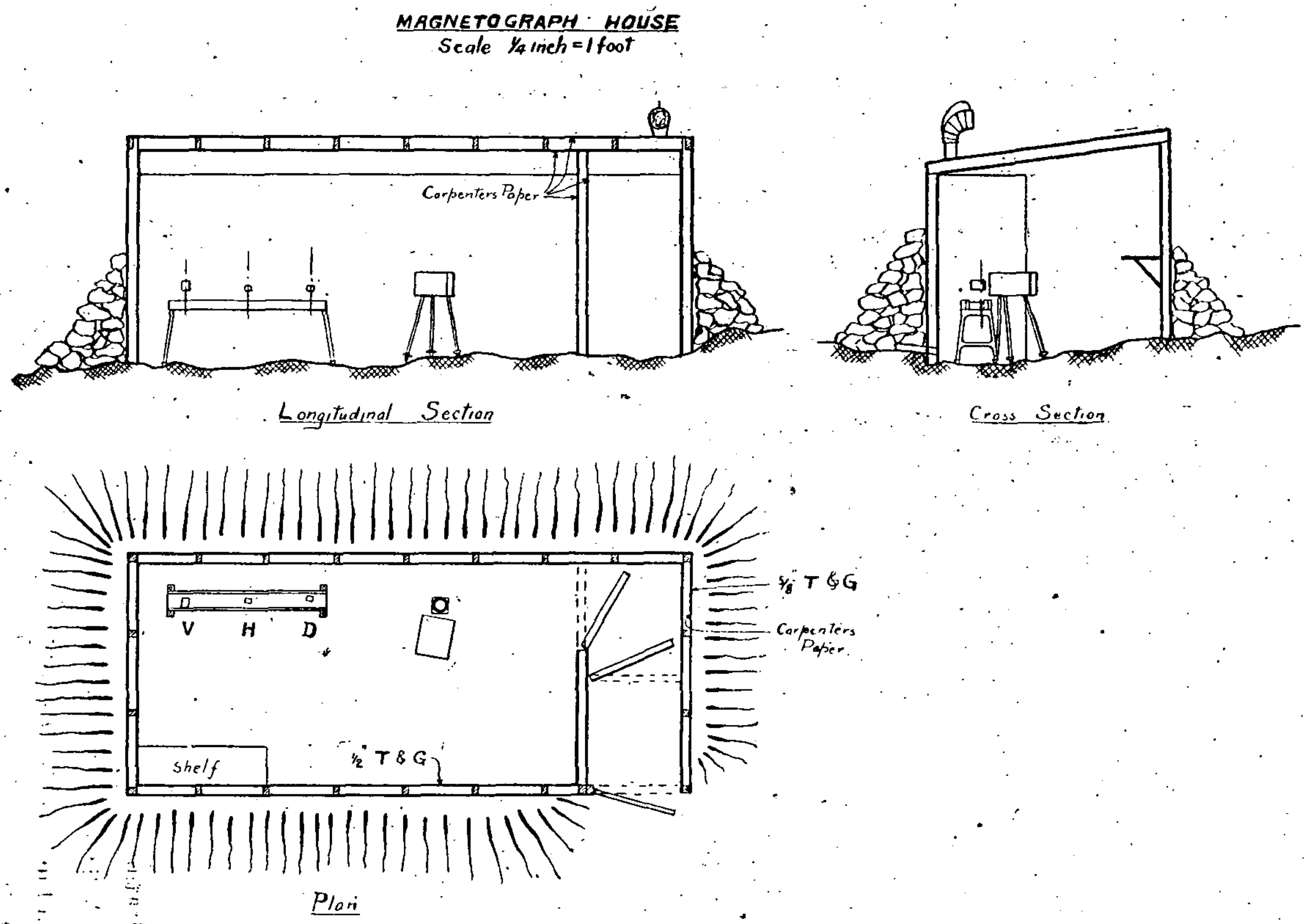


Fig. 5—Sketch Plan of Magnetograph House.

Finally, a continuous paper covering (making three layers of paper and two of wooden lining-boards) was placed over the inside wall, every joint in the paper being made tight by nailing a batten along it. The whole of the frame-work was secured by means of copper spikes and bolts, largely salved from the wreck of the schooner "Clyde" on Macquarie Island. Unfortunately, owing to shortage of small copper nails, some iron nails had to be used for fastening on the linings, but none of these was larger than a 1½-inch wire nail, and none was within 6 feet of the instruments. As a final effort to protect the building against violent winds which, even during construction had given indication of their persistence and violence, some twenty sheep skins were fastened on the roof and windward side and some thirty tons of rocks were carried and stacked round the outer walls as a breakwind. In building the framework, cross pieces had been fastened to the studs on which the stones should be piled to prevent the hut blowing bodily away, and this precaution was more than justified later when the structure was called on repeatedly to withstand winds exceeding 90 miles per hour.

As shown in the sketch, a double porch with specially fitted doors was provided at one end of the building to enable the temperature to be maintained as constant as possible. An adjustable cowl ventilator was also provided for the same purpose.

3. Setting up the Magnetographs.

Before setting up the variometers, a determination of H was made in the magnetograph house with the magnetometer, the value obtained agreeing very well with the value at the Absolute Hut.

The instrument frame and the recording apparatus were set up as shown in Fig. 15. (see also Plate V; Fig. 1). The feet were set in "dabs" cut into solid gneiss and, although the legs were to some extent adjustable for length, the floor was so uneven that considerable cuts had to be made in the rock.

Illumination was afforded by means of a kerosene lamp, the whole of the recording apparatus being placed to the west (geographic and magnetic) of the variometers. As first arranged, the variometers were in the order H, D, V, from west to east, the H instrument being nearest the recording drum. Shortly after commencement of operation, however, it was found that the D instrument was much too sensitive, and the D and H variometers were, therefore interchanged. This arrangement, coupled with the provision of two mirrors throwing two recording "spots" a little less than the width of the photographic sheet apart, covered a range of nearly 10°, and the limits of registration were exceeded on very few occasions. Similar provision for a "reserve spot" was made in the H instrument, but the V had at all times only one trace.

In the V instrument a thermograph was also fitted, and by means of a mirror this cast a recording light spot on to the drum.

Both V and H variometers were fitted with temperature compensating systems which on the H instrument also partly determined the sensitiveness.

4. Temperature Compensations.

The mathematical treatment of the application of temperature compensations is given below. This originated in Potsdam and the writer is indebted to Dr. J. M. Baldwin for the translation from the German.

Horizontal Intensity Variometer Temperature Compensation.

Let M = magnetic moment of the suspended magnet
F = intensity of field at the centre due to the deflector magnets
θ = torsion couple of the suspension per radian
} at temp. t_o.

At temp. $t = t_o + dt$ these become $M(1 - \alpha \cdot dt)$; $F(1 - \overline{\alpha' + 3\beta \cdot dt})$; $\theta(1 + \gamma \cdot dt)$
where α is temp. coefficient of suspended magnet.
α' ,, ,, deflector magnets.
β ,, ,, expansion of support of deflector magnets.
γ ,, ,, torsion of suspension fibre.

From fig. 16 let v be the deflection of the needle from the mean magnetic meridian, v_o its mean value so that $v = v_o + dv$, and dv measures the variation of that component, which is at right angles to the direction defined by v_o.

For dH the value of v_o is $-\frac{\pi}{2}$. The direction of the deflector field makes an angle ϕ with the magnetic meridian and the torsion angle with needle in the meridian would have the value ν. In the actual case, it has the value $\nu - v$.

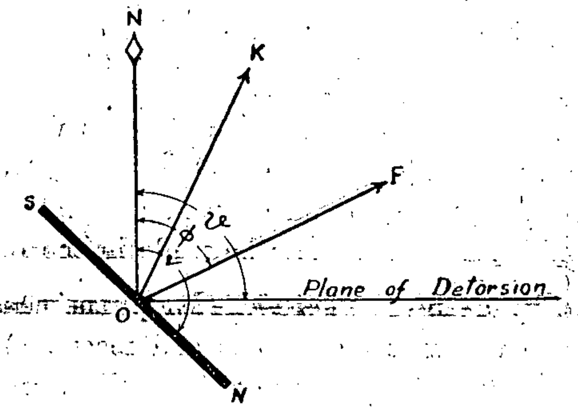


Fig. 16.—Diagram of Horizontal-Force Temperature Compensation.

Let K be the component of the horizontal intensity that is to be observed.

Angles being reckoned positive from N. through E., the couple tending to reduce v is

$$KM(1 - \alpha \cdot dt) + F(1 - \overline{\alpha' + 3\beta \cdot dt})\,M(1 - \alpha \cdot dt)\sin(v - \phi) + \theta(1 + \gamma \cdot dt)(v - \nu) = 0.$$

$$\therefore K + F(1 - \overline{\alpha' + 3\beta \cdot dt})\sin(v - \phi) + \frac{\theta}{M}(1 + \overline{\alpha' + 3\beta \cdot dt})(v - \nu) = 0.$$

$$\therefore K_o + dK + F(1 - \overline{\alpha' + 3\beta \cdot dt})\sin(v_o + dv - \phi) \cdot$$
$$+ \frac{\theta}{M}(1 + \overline{\alpha' + 3\beta \cdot dt})(v_o + dv - \nu) = 0.$$

(The direction of K is $v - \frac{\pi}{2}$.)

From this equation the three following are derived :—

$$K_o + F \sin(v_o - \phi) + \frac{\theta}{M}(v_o - \nu) = 0 \quad . \quad . \quad 1$$

$$dK + F \cos(v_o - \phi)\, dv + \frac{\theta}{M}\, dv = 0 \quad . \quad . \quad 2$$

$$- F(\alpha' + 3\beta) \sin(v_o - \phi) + \frac{\theta}{M}(\alpha + \gamma)(v_o - \nu) = 0 \quad . \quad . \quad 3$$

In these equations put $v_o = -\frac{\pi}{2}$; then K_o will be the component acting towards the south $= - H_o$.

$$- H_o + F \sin\left(-\frac{\pi}{2} - \phi\right) + \frac{\theta}{M}\left(-\frac{\pi}{2} - \nu\right) = 0 \quad . \quad . \quad 1$$

$$- dH + F \cos\left(-\frac{\pi}{2} - \phi\right) dv + \frac{\theta}{M}\, dv = 0 \quad . \quad . \quad 2$$

$$- F(\alpha' + 3\beta) \sin\left(-\frac{\pi}{2} - \phi\right) + \frac{\theta}{M}(\alpha + \gamma)\left(-\frac{\pi}{2} - \nu\right) = 0 \quad . \quad . \quad 3$$

whence

$$- F \cos\phi - \frac{\theta}{M}\left(\frac{\pi}{2} + \nu\right) = H_o \quad . \quad . \quad 1$$

$$- F \sin\phi = \frac{dH}{dv} - \frac{\theta}{M} \quad . \quad . \quad 2$$

$$+ F(\alpha' + 3\beta) \cos\phi - \frac{\theta}{M}(\alpha + \gamma)\left(\frac{\pi}{2} + \nu\right) = 0 \quad . \quad . \quad 3$$

$$\therefore F(\alpha + \alpha' + 3\beta + \gamma) \cos\phi = - H_o(\alpha + \gamma) \quad . \quad . \quad 4$$

$$\therefore F \cos\phi = - \frac{\alpha + \gamma}{\alpha + \alpha' + 3\beta + \gamma} H_o \quad . \quad . \quad 5$$

and

$$\because F \sin\phi = - \frac{dH}{dv} + \frac{\theta}{M} \quad . \quad . \quad 2$$

$$\therefore \quad \tan\phi = - \frac{-\frac{dH}{dv} + \frac{\theta}{M}}{H_o} \cdot \frac{\alpha + \alpha' + 3\beta + \gamma}{\alpha + \gamma} \quad . \quad . \quad 6$$

$$\text{and } F = \frac{-\frac{dH}{dv} + \frac{\theta}{M}}{\sin\phi} \quad . \quad . \quad 7$$

from which (6 and 7) the dimensions of the required magnetic field can be obtained

To find $\frac{\theta}{M}$.

From the H variometer $MH = \theta a$

$$\therefore \quad M \cdot dH = \theta \cdot da$$

$$\text{or} \quad \frac{\theta}{M} = \frac{dH}{da}.$$

To find dH, deflect the declination system by means of a deflector magnet at a known distance,

then, if ψ be the angle of deflection,

$dH = H \tan \psi$

but, if R be the distance from the recording drum or shutter to the mirror of the suspended system, and δ the deflected distance on the drum or shutter in mm.,

$$\text{then } \psi = \frac{\delta}{2R} = \tan \psi$$

since the angle is small.

$$\therefore dH = \frac{\delta}{2R} \cdot H.$$

To find $d\alpha$, deflect the horizontal intensity system by the same deflector magnet at the same distance, and let δ_1 and R_1 be the deflected distance of the recording light spot and the distance from the recording drum to the suspended system respectively, in mm.

$$\text{Then } d\alpha = \frac{\delta_1}{2R_1}$$

$$\therefore \frac{\theta}{M} = \frac{dH}{d\alpha}$$

$$= \frac{2\,\delta\,H_o\,R_1}{2\,\delta_1\,R},$$

all of which quantities are known.

To determine $\frac{dH}{dv}$ call the sensitiveness ϵ *gamma* per mm.

$$\epsilon \text{ gamma} = \epsilon \times 10^{-5} \text{ c.g.s. units.}$$

$$1 \text{ mm. corresponds to } \frac{1}{2R_1}.$$

$$\therefore \frac{dH}{dv} = \epsilon \times 10^{-5} \times 2R_1$$

$$= 2R_1\,\epsilon \times 10^{-5}.$$

$$\text{If } \epsilon = 10, \text{ then } \frac{dH}{dv} = 2R_1 \times 10^{-4}.$$

Temperature coefficients, after consideration of data extant, were assumed as under :—

$$\alpha = \alpha' = \cdot00044$$

$$\beta = \cdot00002$$

$$\gamma \text{ negligible.}$$

$$\text{Then } \tan \phi = \frac{-\,2R_1 \times 10^{-4} + \dfrac{2\delta\,H_o\,R_1}{2\delta_1\,R}}{H_o} \times \frac{\cdot00094}{\cdot00044},$$

and F can be found by substituting similarly.

The moments of the deflecting magnets having been determined by means of the magnetometer, the required field F was then secured by placing suitable magnets at a distance d from the centre of the variometer determined from

$$F = \frac{\text{moment of magnet}}{d^3}.$$

Vertical Force Variometer Temperature Compensation.

Referring to Fig. 17: Let

M be the magnetic moment of the suspended magnet,
K the component of the earth's field perpendicular to the magnet,
F the intensity of the field at the centre due to deflector magnets,
v the angle the suspended magnet makes with the horizontal,
$m_1 g$ the vertical sliding weight,
l_1 its distance from point of support,
$m_2 g$ the horizontal sliding weight,
l_2 its distance from point of support.

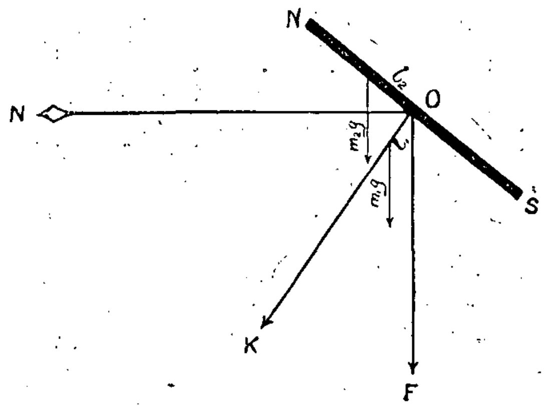


Fig. 17—Diagram of Vertical-Force Temperature Compensation.

The angle v is positive when N end is tilted up (positive from N through zenith).

K makes an angle $v - \frac{\pi}{2}$ with the horizontal ON.

F is positive when vertically downwards.
l_1 measured vertically downward.
l_2 positive from O toward the N pole.

The above are values at temperature t_o.

At temp. $t \equiv t_o + dt$ they become

$M(1 - \alpha \cdot dt)$; $F(1 - \overline{\alpha' + 3\beta} \cdot dt)$; $l_1(1 + \gamma \cdot dt)$; $l_2(1 + \gamma \cdot dt)$

where α and α' are the temp. coefficients of balanced and deflector magnets,

β coefficient of expansion of deflector magnet supports,
γ coefficient of expansion of supports of adjusting weights.

The equation of equilibrium is

$$KM(1 - \alpha{\cdot}dt) + F(1 - \overline{\alpha' + 3\beta}{\cdot}dt)\,M(1 - \alpha{\cdot}dt)\cos v + m_1 g l_1 (1 + \gamma{\cdot}dt)\sin v + m_2 l_2 (1 + \gamma{\cdot}dt)\cos v = 0.$$

$$\therefore\ K_o + dK + F(1 - \overline{\alpha' + 3\beta}{\cdot}dt)\cos(v_o + dv) + \frac{m_1 g l_1}{M}(1 + \overline{\alpha + \gamma}{\cdot}dt) \times \sin(v_o + dv) + \frac{m_2 g l_2}{M}(1 + \overline{\alpha + \gamma}{\cdot}dt)\cos(v_o + dv) = 0.$$

This gives the three equations:—

$$K_o + F\cos v_o + \frac{m_1 g l_1}{M}\sin v_o + \frac{m_2 g l_2}{M}\cos v_o = 0 \quad . \quad . \quad . \quad 8$$

$$dK - F\sin v_o{\cdot}dv + \frac{m_1 g l_1}{M}\cos v_o{\cdot}dv - \frac{m_2 g l_2}{M}\cdot\sin v_o\,dv = 0 \quad . \quad . \quad . \quad 9$$

$$-F(\alpha' + 3\beta)\cos v_o + \frac{m_1 g l_1}{M}\cdot(\alpha + \gamma)\sin v_o + \frac{m_2 g l_2}{M}\cdot(\alpha + \gamma)\cos v_o = 0 \quad . \quad 10$$

Putting $v_o = 0$ these become

$$K_o + F + \frac{m_2 g l_2}{M} = 0 \quad . \quad . \quad . \quad . \quad 11$$

$$dK + \frac{m_1 g l_1}{M}{\cdot}dv = 0 \quad . \quad . \quad . \quad . \quad 12$$

$$-F(\alpha' + 3\beta) + \frac{m_2 g l_2}{M}(\alpha + \gamma) = 0 \quad . \quad . \quad . \quad . \quad 13$$

where K_o is the vertical component vertically downwards.

$$\therefore\ K_o(\alpha + \gamma) + F(\alpha + \gamma) + \frac{m_2 g l_2}{M}(\alpha + \gamma) = 0 \quad . \quad . \quad . \quad . \quad 11$$

$$\therefore\ K_o(\alpha + \gamma) + F(\alpha + \alpha' + 3\beta + \gamma) = 0 \quad . \quad . \quad . \quad . \quad 14$$

$$F = -\frac{\alpha + \gamma}{\alpha + \alpha' + 3\beta + \gamma}\cdot K_o \quad . \quad . \quad . \quad . \quad (i)$$

$$\frac{m_1 g l_1}{M} = -\frac{dK}{dv} \quad . \quad . \quad . \quad . \quad (ii)$$

$$\frac{m_2 g l_2}{M} = -\frac{\alpha' + 3\beta}{\alpha + \alpha' + 3\beta + \gamma}\cdot K_o \quad . \quad . \quad . \quad . \quad (iii)$$

(i) gives the intensity required for compensation and balance, and any alteration in F does not in any way affect the sensitiveness.

K_o = vertical intensity (+ *ve* if downward).
$= H \tan I.$
$\alpha = \alpha' = \cdot 00044.$
$\beta = \gamma = \cdot 00002.$

while as before the field F was obtained by using deflector magnets of known moment at distance $d = \sqrt[3]{\frac{M}{F}}$.

The temperature compensations were computed on first setting up and the compensating fields based on values of the moments of deflector magnets which had been determined in Hobart, a small allowance being made for ageing.

The compensating system of the vertical force variometer was not altered subsequently, but the sensitiveness of the H variometer was increased by adjustment of the deflector system on 8th July, 1912, though no further alteration was made after that date.

It is not proposed to discuss here the merits and demerits of temperature compensating systems. In Adelie Land, despite the extreme care taken to ensure a protected and airtight building, the magnetograph house was inevitably subject to greater or lesser changes of temperature. No building which it would have been practicable in the circumstances to construct could have withstood the terrific winds that were experienced to the extent of maintaining the temperature constant within the limits attainable in a cellar or ice-cave.

Hence, temperature variations had to be faced, and it was decided to use the compensating systems.

The results obtained would appear to establish the value of the compensating device. For the most part, the diurnal temperature range was small, usually not greater than 2° or 3° C., but the seasonal changes were, of course, considerable, the total range amounting to about 30° C.

Inspection of the magnetograms and preliminary consideration of the results give no evidence of drift nor of necessity for a temperature correction. The effects of temperature change would appear to have been eliminated within practical limits of measurement.

5. Declination Scale Values—Method of Determination.

With the first arrangement of the variometers which obtained to 22nd April, 1912, the D instrument was placed in the middle, while later it was nearest the recording apparatus. To determine the scale value for either position, the distance from the variometer lens to the scale of the recording apparatus was carefully measured by means of a metal gauge filed to fit exactly between the two surfaces. This gauge was then measured against an accurate 24-inch steel rule. The distance from the scale to the sensitised paper was 85 mm., and from the outside of the variometer lens to the mirror 36 mm. In the first position of the variometer, the distance from the scale to the lens was 1,590 mm.

The scale value was determined by means of the formula

$$\epsilon_d = \frac{\textit{cotan}\ 1'}{2R}\left(\frac{f}{f-h}\right).$$

In this formula R was taken as the distance from the mirror to the sensitised paper and, for the above conditions,

$$R = 1590 + 85 + 36 = 1711 \text{ mm.}$$

The same quartz fibre was used throughout, and the torsion factor $\frac{f}{f-h}$ was determined on three occasions yielding the following results :—

8 April, 1912	1·215
25 ,, 1912	1·182
3 Nov., 1913	1·210

It was found that during the experiment of 25th April, 1912, the magnet system was not moving quite freely, so that the mean of the other two results was adopted, *i.e.*,

$$\frac{f}{f-h} = 1·212.$$

For the period up to 22nd April, 1912, this gives a scale value

$$\epsilon_d = \frac{3437·75}{3422} \times 1·212$$
$$= 1·218'.$$

In the second position of the D variometer, the distance from the scale to the lens was 1,021·5 mm., thus giving

$$R = 1021·5 + 85 + 35·5 = 1142·0 \text{ mm}.$$

For the period from 22nd April, 1912, to 3rd November, 1913, the scale value, therefore, was—

$$\epsilon_d = \frac{3437·75}{2284·0} \times 1·212$$
$$= 1·82'.$$

Both the above scale values were adopted for the periods mentioned.

In order to check the scale value determined from the geometrical and optical conditions, continuous observations of declination were made with the magnetometer on 19th October, 1912, for six hours, and on 18th and 19th January, 1913, intermittently for periods of six and seven hours. By comparing the ranges observed at the magnetometer with the magnetograph curves, a fair check on the scale value was thus obtained. The straight mean of twenty-seven determinations of D scale value made in this way gave $\epsilon_d = 1·78'$, which indicated the adopted value of 1·82′ as being 2·2 per cent. too large.

This method of obtaining the scale value for D is not entirely satisfactory because, on account of the magnetometer magnet being heavy, consequent on which it tended to over-run, and was not deadbeat, it was often difficult to say exactly what the extreme value was. Hence, the peaks of the curves on which the measurements were based are in some cases a little uncertain. However, since the total range of the twenty-seven determinations was from 1·67′ to 1·85′ the uncertainty is not great.

Base-line determinations did not afford any check on the scale value. Firstly, the base line did not remain constant for very long periods without adjustment of some kind; secondly, the determinations of base line were all made at about the same absolute value of D; while, thirdly, the error of individual observations was sufficient to vitiate any comparisons over the short ranges covered.

Another source of error should be noted, namely, in the torsion factor. This is correct only for the particular value of H ruling at the time that the torsion experiment is made and, in the present case, the torsion factor was probably correct for the average H at the station. On the other hand, since this factor was large, at times of abnormal H, the D scale value was sensibly affected.

One further source of error existed in the parallax caused by the instruments having to be placed in echelon, so that the illuminating beam could fall on all three. This disposition, combined with the necessity of placing the D variometer as near as possible to the recording apparatus in order to secure the greatest range of registration, occasioned the D variometer being placed slightly skew in relation to the recording apparatus, thus causing a slightly lower ϵ_d towards one side of the paper. The maximum error possible on this account is 1·4 per cent.

Summing up, it would appear that the maximum possible error at any time in the ϵ_d adopted is of the order of $\pm$ 4·5 per cent., while the probable error is considerably less.

6. Horizontal Force and Vertical Force Scale Values—Method of Determination.

For the deflection experiments to determine H and V scale values, a small deflecting magnet was provided of the same size and form as the D and H suspended magnets. Each variometer was furnished with a stiff aluminium bar, graduated in centimetres, on which was fitted a standard to carry the deflecting magnet at the same height as the suspended magnet system. The deflecting magnet was placed on these standards by means of a socket to which it was affixed, and by virtue of which it could be rotated easily end for end. Deflection distances up to 25 cm. were provided for, and distances of 20 cm. and 25 cm. were used throughout, a few determinations being made at 15 cm. also. The two former distances gave suitable deflections for D and H, but somewhat small ones for V.

For determination of ϵ_h the following procedure was used.* First, double deflections of the D system were made by placing the deflecting magnet successively east and west of the suspended system, and with north end east and north end west in each position. Two values of the double deflection were thus obtained for each distance.

Next, the deflecting magnet was transferred to the H variometer and placed successively north, north end north; north, north end south; S., N.; and S., S.; thus making two determinations of the double deflection for each of the distances.

Finally, the operation with the D instrument was repeated, so that the mean time of the observations with D and H should be the same.

It will be noted that the deflections in each case are due to inter-action of the magnets in the "end on" relation.

* The method used for scale values was first introduced by J. A. Broun.

If μ and μ' be the resulting deflections of the D and H variometers in millimeters and θ the angle through which the D system is deflected, then the force causing the deflection of the D system is—

$$W = H \tan \theta \times \text{torsion factor.}$$
$$= \frac{H\mu}{2R}\left(\frac{f}{f-h}\right)$$

when the angle is small. But, since the same force W also causes the deflection μ' of the H system, therefore

$$W = \epsilon_h \times \mu';$$
$$\epsilon_h \mu' = \frac{H\mu}{2R}\left(\frac{f}{f-h}\right)$$
$$\text{or } \epsilon_h = \frac{2\mu}{2\mu'} \times \frac{H}{2R} \times \frac{f}{f-h}$$
$$= \frac{2\mu}{2\mu'} \times \text{constant,}$$

providing H is reasonably constant. In Adelie Land, the value of H varied considerably for each determination, so that the mean value of H which obtained during each experiment was used in computing final scale values.

To determine ϵ_v analogous operations were performed with D and V variometers. First, the D system was deflected by placing the deflecting magnet north, north end east; north, north end west; S., E.; S., W. Then, on the V variometer the deflector was placed north, north end up; north, north end down; S., down; S., up. Finally the deflections of D were repeated in order that the mean of the D and V deflections should apply as nearly as possible to the same mean value of magnetic force.

In this case, the " broadside on " position was used in deflecting each suspended system.

Then by similar reasoning as for H,

$$\epsilon_v = \frac{2\mu}{2\mu'} \times \frac{H}{2R} \times \frac{f}{f-h}$$
$$= \frac{2\mu}{2\mu'} \times \text{constant,}$$

which constant, as before, depends on the invariableness of H. For determination of ϵ_v as for ϵ_h, the actual H ruling during the experiment was scaled from the magnetogram and used in the final computation.

The apparatus provided for the making of deflection experiments with the variometers was not the best for the conditions of low temperature and high wind that prevailed. In the Antarctic, fingers were much less sensitive and nimble than in lower latitudes, which fact, combined with the persistent forming of ice crystals on the deflection bars and supporting standards, rendered it difficult to place the deflecting magnet at the several distances and positions without jarring the suspended system. This difficulty was greatest with the V instrument, which, on account of its being farthest from the illuminating lamp, was most liable to frosting and, at the same time, was most susceptible to shocks.

For Antarctic work, at least, if not for all magnetograph stations, it seems desirable that apparatus for carrying the deflecting magnet should be independent of the variometers and even of any supporting frame for the variometers. In any case the apparatus should be substantial.

In Table VIII are given the means of the double deflections obtained with the different instruments for several of the periods during which the scale value remained constant. From these figures it will be observed that the deflecting magnet weakened appreciably between May and December, but the abrupt change between December, 1922, and the following year is due to a different deflecting magnet having been used after December.

TABLE VIII.
Scale Value Deflections.

Instrument.	Position of Deflecting Magnet.	Mean Double Deflection.			Change in Force.			Scale Value Used.	Date.
		15 cm.	20 cm.	25 cm.	15 cm.	20 cm.	25 cm.		
		mm.	mm.	mm.	γ	γ	γ		
D ...	End on ...	......	181·0	92·0	......	......	......	1·82′	May, 1912.
H ...	,, ...	......	76·9	39·2	......	298	152	3·89γ	
D ...	Broadside	......	91·75	46·5	......	......	......	1·82′	May, 1912.
V ...	,, ...	......	27·45	13·6	......	166	82	6·05γ	
D ...	,, ...	221·7	91·1	45·6	......	......	......	1·82′	June, 1912.
V ...	,, ...	139·3	48·7	22·8	466	163	94	3·35γ	
D ...	End on ...	......	175·91	89·16	......	......	......	1·82′	July to Nov., 1912.
H ...	,, ...	......	43·26	22·06	......	291	148	6·72γ	
D ...	Broadside	......	88·45	44·46	......	......	......	1·82′	Sept. to Dec., 1912.
V ...	,, ...	......	21·90	10·7	......	162	79	7·40γ	
D ...	End on ...	......	120·00	60·43	......	......	......	1·82′	March to June, 1913.
H ...	,, ...	......	42·57	21·75	......	198	100	4·60γ	
D ...	Broadside	......	60·05	30·28	......	......	......	1·82′	April–May, 1913.
V ...	,, ...	......	19·25	9·80	......	125	53	5·45γ	

7. DISTRIBUTION COEFFICIENTS.

In the D and H variometers the suspended magnet systems were identical, while the deflecting magnet also was identical with the D and H magnets. Hence the moment acting on H and D suspended magnets due to the deflecting magnet was the same with each variometer and no correction for "distribution" was required.

In the case of the V variometer, however, the dimensions of the suspended system were considerably greater than those of the deflecting magnet. Corrections, therefore, required to be applied to the V scale values determined, to allow for the unequal interaction of the deflecting magnet and the D and V systems, respectively. To arrive at the sign and magnitude of this correction, the dimensions of the magnets employed were considered.

Thus if $2l$ = the effective length of deflecting magnet,
$2l'$ = " " V magnet system,
$2l''$ = " " D " "
d = deflection distance,

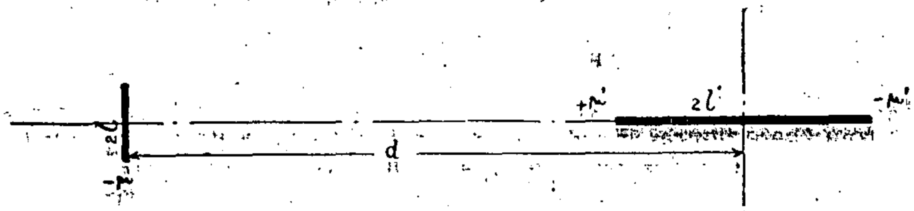


Fig. 18—Diagram for Discussion of Distribution Coefficient.

then with the V variometer as shown in fig. 18, the force on the V magnet in the direction of its length is zero. The force acting on $+\mu'$ downwards is

$$2\,\mu\,\mu'\,\frac{l}{\{(d-l')^2+l^2\}^{3/2}}$$

and on $-\mu'$ upwards is

$$2\,\mu\,\mu'\,\frac{l}{\{(d+l')^2+l^2\}^{3/2}}$$

The resultant couple

$$2\,\mu\,\mu'\,ll'\left[\frac{1}{\{(d-l')^2+l^2\}^{3/2}}+\frac{1}{\{(d+l')^2+l^2\}^{3/2}}\right]$$

$$=\frac{MM'}{d^3}\left[1+\frac{3}{2d^2}(4\,l'^2-l^2)\right] \text{ omitting higher powers of } \frac{l'}{d} \text{ and } \frac{l}{d}.$$

From the above it will be noted that if the V suspended magnet is longer than the D magnet, the correction to be applied is such as to increase the observed V scale value.

The dimensions of the several magnets were as under :—

D and H suspended and deflecting magnet ...	24 mm. overall.
Assumed effective length	19 mm. (= $2\,l$).
V suspended magnet	66 mm. overall.
Assumed effective length	53 mm. (= $2\,l'$).

With these dimensions the couple acting on the several systems is—

	At 20 cm.	At 25 cm.
H and D	$1{\cdot}01\ \frac{MM'}{d^3}$	$1{\cdot}0065\ \frac{MM'}{d^3}$
V	$1{\cdot}101\ \frac{MM''}{d^3}$	$1{\cdot}065\ \frac{MM''}{d^3}$

so that, although the change in force is the same at the centres of both instruments, the couple causing the deflection of the V system is greater than that deflecting the D system by 9·0 per cent. and 5·8 per cent. respectively.

Therefore, the V scale values as determined from the deflection experiments were increased by these percentages.*

*NOTE.—It has been pointed out by Dr. Chree that as the second power term in the above expansion amounts to 9 per cent. and 6 per cent., the fourth power term is unlikely to be negligible. In fact, it becomes 1·3 per cent. and 0·5 per cent. respectively, but, in view of the order of the uncertainties introduced by other causes, the inclusion of this term would give only a semblance of greater accuracy.

In view of the magnitude of these correction factors and of the fact they are based on an assumption of the pole distances of the various magnets, it will be obvious that such a method for determination of scale values, involving as it does a large "distribution coefficient," cannot be regarded as satisfactory. The deflections should be made by means of a strong magnet at distances sufficiently great to obviate any necessity for a distribution constant.

8. Vertical Force Scale Values.

Table IX shows the values determined for ϵ_0 both uncorrected for "distribution" and corrected, as well as the value of ϵ_0 adopted and the period for which this value was used. As was inevitable, during the early stages fairly frequent adjustments to the instruments were rendered necessary by both the climatic and magnetic conditions. In order to adjust the V variometer for either scale, or base-line value, it was necessary to handle the magnet system with the fingers and alter the position of jockey weights. During this operation it was impossible to prevent formation of some small amount of ice on the suspended system, so that it was not until some time afterwards (usually twenty-four hours to several days) when this ice had evaporated that the true base-line or scale value came into action. Thus the portion of the V trace immediately following such adjustment was unreliable.

All the changes in ϵ_v during 1912 were consequent on manipulation of the magnet system. The frequency of these was brought about partly by the inexperience of the magnetician, partly by in-appreciation of the requirements for such high magnetic "latitudes," and partly by general expeditionary and Antarctic conditions.

Table IX.

Vertical Force Scale Values.

Date.	Scale Values Determined. Uncorrected. r = 20 cm.	Uncorrected. r = 25 cm.	Corrected. r = 20 cm.	Corrected. r = 25 cm.	Scale Values Adopted.	Period for which Used.
1912.	γ	γ	γ	γ	γ	1912.
April 2...	4·40	4·34	4·51	4·40	5·72	April 1 to
April 7...	5·75	5·79	5·89	5·88		
April 22...	....	5·66	....	5·75		
April 25...	2·46	2·25	2·52	2·28	2·36	April 22 1 h. to April 25 8 h.
April 25...	4·44	....	4·55	....	4·40	April 25 8 h. to May 6 11 h.
May 2...	3·84	4·48	3·94	4·55		
May 17...	5·64	....	6·15	....	6·05	May 6 11 h. to June 11 2 h.
May 30...	5·40	5·65	5·89	5·98		
June 15...	2·94	3·10	3·21	3·28	3·35	June 11 2 h. to July 7 9 h.
June 23...	3·87	2·98	4·22	3·15		
July 1...	....	2·98	....	3·15		
July 9...	6·96	7·28	7·60	7·71	7·53	July 7 9 h. to July 13 9 h.
July 13...	6·92	6·91	7·55	7·32		
July 13...	5·06	6·00	5·51	6·35	5·90	July 13 9 h. to July 15 2 h.
July 22...	3·30	3·47	3·60	3·67	3·64	July 15 2 h. to July 22 8 h.

TABLE IX—*continued.*

Vertical Force Scale Values—continued.

Date.	Scale Values Determined.				Scale Values Adopted.	Period for which Used.
	Uncorrected.		Corrected.			
	r = 20 cm.	r = 20 cm.	r = 20 cm.	r = 25 cm.		
1912.	γ	γ	γ	γ	γ	1912.
July 23	5·79	5·77	6·31	6·11		July 22 8 h.
July 25	5·80	5·25	6·32	5·56 (?)		
Aug. 11	5·90	6·17	6·43	6·54	6·40	to
Aug. 19	5·95	6·41	6·48	6·79		
Aug. 28	5·99	6·03	6·53	6·38		Aug. 30 8 h.
Sept. 2	6·78	6·74	7·40	7·13		Aug. 30 8 h.
Sept. 19	9·12	9·27	9·94	9·81		
Oct. 6	6·92	7·53	7·54	7·97		
Oct. 15	6·67	6·98	7·27	7·39	7·40	to
Oct. 18	6·89	6·57	7·51	6·95		
Oct. 30	7·18	7·44	7·84	7·87		
Nov. 8	6·62	6·64	7·21	7·03		Jan. 13 3 h.
1913.						1913.
Jan. 13	5·77	5·83	6·30	6·17		Jan. 13 3 h.
Jan. 24	6·38	7·10	6·95	7·52		
Feb. 14	6·06	5·57	6·61	5·90		
Feb. 15	5·57	5·92	6·07	6·26	6·80	to
Feb. 28	6·99	7·08	7·62	7·50		
Mar. 16	6·46	6·69	7·05	7·08		Mar. 24 8 h.
Mar. 30	4·74	4·12	5·17	4·36 (?)		Mar. 24 8 h.
April 13	5·27	4·94	5·75	5·23		
May 1	4·90	5·09	5·35	5·39	5·45	to
May 19	5·16	5·14	5·63	5·44		
June 10	5·01	5·08	5·46	5·37		June 13 3 h.
June 24	4·74	5·16	5·17	5·46	5·30	to
July 10	4·88	4·94	5·38	5·23		July 25 2 h.
July 30	4·73	4·80	5·16	5·08	5·20	to
Nov. 3	4·74	4·87	5·17	5·15		Nov. 3.

After 13th January, 1913, the jockey weights of the V balance were not altered, so that the obvious change in scale value between 16th and 30th March is rather inexplicable. On 24th March an adjustment of the thermograph contained in the V variometer was made, during which the V balance was disturbed and required to be lifted in order to bring the recording spot to the right place on the drum. In the absence of any other evidence to account for the change in ϵ_v, it has been attributed to the occasion of this adjustment.

On 13th June it was found necessary to raise the V balance several times in order to bring the recording spot into its normal position on the drum. From some cause unknown, the V system at times would quite abruptly move its trace several millimetres across the magnetogram. It appeared as though some state of strain was being overcome in a series of jerks for which slowly evaporating ice crystals may have been responsible.

A similar occurrence is accepted as the justification for the other change on 25th July.

It is questionable whether the change credited to 13th June is not fictitious, but, on the other hand, the determinations subsequent to 10th July seem to substantiate an alteration in ϵ_v between that date and 30th July. Even if the change on 13th June be unreal, however, the error introduced is not large.

One other item demands remark, *i.e.*, the determination of 19th September, 1912. No explanation of the high value for ϵ_v on that date has been elucidated, so that in the absence of any indication of two changes (since ϵ_v appears unchanged subsequently) this value has been omitted.

9. Horizontal Force Scale Values.

In Table X are given the values determined and adopted for ϵ_h. These are eminently satisfactory to the end of 1912, the only alterations taking place on 22nd April and 8th July, on which dates the H variometer was deliberately adjusted. The values determined during these periods are a fair indication of the accuracy that might be expected from any individual observation. As the total range of twenty-two observations is only 0·63 γ, the mean must be very little removed from the correct value.

From 8th December to 13th January the H suspended magnet was not moving freely; in fact, it was definitely arrested mechanically. On 13th January the variometer was opened up after attempts to release the system by disturbing it with an auxiliary magnet had failed. The damping chamber was opened and the whole carefully scrutinised, but the cause of the trouble was not discovered. However, on adjusting the height of the suspended system and disturbing it mechanically, the magnet was found to move freely again. This incident is the only cause to which the change of scale value from 6·72 to 5·24 can be assigned.

The small change on 17th January is incidental to disturbing the H magnet mechanically again, because it was moving sluggishly and appeared to be sticking. The system was also adjusted slightly for height.

On 26th January, the H instrument was slightly readjusted generally preparatory to the magnetographs being taken over by R. Bage.

The remaining changes in scale value have been assigned somewhat arbitrarily. On 30th March, just prior to scale value experiments, the deflection bar was cleaned of ice, and as some change of scale value seemed definitely to have taken place between 16th and 30th and no other cause was recorded, or could be elucidated from the magnetograms, the change was attributed to this cause.

The changes of 1st, 12th, and 24th June may well be fortuitous, or, possibly a temperature factor may have made itself apparent in the scale value determinations between March and November. The temperature during the determinations on 30th March was $-10°$, in April $-13°$, in May $-12·5°$, in June $-14·5°$, in July $-17·5°$, and in November, $-10°$. Although the single isolated determination in November is insufficient to establish this hypothesis, the fact that the value obtained on 3rd November agrees very closely with that on 30th March lends some support to this view.

Following on the consistent and satisfactory H scale values established for 1912, those for 1913 are somewhat disconcerting, and leave room to question whether the variometer was in the same working order. It is possible that during the higher temperatures and resultant condensation which occurred during the summer the quartz suspension may have loosened and slipped, which would account for the sticking, and at least in part for the change in scale value.

TABLE X.

Horizontal Force Scale Values.

Date.	Values Determined. $r = 20$ cm.	Values Determined. $r = 25$ cm.	Scale Values Adopted.	Period for which Used.
1912.	γ	γ	γ	1912.
April 2	6·13	6·09	6·05	Mar. 21 to April 22 1 h.
April 7	6·11	6·01		
April 22	5·91	......		
April 25	4·05	3·94	3·89	April 22 1 h. to July 8 2 h.
May 2	3·71	3·91		
May 17	3·91	3·79		
May 30	3·91	3·86		
June 15	3·90	3·93		
June 23	3·87	3·87		
July 9	6·61	6·58	6·72	July 8 2 h. to Dec. 31
July 13	6·76	6·69		
July 25	6·67	6·65		
Aug. 11	6·79	6·84		
Aug. 28	6·67	6·48		
Sept. 19	6·71	6·61		
Oct. 2	6·68	6·73		
Oct. 15	7·11	6·69		
Oct. 18	6·66	6·80		
Oct. 30	6·79	6·70		
Nov. 8	6·71	6·86		

Date.	Values Determined. $r = 20$ cm.	Values Determined. $r = 25$ cm.	Scale Values Adopted.	Period for which Used.
1913.	γ	γ	γ	1913.
Jan. 13	5·26	5·21	5·24	Jan. 13 3 h. to Jan. 17 8 h.
Jan. 24	5·53	5·44	5·48	Jan. 17 8 h. to Jan. 26 9 h.
Feb. 14	4·79	4·89	4·92	Jan. 26 9 h. to Mar. 30 8 h.
Feb. 15	4·91	4·82		
Feb. 28	4·97	4·95		
Mar. 16	5·05	5·00		
Mar. 30	4·69	4·59	4·60	Mar. 30 8 h. to June 1 0 h.
April 13	4·56	4·60		
May 1	4·62	4·53		
May 19	4·63	4·56		
June 10	4·56	4·54	4·55	June 1 0 h.
			4·50	June 12 0 h. to June 24 8 h.
June 24	4·48	4·50		
July 19	4·30	4·28	4·42	June 24 8 h. to Nov. 3
July 30	4·51	4·43		
Nov. 3	4·72	4·57		

Chapter IV.

ABSOLUTE OBSERVATIONS AND BASE-LINE VALUES.

1. Absolute Hut.

The Absolute Station was placed on top of a rock ridge, 171 feet south of the Magnetograph House and 15 to 20 feet above it. (See plan on page 31, and Plate VI, fig. 2.) This site was selected because a gap in the rock with a fairly level surface offered a suitable platform on which to set up the magnetometer and dip-circle tripod, and at the same time promised at least some shelter for the hut from the wind which, from the first, left no room to doubt its frequency or intensity. A hut was built from odds and ends of timber left over from various building operations. This was 6 feet square in the ground plan, with a lean-to roof sloping from 6 feet high on the windward side to 7 feet on the leeward. The frame was fastened together entirely with copper spikes and bolts, and the single lining of $\frac{5}{8}$-inch timber (doubtfully tongued and grooved !) was secured with copper nails. No iron whatever was used in the construction and special care was taken to remove all tools. In order to make the hut reasonably tight, a complete lining of tarred paper was placed inside, every joint being carefully made by nailing on a wooden batten. This procedure proved very successful, and when snow packed round somewhat, very little wind came in other than at the door. It may be remarked incidentally that this rather flimsy structure was firmly anchored as a precaution against being blown bodily away by the hurricane wind.

The instrument tripod legs were set in "dabs" cut in the gneissic rock with a hammer and drill. Prior to the completion of the hut, a number of observations were made for Latitude, Azimuth, and L.M.T. correction.

The main azimuth mark consisted of a 3 in. x 2 in. timber, about 4 feet long, round which a cairn of stones was built on top of a rock ridge 1,266 feet to the west. Also a short-distance mark for use at night and during heavy drift was established on a small rock prominence 144 feet to the east. This mark consisted of a pointed piece of 3 in. x 2 in. timber with a hole bored through and built round with a cairn. At night a tin carrying an oil lamp was placed so that the light shone through the hole in the post. Although this mark was less than 50 yards distant, on many occasions it was impossible to see it through flying drift snow.

To enable the marks to be viewed, small sliding wooden doors were placed in the walls of the hut.

2. Latitude.

Determinations of latitude were made both at the Absolute Station and at the Winter Quarters hut, 770 feet further south, and using both the magnetometer theodolite and the Cary six-inch theodolite. Five observations for latitude gave the following results all reduced to the Absolute Station :—

Date.	Object.	Latitude.		Instrument.
		Observed.	Circum.-Mer.	
		° ′	° ′	
1912.				
Jan. 18 ...	Sun ...	67 00·7	67 00·7	Magnetometer No. 9.
Feb. 5 ...	Sun ...	66 59·8	67 00·0	Magnetometer No. 9.
Feb. 8 ...	Sun ...	66 59·9	66 59·9	Cary six-inch theodolite.
July 8 ...	Antares ...	66 59·7	66 59·9	Cary six-inch theodolite.
1913.				
Jan. 16 ...	Sun ...	67 00·0	67 00·1	Cary six-inch theodolite.

Accepted mean, 67° 00·0′ S.

Since the determination of 18th January, 1912, was obviously in error, it has been omitted from the accepted mean.

3. Azimuth.

As a result of twenty-four determinations of the azimuth of the West Mark, each based on the mean of four settings on the sun, a final weighted mean value of 65° 54·9′ west of south was accepted. The range of eighteen of the determinations was 5′, and the total range 15′.

The corresponding azimuth of the East Mark was accepted as 117° 25·8′ east of south.

4. Longitude.

Longitude was determined first by the ship's (S.Y. "Aurora") chronometers both during the 1911–12 and 1912–13 cruises, and yielded a mean value of 142° 40·1′ E.

Subsequently, during 1913, a longitude definitely accurate within ± 0·8 sec. was determined by means of wireless time signals from Melbourne Observatory, in conjunction with L.M.T. observations made by Bage with a transit telescope. These gave a value of 142° 40·025′ E. (9 hr. 30 min. 40·1 secs. E. of Greenwich).

The closeness of these two values is remarkable but cannot be regarded as other than a coincidence. The probable error with ships' chronometers, even though very specially cared for, is, under Antarctic conditions, rather of the order of ± 10 secs than of ± 1·0 sec.

5. Time.

During the period of occupation a provisional longitude of 9 hrs. 30 mins. 29·4 secs. E. was used, and all chronometer corrections were based primarily on this value, being corrected only in the final results to the actual value of 9 hrs. 30 mins. 40 secs. E.

Six box chronometers (4 mean time and 2 sidereal) were wound regularly about 9 a.m. every day and intercompared, all intercomparisons being recorded in a special inter-comparison book.

In order to check the chronometer rates and corrections to L.M.T., observations for L.M.T. were made as nearly as possible once a month. As these had to be carried out in the open, and since, in addition to low temperature, wind and drift were so constant, it was sometimes as long as six weeks or more before any "shots" were possible. Then, on several occasions when the wind had abated to a normal stiff breeze, the sky was too overcast for stars to be seen.

The following table, XI, gives the rates determined from L.M.T. observations and finally adopted for the three best mean-time chronometers. The final G.M. times were obtained from the means of these three chronometers, but, from time to time, checked satisfactorily with the means of the remaining three.

The probable absolute error in time on any occasion is not more than ± 4 secs.

TABLE XI.

Standard Chronometer Rates.

1912–13.	Loseby 102.	Barraud 921.	Casseres 655.	Fletcher 3609.
Feb. 13–Mar. 21	— 4·38	+ 0·71	— 0·67	+ 5·84 (stopped).
Mar. 21–May 26	— 3·38	+ 0·656	— 0·761	+ 4·324
May 26–July 8	......	+ 0·644	— 0·514	+ 4·588
July 8–Aug. 11	......	+ 0·606	— 0·771	+ 4·19
Aug. 11–Sept. 25	......	+ 0·903	— 0·769	+ 4·400
Sept. 25–Nov. 8	......	+ 0·877	— 1·091	+ 4·320
Nov. 8–Jan. 14	......	+ 0·675	— 1·190	+ 4·803

NOTE.—+ ve signifies a losing, and — ve a gaining rate.

6. SUITABILITY OF ABSOLUTE STATION.

It was, of course, essential that the Absolute Station be within easy distance of both the magnetograph and the living quarters. On the other hand, it was desirable that the vicinity be as free as possible from magnetic disturbance.

From consideration of the Field Results obtained by the Expedition, it would appear that the vicinity of the Magnetic Observatory, although not entirely free from disturbance, is not seriously disturbed. The declinations determined at field stations as set out in the map on page 37 show that the normal declination at Commonwealth Bay was westerly and of the order of 10° to 15°.

Of the stations A, B, C, and E, station B would be expected to be least disturbed since it was on ice and probably several hundred feet from the nearest rock. Concerning station C, the observer's notes on the locality remark that small veins of magnetite occurred in that vicinity.

Determinations of declination at stations A, B, and C gave about 6° W., 1° W., and 5° E. respectively, and of Horizontal Force ·0308 and ·0307 for A and B. The variance between the latter two stations in H. F. is therefore only 0·3 to 0·4 per cent., which is not large.

It had been hoped that the sea would freeze over for a considerable distance off-shore, so that a check station could be occupied on sea-ice, but the wind was so constant that, despite 60° of frost, the sea never froze over sufficiently to permit of going half a mile out.

In order to ascertain whether there was any difference between the magnetic conditions existing at the Absolute Hut and the Magnetograph House, a determination of H. F. was made in the latter shortly prior to its completion. This gave a value of ·03105, which appears to be in general agreement with values determined at the Absolute Hut. It may, therefore, be fairly concluded that there is little difference between the Magnetograph and Absolute Stations, so that variations recorded at the one apply to the other within the limits of observational error.

7. Absolute Observations, &c.

Since several "term days" fell due before the magnetographs were set up and in running order, these were kept by visual observations of D with the magnetometer in the Absolute Hut. After the end of March, routine absolute observations were instituted.

Following on several unsuccessful and doubtfully successful attempts, it was soon realised that satisfactory observations were only possible during certain hours of the day, and these mostly towards night or early morning. Even a casual consideration of the magnetograms showed that during the greater part of the twenty-four hours there was far too much movement for observations, and that the best times occurred between 4 p.m. and 8 a.m. On the other hand, any portion of this period was liable to special disturbances accompanying auroræ.

Hence the major part of the work had to be done at night with all the attendant discomfort and difficulty of darkness added to the inevitable trials of Antarctic conditions.

Since the period of actual observation exclusive of preparations of person and instrument amounted, under good conditions, to more than an hour for magnetometer work, and from two and a half to four hours for dip-circle sets, the complete observations were carried out in two parts. Further, on account of the difficulty first of setting on the marks in darkness or drift, and, secondly, in selecting a sufficiently steady period to secure satisfactory magnet readings, Declination sets were obtained when one could, rather than when one would.

In preparing for Absolute Observations, a visit was always paid to the magnetograph, since one could tell at least to some extent from the position of the recording spots whether or not a storm were in progress.

Preparations for observations which comprised dressing in outdoor clothes, finding one's way across the slippery snow and ice slopes, consulting the magnetograph, clearing snow from the Absolute Hut, carrying in and setting up the instrument, and, if necessary, putting a light on the mark required at least one to two hours, depending on the time of day and the state of the weather; while the clearing up and stowing of gear afterwards would take another hour. Hence, as it was impracticable to heat the Absolute Hut, and much of the manipulation had to be carried out with bare fingers, the taking of absolute observations constituted a somewhat arduous task.

During observations, all spare magnets were placed about 10 yards to the north of the hut, and the moving in and out in the high wind and thick drifting snow was an unenviable occupation.

The results of the Absolute Observations are given in Table XII, while Table XIII gives the values at the several stations B and C, previously described, and at the Magnetograph House.

TABLE XII.

Observational Results.

Absolute Hut (Station A)—Cape Denison, Adelie Land.

Latitude, 67° 00·0′ S.; Longitude, 142° 40·0′ E.

Date.	Declination.		Inclination.		Horizontal Intensity.			Instruments.		Obs'r.
	Local Mean Time.	Value.	L.M.T.	Value.	L.M.T.	Value.	Magnet. m.	Mag'r.	Dip-Circle.	
1912.	h. h. h.	° ′	h. h.	° ′	h. h.	Γ				
Feb. 20	15·1	6 26·7 W.	....	....	16·1 ...	·03073	465·12	9	....	ENW
Mar. 28	....	....	18·1 ...	87 22·9 S.	23·5 ...	*·03098*	....	*178*	178·12	ENW
April 1	12·3, 15·1 ...	6 20·2 W.	....	....	16·5, 18·2	·03126	464·14	9	....	ENW
April 6	15·8	6 06·2 W.	....	....	17·1 ...	·03118	465·48	9	....	ENW
April 9	....	....	17·8 ...	87 21·4 S.	19·6 ...	*·03106*	....	*178*	178·12	ENW
April 13	16·9, 17·3 ...	5 48·7 W.	....	....	18·0, 19·3	·03058	464·03	9	....	ENW
April 17	....	....	7·4 ...	87 19·8 S.	7·6 ...	*·03129*	....	*178*	178·12	ENW
April 20	17·0	6 00·5 W.	....	....	17·4, 17·7	·03096	....	9	....	ENW
April 21	....	....	....	....	6·0 ...	·03108	....	9	....	ENW
April 24	15·4, 16·5 ...	6 05·0 W.	....	....	17·3, 19·1	·03112	463·04	9	....	ENW
April 29	15·7	6 19·5 W.	20·0 ...	87 21·6 S.	17·3 ...	·03121	461·44	9	178·12	ENW
May 3	....	....	16·0 ...	87 22·0 S.	16·2 ...	*·03120*	....	*178*	178·12	ENW
May 4	16·0	6 17·0 W.	....	....	....	......	....	9	....	ENW
May 7	15·7	6 16·3 W.	....	....	....	......	....	9	....	ENW
May 9	7·9	6 47·7 W.	....	....	6·3 ...	·03115	460·09	9	....	ENW
May 12	15·5	5 27·7 W.	....	....	....	......	....	9	....	ENW
May 13	....	....	6·9 ...	87 21·6 S.	7·2 ...	*·03124*	....	*178*	178·12	ENW
May 16	16·2	6 13·4 W.	....	....	....	......	....	9	....	ENW
May 18	....	....	....	....	16·2, 17·4	·03116	459·56	9	....	ENW
May 21	15·4	6 23·7 W.	....	....	....	......	....	9	....	ENW
May 24	....	....	8·9 ...	87 21·6 S.	11·2 ...	*·03097*	....	*178*	178·12	ENW
May 26	14·5	6 20·3 W.	....	....	....	......	....	9	....	ENW
May 27	14·6	6 18·6 W.	....	....	15·4, 16·4	·03120	459·26	9	....	ENW
May 31	....	....	21·0 ...	87 21·5 S.	21·4 ...	*·03090*	....	*178*	178·12	ENW
May 31	18·3	6 26·4 W.	....	....	....	......	....	9	....	ENW
June 7	16·9	6 07·7 W.	15·9 ...	87 19·4 S.	....	......	....	9	B.12	ENW
June 8	....	....	....	....	22·1 ...	·03133	456·36	9	....	ENW
June 12	13·6	6 16·8 W.	....	....	16·2, 17·5	·03114	459·99	9	....	ENW
June 13	....	....	16·1 ...	87 21·2 S.	16·2 ...	*·03123*	....	*178*	178·12	ENW
June 18	18·8	6 21·8 W.	....	....	16·6, 17·8	·03112	458·80	9	....	ENW
June 22	17·7	6 31·0 W.	....	....	....	....	......	9	....	ENW
June 23	....	....	18·4 ...	87 21·9 S.	18·5 ...	*·03098*	....	*178*	178·12	ENW
June 28	18·7	6 27·9 W.	....	....	16·0, 17·4	·03138	458·76	9	....	ENW
July 2	18·0	6 31·0 W.	....	....	....	......	....	9	....	ENW
July 3	....	....	6·6 ...	87 21·3 S.	6·8 ...	*·03102*	....	*178*	178·12	ENW

TABLE XII—*continued.*

Date.	Declination.		Inclination.		Horizontal Intensity.			Instruments.		Obs'r.
	Local Mean Time.	Value.	L.M.T.	Value.	L.M.T.	Value.	Magnet. m.	Mag'r.	Dip-Circle.	
1912.	h. h. h.	° ′	h. h.	° ′	h. h.	Γ				
July 9	7·1	6 18·8 W.	....	....	5·9 ...	·03129	459·43	9	....	ENW
July 10	17·3	6 34·0 W.	....	....	15·5, 16·4	·03117	458·20	9	....	ENW
July 14	17·5	6 28·7 W.	....	....	....	......	....	9	....	ENW
July 15	....	....	6·4 ...	87 21·0 S.	6·5 ...	*·03125*	....	*178*	178·12	ENW
July 17	....	....	15·9 ...	87 21·5 S.	16·1 ...	*·03105*	....	*178*	178·12	ENW
July 20	....	....	....	....	15·2, 16·5	·03100	458·53	9	....	ENW
July 21	18·4	6 29·1 W.	....	....	16·3, 17·2	·03106	458·15	9	....	ENW
July 26	14·9	6 30·2 W.	16·6 ...	87 22·8 S.	....	......	....	9	178·12	ENW
July 26	....	....	....	....	16·8 ...	*·03103*	....	*178*	....	ENW
July 28	17·1	6 35·2 W.	....	....	15·0, 16·0	·03102	458·70	9	....	ENW
Aug. 4	....	....	15·9 ...	87 21·9 S.	16·1 ...	*·03102*	....	*178*	178·12	ENW
Aug. 6	14·9, 15·6 ...	6 49·4 W.	....	....	16·2 ...	·02929	462·14	9	....	ENW
Aug. 7	16·8	6 48·6 W.	....	....	16·1 ...	·03094	457·42	9	....	ENW
Aug. 13	14·6	6 27·6 W.	....	....	15·4, 16·6	·03108	458·12	9	....	ENW
Aug. 14	7·6	6 58·5 W.	....	....	....	......	....	9	....	ENW
Aug. 15	....	....	16·3 ...	87 21·4 S.	16·4 ...	*·03115*	....	*178*	178·12	ENW
Aug. 24	....	....	....	....	15·7, 17·0	·03078	460·22	9	....	ENW
Aug. 25	15·2, 15·7 ...	6 18·2 W.	....	....	....	......	....	9	....	ENW
Aug. 26	....	....	16·5 ...	87 22·2 S.	16·6 ...	*0·3099*	....	*178*	178·12	ENW
Aug. 27	15·7, 16·3 ...	6 14·6 W.	....	....	....	......	....	178	....	ENW
Aug. 29	17·5	6 18·5 W.	....	....	....	......	....	9	....	ENW
Aug. 30	15·9	6 19·0 W.	....	....	....	......	....	9	....	ENW
Sept. 2	16·5	6 21·9 W.	....	....	....	......	....	9	....	ENW
Sept. 3	8·7	6 54·4 W.	18·4, 18·7	87 21·6 S.	6·9, 8·2	·03126	459·02	9	178·1278	ENW
Sept. 3	....	....	....	....	18·6 ...	*·03105*	....	*178*	....	ENW
Sept. 17	16·1	6 13·0 W.	....	....	16·7 ...	·03104	457·67	9	....	ENW
Sept. 18	8·3	6 33·1 W.	16·1 ...	87 24·6 S.	7·7 ...	·03085	453·98	9	178·1278	ENW
Sept. 18	....	....	....	....	16·2 ...	*·03048*	....	*178*	....	ENW
Sept. 27	17·8	6 26·6 W.	....	....	19·0 ...	·03111	457·82	9	....	ENW
Sept. 28	5·7	6 49·2 W.	....	....	5·1 ...	·03117	458·00	9	....	ENW
Sept. 29	....	....	2·9 ...	87 21·7 S.	3·0 ...	*·03106*	....	*178*	178·1278	ENW
Oct. 9	18·9	6 02·1 W.	22·0 ...	87 21·4 S.	5·7, 6·0	·03109	459·10	9	178·1278	ENW
Oct. 9	....	....	....	....	22·1 ...	*·03099*	....	*178*	....	ENW
Oct. 16	16·4	6 12·5 W.	....	....	17·2 19·0	·03092	459·10	9	....	ENW
Oct. 18	3·5	7 14·0 W.	....	....	....	......	....	9	....	ENW
Oct. 21	14·8	6 21·7 W.	22·9 ...	87 20·8 S.	16·8 ...	·03104	457·58	9	178·1278	W&H
Oct. 21	....	....	....	....	23·2 ...	*·03130*	....	*178*	....	ENW
Oct. 26	16·4	5 54·6 W.	....	....	17·1 ...	·03108	....	9	....	WHH
Oct. 28	2·8, 5·9 ...	6 53·8 W.	....	....	3·2, 5·1	·03126	457·71	9	....	ENW
Oct. 29	....	....	22·5 ...	87 21·4 S.	22·6 ...	*·03103*	....	*178*	178·1278	ENW
Oct. 30	15·9	6 19·2 W.	....	....	17·9 ...	·03110	459·22	9	....	WHH
Nov. 4	20·6	6 33·1 W.	....	....	21·3 ...	·03148	....	9	....	WHH
Nov. 6	....	....	....	....	6·4, 7·1	·03086	....	9	....	ENW
Nov. 7	....	....	2·7 ...	87 20·6 S.	2·8 ...	*·03120*	....	*178*	178·1278	ENW
Nov. 20	20·7, 23·7 ...	6 30·6 W.	....	....	22·6 ...	·03109	458·42	9	....	WHH
Nov. 22	0·6	6 24·7 W.	....	....	1·5 ...	·03103	459·11	9	....	WHH
Dec. 1	20·4	6 34·1 W.	....	....	20·9 ...	·03108	....	9	....	WHH
Dec. 4	19·4	6 27·0 W.	....	....	20·0 ...	·03094	....	9	....	WHH
Dec. 11	20·4	6 31·3 W.	....	....	21·4 ...	·03090	456·44	9	....	WHH
Dec. 13	0·7	6 19·8 W.	....	....	1·7 ...	·03135	457·01	9	....	WHH
Dec. 22	20·2	6 29·2 W.	....	....	....	......	....	9	....	WHH
Dec. 29	....	....	....	....	20·9 ...	·03196	458·09	9	....	WHH
Dec. 31	0·7	6 51·4 W.	....	....	....	......	....	9	....	WHH

TABLE XII.—*continued.*

Date.	Declination.		Inclination.		Horizontal Intensity.			Instruments.		Obs'r.
	Local Mean Time.	Value.	L.M.T.	Value.	L.M.T.	Value.	Magnet "m"	Mag'r.	Dip-Circle.	
1913.	h. h. h.	° ′	h. h.	° ′	h. h.	Γ				
Jan. 5	0·7	6 16·3 W.	....	....	....	......	....	9	....	WHH
Jan. 7	20·0	6 03·3 W.	....	....	21·0 ...	·03096	....	9	....	WHH
Jan. 13	23·1	6 41·5 W.	....	....	23·9 ...	·03113	458·92	9	....	WHH
Jan. 19	21·0	4 40·1 W.	....	....	21·7, 21·9	·03127	457·85	9	....	ENW
Jan. 25	17·4	5 40·6 W.	....	....	18·0 ...	·03101	459·70	9	....	W&B
Jan. 26	17·2, 22·5 ...	6 16·3 W.	....	....	21·6 ...	·03109	458·19	9	....	W&B
Feb. 5	17·5	6 15·3 W.	....	....	....	......	....	9	....	ENW
Feb. 16	21·2	7 13·0 W.	....	....	....	......	....	9	....	RB
Feb. 17	20·6	6 30·8 W.	....	....	21·7 ...	·03099	457·06	9	....	RB
Feb. 25	17·4	5 35·7 W.	....	....	....	......	....	9	....	RB
Feb. 27	17·1	6 13·5 W.	....	....	17·9 ...	·03103	459·92	9	....	RB
Mar. 7	19·4	6 31·0 W.	....	....	20·5 ...	·03085	458·90	9	....	RB
Mar. 20	16·6	6 16·1 W.	....	....	....	......	....	9	....	RB
Mar. 21	16·0, 18·5 ...	6 12·6 W.	....	....	19·6 ...	·03098	458·52	9	....	RB
Mar. 29	18·6	6 42·5 W.	....	....	19·6 ...	·03099	458·93	9	....	RB
April 5	21·0	7 08·2 W.	....	....	21·8 ...	·03100	458·12	9	....	RB
April 14	15·8	7 18·8 W.	....	....	16·8 ...	·03064	456·62	9	....	RB
April 19	16·6	6 43·2 W.	....	....	17·5 ...	·03085	458·61	9	....	RB
April 25	19·9	6 39·4 W.	....	....	20·6 ...	·03081	457·42	9	....	RB
April 26	17·0, 19·9 ...	6 47·6 W.	....	....	17·6, 19·1	·03085	457·56	9	....	RB
May 3	16·1	6 36·6 W.	....	....	17·3 ...	·03087	457·34	9	....	RB
May 15	16·5	6 44·4 W.	....	....	17·3 ...	·03083	456·64	9	....	RB
May 23	16·0	6 40·5 W.	....	....	16·7 ...	·03090	457·30	9	....	RB
May 31	16·3	6 51·1 W.	....	....	....	......	....	9	....	RB
June 4	16·7	6 37·9 W.	....	....	....	......	....	9	....	RB
June 6	17·3	6 52·5 W.	....	....	18·0 ...	·03071	458·08	9	....	RB
June 15	21·2	7 04·4 W.	....	....	....	......	....	9	....	RB
June 16	17·1	6 39·7 W.	....	....	....	......	....	9	....	RB
June 17	17·1	6 54·9 W.	....	....	17·8 ...	·03079	456·66	9	....	RB
June 26	17·0	7 06·7 W.	....	....	....	......	....	9	....	RB
June 27	19·4	6 58·3 W.	....	....	20·2 ...	·03089	457·74	9	....	RB
July 6	21·2	6 53·8 W.	....	....	21·9 ...	·03090	457·12	9	....	RB
July 13	16·9	6 58·6 W.	....	....	....	......	....	9	....	RB
July 14	20·9	6 56·2 W.	....	....	21·5, 22·0	·03097	458·04	9	....	RB
July 28	16·3	6 54·9 W.	....	....	17·0 ...	·03087	457·48	9	....	RB
Aug. 6	17·0	6 47·9 W.	....	....	....	......	....	9	....	RB
Aug. 7	16·9	6 55·5 W.	....	....	17·8 ...	·03071	457·80	9	....	RB
Oct. 30	17·5	6 44·3 W.	....	....	....	......	....	9	....	RB
Nov. 1	16·8	6 29·7 W.	....	....	17·4 ...	·03058	457·00	9	....	RB
Nov. 3	18·0	6 40·5 W.	....	....	18·7 ...	·03040	457·28	9	....	RB

8. DISCUSSION OF THE ABSOLUTE OBSERVATIONS.

All observations were carried out as described on page 22, except that magnetometer and dip-circle sets were rarely obtained on the same day.

Declination results recorded in Table XII correspond to either eight readings of the magnet only, as detailed under *a*2 or *a*6 on page 22, or to a full set of twice this number. The first are identified in the table by a single entry for L.M.T., which is the mean time for the half set, while the latter are indicated by two entries for L.M.T., each of which is the mean time of a half set.

For all observations to 4th November, 1912, and for those on 3rd, 15th, and 23rd May, 1913, the fine bronze ribbon intended for the purpose was used in the magnetometer. With this suspension, an error of 1° in determining the plane of detorsion would lead to an error of 0·6′ in the resulting D.

For the remaining observations, because constant breakages had so reduced the stocks of light fibre, the heavy ribbon normally intended for use in inertia experiments only, had to be used and, with this suspension, an error of 1° in detorsioning would introduce an error of 3·0′ in D.

The observations subsequent to 4th November, therefore, are mostly of a lower order of accuracy than those preceding that date, both because of the necessity for using the heavy suspension, and also because the observers were less experienced. This aspect is discussed more fully later when dealing with base-lines.

The *Horizontal Intensity* values recorded in full type are the values resulting from either a full double set with magnetometer, as described on page 22, paragraphs *a*2, 3, 4, and 5, or a half set consisting of one set of oscillations and one set of deflections only. In the table where the value is the mean of a complete double set the mean L.M.T. of each half set is recorded, whereas a single L.M.T. indicates the mean time of a half set only.

The moment of the magnet, "m," as deduced from each determination of H is given, and the amount by which it differs from the average value is a fair indication of the reliability of individual observations. It will be noted that there was an appreciable, though small, ageing of the magnet, amounting to about 0·95 per cent. per annum average. However, there appears to have been a rapid ageing between March and June, 1912, probably resulting from the unusual changes of temperature.

The resulting H base-line values, which are discussed later, indicate by their consistency in 1913 that the accuracy of H determinations was not seriously affected by the use of heavy suspension ribbon. This is quite understandable and compatible with want of accuracy in D, since, deflections being made on both sides of the plane of detorsion, any error in determination of the latter will become eliminated.

The values of H, recorded in italics, were obtained by combining the total intensity determined with the dip-circle with the value of the dip secured at the same observation. The time recorded is the L.M.T. of the intensity observation which usually agreed very closely with the L.M.T. of dip experiments.

Inclination was obtained with either two or four needles, as indicated in the table by 12 or 1278, following the number of the dip-circle, 178.

In Table XIII the values of the dip obtained with the individual needles are given. From this table it will be seen that the maximum range for two or four needles during any set of observations was 1·5′, which occurs twice, while the mean range for all the sets was 0·75′.

As both circles had to be abandoned during sledging activities of the 1912–13 summer, no determinations of inclination were made after 7th November, 1912.

TABLE XIII.

Values of Inclination from Individual Needles.

Absolute Hut, Cape Denison, Adelie Land.

Date.	L.M.T.	Needle No.	Inclination.	Mean.
			° ′ S.	° ′ S.
1912.	h.			
Mar. 28	18·1	1	87 22·8	87 22·9
	18·1	2	87 23·0	
April 9	17·8	1	87 22·0	87 21·4
	17·8	2	87 20·7	
April 17	7·4	1	87 20·4	87 19·8
	7·4	2	87 19·2	
April 29	19·9	1	87 21·0	87 21·6
	20·0	2	87 22·2	
May 3	16·0	1	87 22·2	87 22·0
	16·0	2	87 21·8	
May 13	6·9	1	87 22·0	87 21·6
	6·9	2	87 21·2	
May 24	8·9	1	87 22·3	87 21·6
	9·0	2	87 20·8	
May 31	21·0	1	87 21·4	87 21·5
	21·1	2	87 21·6	
June 7	15·8	1	87 20·1	87 19·5
	15·9	2	87 18·9	
June 13	16·1	1	87 21·4	87 21·2
	16·1	2	87 21·0	
June 23	18·4	1	87 22·4	87 21·9
	18·3	2	87 21·4	
July 3	6·6	1	87 21·2	87 21·3
	6·6	2	87 21·4	
July 15	6·4	1	87 21·4	87 21·0
	6·3	2	87 20·7	
July 17	15·9	1	87 21·6	87 21·5
	15·9	2	87 21·4	
July 26	16·6	1	87 23·4	87 22·8
	16·6	2	87 22·2	
Aug. 4	15·9	1	87 22·4	87 21·9
	15·9	2	87 21·4	
Aug. 15	16·3	1	87 21·4	87 21·4
	16·3	2	87 21·4	
Aug. 26	16·5	1	87 22·2	87 22·2
	16·5	2	87 22·1	
Sept. 3	18·3	1	87 22·2	87 21·6
	18·4	2	87 21·4	
	18·7	7	87 21·4	
	18·7	8	87 21·3	
Sept. 18	16·1	1	87 25·1	87 24·6
	16·1	2	87 24·1	
	16·1	7	87 24·8	
	16·1	8	87 24·4	
Sept. 29	02·9	1	87 21·8	87 21·7
	02·9	2	87 21·9	
	02·9	7	87 22·0	
	02·9	8	87 21·2	
Oct. 9	22·0	1	87 22·0	87 21·4
	22·0	2	87 21·6	
	22·0	7	87 21·0	
	22·0	8	87 21·1	

TABLE XIII—*continued.*

Date.	L.M.T.	Needle No.	Inclination.	Mean.
			S.	S.
1912.	h.		° ′	° ′
Oct. 21	22·8	1	87 21·2	
	22·8	2	87 20·8	87 20·8
	23·1	7	87 20·4	
	22·9	8	87 21·0	
Oct. 29	22·5	1	87 22·4	
	22·5	2	87 21·0	87 21·4
	22·5	7	87 21·4	
	22·5	8	87 20·9	
Nov. 7	02·6	1	87 21·0	
	02·7	2	87 20·2	87 20·6
	02·7	7	87 21·0	
	02·6	8	87 20·4	

9. BASE-LINE VALUES.

Declination base-lines were determined by scaling the curve during the actual time of observation, applying the scale value and reducing. For Horizontal Force, the curve was scaled only for the time that oscillations or deflections were actually in progress, and the mean value was then reduced.

In the case of Vertical Force, the V base-line was determined by combining I and H, and I and F. In the first instance, the H and V curves were scaled during the dip observation, and, in the second, since the mean time of I and F observations was about the same, the V curve was scaled over the whole period of the observations.

V base-lines were very difficult to fix, and the accuracy attainable is of a considerably lower order than is the case with H. This arises not only from the lower accuracy of dip-circle work and the inherent mathematical conditions, but also from the liability of the V system to artificial disturbance due either to formation or evaporation of ice, or merely to jarring.

With further reference to the Vertical Force variometer, since no inclination or total intensity observations were made after 7th November, 1912, no V.F. base-line values were determined subsequent to that date. However, though absolute values could not be obtained for these later months, computation of the diurnal inequalities was not affected.

The base-line values for D, H, and V are given in Tables XIV, XV, and XVI.

The possible causes of alteration in base-line value for either D, H, or V instruments may be summarised as follows :—(*a*) Deliberate adjustment of the variometer resulting in an abrupt artificial movement of either the base-line or the variable trace; (*b*) release of strain in the suspension, or of mechanical interference, or, in the case of V, formation or evaporation of ice, any of which would give rise to an abrupt movement of trace; (*c*) introduction or withdrawal of magnetic material from within range of the variometers; (*d*) undeniable changes for which no specific cause can be assigned.

Declination Base-lines.—Adjustments of considerable magnitude falling under heading (*a*) occurred on 4th and 22nd April and on 9th July, 1912. Minor ones took place at the ends of the periods over which the system is described as "sticking." On these occasions, the magnet system was arrested mechanically by some agency which was never definitely discovered, but appeared to be ice.

The remaining shifts of base-line up to and including 9th July fall into category (*b*). In some instances the cause was known and recorded, *e.g.*, an inadvertent knock or slight irregularity in placing of the illuminating lamp. The change on 6th April, 1913, also is definite.

So far as is ascertainable, no changes were due to the permanent introduction of magnetic materials to the vicinity of the magnetographs.

Those changes of base-line marked "progressive" in the table are the only ones remaining to be discussed. These are assigned to classification (*d*).

To 4th November, 1912, fine suspension ribbon was used during the D absolute observations, and the consistency of the D results indicates that the accuracy of individual determinations is high. Hence, change between 9th and 26th July appears to be substantiated.

Similarly, there seems to be strong evidence for a progressive movement of the base-line between the beginning of October and the end of November. In both instances the changes were applied progressively over the whole periods, the values being increased or decreased arbitrarily at the rate of so much per day.

In the light of later knowledge and experience, the advisability of adopting such a course is questionable and especially so where small changes of opposite sign occur as in October and November.

After 4th November, all but three D absolute values depend on the use of heavy bronze ribbon in the magnetometer, with the result that the base-line values obtained are decidedly erratic. This irregularity was liable to be accentuated during December and January by the more disturbed character of the magnetic elements rendering observation more difficult. In fact, the range of the values of D base determined is considerably greater from February to August.

The whole of the base-line values determined for D, H, and V were plotted as figured on page 86, and it was only from this graph that it appeared feasible to make any intelligent interpolation of the base-line which should be adopted.

It is difficult to suggest any adequate explanation for the later D base-line values being so erratic. Certainly there had been a change of observer, but Bage was extremely careful and conscientious, a fact to which the consistency of the H base-line values testifies. The instrument was well established; and not subject to more than the minor attention of clearing ice from the lens window of the variometer. A comparison of the base-line values determined with the absolute values from which they were obtained gives no indication of a change in scale value, the base-line values being indiscriminately high, or low, whether the absolute value of D was above or

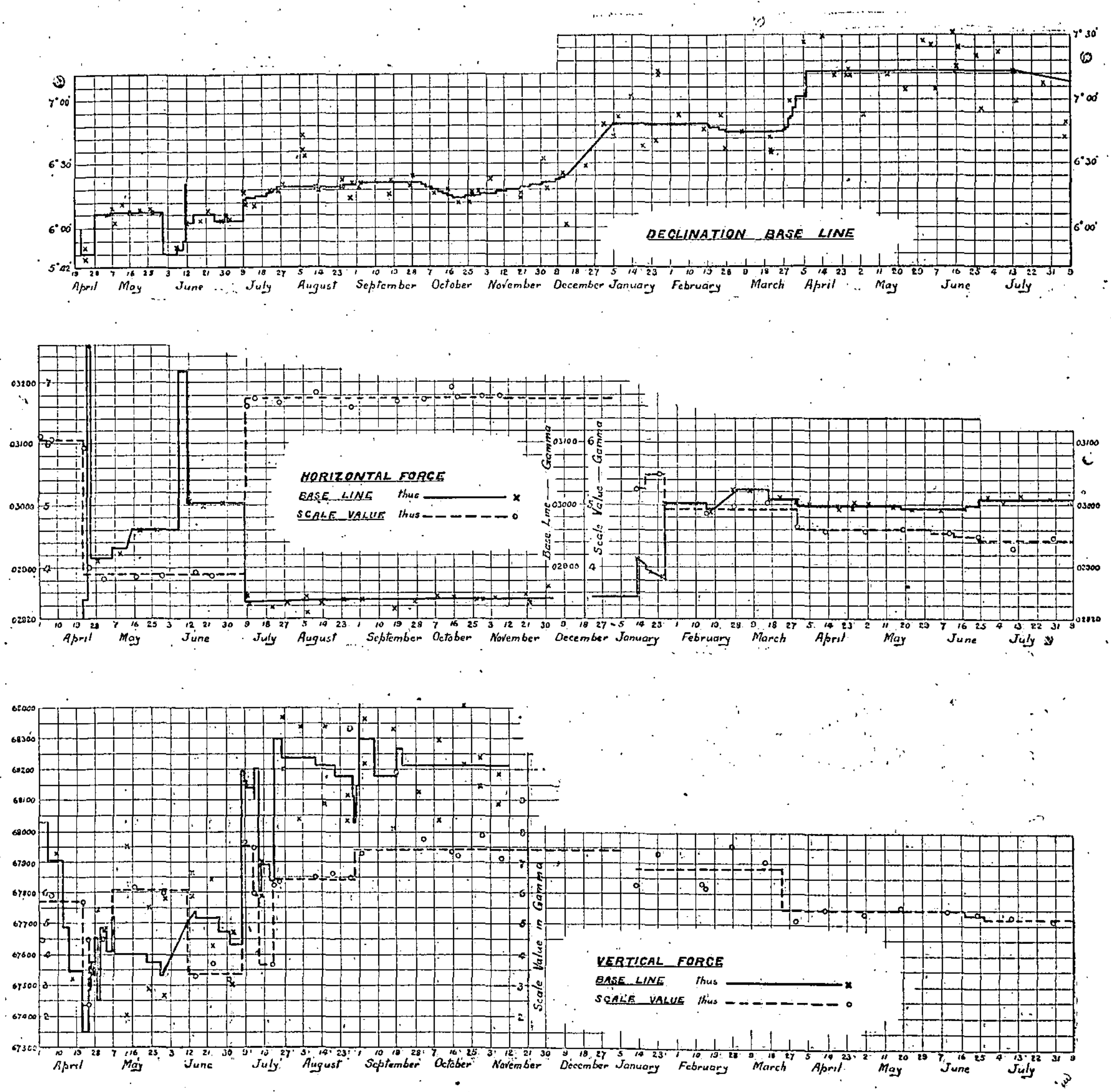


Fig. 19.—Graphs showing Scale Values and Base Line Values of D, H and V.

below normal. In any case the visual observations of D on 18th and 19th January, 1913, confirmed ϵ_d. Apparently the heavy fibre suspension with its large torsion coefficient (3′ for each degree) was mainly responsible for the inconsistency of the D base-line values. Though the suspension was carefully detorsionised before each observation, it is more than probable that the plane of detorsion did not always remain constant throughout the observation. During periods of several months over which the fibre remained unaltered, the plane of detorsion was found to vary as much as 21° (equivalent to 1° 03′ on the suspended magnet). It is therefore justifiable to suppose that either an error of several degrees may have entered when detorsionising, or that the plane of detorsion may have altered by a like amount during the course of an observation. It should be mentioned here that the observations of 3rd, 15th, and 23rd May, 1913, were made with the light fibre so that no sensible error due to torsion can have been introduced into these. (For light fibre 1° torsion = 0·6′ on suspended magnet.)

Dr. Chree has pointed out an anomaly in the secular change as obtained from comparison of equinoxial months and of midwinter months respectively in the two years. This anomaly appears to rest on a fictitious change in base-line between March and April, 1913, rather than on any extraordinary variation of the magnetic force. However, an inspection of the plot, fig. 19, will show that while there was a considerable range in the base-line values determined, the base-line adopted subsequent to March appears to be established beyond question. On the other hand, unless the eight determinations in February and March are entirely ignored, a considerable change in base-line between March and April must be admitted. Without further evidence, there does not appear to be any sufficiently valid reason for altering the base-line as already located. It will, of course, be obvious that in the circumstances there is a possibility of 15′, or even 20′, of error.

Horizontal Force Base-lines.—Much the same remarks apply here as in the case of D. Instrumental adjustments classified under heading (*a*) took place on 22nd April, and 8th and 9th July, 1912, and 13th January, 1913. Deliberate movements of the trace were also made on 24th and 26th April, 7th and 11th June, 1912, and 24th January, 1913. A small progressive alteration in the base-line has been made between 9th July, 1912, and 13th January, 1913, and in view of the consistency of the determinations, this drift seems to be well established. The progressive change accepted for January, 1913, has less certain foundation.

In view of subsequent reflections by Dr. Chree consequent on his deduction of the secular variation, it is probable that the changes of base-line between 15th February and 16th March, 1913, are not justified, and the base-line should read ·03008 for the whole of this period.

Changes subsequent to this are minor ones only, and all due to definite abrupt movements of the trace, evidently of instrumental origin.

Vertical Force Base-lines.—The accuracy of these is in no way comparable with D or H, and one is constrained to admit that satisfactory results cannot be obtained in such high magnetic and geographic latitudes with a dip-circle in conjunction with a magnetometer. A good earth inductor, including apparatus for determining the Total Force, appears to be the only satisfactory solution of this difficulty.

In addition to uncertainties introduced by the methods used for determination of individual base values, the relation of the optical base-line to the variable trace was also unreliable. Unquestionable shifts of base-line for which no quite definite cause could be adduced occurred, more particularly and frequently in the early months of occupation and immediately after general adjustment. This circumstance has been referred to elsewhere, and must be regarded as unavoidable with the knife-edge balance type of Vertical Force variometer under Antarctic conditions. A different form of suspension, such as a wire (which, it is understood, has been used in this connection) will probably overcome the difficulty eventually.

In view of the foregoing, it seems unnecessary to detail the causes of all the shifts of base-line adopted. Suffice it to say, that instrumental adjustments of a fundamental nature were responsible for the changes of base on 22nd, 24th, and 26th April, 13th July, and 30th August, 1912; while those of 5th, 25th 29th April, 3rd, 7th, 22nd, 29th May, 11th, 12th, 26th June, 1st, 7th, 9th, 20th, 22nd, 25th July, 30th and 31st August, 1st and 19th September, were all due to minor manipulation of the variometer. The remaining shifts of base, while unmistakable, are attributable only to obscure causes which, though suspected, cannot be definitely proved.

No base-line determinations were possible after the beginning of November, as both dip-circles were taken away by sledging parties and under stress of conditions had to be abandoned on the plateau.

TABLE XIV.

Declination Base-line Values.

Date.	Base-line.		Period for which Used.		Date.	Base-line.		Period for which Used.	
	Determined.	Adopted.	Date.	G.M.T. hour.		Determined.	Adopted.	Date.	G.M.T. hour.
1912.	W. ° ′	W. ° ′	1912.		1912.	W. ° ′	W. ° ′	1912.	
			Mar. 21		May 7	6 08·7		May 6	21
April 1	4 41·4	4 42	to		May 9	6 02·5			
April 1	4 43·4		April 4		May 12	6 11·7			
		4 28	to		May 16	6 07·4	6 07	to	
April 6	4 28·2		April 12	16	May 21	6 08·4			
April 13	4 25·7	4 28			May 26	6 09·2			
		to			May 27	6 06·8			
April 13	4 31·8	4 37	to		May 31	6 06·0		June 1	2
		progres-					5 48	to	
April 20	4 36·7	sive.	April 22	11				June 7	2
April 24	5 51·1	5 48	to				5 49	to	
April 24	5 45·7		April 29	7				June 7	5
May 4	6 06·3	6 06			June 7	5 51·1	5 51	to	
			May 6	3				June 10	2
		Sticking					5 54	to	
			May 6	21				June 11	2

TABLE XIV—*continued.*

Date.	Base-line. Determined.	Base-line. Adopted.	Period for which Used. Date.	Period for which Used. G.M.T. hour.
1912.	W. ° ′	W. ° ′	1912.	
			June 11	2
June 7		5 57	to	
			June 11	8
		6 21	to	
			June 11	10
June 12	6 01·8	6 02	to	
			June 15	12
June 18	6 03·4	6 06		
June 22	6 08·0		June 25	2
		Sticking	to	
			June 25	12
June 28	6 03·1	6 03	to	
			June 29	7
		Sticking	to	
			June 30	12
		6 06	to	
			July 1	0
July 2	6 03·8	6 03	to	
			July 9	8
July 9	6 16·8	6 13	to	
			July 10	0
July 10	6 10·7	6 14	to	
July 14	6 10·3		July 15	12
		6 15	to	
			July 20	0
		6 16	to	
July 21	6 17·3		July 21	12
		6 17	to	
			July 23	12
		6 18	to	
			July 25	0
July 26	6 17·5			
July 28	6 19·9			
Aug. 6	6 37·0			
Aug. 6	6 44·0			
Aug. 7	6 34·0	6 19	to	
Aug. 13	6 19·4			
Aug. 14	6 18·0			
Aug. 25	6 22·6			
Aug. 25	6 19·4			
Aug. 29	6 13·8	6 20	Aug. 26	0
Aug. 30	6 21·0		to	
Sept. 2	6 19·2		Sept. 1	0
Sept. 3	6 21·2			
Sept. 17	6 15·5	6 21		
Sept. 18	6 22·2		to	
Sept. 27	6 20·1			
Sept. 28	6 24·1	6 20	Oct. 3	12
Oct. 9	6 15·7	to		
		6 14	to	
Oct. 16	6 17·9	progres-		
		sive.	Oct. 18	12

Date.	Base-line. Determined.	Base-line. Adopted.	Period for which Used. Date.	Period for which Used. G.M.T. hour.
1912.	W. ° ′	W. ° ′	1912.	
Oct. 21	6 11·8		Oct. 18	12
Oct. 26	6 12·1			
Oct. 28	6 16·9			
Oct. 28	6 15·6	6 14		
Oct. 30	6 17·5	to		
Nov. 4	6 22·7	6 22	to	
Nov. 20	6 16·0	progres-		
Nov. 20	6 13·7	sive.		
Nov. 22	6 51·6			
Dec. 1	6 32·3			
Dec. 4	6 17·7		Dec. 8	12
Dec. 11	6 25·2	6 22		
Dec. 13	6 00·9	to		
Dec. 22	6 28·2	6 49		
Dec. 31	6 48·5	progres-		
		sive.		
1913.			1913.	
Jan. 5	6 42·4		Jan. 5	12
Jan. 7	6 52·3			
Jan. 13	7 01·4			
Jan. 19	6 37·9			
Jan. 25	6 40·6	6 49	to	
Jan. 26	7 11·7			
Jan. 26	7 12·6			
Feb. 5	6 53·3			
Feb. 16	8 44·7			
Feb. 17	6 46·6	6 49	Feb. 18	0
		to		
Feb. 25	6 52·7	6 45		
		progres-	to	
Feb. 27	6 36·9	sive.	Feb. 27	12
Mar. 7	6 45·4			
Mar. 20	6 42·5	6 45	to	
Mar. 21	6 35·0			
Mar. 21	6 35·7			
		6 46	Mar. 27	12
			to	
		6 47	Mar. 28	0
			to	
Mar. 29	6 58·9	6 51	Mar. 29	17
			to	
		6 52	Mar. 30	8
			to	
		6 56	Mar. 31	12
			to	
April 5	7 26·5	7 01	April 1	0
			to	
April 14	7 29·8		April 6	0
April 19	7 11·4		to	
April 25	7 11·3		July 13	0

TABLE XIV—*continued.*

Date.	Base-line.		Period for which Used.		Date.	Base-line.		Period for which Used.	
	Determined.	Adopted.	Date.	G.M.T. hour.		Determined.	Adopted.	Date.	G.M.T. hour.
1913.	W. ° ′	W. ° ′	1913.		1913.	W.	W.	1913.	
April 26	7 14·2		April 6	0	July 14	6 59·2		July 13	0
April 26	7 11·3				July 28	7 07·5	7 13		
May 3	6 52·8				Aug. 6	6 42·7	to		
May 15	7 11·8				Aug. 7	6 49·4	6 53	to	
May 23	7 04·4				Oct. 30	7 21·2	progres-		
May 31	7 27·2				Nov. 1	6 51·8	sive.		
June 4	7 24·3				Nov. 3	6 54·6		Nov. 3	
June 6	7 04·7	7 13							
June 15	7 31·6								
June 16	7 15·0								
June 17	7 23·8								
June 26	7 19·5								
June 28	6 54·7								
July 6	7 22·5								
July 13	7 13·4		July 13	0					

TABLE XV.

Horizontal Force Base-line Values.

Date.	Base-line.		Period for which Used.	
	Determined.	Adopted.	Date.	G.M.T. hour.
1912.	γ	γ	1912.	
			Mar. 21	
April 1	2300			
		2302		
April 1	2304			
April 6	2309	2260	April 12	6
April 13	2271	to		
April 13	2269	2298		
April 20	2298	progres-		
April 20	2300	sive.	April 22	1
		2850	to	
			April 24	0
April 24	3249	3255	to	
April 24	3261	......	April 26	9
			to	
April 29	2910	2914		
			May 6	11

Date.	Base-line.		Period for which Used.	
	Determined.	Adopted.	Date.	G.M.T. hour.
1912.	γ	γ	1912.	
			May 6	
May 9	2921	2930	to	
		to	May 12	0
		2960	to	
		progres-		
		sive.	May 15	0
May 18	2955			
May 18	2966	2960	to	
May 27	2959			
May 27	2962		June 7	2
		3214	to	
			June 7	5
		3222	to	
			June 7	6
		3217	to	
			June 11	3

TABLE XV—*continued.*

Date.	Base-line: Determined.	Base-line: Adopted.	Period for which Used: Date.	Period for which Used: G.M.T. hour.
1912.	γ	γ	1912.	
			June 11	
June 12	3012			
June 12	2998	3002		
June 18	2995		to	
June 18	3000			
June 28	3004			
June 28	3004		July 8	2
July 9	2856			
July 10	2840			
July 10	2846			
July 21	2831			
July 21	2843			
July 28	2842			
July 28	2847			
Aug. 6	2854			
Aug. 7	2830	2845		
Aug. 13	2837	to		
Aug. 13	2851	2853		
Aug. 24	2857	progres-	to	
Aug. 24	2842	sive.		
Sept. 2	2849			
Sept. 2	2850			
Sept. 17	2836			
Sept. 17	2817			
Sept. 27	2846			
Sept. 27	2846			
Oct. 8	2852			
Oct. 8	2857			
Oct. 16	2846			
Oct. 16	2857			
Oct. 27	2848		Dec. 3	
Oct. 27	2850		July 8	2
Oct. 30	2850	2845		
Nov. 5	2852	to		
Nov. 20	2858	2853		
Nov. 22	2845	progres-		
Dec. 1	2870	sive.	Dec. 3	
		Sticking	to	
			Dec. 21	0
		2853	to	
		No re-	Jan. 1	0
		cord.	to	
			Jan. 13	3
1913.		2912		
Jan. 13	2913	to		
		2903	to	
		progres-		
		sive.	Jan. 17	8

Date.	Base-line: Determined.	Base-line: Adopted.	Period for which Used: Date.	Period for which Used: G.M.T. hour.
1913.	γ	γ	1913.	
Jan. 19	2890	2899	Jan. 17	
Jan. 19	2896	to		
Jan. 25	2883	2881	to	
		progres-		
		sive.	Jan. 20	9
Jan. 26	3002	3002	to	
			Feb. 15	12
Feb. 17	2988	2992	to	
			Feb. 18	0
Feb. 27	3023	2992		
		to		
		3022	to	
		progres-		
		sive.	Mar. 1	0
Mar. 7	3021	3022	to	
			Mar. 16	9
Mar. 21	3012			
Mar. 21	3007	3008	to	
Mar. 29	3006			
April 5	3001		Mar. 30	8
April 19	2992			
April 25	2994			
April 26	2998	2997	to	
April 26	3008			
May 3	3002			
May 14	2996		May 18	3
May 23	2992			
June 6	2991	2992		
June 17	2993			
			June 18	3
		2998	to	
			June 24	8
June 28	3010			
July 6	3001			
July 14	3012	3800	to	
July 14	3012			
July 28	3008			
Aug. 7	3003	3008	Aug. 8	0
		to		
Nov. 1	2989	2286		
Nov. 3	2983	progres-		
		sive.		

Table XVI.

Vertical Force Base-line Values.

Date.	Dip Observations. Needle Number.	Dip Observations. Value of Dip.	Base-line Detached. From Dip.	Base-line Detached. From Total Intensity.	Base-line Adopted.	Period for which Used. Date.	Period for which Used. Hour.
1912.		° ′	γ	γ	γ	1912.	G.M.T.
					68029	April 1 to	
April 9 ...	1	87 22·0	67958	67896	67905	April 5 to	4
April 9 ...	2	87 20·7					
					67687	April 12 to	6
April 17 ...	1	87 20·4	67541	67493	67544	April 15 to	4
April 17 ...	2	87 19·2					
					67350	April 22 to	1
					67483	April 25 to	8
					67578	April 26 to	9
					67530	April 27 to	7
					67654	April 28 to	7
April 29 ...	1	87 21·0	67740	......	67470	April 29 to	7
April 29 ...	2	87 22·2					
					67450	April 29 to	23
					67682	April 30 to	7
					67672	May 1 to	7
May 3 ...	1	87 22·2	67650	67715	67606	May 3 to	3
May 3 ...	2	87 21·8					
					67720	May 6 to	11
May 13 ...	1	87 22·0	67465	67950	67600	May 7 to	5
May 13 ...	2	87 21·2					
					67576	May 22 to	6
					67564	May 22 to	22
May 24 ...	1	87 22·3	67752	67490	67572	May 23 to	18
May 24 ...	2	87 20·8					
May 31 ...	1	87 21·4	67783	67470	67526 progressive to 67715	May 29 to	3
May 31 ...	2	87 21·6					
					67715	June 11 to	10
June 13 ...	1	87 21·4	67785	67865	67715 progressive to 67741	June 12 to	0
June 13 ...	2	87 21·9				June 15	8

TABLE XVI—*continued.*

Date.	Dip Observations. Needle Number.	Dip Observations. Value of Dip.	Base-line Detached. From Dip.	Base-line Detached. From Total Intensity.	Base-line Adopted.	Period for which Used. Date.	Period for which Used. Hour.
1912.		° ′	γ	γ	γ	1912.	G.M.T.
June 23 ...	1	87 22·4	67849	67626	67715	June 15	8
June 23 ...	2	87 21·4				to	
						June 26	2
					67671	to	
July 3 ...	1	87 21·2	67673	67500		July 1	8
	2	87 21·4			67631	to	
						July 7	9
					68190	to	
						July 8	2
					68160	to	
						July 10	20
					68140	to	
						July 13	2
					68100	to	
						July 13	9
					68200	to	
						July 15	2
					67800	to	
July 17 ...	1	87 21·6	67902	67785		July 16	10
July 17 ...	2	87 21·4			67889	to	
						July 20	14
					67835	to	
						July 22	8
					68297	to	
						July 25	9
July 26 ...	1	87 23·4	68207	68368			
July 26 ...	2	87 22·2					
Aug. 4 ...	1	87 22·4			68233	to	
Aug. 4 ...	2	87 21·4	68346	68039			
Aug. 15 ...	1	87 21·4				Aug. 11	8
Aug. 15 ...	2	87 21·4	68093	68344	68214	to	
Aug. 26 ...	1	87 22·2				Aug. 20	8
	2	87 22·1	68112	68081	68178	to	
						Aug. 28	8
					68110	to	
						Aug. 29	7
					68030	to	
						Aug. 30	8
					68146	to	
						Aug. 31	7
					68120 progressive to 68414	to	
						Sept. 1	8
					68044 progressive to 68236	to	
						Sept. 2	8

TABLE XVI—*continued.*

Date.	Dip Observations.		Base-line Detached.		Base-line Adopted.	Period for which Used.	
	Needle Number.	Value of Dip.	From Dip.	From Total Intensity.		Date.	Hour.
1912.		° ′	γ	γ	γ	1912.	G.M.T.
Sept. 3 ...	1	87 22·2	68361	68222	68292	Sept. 2 to Sept. 8	8 to 8
Sept. 3 ...	2	87 21·4					
Sept. 3 ...	7	87 21·4					
Sept. 3 ...	8	87 21·3					
Sept. 18 ...	1	87 25·1	68334	68014	68174	to	
	2	87 24·1					
	7	87 24·8					
	8	87 24·4				Sept. 19	8
					68264	to Sept. 21	8
Sept. 29 ...	1	87 21·8	68430	68126	68210		
	2	87 21·9					
	7	87 22·0					
	8	87 21·2					
Oct. 9 ...	1	87 22·0	68296	68038			
	2	87 21·6					
	7	87 21·0					
	8	87 21·1					
Oct. 21 ...	1	87 21·2	68217	68404		to	
	2	87 20·8					
	7	87 20·4					
	8	87 21·0					
Oct. 29 ...	1	87 22·4	68237	68148			
	2	87 21·0					
	7	87 21·4					
	8	87 20·9					
Nov. 7 ...	1	87 21·0	68084	68181			
	2	87 20·2					
	7	87 21·0					
	8	87 20·4				Nov.	

CHAPTER V.

REDUCTION OF MAGNETOGRAPH CURVES.

1. MAGNETOGRAMS.

The magnetograms secured from the magnetographs in Adelie Land comprised ordinary curves for about sixteen months, and a number of curves secured with the drum run at twelve times normal speed in conjunction with other observatories in lower latitudes, and also during auroral "storms" in conjunction with Melbourne only.

The curves in general showed such constant and extensive movement that it was a matter for much discussion as to what method of scaling should be used for reducing to hourly mean values. Many of the movements were so large and varied that without considerable experience it was often difficult to distinguish one curve from another. However, discrimination was assisted by the fact that the recording light spots were not all either of the same intensity, or breadth, and, although this had disadvantages, it did assist in identifying the different traces.

2. METHOD OF REDUCTION.

As an engineer not particularly conversant with the reduction of magnetograph curves, the writer was of opinion that the only satisfactory method of obtaining mean hourly values from such highly disturbed curves would be by using some form of planimeter. At the Christchurch (N.Z.) Observatory, there was a Schmidt planimeter, and, as this was made available for measuring up the curves secured by the Expedition, it was resolved to adopt this method.

The strongest argument against the use of the planimeter appeared to be that the results would not be exactly comparable with those of the previous Antarctic Expeditions, which had been obtained by direct measurement of one or more ordinates per hour. However, the methods and instrument appeared to promise good results and to be particularly applicable to the class of curves to be dealt with, so that this objection was overruled.

3. PLANIMETER.

The planimetering machine consists essentially of a drum (which is a replica of the drum in the Eschenhagen recording apparatus) geared with a plane which rotates about a vertical axis. (See Plate V, fig. 2.) The planimeter proper rests on this horizontal plane and motion is imparted to it (*a*) by rotation of the plane which is caused through positive gearing by the rotation of the drum, and (*b*) by the operator who, with a pointer, follows the curve on the magnetogram which, in turn, has been clamped on the drum, the pointer being connected to the planimeter by an arm of suitable length. This second motion is in the direction of the ordinates of the curves on the magnetogram and radial in reference to the rotating plane. Thus, the planimeter itself moves only in one straight line, the second dimension being compounded by the movement of the plane on which the planimeter rests.

Hence the instrument measures up the area contained between the variable curve and a certain base for whatever interval of time (length of base) the measurement is made. Since when the roller of the planimeter is in the centre of the rotating plane the area recorded is zero, it follows that the point or line on the magnetogram corresponding to this position of the planimeter is the base-line to which all areas are referred. This was called the "zero base-line," and its value was obtained from the traced base-line by measuring the length of the ordinate between and applying the equivalent value in γ or minutes of arc. To facilitate this measurement, as well as that of absolute maxima and minima, a millimeter scale is attached to the instrument in a suitable manner.

When placing magnetogram papers on the recording drum, these were always clamped so that the left edge was firmly against the rim of the drum. This greatly facilitated the placing of papers on the measuring drum so that each followed on exactly.

One difficulty arose in fixing the time interval for scaling.

Although the rotating plane was subdivided into hours and minutes, one complete revolution corresponding to twenty-four hours, this referred to twenty-four hours of exactly 20 mm. each on the magnetogram. By reason of variable clock-rate and shrinkage of paper, scarcely any hour intervals were 20 mm. It thus became necessary to rule on each magnetogram lines marking the time intervals, and this was done for every half-hour G.M.T.

In this connection it may be noted that Dr. G. C. Simpson and Mr. C. S. Wright when operating the magnetographs of Captain Scott's last Expedition met this difficulty very simply by arranging for a small electric lamp to be switched on in the magnetograph house for a fraction of a second at each half hour, the circuit being closed by a standard chronometer. The light from this lamp was focussed on to the paper, and after development left a very suitably ruled graticule. Unfortunately, no such apparatus was available in Adelie Land.

4. Time Used.

As stated above, the time marks on the curves were correct for G.M.T. However, since the longitude of the observatory was 9 hours 30 minutes 40 seconds east, by measuring up each half-hour and neglecting the error in time of 40 seconds, values for both G.M.T. and L.M.T. hours could be obtained. It was actually decided to do this, and subsequently mean hourly values were obtained for both G.M.T. and L.M.T., the latter times being nominally 40 seconds in error, though it is doubtful whether in practice this error could be detected with certainty.

In ruling the graticule, the clock-rate was of course allowed for, and, in addition a slight parallax between the two sides of the paper was also taken into account. The final accuracy of the time marks is probably of the order of $\pm$ 0·25 mm., or $\pm$ 45 seconds, so that the maximum error of G.M.T. is about $\pm$ 1 minute.

5. Method of Operation.

Planimeter readings were recorded at each half-hour consecutively, and the precision with which the operator ran each time-base largely determined the correctness of each individual half-hourly mean. But, since the planimeter integrates continuously, errors in individual half-hours tend to disappear in the means for whole hours and must ultimately be eliminated within practical limits.

Differences between successive planimeter readings with due regard to sign were then measures of the mean departure of the curve from the zero base-line during the interval. The next step, therefore, was to convert these values into conventional units.

With a constant time-base (*i.e.*, constant clock-rate and shrinkage), it was only necessary for any particular scale value to multiply by a single constant to obtain the ordinate in ordinary units. To arrive at this "Conversion Factor," it was first necessary to know the planimeter constant; *i.e.*, the factor to apply to planimeter differences to convert to area in square millimeters. This was determined by measuring up several known areas of considerable size in which the mean ordinate was known, *e.g.* several large rectangles, and from these measurements a mean value of 1·1927 was obtained for the constant to convert planimeter differences to square millimeters. In order to arrive at the mean ordinate in millimeters, this value required to be divided by the length of base-line over which any particular measurement was made.

The third value required in the constitution of the complete Conversion Factor was the Scale Value.

The Conversion Factor therefore became—

$$\frac{1{\cdot}1927 \times \text{Scale Value}}{\text{Half-hour length of base-line in mm.}}$$

and this factor applied to the planimeter difference prefixed with the appropriate sign gave the mean ordinate for the half-hour, referred to the zero base-line value for the element.

6. Recording Sheets.

A reproduction of one of the sheets is figured on page 98. On such forms the required data was recorded and worked up. To ascertain the time-base, the length corresponding to 20 hours was measured and recorded, and the time-base reckoned from this. The "actual Base-line" and "Scale Value" were then written in and the "Conversion Factor" computed and written in also. When scaling, the operator would first write in the reading of the actual base-line of the particular element to be scaled as shown on the small brass scale in front of the drum, the zero of which scale corresponded with the zero base-line of the planimeter instrument. Thus the zero base-line value could easily be calculated, and was written in at the head of the column of half-hourly values of the element.

At the head of the first column was written in the planimeter reading at either 0 or 12 hours G.M.T., the readings at subsequent half-hours following. Differences were recorded in the next column, and it will be noted that the final value is the mean of the half-hours on either side of the hour.

ERROR IN 20 HRS. .... TIME-BASE = ...

A.A.E. ADELIE LAND

DATE ....

	DECLINATION								HORIZONTAL FORCE						VERTICAL FORCE							TOTAL FORCE
	ACTUAL BASE-LINE .... CON. FACTOR .... BASE-LINE READING .... SCALE VALUE 1mm=								ACTUAL BASE-LINE .... CON. FACTOR .... BASE-LINE READING .... SCALE VALUE 1mm=						ACTUAL BASE-LINE .... CON. FACTOR .... BASE-LINE READING .... SCALE VALUE 1mm=							
G.M.T.	READING	AREA IN PLANR. DIV.	ORDINATE R-M MAIN	ORDINATE RESERVE	DEC.	DEC. G.M.T. HR.	L.M.T.	DEC. L.M.T. HR.	READING	AREA IN PLANR. DIV.	ORDINATE	H.F.	H.F. G.M.T HR.	H.F. L.M.T. HR.	TEMP.	READING	AREA IN PLANR. DIV.	ORDINATE	V.F.	V.F. G.M.T. HR.	V.F. L.M.T. HR.	TOTAL F. G.M.T. HR.
0																						
30							10															
1																						
30							11															
2																						
30							12															
3																						
30							13															
4																						
30							14															
5																						
30							15															
6																						
30							16															
7																						
30							17															
8																						
30							18															
9																						
30							19															
10																						
30							20															
11																						
30							21															
12																						

Fig. 20—Facsimile of Recording Sheet for Planimeter Measurements.

It will be noticed that in the case of D there are two columns for the ordinate. This was necessary because there was a reserve trace as well as the main one, and this reserve required to be used fairly often in scaling, on account both of the large movements and also of the arrangement of the traces on the sheet.

The Absolute Maximum and Minimum for the day were written in red ink in the G.M.T. column for each element.

7. Arithmetical Reduction.

From the daily sheets above described, the mean hourly values were transferred to monthly sheets both for G.M.T. and L.M.T., and monthly means for each hour and hourly means for each month then computed. For this latter arithmetical work a Brunsviga calculating machine was used, and all work was checked.

At this stage the monthly sheets were forwarded to Dr. Charles Chree, for analysis and discussion, and are dealt with in a later part of this present work.

The mean hourly values G.M.T. for D, H, and V are given in the forty-nine tables on pages 100 to 197.

The enormous amount of work involved in completion of the daily sheets, the whole of the reduction of the hourly means for monthly sheets and a huge amount of scaling and checking were done during the writer's absence at the War by a number of lady students in Physics at Canterbury College, New Zealand University, under the leadership of Miss Beatrice Smith and the direction and supervision of Dr. C. C. Farr. and Mr. H. F. Skey. The latter gentleman also undertook the arduous task of checking and assigning Vertical Force base-line values.

In order to avoid possibility of loss in transit during hostilities, all monthly sheets were copied by blue-printing before being posted. The blue-print process effected a considerable saving in time (and expense) and at the same time ensured an exact copy. The prints were taken off ordinary writing paper originals, but indian ink was used for the figuring.

8. The Tables of Mean Hourly Values.

Though mean hourly values were reduced both on a basis of L.M.T. and G.M.T., only tables relating to G.M.T. are herewith published as the data contained therein will suffice for all ordinary purposes of reference. The reductions to L.M.T. are filed and preserved with the magnetograms for reference should they ever be needed.

The mean hourly values of Declination are set forth in Tables XVIIa—1 to 17. The values of Horizontal Force constitute Tables XVIIb—1 to 16, the month of December, 1912, being omitted on account of defective data. The values for Vertical Force form Table XVIIc—1 to 16, the month of December, 1912, being omitted in this case also.

The head-notes and foot-notes to the tables will be found sufficiently explanatory for their interpretation.

DECLINATION—MEAN

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	40	36	27	24	17	14	13	10	17	16	4	3	10	12	8
2	58	49	45	33	24	20	13	17	9	17	22	24	27	31	34
3	126	112	50	50	25	— 3	2	— 11	11	21	10	— 11	2	17	12
4	53	39	65	26	24	15	...	3	— 5	8	14	25	26	27	22
5	81	70	45	29	*	*	*	*	— 12	— 35	— 36	— 4	— 8	— 20	— 27
6	206	†	†	†	31	25	10	1	— 2	— 26	— 31	— 28	— 11	— 21	— 1
7	72	82	6	7	9	3	2	1	— 6	— 28	— 84	— 48	— 31	— 10	10
8	35	25	24	10	5	— 6	— 6	— 4	— 1	1	2	5	0	6	17
9	46	36	29	15	7	1	5	9	14	11	16	11	13	8	8
10	24	26	43	60	59	37	28	— 4	— 40	‡	‡	— 21	21	32	27
11	65	64	51	37	21	10	6	3	10	7	6	5	7	14	17
12	61	28	30	39	27	21	0	13	9	— 4	— 12	— 8	— 7	7	12
13	34	31	67	79	57	46	11	53	43	31	38	43	11	9	7
14	62	42	31	27	21	12	5	7	5	6	11	9	17	17	18
15	31	26	78	61	57	— 9	— 69	— 96	— 126	— 82	— 48	— 144	— 91	— 34	25
16	70	62	36	42	30	18	— 18	— 40	— 70	— 94	— 7	— 46	— 51	14	10
17	20	85	50	96	54	— 1	— 5	18	10	— 40	— 16	17	28	17	16
18	130	60	47	55	39	5	— 22	— 20	— 1	— 15	— 90	— 45	— 26	— 6	6
19	— 38	31	32	19	32	27	26	21	16	19	16	— 2	— 36	— 3	26
20	48	50	119	91	27	32	10	9	0	— 6	— 1	9	9	10	25
21	46	48	41	28	21	22	26	24	24	24	24	25	20	28	27
22	92	65	*	*	*	*	*	*	*	*	— 6	— 4	4	11	6
23	82	33	37	32	15	22	18	31	27	22	25	24	30	28	29
24	60	56	21	23	20	21	11	1	— 3	— 7	— 14	— 10	— 15	— 24	7
25§	§ Instrument system interfered with.														
26§															
27§															
28§															
29	§	§	§	§	§	§	§	14	13	17	§	§	§	§	§
30	33	33	27	25	18	11	17	19	16	18	13	9	— 52	2	15
Sums	1,487	1,189	1,001	908	640	343	83	79	— 42	— 119	— 144	— 162	— 103	172	356
Means	59·3	49·5	43·5	39·5	27·8	14·9	3·6	3·3	— 1·7	— 5·0	— 6·0	— 6·5	— 4·1	6·9	14·2

* No record. † Off sheet to West Dec.

HOURLY VALUES—G.M.T.

TABLE XVIIa—1.

APRIL, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
26	38	34	46	42	39	46	50	53	58	26	— 33	10 42	70	23 36	103	1
36	35	57	48	50	63	75	87	102	126	42	4	7 35	135	23 59	129	2
40	41	68	54	58	69	75	75	67	53	39	— 25	6 52	‡ 152	0 50	177	3
17	27	36	50	64	62	73	65	70	81	...	— 23	7 45	113	1 55	136	4
— 1	47	74	51	76	†	†	136	151	206	...	— 67	9 28	286	20 45	353	5
6	29	39	49	54	105	134	73	74	72	...	— 117	3 12	†	1 30	...	6
10	37	57	41	44	76	55	42	48	35	16	— 137	9 40	149	0 16	286	7
18	26	22	23	26	27	33	45	44	46	16	— 15	8 40	62	23 58	77	8
25	15	28	38	44	44	51	55	44	24	23	— 10	12 50	94	0 15	104	9
22	44	56	49	44	28	35	37	51	65	...	— 210	9 30	134	3 30	344	10
26	24	23	25	24	26	25	30	38	61	23	— 5	7 0	96	23 45	101	11
20	27	23	48	37	26	31	34	32	34	20	— 56	9 30	87	0 15	143	12
24	26	25	29	28	28	28	37	62	62	36	— 39	8 52	109	1 55	148	13
18	16	12	27	55	75	109	75	47	31	30	— 7	6 40	139	20 55	146	14
17	40	34	44	36	33	45	45	28	70	— 3	— 203	11 10	135	2 23	338	15
31	36	51	43	49	78	45	41	33	20	14	— 213	8 30	194	0 10	407	16
37	65	21	56	85	54	48	107	151	130	43	— 90	9 47	174	1 12	264	17
16	30	39	33	40	64	87	68	42	— 38	19	— 141	10 10	144	0 10	285	18
29	35	33	47	56	41	52	120	76	48	30	— 57	12 0	157	22 24	214	19
33	34	34	31	37	41	36	38	42	46	32	— 42	6 28	149	1 45	191	20
31	31	32	32	34	46	59	80	96	92	37	4	3 35	126	23 22	122	21
21	31	39	42	39	46	68	46	41	32	...	— 16	10 50	73	21 12	89	22
25	34	47	49	57	82	113	119	37	60	41	— 6	4 27	144	22 25	150	23
20	...	...	...	...	...	...	...	...	...	...	— 41	12 03	117	0 1	158	24
§ Instrument system interfered with.																§25
																§26
																§27
																§28
§	§	§	§	§	§	§	§	§	33	§	§	§	§	§	*	29
29	31	24	28	27	28	34	33	50	41	21	— 109	11 48	58	23 35	167	30
576	799	908	983	1,106	1,181	1,354	1,538	1,479	1,488							
23·0	33·3	37·8	41·0	46·1	51·3	58·9	64·1	61·6	59·5							

‡ Off to East Dec. § Instrument system interfered with.

DECLINATION—MEAN-

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	41	27	30	28	16	11	7	— 0	11	16	21	19	21	19	32
2	50	29	43	42	23	24	*	— 4	2	8	3	— 9	4	5	14
3	76	88	57	13	10	4	— 4	0	— 7	11	— 2	— 16	10	20	23
4	51	32	16	9	13	6	21	18	22	15	13	5	— 2	10	23
5	63	155	123	55	44	24	7	19	— 14	— 45	— 39	— 88	— 94	20	36
6	†	†	†	†	†	†	†	†	†	†	†	†	— 26	— 17	6
7	127	115	91	53	44	18	17	14	19	22	12	— 49	— 45	98	29
8	72	77	66	88	60	25	28	17	11	1	— 4	— 2	— 8	— 10	9
9	50	39	53	23	19	24	20	26	22	28	26	29	14	26	17
10	68	41	49	24	13	31	40	23	24	16	22	21	9	21	23
11	38	38	35	38	40	26	33	25	19	23	23	24	27	24	25
12	68	70	95	77	24	— 6	— 34	— 65	— 71	11	— 7	— 60	— 65	— 14	35
13	155	164	64	37	52	11	— 2	— 5	— 103	— 136	— 110	— 23	24	46	32
14	126	87	81	33	34	— 9	— 19	— 37	— 21	24	31	20	8	23	31
15	55	58	38	45	29	30	28	21	12	13	— 8	— 34	2	27	25
16	51	42	35	34	15	18	25	17	9	10	18	19	10	12	14
17	50	57	62	47	22	9	13	19	15	16	18	20	9	— 5	27
18	37	36	32	34	14	26	24	26	22	29	32	25	31	34	13
19	34	32	29	29	22	10	21	15	16	17	21	25	18	21	14
20	78	66	61	32	29	7	1	18	16	23	21	22	30	27	25
21	39	34	35	38	22	15	28	26	25	30	30	22	26	12	26
22	41	56	53	44	32	14	22	22	32	23	27	21	31	32	29
23	38	36	36	39	27	21	33	28	23	27	30	24	28	27	33
24	39	38	36	32	30	25	28	29	29	24	26	28	30	30	25
25	50	45	27	22	21	20	27	24	29	29	32	28	26	30	24
26	40	40	20	21	20	18	18	24	16	11	12	17	18	26	29
27	54	52	47	32	23	21	31	17	22	21	27	30	28	34	34
28	46	37	34	32	27	24	12	22	31	31	27	30	31	29	28
29	37	36	28	23	23	18	17	21	25	21	20	10	— 25	0	26
30	39	41	31	26	24	21	23	27	28	30	30	30	28	26	21
31	51	33	38	25	17	16	22	21	26	19	18	19	13	16	16
Sums	1,764	1,701	1,445	1,075	789	504	487	408	290	368	370	207	211	649	744
Means	59	57	48	36	26	17	16	13	10	12	12	7	7	21	24

* No record. † Instrument system interfered with.

HOURLY VALUES—G.M.T.

TABLE XVIIa—2.

MAY, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
34	28	25	32	32	27	37	48	59	50	29	...	6 50	80	23 32	83	1
28	32	35	76	69	51	43	35	61	76	28	— 28	10 58	88	17 50	116	2
19	20	35	33	36	51	114	55	92	51	31	— 24	7 59	144	21 7	168	3
30	34	31	36	32	40	95	84	100	63	31	— 30	12 12	132	22 31	162	4
29	31	45	†	†	†	†	†	†	†	†	†	†	†	†	†	5
24	88	38	38	25	31	39	59	74	127	...	...	...	...	...	...	6
28	28	34	36	39	75	51	124	91	72	44	— 76	11 5	178	1 10	254	7
42	35	25	30	40	38	32	50	41	50	31	— 23	9 52	149	2 48	172	8
27	33	32	39	41	38	42	32	48	68	31	— 1	13 40	105	2 20	106	9
27	36	34	32	34	32	38	31	34	38	30	— 9	11 45	75	0 00	84	10
24	29	42	32	33	52	69	63	80	68	37	14	15 33	117	23 11	103	11
37	37	50	39	37	45	74	199	153	155	32	— 164	7 35	251	22 13	415	12
33	35	31	43	112	116	143	149	137	126	41	— 201	8 40	208	1 30	409	13
25	51	42	20	54	71	77	79	84	55	32	— 66	7 20	182	1 30	248	14
28	33	42	36	37	35	35	30	45	51	28	— 53	11 4	92	1 12	145	15
29	31	40	36	42	50	49	34	44	50	29	— 11	14 12	72	1 45	83	16
29	29	36	30	24	23	27	42	36	37	27	— 49	12 45	86	0 15	135	17
16	33	35	33	35	40	54	44	41	34	31	— 2	14 20	67	21 12	69	18
35	34	25	26	30	91	86	42	40	78	31	— 2	13 45	139	20 28	141	19
25	29	22	39	40	49	42	36	36	39	31	— 6	6 3	85	0 2	91	20
26	32	36	32	35	32	29	33	56	41	30	— 10	12 48	71	23 5	81	21
27	34	36	36	37	34	36	36	37	38	33	7	4 50	71	1 5	64	22
35	35	33	34	35	39	46	37	39	39	33	18	12 57	59	21 40	41	23
29	27	31	31	33	35	36	37	49	50	31	21	12 35	65	23 45	44	24
31	37	30	36	40	33	37	35	41	40	31	9	4 28	69	23 15	60	25
29	37	39	33	30	35	40	38	38	54	27	— 0	9 22	61	23 40	61	26
32	32	34	30	33	37	34	40	43	46	33	3	5 15	66	0 05	63	27
34	32	31	35	38	34	41	46	40	37	32	5	5 56	59	...	54	28
31	30	34	35	37	37	51	54	50	39	27	— 54	12 20	69	21 15	1,213	29
32	34	39	35	40	98	119	92	61	51	41	11	4 8	146	20 50	135	30
19	32	29	29	25	25	37	43	46	51	26	— 16	11 45	72	22 45	88	31
894	1,058	1,071	1,052	1,175	1,466	1,653	1,717	1,796	1,774							
29	34	35	35	39	49	55	57	60	59							

DECLINATION—MEAN

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	51	55	57	50	37	11	10	0	— 28	— 52	— 14	— 67	— 40	12	8
2	43	45	26	25	23	1	6	— 22	2	1	0	8	9	1	— 13
3	57	56	35	24	0	— 9	— 23	— 3	20	— 3	1	7	0	— 4	9
4	35	32	38	38	24	15	5	7	3	4	7	4	3	6	5
5	16	18	16	32	15	10	6	8	10	5	8	11	13	13	7
6	13	16	6	11	3	— 5	9	10	8	10	8	9	12	12	9
7	12	19	12	12	16	14	5	7	5	8	10	4	9	7	6
8	38	— 4	30	29	10	21	— 27	— 43	— 36	— 46	— 15	— 21	9	— 64	— 21
9	56	37	76	48	25	8	— 7	0	5	— 16	— 1	— 22	— 36	— 23	— 14
10	144	63	77	38	29	18	6	11	— 7	11	14	— 1	— 1	— 1	0
11	34	69	35	23	25	14	1	15	25	30	20	15	— 11	10	15
12	44	36	39	37	24	12	15	12	21	17	16	1	1	5	13
13	33	33	28	23	19	14	19	24	23	19	23	10	21	22	40
14	44	31	34	17	15	22	14	9	6	— 1	1	4	15	19	17
15	51	50	49	21	21	19	18	23	20	26	17	35	27	36	27
16	40	42	29	32	27	30	33	34	31	35	33	35	32	34	25
17	29	39	35	32	32	26	34	32	29	34	27	14	12	14	31
18	37	42	36	33	31	33	26	27	26	30	29	24	28	13	30
19	35	50	34	33	22	38	31	32	22	30	36	24	31	34	33
20	34	33	38	32	33	32	34	30	34	32	31	29	35	35	35
21	37	34	39	32	27	25	25	28	28	33	29	28	20	15	32
22	59	43	26	35	28	26	26	25	30	27	28	22	20	12	11
23	44	54	40	39	26	33	28	31	27	31	21	23	— 7	— 19	37
24	62	32	53	57	38	36	38	13	07	23	31	33	14	— 14	06
25	*	*	*	44	35	33	28	23	30	30	27	29	36	38	33
26	45	41	49	46	36	14	22	28	29	25	33	34	25	23	05
27	34	31	33	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡
28	...	...	...	34	29	27	16	09	12	20	29	29	29	20	06
29	*	*	*	60	44	22	28	14	26	08	13	04	— 11	— 10	00
30	*	*	63	48	36	29	26	29	30	27	15	— 2	03	11	19
Sums	1,127	997	1,033	985	730	569	452	413	438	398	477	323	298	257	411
Means	43	38	38	34	25	20	16	14	15	14	16	11	10	11	14

* Interfered with. † Instrument interfered with.

HOURLY VALUES—G.M.T.

TABLE XVIIa—3.

JUNE, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
10	16	15	16	13	26	25	28	29	43	11	—154	11 16	108	2 28	262	1
— 10	7	17	14	16	34	63	88	40	57	18	— 48	7 25	69	21 48	117	2
18	17	13	13	10	18	13	35	55	35	14	— 56	5 55	77	0 32	133	3
10	16	11	23	27	22	18	12	19	16	16	— 4	12 05	59	1 48	62	4
5	15	19	13	13	15	21	15	16	13	13	— 5	11 57	44	3 02	49	5
13	16	19	16	15	14	18	30	29	12	13	— 12	4 35	44	22 16	56	6
9	15	11	9	6	9	13	21	35	38	12	— 3	14 15	68	23 32	71	7
26	6	37	41	41	120	179	79	43	56	18	—112	14 00	222	20 35	334	8
10	19	35	33	31	46	100	158	133	144	31	—127	12 28	187	21 35	314	9
— 10	36	25	101	73	50	31	58	41	34	31	— 25	14 29	168	18 06	193	10
25	31	19	29	30	29	23	39	43	44	25	— 31	12 00	143	0 55	174	11
31	32	26	21	33	28	31	39	32	33	23	— 23	10 40	70	1 02	93	12
29	27	34	29	41	36	37	37	30	44	27	— 1	5 27	61	14 21	62	13
12	32	30	37	30	36	32	36	48	51	23	— 9	10 15	67	23 50	76	14
37	9	29	34	32	57	32	39	35	40	31	4	4 45	67	1 48	63	15
32	34	28	32	40	52	67	60	37	29	36	19	23 03	80	20 42	61	16
30	35	34	58	32	30	36	45	40	37	32	— 9	12 46	85	18 00	94	17
38	33	37	32	36	36	35	35	52	35	32	— 4	13 00	62	22 54	66	18
33	36	35	37	36	39	30	37	35	34	33	14	04 05	59	1 02	45	19
36	37	35	36	33	29	40	29	40	37	34	+ 15	3 15	51	16 18	36	20
36	34	31	44	40	40	45	52	51	59	34	— 0	12 02	76	23 22	76	21
22	25	46	37	37	27	36	36	43	44	30	2	14 00	61	0 01	59	22
28	39	22	36	57	68	80	73	71	62	37	— 69	12 32	105	22 50	174	23
26	46	45	32	40	38	37	56	52	*	*	— 33	13 00	92	0 04	125	24
35	35	31	34	28	41	38	34	37	45	†	†	†	†	†	†	25
																26
30	31	32	35	40	37	42	35	37	34	32	— 12	13 50	57	3 20	69	26
‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡	27
31	37	36	32	50	49	64	*	*	*	§	§	§	§	§	§	28
...	43	39	33	40	*	*	*	*	*	*	*	*	*	*	*	29
39	45	44	45	38	40	46	62	71	*	*	*	*	*	*	*	30
631	804	835	952	958	1,066	1,232	1,268	1,194	1,076							
23	28	29	33	33	38	44	47	44	43							

‡ D. and Dr. not recorded. § Instrument arrested.

DECLINATION—MEAN

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	70	50	49	38	24	15	30	35	12	17	20	26	21	17	00
2	39	51	49	45	32	27	23	27	23	30	27	26	27	29	31
3	35	45	40	36	32	28	23	25	19	30	17	01	— 06	09	13
4	84	40	69	97	51	06	08	— 13	— 21	— 07	15	— 24	— 02	— 33	24
5	148	155	39	09	23	40	26	06	08	10	— 21	07	— 2	— 8	01
6	79	70	48	33	32	40	25	25	25	21	20	41	†	14	26
7	65	42	35	26	23	24	21	21	27	27	29	33	27	28	26
8	39	52	‡ 41	29	25	23	23	27	26	26	27	24	22	00	— 03
9	37	31	35	52	29	28	36	27	‡ 27	‡ 26	26	19	— 07	17	33
10	44	53	47	47	30	30	33	34	36	33	36	37	32	23	37
11, 12	§ Instrument arrested.														
13	...	...	...	38	27	32	26	37	34	38	34	40	39	36	41
14	49	51	42	31	36	30	27	24	40	30	32	38	37	24	29
15	49	47	49	35	30	22	30	23	27	25	35	33	48	42	40
16	50	66	53	51	47	20	14	10	— 05	30	22	36	50	35	46
17	49	53	47	44	37	36	34	35	36	32	33	34	35	34	32
18	84	69	62	47	30	25	31	33	33	34	39	41	39	38	46
19	63	44	49	42	31	27	27	29	35	31	30	26	22	21	35
20	71	51	50	57	43	34	25	10	12	01	02	— 01	04	— 02	26
21	80	74	73	59	43	18	20	27	28	33	30	06	12	18	42
22	51	41	52	47	41	34	25	23	21	27	35	27	14	17	21
23	47	46	36	32	36	37	21	21	28	40	34	29	38	31	26
24	37	50	36	34	34	34	33	30	35	35	33	36	38	41	35
25	55	54	45	38	30	29	32	32	36	30	24	20	24	20	19
26	53	43	76	59	52	41	25	27	28	17	12	— 12	— 03	29	41
27	97	79	93	66	61	46	33	23	25	41	30	30	34	34	38
28	45	51	52	53	45	36	29	24	32	30	28	36	28	37	36
29	48	50	59	55	50	34	25	23	31	28	28	37	26	12	23
30	59	63	60	58	49	* 34	25	23	20	08	17	12	17	— 09	04
31	76	93	96	68	45	30	17	03	06	01	— 47	— 17	08	20	21
Sums	1,703	1,614	1,447	1,326	1,068	860	747	671	657	698	647	641	622	574	789
Means	61	58	58	46	37	30	26	23	23	25	22	22	22	20	27

* Minimum recorded. † Brief violent storm.

HOURLY VALUES—G.M.T. **TABLE XVIIa—4.**

JULY, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
38	37	31	37	32	34	38	43	33	39	31	— 29	13 40	*84	01 30	113	1
29	34	31	36	31	31	34	32	37	35	32	15	04 48	63	0 59	48	2
28	35	80	65	54	55	64	55	93	84	38	— 19	12 02	136	22 27	155	3
— 17	49	46	29	61	90	83	66	116	148	35	— 86	13 15	175	22 44	261	4
33	32	52	72	52	118	188	114	138	79	50	— 85	10 30	*257	21 25	342	5
35	26	60	47	49	49	43	82	74	65	...	—123	11 22	121	0 35	244	6
29	32	30	49	56	27	47	70	68	39	35	— 2	04 17	105	00 01	107	7
31	44	32	37	41	51	81	64	41	37	33	— 49	14 10	111	21 16	160	8
41	44	41	42	47	49	44	35	40	44	34	— 25	11 59	70	3 05	95	9
35	41	41	42	47	57	38	46	47	...	...	17	12 27	66	19 55	49	10
§ Instrument arrested.																11, 12
45	41	41	42	42	40	43	46	39	49	...	28	4 33	52	18 56	24	13
46	33	39	35	41	41	48	60	52	54	38	17	13 03	68	23 33	51	14
42	45	49	46	49	44	42	52	59	50	40	12	7 24	67	22 16	55	15
46	45	46	40	45	41	50	51	52	49	39	— 14	8 12	71	00 16	85	16
29	42	44	53	60	97	93	102	89	84	50	13	16 14	111	21 28	98	17
42	47	43	48	47	44	51	48	57	63	44	17	03 58	90	00 00	73	18
41	41	38	36	39	39	49	51	56	71	38	11	13 00	77	23 59	66	19
40	44	48	45	41	33	44	59	87	80	35	— 30	13 06	105	23 04	135	20
34	36	43	42	39	37	40	43	54	51	38	— 42	11 22	101	00 20	143	21
33	43	53	41	40	41	41	40	50	47	36	06	12 10	73	02 16	67	22
19	47	47	44	42	44	34	49	44	37	36	02	14 50	69	0 45	67	23
42	41	42	44	46	55	53	64	51	55	41	23	01 30	70	00 50	47	24
40	42	41	66	55	51	53	50	70	53	40	04	12 45	105	22 50	101	25
38	73	57	43	46	49	69	99	98	97	45	— 30	11 22	132	23 59	162	26
49	44	42	45	45	46	44	47	47	45	47	04	10 25	114	1 45	110	27
45	45	49	52	48	46	47	46	49	48	41	21	04 08	66	22 22	45	28
26	43	49	51	48	47	46	42	43	59	39	— 9	13 15	58	02 45	67	29
30	55	59	60	55	57	70	63	68	76	40	— 38	12 45	82	01 32	120	30
42	40	67	77	102	105	121	107	94	114	50	— 86	09 45	161	23 00	247	31
1,011	1,221	1,341	1,361	1,400	1,518	1,698	1,726	1,846	1,747							
35	42	46	47	48	52	59	60	64	62							

‡Interpolated; curve regular. § Instrument arrested.

DECLINATION—MEAN

— 6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	114	80	70	58	33	20	41	19	24	31	38	35	31	42	44
2	64	59	51	41	42	28	35	33	36	26	34	32	25	18	20
3	68	68	57	40	32	21	12	21	24	31	25	25	4	23	50
4	65	64	51	41	37	35	38	35	33	41	36	39	37	45	48
5	43	40	43	43	31	25	34	34	37	36	34	40	30	34	35
6	118	137	159	154	99	43	17	— 61	— 24	— 36	— 91	— 75	— 75	— 54	— 23
7	67	97	94	84	56	41	17	33	34	37	36	44	44	42	42
8	57	66	41	40	35	29	30	34	35	39	36	39	35	33	40
9	51	61	65	55	41	34	36	22	28	17	18	19	15	42	43
10	67	75	57	54	31	27	22	29	32	39	31	36	28	36	38
11	88	73	56	46	32	31	25	29	25	29	33	37	39	36	37
12	47	43	41	40	36	27	34	31	37	38	38	34	35	46	44
13	61	61	56	48	41	29	28	19	34	40	28	39	38	33	41
14	49	51	61	45	36	29	27	22	18	28	8	— 8	10	23	34
15	81	78	86	43	26	12	22	23	30	39	42	40	35	40	44
16	72	54	44	40	34	27	27	33	32	32	31	36	28	16	46
17	180	197	75	120	86	27	18	— 15	18	— 6	— 74	— 73	— 45	25	33
18	79	42	58	69	53	48	41	29	30	38	32	33	— 6	21	28
19	196	143	105	30	50	28	13	15	9	— 18	— 21	3	4	— 2	24
20	101	118	80	71	68	42	26	20	40	22	22	10	14	18	37
21	78	57	61	75	65	64	30	25	35	31	— 14	— 55	— 21	1	30
22	179	138	190	71	28	36	17	— 2	9	18	23	20	25	22	30
23	187	169	119	108	49	14	— 16	— 31	— 21	— 22	— 4	8	12	6	34
24	79	51	47	45	32	26	14	5	— 16	— 4	22	22	40	36	24
25	82	108	82	66	54	40	19	15	27	10	3	24	11	37	32
26	68	61	57	41	19	27	12	16	31	27	28	27	29	11	31
27	85	86	53	41	33	24	19	15	28	7	— 18	— 70	— 46	22	37
28	55	45	24	46	45	51	31	25	32	33	27	29	34	28	37
29	66	40	46	35	30	26	21	22	28	41	34	33	26	39	36
30	62	55	63	50	39	18	16	25	33	33	34	24	36	37	43
31	45	59	73	41	29	41	33	22	30	39	35	37	30	38	37
Sums	2,654	2,476	2,165	1,781	1,322	970	739	542	748	716	506	484	502	794	1,076
Means	85·6	79·9	69·8	57·5	42·6	31·3	23·8	17·5	24·1	23·1	16·3	15·6	16·2	25·6	34·7

HOURLY VALUES.—G.M.T.

TABLE XVIIa—5.

AUGUST, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
52	40	41	41	45	74	77	53	49	64	47	— 30	4 44	143	0 22	173	1
35	47	50	47	41	47	44	51	60	68	40	— 8	14 51	118	15 4	126	2
50	46	47	40	46	45	43	64	73	65	40	— 17	12 10	146	1 9	163	3
43	43	44	38	43	47	57	52	49	43	44	25	5 23	85	0 35	60	4
36	35	47	50	39	49	75	163	151	118	51	15	4 50	214	22 40	191	5
42	35	46	109	77	61	57	56	75	67	34	— 239	7 12	182	2 35	421	6
43	46	61	50	53	57	50	49	49	57	51	— 14	6 30	153	0 36	167	7
43	46	48	48	45	47	53	59	65	51	43	24	1 43	93	1 18	69	8
45	45	44	55	55	46	44	58	52	67	42	0	11 35	77	1 15	77	9
44	42	42	43	42	88	88	97	92	88	50	11	6 10	124	22 35	113	10
42	47	48	44	47	49	52	48	48	47	43	8	4 39	109	0 40	101	11
43	39	47	50	51	41	44	47	45	61	41	20	5 27	62	22 51	42	12
45	43	44	43	43	43	52	53	54	49	42	15	5 34	74	1 5	59	13
39	48	44	50	48	48	67	70	83	81	39	— 30	11 12	122	23 54	152	14
46	44	42	41	47	45	49	53	56	72	44	1	5 18	106	1 30	105	15
42	46	47	49	60	47	49	74	132	180	48	— 4	12 45	204	23 59	208	16
42	47	50	66	52	48	54	67	58	79	42	— 156	10 15	232	1 15	388	17
29	33	52	52	65	264	250	122	137	196	69	— 27	11 51	352	20 35	379	18
70	31	51	50	71	56	51	51	87	101	44	— 52	9 15	235	0 32	287	19
30	46	67	49	50	56	71	84	83	78	51	2	11 15	141	1 18	139	20
43	48	47	61	63	60	62	91	147	179	47	— 76	11 2	209	23 47	285	21
52	61	39	93	97	114	92	115	163	187	68	— 18	4 30	237	1 55	255	22
47	38	44	81	90	88	92	154	138	79	55	— 125	7 27	229	0 55	354	23
20	33	43	72	60	53	63	76	92	82	39	— 52	8 15	107	22 55	159	24
44	47	57	45	49	68	67	78	77	68	47	— 41	9 35	140	0 10	181	25
44	48	44	43	53	59	60	76	86	85	42	— 7	13 5	112	23 52	119	26
40	43	42	58	100	65	62	67	54	55	35	— 98	11 22	138	19 15	236	27
34	55	47	40	53	64	51	44	46	66	41	— 5	1 27	98	0 55	103	28
33	54	53	67	73	81	54	61	64	62	44	— 1	1 30	113	19 50	114	29
41	44	44	49	45	52	59	84	68	45	44	2	6 15	110	2 30	108	30
41	43	40	50	70	77	78	70	84	110	49	0	2 40	120	1 24	120	31
300	1,363	1,462	1,674	1,773	2,039	2,067	2,287	2,517	2,650							
41·9	44·0	47·2	54·0	57·1	65·8	66·7	73·8	81·2	85·5							

DECLINATION—MEAN

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	110	120	89	42	36	14	25	20	46	40	40	38	38	29	40
2	42	49	46	47	33	31	31	30	29	40	37	37	30	39	47
3	58	53	45	39	36	35	34	28	35	42	39	40	38	41	35
4	90	134	135	103	64	44	30	24	35	26	6	— 53	— 12	33	48
5	64	50	48	46	31	21	36	28	34	25	8	— 52	— 2	39	47
6	132	144	100	53	46	35	30	29	16	— 7	1	17	22	29	48
7	80	55	52	39	31	37	34	27	24	33	17	30	30	26	44
8	61	56	48	42	38	24	21	17	4	10	3	4	24	37	44
9	82	44	104	83	59	43	33	12	17	0	0	— 19	— 22	24	35
10	84	105	96	104	60	42	25	26	34	31	29	9	18	28	38
11	80	53	87	85	49	39	26	9	11	25	22	25	29	41	45
12	94	83	96	98	76	40	10	— 6	— 4	— 29	— 4	— 29	— 5	31	45
13	102	99	88	62	35	26	38	30	40	30	46	34	30	34	38
14	62	79	52	60	45	50	13	21	27	5	13	19	35	40	39
15	86	72	48	37	26	21	20	29	30	34	31	40	37	44	39
16	53	61	85	17	59	37	7	14	10	4	6	7	13	25	37
17	54	41	51	44	26	27	17	31	*33	35	28	30	3	— 31	— 7
18	61	162	111	60	34	30	10	— 19	— 7	— 8	2	— 6	— 39	8	55
19	77	63	50	78	67	35	28	29	17	24	36	33	41	36	42
20	146	136	138	110	62	44	20	8	7	23	20	15	— 6	2	30
21	56	50	41	45	28	32	21	31	15	20	5	1	— 25	5	11
22	154	115	124	80	74	54	— 4	19	8	13	3	16	— 7	28	31
23	46	86	65	56	41	35	22	12	22	34	15	14	29	39	35
24	41	65	76	90	131	75	13	— 54	— 82	— 141	— 161	— 52	26	33	54
25	128	76	39	47	50	25	28	29	29	27	34	36	38	43	42
26	41	41	81	16	50	29	32	24	13	29	28	37	37	43	36
27	53	48	55	30	19	19	15	23	32	30	31	20	15	35	44
28	67	54	47	33	17	21	24	17	28	37	37	42	39	36	40
29	77	70	57	34	23	10	13	31	34	31	41	34	37	38	37
30	65	80	90	82	51	21	15	12	15	19	26	17	16	44	40
Sums	2,346	2,344	2,244	1,762	1,397	996	667	531	552	482	439	384	507	899	1,159
Means	79	78	74	59	48	33	22	18	18	16	15	13	17	30	39

* Interpolated; curve regular.

HOURLY VALUES.—G.M.T.

TABLE XVIIa—6.

SEPTEMBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
43	49	44	44	43	46	42	49	50	42	46	6	4 45	134	0 45	128	1
44	41	43	46	42	37	48	56	54	58	41	16	6 48	69	23 55	53	2
44	41	44	46	40	47	42	50	58	90	43	21	4 30	112	23 30	91	3
44	44	78	67	76	57	57	62	70	64	52	— 88	10 32	202	1 0	290	4
49	47	46	49	53	59	69	86	76	132	42	— 81	11 0	176	23 45	257	5
48	47	43	45	45	46	52	62	86	80	48	— 21	9 0	160	1 10	181	6
46	42	48	63	60	49	48	58	68	61	43	6	10 2	131	0 5	125	7
45	50	47	55	58	71	48	57	79	82	39	— 18	8 15	118	23 25	136	8
55	48	45	56	58	54	56	73	73	84	41	— 59	11 20	170	2 1	229	9
38	37	55	47	46	46	47	54	85	80	49	— 23	11 2	162	0 59	185	10
47	39	49	46	58	48	58	69	90	94	47	— 5	7 42	150	2 15	155	11
52	43	46	53	53	83	116	87	79	102	46	— 86	10 50	140	21 5	226	12
49	47	43	68	80	119	133	96	49	62	58	14	4 45	162	21 22	148	13
41	69	45	45	41	51	64	69	81	86	45	— 3	9 10	131	23 55	134	14
47	43	46	47	47	48	52	47	57	53	42	12	5 0	117	0 58	105	15
51	53	45	47	51	44	49	42	42	54	36	— 6	8 29	99	1 58	105	16
19	30	118	105	102	172	270	130	72	61	58	— 52	12 58	320	20 35	372	17
47	44	51	44	49	60	93	90	75	77	42	— 90	11 40	213	1 2	303	18
41	51	52	54	65	59	109	66	129	146	55	7	8 50	184	23 0	177	19
34	46	41	50	53	52	61	59	56	56	50	— 32	12 22	184	0 20	216	20
38	52	50	54	58	66	79	108	103	154	41	— 37	11 48	174	23 40	211	21
31	40	43	60	84	69	57	59	98	46	49	— 35	12 0	154	1 58	189	22
45	42	60	100	64	50	43	40	32	41	43	— 26	0 22	176	0 59	202	23
57	51	51	49	60	96	200	195	206	128	47	—219	9 52	226	21 12	445	24
45	44	48	44	46	45	46	50	34	41	43	— 1	3 10	131	1 18	132	25
46	50	50	44	52	98	105	71	52	53	46	— 4	2 48	133	2 1	137	26
42	47	51	57	50	45	48	53	61	67	39	— 19	11 48	97	0 40	116	27
47	46	25	48	48	51	51	50	70	77	41	10	4 30	90	23 59	80	28
45	47	47	58	63	66	57	80	80	65	46	— 1	5 0	96	23 2	97	29
43	40	54	47	51	50	62	90	63	74	46	— 6	11 30	128	1 45	134	30
1,323	1,370	1,508	1,638	1,696	1,884	2,262	2,158	2,228	...							
44	46	50	55	57	62	75	72	74	76							

DECLINATION—MEAN

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	74	— 1	33	55	6	— 8	— 52	— 82	— 89	— 119	— 86	27	— 70	— 38	0
2	74	75	80	71	58	37	27	21	42	38	42	43	41	42	44
3	156	140	131	51	24	25	38	25	24	22	27	33	21	32	40
4	82	59	75	75	54	29	12	15	13	8	2	19	18	19	39
5	77	57	43	22	33	29	19	14	17	15	15	24	27	33	31
6	64	61	47	26	31	15	14	4	26	32	17	27	15	14	30
7	59	59	57	29	11	19	14	23	18	27	35	24	24	29	23
8	128	154	112	60	47	51	11	7	1	— 17	— 14	21	33	32	38
9	121	89	58	56	38	26	26	5	— 21	— 8	18	42	18	31	53
10	107	69	36	25	35	38	36	32	22	19	14	31	39	40	38
11	190	6	100	34	48	30	20	13	29	— 8	— 18	— 27	— 22	24	5
12	166	51	29	26	21	28	— 15	— 14	— 43	— 53	— 12	— 32	— 17	15	24
13	180	172	141	113	90	61	14	19	37	9	— 12	— 59	6	30	12
14	84	96	64	132	70	46	21	— 22	— 75	— 63	— 100	— 88	— 62	— 49	7
15	290	43	97	43	68	55	17	3	2	— 37	— 3	15	8	4	31
16	147	125	85	42	11	13	14	7	3	— 12	— 6	— 14	4	36	20
17	186	161	184	127	84	39	— 1	— 4	— 9	— 8	— 11	— 13	10	43	43
18	58	81	65	56	12	8	4	1	10	1	13	25	29	46	41
19	63	59	33	27	9	9	9	21	20	27	25	30	19	22	31
20	76	52	36	28	22	16	5	6	21	30	28	30	31	39	31
21	34	62	54	32	42	26	16	5	13	7	15	21	27	21	24
22	63	47	53	25	15	10	10	4	6	3	17	33	30	38	37
23	32	30	46	26	6	25	— 4	— 5	1	25	20	21	21	28	26
24	78	69	57	39	18	19	2	9	19	19	17	23	26	35	32
25	95	102	85	74	38	15	— 2	8	— 10	— 16	— 19	1	7	33	42
26	65	77	53	35	17	— 1	0	— 11	— 2	15	27	26	31	41	38
27	105	70	114	97	60	22	7	— 1	— 16	— 9	6	2	3	17	14
28	80	55	33	60	91	10	30	— 10	14	— 17	— 37	— 5	29	33	33
29	106	84	78	76	28	7	8	— 5	2	10	18	15	39	39	42
30	66	55	33	32	15	12	15	19	18	26	24	40	34	8	27
31	106	65	35	28	13	4	8	10	18	25	32	25	18	16	26
Sums	3,212	2,324	2,147	1,622	1,115	715	323	117	111	— 9	40	360	437	753	922
Means	104	75	69	52	36	23	10	4	4	0	1	12	14	24	30

HOURLY VALUES—G.M.T.

TABLE XVIIa—7.

OCTOBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
32	43	84	75	68	56	70	76	84	74	11	— 152	8 10	132	0 26	284	1
48	44	47	49	46	45	50	65	105	156	53	18	6 15	169	23 48	151	2
48	57	58	48	43	67	90	99	88	82	56	7	4 50	208	1 48	200	3
46	56	47	54	59	58	68	73	77	77	44	— 24	9 57	135	1 50	159	4
44	44	49	45	48	52	57	57	60	64	38	4	2 15	90	0 18	86	5
35	43	52	53	57	51	49	58	64	59	37	— 19	12 21	95	1 7	114	6
69	45	45	47	49	54	65	89	107	128	44	4	4 8	138	22 29	134	7
45	55	46	43	47	60	78	90	83	121	50	— 57	9 22	187	1 23	244	8
42	42	48	49	45	48	75	86	91	107	45	— 32	8 52	175	0 8	207	9
41	38	100	130	88	72	109	133	156	190	62	0	9 40	237	23 59	237	10
45	44	50	89	95	124	147	156	142	166	54	— 61	11 3	240	0 9	301	11
49	59	53	47	54	71	73	108	151	180	35	— 107	8 40	200	23 55	307	12
39	53	46	50	60	66	54	78	57	84	53	— 70	11 15	231	0 35	301	13
18	62	77	146	96	111	221	202	203	290	54	— 126	8 15	344	23 52	470	14
31	90	87	128	88	84	118	180	175	147	64	— 59	8 50	330	0 21	389	15
61	47	75	72	53	91	81	46	97	186	44	— 120	10 4	224	23 59	344	16
45	38	49	75	72	58	80	102	63	58	56	— 30	10 55	224	0 0	254	17
45	39	47	37	48	51	54	64	65	63	38	— 9	8 50	125	1 28	134	18
43	44	43	51	52	57	54	70	65	76	37	— 9	12 30	119	0 35	129	19
40	52	48	51	46	59	29	23	8	34	33	— 33	23 25	113	23 48	146	20
48	40	56	59	49	40	33	53	71	63	36	— 28	0 1	109	23 55	137	21
44	38	40	48	30	39	23	35	46	32	30	— 24	23 48	91	22 35	115	22
42	48	56	42	33	64	79	67	76	78	35	— 19	7 42	109	23 59	128	23
43	44	30	45	51	65	70	101	108	95	43	— 1	7 27	136	22 42	137	24
45	51	45	43	40	49	53	52	83	65	37	— 34	9 36	150	0 40	184	25
43	39	42	43	45	61	69	92	104	105	40	— 21	7 7	156	0 46	177	26
23	46	36	39	64	78	74	64	57	80	40	— 24	7 48	143	2 0	167	27
37	43	45	63	65	60	69	104	115	106	42	— 76	9 38	152	23 35	228	28
38	39	61	60	39	40	40	39	62	66	39	— 12	7 35	116	2 16	128	29
50	46	28	40	64	80	90	85	111	106	43	— 25	3 40	137	23 43	162	30
44	53	39	55	57	62	80	93	104	94	42	— 5	5 53	143	0 12	148	31
1,323	1,482	1,620	1,876	1,751	1,973	2,302	2,640	2,878	3,232							
43	48	53	61	56	63	74	85	93	104							

DECLINATION—MEAN

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	94	100	116	87	47	33	27	— 14	17	— 27	— 52	— 59	— 4	40	26
2	130	123	111	83	89	49	9	— 31	— 39	— 62	— 66	— 12	32	45	30
3	66	50	39	42	30	25	15	14	22	22	26	32	35	33	42
4	66	53	62	33	14	12	10	14	21	24	15	29	22	33	35
5	45	32	25	35	13	12	16	13	23	33	36	35	25	37	26
6	89	53	59	30	24	30	27	16	13	3	— 4	— 20	— 3	8	20
7	83	50	80	84	91	63	47	16	0	— 21	— 37	— 29	— 25	— 31	43
8	91	72	64	22	13	3	— 3	— 10	— 23	— 14	18	25	1	0	8
9	136	91	31	25	8	6	— 1	— 6	23	31	24	4	11	27	30
10	43	44	80	57	6	31	18	— 58	— 90	— 111	— 76	— 35	— 43	— 73	— 12
11	70	81	166	153	97	54	31	— 13	— 87	— 43	— 37	— 33	— 62	— 17	22
12	121	83	84	83	41	15	6	13	21	29	13	32	36	38	45
13	77	88	78	65	50	23	14	8	17	22	31	32	35	43	42
14	122	95	107	129	73	24	— 3	— 9	— 33	— 40	— 88	— 118	— 93	— 101	— 102
15	21	23	43	41	28	32	23	10	11	33	49	35	31	32	45
16	26	211	157	108	48	34	16	— 1	6	— 35	— 6	17	34	30	45
17	70	137	93	68	34	24	3	9	14	6	18	1	13	23	— 1
18	8	20	57	32	31	17	— 2	— 2	30	— 4	6	3	9	30	59
19	84	40	56	63	33	29	21	0	— 14	— 4	25	23	27	24	36
20	165	123	117	89	33	19	0	— 3	— 13	16	3	19	35	41	37
21	97	77	56	38	26	15	18	18	28	28	24	36	33	41	35
22	74	49	63	86	58	33	9	— 63	— 57	— 72	— 95	— 81	— 72	— 49	— 38
23	102	90	108	72	65	64	33	2	— 13	— 64	11	34	16	39	42
24	91	62	114	108	49	3	— 48	— 21	7	11	16	— 5	30	47	49
25	107	97	81	57	36	14	10	6	14	22	21	33	27	36	47
26	143	118	153	69	49	19	— 4	13	— 12	42	34	2	43	46	38
27	87	72	70	55	36	16	6	14	12	26	17	21	29	37	16
28	51	87	134	31	23	9	4	8	18	20	11	6	7	32	32
29	82	76	47	33	17	5	— 3	— 3	22	15	28	34	34	37	40
30	108	76	63	59	36	20	4	9	14	17	27	22	30	15	16
Sums	2,549	2,373	2,520	1,937	1,197	733	437	— 51	— 48	— 105	— 8	83	293	543	753
Means	85	78	84	65	40	24	15	— 2	— 2	— 4	0	3	10	18	25

HOURLY VALUES—G.M.T.

TABLE XVIIa—8.

NOVEMBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
39	49	58	61	58	79	104	133	138	130	49	— 79	10 35	209	2 8	288	1
53	56	29	24	78	101	74	68	69	66	42	— 92	9 50	149	0 20	241	2
34	37	43	24	31	47	48	48	70	66	36	8	6 50	114	0 25	106	3
33	40	45	55	39	51	46	62	79	45	37	— 8	23 48	125	22 50	133	4
35	31	55	39	71	96	102	120	151	89	47	— 5	5 15	162	23 10	167	5
42	42	56	59	62	86	99	57	62	83	38	— 26	10 42	137	23 31	163	6
63	56	55	48	53	61	52	93	82	91	41	— 49	12 50	139	23 0	188	7
18	45	44	49	62	86	120	141	97	136	40	— 37	8 25	193	23 50	230	8
44	49	54	44	43	67	43	11	60	43	37	— 50	22 8	178	0 1	228	9
— 24	13	65	69	92	106	128	120	84	70	16	— 174	8 50	152	20 58	326	10
44	39	61	94	79	97	116	102	96	121	47	— 142	7 50	226	2 24	368	11
44	31	34	43	45	67	68	84	111	77	48	1	6 35	184	22 40	183	12
38	40	40	44	40	75	88	89	106	122	50	2	7 45	170	23 58	168	13
— 46	14	107	104	80	87	20	84	193	21	22	— 139	11 3	309	23 29	448	14
39	41	40	40	36	43	62	25	— 5	26	33	— 82	23 48	104	19 31	186	15
47	51	53	32	52	21	83	153	85	70	54	— 75	9 [illegible]0	313	0 30	388	16
55	40	54	59	43	13	88	63	41	8	39	— 30	23 38	221	0 50	251	17
47	30	19	71	85	56	45	58	100	84	35	— 40	0 2	150	23 30	190	18
31	62	30	50	66	50	55	35	123	165	41	— 31	8 16	244	23 55	275	19
49	41	37	42	30	37	45	62	87	97	45	— 45	7 40	234	0 2	279	20
46	25	41	38	41	52	41	53	59	74	40	— 3	4 59	117	0 15	120	21
— 5	53	63	79	72	86	131	128	138	102	25	— 112	9 50	169	23 18	281	22
46	50	61	62	38	55	66	84	96	91	48	— 140	9 0	162	1 30	302	23
48	45	65	34	62	87	111	143	150	107	53	— 76	6 28	170	22 30	246	24
47	52	43	35	59	60	64	103	114	143	50	— 5	7 40	199	23 59	204	25
47	36	36	52	75	132	100	112	78	87	57	— 52	7 50	335	1 27	387	26
53	43	20	63	32	45	70	31	47	51	38	— 26	23 30	153	2 0	179	27
55	40	52	34	33	47	70	70	94	82	41	— 23	0 59	207	1 27	230	28
42	35	36	38	43	69	77	81	92	108	47	— 16	6 25	119	22 58	135	29
37	24	43	61	63	74	94	106	127	101	48	— 7	6 0	153	23 10	160	30
1,101	1,196	1,439	1,548	1,603	2,033	2,310	2,609	2,824	2,556							
37	40	48	52	53	68	77	87	94	85							

DECLINATION—MEAN

—{ 6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	101	85	96	56	23	06	04	— 17	— 07	+ 14	17	17	27	33	30
2	169	71	43	95	41	39	26	43	43	— 2	— 4	— 88	— 59	— 30	— 23
3	82	76	11	37	23	17	*	*	*	21	33	26	42	46	47
4	105	52	58	47	18	01	01	15	25	10	21	— 05	09	31	27
5	94	76	70	28	23	18	20	20	34	23	29	27	29	34	32
6	74	56	60	18	6	— 3	— 7	— 5	+ 3	— 9	— 28	— 30	— 48	— 13	+ 21
7	300	280	199	56	43	65	28	17	— 36	†	— 58	+ 40	39	23	13
8	108	117	77	78	49	24	23	12	02	— 58	— 03	+ 33	37	44	52
9	113	116	97	82	66	37	31	40	21	— 25	+ 18	00	— 04	+ 09	46
10	95	61	72	56	60	41	45	14	06	— 07	+ 01	19	24	20	33
11	126	124	102	62	25	20	11	07	20	20	32	24	12	19	20
12	88	83	70	10	24	00	—†07	19	03	11	24	05	38	45	51
13	89	80	68	48	34	19	25	— 06	09	10	— 01	+ 21	29	13	20
14	62	57	67	50	33	12	01	— 09	— 03	+ 07	17	26	11	12	23
15	72	68	82	51	23	37	— 09	+ 13	19	19	27	16	32	43	50
16	75	76	88	26	24	08	04	06	14	39	20	19	18	27	30
17	78	91	67	48	25	09	09	08	06	20	17	25	26	31	25
18	69	55	52	37	30	00	02	23	28	23	43	37	31	29	38
19	99	64	49	36	29	27	19	25	23	22	17	25	31	31	23
20	71	64	99	93	68	36	28	25	41	28	02	— 09	— 19	+ 13	39
21	89	70	35	30	21	16	13	17	08	14	12	26	17	24	29
22	89	77	44	19	10	12	12	16	19	33	35	41	25	32	31
23	115	39	58	37	44	— 29	— 63	— 95	— 109	— 42	— 30	— 44	— 38	+ 32	45
24	114	107	110	62	41	19	08	01	22	— 14	+ 04	33	18	40	50
25	257	263	51	57	53	06	21	16	— 03	— 01	+ 13	30	29	47	52
26	85	117	145	80	28	09	07	10	25	19	23	74	22	33	19
27	92	72	100	63	20	25	34	27	20	16	13	18	19	33	46
28	†	†	†	48	27	27	13	00	— 05	— 06	+ 03	25	25	35	53
29	92	77	67	46	32	09	08	01	— 02	+ 10	36	37	39	39	36
30	167	174	167	94	63	27	38	— 02	+ 52	36	33	28	04	07	18
31	76	88	69	66	57§	64§	49	35	*	*	*	29	40	29	42
Sums	3,246	2,836	2,373	1,616	1,063	598	394	276	278	231	366	525	505	811	1,018
Means	108·2	94·5	79·1	52·1	34·3	19·3	13·1	9·2	9·6	8·0	12·2	16·9	16·3	26·2	32.8

* No record. † Indistinct.

HOURLY VALUES—G.M.T. TABLE XVIIa—9.

DECEMBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
49	53	59	67	17	89	112	127	197	169	54	— 34	7 30	245	23 00	279	1
—12	+ 13	36	59	80	163	128	55	142	82	41	— 126	11 20	311	0 05	437	2
46	38	40	49	74	94	143	150	73	105	...	— 47	0 59	205	21 53	252	3
42	44	48	56	65	87	111	99	129	94	45	— 21	6 08	149	23 18	170	4
34	33	37	35	70	75	79	69	85	74	44	— 01	4 28	118	1 18	119	5
33	45	26	40	103	106	141	175	309	300	49	— 55	11 50	365	23 00	420	6
60	52	50	81	86	114	154	228	164	108	...	— 201	8 58	‡366	0 18	567	7
59	56	50	53	69	81	52	69	91	113	49	— 137	8 50	187	0 40	324	8
52	52	39	30	74	101	120	138	124	95	57	— 57	8 45	156	22 20	213	9
37	39	43	53	68	74	81	121	149	126	51	— 11	9 28	173	23 29	184	10
21	44	48	67	02	41	40	80	91	88	43	— 19	18 36	167	23 20	186	11
41	29	29	46	54	65	67	73	80	89	40	— 29	5 48	147	23 35	176	12
42	30	53	76	35	33	101	85	99	62	42	— 75	19 50	213	22 42	288	13
23	39	40	50	68	64	118	97	78	72	40	— 26	6 48	151	21 12	177	14
47	43	46	41	31	39	35	78	107	75	42	— 36	6 10	130	22 55	166	15
39	37	36	16	28	31	38	57	64	78	34	— 10	6 16	126	1 53	136	16
35	33	37	14	64	98	82	73	68	69	41	— 14	17 48	114	0 35	128	17
42	39	44	64	78	104	106	106	89	99	49	— 19	5 15	141	21 37	160	18
34	41	66	65	72	63	117	137	94	71	50	+ 01	1 02	147	21 55	146	19
43	41	49	63	56	59	74	94	103	89	49	— 36	11 30	134	22 30	170	20
26	33	32	45	27	53	58	75	114	89	37	+ 02	8 00	157	22 50	155	21
06	17	28	82	91	117	138	91	126	115	50	— 25	21 58	216	21 45	241	22
61	58	58	88	71	76	12	189	187	114	34	— 148	8 00	298	1 42	446	23
49	46	64	56	85	148	100	94	126	257	61	— 36	9 05	326	23 48	362	24
42	34	24	42	61	57	61	58	57	85	52	— 20	7 52	308	0 15	328	25
49	57	52	56	59	32	85	120	113	92	55	— 22	6 40	195	1 30	217	26
47	47	41	37	37	32	†	†	†	†	†	+ 04	3 42	151	1 48	147	27
53	63	51	21	51	35	41	80	101	92	...	— 21	9 35	127	22 35	148	28
43	51	42	32	53	91	129	116	104	167	51	— 10	7 18	177	23 59	187	29
42	41	49	63	67	79	85	83	85	76	61	— 19	7 12	230	0 58	249	30
49	56	75	84	70	95	100	97	130	107	...	+ 18	13 00	157	23 00	139	31
1,234	1,304	1,392	1,631	1,866	2,396	2,819	3,114	3,479	3,252							
39·8	42·1	44·9	52·6	60·2	77·3	94·0	103·8	116·0	108·4							

‡ Minimum recorded. § Interpolation justifiable.

DECLINATION—MEAN

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	107	67	59	52	26	25	35	31	25	24	24	24	34	35	57
2	83	99	68	45	44	31	20	21	22	16	24	18	11	13	12
3	27	22	33	120	183	61	15	23	30	05	— 38	— 70	— 90	— 43	+ 04
4	52	64	73	42	52	62	53	39	33	31	— 05	— 14	+ 04	+ 05	10
5	101	94	99	51	12	16	31	33	09	18	— 12	— 14	— 40	+ 06	00
6	36	61	34	— 09	— 09	— 02	04	09	21	23	10	— 06	— 07	— 06	+ 12
7	60	85	15	60	40	05	00	05	— 07	— 02	+ 02	— 16	— 06	00	— 01
8	55	29	11	— 09	— 15	— 14	— 21	— 06	+ 16	03	— 15	— 11	— 26	— 30	— 30
9	42	44	04	— 01	+ 30	— 15	— 25	— 27	— 27	— 70	— 78	— 63	— 43	— 43	— 31
10	+ 56	85	— 45	— 05	— 16	— 18	— 21	— 20	— 44	— 23	— 12	— 17	— 34	— 44	— 42
11	30	37	47	51	44	30	23	16	07	— 06	+ 04	22	22	24	31
12	31	41	45	48	40	24	17	02	13	15	25	19	28	21	28
13	78	49	*27	09	— 01	— 04	— 09	— 16	— 02	10	12	15	25	21	30
14	29	35	26	24	00	— 03	— 12	— 16	— 30	— 61	— 30	— 22	— 31	— 34	— 15
15	51	22	03	— 09	— 19	— 24	— 17	— 13	— 13	— 33	— 29	— 35	— 69	— 37	— 09
16	36	18	15	03	— 08	— 20	— 21	— 26	— 24	— 33	— 28	— 22	— 14	— 16	— 11
17	19	— 05	+ 14	— 07	— 17	— 30	— 29	— 26	+ 10	36	28	48	60	77	53
18	181	133	143	164	23	38	51	35	40	07	09	— 41	— 38	— 08	+ 39
19	151	219	174	98	80	64	86	47	48	45	27	— 03	— 15	— 42	+ 27
20	92	121	107	99	58	48	34	41	34	34	41	26	43	39	53
21	203	190	150	158	135	77	60	37	65	52	21	12	— 04	12	39
22	53	122	72	71	67	43	42	50	21	32	27	45	53	32	31
23	68	158	164	106	56	42	43	46	26	26	39	26	52	63	71
24	122	104	77	53	54	45	57	62	52	22	23	14	06	— 08	— 06
25	21	36	44	08	04	00	— 06	— 03	— 08	+ 07	00	— 04	+ 02	— 08	— 12
26	54	26	34	31	18	12	05	— 13	— 14	— 24	— 26	— 15	— 10	+ 03	17
27	40	47	39	43	09	— 06	— 11	— 10	— 11	+ 02	14	21	16	22	22
28	98	55	39	46	34	50	44	34	16	16	19	25	19	14	16
29	41	59	48	51	26	07	— 05	— 11	— 03	— 10	— 07	— 08	— 02	+ 02	03
30	46	42	14	26	12	17	24	— 11	— 50	— 68	— 52	— 45	— 40	— 12	+ 10
31	69	35	64	71	30	09	— 03	— 07	— 07	— 23	— 38	— 34	— 29	— 17	+ 08
Sums	2,132	2,194	1,697	1,490	989	570	464	326	248	71	— 21	— 125	— 123	41	416
Means	68·8	70·8	54·7	48·1	31·9	18·4	15·0	10·5	8·0	2·3	—0·7	—4·0	—4·0	1·3	13·4

* Interpolated.

HOURLY VALUES—G.M.T. **TABLE XVIIa—10.**

JANUARY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
51	55	48	78	62	84	86	98	104	83	53	+ 10	6 54	113	23 20	103	1
18	43	65	39	37	19	12	16	46	27	33	— 41	18 03	126	0 01	167	2
25	52	50	54	97	120	99	65	57	52	38	— 108	11 48	292	3 40	400	3
24	35	39	44	79	90	119	90	104	101	48	— 40	10 23	143	2 21	183	4
00	35	34	32	27	36	43	26	55	36	28	— 62	11 48	128	1 39	190	5
25	30	33	23	46	59	66	64	57	60	24	— 28	2 51	142	0 42	170	6
+ 16	34	33	24	39	33	41	62	66	55	24	— 40	10 59	115	1 25	155	7
— 16	+ 06	09	04	07	07	12	15	25	42	0	— 60	23 15	70	22 45	130	8
— 39	— 50	— 02	03	10	05	09	— 13	— 02	+ 56	— 16	— 104	23 48	90	0 02	194	9
— 38	+ 08	46	49	24	26	29	43	44	30	01	— 108	1 31	259	1 00	367	10
26	38	21	21	20	27	60	60	62	31	30	— 22	9 10	110	22 35	132	11
32	30	34	34	26	50	56	62	80	78	34	— 26	0 03	126	23 14	152	12
28	30	21	21	16	40	37	55	55	29	22	— 20	6 30	115	23 42	135	13
— 07	— 07	00	— 08	+ 30	30	57	71	38	51	03	— 81	9 03	131	23 47	212	14
+ 08	19	04	07	03	24	36	39	32	36	— 03	— 88	11 52	64	0 49	152	15
— 10	— 07	— 09	— 01	— 08	+ 08	13	16	30	19	— 05	— 36	7 51	73	23 30	109	16
68	75	72	82	78	73	94	153	207	181	51	— 42	5 22	229	23 22	271	17
49	135	111	134	103	103	210	166	193	151	82	— 75	11 15	318	22 54	393	18
82	87	94	83	96	114	147	105	123	92	80	— 78	13 30	305	0 40	383	19
64	34	87	67	113	120	163	197	260	203	85	+ 01	8 01	372	23 38	371	20
61	80	100	99	109	114	106	101	69	53	82	— 34	11 42	273	0 57	307	21
49	88	39	119	116	122	92	74	92	68	65	— 06	8 12	180	3 18	186	22
76	75	65	76	90	92	114	139	153	122	79	+ 14	10 22	310	23 15	296	23
+ 16	— 04	+ 08	26	12	35	37	66	51	21	36	— 18	13 24	140	0 24	158	24
+ 15	10	51	23	27	46	24	18	53	54	15	— 39	2 15	127	1 45	166	25
13	09	16	13	23	25	22	16	23	40	10	— 40	9 40	106	1 35	146	26
25	28	46	50	56	67	79	89	100	98	34	— 17	5 18	116	22 20	133	27
42	27	38	52	28	62	71	89	42	41	40	— 02	13 55	146	0 01	148	28
13	14	18	21	27	29	32	40	35	46	18	— 20	0 40	106	1 21	126	29
33	38	29	28	33	42	28	41	62	69	11	— 98	8 55	99	23 40	197	30
23	22	16	09	35	31	36	48	76	104	18	— 47	10 12	128	2 30	175	31
772	1,069	1,216	1,306	1,461	1,733	2,030	2,111	2,392	2,129							
24·9	34·5	39·2	42·1	47·1	55·9	65·5	68·1	77·2	68·7							

DECLINATION—MEAN

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	104	82	44	11	— 04	— 01	— 05	— 01	— 02	— 22	— 17	— 10	— 03	+ 04	03
2	43	32	20	14	10	04	13	14	16	— 04	+ 01	12	18	18	09
3	63	43	25	13	11	15	06	06	12	14	18	21	24	25	25
4	48	24	14	05	01	— 03	+ 06	06	12	08	10	13	22	22	28
5	58	35	26	33	08	— 05	00	08	15	14	21	18	07	— 01	18
6	30	64	49	15	07	07	12	17	24	19	18	30	30	31	34
7	55	47	36	21	36	26	08	10	15	14	22	16	— 02	+ 04	22
8	56	44	30	37	39	46	30	22	37	27	25	25	13	15	19
9	59	10	21	31	25	— 02	— 17	— 34	— 31	— 12	— 13	00	17	29	24
10	40	48	35	29	15	10	07	06	18	22	26	29	29	31	25
11	65	46	37	27	26	21	15	14	09	16	16	18	20	10	28
12	56	41	41	55	52	39	— 06	— 42	— 45	— 40	— 13	+ 05	07	— 07	— 19
13	103	103	105	61	37	21	12	— 10	— 51	— 18	— 03	00	04	00	— 01
14	38	31	21	56	20	26	03	— 30	— 92	— 108	— 90	— 70	— 56	— 10	+ 04
15	28	73	77	68	32	06	— 41	— 37	— 53	+ 01	00	— 06	— 09	+ 03	— 01
16	41	87	93	20	06	07	— 03	— 13	— 19	— 16	— 37	— 39	— 47	— 62	— 45
17	24	45	28	29	16	— 02	+ 08	+ 08	— 13	— 32	— 18	+ 04	00	— 03	+ 07
18	19	83	54	38	14	— 04	— 23	+ 04	+ 06	+ 12	— 01	— 22	— 19	+ 21	33
19	54	62	38	35	36	50	25	00	— 07	— 25	+ 27	33	00	— 25	00
20	57	38	40	51	55	36	18	16	11	22	— 07	+ 16	30	42	35
21	88	94	87	94	63	51	20	24	35	40	40	40	55	51	42
22	84	78	68	56	34	09	18	28	22	22	34	36	35	41	39
23	140	96	103	44	43	25	30	38	45	39	43	48	53	50	53
24	74	79	58	43	41	32	27	24	35	29	42	39	25	39	41
25	120	104	130	151	141	76	69	41	08	19	13	— 23	— 57	— 12	+ 26
26	03	38	65	71	93	48	30	27	08	08	— 04	+ 37	49	43	47
27	109	87	110	81	74	52	47	30	22	31	14	31	37	44	45
28	75	75	77	45	37	46	36	38	25	39	37	37	33	39	35
Sums	1,734	1,689	1,532	1,234	968	636	345	213	62	119	204	334	315	442	577
Means	61·9	60·3	54·7	44·1	34·6	22·7	12·3	7·6	2·2	4·3	7·3	11·9	11·3	15·8	20·6

HOURLY VALUES—G.M.T. TABLE XVIIa—11.

FEBRUARY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m		h. m.		
16	18	10	30	30	38	37	53	53	43	18	— 46	9 10	150	0 28	196	1
18	19	31	30	35	44	51	68	66	63	25	— 26	8 56	86	0 26	112	2
26	28	31	32	39	41	51	54	55	48	28	— 01	3 48	75	0 10	76	3
26	28	30	30	25	41	75	100	88	58	28	— 10	4 54	124	23 30	134	4
19	32	32	33	42	36	52	58	52	30	25	— 18	12 31	72	23 55	90	5
33	32	29	30	18	36	60	86	64	55	33	00	19 23	104	21 55	104	6
22	26	27	42	57	60	69	76	56	56	32	— 30	12 17	89	22 07	119	7
22	39	81	51	43	35	52	83	61	59	39	— 07	12 12	103	23 05	110	8
30	26	34	36	45	51	63	50	49	40	20	— 67	7 34	88	20 40	155	9
34	35	37	28	32	39	56	43	50	65	31	— 07	5 28	77	1 26	84	10
43	45	37	43	41	41	44	56	53	56	32	— 04	7 56	112	23 52	116	11
+ 22	37	33	39	31	33	44	32	61	103	20	— 62	7 07	131	23 49	193	12
+ 20	25	19	35	63	17	21	22	40	38	25	— 86	8 12	130	0 23	216	13
33	44	61	54	48	50	56	54	38	28	07	—149	11 30	133	23 59	282	14
+ 07	07	32	38	24	44	27	31	47	41	17	— 98	7 42	171	2 04	269	15
— 24	— 04	+ 21	15	20	51	45	31	43	24	07	— 75	12 45	121	0 58	196	16
— 03	+ 18	38	31	28	39	41	34	26	19	15	— 53	8 34	133	0 47	186	17
33	30	43	45	37	50	45	58	59	54	26	— 47	10 43	170	1 13	217	18
46	54	41	58	53	44	85	127	83	57	37	— 53	13 20	167	21 36	220	19
48	63	64	83	84	66	72	91	68	88	46	— 40	10 07	112	21 48	152	20
57	53	64	70	59	66	83	81	83	84	60	— 04	6 15	126	1 12	130	21
38	44	56	63	64	63	53	74	86	140	49	— 06	5 37	142	23 50	148	22
55	54	55	50	56	46	59	72	88	74	56	+ 14	5 12	170	0 05	156	23
48	51	51	54	59	64	77	68	103	120	51	+ 14	6 52	139	23 54	125	24
51	76	78	87	88	104	74	42	16	03	57	— 79	12 0	222	1 50	301	25
55	58	57	61	69	87	123	110	108	109	56	— 44	9 41	141	23 16	185	26
45	45	49	50	53	59	76	91	93	75	57	— 01	10 20	137	2 11	138	27
46	50	46	51	56	59	65	64	71	68	49	+ 14	3 15	118	1 23	104	28
866	1,033	1,187	1,269	1,290	1,404	1,656	1,809	1,760	1,698							
30·9	36·9	42·4	45·3	46·1	50·1	59·1	64·6	62·9	60·6							

—{6° + *tabular minutes.*

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	68	53	53	48	46	37	36	40	36	40	33	33	35	37	42
2	72	65	54	44	39	38	36	38	31	39	31	31	34	41	44
3	60	49	34	39	33	35	33	32	33	32	31	26	32	29	34
4	68	60	52	54	44	31	30	14	— 23	— 11	00	— 16	00	37	44
5	57	89	72	62	42	42	39	24	12	01	15	31	29	18	31
6	49	43	34	56	31	29	30	40	28	61	28	30	20	16	38
7	142	134	126	103	90	71	42	37	40	25	29	21	18	25	52
8	71	57	65	67	62	57	37	42	51	*54	55	58	62	42	54
9	102	86	59	46	43	33	34	42	43	40	35	49	49	50	51
10	65	66	55	43	38	27	25	27	27	37	35	33	28	44	45
11	73	59	50	43	32	28	32	35	34	51	33	26	31	37	38
12	135	88	67	52	41	40	33	24	30	34	29	35	35	29	38
13	66	49	48	42	33	25	20	20	24	26	26	31	24	29	34
14	34	34	41	40	30	30	— 16	— 47	— 10	+ 29	00	17	12	09	43
15	68	82	50	49	62	51	16	— 08	08	13	— 07	— 30	— 32	+ 29	56
16	133	77	82	117	60	49	50	22	06	11	41	47	48	30	42
17	108	133	118	73	43	43	42	17	— 11	00	10	36	24	15	11
18	54	54	56	64	52	32	38	26	42	30	31	41	31	30	39
19	79	82	83	89	46	47	33	16	17	— 10	+ 02	02	24	31	54
20	74	47	52	50	36	28	28	21	28	18	18	15	15	22	30
21	57	73	75	66	59	21	11	04	01	27	27	22	15	05	— 19
22	40	98	46	48	38	24	33	— 05	+ 03	08	— 08	+ 46	27	23	26
23	71	56	31	45	39	26	17	10	16	10	17	05	22	30	26
24	29	07	39	37	26	30	17	13	10	27	15	18	25	26	34
25	55	53	43	40	27	24	22	30	27	28	27	26	32	39	41
26	98	84	68	64	59	50	47	36	51	51	42	41	48	46	55
27	75	100	84	56	49	33	32	28	30	27	— 01	+ 22	27	27	36
28	56	60	89	88	53	59	35	32	31	27	04	24	28	21	42
29	76	103	105	80	81	60	54	39	46	34	40	38	42	31	24
30	71	62	53	113	52	34	10	15	33	15	02	24	32	31	13
31	35	55	57	46	39	35	22	19	16	36	38	36	36	27	22
Sums	2,241	2,158	1,941	1,864	1,425	1,169	918	683	710	810	678	778	853	906	1,138
Means	72·3	69·6	62·6	60·1	46·0	37·7	29·6	22·0	22·9	26·1	21·9	25·1	27·5	29·2	36·7

* Interpolated.

HOURLY VALUES—G.M.T.

TABLE XVIIa—12.

MARCH, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
42	51	57	53	58	59	69	72	78	72	49	+ 27	11 05	+ 100	23 40	73	1
39	54	43	47	47	51	55	65	65	60	46	+ 20	1 55	93	2 00	73	2
43	60	53	45	72	69	51	57	53	68	43	+ 10	12 20	90	19 24	80	3
52	52	56	56	53	42	53	52	54	57	35	— 38	8 16	83	0 44	121	4
43	46	54	46	50	57	64	61	56	49	43	— 10	9 18	110	0 06	120	5
47	47	46	46	43	44	55	64	72	142	44	— 04	12 38	155	23 57	159	6
57	59	71	72	69	77	77	79	75	71	65	+ 09	12 12	168	0 05	159	7
65	59	61	64	69	57	84	113	105	102	64	+ 30	5 51	150	23 36	120	8
58	54	53	55	55	58	61	68	78	65	54	+ 21	4 45	120	0 05	99	9
48	52	47	50	50	51	59	52	96	73	46	+ 13	11 30	118	23 35	105	10
42	42	47	45	49	55	57	79	143	135	50	+ 18	11 05	189	23 30	171	11
40	42	41	44	44	44	51	57	60	66	46	+ 12	7 08	153	0 19	141	12
39	37	50	53	51	42	48	45	45	34	37	+ 17	7 24	69	0 02	52	13
41	45	59	82	70	73	132	135	57	68	40	— 66	7 10	158	21 20	224	14
60	71	58	64	81	112	130	161	176	133	56	— 107	11 34	206	23 30	313	15
42	40	136	60	92	147	158	161	106	108	73	— 14	1 22	206	17 07	220	16
58	58	64	73	103	104	92	58	117	54	57	— 31	8 21	171	1 51	202	17
46	52	48	45	49	48	56	57	52	79	45	+ 16	2 51	98	2 46	82	18
41	43	43	47	57	66	65	60	61	74	45	— 24	9 15	117	2 48	141	19
33	41	42	52	57	60	73	73	74	57	41	+ 06	9 07	94	0 03	88	20
+ 24	46	41	48	74	68	77	73	73	40	40	— 42	13 48	103	1 37	145	21
31	29	43	52	49	59	57	36	86	71	36	— 17	9 51	143	1 05	160	22
20	15	31	44	70	59	48	46	30	29	32	— 17	1 44	97	0 51	114	23
35	26	45	43	44	42	56	53	59	55	32	— 33	1 14	77	23 42	110	24
34	56	52	54	54	72	58	67	86	98	45	+ 13	5 45	108	23 30	95	25
56	59	62	78	73	56	70	72	78	75	60	+ 19	1 30	120	0 36	101	26
48	51	49	46	47	53	53	70	52	56	45	— 30	9 45	115	0 42	145	27
55	43	49	46	75	61	60	63	78	76	50	— 27	9 18	118	0 17	145	28
44	62	79	61	69	93	76	63	66	71	61	+ 13	13 43	137	0 55	124	29
44	57	54	48	76	61	74	111	106	35	50	— 45	9 54	157	22 25	202	30
— 04	+ 47	56	70	74	73	76	102	122	128	49	— 37	14 49	159	23 57	196	31
1,323	1,496	1,690	1,689	1,924	2,013	2,195	2,325	2,459	2,301							
22·7	48·3	54·5	54·5	62·1	65·0	70·8	75·0	79·3	74·2							

DECLINATION—MEAN

—{6° + *tabular minutes.*}

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	128	105	38	58	56	52	38	27	43	46	25	37	46	41	44
2	84	89	104	83	51	40	25	33	40	36	28	22	37	40	48
3	74	64	49	46	41	36	32	34	34	43	41	40	42	47	48
4	57	53	55	58	95	74	55	40	51	45	46	45	50	47	49
5	120	112	80	76	54	40	36	40	51	50	49	50	51	58	46
6	74	68	63	58	50	56	51	51	63	58	62	66	68	66	67
7	88	76	77	70	57	66	60	64	61	63	73	72	71	79	76
8	106	91	83	85	75	69	71	66	66	66	69	66	69	65	64
9	44	24	50	86	42	35	33	50	52	51	40	40	45	21	48
10	146	105	81	68	62	49	29	26	21	11	— 42	51	63	55	65
11	108	110	95	89	68	73	63	54	60	52	13	— 18	24	52	50
12	117	99	86	87	82	71	57	36	36	33	43	54	41	44	39
13	106	79	69	69	48	56	39	31	41	44	49	46	39	36	43
14	64	65	63	67	56	50	60	28	37	4	10	20	30	42	56
15	60	74	64	67	63	30	23	17	26	22	35	48	53	46	52
16	106	82	58	42	44	43	26	31	43	45	44	35	7	— 24	26
17	54	48	45	47	45	31	12	3	7	23	28	27	24	38	37
18	91	95	44	39	37	38	38	37	36	41	41	44	43	36	36
19	61	60	58	48	42	35	31	41	42	42	41	39	44	42	47
20	59	64	61	52	44	40	43	40	40	41	36	42	36	36	53
21	52	48	51	47	52	44	41	35	37	39	43	42	44	41	46
22	69	61	51	41	35	21	32	37	37	42	45	44	41	33	31
23	85	50	66	60	73	41	37	51	46	50	47	47	38	30	43
24	66	63	65	59	61	45	41	51	54	52	53	53	49	50	60
25	84	68	68	67	58	52	51	58	58	51	45	48	20	40	59
26	79	76	72	61	112	107	113	110	109	108	106	102	38	46	54
27	63	56	53	43	54	51	42	44	37	42	34	38	34	27	34
28	45	52	103	73	55	21	21	34	41	39	36	22	27	46	48
29	58	55	62	44	54	43	47	33	31	23	5	41	51	50	49
30	61	54	51	52	46	54	41	47	46	46	43	44	39	40	40
Sums	2,409	2,146	1,965	1,842	1,714	1,463	1,288	1,249	1,346	1,308	1,188	1,307	1,260	1,270	1,458
Means	80·3	71·5	65·5	61·4	57·1	48·8	43·0	41·6	44·9	43·6	39·6	44·0	42·0	42·3	48·6

HOURLY VALUES—G.M.T.

TABLES XVIIa—13.

APRIL, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
56	48	49	65	61	95	72	73	89	84	57	17	9 42	160	0 01	143	1
52	53	61	54	58	56	59	68	62	74	53	8	6 04	125	0 47	117	2
51	56	53	56	54	54	62	78	75	57	50	22	6 15	106	23 25	84	3
53	48	76	61	62	60	66	64	98	120	60	34	16 08	120	3 35	86	4
54	55	58	56	57	61	63	67	73	74	60	25	5 35	156	0 42	131	5
70	75	77	81	79	79	84	77	83	88	68	45	5 47	93	0 55	48	6
82	83	83	84	78	96	91	96	97	106	77	56	4 34	108	23 58	52	7
62	72	69	67	73	88	113	150	70	44	77	35	23 53	193	21 30	158	8
78	81	80	142	188	145	158	181	185	146	81	— 34	12 24	223	22 50	257	9
71	68	94	80	78	88	109	98	114	108	66	— 102	9 57	159	00 01	261	10
63	84	64	81	102	125	112	78	91	117	71	— 54	10 50	191	1 24	245	11
61	74	73	61	131	114	135	155	168	106	79	14	8 50	208	23 15	194	12
58	57	60	53	58	67	65	57	66	64	55	— 7	6 25	112	0 01	119	13
52	54	64	77	62	62	62	68	61	60	51	— 13	9 32	120	1 25	133	14
47	55	68	73	20	34	39	112	162	106	55	— 8	9 13	186	23 01	194	15
40	49	64	97	74	73	91	90	60	54	51	— 45	13 00	126	1 22	171	16
60	35	61	62	89	87	91	85	105	91	48	— 18	6 45	138	22 50	156	17
42	54	54	53	60	52	54	56	63	61	49	6	1 40	124	0 50	118	18
44	51	53	55	54	65	86	88	71	59	52	19	5 42	95	21 12	76	19
51	51	50	46	51	49	47	52	51	52	47	25	4 32	78	0 45	53	20
45	47	44	45	46	54	57	63	74	69	48	27	8 30	88	23 30	61	21
46	49	48	47	54	54	56	56	80	85	47	12	4 56	118	23 45	106	22
53	56	52	54	58	57	65	76	72	66	54	19	12 45	106	0 15	87	23
66	64	77	69	69	75	90	88	91	84	63	39	5 45	125	23 20	86	24
66	64	67	77	75	77	67	68	67	79	61	— 5	12 08	111	0 40	116	25
57	58	61	63	62	71	69	61	61	63	77	36	12 08	113	0 52	77	26
30	54	61	62	58	81	89	80	70	45	51	7	14 36	115	23 20	108	27
51	49	58	59	62	66	65	64	61	58	50	— 3	10 50	133	1 47	136	28
52	59	57	56	62	62	72	70	65	61	50	— 10	10 00	94	22 28	104	29
50	58	57	58	67	85	99	80	74	80	56	31	13 38	110	20 50	79	30
1,663	1,761	1,893	1,994	2,102	2,232	2,388	2,499	2,559	2,361							
55·4	58·7	63·1	66·5	70·0	74·4	79·6	83·3	85·3	78·7							

DECLINATION—MEAN

—{6° + *tabular minutes.*}

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
*1							* Record missing.								
2	*	*	*	71	66	64	52	52	57	52	57	31	24	47	57
3	66	60	74	72	70	64	59	62	63	53	35	08	21	65	62
4	70	64	73	67	67	63	63	58	47	24	36	48	48	26	57
5	85	91	109	85	53	39	24	— 17	— 01	+ 46	34	48	54	51	66
6	200	104	67	62	75	70	64	54	21	— 10	57	64	33	24	48
7	138	162	128	84	69	64	63	55	48	34	05	24	51	57	35
8	124	114	107	104	85	83	75	63	77	81	74	72	65	70	68
9	91	89	103	85	86	78	70	71	64	52	40	60	33	44	68
10	126	115	96	74	62	46	61	51	48	52	51	54	56	57	58
11	96	103	82	77	79	66	58	59	53	64	57	51	59	70	69
12	108	106	69	66	66	61	58	62	60	61	63	59	62	62	59
13	81	78	83	63	62	49	45	51	55	45	48	46	47	49	49
14	79	70	64	55	48	51	43	50	48	51	55	54	49	53	54
15	60	55	67	58	50	42	45	44	46	30	38	35	43	44	46
16	81	66	70	61	62	59	60	63	62	63	60	65	62	68	67
17	70	93	83	78	75	65	57	43	30	36	41	44	45	29	42
18	69	64	67	66	57	56	57	56	56	56	54	52	51	62	53
19	80	87	81	92	78	74	65	71	56	50	55	29	58	75	72
20	77	85	71	64	71	61	63	67	72	65	62	65	64	67	67
21	80	79	70	62	48	55	50	55	55	59	55	52	39	42	51
22	54	60	51	54	45	45	44	48	49	47	45	49	47	52	52
23	55	52	48	53	49	47	50	49	51	53	50	53	49	56	54
24	59	58	60	58	54	51	45	47	48	44	41	40	38	44	40
25	73	67	65	60	36	31	39	33	26	31	42	42	47	37	41
26	59	51	49	43	41	44	48	47	50	54	48	36	47	48	56
27	54	56	56	55	54	47	48	49	48	46	40	37	36	24	21
28	55	55	54	47	45	45	44	43	44	33	32	19	16	43	44
29	51	47	41	46	45	41	43	44	41	47	36	46	35	37	46
30	41	46	41	51	37	40	35	34	32	37	40	32	27	28	40
31	52	51	52	53	42	36	41	36	39	37	40	41	42	44	41
Sums	2,334	2,228	2,081	1,966	1,777	1,637	1,569	1,500	1,445	1,393	1,391	1,356	1,348	1,475	1,583
Means	75·3	71·9	67·1	63·4	57·3	52·8	50·6	48·4	46·6	44·9	44·9	43·7	43·5	47·6	51·1

* Record missing.

HOURLY VALUES—G.M.T.

TABLE XVIIa—14.

MAY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
						* Record missing.						h. m.		h. m.		*1
61	62	61	63	67	69	77	66	76	66	...	— 2	11 37	+ 104	22 54	106	2
71	77	74	72	73	75	72	75	74	70	62	— 19	11 10	+ 108	23 00	127	3
52	75	132	139	163	146	122	94	91	85	76	— 14	13 08	+ 195	17 25	209	4
67	88	78	78	106	111	147	149	144	200	75	— 89	7 29	+ 236	23 57	325	5
66	159	116	97	55	112	160	182	166	138	84	— 56	8 50	+ 341	16 12	397	6
70	82	82	102	103	110	115	146	130	124	81	— 25	10 14	+ 186	22 05	211	7
86	93	91	87	103	109	101	101	94	91	88	+ 49	12 24	+ 169	1 15	120	8
82	82	83	84	83	85	93	105	114	126	78	+ 13	12 06	+ 145	23 43	132	9
68	73	71	77	75	72	74	85	93	96	70	+ 33	6 40	+ 148	0 20	115	10
78	77	82	76	78	79	88	105	109	108	76	+ 46	11 10	+ 141	23 48	95	11
57	64	63	66	73	96	100	109	85	81	72	+ 51	14 40	+ 132	1 00	81	12
65	56	56	59	70	96	72	58	77	79	61	+ 37	10 43	+ 114	20 10	77	13
56	59	57	56	53	57	56	57	55	60	55	+ 40	6 57	+ 88	0 00	48	14
53	59	59	57	58	89	78	83	91	81	56	+ 17	9 12	+ 107	23 03	90	15
66	68	66	72	80	76	92	86	72	70	68	+ 51	8 40	+ 98	20 45	47	16
54	62	79	77	73	65	65	66	65	69	60	+ 23	12 45	+ 108	0 58	85	17
56	62	65	63	63	64	68	73	75	80	61	+ 49	11 36	+ 89	23 48	40	18
68	67	89	74	74	71	77	86	82	77	71	+ 11	10 54	+ 123	23 45	112	19
64	69	69	68	70	71	70	80	75	80	69	+ 48	0 10	+ 100	23 37	52	20
53	57	60	52	56	55	55	56	59	54	56	+ 26	12 18	+ 92	0 30	66	21
49	54	53	53	57	59	51	55	56	55	51	+ 37	9 52	+ 68	0 44	31	22
56	56	55	53	55	51	55	57	58	59	53	+ 42	4 40	+ 63	23 15	21	23
51	54	50	47	50	74	69	64	69	73	53	+ 32	13 48	+ 102	23 15	70	24
50	49	56	58	52	51	56	56	64	59	48	+ 16	8 15	+ 83	1 25	67	25
60	51	57	56	60	61	52	53	61	54	51	+ 11	10 30	+ 83	22 42	72	26
50	54	46	49	49	49	50	53	57	55	47	— 39	13 30	+ 69	1 23	108	27
50	40	48	49	49	44	46	46	46	51	43	+ 00	11 38	+ 72	0 45	72	28
48	49	52	50	49	55	72	77	59	41	48	+ 13	13 55	+ 95	14 18	82	29
41	43	58	54	45	46	49	54	48	52	42	— 03	12 19	+ 78	16 54	81	30
44	46	43	43	43	53	55	57	56	66	46	+ 29	7 15	+ 71	23 30	42	31
1,792	1,987	2,051	2,031	2,085	2,251	2,337	2,434	2,401	2,400							
57·8	64·1	66·2	65·5	67·3	72·6	75·1	78·5	77·5	77·4							

DECLINATION—MEAN

—{6° + *tabular minutes.*}

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	66	57	58	45	45	38	23	27	16	35	25	12	02	19	24
2	90	102	95	65	41	35	28	30	15	11	21	27	33	39	40
3	58	51	47	45	39	33	26	— 12	06	00	00	20	24	32	33
4	61	37	51	53	42	36	30	29	28	41	34	05	— 01	47	49
5	77	69	53	42	29	36	40	43	43	41	30	39	39	39	41
6	50	52	49	52	43	40	30	32	36	24	23	24	17	27	45
7	49	48	48	44	37	38	38	34	36	38	38	39	36	49	42
8	46	44	47	40	42	42	37	39	39	38	37	33	35	38	42
9	52	53	50	44	39	43	39	41	41	45	44	47	48	44	49
10	89	98	80	68	56	45	41	42	56	52	53	48	54	50	56
11	64	62	52	61	54	58	59	60	60	62	61	58	54	36	50
12	72	72	65	65	60	57	54	57	59	54	57	54	49	54	56
13	57	57	55	62	56	54	52	51	51	50	50	51	47	36	46
14	49	50	44	46	44	43	44	44	43	40	40	44	46	48	50
15	53	54	51	51	54	46	41	46	38	36	29	40	41	29	48
16	52	56	54	58	52	47	41	39	33	43	42	43	33	43	51
17	51	48	49	47	43	47	44	43	46	43	42	38	39	41	50
18	49	52	48	49	45	47	43	45	45	44	42	38	43	47	52
19	53	51	48	49	48	50	48	50	53	52	54	51	55	46	44
20	56	68	55	60	51	50	43	44	44	41	39	38	45	45	44
21	48	50	43	48	42	38	45	40	43	41	45	43	40	31	22
22	57	63	60	61	52	52	56	58	60	54	58	58	61	62	66
23	74	74	72	79	71	64	67	67	68	68	67	65	40	39	72
24	69	70	69	71	66	64	56	55	53	46	54	51	49	64	67
25	76	80	73	74	70	64	67	66	66	64	66	66	68	66	57
26	73	68	69	77	74	71	70	71	67	68	68	66	65	33	61
27	79	81	80	81	77	66	64	62	68	70	65	68	53	52	66
28	90	89	90	96	82	76	76	76	76	76	75	78	73	76	75
29	92	70	82	78	98	94	83	76	74	69	65	66	75	86	83
30	74	89	81	73	66	65	63	69	64	48	53	38	48	57	55
Sums	1,926	1,915	1,818	1,784	1,618	1,539	1,457	1,424	1,427	1,394	1,377	1,348	1,311	1,366	1,536
Means	64·0	63·8	60·6	59·4	53·9	51·3	48·5	47·4	47·5	46·4	45·9	44·9	43·7	45·5	51·2

HOURLY VALUES—G.M.T.

TABLE XVIIa—15.

JUNE, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
49	40	50	57	95	95	99	114	79	80	49	— 29	11 28	161	21 35	190	1
45	46	46	52	44	62	84	75	58	58	49	— 3	8 55	148	1 28	151	2
42	52	47	48	62	53	52	58	63	61	37	— 49	7 10	86	0 33	135	3
50	45	64	64	58	73	93	84	81	77	48	— 18	12 03	103	21 18	121	4
43	48	45	48	45	46	44	47	49	50	44	+ 22	10 12	86	0 45	64	5
49	49	47	44	44	47	47	51	47	49	41	09	10 36	69	1 45	60	6
39	50	45	44	48	54	55	46	48	46	43	30	8 08	63	1 58	33	7
46	52	45	46	47	44	56	48	50	52	43	25	11 10	68	21 01	43	8
55	55	56	53	50	53	55	62	81	89	51	37	6 36	106	23 59	69	9
52	58	58	72	69	66	66	67	66	64	60	33	6 32	110	0 20	77	10
63	66	68	71	68	72	64	64	67	72	61	15	12 48	77	23 32	62	11
59	57	59	55	56	57	63	59	62	57	58	47	11 16	84	0 10	37	12
56	59	55	54	55	57	57	57	53	49	53	31	13 08	68	23 28	37	13
49	42	44	47	47	47	48	44	52	53	46	27	9 45	60	23 32	33	14
47	48	54	49	51	51	52	50	48	52	46	09	13 00	66	1 31	57	15
50	48	50	49	51	50	50	54	53	51	48	27	12 16	73	0 58	46	16
45	54	53	55	53	49	55	51	55	49	48	35	13 03	79	0 29	44	17
50	53	46	52	52	50	52	52	52	53	48	29	11 20	60	18 45	31	18
53	58	58	50	56	68	117	87	54	56	53	18	13 40	161	21 20	143	19
51	51	59	47	47	52	59	55	55	48	49	27	10 37	82	1 00	55	20
40	45	53	66	54	47	54	64	71	57	47	18	14 12	105	18 28	87	21
66	64	71	75	78	77	79	76	81	74	65	51	04 18	91	23 00	40	22
72	73	78	80	73	71	80	89	84	69	70	18	12 30	110	22 36	92	23
66	69	70	68	76	80	76	71	76	76	65	38	10 45	103	0 36	65	24
67	70	75	69	71	74	72	72	76	73	70	44	13 30	89	1 04	45	25
71	76	75	78	76	89	77	78	79	79	71	17	13 18	88	15 57	71	26
71	81	80	79	78	78	78	79	88	90	73	24	12 25	95	1 33	71	27
79	77	80	73	90	90	96	149	136	92	87	66	20 36	163	22 15	97	28
76	87	89	95	100	113	98	95	83	74	84	47	10 48	123	19 49	76	29
76	76	72	81	82	82	97	83	77	70	69	24	10 45	123	21 29	99	30
1,677	1,749	1,783	1,826	1,881	1,938	2,075	2,081	2,024	1,930							
55·9	58·3	59·4	60·9	62·7	64·6	69·2	69·4	67·5	64·3							

DECLINATION—MEAN

—{6° + *tabular minutes.*}

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	78	78	65	69	66	62	63	54	65	61	63	50	49	47	46
2	74	67	61	58	52	46	47	53	49	46	50	47	45	53	56
3	79	79	68	66	56	49	47	40	48	39	20	39	47	54	57
4	72	60	60	59	55	52	50	54	53	54	53	55	52	58	55
5	54	53	53	46	46	50	45	30	50	49	48	47	42	46	48
6	69	62	55	50	47	42	41	43	44	46	46	47	48	48	45
7	59	49	50	43	41	40	39	37	38	40	41	38	37	26	34
8	50	46	45	43	45	40	36	44	42	41	45	43	39	34	38
9	46	43	48	47	42	42	44	44	43	45	45	45	43	47	48
10	66	47	48	47	44	45	43	46	45	36	31	35	30	23	35
11	47	44	43	49	47	42	40	40	39	32	30	17	39	45	48
12	68	67	62	62	59	52	53	47	43	44	38	40	+ 41	— 14	+ 02
13	89	71	54	76	64	57	59	61	61	57	60	61	41	47	45
14	94	116	124	81	80	73	70	60	50	46	64	62	69	77	68
15	110	68	92	78	80	75	66	67	70	71	67	56	51	55	62
16	86	86	82	76	59	57	53	56	46	50	52	55	56	59	73
17	73	63	69	71	53	56	54	58	59	55	58	52	35	40	55
18	64	66	67	63	53	49	51	49	51	47	23	33	47	47	48
19	78	58	56	51	52	51	54	53	47	54	58	60	60	58	60
20	89	82	88	80	71	60	50	33	42	49	39	37	— 12	+ 06	21
21	94	107	97	107	75	66	47	37	26	28	33	39	50	54	54
22	71	80	63	71	55	46	49	38	51	50	50	48	40	43	39
23	70	87	85	65	46	39	41	43	46	46	47	44	47	47	52
24	48	45	44	43	54	43	36	32	26	27	24	17	26	30	37
25	48	35	46	47	42	29	24	+ 10	— 10	— 09	+ 01	26	20	26	29
26	52	41	49	45	40	36	36	40	38	35	37	39	39	39	43
27	45	43	59	49	32	35	31	30	29	30	30	28	37	46	46
28	66	63	55	55	52	46	48	49	47	49	47	45	40	42	45
29	46	40	50	39	36	30	30	27	34	27	33	34	36	36	37
30	40	34	35	30	32	30	29	32	33	29	28	35	34	36	34
31	58	40	43	34	25	18	27	28	27	25	22	24	27	31	36
Sums	2,083	1,920	1,916	1,800	1,601	1,458	1,403	1,355	1,332	1,299	1,283	1,298	1,255	1,286	1,396
Means	67·2	61·9	61·8	58·1	51·6	47·0	45·3	43·7	43·0	41·9	41·4	41·9	40·5	41·5	45·0

HOURLY VALUES—G.M.T. TABLE XVIIa—16.

JULY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
54	68	73	65	73	101	93	100	83	74	68	+ 27	13 50	+ 117	19 48	90	1
55	56	68	70	61	60	67	62	69	79	57	+ 38	4 51	90	23 39	52	2
56	63	64	66	69	73	78	72	72	72	58	— 13	9 57	91	21 19	104	3
54	56	58	53	55	59	61	63	61	54	56	+ 45	2 47	81	0 01	36	4
53	52	51	57	59	58	62	65	69	69	53	+ 38	13 35	84	23 50	46	5
47	46	56	46	48	52	52	48	59	59	49	+ 37	5 55	80	23 48	43	6
47	47	43	46	56	56	46	54	53	50	44	+ 13	12 38	69	0 28	53	7
44	45	43	51	49	47	44	45	46	46	43	+ 22	13 04	64	1 59	42	8
48	49	50	47	51	52	63	77	77	66	50	+ 38	4 16	88	23 38	50	9
38	55	58	47	50	52	51	43	52	47	44	+ 11	12 40	69	16 42	58	10
53	55	58	57	57	57	56	63	64	68	47	+ 07	10 25	75	23 39	68	11
53	46	58	73	76	107	132	97	92	89	59	— 70	13 19	174	20 42	244	12
63	66	78	104	84	86	77	68	113	94	69	+ 12	12 24	135	23 09	123	13
79	74	88	89	101	98	99	84	106	110	82	+ 28	8 42	148	2 00	120	14
63	66	81	93	87	82	83	102	101	86	76	+ 33	12 17	132	22 37	99	15
50	71	67	65	63	66	63	70	73	73	64	— 04	15 16	108	0 10	112	16
59	60	57	60	72	63	67	65	68	64	59	+ 05	12 16	81	18 42	76	17
51	51	59	56	54	55	60	75	82	78	55	+ 02	10 16	92	22 29	90	18
59	66	71	69	71	74	74	83	91	89	63	+ 45	8 28	99	23 58	44	19
41	62	89	89	80	85	112	126	95	94	63	— 47	11 45	137	21 50	184	20
57	58	65	67	64	61	64	66	70	71	61	+ 19	8 57	123	0 55	104	21
51	54	66	69	60	58	62	57	62	70	56	+ 22	5 12	99	0 47	77	22
47	51	45	49	41	49	44	49	45	48	51	+ 26	4 35	104	1 12	+ 78	23
40	44	49	42	43	48	46	43	48	48	39	+ 14	10 44	72	23 37	58	24
53	49	57	68	50	41	49	60	72	52	36	— 30	9 39	90	23 18	120	25
39	40	53	42	39	42	50	56	42	45	42	+ 21	9 15	70	0 20	49	26
48	50	48	52	51	52	53	57	61	66	44	+ 15	4 13	72	23 59	57	27
47	48	43	45	43	44	45	51	56	46	48	+ 32	12 06	75	2 40	43	28
44	44	46	41	45	44	50	48	43	40	39	+ 13	23 50	69	2 08	56	29
34	39	44	31	38	47	46	53	61	58	37	+ 20	10 31	65	23 12	45	30
34	34	46	41	42	41	40	38	39	43	34	+ 13	5 00	+ 65	0 33	52	31
1,561	1,665	1,932	1,850	1,832	1,910	1,989	2,040	2,125	2,048							
50·4	53·7	62·3	59·7	59·1	61·6	64·2	65·8	68·5	66·1							

DECLINATION—MEAN

—{6° + *tabular minutes.*}

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	43	34	32	28	21	28	23	28	28	25	23	19	25	31	33
2	36	32	29	29	20	21	17	18	23	16	20	17	17	22	24
3	41	58	38	33	32	28	20	27	30	31	22	31	31	36	41
4	63	51	46	48	41	41	42	46	48	47	49	48	53	49	51
5	69	63	57	63	57	51	52	50	51	59	55	56	55	45	55
6	87	80	77	71	61	55	49	52	52	53	54	61	67	67	67
7	82	60	56	61	54	55	55	55	54	52	54	51	46	43	21
Sums	421	378	335	333	286	279	258	276	286	283	277	283	294	293	292
Means	60·1	54·0	47·9	47·6	40·9	39·9	36·9	39·4	40·9	40·4	39·6	40·4	42·0	41·9	41·7

HOURLY VALUES—G.M.T.

TABLE XVIIa—17.

AUGUST, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
32	33	28	32	30	33	30	36	33	36	29	+ 13	4 20	45	0 15	32	1
28	32	31	31	31	30	28	37	34	41	26	+ 12	12 15	46	23 50	34	2
41	47	46	46	49	55	60	63	65	63	31	+ 14	5 58	78	23 18	64	3
57	62	58	54	59	67	67	72	59	69	53	+ 38	4 51	98	22 18	60	4
59	65	72	60	62	73	60	67	76	87	60	+ 39	12 33	102	23 33	63	5
65	72	71	66	63	69	62	66	84	82	65	+ 30	9 40	120	0 55	90	6
36	59	65	60	57	55	58	56	57	58	54	— 10	14 17	95	0 15	105	7
318	370	371	349	351	382	365	397	408	436							
45·4	52·9	53·0	49·9	50.1	54.6	52·1	56·7	58·3	62·3							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,119	3,109	3,104	3,107	3,124	3,116	3,123	3,117	3,126	3,115	3,112	3,100	3,119	3,129	3,137
2	3,106	3,101	3,102	3,111	3,110	3,110	3,114	3,110	3,119	3,121	3,120	3,132	3,128	3,133	3,131
3	3,091	3,105	3,161	3,155	3,130	3,112	3,100	3,135	3,129	3,126	3,133	3,127	3,127	3,155	3,152
4	3,172	3,141	3,115	3,138	3,147	3,140	*	3,144	3,128	3,114	3,125	3,137	3,132	3,130	3,133
5	3,118	3,102	3,106	3,097	*	*	*	*	3,121	3,100	3,101	3,121	3,138	3,149	3,179
6	3,055	3,053	3,164	*	3,095	3,086	3,107	3,125	3,096	3,114	3,113	3,121	3,157	3,199	3,165
7	3,128	3,108	3,151	3,132	3,111	3,115	3,113	3,110	3,112	3,104	3,089	3,107	3,136	3,139	3,138
8	3,146	3,151	3,144	3,143	3,136	3,138	3,122	3,123	3,111	3,097	3,109	3,113	3,119	3,136	3,131
9	3,118	3,113	3,135	3,121	3,130	3,125	3,112	3,128	3,120	3,125	3,121	3,119	3,130	3,128	3,144
10	3,122	3,094	3,080	3,084	3,100	3,097	3,090	3,096	3,094	3,054	3,071	3,117	3,122	3,121	3,143
11	3,110	3,104	3,097	3,085	3,088	3,095	3,113	3,089	3,100	3,105	3,106	3,109	3,116	3,123	3,120
12	3,113	3,101	3,101	3,082	3,090	3,093	3,106	3,077	3,074	3,064	3,060	3,070	3,083	3,093	3,086
13	3,084	3,073	3,043	3,006	2,985	2,993	3,026	3,036	3,038	3,048	3,066	3,076	3,089	3,085	3,106
14	3,095	3,062	3,054	3,066	3,071	3,070	3,073	3,069	3,073	3,078	3,085	3,087	3,095	3,088	3,089
15	3,089	3,071	3,066	3,043	2,963	2,938	2,973	2,947	2,957	3,032	3,076	3,130	3,113	3,091	3,089
16	3,122	3,088	3,111	3,074	3,042	3,053	3,035	3,007	3,018	2,967	3,040	3,063	3,056	3,081	3,107
17	3,109	3,130	3,089	3,021	2,998	3,002	3,049	3,107	3,100	3,069	3,028	3,083	3,100	3,095	3,116
18	3,085	3,051	3,080	3,075	3,042	3,051	3,064	3,050	3,073	3,089	3,076	3,064	3,084	3,110	3,117
19	3,154	3,117	3,118	3,082	3,057	3,077	3,074	3,092	3,097	3,104	3,109	3,104	3,116	3,108	3,116
20	3,140	3,119	3,063	3,023	3,054	3,076	3,073	3,078	3,091	3,100	3,102	3,105	3,113	3,138	3,123
21	3,106	3,104	3,095	3,136	3,095	3,097	3,095	3,123	3,112	3,114	3,108	3,110	3,116	3,112	3,118
22	3,105	3,118	*	*	*	*	*	*	*	*	3,097	3,100	3,107	3,125	3,126
23	3,103	3,101	3,094	3,108	3,111	3,065	3,090	3,096	3,101	3,106	3,106	3,106	3,103	3,103	3,104
24	3,113	3,074	3,103	3,111	3,093	3,082	3,082	3,099	3,113	3,116	3,113	3,116	3,130	3,140	3,150
25	3,128	3,113	3,109	3,101	3,100	3,110	3,126	3,128	3,120	3,124	3,134	3,123	3,136	3,185	3,144
26	3,127	3,113	3,122	3,111	3,108	3,115	3,118	*	*	*	3,119	3,117	3,127	3,135	3,134
27	3,127	3,115	3,131	3,125	3,123	3,124	3,115	3,114	3,126	3,120	3,116	3,117	3,135	3,146	3,140
28	3,124	3,127	3,128	3,120	3,138	3,132	3,126	3,105	3,129	3,121	3,128	3,125	3,134	3,136	3,135
29	3,116	3,108	3,107	3,114	3,117	3,108	3,118	3,122	3,129	3,126	3,125	3,122	3,130	3,130	3,129
30	3,132	3,138	3,130	3,134	3,130	3,117	3,122	3,132	3,124	3,123	3,124	3,124	3,111	3,128	3,131
Sums	93,457	93,104	90,103	86,705	86,488	86,437	83,459	83,559	86,731	86,676	93,012	93,245	93,502	93,771	93,823
Means	3,115·2	3,103·5	3,107·0	3,096·6	3,088·9	3,087·0	3,091·1	3,094·8	3,097·5	3,095·6	3,100·4	3,108·2	3,116·7	3,125·7	3,127·4

* No record.

HOURLY VALUES—G.M.T.

TABLE XVIIb—1.

APRIL, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m		h. m.		
3,130	3,132	3,126	3,133	3,125	3,124	3,124	3,116	3,111	3,106	3,120	3,155	13 48	3,089	10 40	66	1
3,142	3,139	3,157	3,156	3,144	3,141	3,132	3,133	3,125	3,091	3,125	3,164	16 55	3,090	23 56	74	2
3,139	3,135	3,138	3,148	3,137	3,156	3,146	3,127	3,122	3,172	3,134	3,200	23 59	3,055	0 32	145	3
3,140	3,133	3,140	3,144	3,133	3,142	3,133	3,112	3,128	3,118	...	3,203	0 03	3,064	1 50	139	4
3,169	3,161	3,171	3,126	3,169	3,132	3,151	3,126	3,075	3,055	...	3,207	16 54	3,035	23 55	172	5
3,152	3,151	3,160	3,145	3,162	3,136	3,127	3,119	3,117	3,128	...	3,267	3 09	3,034	0 02	233	6
3,132	3,141	3,161	3,156	3,136	3,137	3,161	3,124	3,131	3,146	3,128	3,211	2 07	3,047	9 45	164	7
3,123	3,126	3,126	3,124	3,124	3,123	3,117	3,107	3,111	3,118	3,124	3,162	0 50	3,089	21 58	73	8
3,136	3,130	3,141	3,129	3,133	3,126	3,119	3,106	3,106	3,122	3,125	3,214	0 10	3,079	23 16	135	9
3,136	3,129	3,143	3,125	3,113	3,117	3,118	3,115	3,112	3,110	3,107	3,149	16 39	2,958	3 38	191	10
3,120	3,120	3,122	3,123	3,123	3,122	3,120	3,112	3,113	3,113	3,110	3,131	21 50	3,072	3 34	59	11
3,095	3,090	3,088	3,093	3,085	3,083	3,083	3,087	3,087	3,084	3,086	3,125	6 15	3,028	3 30	67	12
3,088	3,090	3,090	3,094	3,086	3,093	3,089	3,083	3,073	3,095	3,064	3,120	0 32	2,969	3 00	151	13
3,095	3,098	3,107	3,103	3,109	3,107	3,120	3,069	3,071	3,089	3,085	3,133	23 48	3,037	2 15	96	14
3,106	3,104	3,098	3,109	3,099	3,101	3,102	3,120	3,117	3,122	3,065	3,176	11 16	2,915	4 46	261	15
3,111	3,125	3,116	3,131	3,131	3,129	3,104	3,115	3,122	3,109	3,081	3,196	1 45	2,921	8 06	275	16
3,122	3,117	3,107	3,118	3,121	3,093	3,120	3,113	3,099	3,085	3,087	3,176	1 02	2,974	5 38	202	17
3,113	3,128	3,108	3,104	3,119	3,107	3,115	3,147	3,134	3,154	3,093	3,223	22 25	3,005	0 51	218	18
3,129	3,116	3,123	3,109	3,114	3,131	3,134	3,112	3,137	3,140	3,109	3,200	0 01	3,045	4 00	155	19
3,103	3,096	3,101	3,112	3,114	3,113	3,112	3,112	3,110	3,106	3,098	3,207	1 22	2,989	3 30	218	20
3,119	3,114	3,117	3,114	3,117	3,115	3,116	3,105	3,087	3,105	3,110	3,145	3 00	3,072	0 57	73	2
3,130	3,119	3,117	3,116	3,118	3,118	3,107	3,113	3,080	3,103	...	3,138	13 24	3,080	23 50	58	22
3,110	3,128	3,130	3,122	3,121	3,126	3,116	3,102	3,118	3,113	3,107	3,146	15 48	3,044	4 48	102	23
3,139	3,144	3,141	3,131	3,131	3,135	3,130	3,137	3,134	3,128	3,119	3,159	13 39	3,060	4 26	99	24
3,139	3,141	3,134	3,137	3,129	3,127	3,134	3,135	3,132	3,127	3,129	3,233	12 58	3,083	3 40	150	25
3,132	3,128	3,136	3,133	3,132	3,133	3,132	3,126	3,123	3,127	...	3,148	2 03	3,092	4 03	56	26
3,142	3,142	3,142	3,137	3,138	3,134	3,134	3,141	3,139	3,124	3,130	3,179	23 27	3,103	11 17	76	27
3,137	3,138	3,138	3,134	3,131	3,135	3,131	3,131	3,119	3,116	3,129	3,159	2 48	3,079	2 40	80	28
3,120	3,131	3,135	3,128	3,132	3,120	3,130	3,127	3,130	3,132	3,124	3,142	12 20	3,097	4 58	45	29
3,132	3,135	3,134	3,127	3,130	3,131	3,131	3,133	3,123	3,118	3,128	3,144	2 10	3,093	12 06	51	30
93,790	93,781	93,847	93,761	93,756	93,696	93,688	93,505	93,386	93,456							
3,126·3	3,126·0	3,128·2	3,125·4	3,125·2	3,123·2	3,122·9	3,116·8	3,112·9	3,115·2							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,120	3,118	3,116	3,106	3,119	3,099	3,104	3,097	3,108	3,121	3,125	3,126	3,129	3,131	3,128
2	3,123	3,125	3,107	3,098	3,110	3,116	3,091	3,079	3,096	3,107	3,109	3,115	3,127	3,131	3,147
3	3,124	3,098	3,112	3,107	3,127	3,103	3,106	3,082	3,102	3,109	3,110	3,117	3,123	3,127	3,155
4	3,146	3,156	3,163	3,147	3,135	3,140	3,129	3,118	3,118	3,118	3,117	3,111	3,123	3,122	3,126
5	3,101	...	...	...	3,091	3,081	3,108	3,091	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*	*	3,092	3,107	3,086
7	3,049	3,013	3,031	3,041	3,065	3,098	3,097	3,089	3,079	3,085	3,084	3,061	3,089	3,065	3,097
8	3,077	3,064	3,055	3,019	3,014	3,046	3,079	3,074	3,080	3,062	3,062	3,063	3,100	3,113	3,098
9	3,084	3,087	3,070	3,088	3,088	3,086	3,079	3,085	3,076	3,073	3,082	3,084	3,088	3,087	3,095
10	3,089	3,085	3,077	3,090	3,086	3,051	3,052	3,088	3,091	3,093	3,088	3,091	3,089	3,098	3,098
11	3,089	3,082	3,076	3,065	3,065	3,077	3,083	3,092	3,093	3,090	3,095	3,090	3,094	3,094	3,091
12	3,085	3,056	3,042	3,029	3,013	3,020	2,998	3,016	3,003	3,073	3,094	3,116	3,116	3,115	3,096
13	3,076	3,002	3,009	3,068	3,035	3,041	3,026	3,040	3,005	2,963	3,005	3,048	3,101	3,109	3,120
14	3,112	3,067	3,070	3,073	3,061	3,029	3,033	3,037	3,028	3,077	3,113	3,122	3,121	3,116	3,112
15	3,126	3,124	3,114	3,110	3,081	3,074	3,087	3,100	3,107	3,107	3,102	3,081	3,103	3,124	3,119
16	3,109	3,115	3,132	3,113	3,114	3,112	3,107	3,102	3,102	3,097	3,104	3,111	3,118	3,125	3,151
17	3,123	3,129	3,114	3,106	3,113	3,107	3,107	3,108	3,108	3,110	3,118	3,109	3,122	3,137	3,130
18	3,116	3,118	3,110	3,120	3,124	3,109	3,109	3,118	3,118	3,118	3,120	3,117	3,120	3,118	3,119
19	3,117	3,115	3,132	3,127	3,117	3,121	3,116	3,104	3,107	3,103	3,117	3,116	3,124	3,126	3,134
20	3,117	3,103	3,104	3,113	3,098	3,119	3,112	3,124	3,109	3,118	3,121	3,123	3,124	3,123	3,119
21	3,135	3,135	3,126	3,101	3,107	3,108	3,109	3,111	3,113	3,121	3,123	3,115	3,118	3,123	3,121
22	3,120	3,103	3,099	3,088	3,087	3,115	3,101	3,111	3,120	3,119	3,122	3,120	3,116	3,116	3,120
23	3,114	3,107	3,105	3,100	3,107	3,111	3,116	3,114	3,113	3,112	3,116	3,110	3,114	3,121	3,117
24	3,108	3,112	3,105	3,111	3,110	3,111	3,112	3,117	3,116	3,110	3,114	3,118	3,119	3,120	3,121
25	3,109	3,109	3,117	3,115	3,119	3,113	3,118	3,116	3,117	3,116	3,117	3,116	3,118	3,119	3,129
26	3,120	3,113	3,122	3,125	3,135	3,127	3,119	3,119	3,119	3,100	3,104	3,118	3,121	3,120	3,130
27	3,123	3,110	3,106	3,125	3,129	3,219	3,124	3,119	3,122	3,115	3,121	3,120	3,121	3,124	3,119
28	3,114	3,110	3,121	3,104	3,107	3,099	3,109	3,104	3,121	3,120	3,121	3,116	3,121	3,122	3,122
29	3,118	3,115	3,127	3,123	3,126	3,130	3,124	3,128	3,126	3,125	3,126	3,121	3,129	3,131	3,136
30	3,112	3,116	3,109	3,112	3,118	3,118	3,121	3,121	3,122	3,123	3,124	3,117	3,121	3,120	3,122
31	3,117	3,106	3,113	3,107	3,111	3,110	3,116	3,121	3,123	3,118	3,118	3,117	3,117	3,126	3,130
Sums	93,273	89,893	89,884	89,831	92,912	92,900	92,892	92,925	89,842	89,903	90,072	90,079	93,418	93,510	93,588
Means	3,109	3,100	3,099	3,098	3,097	3,097	3,096	3,098	3,098	3,100	3,106	3,106	3,114	3,117	3,119

* Instrument system interfered with.

HOURLY VALUES—G.M.T. TABLE XVIIb—2.

MAY, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,130	3,126	3,124	3,125	3,132	3,132	3,129	3,133	3,126	3,123	3,121	3,144	23 20	3,087	4 45	57	1
3,139	3,141	3,134	3,154	3,141	3,129	3,120	3,124	3,130	3,124	3,121	3,171	18 48	3,064	7 25	107	2
3,159	3,132	3,129	3,128	3,136	3,137	3,135	3,136	3,142	3,146	3,123	3,186	14 40	3,062	4 58	24	3
3,131	3,130	3,121	3,123	3,132	3,128	3,125	3,139	3,120	3,101	3,129	3,188	1 32	3,089	23 56	99	4
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	5
3,113	3,066	3,081	3,091	3,091	3,102	3,091	3,094	3,095	3,049	...	3,169	15 37	2,897	15 56	272	6
3,099	3,106	3,096	3,102	3,110	3,118	3,090	3,067	3,064	3,077	3,080	3,146	19 50	2,977	1 6	169	7
3,113	3,105	3,095	3,093	3,090	3,094	3,093	3,086	3,086	3,084	3,078	3,123	22 28	2,975	2 47	148	8
3,096	3,102	3,092	3,094	3,087	3,087	3,088	3,092	3,087	3,089	3,087	3,109	02 27	3,027	2 8	82	9
3,096	3,098	3,092	3,093	3,097	3,097	3,095	3,096	3,095	3,089	3,089	3,112	3 1	3,026	5 27	86	10
3,110	3,112	3,104	3,103	3,095	3,095	3,094	3,101	3,093	3,085	3,091	3,128	15 6	3,060	3 28	68	11
3,098	3,100	3,104	3,107	3,099	3,125	3,134	3,066	3,091	3,076	3,075	3,168	11 24	2,951	3 40	217	12
3,112	3,114	3,118	3,133	3,121	3,166	3,131	3,070	3,107	3,112	3,072	3,192	19 58	2,925	8 30	167	13
3,115	3,142	3,130	3,132	3,135	3,135	3,136	3,127	3,134	3,126	3,099	3,173	22 25	2,995	1 30	178	14
3,123	3,122	3,123	3,127	3,125	3,113	3,115	3,130	3,109	3,109	3,110	3,171	0 40	3,008	11 0	163	15
3,117	3,120	3,114	3,114	3,118	3,125	3,124	3,123	3,127	3,123	3,117	3,164	13 57	3,084	8 40	80	16
3,131	3,122	3,130	3,126	3,121	3,130	3,133	3,120	3,123	3,116	3,120	3,174	12 37	3,094	03 12	80	17
3,132	3,138	3,127	3,125	3,127	3,127	3,124	3,118	3,115	3,117	3,120	3,155	3 15	3,090	2 23	65	18
3,131	3,123	3,123	3,122	3,136	3,128	3,127	3,129	3,120	3,117	3,121	3,156	1 45	3,088	8 24	68	19
3,127	3,130	3,121	3,132	3,135	3,127	3,128	3,133	3,125	3,135	3,121	3,136	18 8	3,083	1 33	53	20
3,145	3,133	3,118	3,120	3,117	3,118	3,121	3,120	3,121	3,120	3,120	3,153	14 46	3,083	2 59	70	21
3,115	3,124	3,117	3,116	3,113	3,114	3,112	3,115	3,111	3,114	3,112	3,127	16 10	3,075	3 40	52	22
3,113	3,117	3,116	3,117	3,117	3,117	3,110	3,113	3,108	3,108	3,113	3,120	12 17	3,095	02 30	25	23
3,118	3,119	3,119	3,122	3,124	3,123	3,116	3,116	3,123	3,109	3,116	3,134	21 12	3,098	4 7	36	24
3,132	3,128	3,121	3,120	3,117	3,122	3,119	3,118	3,120	3,120	3,119	3,139	14 59	3,092	1 14	47	25
3,129	3,125	3,126	3,119	3,121	3,123	3,120	3,128	3,125	3,123	3,121	3,149	22 44	3,073	9 30	76	26
3,119	3,119	3,123	3,125	3,122	3,125	3,127	3,119	3,116	3,114	3,121	3,137	02 38	3,106	9 15	31	27
3,127	3,124	3,121	3,123	3,124	3,123	3,120	3,120	3,117	3,118	3,117	3,134	21 52	3,090	4 58	44	28
3,127	3,124	3,122	3,131	3,134	3,134	3,123	3,130	3,111	3,112	3,126	3,153	12 25	3,094	4 12	59	29
3,124	3,136	3,131	3,133	3,137	3,122	3,139	3,133	3,121	3,117	3,123	3,153	21 5	3,098	1 45	55	30
3,124	3,119	3,119	3,119	3,138	3,134	3,133	3,119	3,118	3,097	3,119	3,168	18 29	3,086	2 40	82	31
93,645	93,597	93,491	93,569	93,592	93,652	93,552	93,415	93,380	93,250							
3,122	3,120	3,116	3,119	3,120	3,122	3,118	3,114	3,113	3,108							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,097	3,087	3,076	3,093	3,066	3,058	3,063	3,067	3,082	3,066	3,088	3,134	3,103	3,109	3,119
2	3,109	3,095	3,103	3,099	3,082	3,067	3,087	3,051	3,061	3,109	3,118	3,117	3,119	3,131	3,108
3	3,123	3,093	3,090	3,083	3,101	3,090	3,000	3,024	3,105	3,106	3,110	3,117	3,135	3,118	3,127
4	3,092	3,091	3,091	3,075	3,070	3,083	3,104	3,114	3,121	3,118	3,122	3,111	3,119	3,118	3,125
5	3,118	3,111	3,114	3,100	3,099	3,099	3,098	3,104	3,120	3,116	3,116	3,118	3,119	3,119	3,117
6	3,110	3,112	3,133	3,116	3,121	3,122	3,108	3,118	3,124	3,123	3,123	3,119	3,119	3,118	3,115
7	3,118	3,111	3,115	3,115	3,113	3,116	3,127	3,124	3,121	3,122	3,123	3,122	3,117	3,116	3,118
8	3,102	3,119	3,114	3,087	3,042	3,066	3,073	3,047	3,056	3,075	3,093	3,124	3,119	3,158	3,115
9	3,116	3,103	3,045	3,055	3,093	3,082	3,083	3,083	3,106	3,101	3,105	3,104	3,114	3,100	3,136
10	3,044	3,064	3,041	3,056	3,084	3,052	3,077	3,108	3,097	3,113	3,113	3,117	3,125	3,140	3,125
11	3,103	3,122	3,094	3,097	3,076	3,091	3,096	3,092	3 088	3,088	3,099	3,111	3,110	3,129	3,132
12	3,126	3,117	3,116	3,109	3,086	3,103	3,119	3,107	3,113	3,107	3,114	3,121	3,110	3,129	3,130
13	3,124	3,116	3,118	3,124	3,120	3,117	3,118	3,119	3,114	3,112	3,115	3,108	3,115	3,124	3,136
14	3,123	3,119	3,118	3,119	3,108	3,094	3,102	3,096	3,095	3,104	3,104	3,116	3,123	3,127	3,130
15	3,122	3,114	3,112	3,118	3,120	3,117	3,119	3,117	3,115	3,116	3,116	3,117	3,118	3,119	3,116
16	3,115	3,117	3,125	3,115	3,120	3,121	3,121	3,119	3,122	3,124	3,122	3,122	3,116	3,119	3,123
17	3,125	3,116	3,115	3,115	3,116	3,116	3,122	3,119	3,118	3,121	3,119	3,116	3,112	3,118	3,121
18	3,118	3,114	3,109	3,107	3,108	3,106	3,119	3,116	3,114	3,119	3,118	3,119	3,124	3,125	3,118
19	3,115	3,112	3,116	3,114	3,114	3,097	3,103	3,113	3,107	3,116	3,118	3,110	3,120	3,123	3,122
20	3,116	3,109	3,108	3,111	3,117	3,110	3,115	3,115	3,120	3,116	3,119	3,117	3,122	3,115	3,120
21	3,117	3,113	3,116	3,117	3,117	3,115	3,109	3,105	3,112	3,119	3,117	3,117	3,124	3,127	3,126
22	3,106	3,120	3,115	3,119	3,118	3,119	3,121	3,120	3,116	3,120	3,117	3,116	3,120	3,140	3,147
23	3,116	3,111	3,113	3,118	3,108	3,119	3,115	3,116	3,116	3,117	3,115	3,118	3,140	3,129	3,122
24	3,107	3,104	3,087	3,085	3,084	3,094	3,093	3,109	3,093	3,098	3,115	3,124	3,121	3,119	1,129
25	3,116	3,095	3,093	3,086	3,102	3,106	3,118	3,111	3,112	3,112	3,120	3,117	3,120	3,118	3,118
26	3,119	3,115	3,104	3,081	3,095	3,121	3,118	3,121	3,120	3,121	3,118	3,118	3,117	3,117	3,121
27	3,112	3,108	3,109	3,096	3,104	3,111	3,112	3,092	3,063	3,031	3,057	3,081	3,098	3,117	3,119
28	3,075	3,106	3,099	3,110	3,108	3,113	3,123	3,090	3,067	3,059	3,098	3,123	3,121	3,120	3,121
29	3,088	3,072	3,085	3,091	3,083	3,095	3,099	3,090	3,089	3,080	3,060	3,089	3,137	3,127	3,087
30	3,097	3,086	3,084	3,089	3,098	3,100	3,102	3,110	3,107	3,112	3,103	3,095	3,105	3,124	3,127
Sums	93,278	93,172	93,058	93,000	92,973	93,009	93,064	93,017	93,094	93,141	93,272	93,438	93,562	93,693	93,670
Means	3,109	3,106	3,102	3,100	3,099	3,100	3,101	3,101	3,104	3,105	3,109	3,115	3,119	3,123	3,122

HOURLY VALUES—G.M.T.

TABLE XVIIb—3.

JUNE, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,124	3,126	3,123	3,118	3,123	3,116	3,119	3,120	3,119	3,109	3,100	3,207	11 15	2,826	11 30	381	1
3,121	3,151	3,135	3,130	3,133	3,133	3,127	3,115	3,125	3,123	3,110	3,158	15 38	2,979	7 20	179	2
3,131	3,121	3,123	3,122	3,120	3,119	3,120	3,126	3,098	3,092	3,104	3,170	13 52	2,956	6 02	214	3
3,125	3,124	3,123	3,125	3,123	3,119	3,121	3,127	3,121	3,118	3,111	3,133	22 05	3,048	3 45	85	4
3,134	3,128	3,117	3,117	3,119	3,116	3,119	3,120	3,118	3,119	3,115	3,145	15 20	3,081	5 56	64	5
3,118	3,120	3,120	3,119	3,122	3,116	3,119	3,114	3,104	3,118	3,118	3,145	1 58	3,098	6 12	47	6
3,119	3,116	3,119	3,118	3,122	3,126	3,132	3,133	3,126	3,102	3,120	3,143	21 35	3,100	23 45	43	7
3,127	3,145	3,130	3,123	3,135	3,125	3,113	3,129	3,124	3,116	3,107	3,322	13 45	2,976	4 20	346	8
3,105	3,120	3,135	3,118	3,109	3,153	3,115	3,094	3,080	3,044	3,101	3,279	12 20	2,968	12 15	311	9
3,142	3,136	3,128	3,151	3,134	3,123	3,120	3,140	3,118	3,103	3,108	3,190	22 12	3,013	2 45	177	10
3,121	3,122	3,126	3,123	3,122	3,124	3,139	3,131	3,122	3,126	3,111	3,174	0 50	3,019	3 42	160	11
3,137	3,130	3,118	3,125	3,116	3,127	3,122	3,122	3,128	3,124	3,118	3,146	15 01	3,060	12 15	86	12
3,133	3,124	3,127	3,128	3,125	3,123	3,134	3,132	3,128	3,123	3,122	3,158	14 20	3,095	5 3	63	13
3,152	3,132	3,123	3,121	3,125	3,120	3,136	3,126	3,130	3,122	3,118	3,200	14 57	3,080	4 30	120	14
3,128	3,120	3,120	3,121	3,125	3,116	3,123	3,121	3,119	3,115	3,119	3,138	15 00	3,091	1 48	47	15
3,125	3,126	3,127	3,127	3,128	3,130	3,122	3,128	3,126	3,125	3,123	3,142	22 35	3,107	3 01	35	16
3,124	3,122	3,129	3,128	3,126	3,118	3,122	3,113	3,127	3,118	3,120	3,142	18 18	3,099	21 48	43	17
3,125	3,140	3,119	3,119	3,119	3,119	3,118	3,122	3,116	3,115	3,118	3,175	15 30	3,093	4 37	82	18
3,117	3,119	3,119	3,119	3,118	3,119	3,120	3,117	3,113	3,116	3,115	3,123	10 27	3,089	4 40	34	19
3,119	3,123	3,121	3,119	3,119	3,119	3,120	3,118	3,118	3,117	3,117	3,148	3 17	3,091	3 35	57	20
3,121	3,115	3,121	3,122	3,122	3,126	3,127	3,119	3,112	3,106	3,118	3,136	22 40	3,093	22 30	43	21
3,146	3,141	3,129	3,216	3,124	3,123	3,122	3,125	3,125	3,116	3,124	3,161	13 46	3,095	0 13	66	22
3,129	3,122	3,127	3,118	3,132	3,142	3,118	3,126	3,124	3,107	3,121	3,168	12 28	3,099	23 50	69	23
3,134	3,125	3,120	3,120	3,120	3,118	3,118	3,111	3,115	3,116	3,110	3,148	14 16	3,056	2 16	92	24
3,121	3,120	3,116	3,117	3,119	3,118	3,115	3,122	3,121	3,119	3,113	3,130	21 33	3,066	1 48	64	25
3,118	3,118	3,119	3,116	3,117	3,116	3,113	3,113	3,111	3,112	3,114	4,149	0 47	3,064	3 20	85	26
3,116	3,115	3,117	3,112	3,116	3,115	3,117	3,123	3,125	3,075	3,102	3,148	22 20	2,924	9 6	224	27
3,112	3,115	3,115	3,121	3,121	3,128	3,108	3,112	3,111	3,088	3,108	3,163	21 38	3,049	9 15	114	28
3,051	3,115	3,115	3,118	3,219	3,126	3,099	3,104	3,113	3,097	3,098	3,181	12 16	3,006	1 05	175	29
3,127	3,117	3,112	3,110	3,113	3,116	3,118	3,124	3,109	3,110	3,108	3,146	13 26	3,066	2 20	80	30
93,702	93,748	93,673	93,651	93,676	93,689	93,616	93,627	93,526	93,291							
3,123	3,125	3,122	3,122	3,123	3,123	3,121	3,121	3,118	3,110							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,110	3,113	3,102	3,105	3,106	3,075	3,048	3,104	3,113	3,108	3,096	3,114	3,112	3,118	3,131
2	3,112	3,106	3,100	3,093	3,107	3,108	3,119	3,118	3,118	3,119	3,119	3,120	3,126	3,125	3,121
3	3,120	3,117	3,110	3,114	3,105	3,118	3,120	3,119	3,124	3,120	3,119	3,116	3,118	3,127	3,136
4	3,080	3,078	3,103	3,029	3,064	3,078	3,075	3,072	3.055	3,083	3,109	3,129	3,126	3,161	3,130
5	3,043	3,051	3,095	3,103	3,047	3,030	3,077	3,092	3,081	3,067	3,078	3,078	3,052	3,128	3,155
6	3,092	3,102	3,101	3,106	3,102	3,082	3,109	3,118	3,116	3,122	3,116	3,107	†	3,117	3,132
7	3,124	3,112	3,121	3,134	3,125	3,131	3,132	3,121	3,119	3,125	3,130	3,132	3,131	3,131	3,134
8	3,130	3,092	*3,124	3,156	3,148	3,167	3,161	3,176	3,170	3,169	3,173	3,174	3,170	3,177	3,176
9	3,177	3,169	3,163	3,151	3,163	3,150	3,152	3,169	*3,149	*3,129	3,108	3,117	3,114	3,110	3,114
10	3,118	3,115	3,128	3,110	3,120	3,116	3,122	3,120	3,120	3,121	3,120	3,120	3,123	3,120	3,126
11	3,126	3,121	3,126	3,130	3,135	3,133	3,134	3,129	3,130	3,133	3,125	3,127	3,124	3,124	3,129
12	3,125	3,122	3,133	3,142	3,130	3,127	3,127	3,120	3,124	3,126	3,128	3,129	3,126	3,145	3,137
13	3,129	3,130	3,137	3,135	3,131	3,138	3,129	3,139	3,136	3,137	3,131	3,141	3,132	3,135	3,128
14	3,127	3,118	*3,122	3,127	3,125	3,131	3,126	3,118	3,134	3,129	3,129	3,130	3,128	3,127	3,139
15	3,138	3,133	3,109	3,111	3,111	3,118	3,102	3,100	3,099	3,103	3,097	3,092	3,117	3,120	3,125
16	3,121	3,113	3,098	3,077	3,090	3,085	3,080	3,067	3,039	3,070	3,103	3,103	3,123	3,109	3,118
17	3,114	3,100	3,105	3,106	3,102	3,106	3,119	3,107	3,116	3,106	3,115	3,115	3,114	3,115	3,124
18	3,100	3,101	3,103	3,127	3,117	3,113	3,112	3,113	3,117	3,119	3,120	3,117	3,122	3,119	3,121
19	3,126	3,132	3,122	3,119	3,120	3,109	3,120	3,116	3,130	3,124	3,123	3,121	3,124	3,128	3,134
20	3,121	3,108	3,116	3,106	3,090	3,113	3,102	3,082	3,091	3,101	3,106	3,116	3,127	3,137	3,143
21	3,111	3,100	3,088	3,083	3,113	3,100	3,107	3,106	3,129	3,129	3,122	3,107	3,108	3,126	3,136
22	3,120	3,126	3,115	3,096	3,095	3,099	3,103	3,099	3,109	3,121	3,129	3,123	3,118	3,130	3,135
23	3,116	3,117	3,113	3,121	3,106	3,100	3,093	3,082	3,110	3,123	3,117	3,116	3,117	3,115	3,119
24	3,116	3,116	3,124	3,124	3,125	3,115	3,121	3,119	3,120	3,124	3,114	3,122	3,117	3,121	3,119
25	3,118	3,105	3,108	3,111	3,111	3,109	3,112	3,112	3,124	3,108	3,107	3,104	3,110	3,127	3,119
26	3,114	3,106	3,084	3,080	3,079	3,069	3,090	3,089	3,108	3,104	3,089	3,084	3,114	3,118	3,119
27	3,100	3,081	3,057	3,061	3,032	3,045	3,085	3,097	3,107	3,105	3,112	3,106	3,110	3,118	3,119
28	3,122	3,106	3,097	3,093	3,099	3,102	3,101	3,096	3,105	3,109	3,118	3,116	3,112	3,113	3,119
29	3,114	3,109	3,100	3,084	3,094	3,104	3,099	3,097	3,092	3,107	3,117	3,117	3,111	3,114	3,118
30	3,114	3,107	3,100	3,081	3,094	3,104	3,098	3,095	3,090	3,081	3,092	3,087	3,117	3,133	3,139
31	3,105	3,091	3,059	3,080	3,095	3,073	3,077	3,080	3,096	3,103	3,094	3,111	3,123	3,132	3,127
Sums	96,583	96,397	96,363	96,295	96,281	96,248	96,352	96,372	96,471	96,425	96,556	96,591	93,566	96,920	97,022
Means	3,116	3,110	3,108	3,106	3,106	3,105	3,108	3,109	3,112	3,110	3,115	3,116	3,119	3,126	3,130

* Interpolated: curve regular. † Brief violent storm.

HOURLY VALUES—G.M.T.

TABLE XVIIb—4.

JULY, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,115	3,116	3,115	3,114	3,117	3,113	3,116	3,112	3,118	3,112	3,108	3,171	13 35	3,035	5 55	36	1
3,125	3,124	3,118	3,122	3,123	3,123	3,118	3,126	3,116	3,120	3,117	3,136	22 18	3,080	3 15	56	2
3,133	3,133	3,149	3,144	3,134	3,114	3,146	3,132	3,106	3,080	3,123	3,177	21 00	3,096	19 42	81	3
3,144	3,123	3,113	3,121	3,157	3,135	3,126	3,137	3,125	3,043	3,106	3,202	13 00	2,989	14 23	213	4
3,110	3,122	3,144	3,154	3,141	3,149	3,108	3,126	3,117	3,092	3,099	3,204	13 55	2,975	12 02	229	5
3,123	3,136	3,143	3,135	3,140	3,134	3,136	3,135	3,133	3,124	...	3,180	22 00	‡2,625	11 50	555	6
3,135	3,137	3,138	3,138	3,132	3,142	3,143	3,139	3,139	3,130	3,131	3,170	02 40	3,091	02 55	79	7
3,179	3,192	3,186	3,185	3,176	3,182	3,173	3,170	3,164	3,177	3,166	3,241	13 55	3,060	01 08	81	8
3,127	3,124	3,129	3,114	3,128	3,125	3,113	3,128	3,127	3,118	3,134	3,196	0 15	3,080	13 18	116	9
3,124	3,131	3,123	3,126	3,134	3,127	3,124	3,130	3,128	3,126	3,123	3,141	01 27	3,094	02 29	47	10
3,126	3,131	3,131	3,126	3,127	3,129	3,127	3,124	3,122	3,125	3,128	3,144	04 08	3,104	02 00	40	11
3,136	3,125	3,132	3,130	3,133	3,133	3,135	3,135	3,126	3,129	3,130	3,157	13 30	3,097	03 39	60	12
3,135	3,133	3,135	3,136	3,141	3,140	3,139	3,130	3,130	3,127	3,134	3,144	01 42	3,124	23 56	20	13
3,134	3,125	3,129	3,133	3,128	3,136	3,135	3,130	3,126	3,138	3,129	3,147	14 18	3,104	02 15	43	14
3,122	3,121	3,119	3,125	3,123	3,127	3,125	3,118	3,120	3,121	3,115	3,137	21 00	3,097	03 31	40	15
3,116	3,112	3,109	3,112	3,116	3,116	3,107	3,117	3,109	3,114	3,100	3,134	00 14	3,023	07 45	111	16
3,139	3,150	3,126	3,129	3,132	3,134	3,128	3,123	3,110	3,100	3,118	3,191	16 00	3,088	01 54	103	17
3,114	3,112	3,128	3,120	3,121	3,128	3,130	3,126	3,131	3,126	3,119	3,139	02 40	3,090	00 08	49	18
3,130	3,122	3,124	3,128	3,125	3,131	3,121	3,127	3,121	3,121	3,124	3,142	00 22	3,104	03 00	38	19
3,135	3,136	3,130	3,134	3,127	3,128	3,126	3,133	3,111	3,111	3,117	3,148	14 08	3,067	08 00	81	20
3,128	3,122	3,124	3,125	3,126	3,121	3,120	3,115	3,119	3,120	3,116	3,138	20 53	3,061	02 07	77	21
3,132	3,130	3,128	3,128	3,127	3,124	3,120	3,122	3,113	3,116	3,118	3,145	14 10	3,074	03 10	71	22
3,128	3,132	3,119	3,117	3,115	3,120	3,114	3,116	3,119	3,116	3,114	3,146	15 15	3,078	07 26	68	23
3,120	3,118	3,117	3,120	3,118	3,120	3,121	3,126	3,122	3,118	3,120	3,139	01 30	3,109	09 00	30	24
3,121	3,121	3,119	3,150	3,127	3,122	3,114	3,128	3,104	3,114	3,116	3,159	17 50	3,079	22 55	80	25
3,125	3,157	3,134	3,121	3,123	3,123	3,121	3,116	3,097	3,100	3,107	3,173	16 02	3,052	04 40	121	26
3,122	3,127	3,118	3,120	3,121	3,121	3,120	3,121	3,123	3,122	3,102	3,170	14 50	3,022	01 55	148	27
3,131	3,125	3,121	3,121	3,124	3,121	3,118	3,124	3,123	3,114	3,113	3,153	04 15	3,092	04 54	61	28
3,130	3,124	3,117	3,122	3,126	3,119	3,112	3,123	3,123	3,114	3,111	3,139	14 45	3,089	07 45	50	29
3,141	3,142	3,129	3,122	3,122	3,114	3,109	3,114	3,110	3,105	3,110	3,153	12 55	3,079	11 03	74	30
3,124	3,135	3,152	3,160	3,130	3,132	3,151	3,100	3,086	3,114	3,109	3,205	17 44	3,032	02 05	173	31
97,003	97,038	96,999	97,032	97,014	96,983	96,896	96,903	96,718	96,587	93,557						
3,129	3,130	3,129	3,130	3,129	3,128	3,126	3,126	3,120	3,116	3,119						

‡ Curve runs off paper; minimum recorded, 2,625.

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,111	3,073	3,067	3,062	2,984	2,971	3,082	3,113	3,114	3,111	3,122	3,116	3,110	3,115	3,115
2	3,120	3,112	3,103	3,118	3,109	3,086	3,098	3,099	3,110	3,114	3,119	3,112	3,113	3,118	3,161
3	3,102	3,109	3,093	3,110	3,100	3,106	3,067	3,071	3,090	3,095	3,110	3,116	3,149	3,125	3,125
4	3,118	3,112	3,113	3,121	3,117	3,119	3,120	3,101	3,115	3,115	3,121	3,118	3,118	3,119	3 118
5	3,132	3,120	3,116	3,120	3,122	3,123	3,115	3,114	3,117	3,117	3,115	3,130	3,117	3,126	3,140
6	3,076	3,037	2,967	2,950	2,930	2,930	2,937	2,978	2,955	3,011	3,027	3,047	3,058	3,102	3,132
7	3,115	3,106	3,072	3,067	3,088	3,104	3,095	3,116	3,084	3,109	3,124	3,124	3,126	3,119	3,126
8	3,118	3,135	3,121	3,120	3,118	3,119	3,111	3,111	3,181	3,120	3,116	3,114	3,117	3,119	3,122
9	3,122	3,108	3,103	3,098	3,105	3,089	3,073	3,089	3,106	3,117	3,117	3,114	3,107	3,122	3,115
10	3,123	3,111	3,118	3,105	3,117	3,117	3,122	3,136	3,099	3,121	3,113	3,115	3,112	3,117	3,125
11	3,089	3,092	3,108	3,102	3,110	3,116	3,119	3,116	3,101	3,107	3,110	3,118	3,117	3,121	3,125
12	3,116	3,117	3,110	3,107	3,105	3,118	3,117	3,112	3,112	3,112	3,108	3,110	3,107	3,118	3,116
13	3,104	3,107	3,102	3,096	3,103	3,115	3,111	3,101	3,107	3,109	3,117	3,113	3,113	3,111	3,112
14	3,112	3,103	3,119	3,107	3,095	3,099	3,107	3,115	3,105	3,106	3,102	3,094	3,100	3,120	3,124
15	3,114	3,093	3,063	3,097	3,105	3,109	3,116	3,112	3,112	3,108	3,110	3,109	3,108	3,106	3,112
16	3,102	3,100	3,104	3,108	3,101	3,103	3,104	3,112	3,106	3,115	3,114	3,115	3,114	3,123	3,117
17	3,074	3,037	3,022	3,023	3,023	3,010	3,039	3,043	3,071	3,091	3,087	3,088	3,100	3,119	3,121
18	3,119	3,110	3,087	3,075	3,066	3,064	3,090	3,093	3,105	3,109	3,105	3,112	3,109	3,111	3,117
19	3,053	3,075	3,072	3,082	3,034	3,087	3,098	3,091	3,090	3,068	3,065	3,079	3,124	3,103	3,110
20	3,106	3,065	3,063	3,075	3,077	3,099	3,094	3,088	3,101	3,100	3,098	3,091	3,098	3,112	3,115
21	3,089	3,089	3,084	3.078	3,084	3,052	3,051	3,054	3,081	3,104	3,114	3,110	3,112	3,143	3,124
22	3,050	3,038	3,027	3,071	3,056	3,056	3,087	3,074	3,055	3,084	3,096	3,100	3,108	3,112	3,127
23	3,041	3,018	3,087	3,042	3,089	3,061	3,057	3,057	3,081	3,089	3,095	3,106	3,122	3,127	3,149
24	3,083	3,094	3,098	3,111	3,119	3,131	3,096	3,067	3,067	3,063	3,094	3,102	3,108	3,112	3,116
25	3,115	3,079	3.057	3,054	3,054	3,046	3,051	3,069	3,094	3,096	3,082	3,109	3,114	3,120	3,125
26	3,104	3,102	3,097	3,098	3,094	3,093	3,102	3,092	3,101	3,104	3,104	3,104	3,107	3,117	3,120
27	3,101	3,097	3,086	3,089	3,088	3,074	3,070	3,068	3,114	3,116	3,110	3,103	3,094	3,115	3,116
28	3,100	3,132	3,123	3,093	3,082	3,070	3,092	3,080	3,120	3,116	3,117	3,117	3,119	3,124	3,129
29	3,153	3,148	3,110	3,114	3,111	3,102	3,129	3,101	3,112	3,120	3,116	3,114	3,118	3,125	3,129
30	3,107	3,112	3,116	3,116	3,104	3,100	3,107	3,100	3,096	3,113	3,124	3,115	3,120	3,118	3,126
31	3,127	3,125	3,150	3,146	3,118	3,102	3,104	3,099	3,107	3,118	3,118	3,116	3,111	3,116	3,115
Sums	96,196	95,956	95,758	95,755	95,609	95,571	95,761	95,771	95,946	96,178	96,270	96,331	96,450	96,655	96,824
Means	3,103·1	3,095·4	3,089·0	3,088·9	3,084·2	3,083·0	3,089·1	3,089·4	3,095·0	3,102·5	3,105·5	3,107·5	3,111·3	3,117·9	3,123·4

HOURLY VALUES—G.M.T.

TABLE XVIIb—5.

AUGUST, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,123	3,115	3,116	3,114	3,127	3,124	3,111	3,123	3,135	3,120	3,098	3,154	0 02	2,895	4 30	259	1
3,080	3,117	3,105	3,111	3,115	3,114	3,118	3,116	3,120	3,102	3,112	3,202	1 02	2,968	14 54	234	2
3,119	3,115	3,119	3,119	3,122	3,125	3,136	3,126	3,108	3,118	3,111	3,182	23 38	3,049	6 22	133	3
3,116	3,120	3,121	3,124	3,124	3,126	3,125	3,126	3,125	3,132	3,120	3,143	23 57	3,109	5 29	34	4
3,148	3,138	3,138	3,134	3,142	3,147	4,143	3,107	3,084	3,076	3,124	3,170	19 27	3,050	23 30	120	5
3,127	3,132	3,135	3,144	3,138	3,121	3,122	3,121	3,116	3,115	3,055	3,157	18 15	2,827	7 20	330	6
3,123	3,131	3,144	3,129	3,119	3,118	3,130	3,130	3,130	3,118	3,113	3,149	5 40	3,034	2 09	115	7
3,133	3,129	3,122	3,122	3,120	3,120	3,120	3,122	3,114	3,122	3,120	3,163	1 22	3,086	21 57	77	8
3,119	3,119	3,122	3,118	3,118	3,119	3,141	3,106	3,134	3,123	3,112	3,149	23 45	3,057	5 45	92	9
3,128	3,117	3,122	3,120	3,126	3,128	3,124	3,103	3,101	3,089	3,117	3,141	20 20	3,089	23 50	52	10
3,124	3,116	3,128	3,123	3,123	3,125	3,121	3,122	3,119	3,116	3,115	3,140	5 10	3,073	4 57	67	11
3,116	3,116	3,122	3,123	3,117	3,123	3,115	3,113	3,114	3,104	3,114	3,132	20 50	3,097	22 56	35	12
3,112	3,115	3,114	3,118	3,118	3,124	3,118	3,121	3,120	3,112	3,112	3,130	23 24	3,078	2 32	52	13
3,128	3,118	3,117	3,116	3,115	3,117	3,111	3,108	3,099	3,114	3,110	3,130	2 12	3,083	11 35	47	14
3,111	3,107	3,113	3,114	3,115	3,112	3,117	3,116	3,104	3,102	3,107	1,130	0 25	3,046	2 05	84	15
3,118	3,122	3,116	3,114	3,113	3,116	2,114	3,115	3,100	3,074	3,111	3,142	21 40	3,043	23 45	99	16
3,117	3,119	3,131	3,124	3,130	3,117	3 121	3,111	3,117	3,119	3,086	3,138	17 15	2,942	5 20	196	17
3,131	3,115	3,130	3,124	3,142	3,131	3,108	3,106	3,131	3,053	3,107	3,162	22 25	3,031	21 02	131	18
3,142	3,132	3,120	3,122	3,112	3,111	3,111	3,108	3,099	3,106	3,096	3,157	15 15	2,989	4 05	168	19
3,114	3,120	3,133	3,112	3,112	3,117	3,113	3,107	3,128	3,089	3,101	3,141	17 00	3,024	1 42	117	20
3,128	3,126	3,130	3,123	3,118	3,116	3,116	3,111	3,096	3,050	3,101	3,158	13 20	3,008	5 46	150	21
3,153	3,120	3,137	3,137	3,159	3,130	3,110	3,118	3,061	3,041	3,094	3,202	15 25	2,946	1 30	256	22
3,122	3,118	3,125	3,129	3,149	3,126	3,124	3,100	3,081	3,083	3,007	3,225	14 28	2,809	14 50	416	23
3,144	3,130	3,134	3,122	3,118	3,118	3,107	3,127	3,122	3,115	3,108	1,157	15 40	3,010	7 15	147	24
3,122	3,123	3,128	3,129	3,131	3,125	3,112	3,116	3,115	3,104	3,098	3,145	22 05	3,025	5 20	120	25
3,121	3,119	3,114	3,119	3,122	3,114	3,101	3,121	3,100	3,101	3,107	3,139	14 28	3,059	4 36	80	26
3,128	3,139	3,127	3,126	3,132	3,143	3,140	3,107	3,112	3,100	3,108	3,184	21 05	3,049	6 45	135	27
3,138	3,162	3,129	3,123	3,118	3,122	3,124	3,148	3,163	3,153	3,120	3,185	15 50	3,027	4 30	158	28
3,125	3,123	3,139	3,144	3,121	3,108	3,141	3,149	3,120	3,107	3,123	3,178	0 29	3,074	20 05	104	29
3,118	3,119	3,122	3,122	3,122	3,125	3,132	3,141	3,132	3,127	3,117	3,155	22 16	3,071	2 02	84	30
3,131	3,117	3,117	3,130	3,138	3,124	3,123	3,130	3,147	3,102	3,122	3,198	2 45	3,071	23 50	127	31
96,859	96,809	96,870	96,829	96,876	96,786	96,758	96,680	96,547	96,187							
3,124·5	3,122·9	3,124·8	3,123·5	3,125·0	3,122·1	3,121·2	3,118·7	3,114·4	3,102·8							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,102	3,071	3,092	3,102	3,109	3,113	3,108	3,099	3,121	3,113	3,120	3,117	3,118	3,122	3,132
2	3,139	3,117	3,114	3,125	3,113	3,116	3,111	3,112	3,108	3,111	3,117	3,118	3,117	3,124	3,127
3	3,109	3,128	3,126	3,110	3,125	3,118	3,113	3,113	3,107	3,113	3,119	3,116	3,115	3,121	3,122
4	3,085	3,054	3,039	3,042	3,050	3,055	3,115	3,093	3,113	3,102	3,112	3,109	3,111	3,133	3,121
5	3,102	3,100	3,101	3,103	3,105	3,116	3,104	3,102	3,102	3,104	3,103	3,108	3,111	3,124	3,121
6	3,078	3,048	3,043	3,097	3,090	3,070	3,057	3,085	3,085	3,093	3,084	3,112	3,123	3,129	3,111
7	3,098	3,093	3,097	3,101	3,114	3,081	3,080	3,104	3,097	3,096	3,085	3,108	3,110	3,121	3,113
8	3,120	3,095	3,139	3,116	3,088	3,086	3,090	3,095	3,077	3,094	3,111	3,110	3,122	3,125	3,119*
9	3,114	3,114	3,062	3,048	3,047	3,086	3,076	3,097	3,091	3,092	3,106	3,122	3,140	3,132	3,129
10	3,111	3,105	3,075	3,031	3,064	3,079	3,114	3,125	3,119	3,122	3,120	3,109	3,115	3,123	3,123
11	3,150	3,156	3,079	3,062	3,066	3,083	3,088	3,093	3,090	3,106	3,121	3,119	3,111	3,125	3,124
12	3,107	3,118	3,090	3,060	3,079	3,089	3,069	3,055	3,083	3,086	3,106	3,140	3,113	3,123	3,126
13	3,127	3,103	3,085	3,093	3,144	3,095	3,086	3,080	3,123	3,119	3,121	3,120	3,122	3,132	3,128
14	3,116	3,091	3,093	3,075	3,085	3,074	3,104	3,089	3,078	3,104	3,101	3,119	3,113	3,128	3,120
15	3,116	3,147	3,139	3,132	3,117	3,130	3,126	3,122	3,129	3,126	3,120	3,126	3,119	3,125	3,121
16	3,145	3,143	3,119	3,099	3,073	3,112	3,113	3,121	3,115	3,117	3,116	3,140	3,136	3,134	3,130
17	3,137	3,107	3,078	3,095	3,115	3,122	3,124	3,125*	3,125	3,126	3,117	3,136	3,127	3,124	3,144
18	3,116	3,033	3,076	3,075	3,094	3,043	3,048	3,058	3,084	3,101	3,101	3,117	3,123	3,129	3,143
19	3,105	3,115	3,114	3,081	3,046	3,073	3,072	3,100	3,112	3,115	3,119	3,117	3,128	3,118	3,133
20	3,089	3,089	3,057	3,067	3,097	3,100	3,093	3,073	3,076	3,108	3,112	3,133	3,147	3,156	3,143
21	3,110	3,115	3,123	3,122	3,112	3,128	3,102	3,135	3,121	3,134	3,125	3,134	3,136	3,143	3,150
22	3,042	3,063	3,027	3,042	3,037	3,053	3,121	3,110	3,099	3,123	3,106	3,128	3,153	3,133	3,129
23	3,175	3,080	3,060	3,092	3,073	3,068	3,080	3,094	3,104	3,114	3,131	3,136	3,129	3,127	3,134
24	3,214	3,194	3,145	3,020	2,932	2,953	2,959	2,969	2,986	3,008	3,045	3,094	3,117	3,117	3,127
25	3,176	3,167	3,123	3,108	3,062	3,110	3,105	3,090	3,119	3,119	3,119	3,118	3,117	3,122	3,118
26	3,127	3,102	3,151	3,118	3,073	3,116	3,081	3,102	3,124	3,111	3,115	3,115	3,110	3,115	3,110
27	3,126	3,130	3,118	3,126	3,130	3,118	3,120	3,104	3,119	3,120	3,117	3,114	3,115	3,110	3,113
28	3,123	3,106	3,127	3,155	3,134	3,118	3,128	3,125	3,112	3,114	3,116	3,113	3,113	3,114	3,120
29	3,123	3,143	3,159	3,133	3,106	3,113	3,113	3,115	3,132	3,114	3,127	3,125	3,120	3,119	3,122
30	3,146	3,119	3,095	3,066	3,088	3,130	3,111	3,114	3,107	3,119	3,131	3,128	3,137	3,132	3,128
Sums	93,628	93,246	92,946	92,696	92,568	92,748	92,811	92,899	93,058	93,224	93,343	93,601	93,668	93,770	93,781
Means	3,121	3,108	3,098	3,090	3,086	3,092	3,094	3,097	3,102	3,107	3,111	3,120	3,122	3,126	3,126

* Interpolated—curve smooth.

HOURLY VALUES—G.M.T.

TABLE XVIIb—6.

SEPTEMBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,122	3,116	3,115	3,120	3,119	3,119	3,122	3,135	3,151	3,139	3,116	3,167	22 59	3,044	3 16	123	1
3,118	3,119	3,118	3,117	3,119	3,121	3,123	3,124	3,131	3,109	3,119	3,146	3 3	3,092	2 5	54	2
3,122	3,117	3,121	3,121	3,116	3,121	3,129	3,141	3,169	3,085	3,121	3,193	22 58	3,072	23 55	121	3
3,124	3,123	3,136	3,142	3,118	3,106	3,116	3,110	3,108	3,102	3,101	3,166	17 18	3,008	4 30	158	4
3,117	3,119	3,119	3,115	3,119	3,110	3,105	3,117	3,114	3,078	3,110	3,146	22 30	3,058	3 2	88	5
3,113	3,116	3,118	3,116	3,114	3,114	3,120	3,124	3,101	3,098	3,098	3,144	12 30	3,005	1 42	139	6
3,115	3,120	3,115	3,124	3,115	3,112	3,112	3,114	3,105	3,120	3,106	3,152	0 1	3,070	5 20	82	7
3,125	3,128	3,126	3,130	3,134	3,122	3,135	3,141	3,150	3,114	3,116	3,199	23 20	3,028	1 15	171	8
3,139	3,125	3,123	3,121	3,124	3,120	3,125	3,121	3,116	3,111	3,107	3,176	11 42	3,008	2 20	168	9
3,119	3,146	3,129	3,120	3,121	3,123	3,127	3,131	3,136	3,150	3,113	3,159	23 15	2,998	3 18	161	10
3,123	3,120	3,124	3,123	3,124	3,126	3,125	3,125	3,125	3,107	3,111	3,186	0 0	3,018	3 0	168	11
3,137	3,131	3,123	3,127	3,131	3,133	3,150	3,108	3,119	3,127	3,109	3,165	10 50	3,017	3 15	148	12
3,127	3,115	3,125	3,126	3,149	3,154	3,130	3,174	3,145	3,116	3,122	3,218	22 22	3,052	3 5	166	13
3,121	3,129	3,127	3,123	3,124	3,128	3,129	3,119	3,120	3,116	3,109	3,143	22 48	3,025	5 15	118	14
3,122	3,122	3,133	3,123	3,131	3,128	3,134	3,133	3,160	3,145	3,129	3,163	23 5	3 102	0 15	61	15
3,133	3,125	3,122	3,120	3,125	3,127	3,151	3,158	3,160	3,137	3,126	3,183	23 59	3,058	3 48	125	16
3,166	3,170	3,187	3,193	3,171	3,171	3,119	3,120	3,102	3,116	3,133	3,246	17 40	3,031	23 20	215	17
3,153	3,129	3,123	3,124	3,133	3,134	3,127	3,124	3,120	3,105	3,104	3,206	11 40	2,991	11 58	215	18
3,127	3,151	3,152	3,147	3,136	3,119	3,140	3,118	3,110	3,089	3,114	3,170	17 0	3,018	3 40	152	19
3,149	3,145	3,136	3,134	3,134	3,127	3,121	3,115	3,121	3,110	3,114	3,166	14 20	3,031	2 10	135	20
3,172	3,164	3,157	3,145	3,142	3,140	3,124	3,144	3,149	3,042	3,133	3,186	23 1	3,017	23 59	169	21
3,133	3,151	3,138	3,151	3,150	3,123	3,186	3,190	3,172	3,175	3,118	3,233	21 2	2,978	1 50	255	22
3,136	3,135	3,142	3,165	3,127	3,124	3,133	3,147	3,174	3,214	3,121	3,216	23 50	3,022	2 15	194	23
3,129	3,129	3,122	3,124	3,120	3,150	3,169	3,164	3,118	3,176	3,087	3,246	1 45	2,907	3 58	339	24
3,114	3,121	3,117	3,117	3,124	3,128	3,130	3,146	3,155	3,127	3,120	3,226	0 15	3,025	3 30	201	25
3,117	3,117	3,117	3,121	3,141	3,135	3,125	3,111	3,131	3,126	3,116	3,206	2 42	3,042	3 10	164	26
3,118	3,123	3,124	3,121	3,125	3,128	3,137	3,142	3,136	3,123	3,122	3,169	2 25	3,095	6 45	74	27
3,119	3,113	3,117	3,118	3,118	3,125	3,125	3,142	3,148	3,123	3,123	3,173	2 45	3,098	2 12	75	28
3,124	3,125	3,128	3,135	3,136	3,121	3,135	3,111	3,117	3,146	3,125	3,176	1 29	3,089	4 32	87	29
3,129	3,129	3,133	3,137	3,133	3,137	3,129	3,131	3,148	3,181	3,124	3,206	23 48	3,040	3 2	166	30
93,863	93,873	93,867	93,900	93,873	93,826	93,933	93,980	94,011	93,707							
3,129	3,129	3,129	3,130	3,129	3,128	3,131	3,133	3,134	3,124							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,182	3,144	3,073	3,142	3,211	3,028	2,922	2,964	3,008	3,037	3,079	3,106	3,130	3,141	3,150
2	3,112	3,089	3,063	3,067	3,071	3,096	3,108	3,096	3,112	3,108	3,112	3,115	3,107	3,110	3,116
3	3,090	3,073	3,085	3,116	3,098	3,083	3,078	3,116	3,117	3,115	3,117	3,116	3,120	3,128	3,121
4	3,099	3,100	3,095	3,067	3,068	3,080	3,094	3,103	3,114	3,092	3,101	3,117	3,112	3,130	3,110
5	3,102	3,115	3,116	3,110	3,082	3,085	3,049	3,063	3,088	3,106	3,110	3,115	3,112	3,118	3,119
6	3,131	3,156	3,156	3,091	3,091	3,111	3,099	3,111	3,122	3,110	3,100	3,112	3,116	3,121	3,114
7	3,092	3,123	3,109	3,138	3,125	3,107	3,089	3,109	3,111	3,111	3,113	3,112	3,112	3,113	3,123
8	3,076	3,044	3,055	3,070	3,038	3,014	3,071	3,078	3,088	3,090	3,090	3,101	3,118	3,149	3,136
9	3,099	3,080	3,066	3,092	3,099	3,065	3,081	3,122	3,080	3,090	3,097	3,110	3,115	3,111	3,121
10	3,115	3,136	3,105	3,103	3,095	3,059	3,064	3,070	3,091	3,079	3,085	3,102	3,102	3,108	3,114
11	3,014	3,086	3,115	3,138	3,060	3,069	3,094	3,092	3,115	3,112	3,109	3,109	3,114	3,134	3,135
12	3,117	3,187	3,161	3,151	3,107	3,060	3,044	3,058	3,073	3,073	3,088	3,109	3,119	3,124	3,121
13	3,069	3,024	3,016	2,996	3,020	3,043	3,082	3,078	3,090	3,071	3,088	3,112	3,098	3,120	3,115
14	3,107	3,100	3,077	3,043	3,034	3,024	3,023	3,032	2,995	3,049	3,090	3,104	3,131	3,145	3,138
15	3,014	3,038	3,048	3,053	2,985	3,027	3,037	3,068	3,089	3,066	3,103	3,121	3,149	3,213	3,169
16	3,057	3,015	3,067	3,087	3,074	3,095	3,087	3,075	3,075	3,093	3,092	3,107	3,116	3,124	3,115
17	3,040	3,042	3,007	3,033	2,986	3,081	3,061	3,055	3,078	3,084	3,086	3,122	3,111	3,115	3,110
18	3,092	3,098	3,109	3,093	3,107	3,117	3,117	3,111	3,105	3,082	3,094	3,108	3,111	3,121	3,109
19	3,099	3,129	3,128	3,145	3,150	3,134	3,114	3,100	3,104	3,107	2,104	3,117	3,117	3,138	3,130
20	3,098	3,107	3,108	3,121	3,139	3,098	3,105	3,099	3,105	3,117	3,114	4,117	3,117	3,117	3,114
21	3,225	3,028	3,027	3,049	3,010	3,049	3,090	3,099	3,108	3,121	3,118	3,118	3,114	3,126	3,132
22	3,095	3,100	3,077	3,111	3,093	3,096	3,084	3,087	3,111	3,113	3,115	3,121	3,112	3,114	3,107
23	3,224	3,185	3,118	3,194	3,160	3,110	3,117	3,105	3,124	3,112	3,113	3,117	3,117	3,124	3,115
24	3,105	3,116	3,118	3,134	3,137	3,116	3,106	3,105	3,116	3,121	3,111	3,116	3,117	3,122	3,118
25	3,082	3,067	3,048	3,030	3,077	3,090	3,104	3,120	3,130	3,111	3,113	3,126	3,126	3,125	3,120
26	3,122	3,117	3,101	3,110	3,111	3,118	3,101	3,091	3,108	3,105	3,124	3,114	3,113	3,121	3,117
27	3,131	3,150	3,116	3,090	3,053	3,066	3,056	3,073	3,106	3,110	3,115	3,114	3,124	3,132	3,134
28	3,111	3,085	3,085	3,052	2,970	3,062	3,092	3,052	3,090	3,086	3,103	3,116	3,119	3,112	3,130
29	3,077	3,080	3,068	3,021	3,126	3,122	3,120	3,109	3,125	3,123	3,119	3,117	3,114	3,117	3,119
30	3,102	3,109	3,112	3,144	3,107	3,113	3,100	3,101	3,111	3,111	3,113	3,113	3,115	3,123	3,122
31	3,094	3,142	3,128	3,113	3,113	3,112	3,102	3,101	3,120	3,118	3,119	3,119	3,122	3,145	3,151
Sums	96,173	96,065	95,757	95,904	95,597	95,530	95,491	95,643	96,009	96,023	96,235	96,523	96,620	96,939	96,845
Means	3,103	3,099	3,089	3,094	3,084	3,082	3,080	3,085	3,097	3,098	3,104	3,114	3,117	3,127	3,124

HOURLY VALUES—G.M.T.

TABLE XVIIb—7.

OCTOBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,165	3,151	3,129	3,114	3,113	3,125	3,131	3,127	3,121	3,112	3,102	3,344	3 33	2,900	5 48	444	1
3,126	3,125	3,119	3,116	3,117	3,122	3,122	3,122	3,103	3,090	3,106	3,139	21 42	3,045	1 53	94	2
3,121	3,121	3,122	3,115	3,128	3,142	3,117	3,094	3,090	3,099	3,111	3,175	23 42	3,027	1 47	148	3
3,116	3,117	3,116	3,121	3,112	3,114	3,104	3,095	3,097	3,102	3,103	3,154	12 57	3,033	4 2	121	4
3,126	3,120	3,120	3,119	3,120	3,119	3,126	3,124	3,114	3,131	3,108	3,152	2 15	3,038	5 55	114	5
3,131	3,122	3,133	3,131	3,127	3,123	3,133	3,111	3,107	3,092	3,118	3,206	1 45	3,060	3 00	149	6
3,150	3,121	3,115	3,115	3,114	3,119	3,114	3,100	3,065	3,076	3,112	3,173	14 48	3,033	23 55	140	7
3,132	3,117	3,122	3,126	3,119	3,118	3,122	3,104	3,099	3,099	3,095	3,153	0 13	2,986	1 25	167	8
3,115	3,116	3,109	3,112	3,116	3,127	3,100	3,111	3,103	3,115	3,102	3,144	21 54	3,013	2 45	131	9
3,115	3,111	3,137	3,119	3,113	3,111	3,094	3,063	3,061	3,014	3,096	3,159	17 5	2,991	23 37	168	10
3,171	3,192	3,162	3,145	3,161	3,141	3,137	3,084	3,085	3,117	3,118	3,218	15 33	2,992	0 10	226	11
3,129	3,124	3,123	3,118	3,107	3,098	3,104	3,120	3,080	3,069	3,107	3,224	1 18	3,031	4 29	193	12
3,122	3,109	3,121	3,122	3,129	3,110	3,116	3,099	3,109	3,107	3,087	3,144	18 58	2,984	2 15	163	13
3,149	3,167	3,201	3,154	3,161	3,147	3,157	3,107	3,084	3,014	3,099	3,220	16 42	2,968	8 15	252	14
3,151	3,151	3,160	3,181	3,172	3,122	3,095	3,089	3,060	3,057	3,099	3,241	12 54	2,930	4 18	311	15
3,143	3,134	3,136	3,116	3,111	3,095	3,092	3,136	3,096	3,040	3,097	3,164	21 50	2,970	1 12	194	16
3,117	3,111	3,124	3,138	3,125	3,150	3,126	3,082	3,096	3,092	3,088	3,159	20 15	2,970	2 35	189	17
3,118	3,109	3,116	3,112	3,114	3,110	3,115	3,104	3,105	3,099	3,108	3,169	1 38	3,047	2 58	122	18
3,126	3,120	3,130	3,122	3,129	3,118	3,121	3,109	3,116	3,098	3,121	3,159	3 42	3,078	23 30	81	19
3,125	3,126	3,135	3,143	3,185	3,161	3,195	3,205	3,186	3,225	3,133	3,361	23 42	3,073	4 53	288	20
3,137	3,130	3,128	3,132	3,134	3,148	3,163	3,148	3,122	3,095	3,108	3,308	0 2	2,992	3 45	316	21
3,120	3,115	3,114	3,114	3,133	3,141	3,177	3,226	3,216	3,224	3,123	3,270	22 21	3,045	2 45	225	22
3,122	3,132	3,130	3,130	3,141	3,123	3,112	3,124	3,114	3,105	3,129	3,283	0 3	3,066	4 42	217	23
3,121	3,121	3,123	3,130	3,140	3,125	3,119	3,117	3,107	3,082	3,119	3,176	22 14	3,077	24 00	99	24
3,117	3,117	3,120	3,119	3,130	3,123	3,130	3,157	3,144	3,122	3,110	3,169	22 12	2,984	2 30	185	25
3,115	3,118	3,117	3,124	3,126	3,121	3,119	3,112	3,106	3,131	3,114	3,165	1 5	3,072	2 50	93	26
3,142	3,138	3,137	3,132	3,129	3,134	3,122	3,120	3,136	3,111	3,115	3,184	0 55	3,038	4 5	146	27
3,134	3,139	3,130	3,126	3,153	3,152	3,115	3,092	3,088	3,077	3,099	3,181	19 40	2,885	4 2	296	28
3,113	3,120	3,120	3,131	3,134	3,144	3,153	3,160	3,125	3,102	3,115	3,201	21 38	2,986	3 12	215	29
3,127	3,108	3,120	3,128	3,143	3,129	3,107	3,091	3,099	3,094	3,114	3,198	3 37	3,072	21 48	126	30
3,138	3,112	3,121	3,113	3,109	3,105	3,097	3,106	3,086	3,107	3,116	3,174	13 50	3,078	22 55	96	31
97,034	96,914	96,990	96,918	97,045	96,917	96,835	96,639	96,320	96,098							
3,130	3,126	3,129	3,126	3,130	3,126	3,124	3,117	3,107	3,100							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,107	3,088	3,075	3,021	3,044	3,039	3,057	3,052	3,071	3,087	3,079	3,119	3,112	3,134	3,121
2	3,070	30,70	3,052	3,026	3,021	3,041	3,040	3,032	3,053	3,079	3,084	3,114	3,111	3,116	3,109
3	3,119	3,134	3,109	3,076	3,075	3,094	3,095	3,082	3,115	3,102	3,121	3,124	3,112	3,120	3,123
4	3,100	3,107	3,158	3,171	3,136	3,125	3,115	3,098	3,133	3,114	3,114	3,121	3,112	3,122	3,111
5	3,156	3,130	3,112	3,114	3,106	3,146	3,133	3,110	3,111	3,108	3,115	3,116	3,104	3,114	3,113
6	3,098	3,089	3,112	3,111	3,084	3,068	3,068	3,071	3,060	3,065	3,082	3,084	3,100	3,113	3,131
7	3,088	3,094	3,057	3,031	2,981	2,991	3,003	3,027	3,048	3,060	3,075	3,096	3,104	3,120	3,112
8	3,086	3,094	3,127	3,112	3,103	3,103	3,098	3,090	3,075	3,078	3,096	3,106	3,133	3,154	3,148
9	3,084	3,122	3,145	3,170	3,154	3,148	3,119	3,117	3,104	3,104	3,109	3,100	3,107	3,107	3,122
10	3,259	3,240	3,118	3,070	3,082	3,016	3,002	3,033	2,997	3,044	3,079	3,086	3,114	3,174	3,143
11	3,113	3,069	3,005	2,920	2,903	3,088	2,978	2,997	2,996	3,028	3,068	3,101	3,156	3,116	3,119
12	3,101	3,074	3,099	3,044	3,074	3,105	3,108	3,115	3,092	3,123	3,107	3,107	3,102	3,106	3,100
13	3,099	3,094	3,107	3,097	3,053	3,103	3,096	3,087	3,101	3,101	3,106	3,106	3,106	3,111	3,107
14	3,098	3,104	3,072	3,002	2,961	3,078	3,128	3,132	3,111	3,114	3,100	3,137	3,169	3,185	3,217
15	3,178	3,228	3,173	3,125	3,040	3,037	3,060	3,134	3,114	3,127	3,133	3,116	3,120	3,110	3,112
16	3,191	3,053	2,944	2,959	3,076	3,045	3,016	3,084	3,094	3,122	3,134	3,101	3,113	3,111	3,110
17	3,194	3,109	3,082	3,097	3,099	3,087	3,093	3,103	3,097	3,114	3,120	3,127	3,140	3,135	3,131
18	3,232	3,164	3,107	3,068	3,115	3,081	3,100	3,077*	3,087*	3,098	3,108	3,107	3,113	3,129	3,151
19	3,090	3,096	3,066	3,150	3,143	3,089	3,099	3,102*	3,103*	3,103	3,104	3,110	3,108	3,102	3,087
20	3,078	3,136	3,012	3,037	3,091	3,092	3.037	3,065	3,091	3,093	3,087	3,112	3,109	3,105	3,099
21	3,075	3,084	3,092	3,118	3,126	3,121	3,108	3,101	3,109	3,101	3,098	3,101	3,093	3,103	3,095
22	3,102	3,079	3,081	3,167	3,116	3,122	3,142	3,125	3,135	3,127	3,092	3,121	3,114	3,130	3,146
23	3,084	3,058	2,986	2,956	2,926	2,933	2,955	3,033	3,086	3,038	3,082	3,111	3,098	3,108	3,098
24	3,096	3,179	3,022	2,935	2,953	3,023	3,067	3,046	3,044	3,059	3,082	3,077	3,095	3,087	3,097
25	3,101	3,114	3,112	3,098	3,119	3,109	3,119	3,096	3,105	3,095	3,094	3,101	3,096	3,117	3,108
26	3,089	3,055	2,995	2,999	3,104	3,165	3,100	3,045	3,136	3,144	3,099	3,082	3,095	3,101	3,107
27	3,086	3,146	3,139	3,186	3,190	3,157	3,137	3,104	3,112	3,119	3,100	3,102	3,112	3,148	3,115
28	3,180	3,131	3,130	3,216	3,169	3,142	3,116	3,104	3,094	3,095	3,095	3,093	3,094	3,098	3,095
29	3,075	3,111	3,099	3,124	3,125	3,121	3,128	3,122	3,120	3,107	3,102	3,095	3,096	3,094	3,090
30	3,087.	3,079	3,092	3,147	3,154	3,118	3,119	3,106	3,113	3,104	3,102	3,091	3,079	3,080	3,087
Sums	93,516	93,331	92,480	92,347	92,323	92,587	92,436	92,490	92,706	92,853	92,967	93,164	93,316	93,544	93,504
Means	3,117	3,111	3,083	3,078	3,077	3,086	3,081	3,083	3,090	3,095	3,099	3,105	3,111	3,118	3,117

* Interpolated; curve smooth.

HOURLY VALUES—G.M.T.

TABLE XVIIb—8.

NOVEMBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,133	3,131	3,131	3,116	3,125	3,116	3,106	3,080	3,081	3,070	3,092	3,167	1 55	2,966	5 38	201	1
3,115	3,111	3,127	3,133	3,149	3,113	3,111	3,100	3,143	3,119	3,089	3,170	22 45	2,983	3 45	187	2
3,127	3,132	3,133	3,156	3,164	3,168	3,160	3,155	3,118	3,100	3,121	3,180	19 20	3,049	3 20	131	3
3,117	3,112	3,119	3,118	3,126	3,124	3,152	3,146	3,118	3,156	3,125	3,192	2 25	3,079	22 54	113	4
3,116	3,130	3,201	3,154	3,114	3,104	3,083	3,110	3,085	3,098	3,119	3,235	17 10	3,066	22 50	169	5
3,145	3,126	3,110	3,109	3,105	3,092	3,074	3,122	3,115	3,088	3,097	3,160	15 35	3,041	1 30	119	6
3,105	3,105	3,105	3,115	3,093	3,106	3,113	3,107	3,089	3,086	3,076	3,133	12 55	2,960	3 55	173	7
3,161	3,131	3,122	3,122	3,125	3,113	3,115	3,120	3,177	3,084	3,116	3,200	23 2	3,034	23 59	166	8
3,126	3,110	3,110	3,126	3,128	3,125	3,175	3,231	3,219	3,259	3,135	3,290	23 30	3,034	0 1	256	9
3,140	3,159	3,138	3,146	3,135	3,141	3,147	3,097	3,112	3,113	3,108	3,306	0 38	2,948	5 15	358	10
3,147	3,157	3,148	3,121	3,105	3,108	3,118	3,103	3,105	3,101	3,073	3,167	16 55	2,860	2 45	307	11
3,107	3,116	3,115	3,130	3,137	3,112	3,101	3,120	3,092	3,099	3,104	3,166	1 33	2,994	2 48	172	12
3,115	3,112	3,115	3,116	3,125	3,112	3,110	3,091	3,088	3,098	3,103	3,139	3 10	3,018	3 48	121	13
3,233	3,186	3,127	3,081	3,116	3,141	3,262	3,158	3,079	3,178	3,126	3,368	21 10	2,924	4 15	444	14
3,115	3,116	3,122	3,138	3,158	3,179	3,201	3,240	3,264	3,191	3,139	3,301	23 15	3,006	4 20	295	15
3,108	3,116	3,102	3,124	3,122	3,188	3,177	3,174	3,198	3,194	3,103	3,324	0 20	2,825	2 29	499	16
3,132	3,129	3,120	3,119	3,131	3,202	3,185	3,161	3,164	3,232	3,129	3,307	23 55	3,032	1 38	275	17
3,116	3,122	3,154	3,158	3,149	3,172	3,185	3,166	3,117	3,090	3,125	3,321	0 25	3,032	23 52	289	18
3,129	3,155	3,125	3,115	3,106	3,137	3,153	3,209	3,133	3,078	3,117	3,249	22 25	3,032	0 15	217	19
3,104	3,107	3,114	3,105	3,134	3,151	3,158	3,151	3,097	3,075	3,099	3,217	1 1	2,969	1 45	248	20
3,115	3,107	3,118	3,119	3,135	3,139	3,160	3,164	3,156	3,102	3,115	3,184	22 50	3,046	0 1	138	21
3,150	3,125	3,114	3,105	3,104	3,102	3,082	3,074	3,081	3,084	3,114	3,221	3 3	3,053	0 35	168	22
3,113	3,104	3,108	3,113	3,154	3,137	3,137	3,103	3,129	3,096	3,069	3,170	23 5	2,866	4 45	301	23
3,092	3,097	3,100	3,121	3,104	3,106	3,093	3,089	3,078	3,101	3,073	3,224	1 10	2,890	3 15	334	24
3,107	3,098	3,100	3,111	3,118	3,131	3,126	3,100	3,078	3,089	3,106	3,131	1 2	3,059	22 50	72	25
3,109	3,113	3,113	3,127	3,150	3,157	3,130	3,073	3,083	3,086	3,099	3,274	4 45	2,936	1 50	338	26
3,146	3,152	3,137	3,119	3,159	3,188	3,199	3,202	3,164	3,180	3,144	3,318	3 1	3,049	0 16	269	27
3,093	3,093	3,104	3,113	3,137	3,145	3,142	3,137	3,089	3,075	3,119	3,344	2 42	3,011	1 25	333	28
3,100	3,099	3,102	3,119	3,130	3,137	3,110	3,115	3,087	3,087	3,109	3,143	7 25	3,051	23 30	92	29
3,106	3,096	3,090	3,092	3,086	3,091	3,069	3,071	3,055	3,061	3,096	3,194	3 40	3,053	22 45	141	30
93,723	93,647	93,624	93,631	93,824	94,044	94,134	93,969	93,591	93,470							
3,124	3,122	3,121	3,121	3,127	3,135	3,138	3,132	3,120	3,116							

HORIZONTAL FORCE—MEAN.

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
*1															
*2															
*3															
*4															
*5															
*6															
*7	Instrument interfered with.														
*8															
*9															
*10															
*11															
*12															
13	...	...	...	...	3,128	3,125	3,108	3,105	3,137	3,121	3,114	3,116	3,113	3,109	3,114
14	3,088	3,092	3,096	3,076	3,066	3,066	3,109	3,054	3,091	3,050	3,086	3,092	3,104	3,105	3,110
15	3,101	3,090	3,077	3,090	3,099	3,070	3,069	3,083	3,082	3,057	3,066	3,090	3,144	3,106	3,104
*16	Instrument interfered with.														
17	...	...	...	...	...	...	...	...	...*	3,096	3,106	3,109	3,112	3,119	3,122
18	3,109	3,136	3,167	3,141	3,297	3,223	3,166	3,134	3,129	3,113	3,133	3,131	3,167	3,179	3,166
19	3,206	3,193	3,115	3,128	3,129	3,051	2,992	3,075	3,111	3,096	3,122	3,124	3,133	3,135	3,117
20	3,152	3,142	3,117	3,171	3,202	3,231	3,215	3,176	3,159	3,143	3,133	3,128	3,127	3,131	3,125
21	3,035	3,093	3,104	3,127	3,055	3,058	3,045	3,101	3,107	3,085	3,090	3,092	3,115	3,140	3,117
22	3,192	3,112	3,110	3,141	3,222	3,155	3,149	3,108	3,120	3,133	3,096	3,097	3,110	3,116	3,126
23	3,186	3,139	3,073	3,110	3,117	3,154	3,126	3,129	3,105	3,102	3,117	3,105	3,115	3,113	3,110
24	3,130	3,100	3,108	3,164	3,157	3,146	3,157	3,133	3,128	3,119	3,129	3,119	3,116	3,126	3,131
25	3,118	3,133	3,160	3,066	3,122	3,114	3,097	3,084	3,115	3,111	3,125	3,117	3,133	3,135	3,149
26	3,162	3,136	3,225	3,297	3,117	3,120	3,133	3,136	3,129	3,092	3,095	3,092	3,104	3,109	3,106
27	3,088	3,076	3,077	3,051	3,095	3,124	3,080	3,100	3,099	3,090	3,086	3,089	3,087	3,092	3,097
28	3,075	3,092	3,097	3,090	3,083	3,068	3,059	3,074	3,061	3,066	3,079	3,090	3,094	3,097	3,117
29	3,066	3,077	3,091	3,069	3,041	3,064	3,083	3,085	3,071	3,069	3,072	3,086	3,096	3,100	3,104
30	3,104	3,096	3,095	3,110	3,103	3,086	3,032	2,996	3,022	2,996	3,076	3,105	3,112	3,122	3,115
31	3,087	3,097	3,084	3,033	3,070	3,081	3,099	3,070	3,043	3,055	3,062	3,092	3,119	3,108	3,110
Sums	49,899	49,804	49,796	49,864	53,103	52,936	52,719	52,643	52,709	55,594	55,787	55,874	56,101	56,142	56,140
Means	3,118·7	3,112·8	3,112·3	3,116·5	3,123·7	3,113·9	3,101·1	3,096·6	3,100·5	3,088·6	3,099·3	3,104·1	3,116·7	3,119·0	3,118·9

* Instrument interfered with.

HOURLY VALUES—G.M.T.

TABLE XVIIb—9.

JANUARY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
Instrument interfered with.																*1, *2, *3, *4, *5, *6, *7, *8, *9, *10, *11, *12
3,114	3,114	3,116	3,120	3,136	3,126	3,109	3,099	3,086	3,088	...	3,153	19 31	3,064	23 52	89	13
3,121	3,136	3,122	3,118	3,107	3,133	3,096	3,091	3,143	3,101	3,098	3,169	22 50	3,011	4 33	158	14
3,122	3,123	3,118	3,114	3,119	3,120	3,118	...	...	...	...	3,171	11 57	3,030	5 13	141	15
Instrument interfered with.																*16
3,131	3,141	3,133	3,127	3,140	3,154	3,175	3,141	3,107	3,109	...	...	...	...	...	...	17
3,174	3,196	3,180	3,137	3,138	3,192	3,176	3,248	3,173	3,206	3,169	3,350	4 15	3,073	0 03	277	18
3,123	3,130	3,139	3,144	3,123	3,129	3,101	3,205	3,160	3,152	3,123	3,353	1 03	2,948	5 55	405	19
3,141	3,159	3,162	3,153	3,132	3,117	3,108	3,125	3,073	3,035	3,144	3,265	4 45	2,955	23 37	310	20
3,115	3,130	3,124	3,126	3,108	3,102	3,114	3,109	3,181	3,192	3,106	3,236	23 55	2,981	4 03	255	21
3,177	3,174	3,176	3,144	3,120	3,110	3,145	3,182	3,197	3,186	3,142	3,259	3 48	3,084	1 09	175	22
3,117	3,115	3,121	3,132	3,123	3,126	3,135	3,117	3,114	3,130	3,120	3,202	23 13	3,039	2 19	163	23
3,138	3,133	3,148	3,152	3,165	3,165	3,148	3,133	3,128	3,118	3,136	3,199	3 15	3,084	0 49	115	24
3,155	3,136	3,143	3,146	3,155	3,166	3,216	3,207	3,133	3,162	3,136	3,265	21 30	3,047	3 05	218	25
3,109	3,106	3,104	3,106	3,107	3,108	3,114	3,125	3,139	3,088	3,126	3,347	3 12	3,045	4 25	302	26
3,102	3,103	3,110	3,112	3,101	3,101	3,087	3,077	3,068	3,075	3,091	3,141	5 12	3,017	3 15	124	27
3,118	3,101	3,110	3,097	3,098	3,096	3,081	3,064	3,071	3,066	3,086	3,123	13 51	3,041	22 15	82	28
3,107	3,107	3,104	3,106	3,106	3,104	3,103	3,098	3,101	3,104	3,089	3,137	23 31	3,019	3 45	118	29
3,111	3,115	3,118	3,110	3,113	3,102	3,127	3,122	3,086	3,087	3,090	3,169	3 48	2,921	6 36	248	30
3,117	3,118	3,107	3,115	3,117	3,114	3,103	3,099	3,100	3,074	3,091	3,140	11 46	3,008	2 57	132	31
56,292	56,337	56,335	56,259	56,208	56,265	56,256	53,242	53,060	52,973							
3,127·3	3,129·8	3,129·7	3,125·5	3,122·7	3,125·8	3,125·3	3,131·9	3,121·2	3,116·1							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,074	3,094	3,104	3,100	3,111	3,137	3,110	3,078	3,074	3,084	3,095	3,104	3,101	3,106	3,119
2	3,110	3,101	3,114	3,116	3,111	3,113	3,089	3,085	3,113	3,066	3,074	3,096	3,103	3,104	3,103
3	3,085	3,087	3,094	3,104	3,102	3,068	3,064	3,074	3,081	3,087	3,098	3,102	3,098	3,106	3,105
4	3,082	3,081	3,084	3,098	3,106	3,101	3,106	3,096	3,088	3,092	3,098	3,097	3,101	3,105	3,117
5	3,076	3,080	3,076	3,146	3,152	3,100	3,120	3,112	3,118	3,110	3,105	3,106	3,112	3,123	3,117
6	3,089	3,102	3,126	3,112	3,100	3,096	3,081	3,062	3,080	3,095	3,091	3,095	3,104	3,101	3,102
7	3,123	3,146	3,121	3,116	3,087	3,109	3,108	3,106	3,086	3,088	3,099	3,104	3,113	3,126	3,115
8	3,098	3,088	3,079	3,065	3,044	3,033	3,093	3,064	3,091	3,094	3,106	3,106	3,112	3,122	3,108
9	3,100	3,179	3,102	3,091	3,094	3,133	3,115	3,103	3,085	3,082	3,092	3,103	3,103	3,113	3,105
10	3,147	3,117	3,101	3,083	3,087	3,102	3,112	3,105	3,095	3,098	3,097	3,101	3,101	3,104	3,102
11	3,118	3,112	3,120	3,105	3,108	3,122	3,106	3,092	3,100	3,100	3,100	3,109	3,108	3,112	3,106
12	3,095	3,096	3,098	3,123	3,168	3,041	2,964	3,069	3,052	3,050	3,076	3,095	3,097	3,111	3,133
13	3,137	3,124	3,035	3,055	3,090	3,114	3,112	3,069	3,024	3,044	3,095	3,103	3,110	3,123	3,140
14	3,105	3,103	3,099	3,111	3,103	3,069	3,084	3,095	3,086	3,091	3,117	3,118	3,146	3,166	3,229
15	3,227	3,152	3,202	3,203	3,077	3,055	3,070	3,073	3,018	3,056	3,098	3,105	3,104	3,102	3,156
16	3,128	3,111	3,093	3,125	3,060	3,085	3,100	3,113	3,111	3,106	3,107	3,113	3,124	3,131	3,144
17	3,113	3,119	3,115	3,110	3,106	3,096	3,081	3,052	3,078	3,096	3,085	3,093	3,099	3,108	3,117
18	3,160	3,123	3,134	3,194	3,162	3,113	3,105	3,100	3,103	3,097	3,098	3,097	3,108	3,102	3,100
19	3,105	3,095	3,080	3,065	3,041	3,039	3,091	3,109	3,112	3,087	3,084	3,095	3,100	3,121	3,108
20	3,072	3,075	3,066	3,055	3,041	3,088	3,085	3,102	3,102	3,098	3,087	3,097	3,092	3,096	3,099
21	3,081	3,075	3,077	3,104	3,056	3,045	3,099	3,090	3,095	3,083	3,088	3,086	3,089	3,094	3,100
22	3,084	3,096	3,113	3,133	3,126	3,109	3,103	3,094	3,091	3,096	3,100	3,099	3,096	3,096	3,097
23	3,085	3,068	3,101	3,090	3,095	3,088	3,073	3,087	3,107	3,103	3,095	3,094	3,094	3,094	3,098
24	3,080	3,085	3,089	3,104	3,100	3,106	3,089	3,102	3,102	3,092	3,103	3,099	3,099	3,101	3,102
25	3,070	3,069	2,990	2,956	2,943	2,994	3,021	3,057	3,071	3,102	3,076	3,084	3,124	3,132	3,134
26	3,229	3,131	3,063	3,050	3,041	3,083	3,106	3,100	3,082	3,061	3,032	3,093	3,108	3,109	3,107
27	3,096	3,106	3,114	3,092	3,027	3,049	3,088	3,105	3,103	3,096	3,107	3,104	3,104	3,106	3,107
28	3,107	3,107	3,118	3,107	3,103	3,104	3,107	3,111	3,108	3,106	3,110	3,107	3,116	3,120	3,126
Sums	87,076	86,922	86,708	86,813	86,441	86,392	86,482	86,505	86,456	86,460	86,613	86,865	86,966	87,134	87,296
Means	3,109·9	3,104·4	3,096·7	3,100·5	3,087·2	3,085·4	3,088·6	3,089·5	3,087·7	3,087·9	3,093·3	3,100·2	3,105·9	3,111·9	3,117·7

HOURLY VALUES—G.M.T.

TABLE XVIIb—10.

FEBRUARY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,121	3,125	3,118	3,118	3,114	3,112	3,112	3,108	3,104	3,110	3,106	3,154	4 56	3,054	3 30	100	1
3,107	3,110	3,112	3,103	3,100	3,098	3,091	3,087	3,082	3,085	3,099	3,154	4 47	3,056	9 14	98	2
3,109	3,108	3,106	3,106	3,110	3,111	3,106	3,099	3,093	3,082	3,096	3,119	3 54	3,047	5 57	72	3
3,113	3,109	3,109	3,113	3,130	3,133	3,121	3,082	3,097	3,076	3,102	3,139	19 52	3,056	23 32	83	4
3,113	3,119	3,114	3,114	3,123	3,150	3,128	3,128	3,104	3,089	3,115	3,173	3 34	3,061	1 22	112	5
3,104	3,103	3,108	3,106	3,125	3,127	3,125	3,154	3,121	3,123	3,105	3,199	22 36	3,052	7 07	147	6
3,117	3,129	3,135	3,119	3,114	3,096	3,082	3,082	3,094	3,098	3,108	3,167	1 07	3,035	4 12	132	7
3,113	3,128	3,144	3,121	3,100	3,116	3,111	3,102	3,103	3,100	3,098	3,150	17 20	3,017	5 10	133	8
3,112	3,147	3,144	3,103	3,108	3,105	3,131	3,151	3,155	3,147	3,116	3,241	0 51	3,047	3 42	194	9
3,106	3,107	3,107	3,115	3,117	3,127	3,128	3,133	3,126	3,118	3,109	3,174	0 18	3,032	3 22	142	10
3,116	3,105	3,102	3,103	3,106	3,109	3,118	3,106	3,098	3,095	3,107	3,138	21 31	3,072	23 56	66	11
3,112	3,100	3,100	3,104	3,104	3,108	3,105	3,160	3,166	3,137	3,098	3,216	3 58	2,933	5 51	283	12
3,126	3,119	3,119	3,118	3,132	3,140	3,143	3,150	3,106	3,105	3,105	3,170	21 48	2,965	8 28	205	13
3,128	3,099	3,100	3,104	3,113	3,119	3,128	3,140	3,154	3,227	3,120	3,322	13 45	3,032	5 33	290	14
3,128	3,119	3,109	3,115	3,119	3,119	3,133	3,116	3,116	3,128	3,113	3,290	2 43	2,995	8 20	295	15
3,139	3,133	3,109	3,111	3,112	3,122	3,154	3,177	3,120	3,113	3,118	3,196	21 50	3,012	2 03	184	16
3,125	3,123	3,152	3,104	3,120	3,119	3,124	3,112	3,143	3,160	3,109	3,194	23 25	3,036	7 00	158	17
3,098	3,102	3,112	3,107	3,101	3,101	3,108	3,091	3,084	3,105	3,111	3,250	3 24	3,052	23 17	198	18
3,111	3,111	3,087	3,089	3,084	3,128	3,140	3,105	3,070	3,072	3,093	3,166	20 12	2,984	4 57	182	19
3,108	3,111	3,116	3,121	3,120	3,119	3,114	3,084	3,094	3,081	3,094	3,133	18 12	3,002	3 34	131	20
3,098	3,093	3,100	3,090	3,100	3,108	3,103	3,097	3,080	3,084	3,089	3,127	2 40	3,014	4 38	113	21
3,098	3,108	3,114	3,108	3,098	3,118	3,140	3,132	3,137	3,085	3,108	3,161	20 37	3,057	0 49	104	22
3,117	3,106	3,093	3,093	3,097	3,112	3,114	3,106	3,073	3,080	3,095	3,125	20 38	3,038	0 18	87	23
3,104	3,099	3,097	3,100	3,100	3,100	3,089	3,089	3,073	3,070	3,096	3,118	5 15	3,054	2 08	64	24
3,149	3,143	3,135	3,131	3,142	3,154	3,167	3,198	3,200	3,229	3,097	3,249	23 45	2,912	3 25	337	25
3,142	3,108	3,104	3,105	3,104	3,110	3,084	3,080	3,084	3,096	3,094	3,189	6 11	2,989	3 20	200	26
3,111	3,112	3,112	3,111	3,114	3,115	3,110	3,114	3,097	3,107	3,100	3,147	2 56	3,007	3 41	140	27
3,119	3,119	3,118	3,115	3,114	3,113	3,110	3,106	3,104	3,099	3,111	3,143	1 50	3,043	1 57	100	28
87,244	87,195	87,176	87,047	87,121	87,287	87,319	87,280	87,078	87,101							
3,115·9	3,114·1	3,113·4	3,108·8	3,111·5	3,117·5	3,118·5	3,117·5	3,109·9	3,110·8							

6624—U

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,099	3,106	3,113	3,104	3,100	3,102	3,103	3,097	3,094	3,111	3,115	3,113	3,116	3,120	3,122
2	3,099	3,105	3,118	3,109	3,114	3,107	3,106	3,098	3,094	3,085	3,097	3,099	3,111	3,113	3,117
3	3,101	3,107	3,107	3,113	3,117	3,114	3,107	3,106	3,104	3,107	3,109	3,114	3,119	3,118	3,127
4	3,165	3,154	3,146	3,140	3,137	3,085	3,074	3,096	3,094	3,108	3,124	3,135	3,129	3,124	3,124
5	3,119	3,136	3,156	3,145	3,143	3,119	3,119	3,118	3,104	3,100	3,106	3,117	3,123	3,133	3,129
6	3,112	3,120	3,118	3,122	3,139	3,134	3,122	3,110	3,114	3,122	3,113	3,110	3,120	3,135	3,118
7	3,065	3,057	3,061	3,079	3,083	3,045	3,051	3,055	3,060	3,076	3,091	3,096	3,098	3,108	3,113
8	3,109	3,095	3,081	3,082	3,075	3,089	3,119	3,095	3,101	3,101	3,102	3,103	3,104	3,113	3,122
9	3,115	3,089	3,100	3,105	3,107	3,107	3,079	3,057	3,079	3,091	3,102	3,109	3,111	3,113	3,112
10	3,104	3,104	3,109	3,116	3,103	3,122	3,109	3,115	3,116	3,117	3,116	3,120	3,121	3,119	3,121
11	3,099	3,100	3,099	3,111	3,112	3,104	3,106	3,112	3,112	3,112	3,115	3,117	3,118	3,120	3,119
12	3,057	3,085	3,090	3,085	3,077	3,079	3,089	3,105	3,112	3,117	3,119	3,118	3,125	3,120	3,122
13	3,099	3,101	3,106	3,122	3,116	3,117	3,105	3,115	3,117	3,115	3,118	3,119	3,121	3,125	3,122
14	3,121	3,112	3,074	3,094	3,102	3,095	3,109	3,052	3,094	3,154	3,143	3,136	3,138	3,145	3,175
15	3,174	3,184	3,179	3,142	3,084	3,113	3,109	3,098	3,091	3,093	3,101	3,129	3,087	3,111	3,123
16	3,093	3,101	3,101	3,031	3,050	3,092	3,094	3,087	3,089	3,074	3,084	3,083	3,092	3,090	3,096
17	3,114	3,073	3,070	3,094	3,071	3,075	3,087	3,082	3,062	3,038	3,069	3,093	3,112	3,120	3,126
18	3,109	3,102	3,085	3,112	3,100	3,093	3,100	3,088	3,096	3,099	3,103	3,102	3,103	3,121	3,107
19	3,122	3,105	3,104	3,070	3,098	3,053	3,079	3,074	3,076	3,095	3,098	3,111	3,101	3,112	3,132
20	3,102	3,108	3,125	3,141	3,136	3,112	3,113	3,105	3,098	3,107	3,097	3,101	3,109	3,112	3,130
21	3,124	3,116	3,064	3,056	3,021	3,035	3,037	3,049	3,075	3,105	3,102	3,101	3,115	3,128	3,149
22	3,094	3,094	3,139	3,111	3,090	3,094	3,106	3,103	3,105	3,098	3,094	3,100	3,108	3,110	3,114
23	3,103	3,108	3,088	3,049	3,067	3,087	3,086	3,101	3,103	3,099	3,107	3,109	3,116	3,108	3,116
24	3,186	3,158	3,186	3,100	3,093	3,099	3,110	3,097	3,090	3,098	3,100	3,110	3,105	3,114	3,114
25	3,095	3,097	3,093	3,088	3,086	3,099	3,090	3,087	3,091	3,090	3,094	3,100	3,101	3,098	3,099
26	3,074	3,081	3,074	3,060	3,056	3,060	3,075	3,082	3,089	3,092	3,088	3,087	3,093	3,096	3,103
27	3,094	3,086	3,076	3,091	3,084	3,090	3,094	3,084	3,080	3,086	3,075	3,092	3,099	3,103	3,106
28	3,103	3,082	3,055	3,037	3,052	3,039	3,043	3,068	3,078	3,085	3,092	3,094	3,100	3,118	3,114
29	3,104	3,079	3,052	3,045	3,009	3,033	3,066	3,088	3,098	3,100	3,104	3,106	3,108	3,105	3,119
30	3,130	3,132	3,126	3,026	3,055	3,087	3,079	3,088	3,087	3,082	3,093	3,095	3,094	3,104	3,096
31	3,073	3,071	3,083	3,080	3,086	3,097	3,090	3,076	3,055	3,075	3,086	3,091	3,088	3,092	3,116
Sums	96,358	96,248	96,178	96,860	95,763	95,777	95,856	95,788	95,858	96,014	96,157	96,310	96,385	96,548	96,703
Means	3,108·3	3,104·8	3,102·5	3,092·3	3,089·1	3,089·6	3,092·1	3,089·9	3,092·2	3,097·2	3,101·8	3,106·8	3,109·2	3,114·5	3,119·6

HOURLY VALUES—G.M.T.

TABLE XVIIb—11.

MARCH, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,120	3,124	3,125	3,122	3,119	3,115	3,106	3,102	3,096	3,099	3,110	3,133	20 00	3,073	7 38	60	1
3,116	3,113	3,114	3,113	3,114	3,114	3,109	3,103	3,100	3,101	3,107	3,143	1 51	3,080	9 16	63	2
3,128	3,125	3,125	3,131	3,134	3,149	3,147	3,153	3,164	3,165	3,123	3,192	23 03	3,096	1 33	96	3
3,123	3,121	3,118	3,117	3,116	3,132	3,138	3,148	3,140	3,119	3,124	3,177	0 01	3,056	5 32	121	4
3,126	3,123	3,122	3,120	3,121	3,124	3,112	3,111	3,109	3,112	3,122	3,172	2 03	3,093	9 16	79	5
3,115	3,114	3,108	3,113	3,111	3,118	3,135	3,143	3,139	3,065	3,120	3,175	23 00	3,056	2 36	119	6
3,111	3,110	3,108	3,108	3,104	3,101	3,102	3,106	3,111	3,109	3,088	3,120	22 56	3,032	5 00	88	7
3,109	3,106	3,109	3,108	3,109	3,121	3,145	3,139	3,164	3,115	3,109	3,229	23 37	3,060	4 06	169	8
3,121	3,115	3,114	3,115	3,119	3,116	3,115	3,116	3,108	3,104	3,105	3,130	4 42	3,044	6 45	86	9
3,119	3,120	3,124	3,121	3,123	3,125	3,122	3,118	3,106	3,099	3,116	3,130	2 28	3,083	2 20	47	10
3,121	3,120	3,122	3,124	3,122	3,120	3,123	3,125	3,069	3,057	3,112	3,143	22 12	3,022	23 31	121	11
3,120	3,120	3,117	3,117	3,115	3,116	3,118	3,117	3,104	3,099	3,107	3,130	22 10	3,047	0 28	83	12
3,128	3,125	3,123	3,121	3,111	3,117	3,119	3,134	3,130	3,121	3,118	3,150	22 09	3,088	0 06	62	13
3,105	3,123	3,134	3,125	3,137	3,148	3,142	3,158	3,154	3,174	3,125	3,287	13 52	2,950	14 10	337	14
3,110	3,106	3,110	3,120	3,118	3,129	3,138	3,094	3,068	3,093	3,115	3,256	2 15	3,015	4 22	241	15
3,100	3,118	3,129	3,110	3,116	3,126	3,098	3,111	3,122	3,114	3,096	3,184	1 24	2,995	3 00	189	16
3,127	3,151	3,123	3,130	3,121	3,130	3,121	3,147	3,123	3,109	3,102	3,165	22 14	2,998	4 15	167	17
3,119	3,112	3,106	3,105	3,103	3,104	3,105	3,121	3,138	3,122	3,106	3,180	23 07	3,022	4 15	158	18
3,109	3,105	3,106	3,110	3,121	3,113	3,108	3,101	3,095	3,102	3,100	3,146	13 45	3,023	4 57	123	19
3,120	3,115	3,109	3,112	3,110	3,116	3,110	3,106	3,102	3,124	3,113	3,156	2 54	3,083	22 41	73	20
3,128	3,113	3,112	3,100	3,131	3,137	3,116	3,116	3,094	3,094	3,096	2,161	13 45	2,998	4 03	163	21
3,115	3,116	3,117	3,125	3,132	3,126	3,128	3,130	3,129	3,103	3,112	3,161	1 51	3,060	1 30	101	22
3,136	3,148	3,116	3,122	3,122	3,108	3,112	3,114	3,144	3,186	3,109	3,200	23 48	3,006	3 57	194	23
3,110	3,113	3,107	3,107	3,106	3,104	3,106	3,095	3,098	3,095	3,111	3,190	0 10	3,057	2 02	133	24
3,102	3,123	3,106	3,099	3,100	3,099	3,094	3,092	3,082	3,074	3,096	3,148	16 16	3,067	23 51	81	25
3,102	3,096	3,099	3,099	3,094	3,092	3,089	3,090	3,090	3,094	3,086	3,116	14 42	3,042	1 33	74	26
3,101	3,101	3,103	3,104	3,104	3,106	3,101	3,096	3,101	3,103	3,094	3,119	23 41	3,052	2 16	67	27
3,108	3,106	3,105	3,107	3,105	3,101	3,100	3,095	3,099	3,104	3,087	3,135	23 45	3,008	3 12	127	28
3,129	3,128	3,149	3,138	3,121	3,122	3,129	3,124	3,128	3,130	3,100	3,153	16 32	2,993	3 51	160	29
3,087	3,111	3,100	3,093	3,099	3,104	3,108	3,098	3,116	3,073	3,094	3,188	1 02	2,986	3 27	202	30
3,141	3,132	3,114	3,112	3,095	3,090	3,111	3,104	3,080	3,081	3,093	3,176	14 39	3,025	23 55	151	31
96,606	96,653	96,574	96,548	96,553	96,623	96,607	96,607	96,503	96,340							
3,116·3	3,117·8	3,115·3	3,114·5	3,114·6	3,116·9	3,116·4	3,116·4	3,113·0	3,107·7							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,081	3,093	3,096	3,095	3,031	3,069	3,091	3,098	3,093	3,086	3,087	3,090	3,094	3,092	3,103
2	3,099	3,073	3,040	3,049	3,054	3,055	3,051	3,078	3,079	3,085	3,085	3,086	3,100	3,106	3,099
3	3,100	3,116	3,140	3,108	3,106	3,097	3,098	3,093	3,092	3,091	3,090	3,088	3,088	3,089	3,093
4	3,085	3,078	3,073	3,070	3,044	3,025	3,054	3,073	3,085	3,091	3,088	3,092	3,090	3,091	3,102
5	3,062	3,025	3,029	3,031	3,070	3,094	3,091	3,093	3,091	3,091	3,089	3,091	3,093	3,093	3,094
6	3,077	3,076	3,075	3,083	3,087	3,085	3,089	3,087	3,087	3,084	3,083	3,086	3,086	3,085	3,087
7	3,075	3,069	3,068	3,071	3,076	3,086	3,074	3,079	3,078	3,076	3,083	3,083	3,083	3,082	3,081
8	3,068	3,065	3,065	3,086	3,069	3,066	3,069	3,074	3,078	3,081	3,080	3,081	3,081	3,078	3,084
9	3,132	3,138	3,125	3,060	3,075	3,046	3,048	3,071	3,076	3,079	3,078	3,089	3,059	3,167	3,129
10	3,064	3,044	3,049	3,055	3,050	3,043	3,020	3,033	3,038	3,051	3,070	3,061	3,074	3,081	3,089
11	3,103	3,054	3,031	3,026	3,070	3,030	3,047	3,065	3,071	3,071	3,070	3,071	3,075	3,087	3,089
12	3,086	3,075	3,044	3,023	3,015	3,026	3,032	3,044	3,058	3,073	3,069	3,085	3,088	3,089	3,092
13	3,057	3,082	3,075	3,073	3,087	3,069	3,075	3,072	3,070	3,083	3,083	3,083	3,086	3,091	3,095
14	3,089	3,089	3,148	3,093	3,079	3,082	3,069	3,070	3,083	3,076	3,072	3,086	3,092	3,098	3,103
15	3,091	3,104	3,101	3,089	3,046	3,029	3,032	3,042	3,066	3,071	3,080	3,091	3,093	3,093	3,093
16	3,090	3,098	3,091	3,089	3,091	3,068	3,083	3,062	3,082	3,090	3,092	3,093	3,108	3,126	3,099
17	3,094	3,082	3,087	3,098	3,093	3,086	3,051	3,045	3,044	3,076	3,090	3,090	3,100	3,113	3,144
18	3,098	3,109	3,097	3,094	3,091	3,085	3,088	3,092	3,092	3,089	3,088	3,090	3,092	3,090	3,095
19	3,091	3,088	3,081	3,107	3,098	3,100	3,096	3,091	3,090	3,092	3,093	3,093	3,091	3,100	3,097
20	3,106	3,080	3,081	3,087	3,093	3,090	3,064	3,070	3,077	3,082	3,076	3,085	3,090	3,088	3,092
21	3,091	3,085	3,090	3,077	3,068	3,073	3,077	3,078	3,081	3,082	3,086	3,088	3,094	3,096	3,096
22	3,092	3,097	3,102	3,087	3,091	3,087	3,087	3,089	3,091	3,095	3,096	3,094	3,094	3,098	3,103
23	3,052	3,056	3,051	3,058	3,042	3,055	3,034	3,059	3,090	3,093	3,089	3,089	3,089	3,090	3,092
24	3,081	3,077	3,076	3,067	3,067	3,080	3,074	3,076	3,082	3,086	3,088	3,086	3,088	3,089	3,090
25	3,078	3,077	3,070	3,070	3,082	3,079	3,065	3,066	3,072	3,078	3,079	3,084	3,089	3,094	3,098
26	3,079	3,085	3,074	3,075	3,082	3,080	3,078	3,079	3,080	3,079	3,081	3,083	3,085	3,091	3,098
27	3,079	3,087	3,094	3,089	3,073	3,078	3,085	3,086	3,081	3,078	3,077	3,088	3,090	3,103	3,120
28	3,099	3,104	3,049	3,033	3,072	3,066	3,059	3,063	3,077	3,085	3,085	3,078	3,088	3,094	3,096
29	3,090	3,080	3,086	3,092	3,090	3,087	3,087	3,079	3,065	3,070	3,071	3,082	3,090	3,090	3,101
30	3,087	3,089	3,083	3,091	3,092	3,089	3,086	3,085	3,085	3,081	3,081	3,083	3,087	3,093	3,102
Sums	92,576	92,475	92,371	92,226	92,184	92,105	92,054	92,192	92,334	92,445	92,479	92,569	92,657	92,877	92,956
Means	3,085·9	3,082·5	3,079·0	3,074·2	3,072·8	3,070·2	3,068·5	3,073·0	3,077·8	3,081·5	3,082·6	3,085·6	3,088·6	3,095·9	3,098·5

HOURLY VALUES—G.M.T.

TABLE XVIIb—12.

APRIL, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,117	3,093	3,092	3,094	3,105	3,101	3,099	3,088	3,122	3,099	3,092	3,149	22 45	3,021	3 46	128	1
3,094	3,096	3,093	3,092	3,088	3,094	3,088	3,092	3,089	3,100	3,082	3,112	12 48	3,025	1 28	87	2
3,100	3,095	3,092	3,093	3,093	3,092	3,091	3,079	3,075	3,085	3,096	3,160	1 47	3,059	23 30	101	3
3,099	3,101	3,102	3,108	3,091	3,091	3,094	3,089	3,102	3,062	3,084	3,121	17 25	3,006	4 9	115	4
3,096	3,092	3,090	3,092	3,094	3,091	3,089	3,086	3,084	3,077	3,082	3,103	6 28	3,004	1 23	98	5
3,087	3,087	3,088	3,088	3,088	3,090	3,089	3,085	3,082	3,075	3,085	3,098	5 40	3,061	2 24	37	6
3,081	3,080	3,080	3,080	3,078	3,079	3,078	3,075	3,070	3,068	3,078	3,094	4 45	3,062	1 10	32	7
3,092	3,087	3,089	3,087	3,087	3,081	3,082	3,091	3,123	3,132	3,082	3,140	23 6	3,043	22 5	97	8
3,130	3,100	3,142	3,118	3,103	3,106	3,074	3,062	3,049	3,064	3,093	3,232	13 4	2,910	15 25	322	9
3,102	3,103	3,094	3,083	3,098	3,107	3,102	3,107	3,103	3,103	3,073	3,137	23 58	3,009	6 8	128	10
3,094	3,091	3,092	3,094	3,101	3,094	3,089	3,097	3,103	3,086	3,075	3,121	23 27	2,992	3 15	129	11
3,126	3,124	3,104	3,112	3,108	3,101	3,100	3,094	3,077	3,057	3,076	3,142	15 33	2,987	3 9	155	12
3,091	3,088	3,089	3,093	3,094	3,102	3,090	3,097	3,100	3,089	3,084	3,137	23 11	3,043	0 25	94	13
3,109	3,101	3,108	3,101	3,092	3,092	3,100	3,093	3,096	3,091	3,093	3,149	2 15	3,050	9 20	99	14
3,093	3,095	3,103	3,107	3,105	3,106	3,113	3,096	3,071	3,090	3,084	3,137	1 0	3,018	5 8	119	15
3,115	3,111	3,107	3,119	3,118	3,100	3,100	3,099	3,098	3,094	3,097	3,158	12 47	3,045	4 58	113	16
3,118	3,105	3,094	3,107	3,108	3,114	3,104	3,105	3,090	3,098	3,093	3,163	13 59	3,029	7 50	134	17
3,093	3,094	3,097	3,095	3,092	3,088	3,113	3,117	3,098	3,091	3,095	3,126	20 45	3,063	4 43	63	18
3,096	3,095	3,099	3,106	3,096	3,105	3,099	3,107	3,109	3,106	3,097	3,133	23 52	3,041	2 13	92	19
3,089	3,087	3,094	3,093	3,094	3,094	3,097	3,103	3,101	3,091	3,088	3,121	4 36	3,056	6 6	65	20
3,096	3,095	3,096	3,097	3,098	3,099	3,098	3,096	3,096	3,092	3,089	3,106	23 9	3,061	4 21	44	21
3,098	3,094	3,091	3,092	3,094	3,900	3,090	3,093	3,088	3,052	3,092	3,160	2 30	3,049	3 10	111	22
3,090	3,088	3,090	3,088	3,090	3,089	3,085	3,085	3,081	3,081	3,077	3,107	13 45	3,004	4 11	103	23
3,092	3,094	3,095	3,085	3,087	3,096	3,086	3,089	3,088	3,078	3,084	3,100	20 20	3,057	3 12	43	24
3,090	3,089	3,090	3,092	3,092	3,088	3,087	3,087	3,086	3,079	3,083	3,107	13 25	3,052	6 45	55	25
3,094	3,091	3,092	3,092	3,091	3,091	3,091	3,090	3,084	3,079	3,085	3,105	13 59	3,059	0 11	46	26
3,108	3,100	3,096	3,091	3,102	3,098	3,085	3,095	3,098	3,099	3,091	3,135	14 29	3,056	3 42	79	27
3,095	3,094	3,095	3,093	3,093	3,094	3,091	3,095	3,094	3,090	3,083	3,128	0 50	3,018	1 52	110	28
3,103	3,097	3,091	3,089	3,088	3,084	3,079	3,082	3,087	3,087	3,086	3,107	14 25	3,041	2 3	66	29
3,091	3,092	3,092	3,093	3,094	3,092	3,085	3,084	3,090	3,086	3,089	3,105	13 39	3,075	10 0	30	30
92,979	92,859	92,877	92,874	92,862	92,849	92,768	92,758	92,734	92,581							
3,099·3	3,095·3	3,095·9	3,095·8	3,095·4	3,095·0	3,092·3	3,091·9	3,091·1	3,086·0							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
*1	*Record missing.														
2	...	...	...	3,057	3,060	3,078	3,074	3,072	3,078	3,078	3,080	3,083	3,088	3,089	3,085
3	3,080	3,071	3,068	3,072	3,064	3,057	3,068	3,078	3,081	3,078	3,063	3,066	3,075	3,081	3,085
4	3,078	3,074	3,073	3,072	3,064	3,067	3,068	3,075	3,068	3,046	3,062	3,082	3,089	3,108	3,095
5	3,091	3,044	3,055	2,983	2,969	3,005	3,008	3,039	3,033	3,067	3,083	3,080	3,089	3,091	3,094
6	3,003	3,059	3,085	3,055	3,015	3,037	3,060	3,064	3,064	3,004	3,067	3,080	3,105	3,030	3,087
7	3,054	3,033	2,996	3,039	3,039	3,045	3,062	3,065	3,073	3,054	3,035	3,061	3,087	3,040	3,008
8	3,072	3,077	3,063	3,056	3,050	3,046	3,075	3,059	3,084	3,077	3,078	3,080	3,071	3,091	3,091
9	3,084	3,080	3,081	3,072	3,061	3,072	3,080	3,078	3,075	3,066	3,061	3,076	3,092	3,079	3,077
10	3,090	3,085	3,067	3,063	3,059	3,046	3,058	3,063	3,068	3,063	3,072	3,073	3,081	3,086	3,086
11	3,072	3,057	3,042	3,052	3,043	3,033	3,044	3,050	3,070	3,072	3,077	3,078	3,082	3,085	3,087
12	3,069	3,070	3,081	3,071	3,083	3,078	3,081	3,082	3,082	3,082	3,080	3,080	3,082	3,084	3,087
13	3,088	3,086	3,077	3,078	3,052	3,074	3,078	3,080	3,084	3,081	3,081	3,083	3,086	3,091	3,091
14	3,088	3,078	3,085	3,091	3,085	3,089	3,091	3,085	3,082	3,085	3,084	3,091	3,087	3,090	3,091
15	3,089	3,090	3,095	3,087	3,080	3,080	3,082	3,088	3,089	3,077	3,083	3,093	3,094	3,095	3,090
16	3,087	3,085	3,087	3,086	3,080	3,071	3,071	3,082	3,083	3,085	3,082	3,084	3,084	3,086	3,087
17	3,089	3,082	3,079	3,065	3,057	3,055	3,061	3,064	3,050	3,075	3,083	3,088	3,092	3,098	3,101
18	3,087	3,087	3,082	3,074	3,075	3,083	3,086	3,089	3,088	3,087	3,089	3,088	3,087	3,085	3,083
19	3,076	3,068	3,058	3,058	3,051	3,048	3,054	3,070	3,075	3,073	3,069	3,063	3,082	3,084	3,081
20	3,078	3,072	3,079	3,076	3,065	3,071	3,074	3,074	3,076	3,077	3,077	3,077	3,077	3,080	3,083
21	3,071	3,073	3,079	3,074	3,070	3,075	3,080	3,077	3,076	3,076	3,075	3,079	3,074	3,077	3,088
22	3,083	3,082	3,084	3,089	3,090	3,087	3,084	3,086	3,086	3,086	3,081	3,087	3,084	3,089	3,086
23	3,081	3,082	3,079	3,083	3,084	3,085	3,084	3,084	3,084	3,084	3,084	3,084	3,084	3,084	3,084
24	3,082	3,078	3,077	3,073	3,081	3,084	3,082	3,083	3,082	3,084	3,081	3,083	3,086	3,094	3,106
25	3,090	3,083	3,084	3,078	3,083	3,072	3,084	3,078	3,073	3,074	3,092	3,092	3,092	3,094	3,101
26	3,089	3,086	3,081	3,088	3,079	3,089	3,087	3,081	3,080	3,082	3,085	3,079	3,085	3,085	3,086
27	3,080	3,079	3,078	3,084	3,078	3,078	3,078	3,081	3,081	3,083	3,084	3,078	3,078	3,099	3,081
28	3,083	3,080	3,081	3,082	3,081	3,085	3,086	3,088	3,090	3,084	3,076	3,079	3,077	3,091	3,091
29	3,090	3,088	3,084	3,091	3,084	3,085	3,086	3,084	3,084	3,080	3,077	3,083	3,088	3,088	3,073
30	3,093	3,084	3,076	3,077	3,079	3,081	3,078	3,075	3,077	3,084	3,092	3,088	3,094	3,090	3,092
31	3,085	3,089	3,083	3,072	3,076	3,086	3,089	3,089	3,086	3,083	3,087	3,090	3,091	3,089	3,089
Sums	89,302	89,202	89,139	92,098	91,937	92,042	92,193	92,263	92,302	92,227	92,320	92,428	92,563	92,553	92,566
Means	3,079·4	3,075·9	3,073·8	3,069·9	3,064·6	3,068·1	3,073·1	3,075·4	3,076·7	3,074·2	3,077·3	3,080·9	3,085·4	3,085·1	3,085·5

HOURLY VALUES—G.M.T.

TABLE XVIIb—13.

MAY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
*Record missing.																1*
3,084	3,085	3,085	3,089	3,088	3,089	3,089	3,083	3,081	3,080	...	3,112	22 50	3,038	4 03	74	2
3,087	3,086	3,084	3,082	3,084	3,082	3,084	3,081	3,081	3,078	3,077	3,127	11 02	3,043	4 58	84	3
3,098	3,100	3,115	3,136	3,116	3,102	3,073	3,084	3,091	3,091	3,085	3,151	17 32	3,036	9 05	115	4
3,112	3,088	3,089	3,095	3,098	3,087	3,098	3,090	3,076	3,003	3,063	3,130	15 05	2,949	3 38	181	5
3,108	3,003	3,104	3,083	3,084	3,110	3,072	3,067	3,069	3,054	3,064	3,149	15 42	2,778	13 02	371	6
3,097	3,091	3,087	3,091	3,096	3,101	3,073	3,091	3,090	3,072	3,063	3,148	12 41	2,859	13 40	289	7
3,095	3,087	3,083	3,084	3,089	3,096	3,094	3,086	3,090	3,084	3,078	3,130	0 35	2,999	1 20	131	8
3,082	3,080	3,083	3,083	3,083	3,087	3,085	3,083	3,078	3,090	3,078	3,103	0 19	3,045	13 54	58	9
3,084	3,089	3,087	3,089	3,085	3,084	3,078	3,077	3,079	3,072	3,075	3,117	0 12	3,038	5 00	79	10
3,088	3,086	3,084	3,082	3,084	3,082	3,082	3,089	3,071	3,069	3,070	3,094	21 40	3,015	2 00	79	11
3,089	3,087	3,088	3,092	3,088	3,092	3,090	3,085	3,087	3,088	3,083	3,103	20 15	3,050	2 40	53	12
3,089	3,088	3,092	3,098	3,097	3,094	3,083	3,085	3,094	3,088	3,085	3,107	22 50	3,036	3 42	71	13
3,088	3,089	3,085	3,091	3,090	3,089	3,090	3,090	3,090	3,089	3,088	3,096	3 40	3,066	1 13	30	14
3,093	3,094	3,096	3,096	3,101	3,092	3,083	3,083	3,082	3,087	3,089	3,107	18 48	3,052	9 24	55	15
3,087	3,086	3,088	3,089	3,088	3,090	3,084	3,085	3,093	3,089	3,085	3,101	0 20	3,057	5 55	44	16
3,096	3,097	3,100	3,093	3,089	3,091	3,091	3,092	3,091	3,087	3,082	3,103	13 06	3,036	7 45	67	17
3,082	3,081	3,082	3,079	3,081	3,084	3,081	3,080	3,076	3,076	3,083	3,096	11 25	3,066	2 07	30	18
3,081	3,080	3,081	3,078	3,078	3,082	3,087	3,087	3,079	3,078	3,073	3,093	21 35	3,029	4 16	64	19
3,079	3,079	3,081	3,078	3,077	3,079	3,077	3,078	3,081	3,071	3,077	3,107	23 23	3,045	3 33	62	20
3,088	3,086	3,085	3,086	3,086	3,089	3,086	3,089	3,083	3,083	3,080	3,096	2 37	3,056	1 17	40	21
3,085	3,084	3,086	3,087	3,087	3,085	3,085	3,085	3,084	3,081	3,085	3,094	4 05	3,070	10 00	24	22
3,084	3,084	3,084	3,083	3,084	3,084	3,084	3,086	3,083	3,082	3,084	3,090	4 48	3,075	23 08	15	23
3,096	3,092	3,089	3,090	3,097	3,091	3,090	3,088	3,086	3,090	3,087	3,109	13 46	3,068	2 18	41	24
3,097	3,091	3,089	3,085	3,088	3,087	3,091	3,093	3,088	3,089	3,087	3,116	13 37	3,045	8 12	71	25
3,090	3,084	3,083	3,083	3,082	3,089	3,085	3,089	3,083	3,080	3,084	3,093	15 18	3,068	10 40	25	26
3,089	3,091	3,088	3,089	3,086	3,089	3,086	3,084	3,085	3,083	3,084	3,123	13 25	3,061	13 43	62	27
3,089	3,089	3,092	3,094	3,090	3,093	3,092	3,096	3,090	3,090	3,087	3,102	21 03	3,056	12 00	46	28
3,063	3,094	3,094	3,091	3,092	3,095	3,086	3,073	3,101	3,093	3,086	3,112	23 20	2,997	14 40	115	29
3,052	3,097	3,102	3,088	3,089	3,089	3,086	3,087	3,086	3,085	3,086	3,109	16 45	3,050	2 25	59	30
3,088	3,089	3,087	3,091	3,091	3,095	3,091	3,093	3,089	3,079	3,087	3,105	21 30	3,063	3 25	42	31
92,680	92,557	92,673	92,675	92,668	92,699	92,556	92,559	92,537	92,381							
3,089·3	3,085·2	3,089·1	3,089·2	3,088·9	3,090·0	3,085·2	3,085·3	3,084·6	3,079·4							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,079	3,068	3,071	3,077	3,071	3,085	3,079	3,064	3,060	3,078	3,088	3,094	3,097	3,104	3,118
2	3,073	3,026	3,008	3,045	3,054	3,075	3,073	3,079	3,076	3,066	3,073	3,084	3,090	3,100	3,120
3	3,096	3,099	3,074	3,093	3,080	3,064	3,072	3,036	3,036	3,054	3,073	3,092	3,100	3,100	3,117
4	3,081	3,077	3,083	3,061	3,070	3,082	3,088	3,083	3,072	3,073	3,089	3,078	3,087	3,032	3,089
5	3,083	3,076	3,081	3,080	3,084	3,084	3,084	3,082	3,082	3,079	3,078	3,087	3,086	3,091	3,098
6	3,094	3,086	3,086	3,086	3,070	3,079	3,091	3,084	3,079	3,073	3,074	3,082	3,090	3,093	3,092
7	3,090	3,084	3,090	3,094	3,086	3,084	3,085	3,084	3,080	3,086	3,089	3,092	3,092	3,093	3,094
8	3,092	3,089	3,091	3,090	3,088	3,090	3,088	3,091	3,084	3,085	3,086	3,086	3,086	3,091	3,094
9	3,094	3,087	3,080	3,085	3,087	3,087	3,086	3,088	3,088	3,087	3,086	3,086	3,087	3,086	3,090
10	3,061	3,060	3,069	3,063	3,060	3,056	3,068	3,067	3,085	3,083	3,082	3,082	3,079	3,078	3.077
11	3,076	3,072	3,069	3,072	3,078	3,075	3,072	3,068	3,070	3,073	3,075	3,076	3,076	3,090	3,093
12	3,080	3,078	3,074	3,072	3,069	3,083	3,082	3,080	3,081	3,079	3,079	3,079	3,078	3,084	3,083
13	3,083	3,081	3,082	3,082	3,079	3,082	3,083	3,085	3,084	3,085	3,085	3,085	3,084	3,085	3,087
14	3,087	3,083	3,083	3,086	3,082	3,083	3,086	3,086	3,083	3,080	3,079	3,086	3,085	3,087	3,087
15	3,091	3,085	3,081	3,075	3,059	3,071	3,076	3,033	3,086	3,081	3,072	3,082	3,090	3,091	3,086
16	3,085	3,085	3,075	3,067	3,076	3,081	3,083	3,032	3,067	3,074	3,079	3,088	3,101	3,091	3,091
17	3,087	3,079	3,081	3,085	3,078	3,083	3,079	3,076	3,077	3,082	3,081	3,078	3,083	3,085	3,086
18	3,084	3,082	3,082	3,084	3,090	3,090	3,091	3,094	3,094	3,091	3,090	3,081	3,088	3,089	3,094
19	3,090	3,087	3,088	3,088	3,088	3,087	3,086	3,088	3,086	3,087	3,088	3,085	3,090	3,092	3,090
20	3,089	3,081	3,071	3,069	3,082	3,087	3,087	3,095	3,094	3,096	3,092	3,090	3,093	3,094	3,093
21	3,094	3,091	3,093	3,091	3,082	3,076	3,083	3,095	3,097	3,099	3,098	3,097	3,090	3,087	3,097
22	3,086	3,079	3,068	3,073	3,085	3,085	3,086	3,086	3,086	3,086	3,084	3,084	3,086	3,085	3,085
23	3,085	3,080	3,072	3,074	3,071	3,073	3,084	3,082	3,086	3,083	3,085	3,084	3,080	3,080	3,085
24	3,078	3,074	3,070	3,075	3,067	3,081	3,080	3,084	3,092	3,090	3,093	3,092	3,095	3,091	3,088
25	3,085	3,080	3,076	3,076	3,077	3,083	3,085	3,086	3,085	3,086	3,087	3,087	3,087	3,088	3,086
26	3,089	3,089	3,087	3,077	3,072	3,077	3,081	3,084	3,091	3,090	3,093	3,093	3,091	3,093	3,063
27	3,084	3,085	3,075	3,069	3,069	3,082	3,081	3,083	3,075	3,080	3,086	3,084	3,083	3,076	3,084
28	3,082	3,079	3,071	3,071	3,075	3,080	3,082	3,084	3,090	3,089	3,090	3,089	3,090	3,089	3,089
29	3,080	3,085	3,078	3,073	3,024	3,024	3,081	3,082	3,087	3,087	3,083	3,075	3,084	3,088	3,088
30	3,090	3,099	3,084	3,078	3,073	3,070	3,064	3,081	3,083	3,075	3,075	3,076	3,082	3,094	3.101
Sums	92,548	92,406	92,293	92,311	92,226	92,339	92,446	92,442	92,436	92,457	92,512	92,554	92,630	92,627	92,745
Means	3,084·9	3,080·2	3,076·4	3,077·0	3,074·2	3,078·0	3,081·5	3,081·4	3,081·2	3,081·9	3,083·7	3,085·1	4,087·7	3,087·6	3,091·5

HOURLY VALUES—G.M.T.

TABLE XVIIb—14.

JUNE, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,111	3,108	3,110	3,104	3,106	3,110	3,085	3,060	3,089	3,073	3,088	3,133	19 25	3,033	22 20	100	1
3,100	3,100	3,095	3,092	3,095	3,110	3,099	3,091	3,101	3,096	3,081	3,133	14 5	2,956	1 25	177	2
3,101	3,095	3,093	3,095	3,096	3,099	3,096	3,100	3,104	3,081	3,086	3,126	14 18	2,985	7 15	141	3
3,094	3,089	3,102	3,092	3,101	3,103	3,093	3,097	3,087	3,083	3,084	3,114	19 18	2,865	12 45	249	4
3,095	3,090	3,093	3,087	3,090	3,094	3,090	3,091	3,098	3,094	3,087	3,115	22 57	3,066	1 14	49	5
3,088	3,089	3,090	3,093	3,091	3,098	3,093	3,097	3,091	3,090	3,087	3,113	28 18	3,047	4 0	66	6
3,099	3,096	3,096	3,093	3,093	3,099	3,099	3,090	3,093	3,092	3,091	3,101	14 45	3,072	8 29	29	7
3,091	3,095	3,092	3,091	3,091	3,089	3,093	3,094	3,097	3,094	3,090	3,106	3 7	3,074	3 32	32	8
3,091	3,087	3,087	3,086	3,086	3,087	3,089	3,092	3,081	3,061	3,086	3,106	0 10	3,051	23 59	55	9
3,080	3,082	3,083	3,086	3,079	3,077	3,077	3,077	3,076	3,076	3,075	3,092	18 5	3,049	4 3	43	10
3,092	3,084	3,081	3,082	3,080	3,078	3,078	3,081	3,081	3,080	3,078	3,102	13 30	3,063	6 40	39	11
3,082	3,083	3,083	3,083	3,084	3,086	3,085	3,083	3,084	3,083	3,081	3,087	20 25	3,062	3 35	25	12
3,099	3,089	3,083	3,087	3,087	3,086	3,088	3,089	3,084	3,087	3,085	3,109	15 2	3,074	21 00	35	13
3,089	3,091	3,087	3,088	3,093	3,095	3,098	3,095	3,096	3,091	3,087	3,102	21 00	3,066	9 49	36	14
3,092	3,089	3,090	3,089	3,087	3,090	3,088	3,086	3,090	3,085	3,084	3,096	14 58	3,044	3 30	52	15
3,089	3,087	3,087	3,088	3,088	3,087	3,086	3,093	3,090	3,087	3,084	3,107	11 41	3,046	8 24	61	16
3,089	3,091	3,088	3,084	3,084	3,088	3,084	3,082	3,083	3,084	3,083	3,104	16 16	3,060	3 45	44	17
3,094	3,092	3,090	3,089	3,088	3,090	3,091	3,091	3,089	3,090	3,089	3,106	14 18	3,070	10 42	36	18
3,105	3,096	3,094	3,097	3,100	3,099	3,086	3,083	3,083	3,089	3,090	3,124	13 12	3,030	13 48	94	19
3,091	3,091	3,091	3,093	3,094	3,094	3,096	3,093	3,099	3,094	3,090	3,102	22 35	3,053	2 55	49	20
3,068	3,093	3,092	3,093	3,091	3,097	3,089	3,088	3,084	3,086	3,090	3,108	14 8	2,989	14 58	119	21
3,087	3,082	3,083	3,085	3,085	3,085	3,081	3,081	3,083	3,085	3,083	3,093	19 20	3,062	1 48	31	22
3,084	3,087	3,089	3,089	3,087	3,085	3,089	3,083	3,072	3,078	3,082	3,106	22 30	3,052	23 15	54	23
3,088	3,086	3,087	3,086	3,084	3,089	3,091	3,091	3,088	3,085	3,085	3,102	21 25	3,047	4 00	55	24
3,094	3,095	3,094	3,092	3,095	3,091	3,092	3,092	3,092	3,089	3,087	3,101	23 00	3,068	3 15	33	25
3,090	3,091	3,092	3,089	3,090	3,090	3,091	3,088	3,088	3,084	3,079	3,105	15 2	3,008	13 57	97	26
3,086	3,093	3,090	3,087	3,090	3,088	3,089	3,087	3,090	3,082	3,083	3,094	18 35	3,061	3 26	33	27
3,088	3,089	3,091	3,089	3,092	3,095	3,101	3,075	3,070	3,080	3,085	3,114	20 57	3,059	22 42	55	28
3,088	3,093	3,097	3,098	3,096	3,095	3,099	3,095	3,089	3,090	3,082	3,110	20 52	2,993	4 45	117	29
3,107	3,098	3,094	3,097	3,104	3,104	3,098	3,095	3,087	3,087	3,088	3,114	15 3	3,042	4 18	72	30
92,752	92,731	92,725	92,704	92,727	92,778	92,714	92,640	92,639	92,556							
3,091·7	3,091·0	3,090·8	3,090·1	3,090·9	3,092·6	3,090·5	3,088·0	3,088·0	3,085·2							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,087	3,084	3,089	3,094	3,095	3,088	3,085	3,078	3,079	3,088	3,092	3,092	3,095	3,110	3,093
2	3,093	3,094	3,095	3,089	3,074	3,085	3,083	3,085	3,089	3,086	3,091	3,090	3,095	3,100	3,095
3	3,093	3,087	3,074	3,074	3,078	3,086	3,093	3,090	3,085	3,084	3,080	3,087	3,097	3,096	3,099
4	3,090	3,091	3,092	3,083	3,093	3,101	3,096	3,094	3,095	3,096	3,096	3,098	3,097	3,098	3,101
5	3,097	3,097	3,100	3,098	3,096	3,096	3,097	3,099	3,099	3,101	3,100	3,100	3,096	3,101	3,107
6	3,101	3,095	3,099	3,094	3,093	3,101	3,100	3,103	3,103	3,106	3,104	3,104	3,102	3,102	3,099
7	3,106	3,095	3,099	3,094	3,096	3,091	3,099	3,103	3,101	3,107	3,106	3,107	3,101	3,110	3,105
8	3,105	3,105	3,107	3,102	3,101	3,103	3,104	3,105	3,104	3,105	3,107	3,106	3,104	3,108	3,106
9	3,105	3,102	3,103	3,101	3,100	3,103	3,102	3,100	3,100	3,102	3,101	3,103	3,103	3,104	3,105
10	3,095	3,095	3,097	3,097	3,096	3,103	3,098	3,095	3,094	3,091	3,086	3,095	3,098	3,105	3,113
11	3,098	3,099	3,099	3,096	3,096	3,100	3,102	3,105	3,102	3,098	3,094	3,091	3,103	3,104	3,105
12	3,094	3,091	3,085	3,074	3,085	3,084	3,091	3,099	3,098	3,101	3,100	3,098	3,099	3,120	3,092
13	3,086	3,075	3,098	3,085	3,070	3,087	3,090	3,093	3,093	3,094	3,092	3,092	3,102	3,071	3,084
14	3,081	3,063	3,047	3,078	3,051	3,040	3,073	3,074	3,068	3,048	3,075	3,087	3,093	3,094	3,093
15	3,082	3,084	3,070	3,076	3,072	3,072	3,068	3,067	3,076	3,080	3,083	3,076	3,083	3,089	3,092
16	3,093	3,079	3,067	3,078	3,088	3,088	3,085	3,085	3,085	3,070	3,086	3,096	3,092	3,092	3,101
17	3,090	3,088	3,083	3,080	3,089	3,076	3,078	3,094	3,096	3,095	3,097	3,096	3,088	3,083	3,095
18	3,088	3,085	3,082	3,082	3,086	3,088	3,093	3,096	3,096	3,095	3,084	3,088	3,096	3,101	3,105
19	3,089	3,086	3,090	3,093	3,092	3,089	3,088	3,082	3,082	3,090	3,095	3,095	3,097	3,095	3,097
20	3,088	3,081	3,063	3,057	3,060	3,069	3,076	3,069	3,068	3,080	3,088	3,086	3,059	3,093	3,100
21	3,075	3,057	3,057	3,043	3,043	3,043	3,056	3,064	3,061	3,080	3,086	3,089	3,093	3,092	3,093
22	3,085	3,074	3,078	3,074	3,081	3,080	3,070	3,073	3,077	3,086	3,094	3,092	3,083	3,093	3,115
23	3,093	3,071	3,063	3,074	3,091	3,081	3,077	3,079	3,095	3,094	3,097	3,098	3,097	3,095	3,095
24	3,090	3,090	3,088	3,088	3,075	3,066	3,076	3,079	3,086	3,085	3,089	3,096	3,096	3,100	3,105
25	3,100	3,090	3,091	3,090	3,084	3,077	3,086	3,078	3,065	3,054	3,076	3,091	3,106	3,110	3,115
26	3,097	3,097	3,076	3,073	3,084	3,093	3,091	3,097	3,092	3,089	3,094	3,096	3,096	3,097	3,098
27	3,092	3,106	3,087	3,083	3,088	3,087	3,089	3,092	3,086	3,084	3,093	3,090	3,092	3,096	3,094
28	3,090	3,086	3,081	3,089	3,087	3,091	3,091	3,093	3,092	3,092	3,092	3,092	3,093	3,094	3,097
29	3,095	3,094	3,105	3,098	3,071	3,073	3,090	3,096	3,097	3,093	3,093	3,097	3,097	3,098	3,098
30	3,107	3,091	3,092	3,098	3,097	3,100	3,099	3,099	3,096	3,096	3,093	3,095	3,099	3,095	3,092
31	3,092	3,089	3,085	3,086	3,096	3,097	3,096	3,092	3,092	3,092	3,091	3,090	3,097	3,097	3,094
Sums	95,877	95,721	95,642	95,621	95,608	95,638	95,722	95,759	95,755	95,762	95,855	95,913	95,952	96,043	96,073
Means	3,092·8	3,087·8	3,085·2	3,085·2	3,084·1	3,085·1	3,087·8	3,089·0	3,088·9	3,089·1	3,092·1	3,094·0	3,095·2	3,098·2	3,099·1

HOURLY VALUES—G.M.T.

TABLE XVIIb—15.

JULY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,102	3,103	3,099	3,097	3,099	3,091	3,091	3,094	3,096	3,093	3,093	3,127	13 05	3,056	0 45	71	1
3,097	3,101	3,103	3,099	3,091	3,094	3,102	3,095	3,094	3,093	3,093	3,108	16 09	3,057	4 08	51	2
3,098	3,096	3,096	3,096	3,095	3,096	3,093	3,092	3,093	3,090	3,090	3,105	3 18	3,021	3 10	84	3
3,097	3,097	3,096	3,097	3,098	3,098	3,099	3,097	3,098	3,097	3,096	3,105	2 46	3,063	2 55	42	4
3,107	3,104	3,099	3,102	3,103	3,104	3,106	3,107	3,109	3,101	3,101	3,119	13 35	3,094	12 07	25	5
3,099	3,104	3,106	3,103	3,104	3,105	3,102	3,103	3,107	3,106	3,102	3,114	23 38	3,083	3 54	31	6
3,107	3,106	3,102	3,104	3,105	3,109	3,103	3,103	3,100	3,105	3,103	3,119	13 37	3,072	13 55	47	7
3,107	3,107	3,106	3,104	3,105	3,104	3,104	3,106	3,108	3,105	3,105	3,123	1 54	3,083	2 00	40	8
3,105	3,102	3,102	3,102	3,100	3,103	3,105	3,106	3,092	3,095	3,102	3,107	21 58	3,083	23 00	24	9
3,118	3,112	3,109	3,105	3,104	3,103	3,104	3,104	3,103	3,098	3,101	3,123	14 55	3,081	10 06	42	10
3,107	3,103	3,102	3,102	3,101	3,101	3,098	3,099	3,095	3,094	3,100	3,107	6 45	3,079	10 28	28	11
3,109	3,112	3,112	3,110	3,108	3,103	3,097	3,101	3,090	3,086	3,098	3,143	13 18	3,028	14 03	115	12
3,100	3,102	3,104	3,100	3,099	3,085	3,096	3,109	3,096	3,081	3,092	3,119	12 35	2,906	13 24	213	13
3,095	3,098	3,096	3,088	3,096	3,096	3,088	3,096	3,092	3,082	3,080	3,127	22 10	3,008	2 00	119	14
3,042	3,096	3,104	3,102	3,081	3,090	3,088	3,089	3,083	3,093	3,081	3,115	17 45	2,902	14 29	213	15
3,057	3,093	3,095	3,093	3,094	3,094	3,095	3,096	3,093	3,090	3,087	3,116	14 44	2,951	15 20	165	16
3,094	3,093	3,093	3,095	3,093	3,092	3,094	3,092	3,091	3,088	3,090	3,106	20 01	3,056	12 33	50	17
3,110	3,106	3,100	3,098	3,098	3,099	3,099	3,096	3,088	3,089	3,094	3,127	15 20	3,070	10 20	57	18
3,098	3,098	3,096	3,096	3,092	3,093	3,094	3,087	3,087	3,088	3,092	3,104	3 28	3,074	1 17	30	19
3,116	3,113	3,127	3,104	3,103	3,105	3,106	3,087	3,083	3,075	3,086	3,141	17 03	3,043	3 13	98	20
3,093	3,093	3,094	3,093	3,092	3,094	3,092	3,093	3,087	3,085	3,077	3,096	17 15	3,021	2 50	75	21
3,117	3,108	3,097	3,094	3,093	3,095	3,093	3,094	3,090	3,093	3,090	3,123	15 09	3,057	2 48	66	22
3,092	3,095	3,094	3,095	3,097	3,098	3,097	3,098	3,094	3,090	3,090	3,101	4 07	3,050	1 56	51	23
3,106	3,110	3,119	3,096	3,094	3,101	3,099	3,098	3,099	3,100	3,093	3,128	16 36	3,057	4 45	71	24
3,110	3,109	3,109	3,107	3,094	3,100	3,109	3,102	3,086	3,097	3,093	3,124	13 38	3,047	8 51	77	25
3,101	3,100	3,102	3,095	3,099	3,095	3,097	3,098	3,107	3,092	3,094	3,114	22 38	3,052	3 13	62	26
3,093	3,094	3,091	3,091	3,091	3,092	3,092	3,094	3,092	3,090	3,091	3,119	0 52	3,048	2 45	71	27
3,095	3,093	3,091	3,094	3,094	3,095	3,099	3,093	3,094	3,095	3,092	3,102	13 42	3,068	2 35	34	28
3,103	3,104	3,098	3,099	3,101	3,104	3,104	3,098	3,101	3,107	3,096	3,110	1 58	3,057	4 00	53	29
3,095	3,100	3,096	3,103	3,099	3,099	3,098	3,097	3,096	3,092	3,097	3,107	0 15	3,080	1 28	27	30
3,098	3,103	3,106	3,102	3,102	3,101	3,099	3,101	3,100	3,098	3,096	3,112	17 15	3,074	1 36	38	31
96,068	96,155	96,144	96,066	96,025	96,039	96,046	96,023	95,944	95,888							
3,099·0	3,101·8	3,101·4	30,98·9	3,097·6	3,098·0	3,098·3	3,097·6	3,095·0	3,093·2							

HORIZONTAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	3,098	3,101	3,099	3,094	3,090	3,094	3,093	3,096	3,094	3,095	3,095	3,093	3,097	3,097	3,097
2	3,094	3,095	3,097	3,102	3,096	3,098	3,096	3,100	3,098	3,095	3,094	3,093	3,095	3,099	3,101
3	3,090	3,073	3,073	3,086	3,077	3,084	3,084	3,093	3,095	3,093	3,089	3,091	3,093	3,098	3,093
4	3,091	3,087	3,084	3,083	3,086	3,087	3,087	3,088	3,086	3,089	3,089	3,089	3,088	3,087	3,089
5	3,085	3,085	3,081	3,081	3,075	3,070	3,073	3,076	3,079	3,080	3,079	3,081	3,085	3,086	3,086
6	3,076	3,071	3,061	3,061	3,069	3,075	3,076	3,073	3,075	3,078	3,076	3,086	3,085	3,087	3,087
7	3,074	3,072	3,075	3,078	3,076	3,075	3,080	3,082	3,081	3,080	3,080	3,080	3,085	3,085	3,098
Sums	21,608	21,584	21,570	21,585	21,569	21,583	21,589	21,608	21,608	21,610	21,602	21,613	21,628	21,639	21,651
Means	3,086·9	3,083·4	3,081·4	3,083·6	3,081·3	3,083·3	3,084·1	3,086·9	3,086·9	3,087·1	3,086·0	3,087·6	3,089·7	3,091·3	3,093·0

HOURLY VALUES—G.M.T.

TABLE XVIIb—16.

AUGUST, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
3,096	3,094	3,096	3,098	3,099	3,100	3,097	3,095	3,094	3,094	3,096	3,102	23 55	3,079	3 33	23	1
3,099	3,098	3,096	3,097	3,098	3,100	3,098	3,102	3,101	3,090	3,098	3,107	14 08	3,083	24 00	24	2
3,091	3,091	3,092	3,092	3,093	3,093	3,091	3,089	3,088	3,091	3,089	3,101	22 16	3,060	1 21	41	3
3,089	3,085	3,085	3,087	3,085	3,085	3,083	3,085	3,085	3,085	3,087	3,101	22 13	3,059	22 21	42	4
3,083	3,083	3,082	3,080	3,082	3,085	3,084	3,082	3,080	3,076	3,081	3,101	23 31	3,065	5 00	36	5
3,085	3,084	3,090	3,086	3,088	3,084	3,090	3,087	3,084	3,074	3,080	3,092	14 36	3,035	3 08	57	6
3,088	3,087	3,086	3,083	3,085	3,084	3,089	3,085	3,082	3,087	3,082	3,141	13 57	3,050	2 37	91	7
21,631	21,622	21,627	21,623	21,630	21,631	21,632	21,625	21,614	21,597							
3,090·1	3,088·9	3,089·6	3,089·0	3,090·0	3,090·1	3,090·3	3,089·3	3,087·7	3,085·3							

VERTICAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
*1	* Interfered with.														
2	...	...	...	...	...	...	...	...	...	...	67,287	67,260	67,281	67,268	67,266
3	67,223	67,213	67,197	67,184	67,164	67,171	67,160	67,239	67,236	67,258	67,267	67,293	67,293	67,315	67,332
4	67,351	67,328	67,253	67,284	67,235	67,231	†	67,350	67,325	67,317	67,322	67,304	67,304	67,300	67,301
5	67,300	67,260	67,257	67,250	†	†	†	†	67,299	67,288	67,298	67,303	67,304	67,316	67,338
6	67,235	†	†	†	67,342	67,258	67,278	67,262	67,296	67,293	67,291	67,294	67,307	67,386	67,337
7	67,284	67,250	67,217	67,254	67,254	67,246	67,255	67,286	67,314	67,302	67,311	67,334	67,345	67,347	67,305
8	67,271	67,264	67,245	67,216	†	†	†	67,219	67,235	67,225	67,235	67,242	67,251	67,262	67,259
9	67,238	67,233	67,215	67,208	67,190	67,176	67,189	67,216	67,228	67,233	67,234	67,236	67,231	67,234	67,242
10	67,210	67,209	67,209	67,177	67,179	67,218	67,196	67,224	67,239	67,244	67,304	67,261	67,240	67,227	67,230
11	67,195	67,182	67,186	67,173	67,183	67,190	67,206	67,233	67,241	67,233	67,227	67,228	67,225	67,230	67,224
12	67,227	67,231	67,225	67,198	67,226	67,247	67,242	67,334	67,302	67,296	67,297	67,311	67,326	67,326	67,322
13	67,279	67,266	67,198	67,196	67,229	67,244	67,247	67,280	67,285	67,295	67,307	67,314	67,301	67,307	67,330
14	67,292	67,253	67,258	67,265	67,259	67,252	67,244	67,277	67,267	67,260	67,255	67,251	67,247	67,248	67,244
15	67,241	67,253	67,213	67,099	67,087	67,144	67,191	67,191	67,267	67,295	67,271	67,356	67,386	67,315	67,255
16	67,138	67,148	67,123	67,111	67,115	67,153	67,137	67,142	67,193	67,287	67,240	67,262	67,266	67,231	67,248
17	67,133	67,140	67,139	67,087	67,146	67,091	67,150	67,215	67,191	67,175	67,179	67,197	67,189	67,181	67,196
18	67,153	67,159	67,139	67,103	67,086	67,110	67,123	67,154	67,154	67,156	67,116	67,249	67,194	67,198	67,203
19	67,153	67,160	67,151	67,150	67,137	67,128	67,124	67,145	67,143	67,136	67,134	67,140	67,174	67,173	67,160
20	67,131	67,136	67,052	67,031	67,088	67,112	67,121	67,126	67,128	67,136	67,137	67,143	67,146	67,177	67,172
21	67,167	67,147	67,151	67,167	67,170	67,161	67,186	67,250	67,212	67,212	67,207	67,205	67,204	67,202	67,198
22	67,188	†	†	†	†	†	†	†	†	†	†	67,177	67,187	67,206	67,228
23	67,253	67,250	67,243	67,238	67,221	67,204	67,237	67,232	67,220	67,221	67,228	67,231	67,231	67,232	67,233
24	67,228	67,213	67,219	67,201	67,199	67,209	67,215	67,219	67,221	67,223	67,225	67,232	57,235	67,247	67,240
25	67,223	67,222	67,223	67,214	67,214	67,221	67,221	‡	‡	67,213	67,229	67,238	67,245	67,358	67,295
26	67,221	67,207	67,172	67,163	67,160	67,176	67,180	†	†	†	67,230	67,241	67,246	67,248	67,248
27	67,247	67,246	67,245	67,248	67,239	67,237	67,246	67,246	67,241	67,227	67,228	67,252	67,257	67,262	67,250
28	67,226	67,218	67,215	67,203	67,205	67,212	67,209	67,220	67,213	67,223	67,218	67,230	67,235	67,238	67,237
29	67,223	67,217	67,208	67,214	67,202	67,193	67,218	67,236	67,242	67,241	67,244	67,246	67,257	67,256	67,254
30	67,237	67,233	67,224	67,207	67,207	67,206	67,211	67,219	67,233	67,228	67,231	67,235	67,265	67,254	67,251
Sums.	1,882,267	1,747,638	1,747,177	1,746,850	1,679,737	1,679,790	1,612,786	1,613,515	1,680,925	1,748,217	1,882,752	1,950,265	1,950,372	1,950,544	1,950,398
Means	67,223·8	67,216·8	67,199·1	67,186·5	67,189·5	67,191.6	67,199·4	67,229·8	67,237·0	67,239·1	67,241·1	67,250·5	67,254·2	67,260·1	67,255·1

† No Record.

HOURLY VALUES—G.M.T.

TABLE XVIIc—1.

APRIL, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
						* Interfered with.										1*
67,268	67,267	67,298	67,303	67,296	67,281	67,288	67,268	67,230	67,223	...	67,317	17 42	67,202	23 20	115	2
67,305	67,306	67,313	67,346	67,358	67,358	67,324	67,306	67,321	67,351	67,273	67,374	23 48	67,120	5 36	254	3
67,313	67,311	67,316	67,331	67,328	67,359	67,336	67,321	67,309	67,300	...	67,383	0 02	67,194	1 55	189	4
67,325	67,297	67,313	67,291	67,311	67,273	67,329	67,292	67,260	67,235	...	67,425	21 13	67,222	2 57	203	5
67,343	67,340	67,347	67,332	67,355	67,310	67,310	67,319	67,323	67,284	...	67,473	13 09	67,244	23 33	229	6
67,301	67,290	67,308	67,323	67,303	67,273	67,304	67,273	67,287	67,271	67,290	67,376	12 42	67,199	2 21	177	7
67,251	67,250	67,251	67,245	67,242	67,245	67,241	67,237	67,236	67,238	...	67,282	0 34	67,184	3 46	98	8
67,230	67,236	67,240	67,247	67,257	67,260	67,276	67,269	67,249	67,210	67,231	67,327	0 10	67,156	5 05	171	9
67,225	67,221	67,247	67,241	67,229	67,229	67,224	67,225	67,217	67,195	67,226	67,330	9 36	67,093	3 27	237	10
67,227	67,222	67,227	67,232	67,220	67,228	67,234	67,235	67,240	67,227	67,218	67,247	7 25	67,153	2 30	94	11
67,312	67,303	67,305	67,304	67,304	67,305	67,294	76,291	67,289	67,279	67,285	67,361	6 48	67,161	2 57	200	12
67,313	67,301	67,295	67,292	67,291	67,293	67,289	67,297	67,318	67,292	67,282	67,355	14 20	67,149	2 08	206	13
67,242	67,240	67,255	67,236	67,227	67,221	67,238	67,200	67,189	67,241	67,246	67,307	0 14	67,166	22 28	141	14
67,240	67,220	67,212	67,193	67,195	67,190	67,181	67,174	67,136	67,138	67,219	67,533	11 30	67,043	3 36	490	15
67,239	67,229	67,200	67,222	67,234	67,179	67,166	67,152	67,147	67,133	67,190	67,341	8 41	67,052	3 12	289	16
67,210	67,401	67,310	67,250	67,214	67,221	67,243	67,203	67,157	67,153	67,193	67,452	16 05	67,062	3 00	390	17
67,193	67,195	67,198	67,184	67,229	67,180	67,165	67,178	67,133	67,153	67,165	67,264	9 48	67,068	3 07	196	18
67,163	67,151	67,153	67,138	67,155	67,160	67,141	67,102	67,103	67,131	67,144	67,198	12 40	67,075	22 12	123	19
67,155	67,160	67,166	67,172	67.175	67,175	67,174	67,177	67,175	67,167	67,141	67,247	1 27	66,983	2 55	264	20
67,196	67,191	67,189	67,186	67,187	67,182	67,185	67,188	67,181	67,188	67,179	67,238	6 42	67,124	1 11	114	21
67,235	67,235	67,239	67,244	67,251	67,256	67,238	67,251	67,254	67,253	...	67,264	22 24	67,126	9 40	138	22
67,234	67,244	67,246	67,241	67,252	67,260	67,245	67,244	67,256	67,228	67,237	67,277	23 01	67,181	4 48	96	23
67,232	67,232	67,232	67,233	67,229	67,235	67,232	67,230	67,234	67,223	67,226	67,253	13 00	67,188	3 36	65	24
67,261	67.267	67,260	67,245	67,247	67,241	67,235	67,232	67,226	67,221	...	67,474	13 01	67,198	8 35	276	25
67,247	67,247	67,247	67,247	67,247	67,252	67,247	67,249	67,250	67,247	...	67,251	13 00	67,133	3 40	118	26
67,242	67,242	67,240	67,234	67,236	67,231	67,234	67,235	67,229	67,226	67,241	67,268	12 28	67,204	23 02	64	27
67,227	67,234	67,243	67,237	67,238	67,243	67,242	67,244	67,238	67,223	67,227	67,254	22 35	67,178	2 40	76	28
67,251	67,252	67,250	67,250	67,247	67,246	67,243	67,245	67,245	67,237	67,237	67,294	12 20	67,181	4 20	113	29
67,241	67,236	67,240	67,233	67,231	67,231	67,228	67,228	67,233	67,221	67,231	67,291	11 50	67,201	3 08	90	30
1,950,221	1,950,320	1,950,340	1,095,232	1,950,288	1,950,117	1,950,086	1,949,865	1,949,665	1,949,488							
67,249·0	67,252·4	67,253·1	67,249·4	67,251·3	67,245·4	67,244·3	67,236·7	67,229·8	67,223·7							

‡ Unsatisfactory.

VERTICAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	67,221	67,229	67,222	67,215	67,195	67,197	67,214	67,221	67,220	67,217	67,218	67,224	67,222	67,230	67,226
2	67,233	67,225	67,202	67,204	67,206	67,206	67,213	67,208	67,216	67,221	67,219	67,231	67,230	67,236	67,240
3	67,212	67,195	67,209	67,216	67,208	67,201	67,210	67,211	67,220	67,229	67,227	67,239	67,233	67,235	67,254
4	67,199	67,196	67,205	67,199	67,202	67,207	67,226	67,231	67,231	67,234	67,236	67,239	67,249	67,249	67,244
5	67,212	67,226	67,261	67,278	67,275	67,243	67,223	67,234	67,243	67,234	67,262	67,287	67,449	67,299	67,277
6	67,245	67,241	67,232	67,257	67,243	67,229	67,260	67,254	67,260	67,262	67,261	*	*	67,331	67,306
7	67,223	67,244	67,235	67,246	67,232	67,233	67,268	67,257	67,254	67,262	67,268	67,290	67,409	67,383	67,292
8	67,240	67,204	67,187	67,138	67,157	67,193	67,228	67,250	67,242	67,248	67,261	67,270	67,295	67,304	67,306
9	67,249	67,239	67,223	67,227	67,225	67,229	67,237	67,238	67,247	67,243	67,244	67,249	67,246	67,247	67,271
10	67,242	67,229	67,228	67,219	67,207	67,186	67,222	67,235	67,243	67,242	67,239	67,240	67,245	67,255	67,250
11	67,240	67,229	67,228	67,228	67,229	67,231	67,238	67,237	67,240	67,239	67,244	67,241	67,241	67,239	67,240
12	67,223	67,215	67,173	67,161	67,200	67,201	67,221	67,243	67,247	67,256	67,259	67,365	67,387	67,351	67,285
13	67,219	67,171	67,247	67,302	67,244	67,217	67,246	67,252	67,276	67,418	67,413	67,353	67,322	67,300	67,280
14	67,216	67,207	67,190	67,234	67,251	67,197	67,231	67,246	67,260	67,271	67,275	67,275	67,296	67,264	67,280
15	67,221	67,220	67,220	67,202	67,200	67,227	67,238	67,244	67,235	67,238	67,247	67,312	67,324	67,288	67,270
16	67,243	67,244	67,228	67,229	67,226	67,226	67,227	67,228	67,233	67,234	67,234	67,235	67,245	67,255	67,293
17	67,238	67,229	67,215	67,192	77,204	67,200	67,221	67,264	67,271	67,276	67,284	67,277	67,287	67,322	67,299
18	67,263	67,270	67,260	67,230	67,256	67,267	67,272	67,273	67,273	67,272	67,274	67,268	67,275	67,277	67,290
19	67,284	67,274	67,266	67,253	67,258	67,264	67,283	67,286	67,287	67,282	67,282	67,278	67,287	67,284	67,297
20	67,258	67,231	67,221	67,231	67,241	67,261	67,276	67,282	67,283	67,290	67,287	67,293	67,279	67,277	67,283
21	67,268	67,261	67,251	67,233	67,239	67,258	67,260	67,265	67,272	67,274	67,273	67,269	67,280	67,286	67,282
22	67,236	67,217	67,209	67,199	67,215	67,241	67,235	67,247	67,250	67,254	67,254	67,249	67,251	67,242	67,239
23	67,234	67,225	67,221	67,221	67,220	67,223	67,235	67,239	67,247	67,247	67,252	67,251	67,254	67,254	67,250
24	67,242	67,234	67,224	67,228	67,247	67,237	67,244	67,248	67,244	67,244	67,255	67,259	67,258	67,258	67,256
25	67,234	67,232	67,234	67,230	67,235	67,237	67,241	67,245	67,245	67,249	67,260	67,262	67,264	67,265	67,278
26	67,266	67,253	67,261	67,262	67,264	67,268	67,269	67,272	67,279	67,273	67,298	67,300	67,292	67,292	67,295
27	67,281	67,270	67,259	67,251	67,259	67,271	67,278	67,279	67,276	67,275	67,281	67,282	67,283	67,287	67,287
28	67,283	67,277	67,268	67,264	67,269	67,261	67,269	67,268	67,278	67,283	67,287	67,291	67,300	67,304	67,309
29	67,303	67,300	67,303	67,265	67,283	67,291	67,287	67,287	67,285	67,285	67,292	67,287	67,329	67,318	67,304
30	67,282	67,279	67,267	67,273	67,277	67,278	67,289	67,288	67,285	67,288	67,286	67,284	67,284	67,292	67,303
31	67,295	67,295	67,281	67,256	67,283	67,292	67,295	67,296	67,296	67,292	67,295	67,289	67,297	67,308	67,315
Sums	2,084,605	2,084,361	2,084,230	2,084,143	2,084,250	2,084,272	2,084,656	2,084,828	2,084,938	2,085,132	2,085,267	2,018,189	2,018,613	2,085,732	2,085,601
Means	67,245·5	67,237·5	67,233·2	67,230·4	67,233·9	67,234·6	67,247·0	67,252·5	67,256·1	67,262·3	67,266·7	67,273·0	67,287·1	67,281·7	67,277·5

* No record.

HOURLY VALUES—G.M.T.

TABLE XVIIc—2.

MAY, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
67,228	67,227	67,229	67,226	67,226	67,225	67,217	67,217	67,226	67,233	67,221	67,232	23 29	67,165	4 24	67	1
67,238	67,236	67,237	67,239	67,245	67,262	67,249	67,239	67,234	67,212	67,227	67,274	20 33	67,190	2 40	84	2
67,260	67,245	67,240	67,243	67,253	67,246	67,223	67,238	67,230	67,199	67,228	67,276	14 40	67,186	5 01	90	3
67,246	67,243	67,244	67,243	67,252	67,235	67,267	67,265	67,227	67,212	67,232	67,302	21 22	67,179	0 31	123	4
67,264	67,269	67,259	67,265	67,267	67,270	67,257	67,267	67,264	67,245	67,267	67,573	11 46	67,201	5 54	372	5
67,304	67,394	67,337	67,295	67,277	67,269	67,266	67,278	67,250	67,223	...	67,520	16 08	67,179	1 39	341	6
67,272	67,277	67,252	67,262	67,263	67,252	67,246	67,294	67,267	67,240	67,270	67,484	11 57	67,157	1 43	327	7
67,292	67,272	67,269	67,279	67,273	67,272	67,272	67,263	67,257	67,249	67,249	67,322	12 19	67,086	3 01	236	8
67,265	67,261	67,254	67,256	67,256	67,260	67,256	67,253	67,246	67,242	67,247	67,291	14 08	67,180	2 18	111	9
67,247	67,246	67,244	67,246	67,244	67,248	67,250	67,246	67,242	67,240	67,237	67,261	13 15	67,155	4 44	106	10
67,257	67,266	67,258	67,278	67,263	67,245	67,293	67,269	67,233	67,223	67,246	67,301	21 15	67,213	1 00	88	11
67,286	67,286	67,275	67,278	67,290	67,297	67,272	67,203	67,301	67,219	67,261	67,467	11 22	67,117	3 39	350	12
67,275	67,366	67,285	67,281	67,248	67,344	67,279	67,242	67,254	67,216	67,285	67,494	8 37	67,125	1 25	369	13
67,285	67,284	67,282	67,279	67,268	67,291	67,272	67,262	67,242	67,221	67,257	67,367	12 14	67,149	1 30	218	14
67,265	67,261	67,262	67,268	67,270	67,260	67,261	67,249	67,246	67,243	67,252	67,379	11 03	67,172	4 03	207	15
67,254	67,257	67,252	67,251	67,258	67,266	67,265	67,254	67,248	67,238	67,245	67,320	14 05	67,199	4 34	121	16
67,306	67,295	67,297	67,287	67,284	67,285	67,274	67,267	67,265	67,263	67,265	67,388	12 39	67,183	3 15	205	17
67,307	67,310	67,313	67,312	67,305	67,295	67,291	67,300	67,294	67,284	67,282	67,322	15 41	67,210	3 15	112	18
67,293	67,285	67,291	67,297	67,303	67,276	67,345	67,316	67,292	67,258	67,285	67,371	20 43	67,243	3 32	128	19
67,294	67,294	67,298	67,310	67,336	67,338	67,332	67,298	67,284	67,268	67,283	67,345	19 50	67,207	1 42	138	20
67,306	67,307	67,285	67,278	67,275	67,266	67,267	67,261	67,255	67,236	67,269	67,322	14 42	67,207	3 00	115	21
67,243	67,252	67,249	67,254	67,253	67,251	67,247	67,240	67,238	67,234	67,240	67,258	16 10	67,189	3 15	69	22
67,249	67,247	67,252	67,263	67,256	67,253	67,251	67,260	67,249	67,242	67,244	67,271	21 55	67,213	2 30	58	23
67,252	67,261	67,258	67,258	67,257	67,263	67,259	67,257	67,247	67,234	67,249	67,272	3 35	67,216	2 19	56	24
67,284	67,278	67,275	67,276	67,276	67,277	67,273	67,269	67,270	67,266	67,259	67,292	14 30	67,209	1 59	83	25
67,292	67,295	67,289	67,291	67,293	67,285	67,289	67,294	67,284	67,281	67,282	67,313	15 25	67,247	1 10	66	26
67,290	67,289	67,286	67,292	67,290	67,290	67,290	67,295	67,290	67,283	67,281	67,298	19 55	67,235	3 18	63	27
67,311	67,313	67,310	67,308	67,310	67,306	67,302	67,307	67,308	67,303	67,292	67,320	15 58	67,254	1 30	66	28
67,291	67,297	67,285	67,291	67,287	67,292	67,280	67,290	67,275	67,282	67,292	67,393	12 25	67,254	3 59	139	29
67,302	67,319	67,324	67,333	67,328	67,281	67,341	67,334	67,308	67,295	67,297	67,376	21 10	67,257	20 10	119	30
67,313	67,308	67,301	67,286	67,304	67,302	67,309	67,303	67,282	67,288	67,295	67,352	20 45	67,244	2 40	108	31
2,085,571	2,085,740	2,085,492	2,085,525	2,085,510	2,085,502	2,085,495	2,085,330	2,085,108	2,084,672							
67,276·5	67,281·9	67,273·9	67,275·0	67,274·5	67,274·3	67,274·0	67,268·7	67,261·5	67,247·5							

VERTICAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	67,288	67,297	67,313	67,280	67,296	67,277	67,294	67,292	67,305	67,309	67,333	67,441	67,387	67,351	67,335
2	67,299	67,288	67,300	67,270	67,265	67,265	67,295	67,278	67,316	67,320	67,318	67,307	67,316	67,330	67,375
3	67,300	67,278	67,274	67,275	67,295	67,278	67,253	67,325	67,351	67,345	67,333	67,326	67,346	67,324	67,334
4	67,324	67,326	67,286	67,291	67,303	67,327	67,334	67,329	67,326	67,330	67,333	67,327	67,332	67,326	67,332
5	67,334	67,323	67,317	67,285	67,312	67,324	67,335	67,337	67,343	67,342	67,343	67,342	67,344	67,344	67,346
6	67,341	67,336	67,322	67,326	67,329	67,323	67,328	67,337	67,347	67,346	67,345	67,340	67,346	67,349	67,346
7	67,356	67,345	67,344	67,345	67,352	67,352	67,352	67,354	67,355	67,355	67,356	67,355	67,358	67,358	67,358
8	67,317	67,331	67,322	67,286	67,284	67,334	67,321	67,320	67,357	67,364	67,385	67,392	67,359	67,455	*
9	67,373	67,346	67,306	67,322	67,331	67,330	67,340	67,351	67,367	67,384	67,377	67,387	67,543	67,585	67,531
10	67,359	67,379	67,351	67,364	67,403	67,361	67,373	67,381	67,376	67,384	67,386	67,388	67,399	67,426	67,464
11	67,374	67,356	67,373	†	†	†	†	†	†	†	†	67,414	67,433	67,447	67,457
12	67,363	67,356	67,348	67,356	67,324	67,338	67,341	67,351	67,354	67,360	67,368	67,389	67,408	67,418	67,402
13	67,363	67,368	67,364	67,389	67,381	67,370	67,372	67,378	67,374	67,375	67,376	67,380	67,386	67,388	67,405
14	67,386	67,385	67,365	67,385	67,364	67,355	67,308	67,362	67,373	67,377	67,388	67,393	67,389	67,390	67,403
15	67,366	67,360	67,351	67,363	67,377	67,377	67,382	67,383	67,375	67,352	67,366	67,356	67,366	67,367	67,374
16	67,366	67,371	67,358	67,363	67,369	67,375	67,377	67,379	67,376	67,377	67,376	67,375	67,377	67,377	67,385
17	67,373	67,374	67,372	67,370	67,371	67,376	67,380	67,384	67,383	67,377	67,383	67,384	67,387	67,395	67,388
18	67,367	67,369	67,357	67,356	67,361	67,365	67,370	67,373	67,377	67,378	67,376	67,378	67,380	67,389	67,381
19	67,371	67,371	67,359	67,375	67,348	67,366	67,372	67,380	67,384	67,383	67,385	67,379	67,379	67,372	67,372
20	67,365	67,361	67,357	67,362	67,348	67,358	67,365	67,372	67,369	67,371	67,372	67,371	67,364	67,366	67,371
21	67,369	67,365	67,361	67,352	67,349	67,347	67,354	67,353	67,360	67,362	67,362	67,361	67,367	67,378	67,366
22	67,367	67,351	67,365	67,353	67,3 5	67,357	67,355	67,357	67,358	67,358	67,362	67,363	67,363	67,392	67,400
23	67,359	67,348	67,346	67,338	67,343	67,341	67,357	67,356	67,362	67,362	67,369	67,365	67,415	67,423	67,391
24	67,356	67,376	67,350	67,366	67,358	67,366	67,363	67,365	67,363	67,363	67,369	67,373	67,382	67,401	67,417
25	67,341	67,333	67,341	67,356	67,359	67,364	67,360	67,361	67,357	67,362	67,364	67,368	67,365	67,367	67,365
26	67,365	67,368	67,340	67,346	67,348	67,358	67,356	67,357	67,360	67,360	67,359	67,363	67,367	67,369	67,398
27	67,374	67,373	67,366	‡	67,363	67,366	67,359	67,340	67,348	67,399	67,399	67,404	67,377	67,371	67,364
28	67,306	67,370	67,400	67,379	67,381	67,386	67,377	67,362	67,366	67,368	67,390	67,399	67,389	67,397	67,423
29	67,375	67,341	67,407	67,412	67,409	67,392	67,384	67,382	67,382	67,390	67,377	67,405	67,442	67,437	67,490
30	67,394	67,387	67,390	67,387	67,371	67,372	67,375	67,376	67,381	67,362	67,382	67,400	67,434	67,428	67,454
Sums	2,020,591	2,020,532	2,020,405	1,885,652	1,953,048	1,953,109	1,953,192	1,953,284	1,953,445	1,953,434	1,953,632	2,021,225	2,021,500	2,021,720	1,954,428
Means	67,353·0	67,351·1	67,346·8	67,344·7	67,346·8	67,348·6	67,351·5	67,354·6	67,360·2	67,361·5	67,366·6	67,374·2	67,383·3	67,390·7	67,394·1

* Lost to force increasing.

HOURLY VALUES—G.M.T.

TABLE XVIIc—3.

JUNE, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
67,333	67,329	67,323	67,320	67,326	67,324	67,317	67,312	67,314	67,299	67,321	67,633	11 30	67,212	2 45	421	1
67,410	67,387	67,361	67,341	67,353	67,325	67,318	67,347	67,341	67,300	67,322	67,430	14 35	67,246	7 20	184	2
67,338	67,335	67,337	67,335	67,333	67,338	67,336	67,328	67,307	67,324	67,318	67,357	8 25	67,218	6 03	139	3
67,335	67,330	67,337	67,337	67,368	67,367	67,360	67,348	67,340	67,334	67,331	67,378	20 30	67,251	1 53	127	4
67,375	67,375	67,361	67,355	67,364	67,355	67,360	67,350	67,343	67,341	67,342	67,391	15 20	67,253	2 48	138	5
67,350	67,352	67,356	67,354	67,353	67,355	67,359	67,369	67,359	67,356	67,345	67,376	22 15	67,292	1 50	84	6
67,356	67,357	67,354	67,357	67,360	67,363	67,361	67,365	67,341	67,317	67,354	67,379	21 20	67,316	23 45	63	7
67,510	67,481	67,421	67,392	67,402	67,378	67,390	67,426	67,378	67,373	67,375	67,765	13 35	67,230	4 10	535	8
67,570	67,500	67,461	67,448	67,404	67,430	67,366	67,385	67,387	67,359	67,409	67,773	12 15	67,267	2 18	506	9
67,465	67,425	67,415	67,478	67,590	67,516	67,440	67,433	67,377	67,374	67,414	67,611	18 57	67,299	2 48	312	10
67,428	67,398	67,408	67,400	67,392	67,386	67,388	67,378	67,370	67,363	...	67,496	13 40	67,263	3 00	233	11
67,406	67,397	67,382	67,399	67,386	67,372	67,377	67,394	67,372	67,363	67,373	67,456	12 19	67,307	4 03	149	12
67,407	67,404	67,403	67,408	67,419	67,418	67,413	67,393	67,384	67,386	67,389	67,448	19 24	67,333	1 37	115	13
67,442	67,433	67,415	67,413	67,409	67,406	67,402	67,395	67,390	67,366	67,391	67,509	15 00	67,337	4 32	172	14
67,374	67,373	67,368	67,375	67,368	67,380	67,374	67,368	67,356	67,366	67,369	67,407	15 08	67,332	1 48	75	15
67,389	67,393	67,397	67,398	67,391	67,389	67,394	67,396	67,381	67,373	67,381	67,419	21 20	67,350	3 10	69	16
67,386	67,384	67,394	67,395	67,405	67,395	67,388	67,390	67,376	67,367	67,384	67,419	19 22	67,362	23 58	57	17
67,392	67,416	67,389	67,386	67,389	67,388	67,386	67,382	67,382	67,371	67,379	67,474	15 40	67,343	2 27	131	18
67,374	67,371	67,373	67,372	67,371	67,373	67,375	67,369	67,365	67,365	67,372	67,400	2 40	67,338	4 15	62	19
67,376	67,375	67,383	67,376	67,382	67,380	67,376	67,379	67,376	67,369	67,370	67,385	20 13	67,335	3 38	50	20
67,363	67,362	67,367	67,364	67,382	67,382	67,374	67,360	67,365	67,367	67,364	67,387	19 30	67,343	4 08	44	21
67,394	67,384	67,379	67,377	67,378	67,364	67,363	67,367	67,359	67,359	67,367	67,415	15 22	67,338	1 00	77	22
67,376	67,368	67,366	67,377	67,367	67,407	67,383	67,410	67,360	67,356	67,370	67,469	12 26	67,326	4 15	143	23
67,403	67,386	67,375	67,372	67,367	67,360	67,359	67,362	67,357	67,341	67,371	67,434	14 15	67,303	2 17	131	24
67,364	67,366	67,367	67,364	67,366	67,367	67,370	67,369	67,366	67,365	67,361	67,377	20 32	67,301	1 48	76	25
67,382	67,379	67,376	67,374	67,373	67,372	67,380	67,375	67,372	67,374	67,367	67,415	13 50	67,323	2 00	92	26
67,363	67,364	67,367	67,366	67,361	67,368	67,377	67,375	67,361	67,306	67,366	67,425	10 35	67,296	23 55	129	27
67,426	67,402	67,388	67,394	67,396	67,400	67,403	67,412	67,380	67,375	67,389	67,457	14 10	67,296	0 00	161	28
67,459	67,461	67,428	67,391	67,408	67,402	67,445	67,461	67,417	67,394	67,413	67,554	12 12	67,287	1 08	267	29
67,425	67,411	67,400	67,388	67,384	67,380	67,381	67,383	67,364	67,366	67,392	67,483	13 40	67,353	23 28	130	30
2,021,971	2,021,698	2,021,451	2,021,406	2,021,547	2,021,440	2,021,315	2,021,381	2,020,940	2,020,669							
67,399·0	67,389·0	67,381·7	67,380·2	67,383·9	67,381·3	67,377·2	67,379·4	67,364·7	67,355·6							

† Not satisfactory; sensitiveness not known. ‡ No record.

VERTICAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	67,366	67,365	67,359	67,373	67,351	67,333	67,345	67,377	67,385	67,389	67,386	67,396	67,405	67,415	67,484
2	67,400	67,391	67,375	67,377	67,383	67,394	67,405	67,409	67,408	67,406	67,407	67,407	67,409	67,409	67,411
3	67,400	67,393	67,381	67,383	67,395	67,399	67,400	67,400	67,403	67,399	67,403	67,405	67,420	67,420	67,424
4	67,365	67,354	67,333	67,384	67,399	67,394	67,396	67,387	67,391	67,416	67,417	67,446	67,431	67,521	67,525
5	67,353	67,376	67,409	67,406	67,371	67,400	67,431	67,457	67,420	67,447	67,476	67,591	67,429	67,555	67,627
6	67,463	67,434	67,435	67,425	67,416	67,410	67,414	67,427	67,426	67,429	67,431	67,460	†	67,572	67,509
7	67,422	67,431	67,416	67,423	67,416	67,422	67,434	67,434	67,442	‡	67,389	67,382	67,391	67,386	67,379
8	*	*	*	67,435	67,425	67,431	67,438	67,442	67,440	67,449	67,442	67,438	67,453	67,450	67,544
9	67,451	67,437	67,428	67,376	67,376	67,376	67,389	67,399	*	*	67,428	67,438	67,467	67,470	67,466
10	67,416	67,405	67,386	67,386	67,386	67,398	67,408	67,406	67,414	67,416	67,407	67,411	67,415	67,424	67,419
11	67,412	67,398	67,384	67,402	67,397	67,390	67,393	67,405	67,407	67,411	67,408	67,411	67,413	67,416	67,414
12	67,414	67,411	67,401	67,404	67,408	67,394	67,405	67,408	67,411	67,414	67,414	67,417	67,415	67,428	67,423
13	67,415	67,413	67,410	67,412	67,410	77,411	67,411	67,414	†	67,487	67,493	67,494	67,496	67,498	67,501
14	67,515	67,511	67,506	†	†	†	†	†	†	†	†	†	†	†	†
15	†	†	†	67,477	67,472	67,469	67,477	67,480	67,478	67,477	67,480	67,482	67,483	67,484	67,485
16	67,486	67,475	67,479	†	†	†	†	†	†	67,444	67,457	67,446	67,444	67,447	67,447
17	67,428	67,424	67,418	67,422	67,422	67,433	67,443	67,443	67,445	67,440	67,445	67,445	67,443	67,442	67,445
18	67,440	67,429	67,403	67,412	67,415	67,432	67,445	67,447	67,447	67,447	67,443	67,447	67,443	67,441	67,439
19	67,424	67,408	67,383	67,387	67,391	67,395	67,405	67,412	67,410	67,428	67,424	67,420	67,421	67,433	67,429
20	67,400	67,395	67,366	67,354	67,356	67,387	67,387	67,381	67,388	67,413	67,400	67,410	67,410	67,430	67,423
21	67,407	67,395	67,389	67,392	67,397	67,380	67,392	67,409	67,414	67,413	67,410	67,424	67,440	67,438	67,424
22	67,414	67,419	67,394	67,392	67,384	67,385	67,400	67,404	67,399	67,416	67,415	67,419	67,427	67,428	67,438
23	67,402	67,402	67,392	67,400	67,394	67,387	67,415	67,405	67,426	67,429	67,433	67,434	67,431	67,435	67,442
24	67,423	67,411	67,404	67,394	67,412	67,405	67,420	67,420	67,411	67,427	67,429	67,426	67,426	67,430	67,431
25	67,427	67,410	67,425	67,422	67,411	67,411	67,429	67,433	67,428	67,434	67,430	67,431	67,441	67,446	67,453
26	67,428	67,425	67,403	67,392	67,406	67,403	67,417	67,413	67,427	67,429	67,417	67,432	67,444	67,427	67,416
27	67,406	67,395	67,369	67,364	67,363	67,388	67,441	67,443	67,416	67,397	67,426	67,417	67,423	67,427	67,431
28	67,426	67,398	67,418	67,395	67,405	67,405	67,411	67,430	67,424	67,419	67,409	67,411	67,422	67,418	67,418
29	67,412	67,408	67,398	67,411	67,409	67,396	67,409	67,418	67,415	67,430	67,427	67,420	67,421	67,430	67,444
30	67,401	67,396	67,400	67,414	67,414	67,403	67,405	67,405	67,417	67,418	67,415	67,427	67,443	67,462	67,481
31	67,435	67,389	67,374	67,400	67,391	67,383	67,399	67,429	67,406	67,422	67,451	67,452	67,443	67,440	67,432
Sums	1,955,151	1,954,897	1,954,638	1,954,614	1,954,575	1,954,614	1,954,964	1,955,137	1,820,298	1,887,946	2,022,812	2,023,039	1,955,549	2,023,422	2,023,604
Means	67,419·0	67,410·2	67,401·3	67,400·5	67,399·1	67,400·5	67,412·6	67,418·5	67,418·4	67,426·6	67,427·1	67,434·6	67,432·7	67,447·4	67,453·5

* Readjustment. † No Record.

HOURLY VALUES—G.M.T. TABLE XVIIc—4.

JULY, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
67,452	67,416	67,410	67,413	67,412	67,410	67,413	67,412	67,405	67,400	67,395	67,569	13 40	67,326	1 29	243	1
67,411	67,412	67,411	67,414	67,418	67,416	67,411	67,406	67,403	67,400	67,404	67,418	18 28	67,360	3 25	58	2
67,418	67,414	67,424	67,448	67,467	67,453	67,438	67,409	67,385	67,365	67,411	67,518	20 44	67,366	23 35	152	3
67,684	67,507	67,479	67,464	67,488	67,446	67,439	67,433	67,437	67,353	67,439	67,723	14 44	67,287	1 50	436	4
67,566	67,519	67,484	67,554	67,516	67,497	67,477	67,516	67,472	67,463	67,475	67,723	13 48	67,313	0 25	410	5
67,476	67,474	67,475	67,499	67,518	67,500	67,476	67,477	67,441	67,422	...	67,723	11 45	67,395	0 39	328	6
67,387	67,384	67,388	67,384	67,404	67,418	67,400	67,382	67,376	...	...	67,457	2 42	67,349	23 21	108	7
67,469	67,482	67,512	67,473	67,462	67,460	67,490	67,492	67,466	67,451	...	67,670	14 06	67,392	2 48	278	8
67,445	67,443	67,434	67,427	67,430	67,435	67,437	67,424	67,425	67,416	...	67,509	12 11	67,411	23 20	98	9
67,420	67,415	67,402	67,418	67,421	67,437	67,437	67,423	67,421	67,412	67,412	67,459	20 10	67,358	2 05	101	10
67,415	67,409	67,410	67,414	67,414	67,410	67,414	67,411	67,416	67,414	67,407	67,425	21 42	67,368	2 03	57	11
67,416	67,422	67,417	67,406	67,418	67,419	67,418	67,411	67,414	67,415	67,413	67,440	13 30	67,383	3 55	57	12
67,506	67,503	67,505	67,502	67,501	67,515	67,503	67,510	67,515	67,515	...	67,519	20 42	67,403	3 21	116	13
†	†	†	†	†	†	†	†	†	†	...	67,524	1 42	67,486	2·15	38	14
67,486	67,491	67,493	67,494	67,495	67,496	67,492	67,492	67,492	67,486	...	67,499	19 46	67,461	4 37	38	15
67,447	67,446	67,441	67,445	67,451	67,444	67,441	67,440	67,430	67,428	...	...	...	...	...	...	16
67,474	67,544	67,502	67,503	67,496	67,491	67,498	67,487	67,468	67,440	67,459	67,629	16 02	67,401	1 34	228	17
67,440	67,441	67,444	67,443	67,452	67,466	67,454	67,454	67,434	67,424	67,440	67,467	20 09	67,393	2 12	74	18
67,420	67,421	67,411	67,406	67,420	67,421	67,415	67,418	67,415	67,400	67,413	67,447	13 21	67,367	1 51	80	19
67,408	67,405	67,403	67,414	67,412	67,415	67,420	67,425	67,405	67,407	67,400	67,456	13 08	67,307	2 27	149	20
67,431	67,424	67,420	67,425	67,425	67,433	67,434	67,432	67,434	67,414	67,416	67,453	11 40	67,365	4 53	88	21
67,431	67,420	67,403	67,417	67,416	67,420	67,408	67,422	67,418	67,402	67,412	67,446	14 10	67,356	2 18	90	22
67,459	67,456	67,440	67,432	67,429	67,420	67,420	67,430	67,428	67,423	67,423	67,481	15 27	67,359	2 15	122	23
67,430	67,427	67,427	67,428	67,428	67,443	67,454	67,449	67,440	67,427	67,425	67,455	21 35	67,375	2 45	80	24
67,435	67,433	67,445	67,467	67,470	67,461	67,439	67,434	67,435	67,428	67,435	67 481	18 20	67 391	1 00	90	25
67,428	67,465	67,458	67,429	67,428	67,433	67,441	67,431	67,431	67,406	67,426	67,487	16 30	67,356	2 05	131	26
67,473	67,496	67,456	67,451	67,444	67,430	67,425	67,426	67,416	67,426	67,422	67,533	16 00	67,343	1 55	190	27
67,423	67,430	67,419	67,425	67,428	67,415	67,421	67,416	67,423	67,412	67,417	67,432	15 50	67,372	1 35	60	28
67,459	67,438	67,423	67,423	67,415	67,422	67,421	67,416	67,415	67,401	67,420	67,468	14 28	67,388	5 01	80	29
67,459	67,469	67,452	67,449	67,439	67,443	67,438	67,438	67,441	67,435	67,431	67,494	12 55	67,369	1 30	125	30
67,420	67,431	67,445	67,464	67,428	67,425	67,440	67,394	67,427	67,390	67,421	67,507	17 46	67,340	22 32	167	31
2,023,588	2,023,437	2,023,233	2,023,831	2,023,345	2,023,294	2,023,214	2,023,110	2,022,928	1,955,175							
67,452·9	67,447·9	67,441·1	67,444·4	67,444·8	67,443·1	67,440·5	67,437·0	67,430·9	67,419·8							

‡ Not satisfactory.

VERTICAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	67,390	67,400	67,376	67,413	67,326	67,399	67,457	67,444	67,439	67,428	67,438	67,426	67,426	67,428	67,437
2	67,435	67,422	67,422	67,399	67,393	67,390	67,424	67,428	67,442	76,431	67,431	67,428	67,436	67,451	67,495
3	67,429	67,409	67,413	67,405	67,397	67,391	67,397	67,411	67,421	67,416	67,431	67,432	67,464	67,474	67,444
4	67,433	67,425	67,418	67,404	67,393	67,399	67,410	67,412	67,415	67,416	67,421	67,419	67,415	67,414	67,416
5	67,421	67,415	67,410	67,406	67,408	67,400	67,401	67,404	67,404	67,413	67,409	67,415	67,411	67,414	67,426
6	67,370	67,342	67,332	67,333	67,363	67,357	67,414	67,441	67,466	67,498	67,490	67,495	67,491	67,494	67,500
7	67,409	67,382	67,375	67,382	67,389	67,394	67,388	67,376	67,388	67,410	67,411	67,407	67,407	67,403	67,405
8	67,405	67,403	67,403	67,389	67,391	67,391	67,395	67,397	67,393	67,405	67,409	67,409	67,410	67,422	67,414
9	67,408	67,394	67,369	67,370	67,363	67,343	67,362	67,389	67,395	67,400	67,409	67,409	67,414	67,415	67,413
10	67,396	67,366	67,365	67,350	67,374	67,392	67,394	67,400	67,402	67,409	67,413	67,415	67,420	67,424	67,432
11	67,429	67,411	67,404	67,395	67,405	67,398	67,410	67,412	67,412	67,371	67,379	67,380	67,383	67,383	67,388
12	67,378	67,379	67,377	67,374	67,370	67,381	67,375	67,384	67,380	67,379	67,386	67,388	67,387	67,388	67,395
13	67,372	67,372	67,354	67,352	67,356	67,362	67,365	67,385	67,378	67,382	67,380	67,395	67,395	67,399	67,399
14	67,394	67,389	67,363	67,362	67,359	67,377	67,393	67,395	67,397	67,398	67,400	67,417	67,425	67,426	67,422
15	67,410	67,375	67,373	67,385	67,375	67,372	67,384	67,393	67,394	67,396	67,403	67,400	67,394	67,410	67,395
16	67,393	67,377	67,388	67,376	67,365	67,360	67,377	67,394	67,400	67,394	67,393	67,396	67,412	67,399	67,395
17	67,370	67,438	67,364	67,416	67,381	67,365	67,399	67,392	67,399	67,412	67,435	67,483	67,479	67,425	67,404
18	67,380	67,374	67,362	67,338	67,355	67,358	67,382	67,392	67,400	67,402	67,400	67,403	67,430	67,423	67,416
19	67,365	67,403	67,422	67,381	67,369	67,424	67,414	67,404	67,417	67,420	67,445	67,452	67,482	67,448	67,449
20	67,416	67,370	67,379	67,348	67,333	67,378	67,366	67,368	67,421	67,431	67,442	67,438	67,438	67,450	67,430
21	67,422	67,405	67,401	67,368	67,338	67,365	67,365	67,392	67,433	67,446	67,438	67,456	67,468	67,468	67,444
22	67,439	67,444	67,364	67,382	67,366	67,406	67,418	67,419	67,407	67,427	67,432	67,429	67,431	67,431	67,433
23	67,538	67,498	67,369	67,388	67,407	67,375	67,389	67,421	67,447	67,455	67,450	67,459	67,473	67,471	67,501
24	67,477	67,454	67,421	67,427	67,418	67,419	67,399	67,397	67,428	67,436	67,440	67,447	67,441	67,438	67,461
25	67,428	67,391	67,397	67,392	67,403	67,418	67,391	67,414	67,425	67,450	67,453	67,458	67,469	67,458	67,454
26	67,443	67,431	67,414	67,381	67,372	67,379	67,396	67,413	67,420	67,430	67,432	67,438	67,440	67,472	67,448
27	67,434	67,407	67,412	67,413	67,389	67,387	67,399	67,417	67,437	67,447	67,438	67,475	67,506	67,464	67,447
28	67,409	67,427	67,426	67,412	67,405	67,423	67,425	67,410	67,394	67,377	67,376	67,368	67,371	67,387	67,382
29	67,312	67,310	67,327	67,321	67,325	67,335	67,345	67,349	67,340	67,347	67,350	67,348	67,351	67,364	67,378
30	67,360	67,357	67,349	67,343	67,345	67,352	67,358	67,366	67,385	67,400	67,409	67,396	67,381	67,372	67,367
31	67,309	67,326	67,295	67,260	67,284	67,299	67,295	67,301	67,295	67,315	67,297	67,215	67,315	67,317	67,317
Sums	2,089,574	2,089,296	2,088,844	2,088,665	2,088,517	2,088,798	2,089,087	2,089,320	2,089,574	2,089,741	2,089,840	2,089,996	2,090,165	2,090,132	2,090,107
Means	67,405·6	67,396·6	67,382·1	67,376·3	67,371·5	67,380·6	67,389·9	67,397·4	67,405·6	67,411·0	67,414·2	67,419·3	67,424·7	67,423·6	67,422·8

HOURLY VALUES—G.M.T.

TABLE XVIIc—5.

AUGUST, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
67,444	67,430	67,437	67,439	67,456	67,458	67,455	67,474	67,439	67,435	67,428	67,484	21 17	67,300	03 44	184	1
67,501	67,469	67,457	67,446	67,443	67,434	67,437	67,435	67,440	67,429	67,437	67,574	15 09	67,359	03 35	215	2
67,420	67,427	67,428	67,443	67,436	67,433	67,437	67,422	67,425	67,433	67,425	67,507	12 14	67,340	00 54	167	3
67,413	67,415	67,419	67,427	67,426	67,422	67,428	67,433	67,426	67,421	67,417	67,445	21 27	67,375	02 31	70	4
67,439	67,429	67,419	67,426	67,431	67,417	67,394	67,356	67,371	67,370	67,409	67,471	19 25	67,340	22 06	131	5
67,441	67,464	67,446	67,433	67,465	67,434	67,431	67,422	67,413	67,409	67,431	67,543	13 27	67,292	01 55	251	6
67,404	67,411	67,423	67,430	67,428	67,429	67,433	67,419	67,413	67,405	67,405	67,437	18 44	67,334	02 12	103	7
67,424	67,419	67,415	67,394	67,415	67,410	67,413	67,428	67,425	67,408	67,408	67,436	22 09	67,374	01 12	62	8
67,412	67,414	67,417	67,413	67,421	67,426	67,429	67,422	67,416	67,396	67,401	67,439	21 05	67,321	05 18	118	9
67,430	67,429	67,428	67,420	67,431	67,424	67,445	67,455	67,463	67,429	67,412	67,476	22 51	67,331	02 45	145	10
67,388	67,382	67,386	67,384	67,384	67,381	67,377	67,380	67,377	67,378	67,391	67,435	01 31	67,356	09 15	79	11
67,396	67,399	67,400	67,398	67,386	67,392	67,380	67,376	67,378	67,372	67,384	67,401	17 18	67,353	04 08	48	12
67,398	67,402	67,405	67,406	67,405	67,391	67,388	67,388	67,392	67,394	67,385	67,417	10 00	67,334	02 33	83	13
67,427	67,422	67,420	67,410	67,409	67,407	67,397	67,414	67,420	67,410	67,402	67,430	22 05	67,334	04 21	96	14
67,406	67,403	67,404	67,411	67,411	67,412	67,412	67,389	67,395	67,393	67,396	67,414	18 28	67,350	00 54	64	15
67,396	67,398	67,398	67,397	67,401	67,400	67,407	67,396	67,390	67,370	67,393	67,426	12 41	67,340	04 33	86	16
67,395	67,394	67,403	67,392	67,410	67,408	67,400	67,401	67,388	67,380	67,407	67,510	11 22	67,230	02 32	280	17
67,423	67,416	67,413	67,424	67,431	67,398	67,546	67,547	67,457	67,365	67,411	67,715	21 12	67,302	02 39	413	18
67,460	67,481	67,448	67,456	67,420	67,434	67,424	67,424	67,430	67,416	67,429	67,490	15 50	67,321	03 58	169	19
67,431	67,426	67,438	67,435	67,431	67,423	67,451	67,460	67,446	67,422	67,415	67,468	20 56	67,289	03 46	179	20
67,443	67,442	67,450	67,432	67,421	67,444	67,444	67,432	67,450	67,439	67,424	67,480	13 18	67,300	03 30	180	21
67,462	67,611	67,521	67,485	67,522	67,482	67,483	67,541	67,507	67,538	67,454	67,679	15 39	67,324	02 01	355	22
67,581	67,485	67,474	67,472	67,528	67,528	67,521	67,488	67,511	67,477	67,467	67,682	14 34	67,311	02 01	371	23
67,490	67,494	67,489	67,447	67,455	67,458	67,465	67,482	67,441	67,428	67,446	67,519	15 38	67,378	07 11	141	24
67,446	67,454	67,454	67,464	67,472	67,476	67,482	67,485	67,467	67,443	67,442	67,500	22 00	67,356	03 15	144	25
67,461	67,449	67,444	67,451	67,438	67,447	67,456	67,454	67,439	67,434	67,431	67,471	12 48	67,330	04 16	141	26
67,449	67,474	67,458	67,460	67,442	67,452	67,452	67,432	67,405	67,409	67,437	67,530	11 42	67,352	04 58	178	27
67,407	67,430	67,381	67,400	67,400	67,390	67,399	67,387	67,362	67,312	67,396	67,457	15 52	67,291	23 54	166	28
67,381	67,363	67,392	67,416	67,410	67,454	67,426	67,383	67,370	67,360	67,362	67,492	20 30	67,240	02 24	252	29
67,362	67,360	67,360	67,360	67,360	67,363	67,363	67,335	67,296	67,309	67,361	67,413	10 00	67,276	22 58	137	30
67,339	67,324	67,328	67,337	67,347	67,331	67,327	67,342	67,341	67,303	67,315	67,364	19 07	67,228	03 00	136	31
2,090,269	2,090,316	2,090,155	2,090,108	2,090,235	2,090,158	2,090,302	2,090,202	2,089,893	2,089,487							
67,428·0	67,429·5	67,424·4	67,422·8	67,426·9	67,424·5	67,429·1	67,425·9	67,415·9	67,402·8							

VERTICAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	67,303	67,297	67,314	67,330	67,322	67,307	67,345	67,370	67,384	67,344	67,325	67,327	67,332	67,350	67,374
2	67,436	67,435	67,425	67,412	67,405	67,407	67,415	67,412	67,422	67,408	67,408	67,403	67,400	67,406	67,401
3	67,394	67,397	67,385	67,374	67,376	67,386	67,382	67,399	67,403	67,409	67,395	67,415	67,395	67,399	67,405
4	67,374	67,352	67,389	67,402	67,344	67,355	67,394	67,403	67,375	67,400	67,418	67,462	67,438	67,424	67,398
5	67,397	67,393	67,390	67,353	67,372	67,362	67,377	67,374	67,388	67,388	67,409	67,445	67,436	67,399	67,394
6	67,379	67,363	67,360	67,353	67,328	67,342	67,354	67,380	67,380	67,394	67,395	67,404	67,412	67,413	67,394
7	67,377	67,382	67,371	67,366	67,373	67,345	67,367	67,363	67,383	67,387	67,392	67,396	67,397	67,404	67,398
8	67,371	67,362	67,357	67,328	67,354	67,328	67,359	67,345	67,359	67,374	67,379	67,383	67,384	67,377	67,366
9	67,350	67,360	67,298	67,308	67,324	67,345	67,336	67,349	67,343	67,356	67,369	67,382	67,394	67,372	67,367
10	67,344	67,314	67,301	67,292	67,328	67,324	67,348	67,351	67,363	67,373	67,365	67,371	67,377	67,383	67,376
11	67,379	67,357	67,306	67,300	67,341	67,334	67,343	67,326	67,349	67,352	67,366	67,367	67,359	67,363	67,362
12	67,339	67,318	67,302	67,296	67,310	67,319	67,320	67,331	67,359	67,369	67,370	67,401	67,383	67,375	67,374
13	67,374	67,343	67,317	67,319	67,330	67,317	67,329	67,351	67,365	67,371	67,364	67,366	67,370	67,381	67,376
14	67,366	67,356	67,369	67,340	67,347	67,334	67,368	67,357	67,384	67,387	67,377	67,386	67,381	67,379	67 377
15	67,373	67,361	67,351	67,347	67,355	67,355	67,360	67,366	67,367	67,366	67,363	67,362	67,361	67,360	67,360
16	67,382	67,366	67,318	67,308	67,314	67,313	67,327	67,346	67,370	67,370	67,375	67,392	67,377	67,377	67,373
17	67,388	67,362	67,352	67,354	67,353	67,347	67,355	67,355	67,381	67,363	67,359	67,362	67,373	67,384	67,393
18	67,386	67,339	67,338	67,339	67,351	67,348	67,342	67,357	67,364	67,378	67,377	67,391	67,479	67,409	67,389
19	67,359	67,358	67,349	67,292	67,322	67,320	67,327	67,356	67,363	67,352	67,363	67,376	67,365	67,370	67,365
20	67,324	67,329	67,305	67,301	67,322	67,340	67,314	67,311	67,329	67,340	67,364	67,374	67,406	67,394	67,383
21	67,354	67,346	67,359	67,335	67,345	67,332	67,343	67,327	67,385	67,359	67,371	57,385	67,412	67,404	67,414
22	67,381	67,316	67,301	67,318	67,311	67,338	67,327	67,325	67,359	67,362	67,389	67,352	67,420	67,398	67,395
23	67,368	67,353	67,326	67,348	67,335	67,358	67,360	67,352	67,359	67,375	67,403	67,385	67,391	67,383	67,404
24	67,385	67,325	67,254	67,207	67,233	67,301	67,367	67,381	67,404	67,454	67,489	67,459	67,418	67,396	67,405
25	67,361	67,432	67,429	67,413	67,391	67,403	67,394	67,404	67,408	67,411	67,408	67,405	67,412	67,407	67,410
26	67,392	67,418	67,411	67,383	67,394	67,362	67,380	67,383	67,390	67,391	67,397	67,358	67,403	67,400	67,410
27	67,432	67,417	67,394	67,383	67,374	67,377	67,387	67,388	67,394	67,400	67,397	67,400	67,408	67,407	67,400
28	67,419	67,408	67,402	67,367	67,364	67,357	67,371	67,378	67,395	67,390	67,389	67,387	67,386	67,397	67,393
29	67,394	67,366	67,368	67,349	67,345	67,345	67,362	67,366	67,360	67,386	67,372	67,382	67,376	67,374	67,379
30	67,391	67,317	67,290	67,284	67,307	67,346	67,359	67,362	67,372	67,385	67,385	67,393	67,411	67,399	67,398
Sums	2,021,272	2,020,842	2,020,431	2,020,091	2,020,270	2,020,347	2,020,712	2,020,868	2,021,257	2,021,404	2,021,533	2,021,671	2,021,856	2,021,684	2,021,633
Means	67,375·7	67,361·4	67,347·7	67,336·4	67,342·3	67,344·9	67,357·0	67,362·3	67,375·2	67,380·1	67,384·4	67,389·0	67,395·2	67,389·5	67,387·8

HOURLY VALUES—G.M.T.

TABLE XVIIc—6.

SEPTEMBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
67,375	67,363	67,374	67,377	67,393	67,396	67,391	67,416	67,452	67,436	67,360	67,473	22 39	67,262	03 18	211	1
67,399	67,396	67,404	67,407	67,405	67,409	67,410	67,421	67,422	67,394	67,410	67,449	00 11	67,352	20 17	97	2
67,398	67,398	67,394	67,396	67,400	67,401	67,403	67,412	67,399	67,374	67,396	67,447	23 03	67,362	21 12	85	3
67,403	67,402	67,414	67,433	67,419	67,429	67,430	67,423	67,411	67,397	67,404	67,481	10 49	67,259	04 03	222	4
67,390	67,392	67,387	67,393	67,397	67,392	67,411	67,422	67,385	67,379	67,393	67,488	11 15	67,327	03 04	161	5
67,396	67,388	67,390	67,401	67,399	67,392	67,301	67,407	67,399	67,377	67,384	67,436	12 30	67,299	03 48	137	6
67,382	67,388	67,391	67,387	67,385	67,390	67,385	67,391	67,392	67,371	67,383	67,462	00 02	67,340	05 19	122	7
67,372	67,374	67,371	67,370	67,370	67,356	67,379	67,382	67,381	67,350	67,365	67,425	23 18	67,307	01 18	118	8
67,368	67,362	67,362	67,358	67,359	67,365	67,368	67,368	67,351	67,344	67,355	67,444	11 42	67,255	01 56	189	9
67,378	67,387	67,385	67,376	67,371	67,366	67,365	67,367	67,378	67,379	67,358	67,414	22 54	67,274	02 24	140	10
67,361	67,369	67,364	67,366	67,361	67,361	67,377	67,373	67,361	67,339	67,353	67,407	00 00	67,255	02 12	152	11
67,376	67,381	67,373	67,374	67,392	67,378	67,412	67,403	67,391	67,374	67,361	67,444	10 58	67,289	02 04	155	12
67,370	67,371	67,381	67,377	67,407	67,423	67,477	67,409	67,370	67,366	67,369	67,503	20 58	67,289	03 05	214	13
67,381	67,382	67,381	67,382	67,387	67,386	67,391	67,381	67,389	67,373	67,374	67,407	22 45	67,296	05 14	111	14
67,360	67,361	67,369	67,371	67,364	67,369	67,375	67,378	67,389	67,382	67,365	67,411	23 42	67,340	02 41	71	15
67,365	67,370	67,372	67,369	67,368	67,375	67,380	67,378	67,374	67,388	67,361	67,433	23 59	67,301	02 55	132	16
67,387	67,390	67,388	67,444	67,455	67,398	67,352	67,313	67,363	67,386	67,374	67,490	19 00	67,333	01 39	159	17
67,400	67,374	67,375	67,372	67,381	67,387	67,385	67,398	67,375	67,359	67,376	67,622	11 50	67,292	00 49	330	18
67,380	67,397	67,439	67,400	67,419	67,391	67,436	67,367	67,358	67,324	67,367	67,463	20 45	67,280	03 08	183	19
67,393	67,381	67,368	67,374	67,377	67,378	67,357	67,364	67,363	67,354	67,354	67,422	12 24	67,276	06 15	146	20
67,413	67,409	67,395	67,391	67,395	67,409	67,423	67,428	67,402	67,381	67,381	67,448	21 51	67,274	08 32	174	21
67,408	67,413	67,407	67,400	67,412	67,394	67,443	67,350	67,278	67,368	67,366	67,499	21 01	67,237	01 56	262	22
67,387	67,399	67,383	67,420	67,407	67,436	67,421	67,412	67,405	67,385	67,382	67,455	18 11	67,259	00 59	196	23
67,388	67,393	67,397	67,385	67,401	67,416	67,416	67,408	67,316	67,361	67,374	67,525	09 54	67,174	03 32	351	24
67,404	67,409	67,403	67,412	67,409	67,407	67,414	67,429	67,402	67,392	67,408	67,492	01 00	67,359	23 59	133	25
67,405	67,411	67,409	67,429	67,429	67,413	67,419	67,447	67,422	67,432	67,403	67,462	22 35	67,335	02 04	127	26
67,399	67,407	67,416	67,404	67,405	67,414	67,433	67,410	67,419	67,419	67,402	67,451	23 52	67,362	03 52	89	27
67,393	67,393	67,395	67,395	67,395	67,390	67,399	67,411	67,419	67,394	67,391	67,459	22 43	67,344	04 28	115	28
67,366	67,373	67,377	67,382	67,378	67,379	67,382	67,379	67,375	67,391	67,371	67,411	21 02	67,329	03 15	82	29
67,400	67,406	67,407	67,410	67,418	67,411	67,429	67,434	67,443	67,431	67,382	67,462	23 26	67,248	01 45	214	30
2,021,597	2,021,639	2,021,674	2,021,755	2,021,858	2,021,814	2,022,054	2,021,881	2,021,584	2,021,400							
67,386·6	67,388·0	67,389·0	67,391·8	67,395·3	67,393·7	67,401·8	67,396·0	67,386·0	67,380·0							

VERTICAL FORCE—MEAN

In gamma.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	67,431	67,407	67,418	67,358	67,229	67,201	67,275	67,361	67,407	67,436	67,455	67,463	67,478	67,469	67,456
2	67,376	67,376	67,401	67,376	67,382	67,388	67,421	67,411	67,420	67,410	67,415	67,408	67,421	67,414	67,415
3	67,374	67,357	67,351	67,382	67,371	67,330	67,379	67,400	67,407	67,406	67,401	67,404	67,410	67,409	67,405
4	67,405	67,392	67,335	67,311	67,342	67,363	67,389	67,394	67,397	67,398	67,411	67,417	67,423	67,434	67,402
5	67,378	67,378	67,375	67,340	67,320	67,353	67,355	67,387	67,394	67,396	67,396	67,404	67,398	67,407	67,406
6	67,447	67,432	67,376	67,391	67,377	67,383	67,400	67,404	67,392	67,394	67,416	67,400	67,425	67,433	67,418
7	67,397	67,422	67,401	67,390	67,369	67,362	67,384	67,394	67,406	67,408	67,402	67,417	67,415	67,421	67,431
8	67,396	67,356	67,329	67,319	67,335	67,352	67,380	67,381	67,382	67,414	67,415	67,411	67,435	67,444	67,439
9	67,362	67,331	67,330	67,340	67,347	67,346	67,358	67,370	67,384	67,399	67,388	67,432	67,420	67,423	67,407
10	67,400	67,408	67,390	67,386	67,332	67,355	67,373	67,387	67,388	67,387	67,393	67,394	67,400	67,399	67,425
11	67,396	67,449	67,346	67,393	67,361	67,366	67,383	67,412	67,383	67,414	67,401	67,404	67,424	67,418	67,440
12	67,384	67,320	67,299	67,286	67,307	67,317	67,336	67,332	67,326	67,433	67,427	67,443	67,458	67,418	67,427
13	67,370	67,339	67,354	67,345	67,372	67,342	67,344	67,355	67,357	67,387	67,415	67,457	67,424	67,418	67,409
14	67,359	67,305	67,312	67,260	67,378	67,392	67,377	67,380	67,351	67,423	67,449	67,451	67,460	67,462	67,448
15	67,498	67,498	67,446	67,450	67,344	67,393	67,405	67,410	67,416	67,419	67,415	67,420	67,441	67,499	67,436
16	67,406	67,347	67,323	67,318	67,317	67,305	67,317	67,338	67,337	67,353	67,420	67,391	67,402	67,367	67,381
17	67,304	67,297	67,302	67,272	67,319	67,336	67,313	67,349	67,321	67,333	67,359	67,386	67,372	67,346	67,352
18	67,338	67,311	67,292	67,266	67,286	67,297	67,338	67,324	67,307	67,332	67,340	67,353	67,347	67,337	67,356
19	67,334	67,340	67,339	67,322	67,322	67,308	67,303	67,312	67,325	67,339	67,350	67,350	67,369	67,369	67,382
20	67,351	67,337	67,349	67,291	67,300	67,312	67,336	67,335	67,343	67,349	67,352	67,353	67,350	67,362	67,368
21	67,349	67,256	67,301	67,305	67,296	67,338	67,376	67,376	67,370	67,370	67,369	67,362	67,368	67,375	67,393
22	67,358	67,352	67,346	67,328	67,343	67,326	67,339	67,354	67,341	67,375	67,366	67,360	67,369	67,360	67,371
23	67,431	67,399	67,388	67,368	67,313	67,297	67,330	67,333	67,360	67,361	67,375	67,376	67,378	67,379	67,384
24	67,381	67,363	67,358	67,301	67,322	67,318	67,336	67,352	67,346	67,350	67,363	67,371	67,368	67,369	67,382
25	67,320	67,270	67,268	67,268	67,278	67,315	67,359	67,360	67,361	67,369	67,369	67,375	67,381	67,369	67,373
26	67,324	67,318	67,310	67,308	67,325	67,302	67,333	67,367	67,311	67,355	67,356	67,357	67,366	67,355	67,365
27	67,380	67,343	67,255	67,238	67,257	67,248	67,276	67,318	67,307	67,332	67,338	67,358	67,365	67,372	67,381
28	67,332	67,340	67,326	67,228	67,228	67,305	67,328	67,347	67,333	67,352	67,385	67,373	67,362	67,368	67,377
29	67,293	67,292	67,257	67,258	67,316	67,316	67,319	67,353	67,343	67,351	67,341	67,358	67,358	67,351	67,345
30	67,333	67,342	67,352	67,318	67,322	67,360	67,348	67,367	67,365	67,371	67,367	67,362	67,365	67,397	67,390
31	67,328	67,343	67,292	67,297	67,318	67,333	67,303	67,337	67,353	67,365	67,357	67,368	67,376	67,399	67,406
Sums	2,088,535	2,088,020	2,087,521	2,087,013	2,087,028	2,087,259	2,087,813	2,088,300	2,088,233	2,088,781	2,089,006	2,089,178	2,089,328	2,089,343	2,089,370
Means	67,372·1	67,355·4	67,339·4	67,323·0	67,323·5	67,330·9	67,348·8	67,364·5	67,362·4	67,380·0	67,387·3	67,392·8	67,397·7	67,398·2	67,399·0

HOURLY VALUES.—G.M.T.

TABLE XVIIc—7

OCTOBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
67,457	67,443	67,409	67,404	67,416	67,414	67,427	67,411	67,397	67,376	67,400	67,492	11 43	67,159	4 30	333	1
67,429	67,425	67,425	67,419	67,424	67,420	67,424	67,418	67,424	67,374	67,410	67,455	23 12	67,354	0 28	101	2
67,406	67,411	67,403	67,407	67,440	67,420	67,407	67,418	67,412	67,405	67,397	67,496	23 43	67,303	1 43	193	3
67,407	67,399	67,411	67,401	67,413	67,419	67,421	67,403	67,386	67,378	67,394	67,477	12 55	67,288	2 50	189	4
67,397	67,400	67,395	67,400	67,396	67,406	67,415	67,399	67,402	67,447	67,389	67,447	23 55	67,306	4 03	141	5
67,419	67,427	67,417	67,425	67,418	67,430	67,423	67,420	67,406	67,397	67,410	67,485	0 23	67,335	2 13	150	6
67,450	67,418	67,414	67,411	67,410	67,422	67,430	67,428	67,403	67,396	67,409	67,479	22 14	67,343	4 20	136	7
67,437	67,423	67,414	67,420	67,427	67,418	67,434	67,396	67,394	67,362	67,397	67,473	12 40	67,291	3 18	182	8
67,415	67,413	67,411	67,405	67,417	67,426	67,424	67,417	67,418	67,400	67,392	67,462	11 27	67,281	1 19	181	9
67,419	67,423	67,434	67,449	67,458	67,463	67,467	67,453	67,432	67,396	67,409	67,492	19 32	67,292	4 12	200	10
67,453	67,504	67,463	67,423	67,458	67,433	67,423	67,447	67,443	67,384	67,418	67,525	15 46	67,298	2 06	227	11
67,409	67,413	67,416	67,414	67,416	67,433	67,429	67,429	67,415	67,370	67,387	67,477	11 32	67,261	4 24	216	12
67,409	67,416	67,408	67,425	67,427	67,410	67,409	67,404	67,396	67,359	67,391	67,481	10 30	67,296	5 42	185	13
67,407	67,451	67,470	67,425	67,481	67,479	67,460	67,593	67,555	67,498	67,425	67,641	21 54	67,214	2 53	427	14
67,426	67,395	67,415	67,420	67,491	67,462	67,420	67,468	67,419	67,406	67,432	67,614	0 41	67,277	4 17	337	15
67,380	67,393	67,375	67,383	67,386	67,438	67,385	67,371	67,362	67,304	67,364	67,471	19 55	67,244	2 19	227	16
67,343	67,359	67,357	67,386	67,406	67,428	67,387	67,363	67,344	67,338	67,348	67,459	19 45	67,248	0 11	211	17
67,341	67,356	67,341	67,356	67,350	67,359	67,350	67,350	67,338	67,334	67,332	67,385	0 36	67,240	2 22	145	18
67,359	67,367	67,353	67,362	67,357	67,351	67,358	67,352	67,343	67,351	67,345	67,407	12 35	67,285	5 30	122	19
67,351	67,356	67,356	67,374	67,389	67,343	67,336	67,328	67,297	67,349	67,342	67,533	23 31	67,227	3 30	306	20
67,387	67,379	67,366	67,361	67,371	67,373	67,375	67,374	67,347	67,358	67,356	67,407	14 12	67,209	0 29	198	21
67,357	67,368	67,361	67,364	67,370	67,395	67,423	67,379	67,367	67,431	67,363	67,490	23 54	67,258	2 45	232	22
67,375	67,399	67,382	67,386	67,407	67,403	67,387	67,371	67,385	67,381	67,373	67,492	0 25	67,270	4 48	222	23
67,366	67,368	67,366	67,382	67,363	67,380	67,378	67,392	67,351	67,320	67,358	67,422	0 27	67,288	3 13	134	24
67,361	67,372	67,368	67,369	67,369	67,378	67,380	67,412	67,391	67,324	67,352	67,436	21 48	67,233	2 10	203	25
67,360	67,366	67,366	67,363	67,366	67,373	67,365	67,371	67,363	67,380	67,349	67,390	23 25	67,256	0 42	134	26
67,388	67,393	67,394	67,393	67,393	67,372	67,377	67,386	67,374	67,332	67,342	67,411	21 11	67,209	3 24	202	27
67,372	67,382	67,392	67,380	67,388	67,402	67,371	67,366	67,259	67,293	67,349	67,435	19 40	67,168	2 45	267	28
67,353	67,361	67,363	67,363	67,388	67,393	67,402	67,377	67,351	67,333	67,343	67,443	21 20	67,212	2 17	231	29
67,390	67,382	67,397	67,405	67,414	67,412	67,428	67,389	67,369	67,328	67,373	67,453	13 18	67,301	3 31	152	30
67,395	67,380	67,399	67,389	67,387	67,391	67,391	67,393	67,360	67,334	67,361	67,440	13 55	67,233	2 15	207	31
2,089,218	2,089,342	2,089,241	2,089,264	2,089,596	2,089,646	2,089,506	2,089,478	2,089,003	2,088,438							
67,394·1	67,398·1	67,394·9	67,395·6	67,406·3	67,407·9	67,403·4	67,402·5	67,387·2	67,369·0							

VERTICAL FORCE—MEAN

Ordinates in gamma (all—ve).

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	359	419	422	421	400	389	379	374	342	319	298	279	293	317	306
2	343	391	394	413	418	435	420	384	348	303	286	294	315	321	289
3	252	278	287	335	329	340	331	338	314	302	297	308	303	302	308
4	309	317	291	367	373	386	353	321	339	316	306	320	282	301	304
5	212	258	291	336	341	373	321	323	325	305	320	316	307	303	302
6	298	300	307	338	351	363	359	338	344	325	324	300	297	294	284
7	350	323	417	432	428	403	350	331	339	318	304	299	282	268	317
8	332	365	369	340	361	350	355	350	333	317	322	300	266	246	242
9	342	342	315	341	361	353	342	335	339	321	324	308	312	301	292
10	338	405	422	418	404	375	328	331	352	291	291	305	271	201	221
11	317	373	457	447	387	290	310	292	294	263	270	271	214	239	253
12	301	326	363	391	322	327	308	320	284	309	302	310	284	303	285
13	301	317	389	389	362	320	292	283	299	300	280	283	279	287	279
14	321	369	418	444	416	363	333	278	326	316	283	226	196	183	122
15	265	271	289	278	337	349	307	279	290	281	288	289	291	279	292
16	263	435	443	431	429	309	256	270	261	258	299	284	283	279	286
17	276	331	404	388	370	345	329	300	302	272	294	277	250	263	262
18	114	257	268	351	316	330	292	321	*	*	*	*	*	*	*
19	*	*	*	*	*	*	*	*	*	*	*	*	265	255	257
20	324	322	407	374	342	373	365	331	286	301	265	277	279	274	266
21	241	265	270	307	308	319	292	293	*	*	*	*	*	*	*
22	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	...	...	...	...	...	...	...	...	...	...	227	208	224	215	230
25	251	258	293	296	280	260	257	233	222	233	231	226	215	207	194
26	273	312	399	369	273	253	268	229	201	214	226	234	222	224	225
27	093	110	153	259	243	261	255	238	243	249	248	243	235	236	218
28	074	205	366	266	302	304	262	250	263	254	271	270	261	252	247
29	254	231	258	263	282	294	300	286	278	274	270	271	266	256	261
30	201	226	217	250	316	294	276	275	263	259	259	258	265	238	229
Sums	7,004	8,006	8,909	9,244	9,051	8,770	8,240	7,903	7,187	6,900	7,085	6,956	6,957	6,849	6,771
Means	269·4	307·9	342·7	355·5	348·1	337·3	316·9	304·0	299·5	287·5	283·2	278·2	267·6	263·4	260·7

* No record.

HOURLY VALUES—G.M.T.

TABLE XVIIc—8.

NOVEMBER, 1912.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
302	301	309	288	285	269	261	284	322	343	330	—242	20 38	—511	2 10	269	1
304	298	295	276	281	245	275	255	216	252	323	—155	22 45	—452	3 58	297	2
304	311	307	276	268	296	306	283	290	309	304	—210	0 20	—357	4 31	147	3
299	302	308	298	284	271	279	233	262	212	307	—149	23 54	—397	3 28	248	4
304	283	207	233	247	244	264	234	290	298	291	—152	17 10	—392	5 00	240	5
285	298	310	307	297	270	328	327	318	350	316	—221	1 23	—374	23 43	153	6
324	318	311	314	277	274	298	290	326	332	329	—213	20 05	—455	1 57	242	7
238	249	273	252	242	243	206	236	285	342	295	—187	20 42	—391	2 05	204	8
298	301	307	306	296	297	231	286	331	338	316	—171	21 08	—386	0 19	215	9
241	237	276	242	250	252	304	297	267	317	305	—119	13 30	—499	3 08	380	10
250	240	249	272	252	226	250	277	273	301	290	—160	12 20	—514	2 45	354	11
291	284	280	272	261	262	253	242	304	301	299	—219	21 18	—457	2 48	238	12
287	276	281	276	266	252	266	278	314	321	299	—228	0 07	—419	1 59	191	13
141	181	279	292	281	272	177	283	296	265	282	—100	20 50	—519	2 25	419	14
290	284	282	266	240	281	329	275	217	263	285	—118	22 45	—370	4 20	252	15
285	297	281	271	270	235	265	258	275	276	301	—163	0 20	—539	0 55	376	16
276	280	276	277	263	197	284	275	157	114	286	— 62	23 20	—448	1 37	386	17
*	*	*	*	*	*	*	*	*	*	*	†— 70	0 07	‡—420	3 22	350	18
257	233	259	234	246	233	228	189	281	324	...	†—150	21 48	‡—360	23 51	210	19
271	267	266	267	239	245	237	230	250	241	292	—214	19 15	—446	1 35	232	20
*	*	*	*	*	*	*	*	*	*	*	†—214	0 35	‡—334	4 02	120	21
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	22
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	23
214	212	206	186	161	190	173	193	216	251	...	†—152	18 42	‡—258	23 17	106	24
213	207	204	174	187	197	203	206	246	273	229	—171	18 32	—317	23 45	146	25
231	216	216	181	153	147	130	152	143	093	225	— 76	20 45	—488	1 50	412	26
203	202	177	189	125	145	215	183	133	074	202	— 9	22 46	—330	3 32	321	27
258	254	249	241	221	213	225	207	256	254	253	— 39	0 50	—433	1 30	394	28
275	258	229	216	210	209	218	192	215	201	252	—135	22 07	—307	6 20	172	29
241	241	232	243	243	231	238	243	250	287	251	—126	0 19	—348	3 50	222	30
6,882	6,830	6,869	6,649	6,345	6,206	6,443	6,408	6,733	6,932							
264·7	262·7	264·2	255·7	244·0	238·7	247·8	246·5	259·0	266·6							

† Maximum Recorded. ‡ Minimum Record.

Ordinates from base-line in gamma. VERTICAL FORCE—MEAN

All ordinates negative. Base-line of Jan. 5d 0h.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	500	545	585	588	569	577	544	512	532	501	477	459	431	482	479
6	486	491	581	493	546	*	*	*	455	475	466	459	468	442	453
7	486	509	539	615	554	559	565	545	512	476	472	454	460	445	438
8	494	497	479	491	573	558	521	496	489	455	482	487	478	458	435
9	443	473	460	521	593	522	486	472	489	494	497	473	471	455	466
10	422	535	395	*	*	*	*	*	515	471	454	434	441	410	352
11	462	436	485	488	481	517	489	484	481	459	462	467	459	457	458
12	453	444	458	493	520	508	499	506	474	473	462	458	461	463	451
13	495	483	*	*	444	466	436	434	426	414	431	414	413	405	411
14	412	433	468	515	486	472	448	447	422	428	392	400	392	382	404
15	405	443	465	458	456	441	445	429	428	430	422	399	331	409	394
16	458	442	442	418	487	493	473	461	465	454	429	428	425	424	422
17	435	441	461	485	520	512	524	486	450	447	449	450	446	439	434
18	430	420	443	506	476	465	486	487	476	454	454	440	404	384	407
19	475	526	486	455	465	515	511	448	422	443	441	439	413	344	389
20	423	366	497	376	416	454	493	491	493	488	491	488	467	460	451
21	462	509	474	502	515	488	495	481	488	479	458	456	460	430	413
22	362	350	405	470	445	452	464	474	490	501	491	481	443	434	420
23	430	429	510	446	461	468	507	488	489	480	476	457	474	462	456
24	444	447	454	466	474	491	502	494	478	487	484	476	468	460	454
25	461	400	473	530	499	563	555	511	488	505	475	471	465	463	436
26	416	385	402	463	538	528	504	497	492	470	475	464	465	472	461
27	455	506	552	577	534	479	500	473	472	457	447	434	434	428	425
28	437	435	428	455	460	497	478	458	449	439	432	430	425	418	402
29	409	496	520	545	546	523	499	472	482	477	466	451	451	450	450
30	459	492	482	508	492	501	542	427	493	483	426	438	418	424	436
31	516	500	566	585	521	533	498	510	513	472	465	447	421	446	459
Sums	12,130	12,433	12,510	12,449	13,071	12,582	12,464	11,983	12,863	12,612	12,376	12,154	11,884	11,746	11,656
Means	449·3	460·5	481·2	598·0	502·7	503·3	498·6	479·3	476·4	467·1	458·4	450·1	440·1	435·0	431·7

* No record.

HOURLY VALUES—G.M.T.

TABLE XVIIc—9.

JANUARY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4
477	465	480	485	476	469	484	448	488	486	502	403	11 37	607	3 0	204	5
431	462	452	450	449	462	451	423	445	486	...	377	0 26	648	1 48	271	6
450	461	464	446	450	430	433	472	456	494	487	400	21 9	645	3 2	245	7
440	435	460	458	460	446	452	412	454	443	474	382	22 18	585	4 25	203	8
435	408	401	410	420	437	433	361	378	422	458	318	22 51	677	3 48	359	9
365	423	439	419	424	427	428	408	439	462	...	317	14 34	577	1 5	260	10
450	439	443	440	421	397	404	402	407	453	454	341	0 48	555	4 48	214	11
452	451	447	438	418	418	393	433	440	495	460	348	21 0	533	4 0	185	12
413	407	390	387	365	379	381	383	380	412	...	338	23 50	518	0 2	180	13
389	373	391	380	372	368	360	399	348	405	412	287	23 34	593	3 4	306	14
396	398	397	387	390	402	378	408	425	458	415	298	11 58	529	3 35	231	15
421	422	419	419	417	412	417	420	418	435	436	345	23 20	515	4 15	170	16
435	431	427	435	438	416	402	410	421	430	450	390	20 50	541	3 18	151	17
409	394	407	404	481	356	426	410	420	475	436	322	19 37	529	3 0	207	18
421	432	438	442	433	424	432	390	440	423	442	281	12 56	611	0 54	330	19
449	399	389	398	416	410	397	377	407	462	438	272	1 6	509	10 49	237	20
426	428	439	438	435	411	435	431	424	362	455	380	14 21	584	4 10	204	21
394	403	376	402	404	407	379	375	394	430	427	325	22 5	512	9 8	187	22
459	454	447	445	445	432	419	434	434	444	459	359	23 13	571	2 0	212	23
440	442	435	451	430	439	434	464	447	461	461	393	0 18	546	5 28	153	24
437	448	444	426	401	420	451	405	434	416	464	324	23 26	607	4 45	283	25
463	452	449	434	424	421	414	397	417	455	455	305	1 51	570	3 35	265	26
423	418	477	464	454	464	455	434	434	437	466	397	19 34	635	3 12	238	27
412	417	414	423	396	402	389	396	418	409	429	332	21 36	506	4 45	174	28
453	461	461	456	453	453	448	456	449	459	473	349	0 18	580	3 45	231	29
451	455	452	453	446	464	431	481	512	516	466	390	11 49	608	6 36	218	30
454	457	455	457	456	462	463	455	476	521	483	400	11 48	648	2 24	248	31
11,645	11,635	11,693	11,647	11,574	11,428	11,390	11,284	11,605	12,151							
431·3	430·9	433·1	431·4	428·7	423·3	421·9	417·9	429·8	450·0							

Ordinates from base-line in gamma. VERTICAL FORCE—MEAN

All ordinates negative. Base-line of Jan. 5d. 0h.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	521	505	524	480	508	490	497	520	500	492	475	473	464	463	445
2	444	485	491	526	517	544	548	528	509	529	475	476	468	473	460
3	487	505	493	521	549	553	533	497	496	482	487	481	484	471	468
4	505	505	504	501	486	517	509	526	518	497	489	487	477	479	461
5	477	469	489	464	479	502	511	503	504	485	483	493	472	451	463
6	487	443	441	494	515	513	517	501	502	484	497	487	479	481	476
7	412	404	468	505	572	528	539	508	515	502	494	483	469	443	474
8	504	509	507	542	533	526	486	491	485	477	472	471	468	450	468
9	471	376	511	589	565	526	524	511	503	498	488	497	478	478	477
10	454	494	540	514	529	518	515	482	497	487	482	484	479	483	475
11	461	474	482	496	514	524	519	506	497	494	478	477	475	446	458
12	494	507	545	558	578	606	624	517	516	483	480	463	487	459	427
13	529	535	573	554	584	575	529	542	555	504	498	497	494	484	467
14	499	525	538	572	533	566	564	541	523	489	464	484	452	427	351
15	473	556	617	662	645	604	549	521	513	501	502	490	486	474	404
16	473	499	537	548	538	513	496	499	506	492	486	471	462	444	420
17	479	454	491	510	515	516	530	533	500	499	501	480	489	478	475
18	466	495	482	524	517	561	562	559	533	514	499	479	457	478	482
19	461	523	559	539	543	533	479	496	501	491	503	484	467	431	444
20	448	463	498	542	532	491	496	496	483	477	464	463	468	467	459
21	468	515	519	539	549	514	506	512	500	486	479	472	473	471	452
22	445	463	486	500	532	537	523	498	486	490	485	484	477	481	475
23	478	488	477	474	*	*	*	*	*	*	460	460	459	456	453
24	464	470	477	495	495	486	475	471	462	458	458	460	457	453	456
25	484	510	575	540	535	470	451	459	468	460	468	457	398	417	424
26	437	416	446	482	489	510	517	505	504	484	474	455	458	459	458
27	448	472	492	523	537	509	501	493	488	479	458	463	466	467	468
28	481	491	492	492	487	502	494	492	484	482	485	483	477	473	463
Sums	13,250	13,551	14,254	14,686	14,376	14,234	13,994	13,707	13,548	13,216	13,484	13,354	13,140	12,937	12,703
Means	473·2	484·0	509·1	524·5	532·4	527·2	518·3	507·7	501·8	489·5	481·6	476·9	469·3	460·0	453·7

* No record.

HOURLY VALUES=G.M.T.

TABLE XVIIc—10.

FEBRUARY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
458	451	452	457	449	446	443	439	440	444	473	416	22 05	554	1 34	138	1
463	461	459	462	466	465	465	444	482	487	486	414	0 19	562	5 28	148	2
469	467	470	469	467	471	472	471	483	505	490	461	13 42	591	4 29	130	3
469	474	473	471	464	472	447	440	437	477	483	405	22 22	533	6 38	128	4
460	453	458	454	455	454	464	463	455	487	474	397	23 15	529	5 07	132	5
482	480	478	472	464	459	469	440	459	412	478	397	22 36	525	5 41	128	6
466	452	440	442	448	459	456	456	514	504	479	371	0 58	631	4 11	260	7
461	455	444	457	460	443	434	444	478	471	477	412	21 40	560	2 51	148	8
472	421	405	431	429	429	408	450	465	454	475	352	0 35	648	2 46	296	9
476	475	474	458	448	465	466	467	465	461	485	405	0 17	577	2 25	172	10
454	465	467	466	460	453	443	479	478	494	478	410	21 31	543	4 26	133	11
471	497	491	492	483	484	481	416	478	529	502	383	21 40	679	5 44	296	12
495	496	491	491	489	447	460	463	504	499	510	427	20 18	618	2 16	191	13
457	494	493	483	470	475	463	389	574	473	492	244	13 46	611	2 50	367	14
448	443	465	460	467	472	433	455	454	473	504	377	14 15	711	3 22	334	15
442	454	483	481	472	480	450	459	516	479	484	397	14 07	574	2 05	177	16
467	471	422	462	428	447	457	440	426	466	478	370	17 03	544	6 51	174	17
481	479	475	471	461	469	466	476	478	461	494	374	23 39	584	5 15	210	18
457	459	461	459	458	435	472	462	458	448	482	394	20 05	593	1 46	199	19
445	444	438	427	423	441	447	447	431	468	467	411	18 14	598	3 30	187	20
454	447	454	457	444	443	458	435	455	445	479	411	22 00	559	2 13	148	21
470	463	440	434	453	429	439	451	464	478	476	410	0 04	554	3 52	144	22
443	448	453	444	451	438	434	438	465	464	...	425	21 35	518	0 20	93	23
455	464	465	460	461	454	457	463	469	484	466	448	23 48	522	3 30	74	24
412	415	421	421	422	432	428	455	458	437	457	367	12 07	615	2 08	248	25
426	461	463	457	451	437	456	429	436	448	463	394	23 48	557	6 26	163	26
464	470	469	468	458	446	446	439	468	481	475	433	22 05	552	3 24	119	27
474	474	476	476	475	472	475	477	483	493	482	442	13 50	564	1 57	122	28
12,891	12,933	12,880	12,882	12,776	12,717	12,689	12,587	13,173	13,222							
460·4	461·9	460·0	460·1	456·3	454·2	453·2	449·5	470·5	472·2							

Ordinates from base-line in gamma. VERTICAL FORCE—MEAN

All ordinates negative. Base-line of Jan. 5d. 0h.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	493	500	512	512	517	521	522	506	500	485	480	481	476	477	482
2	490	494	506	509	505	501	497	501	497	506	503	498	500	500	500
3	512	519	521	527	532	542	548	543	529	520	520	514	510	511	507
4	514	511	501	544	581	592	572	552	545	525	515	495	500	522	524
5	516	504	535	565	557	554	556	545	544	540	544	538	538	520	525
6	549	554	539	545	549	600	578	569	555	522	527	538	500	472	498
7	549	554	560	574	603	581	543	528	527	511	507	503	500	494	503
8	522	525	531	566	571	547	520	525	506	*	*	525	519	503	499
9	548	559	565	575	570	568	586	550	557	542	535	530	532	531	532
10	548	560	570	573	595	598	570	564	553	549	553	549	541	548	547
11	567	571	571	574	574	574	564	550	546	503	511	508	511	515	513
12	579	551	578	567	563	552	542	527	517	512	517	518	519	516	519
13	532	545	551	573	581	549	533	525	518	506	504	503	500	497	502
14	525	510	533	530	528	588	552	579	506	478	475	492	487	481	240
15	481	508	513	548	515	529	545	516	506	477	454	386	359	421	426
16	469	479	481	565	546	518	507	503	498	480	462	467	457	460	457
17	495	529	527	550	515	493	511	512	513	472	428	448	440	434	413
18	440	438	474	504	524	546	516	496	489	484	478	478	469	439	465
19	494	515	559	573	548	539	504	507	501	467	465	449	465	461	437
20	457	454	461	472	508	513	519	519	507	483	482	473	463	463	448
21	469	497	540	544	541	573	569	540	508	494	486	486	474	463	421
22	467	487	497	542	558	554	513	515	499	488	484	481	494	482	484
23	500	525	531	542	540	519	518	508	501	489	486	487	488	492	478
24	469	502	510	525	524	515	507	492	496	486	484	472	466	472	473
25	485	494	501	523	516	507	501	498	482	475	473	471	471	470	469
26	479	483	495	512	512	500	496	481	477	457	458	461	456	456	452
27	453	497	507	508	518	492	477	477	471	467	457	452	452	450	450
28	482	496	534	517	479	476	476	479	474	467	466	465	464	446	462
29	471	507	550	523	496	473	475	475	475	471	468	467	468	467	455
30	470	480	471	543	517	510	507	494	481	489	467	491	501	482	493
31	480	489	491	497	504	527	530	529	520	503	495	493	494	488	465
Sums	15,505	15,837	16,215	16,722	16,687	16,651	16,354	16,105	15,798	14,848	14,684	15,119	15,014	14,933	14,639
Means	500·2	510·9	523·1	539·4	538·3	537·1	527·5	519·5	509·6	494·9	489·5	487·7	484·3	481·7	472·2

* No record.

HOURLY VALUES—G.M.T.

TABLE XVIIc—11.

MARCH, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day.	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
479	478	479	479	478	472	478	483	482	490	490	457	20 00	537	6 03	80	1
497	504	505	507	506	504	503	502	507	512	502	476	0 32	525	2 25	49	2
510	517	513	507	519	493	492	513	509	514	518	472	20 12	557	6 20	85	3
522	523	522	520	524	496	504	519	530	516	527	487	11 40	606	3 22	119	4
532	535	537	538	538	519	531	523	544	549	537	478	1 20	577	2 52	99	5
505	509	510	515	502	504	485	517	477	549	526	444	12 25	625	2 42	181	6
511	507	507	507	507	508	506	507	511	522	525	488	12 50	635	3 50	147	7
512	514	517	523	521	501	514	537	548	548	...	478	23 38	632	3 12	154	8
523	532	541	534	533	531	532	533	539	548	545	513	15 05	624	2 41	111	9
544	546	545	544	542	542	537	542	530	567	554	512	22 48	620	4 20	108	10
513	516	516	515	512	505	519	493	495	579	531	449	22 16	597	23 40	148	11
517	516	516	516	515	517	506	513	513	532	528	493	21 15	634	0 37	141	12
495	495	496	493	514	490	494	473	483	525	515	442	22 10	597	2 55	155	13
322	431	444	471	464	463	514	501	541	481	485	138	14 25	642	4 55	504	14
456	462	456	447	453	444	474	448	429	469	469	270	11 45	614	1 45	344	15
458	428	337	242	379	405	383	372	421	495	449	189	17 45	614	2 45	425	16
430	386	430	393	402	412	434	442	430	440	459	352	18 03	587	1 53	235	17
450	464	469	468	472	467	458	457	462	494	476	389	13 06	607	4 16	218	18
460	465	464	458	457	460	424	449	461	457	482	406	20 58	614	2 30	208	19
441	455	460	457	459	453	439	448	467	469	471	413	20 28	525	5 30	112	20
448	475	466	467	439	456	488	498	477	467	492	400	13 45	593	5 00	193	21
483	473	478	468	443	469	474	483	470	500	492	434	0 34	585	4 57	151	22
459	403	456	461	467	463	447	454	447	469	485	354	15 58	573	2 33	219	23
473	473	474	476	472	472	472	463	482	485	486	448	11 25	549	2 03	101	24
463	442	452	457	457	456	460	460	466	479	477	413	16 17	528	3 30	115	25
450	453	453	451	449	449	451	458	456	453	468	436	14 45	532	1 35	96	26
462	465	465	464	461	462	461	459	471	482	471	437	13 00	530	2 21	93	27
469	466	462	459	466	463	454	452	452	471	472	434	13 10	550	1 51	116	28
446	446	416	395	406	432	436	466	481	470	465	376	18 18	570	1 57	194	29
491	494	491	493	479	480	491	520	459	480	492	414	9 54	581	3 27	167	30
392	425	450	458	468	480	454	462	501	501	484	344	14 45	556	5 15	212	31
14,713	14,798	14,827	14,683	14,799	14,768	14,815	14,947	15,041	15,513							
474·6	477·4	478·3	473·6	477·4	476·4	477·9	482·2	485·2	500·4							

Ordinates from base-line in gamma. VERTICAL FORCE—MEAN

All ordinates negative. Base-line of Jan. 5d. 0h.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	501	525	487	526	548	506	490	502	499	497	492	496	492	497	482
2	513	529	542	521	518	528	528	512	512	499	502	492	488	479	492
3	502	509	526	539	542	548	540	538	535	530	531	521	517	519	517
4	523	533	518	543	576	554	531	519	539	530	522	537	522	527	510
5	548	568	552	557	546	556	532	532	535	531	534	527	523	518	517
6	527	525	520	526	524	533	519	515	518	508	507	501	516	499	510
7	515	518	523	525	525	524	527	505	508	512	508	509	508	506	505
8	511	514	519	526	521	517	513	507	506	505	502	502	500	503	499
9	535	515	509	539	526	559	543	513	507	515	499	509	472	362	465
10	549	542	534	517	530	530	538	503	497	484	390	488	494	484	486
11	526	552	518	546	555	515	522	511	524	517	511	466	487	491	499
12	540	554	567	586	575	556	552	543	536	535	540	530	530	535	516
13	544	538	549	558	567	571	541	550	532	531	528	525	522	509	509
14	547	535	531	556	591	560	538	529	547	636	520	515	512	522	525
15	549	545	578	595	600	605	578	561	539	532	528	533	535	566	536
16	542	569	552	549	548	564	569	558	543	538	537	531	508	439	476
17	538	536	546	562	590	577	594	568	554	529	524	526	519	511	471
18	554	537	531	544	547	551	540	529	513	507	514	507	510	502	500
19	506	513	544	544	547	550	538	534	516	517	516	514	517	503	511
20	501	511	518	526	539	542	543	517	512	511	515	506	503	498	499
21	520	523	524	529	543	536	530	522	520	516	519	517	518	517	519
22	527	531	533	533	556	539	523	526	513	516	514	519	507	499	495
23	529	493	498	510	534	531	530	510	495	503	503	506	493	486	472
24	508	517	532	524	540	529	519	512	503	501	510	496	500	495	492
25	499	506	515	511	519	518	518	514	495	498	494	503	473	473	471
26	510	508	528	529	522	524	511	505	501	502	499	498	488	486	491
27	503	503	523	518	534	520	513	507	503	508	508	499	492	481	467
28	519	517	560	554	527	534	538	510	514	502	507	497	478	488	496
29	496	497	527	533	528	519	507	513	513	499	486	494	501	494	487
30	502	501	510	508	508	506	496	508	505	506	500	499	491	486	483
Sums	15,684	15,764	15,914	16,134	16,326	16,202	15,966	15,673	15,534	15,415	15,260	15,263	15,116	14,875	14,898
Means	522·8	525·5	530·5	537·8	544·2	540·1	532·2	522·4	517·8	513·8	508·7	508·8	503·9	495·8	496·6

HOURLY VALUES—G.M.T.

TABLE XVIIc—12.

APRIL, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
460	476	478	491	481	495	487	501	472	513	495	437	22 45	573	3 08	136	1
500	496	504	506	510	510	511	509	511	502	509	474	13 00	567	0 48	93	2
512	515	510	522	521	519	518	517	527	523	524	485	0 35	566	3 28	81	3
524	521	511	494	506	511	519	511	516	548	525	479	17 38	621	3 30	142	4
511	516	515	517	516	513	514	518	518	527	529	497	23 05	588	2 50	91	5
499	500	500	499	491	495	501	501	504	515	510	485	19 10	539	0 22	54	6
504	502	501	501	501	502	502	502	506	511	510	497	13 00	534	3 01	37	7
485	494	486	488	494	508	482	462	504	535	503	428	21 41	557	23 33	129	8
421	310	368	426	472	470	493	505	523	549	482	190	15 57	620	2 36	421	9
474	476	486	487	494	489	513	506	494	526	499	365	10 07	583	22 10	218	10
501	518	510	512	502	511	513	501	508	540	513	441	11 03	606	1 25	165	11
490	489	499	458	503	468	441	489	525	544	523	421	20 30	609	3 15	188	12
519	524	525	519	523	524	528	517	522	547	532	478	13 17	592	3 50	114	13
515	521	518	524	516	524	514	514	531	549	531	493	21 30	606	3 23	113	14
536	534	528	522	521	514	501	538	528	542	546	473	20 36	634	4 06	161	15
517	505	515	505	498	517	529	536	507	538	527	399	12 58	585	5 17	186	16
475	475	510	497	497	487	495	516	539	554	526	413	13 55	607	3 36	194	17
504	504	500	500	500	496	497	516	518	506	517	493	14 04	562	4 45	169	18
511	497	502	488	495	491	502	486	480	501	513	471	21 32	564	2 18	93	19
510	509	511	509	509	514	513	513	514	520	515	491	13 00	555	4 31	64	20
517	516	515	515	514	513	517	515	517	527	521	505	22 17	548	4 25	43	21
502	508	503	506	494	512	499	509	506	529	516	485	13 45	564	3 42	79	22
488	501	493	496	499	498	502	500	497	508	502	456	13 45	565	4 00	109	23
500	490	487	475	481	468	508	482	496	499	503	463	19 15	559	3 45	96	24
484	487	487	484	480	492	490	491	496	510	496	454	13 33	537	3 45	83	25
492	494	492	500	484	489	490	504	502	503	502	476	20 02	539	2 01	63	26
463	481	484	490	478	499	505	484	492	519	498	442	14 29	544	3 45	102	27
491	488	488	488	483	490	481	494	498	496	505	470	12 11	569	1 45	99	28
471	489	485	488	483	482	488	489	489	502	498	460	22 44	553	2 06	93	29
485	491	492	483	486	493	480	460	478	496	494	452	22 15	515	0 50	63	30
14,864	14,827	14,894	14,890	14,932	14,994	15,033	15,086	15,218	15,682							
495·5	494·2	496·5	496·3	497·7	499·8	501·1	502·9	507·3	522·7							

Ordinates from base-line in gamma.

VERTICAL FORCE—MEAN

All ordinates negative. Base-line of Jan. 5d. 0h.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	499	513	516	*	*	*	*	*	*	*	*	*	*	*	*
2	...	...	...	496	519	502	507	501	502	498	494	485	477	483	491
3	501	496	509	504	509	511	502	491	490	495	491	436	440	475	470
4	491	486	503	511	501	509	502	491	500	499	491	480	477	452	466
5	477	471	540	541	533	494	475	465	459	464	453	461	459	457	459
6	562	499	492	513	537	489	478	491	484	400	447	458	436	321	364
7	487	500	507	488	508	487	473	474	469	470	397	403	403	339	305
8	488	496	485	522	506	504	486	480	474	474	470	469	459	449	435
9	471	480	501	510	508	498	496	495	496	492	481	478	433	439	424
10	530	537	559	530	541	534	511	506	502	507	499	498	497	497	491
11	508	527	493	521	538	529	514	512	501	512	490	500	492	497	489
12	495	504	511	507	516	510	506	499	499	501	500	498	502	503	501
13	508	518	537	539	555	535	525	524	520	511	521	507	509	511	512
14	523	531	534	529	530	523	519	520	516	514	515	513	513	513	512
15	514	519	523	539	541	538	535	526	523	524	512	508	506	511	511
16	519	510	532	515	528	528	526	516	515	512	509	508	507	511	508
17	505	526	524	530	515	517	508	512	513	499	500	498	501	485	490
18	511	512	513	515	513	509	503	500	500	500	500	500	503	501	500
19	496	503	513	518	504	508	497	494	492	502	499	490	489	498	498
20	504	506	506	513	521	503	500	503	503	499	494	506	503	504	500
21	515	520	529	534	521	517	514	515	514	522	520	519	502	505	502
22	518	529	524	523	526	523	520	519	516	517	520	517	519	517	517
23	521	521	522	523	514	515	513	512	511	511	513	513	514	514	511
24	515	516	527	523	519	513	513	514	514	515	513	514	509	508	498
25	522	535	548	544	536	545	525	520	527	516	512	516	517	511	499
26	520	525	523	523	514	520	521	518	516	512	508	503	504	502	505
27	518	521	524	523	522	523	519	521	519	516	517	522	509	492	463
28	522	517	521	527	533	521	522	515	511	509	515	506	474	505	512
29	505	512	506	528	509	511	515	511	509	510	513	505	495	507	467
30	503	501	515	523	517	518	521	523	522	508	505	505	487	492	502
31	511	512	529	524	517	517	512	511	508	511	512	511	511	510	509
Sums	15,259	15,343	15,566	15,636	15,651	15,451	15,258	15,179	15,125	15,020	14,911	14,827	14,647	14,509	14,420
Means	508·6	511·4	518·9	521·2	521·7	515·0	508·6	506·0	504·2	500·7	497·0	494·2	488·2	483·6	480·7

* Records missing.

HOURLY VALUES—G.M.T. TABLE XVIIc—13.

MAY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1
496	497	491	493	493	494	494	494	494	501	...	450	11 38	531	3 49	81	2
486	482	491	483	489	488	490	490	490	491	488	370	11 15	548	1 35	178	3
462	468	464	395	388	347	396	412	469	477	465	303	19 46	524	4 40	221	4
425	433	416	428	414	420	427	476	518	562	467	384	20 40	591	3 30	207	5
397	243	223	369	411	418	476	455	461	487	433	80	16 42	572	0 04	492	6
350	386	404	429	444	451	457	437	474	488	439	247	14 20	565	1 46	318	7
440	445	449	447	452	444	453	478	472	471	470	426	13 34	545	2 46	119	8
452	470	470	478	481	481	488	497	513	530	481	397	13 58	532	3 16	135	9
499	489	488	488	478	487	492	500	490	508	506	471	19 00	574	2 37	103	10
483	489	492	493	492	493	498	490	504	495	502	476	21 46	547	4 45	71	11
494	503	498	490	490	485	467	460	488	508	497	452	22 03	540	0 56	88	12
510	521	514	501	509	500	481	497	511	523	516	472	20 31	576	3 42	104	13
512	514	515	515	512	512	512	512	512	514	517	507	13 33	541	2 27	34	14
511	514	514	509	496	518	498	489	501	519	516	481	22 12	547	3 18	66	15
508	503	506	509	500	489	492	495	508	505	510	481	21 07	544	1 49	63	16
497	499	504	502	498	505	503	507	505	511	506	475	13 07	545	1 00	70	17
499	496	496	500	496	495	497	498	497	496	502	490	15 30	522	2 52	32	18
494	492	496	492	498	492	492	498	507	504	499	479	11 49	533	2 18	54	19
502	499	498	503	497	500	506	495	499	515	503	481	23 23	530	3 31	49	20
500	508	509	509	510	512	516	515	519	518	515	493	13 32	537	2 29	44	21
516	516	515	514	510	511	515	516	521	521	518	506	19 43	536	1 42	30	22
510	511	509	509	510	510	511	512	514	515	513	506	15 17	526	1 30	20	23
511	516	515	508	500	518	506	499	506	522	512	493	22 06	536	2 25	43	24
499	505	506	507	506	504	508	516	522	520	519	485	13 40	578	2 44	93	25
498	498	510	504	510	509	510	517	516	518	512	495	15 18	531	0 43	36	26
488	523	515	520	521	515	515	507	524	522	514	422	13 33	531	2 24	109	27
514	509	516	504	512	508	511	513	508	505	512	470	11 48	547	3 53	77	28
449	490	497	496	493	488	497	478	480	503	499	425	14 27	544	2 12	119	29
499	492	483	500	498	495	505	506	495	511	505	462	12 21	550	2 27	88	30
510	510	511	520	518	519	513	524	523	538	515	504	20 40	543	2 47	39	31
14,511	14,521	14,515	14,615	14,619	14,608	14,726	14,783	15,041	15,298							
483·7	484·0	483·8	487·2	487·3	486·9	490·9	492·8	501·4	509·9							

Ordinates from base-line in gamma. VERTICAL FORCE—MEAN

All ordinates negative. Base-line of Jan. 5d. 0h.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	538	543	548	540	551	541	550	554	539	532	521	514	507	502	489
2	562	580	557	528	512	509	515	519	516	527	513	508	506	508	473
3	514	536	529	551	549	537	533	536	512	501	489	486	498	503	484
4	541	530	543	578	530	520	523	526	527	415	507	499	442	422	483
5	530	545	533	505	504	506	502	496	498	498	493	491	499	496	484
6	507	515	524	537	529	516	501	500	507	506	502	494	483	474	488
7	501	502	517	518	520	516	511	510	510	510	508	505	506	505	508
8	507	507	517	514	511	507	502	505	500	504	499	500	498	495	499
9	508	518	516	524	509	507	508	502	499	499	500	500	497	496	492
10	526	528	532	537	537	528	516	514	496	483	498	497	501	495	498
11	498	500	502	504	509	509	503	505	497	496	497	498	495	468	471
12	532	541	538	538	526	521	522	521	520	522	522	522	521	521	524
13	532	534	534	535	535	532	530	530	528	528	527	527	530	522	519
14	526	530	534	536	541	542	541	538	536	531	533	531	532	531	533
15	542	540	548	549	552	543	542	542	536	533	536	529	524	519	523
16	531	533	535	531	527	526	530	525	533	524	511	502	482	500	511
17	512	510	513	523	517	517	513	519	514	514	512	510	507	502	504
18	512	515	517	527	526	521	517	517	516	517	518	518	513	513	509
19	520	520	519	514	514	512	511	511	513	511	513	513	511	484	458
20	497	526	525	534	534	529	528	521	518	522	525	519	516	516	508
21	521	523	525	524	533	529	522	515	514	514	515	515	514	511	483
22	511	516	529	525	513	510	507	504	504	504	504	504	508	507	504
23	514	520	525	521	523	518	508	504	503	502	501	502	494	499	496
24	500	513	505	518	535	513	514	514	512	506	514	512	508	517	514
25	520	519	519	518	515	515	515	513	512	512	511	508	510	511	501
26	507	503	514	523	524	511	509	509	507	507	509	508	506	476	419
27	506	516	524	525	528	524	518	512	510	509	507	508	503	493	492
28	506	512	518	520	510	504	509	509	508	504	498	504	498	503	504
29	501	495	501	524	557	521	491	501	502	495	506	502	497	505	497
30	517	520	531	519	533	531	528	519	517	515	504	497	498	510	515
Sums	15,539	15,690	15,772	15,840	15,804	15,615	15,519	15,491	15,404	15,340	15,293	15,223	15,104	15,003	14,888
Means	518·0	523·0	525·7	528·0	526·8	520·5	517·3	516·4	513·5	511·3	509·8	507·4	503·5	500·1	496·3

HOURLY VALUES—G.M.T.

TABLE XVIIc—14.

JUNE, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
501	507	514	520	513	496	528	538	548	562	527	441	19 30	570	2 08	129	1
499	497	493	498	514	505	515	511	508	514	515	440	14 06	646	1 26	206	2
499	500	497	502	511	502	503	507	518	541	513	461	10 35	571	2 44	110	3
500	504	498	500	477	484	513	504	516	530	508	373	12 53	598	3 07	225	4
483	494	490	497	495	498	500	503	506	507	501	476	14 52	554	0 59	78	5
490	491	493	490	496	499	492	494	502	501	501	464	13 05	549	4 00	85	6
496	496	494	494	504	498	497	497	501	507	505	484	16 42	537	2 42	53	7
494	487	489	489	486	489	486	490	502	508	499	478	20 49	525	1 54	47	8
495	497	497	496	495	494	492	494	511	526	502	487	21 27	537	0 04	50	9
495	491	485	484	478	483	489	489	496	498	503	474	18 55	545	3 35	71	10
480	498	500	505	508	504	515	517	525	532	501	445	12 52	532	23 39	87	11
526	519	528	527	528	528	531	529	531	532	527	516	12 47	549	1 14	33	12
500	504	506	510	517	522	517	521	525	526	523	487	15 07	538	0 55	51	13
533	528	532	535	534	533	533	539	542	542	535	524	12 48	549	3 42	25	14
522	528	530	529	530	529	529	530	530	531	534	504	13 04	569	3 39	65	15
508	506	509	510	513	511	511	512	512	512	516	473	11 42	556	2 07	83	16
502	499	489	497	506	506	511	509	512	512	509	471	16 24	536	3 44	65	17
509	503	502	509	511	512	517	518	519	520	515	490	14 18	530	3 26	40	18
481	487	496	495	499	511	524	490	484	497	503	397	13 35	543	21 15	146	19
518	515	513	513	514	513	504	513	518	521	519	493	0 03	546	1 39	53	20
455	484	498	498	478	492	499	501	503	511	507	426	15 02	545	3 56	119	21
500	499	499	498	496	492	496	491	502	514	505	486	21 58	536	1 35	50	22
503	500	501	499	495	493	486	496	490	500	504	465	12 36	533	2 05	68	23
510	512	514	505	508	502	501	496	513	520	511	492	21 23	558	4 04	66	24
499	504	514	506	505	505	508	499	508	507	510	493	13 34	524	1 07	31	25
457	486	497	504	503	501	499	502	504	506	499	391	14 01	530	3 58	139	26
495	498	502	504	500	501	501	499	498	506	507	481	13 28	530	3 36	49	27
506	503	503	499	501	480	492	519	511	501	505	469	20 57	526	21 40	57	28
499	502	496	489	504	492	499	513	519	517	505	479	1 18	561	4 10	82	29
513	522	520	526	521	520	533	530	526	526	520	483	10 20	554	2 05	71	30
14,968	15,061	15,099	15,128	15,140	15,095	15,221	15,251	15,380	15,527							
498·9	502·0	503·3	504·3	504·7	503·2	507·4	508·4	512·7	517·6							

Ordinates from base-line in gamma. VERTICAL FORCE—MEAN

All ordinates negative. Base-line of Jan. 5d. 0h.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	526	541	536	538	550	542	545	541	541	529	536	528	527	494	502
2	535	545	554	552	562	549	554	552	551	545	540	538	536	535	536
3	548	557	554	551	552	546	548	554	555	544	541	533	533	540	542
4	545	551	556	568	554	551	548	557	550	555	552	552	552	550	548
5	*	*	*	*	556	565	561	567	562	565	570	570	572	568	565
6	589	593	597	580	591	582	579	576	571	573	569	571	571	572	568
7	585	589	591	592	582	585	576	577	579	575	576	573	571	565	546
8	601	611	611	602	607	605	604	603	602	598	599	602	600	590	593
9	597	599	601	602	601	597	595	593	592	591	592	592	592	592	591
10	590	593	599	601	603	597	600	603	605	602	606	599	600	592	591
11	603	609	618	627	623	615	609	613	610	606	611	590	594	596	599
12	591	595	604	601	601	605	602	601	601	601	595	595	598	547	507
13	585	578	584	609	593	579	576	582	574	580	577	572	557	527	506
14	567	578	591	554	592	584	565	565	562	554	547	545	547	559	551
15	560	568	577	572	575	581	576	571	567	568	567	567	558	560	550
16	555	578	580	582	572	577	572	576	570	576	559	562	564	567	557
17	584	585	587	588	585	591	584	580	585	588	587	583	578	563	579
18	614	622	631	629	633	634	627	630	628	627	608	577	608	586	578
19	586	584	590	587	590	599	592	585	583	580	580	581	576	577	578
20	575	581	600	599	607	602	591	584	587	585	576	575	557	527	520
21	554	571	571	572	603	598	579	582	582	575	576	580	584	588	586
22	582	590	591	588	588	571	593	590	591	585	580	582	585	570	547
23	592	605	605	597	603	616	603	595	589	589	596	599	601	606	610
24	625	630	637	655	660	642	636	633	636	636	630	629	635	629	628
25	632	631	642	639	635	651	640	638	627	633	605	617	618	614	596
26	628	608	632	653	644	644	646	644	642	642	632	633	644	639	642
27	638	644	666	665	660	651	645	636	643	632	633	622	632	632	632
28	631	635	642	640	640	638	637	636	636	634	636	636	636	634	630
29	639	643	652	668	681	669	665	658	657	649	648	646	652	647	647
30	651	647	650	661	654	666	651	650	637	639	647	644	642	644	644
31	655	665	657	655	658	660	656	656	653	653	650	648	648	647	646
Sums	17,763	17,926	18,106	18,127	18,755	18,682	18,555	18,528	18,468	18,409	18,321	18,241	18,268	18,057	17,915
Means	592·1	597·5	603·5	604·2	605·0	602·6	598·5	597·7	595·7	593·8	591·0	588·4	589·3	582·5	577·9

* No record.

HOURLY VALUES—G.M.T.

TABLE XVIIc—15.

JULY, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
502	513	523	511	523	517	493	512	529	535	525	459	13 04	564	3 54	105	1
536	534	525	524	524	526	529	539	537	548	540	510	16 06	575	4 13	65	2
539	544	541	539	541	542	530	531	541	545	544	520	9 57	597	3 13	77	3
548	548	549	*	*	*	*	*	*	*	*	541	2 46	571	3 21	30	4
563	566	563	571	568	570	564	570	581	589	...	544	13 37	598	23 56	54	5
561	563	559	560	560	563	566	569	575	585	573	550	17 12	605	1 21	55	6
564	570	573	576	588	572	584	587	597	601	578	519	13 58	609	23 50	90	7
594	594	594	595	586	585	588	591	594	597	598	582	13 23	626	1 39	44	8
589	590	589	588	586	586	584	585	591	590	592	581	21 22	609	2 22	28	9
585	595	597	594	602	613	607	604	612	603	600	579	14 50	616	23 16	37	10
593	592	597	598	595	598	594	592	592	591	603	583	23 29	631	3 17	48	11
586	577	583	583	578	572	536	556	574	585	583	486	13 20	616	5 17	130	12
526	544	556	570	549	546	550	565	567	567	564	469	13 39	625	3 04	156	13
555	549	556	558	552	552	538	539	558	560	559	519	21 19	615	2 00	96	14
550	545	549	513	509	539	542	554	538	555	556	463	18 21	678	14 32	215	15
515	540	559	563	565	570	567	569	574	584	566	480	14 41	604	1 38	124	16
593	597	596	598	601	598	594	606	615	614	590	558	12 32	620	23 01	62	17
570	566	587	583	581	584	583	586	577	586	601	531	15 26	640	5 19	109	18
567	567	566	565	565	567	569	567	568	575	578	558	18 03	612	3 09	54	19
521	541	509	512	518	519	540	560	543	554	559	479	17 27	616	3 15	137	20
582	579	576	579	572	572	577	578	579	582	580	547	0 01	614	4 09	67	21
540	556	572	578	584	580	582	584	586	592	579	532	15 24	615	5 26	83	22
611	611	610	610	611	608	614	618	623	625	606	584	8 35	624	4 59	40	23
630	623	609	623	625	620	628	630	628	632	632	601	16 45	676	3 41	75	24
606	593	603	593	594	604	604	629	649	628	620	564	18 26	668	5 02	104	25
644	635	631	628	621	628	620	618	628	638	635	607	21 38	681	3 14	74	26
628	630	628	627	625	623	620	619	622	631	635	613	21 32	684	2 03	71	27
636	637	643	643	646	642	641	650	640	639	638	621	13 42	654	2 37	33	28
643	641	645	639	636	635	648	645	642	651	650	621	19 42	690	3 47	69	29
640	635	641	636	640	639	640	643	649	655	645	628	18 17	672	2 51	44	30
645	639	637	635	640	639	641	644	645	648	649	624	17 16	674	2 43	50	31
17,962	18,014	18,066	17,492	17,485	17,509	17,473	17,640	17,754	17,885							
579·4	581·1	582·8	583·1	582·8	583·6	582·4	588·0	591·8	596·2							

Ordinates from base-line in gamma.

All ordinates negative. Base-line of Jan. 5d. 0h.

Day.	0 h.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	12 h.	13 h.	14 h.
1	648	647	658	670	669	656	648	650	652	650	647	646	643	643	644
2	653	651	656	659	656	654	653	653	652	652	652	652	646	648	642
3	657	668	647	659	666	659	653	647	646	646	644	642	638	637	637
4	629	636	636	637	635	632	630	627	626	626	627	628	631	630	627
5	628	633	637	*	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	630	635	632	629	627	624	626	627	629	630	629
7	637	637	639	638	636	636	632	628	629	628	630	632	630	624	561
8	633	635	641	*	*	*	*	*	*	*	*	*	*	*	*
Sums	4,485	4,507	4,514	3,263	3,892	3,872	3,848	3,834	3,832	3,826	3,826	3,827	3,817	3,812	3,740
Means	640·7	643·9	644·9	652·6	648·7	645·3	641·3	639·0	638·7	637·7	637·7	637·8	636·2	635·3	623·3

* No record.

HOURLY VALUES—G.M.T.

TABLE XVIIc—16.

AUGUST, 1913.

15 h.	16 h.	17 h.	18 h.	19 h.	20 h.	21 h.	22 h.	23 h.	24 h.	Mean for Day	Max.	Time.	Min.	Time.	Range.	Day.
												h. m.		h. m.		
645	647	646	647	647	650	652	652	653	653	651	638	13 39	678	3 35	40	1
647	649	649	650	645	651	653	652	656	657	651	636	14 07	664	2 46	28	2
637	634	632	630	631	631	630	626	634	629	642	619	21 52	683	0 51	64	3
624	625	622	617	618	624	614	607	621	628	626	594	21 23	641	1 45	47	4
*	*	*	*	*	*	*	*	*	*	*	620	0 15	651	2 50	31	5
624	624	621	621	615	608	613	619	621	637	...	599	19 29	652	4 32	53	6
583	615	622	630	626	626	624	632	632	633	625	488	14 07	662	2 38	174	7
*	*	*	*	*	*	*	*	*	*	*	625	0 30	645	2 21	20	8
3,760	3,794	3,792	3,795	3,782	3,790	3,786	3,788	3,817	3,837							
626·7	632·3	632·0	632·5	630·3	631·7	631·0	631·3	636·2	639·5							

PART II.

ANALYSIS AND DISCUSSION OF MAGNETIC CURVES.

BY

CHARLES CHREE, M.A., Sc.D., LL.D., F.R.S.

(WITH TWO TEXT FIGURES, SEVEN PLATES, AND FIFTY TABLES.)

CONTENTS.

CHAPTER VI.
PRELIMINARY REMARKS.

CHAPTER VII.
RESULTS OF CURVE MEASUREMENTS AND THEIR DISCUSSION.

CHAPTER VIII.
VECTOR DIAGRAMS AND FOURIER ANALYSIS.

CHAPTER IX.
ABSOLUTE DAILY RANGES—DAILY MAXIMA AND MINIMA.

CHAPTER X.

COMPARISON OF ADELIE LAND DATA WITH DATA FROM CAPE EVANS.

LIST OF TABLES.

LIST OF PLATES.

CHAPTER VI.

PRELIMINARY REMARKS.

Section 1.—The circumstances under which the present discussion has been prepared are unusual. The magnetic curves were measured in New Zealand. The work was begun by Major Eric Webb, the Chief Magnetic Observer of the Expedition, but the war intervened. Most of the measurements were made at Christchurch, New Zealand, under the general supervision of Professor C. Coleridge Farr, by a party of ladies led by Miss Beatrice Smith. As the work progressed, successive sheets of results were sent to me in England. Each sheet contained hourly values of one of the three elements recorded, declination (D), horizontal force (H), and vertical force (V), for a single month, as well as the maximum and minimum for each day, and the times of their occurrence. Mean values were given for each day for which the trace was complete, and the hourly values were summed and meaned. Each hourly value represented the mean ordinate for 60 minutes centering at the hour, the curves being measured with a planimeter. The extreme values for the day were obtained, however, with an ordinary scale. An exceptional feature was the measurement of the curves for hours and days G.M.T. as well as for hours and days L.M.T. This practice has some decided advantages, and I did not discourage it, though I should hardly have ventured to introduce it in view of the serious addition it made to the labour.

At the start the work was novel to the ladies employed, and some inconsistencies appeared in the earlier sheets. Some represented corrections made on the original sheets retained in New Zealand, but not copied into the sheets sent to England. Again, in summing hourly values, all hours had been included, whether the record for the day was complete or not. For the purpose of diurnal inequalities it seemed best to omit incomplete days, unless the gap in the curves was very short and interpolation appeared reasonably satisfactory. Thus several reasons led me to repeat the summations independently. Discrepancies thus discovered were cleared up by correspondence with Miss Smith, who took a great deal of trouble in the matter.

All questions as to scale and base values were settled in New Zealand. For their consideration a study of the curves was essential, and during the war the sending of original curves to Europe was out of the question. In a D magnetograph the scale value can hardly change sensibly unless the instrument is moved. The base line value also is little liable to change. D is thus an element in which, with reasonable care, at an ordinary observatory, there is little risk of serious error as to either the scale value or the base value. There is further no temperature correction. In high magnetic latitudes, it is true, there is special trouble owing to the large size of D changes. The change of D caused by a given disturbing force acting perpendicular to the magnetic meridian varies inversely as the local value of H. At the station in Adelie Land H was only ·031 as compared with ·184 at Kew or ·225 at Christchurch. Thus a disturbing force which at Kew would have altered D by 1′ occasioned in Adelie Land a change of fully 5′. Moreover, the disturbing forces in Adelie Land were exceptionally large and most persistent. Thus the determination of base line values was inevitably less exact than at an ordinary observatory.

The range of D in the average day in Adelie Land exceeded 2½°. The troubles consequent on this were partly met by the high scale value,* 1 mm. = 1·82′, as against values such as 1 mm. = 1′ customary in Europe. But there would have been considerable loss of trace had not the D magnet carried two mirrors inclined at a small angle, so that when the light from the one which was effective during quiet times got off the sheet, the light from the other came on.

Even in low magnetic latitudes vertical force base line values can seldom claim very high accuracy. The determination of a base line value involves the comparison of an ordinate or ordinates of a curve, supplied by a magnetograph, with a corresponding observational value supplied by an absolute instrument. In the case of D and H the magnetograph and the absolute instrument deal with the same element. But with vertical force the element supplied by the curve is V, while the corresponding absolute value is not observed directly but deduced by calculation from observed values of H and I (inclination). The values of H and I are taken with different instruments. The V base value is affected by any error that may have attended the observation of either H or I, or by any defect in the allowance made for the difference in the times of observation. In high magnetic latitudes special uncertainty exists, owing to the fact that it requires a very large change in V to have the same effect on I as a small change in H. Thus the dip circle is exceedingly insensitive to changes in V. At Kew a change in V of 35γ suffices to alter I by 1′, but to secure the same result in Adelie Land a change of 425γ was necessary. However well the V magnetograph may work, it is useless to expect accuracy to 1γ (or even to 50γ) in base line values in high magnetic latitudes unless dip observations are very numerous, or some instrument observing V directly is introduced. As a matter of fact, the V magnetograph used in Adelie Land did not function very satisfactorily, especially in 1913. The trace then exhibited numerous sudden discontinuities. Doubt was felt at Christchurch whether anything could be made out of the traces. They were, however, measured on the hypothesis that the sudden changes of ordinate represented changes in the base line value. This led sometimes to several base line values being used in the course of a single day. Hourly values obtained in this way must be received with some distrust, but the resemblance between the diurnal inequalities found for the months of 1913, when the defect was most conspicuous, and the corresponding months of 1912 encourages the hope that the treatment adopted was fairly successful. Absolute values are, however, not given for V for the later months.

The tabulation sheets gave the hourly values for each day from 0 h. to 24 h., and also the daily mean $\frac{1}{24}[\frac{1}{2}\{(0)+(24)\}+(1)+\ldots+(23)]$, where (n) represents the

* For a short time at the start a lower scale value obtained.

mean value for 60 minutes centering at n. h. The mean value for the month could be obtained in two ways, either as the arithmetic mean of the daily means, or from the above expression applied to the mean hourly values for the month. The two methods of course should give approximate agreement, but occasional differences of 1γ must occur unless a closer degree of accuracy than 1γ is maintained in the mean values of individual days. The value given by the mean hourly values of the month was always accepted.

As already stated, incomplete days were omitted from the diurnal inequalities, unless the loss of record was small and interpolation seemed possible. Table XVIII

TABLE XVIII.—Number of Days used for all-Day Inequalities.

Month.	1912.						1913.					
	L.M.T.			G.M.T.			L.M.T.			G.M.T.		
	D.	H.	V.	D.	H.	V.	D.	H.	V.	D.	H.	V.
January	...	...	...	...	...	...	31	16	25	31	15	25
February	...	...	...	...	...	...	28	28	27	28	28	27
March	...	...	...	...	...	...	31	31	31	31	31	31
April	20	27	22	20	27	22	30	30	30	30	30	30
May	29	29	31	29	29	31	29	29	29	29	29	29
June	25	30	28	24	30	28	30	30	30	30	30	30
July	27	30	24	26	30	24	31	31	30	31	31	29
August	31	31	31	31	31	31	7	7	5	7	7	5
September	30	30	30	30	30	30	...	...	...	...	...	...
October	31	31	31	31	31	31	...	...	...	...	...	...
November	30	30	24	30	30	24	...	...	...	...	...	...
December	28	...	...	27	...	...	...	...	...	...	...	...

gives the number of days employed for the "all day" inequality in each month. The number of days' trace available sometimes differed for the different elements. In December, 1912, satisfactory H and V records were almost totally lacking, and measurement was confined to the D curves. H records were also unsatisfactory during the earlier part of January, 1913. Recording stopped early in August, 1913, and the results obtained for that month are not fully representative.

Section 2.—Diurnal inequalities and monthly means were also calculated from two limited groups of days, the one representative of quiet, the other of disturbed conditions. Since 1906 an international scheme has been in operation, having De Bilt for its headquarters. Co-operating stations send in returns in which a magnetic "character" figure 0, 1 or 2 is assigned to each day. 0 represents specially quiet, and 2 specially disturbed conditions, 1 answering to moderate disturbance. At the year's end a list is issued from De Bilt assigning to each day a character figure varying from 0·0 to 2·0. This international character figure represents the arithmetic mean of the figures assigned at the co-operating stations. The De Bilt lists also specify for each month five specially quiet days, known as the international quiet days, in order that diurnal inequalities derived from these days alone may be calculated at all stations, in addition to the usual diurnal inequalities. During the last few years there has also been issued from De Bilt a list of five highly disturbed days for each month, and several observatories have calculated inequalities for these as well.

TABLE XIX.—Selected Days and Mean International "Character" Figures.

Month.	Selected Quiet days.			Selected Disturbed days.			All days.			
							Mean "Character."			
	Days.	Mean "Character."	Elements.	Days.	Mean "Character."	Elements.	De Bilt.	D.	H.	V.
1912.										
April ...	1 8 9 11 21	0·08	D	7 14 15 16 17	0·98	D				
	1 8 11 21 28	0·08	H	5 6 10 15 16	1·12	H, V				
	8 11 21 28 29	0·08	V				0·45	...	0·44	...
May	1 16 22 23 26	0·10	D, H, V	7 12 13 14 29	1·06	D, H				
				5 6 12 13 14	1·18	V	0·47	0·43	0·43	...
June ...	5 6 15 19 20	0·08	D, H, V	1 8 9 10 23	0·98	D				
				1 8 9 10 28	0·98	H, V	0·47	0·40	...	0·44
July	10 15 24 28 29	0·04	D							
	10 11 12 15 24	0·02	H	3 4 5 27 31	1·06	D, H, V				
	10 11 12 24 29	0·02	V				0·41	0·45	0·39	0·40
August ...	4 8 12 13 26	0·02	D, H, V	5 6 18 19 22	1·12	D, H, V	0·49			
September ...	2 15 16 27 28	0·02	D, H, V	4 17 18 23 24	1·22	D, H, V	0·47		...	
October ...	2 5 18 19 31	0·02	D, H, V	1 11 13 14 15	1·20	D, H, V	0·46			
November ...	3 12 21 29 30	0·00	D, H	10 11 14 16 22	1·06	D, H				
	3 12 25 29 30	0·02	V	10 11 14 16 26	1·06	V	0·45	...	...	0·47
December ...	4 5 17 20 21	0·00	D	2 6 7 22 23	1·18	D	0·43	0·44		
1913.										
January ...	1 7 12 16 24	0·06	D	3 10 18 19 30	1·20	D				
	22 23 24 27 29	0·26	H	18 19 20 25 30	1·04	H, V				
	— 7 12 16 24	0·08	V				0·51	...	0·59	0·48
February ...	3 4 23 24 28	0·02	D, H							
	3 4 — 24 28	0·00	V	12 14 15 25 26	1·20	D, H, V	0·53	...	...	0·54
March ...	1 2 10 26 27	0·06	D, H, V	14 15 16 17 23	1·26	D, H, V	0·53			
April ...	6 20 21 22 26	0·06	D, H, V	4 9 10 12 16	1·24	D, H, V	0·54			
May ...	14 20 21 22 23	0·02	D, H, V	4 5 6 7 8	1·18	D, H, V	0·45			
June	7 8 11 12 27	0·04	D, H, V	1 2 3 28 29	1·02	D, H, V	0·45			
July	4 9 17 19 28	0·08	D, H							
	— 9 17 19 28	0·08	V	12 13 14 20 25	1·06	D, H, V	0·42			
August ...							0·46	0·34	0·34	0·34

The quiet and disturbed days employed for the calculation of diurnal inequalities in the present work are enumerated in Table XIX. With a few exceptions the quiet days are the international quiet days, and the disturbed days the five days of largest international character figure in each month. In some months, however, days that would naturally have been chosen had to be discarded owing to the record being defective or incomplete. Any deficiency thus occasioned amongst the disturbed days was met by substituting the day of next highest international character available; so that five days were employed in all months. Any gap in the quiet days in the case of D or H was met by substituting the day of next lowest international character. The same course was usually adopted with V, but in January, February and July, 1913, it appeared better to be content with four quiet days.

Besides the dates of the selected quiet and disturbed days, Table XIX gives the mean of the character figures for these days. It also gives in the last four columns the mean character figure for the month as published in the De Bilt list, and when different from this the mean character figure for the days actually used for the "all day" inequalities in D, H and V.

Except in January, 1913, the substituted quiet days, when there were any, represented practically as quiet conditions as the international days. In January, unfortunately, H records were available only for the latter part of the month, which was very deficient in quiet days. If we except this month, so far as an inference can be drawn from the character figures, the days selected for the D, H and V quiet day inequalities were practically alike. A similar remark applies to the selected disturbed days.

As regards the four last columns in Table XIX, when there was no gap in the record the mean character figure was naturally that given at De Bilt. This was even true in some cases when days were lacking, *e.g.*, in May, 1913. In any such case no entry is made in the columns headed D, H and V. A slight difficulty was encountered in one or two months, when the mean monthly value published at De Bilt was not identical with the arithmetic mean of the published daily characters. Presumably the published value was derived from daily values taken out to 0·01, though all published daily values go to 0·1 only. It is thus possible that if the data in the last three columns had been calculated at De Bilt differences of 0·01 or 0·02 from the values given here might have occurred. The only month in which the departure from the De Bilt mean appears of any importance is August, 1913. Records ceased in Adelie Land after the first week, the days of which were especially quiet.

It cannot be claimed that the international character figure, whether for a day or a month, is an exact quantitative measure of the disturbance. There is undoubtedly a tendency at most if not all of the co-operating stations to vary the standard according as the season is quiet or disturbed. A day may be assigned an 0 in a disturbed year which in a quiet year would have got a 1. The application of a rigid standard might lead to an almost total absence of 1's or 2's in a quiet month, and a total absence of 0's in a disturbed month. In either case one of the principal objects of the characterization, the discrimination between days of the same month, would fail of accomplishment.

As a matter of fact, the differences between the different months of 1912 and 1913 were probably greater than the figures in Table XIX suggest. Both years were exceptionally quiet, especially 1913, which coincided with sunspot minimum. In low and mean latitudes the selected disturbed days even represented very moderate disturbance, and there was nothing approaching a magnetic storm of the first class. The international quiet days, on the other hand, represented exceptionally quiet conditions. The great majority of the stations whose data are used at De Bilt are in the northern hemisphere. Few of the northern stations and none of the southern are in high latitudes. Thus *a priori* we should hardly have expected the international character figures to be a satisfactory index of magnetic conditions in Adelie Land. Trial, however, had proved them to be on the whole a good criterion in 1911–12 at Cape Evans, the station of the Scott Expedition, and the same has proved to be true of Adelie Land. This does not mean that more extreme conditions, both quiet and disturbed, might not have been secured in at least some months, from a consideration of the Adelie Land curves themselves. A choice so determined would certainly have omitted a few of the international quiet days. But the adoption of the international quiet days must be allowed to be unprejudiced, and it secures data to which corresponding data exist at many stations. The international days commence at midnight G.M.T.; thus all the quiet and disturbed days considered here are Greenwich days. Only "all day" results were calculated from the L.M.T. days.

CHAPTER VII.

RESULTS OF CURVE MEASUREMENTS AND THEIR DISCUSSION.

Section 3.—Table XX gives the mean monthly values of D, H and V derived from all days, both L.M.T. and G.M.T. Results are lacking for V after October, 1912, as satisfactory base-line values could not be assigned. The columns headed *a-q* or *q-a* give the difference between the all-day (*a*) and quiet day (*q*) monthly means, while the columns headed *a-d* or *d-a* give the difference between the all-day and disturbed day (*d*) means. In assigning these differences to V after October, 1912, it was assumed that the average value of the base line was the same for days of all types.

The accuracy of monthly means derived from curves is in reality mainly determined by the accuracy of the absolute observations. Some of the irregularities in the sequence of the monthly values represent presumably observational imperfections, but only a critical study of the absolute observations, including the base and scale value determinations, would justify an opinion on this point.

The differences between the L.M.T. and G.M.T. monthly means in Table XX are trifling.

It is never an easy question to decide whether there is an annual inequality, *i.e.*, whether a regular variation having a yearly period remains after due allowance is made for secular change. Even at the best of stations results based on one or two years' observations must be received with caution. The data most likely to throw light on this question are the seasonal means in the last three lines of Table XX. Winter includes the four months May to August, summer the four months November to February (with December lacking for H), and equinox the months of March, April, September and October. The precise equinoctial months used in the second last line of the table were September and October, 1912, with March and April, 1913. Thus the three seasons to which the data for D in the three last lines relate all had the end of 1912 for their mean epoch. This was also the mean epoch in the case of H, except for the summer season for which the mean epoch was a little later. If there is no annual inequality, the values of D in the last three lines should be identical, and those of H nearly so. The excess of the equinoctial over the summer value of D appears decided, but in view of the apparent great drop between December, 1912, and January, 1913, the exact significance of the low mean value for summer is open to doubt. It will be noticed that the sequence of the values of D is very different for the two years. In 1913, April, May and June have higher mean values than July and August, but in 1912 the exact opposite is seen.

TABLE XX.—Mean Monthly and Seasonal Values.

Month.	Declination (West).				Horizontal Force.				Vertical Force.			
	L.M.T.	G.M.T.	a-q	d-a	L.M.T.	G.M.T.	q-a	a-d	L.M.T.	G.M.T.	a-q	d-a
1912.	° ′	° ′	′	′	γ	γ	γ	γ	γ	γ	γ	γ
April	6 26·3	6 26·9	+ 1·7	— 6·9	3110	3110	+ 9	+ 9	67226	67224	+ 2	+ 23
May	32·1	31·8	+ 1·8	+ 4·2	3109	3110	+ 7	+ 20	261	262	+ 16	+ 7
June	25·4	25·4	+ 0·6	+ 0·8	3113	3113	+ 4	+ 8	367	369	+ 9	+ 14
July	38·2	39·4	— 0·8	+ 4·6	3119	3119	+ 4	+ 11	422	424	+ 9	+ 10
August	45·7	45·6	+ 3·2	+ 7·6	3108	3108	+ 7	+ 12	412	410	+ 5	+ 17
September	45·7	45·5	+ 5·7	+ 2·9	3116	3116	+ 8	+ 7	376	377	— 9	+ 5
October	42·9	43·1	+ 1·5	+ 4·3	3109	3109	+ 3	+ 8	378	378	+ 11	+ 34
November	41·2	41·5	— 2·3	— 8·5	3108	3108	+ 1	+ 3	...	...	— 19	+ 5
December	47·8	48·1	+ 4·9	+ 2·3	...	...	...	...	...	...	...	...
1913.												
January	33·5	32·9	+ 4·3	+ 9·3	3116	3117	— 1	— 15	...	...	+ 8	+ 4
February	33·6	33·8	— 8·6	— 2·4	3104	3104	— 4	0	...	...	— 1	— 3
March	47·2	47·6	— 1·6	+ 3·8	3106	3106	— 3	— 3	...	...	0	+ 28
April	58·2	58·7	+ 1·5	+ 7·7	3086	3086	+ 2	0	...	...	+ 1	+ 7
May	62·3	62·1	+ 5·3	+ 18·7	3080	3081	+ 2	+ 10	...	...	+ 15	+ 43
June	55·7	55·9	+ 0·3	+ 5·1	3085	3085	0	+ 1	...	...	— 3	— 2
July	53·6	53·1	— 2·3	+ 8·7	3093	3093	+ 1	+ 3	...	...	+ 8	+ 15
August	46·0	47·0	...	...	3088	3087	...	...	...	...	...	...
Mean from all months	43·3	43·4	+ 0·9	+ 3·9	3103	3103	+ 2·7	+ 4·9	...	...	+ 3·5	+ 13·8
Number of months +	...	...	11	13	...	...	11	11	...	...	10	13
,, ,, —	...	...	5	3	...	...	3	2	...	...	4	2
Means.												
Winter, 1912	35·4	35·5	...	...	3112	3112	...	...	...	...	...	...
,, 1913	54·4	54·5	...	...	3087	3087	...	...	...	...	...	...
,, 1912 and 1913	44·9	45·0	...	...	3099	3099	...	...	...	...	...	...
2nd Equinox	48·5	48·7	...	...	3104	3104	...	...	...	...	...	...
Summer	39·0	39·1	...	...	3109	3110	...	...	...	...	...	...

The difference between summer and winter values of H is in the same direction and of approximately the same amplitude as the corresponding difference observed at Cape Evans in 1911–12. But the outstanding feature in Table XX is the small size of the apparent variation in H between April, 1912, and March, 1913, and again between April and August, 1913, alongside of the apparent big drop from March to April, 1913. The phenomenon may be a natural one, but it is more suggestive of some instrumental cause.

The difference between the winter values for 1912 and 1913 so far as real, represents the secular change. We have a fall of 25γ in H and a rise of 19′ in D. The corresponding results obtained by comparing winter values for 1911 and 1912 at Cape Evans were a rise of 40γ in H and a fall of $5\frac{1}{2}'$ in D, counted from astronomical south. The phenomena at the two stations might be explained by mere movement of the south magnetic pole. Fall in H would signify approach, and rise in H retreat of the magnetic pole. The D and H apparent changes at both stations, and the change in V (a fall) observed at Cape Evans are all compatible with a movement of the south magnetic pole in a northerly or north-easterly direction.

Adding the figures in columns 3 and 4 of Table XX, we get the excess of D on the average disturbed day over the average quiet day. The marked predominance of plus signs in both these columns, and the substantial excess, 4·8′, of the *d* over the *q* mean from all the months combined leave little doubt that D tends to be high on disturbed days and low on quiet days. Columns 11 and 12 point to the same result, but to a larger extent, in the case of V, the value for the representative disturbed day exceeding that for the representative quiet day by 17·3γ. In the case of H, columns 7 and 8 point to an opposite result, the average international quiet day having a mean value 7·6γ larger than the average disturbed day. These differences, in the case of H and V, are in the same direction as the corresponding differences at Cape Evans in 1911–12. In the case of H the *q-d* difference was considerably greater in Adelie Land than Cape Evans, where its mean value was only 1·6γ. In the case of V the Cape Evans mean value of *d-q* was the larger, being 17·8γ, but this might arise from 1911 being a more disturbed year than 1913.

Phenomena which are prominent and of similar size in Adelie Land and at Cape Evans may reasonably be supposed characteristic of the Antarctic. It is thus presumably customary in that area for V to be raised by disturbance. The depression of H by disturbance seen in Adelie Land and Cape Evans is a normal phenomenon in lower latitudes.

As regards D, disturbance would seem to make the N-pole of the compass point further from the north in Adelie Land and nearer to the South at Cape Evans. This would be compatible with a movement of the south magnetic pole in a north-easterly direction.

Section 4.—The n.c. (non-cyclic) change—that is, the algebraic excess of the value at 24 h. over the value at 0 h. for the mean of the days from which the diurnal inequality is being calculated—was allowed for in the usual way. Table XXI gives full particulars of the n.c. change for individual months. In all-day (*a*) inequalities, when all days of the month are included, the n.c. change if not accounted for by the secular change must be "accidental" or of instrumental origin. The data for August, 1913, are enclosed in brackets, and were not used in forming the mean from all months, because the number of days available—seven or less—left too large scope for accident.

TABLE XXI.—Non-Cyclic Changes.

Month.	D.				H.				V.			
	L.M.T.	G.M.T.			L.M.T.	G.M.T.			L.M.T.	G.M.T.		
	a	*q*	*a*	*d*	*a*	*q*	*a*	*d*	*a*	*q*	*a*	*d*
1912.	′	′	′	′	γ	γ	γ	γ	γ	γ	γ	γ
April	+ 0·1	+ 9·8	+ 2·8	+ 6·2	− 1·3	− 9·4	+ 2·4	+ 3·6	− 4·1	+ 6·2	− 1·1	−27·8
May	+ 3·3	+ 4·0	− 1·9	−13·2	+ 0·8	+ 1·6	+ 1·0	+12·6	+ 2·2	+ 5·6	+ 2·2	+ 1·8
June	− 0·9	− 2·6	0·0	+ 1·2	0·0	− 1·0	+ 0·4	+ 5·2	− 1·9	+ 4·0	+ 1·2	+27·4
July	− 0·6	+ 7·2	+ 2·0	+ 6·0	+ 0·1	+ 1·4	− 0·9	+ 0·6	+ 7·4	− 1·6	+ 6·6	+ 7·6
August	0·0	− 1·8	− 0·1	+10·8	− 0·4	+ 3·8	− 0·3	− 7·8	− 2·7	− 0·4	− 2·8	+24·6
September	+ 0·2	+ 1·6	− 2·5	+17·8	+ 0·6	− 2·4	+ 2·6	− 2·8	+ 2·4	−13·0	+ 4·3	− 2·6
October	− 0·1	+15·0	+ 0·6	−11·4	+ 0·5	+ 5·2	− 2·4	+ 4·2	0·0	+17·2	− 3·1	− 6·2
November	− 0·5	− 9·6	+ 0·2	+ 9·8	− 1·7	− 1·6	− 1·5	−18·6	+ 0·5	−22·4	−12·2	+52·0
December	− 2·5	− 4·4	− 1·8	− 5·6								
1913.												
January	− 1·2	−20·0	− 0·1	−13·4	− 0·4	− 9·8	− 1·5	− 9·4	− 6·1	−11·0	+ 0·8	− 8·8
February	+ 1·0	− 6·4	− 1·3	+ 7·8	+ 0·3	− 6·4	+ 0·9	+18·2	− 1·7	− 5·5	+ 0·5	+ 5·4
March	− 1·1	− 8·4	+ 1·9	− 4·4	+ 0·8	+ 5·2	− 0·6	+14·2	+ 1·9	− 8·2	− 0·3	+23·2
April	+ 1·5	+ 4·8	+ 0·4	+ 3·4	− 1·6	−11·2	+ 0·2	− 6·8	+ 2·6	− 1·8	+ 0·2	− 0·6
May	− 0·6	− 7·4	0·0	+ 4·2	+ 0·1	+ 1·0	0·0	+ 1·2	− 0·3	− 0·4	− 1·3	+ 4·0
June	+ 0·8	+ 1·4	+ 0·1	− 4·2	+ 0·4	+ 1·8	+ 0·3	+ 2·0	− 0·3	− 8·2	+ 0·4	− 2·8
July	− 1·0	− 1·2	− 1·3	+10·2	− 0·3	− 0·2	+ 0·3	− 5·6	− 3·6	− 5·0	− 2·7	+11·2
August	(−3·6)	...	(+2·1)	...	(−0·7)	...	(−1·6)	...	(+21·0)	...	(+4·8)	...
Mean from all* months	− 0·1	− 1·1	− 0·1	+ 1·6	− 0·1	− 1·7	+ 0·1	+ 0·7	− 0·2	− 3·0	− 0·5	+ 7·2
Number of months +	6	7	8	10	8	6	8	9	...	4	...	9
" " −	10	9	7	6	7	9	7	6	...	11	...	6

* Excluding August, 1913, owing to the small number of days available.

Even the all-day n.c. changes are large in some months, but the means from all the months combined are satisfactorily small. This was hardly expected in the case of V, in view of the instrumental defects referred to above. In quiet and disturbed days there is nothing suspicious in n.c. changes of substantial amount. In temperate latitudes the average quiet day shows a rise in H of the order of 3γ. The variation in the sign of the n.c. changes in different months in Table XXI shows that accident plays a considerable part. In the mean values, however, it will be seen that in every case the sign is different for the disturbed and quiet days, and the all-day value is always intermediate between the other two. Thus, presumably, the phenomena are natural ones. This is, in fact, hardly open to doubt in the case of V. Accident could hardly explain a difference as large as $10 \cdot 2\gamma$ between the n.c. changes on the average disturbed and quiet days. Further, there was a similar large difference in the same direction between the n.c. changes in V at Cape Evans on disturbed and quiet days.

Section 5.—The diurnal inequalities deduced after eliminating the n.c. changes are given in Tables XXII to XXXVIII. Tables XXII to XXV, relating to D, follow a common plan. Table XXII, for instance, has first inequalities for all individual months from April, 1912, to August, 1913. Then follow inequalities for the 12 months of the year. These inequalities for the 5 months, April to August, combine the results of the two years. For the other 7 months inequalities already given under 1912 or 1913 are repeated. Of the next four inequalities that ascribed to the year represents the arithmetic mean of the figures for the 12 months. Winter represents a mean from May, June, July and August; equinox a mean from March, April, September and October; and summer a mean from January, February, November and December. The three last lines represent the winter of 1912, the winter of 1913, and an equinox composed of September and October, 1912, with March and April, 1913. This last equinox has the same mean epoch (December 31, 1912) as the summer and winter derived from the 12 months. The plus sign denotes that the N-pole of the magnet is to the west of its mean position. The extreme plus (westerly) and negative (easterly) values are in heavy type. Their algebraic difference is given under "Range." By A.D. is meant the "average departure" from the mean value for the day, *i.e.*, the arithmetic mean of the 24 figures in the diurnal inequality. Unless the 24-hour harmonic term is very dominant, the A.D. is likely to be a better measure than the range of the forces to which the diurnal inequality is due.

Table XXIII differs from Table XXII only in that it relates to G.M.T., not L.M.T. Tables XXIV and XXV were derived from the quiet and disturbed days (G.M.T.) enumerated in Table XIX. There were no quiet or disturbed days for August, 1913. Winter 1913, in Tables XXIV and XXV, includes only the three months May, June and July, so is not strictly comparable with winter 1912. The absence of August from winter would naturally reduce the range.

In the case of H and V—Tables XXVI to XXXIII—no December data were available. The inequality ascribed to the year represents the mean from the inequalities ascribed to winter, equinox, and summer, the summer inequality being an arithmetic mean derived from the three months January, February and November. The lack of December would naturally reduce the amplitude of the inequality for summer, and to a less extent the amplitude of the inequality for the year. To get an idea of the reduction in the latter case, an inequality is given which represents an arithmetic mean from the 11 months, January to November. This would naturally differ more from the true inequality for the complete year than would the latter from the inequality derived in the way explained above from the three seasons. It is thus satisfactory to find that the difference between the inequality derived from the 11 months, and that ascribed to the year is small in all cases. The quiet and disturbed day tables for H and V suffer in the same way as those for D from an absence of data from August, 1913.

Table XXXIV gives diurnal inequalities of inclination, calculated from the H and V inequalities by means of the formula

$$\Delta \text{I (unit } 1') = \cdot 00234\, \Delta \text{V} - \cdot 0509\, \Delta \text{H (unit } 1\gamma);$$

this being the special form taken by the general relation

$$\Delta \text{I} = \tfrac{1}{2} \sin 2\text{I} (\Delta \text{V}/\text{V} - \Delta \text{H}/\text{H}).$$

In addition to the winter inequality derived from the months of 1912 and 1913 combined, Table XXXIV contains a winter inequality for 1912 alone, to facilitate comparison with Cape Evans.

Economy of labour was only one of the reasons for restricting Table XXXIV to the year and the seasons. As is obvious from the formula, the contribution from ΔV to ΔI is trifling, the coefficient of ΔH being more than 20 times that of ΔV. Thus the diurnal variation of I is necessarily very similar to that in H, with the sign reversed.

Tables XXXV to XXXVIII give diurnal inequalities for N and W, the north and west components of the horizontal force.

The monthly inequalities were derived from the corresponding G.M.T. inequalities for D and H by the formulæ—

$$\Delta \text{N} = 0{\cdot}993\, \Delta \text{H} - 0{\cdot}106\, \Delta \text{D},$$
$$\Delta \text{W} = 0{\cdot}118\, \Delta \text{H} + 0{\cdot}896\, \Delta \text{D},$$

where ΔN, ΔW, ΔH and ΔD represent corresponding departures from the daily mean, the unit being 1′ for D and 1γ for the other elements. These are, of course, special cases of the formulæ

$$\Delta \text{N} = \Delta \text{H} \cos \text{D} - \text{H} \sin \text{D}.\, \Delta \text{D},$$
$$\Delta \text{W} = \Delta \text{H} \sin \text{D} + \text{H} \cos \text{D}.\, \Delta \text{D},$$

where H and D represent the mean values of these elements at the station.

In Tables XXXVI and XXXVIII equinox means September and October, 1912, with March and April, 1913, and year signifies a mean from the winter of 1912, equinox and summer. This choice was determined by the fact that winter, 1913, suffered from the absence of August data.

It was originally intended to give diagrams of the diurnal inequalities for individual months. These contained, however, so many irregularities that the eye did not readily recognise the general features, which it is the primary object of diagrams to disclose. Thus the diagrams were finally restricted to the cases of the whole year and the seasons. Plates XII to XVI contain diagrams of the usual type, with time as abscissa and the departure from the mean value of the day as ordinate. It seemed unnecessary to illustrate both the L.M.T. and G.M.T. inequalities. The choice of G.M.T. was decided by the fact that it enabled quiet day, all day and disturbed day inequalities to be shown side by side. The time answering to local midnight (practically 9½ hours in advance of midnight G.M.T.) is marked on each curve by a vertical line and the letters M.T., so that a glance shows which are night and which are day phenomena. A detailed discussion of the plates will be given presently in connection with the corresponding tables. Meanwhile, the following facts may be mentioned. Plate XII deals with declination, motion up the sheet signifying movement of the N-end of the magnet to the west. In Plates XIII, XIV, and XV, relating respectively to H, V and I, movement up the sheet, represents numerical increase of the element. Plate XVI shows the all-day inequalities of N and W, and reproduces the corresponding V inequalities from Plate XIV, so as to give in one plate a complete picture of the diurnal changes of the earth's field. Plate XVII contains vector diagrams: NW in the horizontal plane, VN in the vertical meridian plane, and VW in the vertical plane perpendicular to the meridian. Plate XVIII compares all-day inequalities for the winter of 1912 from Adelie Land and Cape Evans. The primary object of the plates is to give a general idea of the phenomena of the diurnal variation. The tables should preferably be consulted for details.

Section 6.—*Declination.*—The inequalities, whether from all, quiet or disturbed days, given for individual months in Tables XXII to XXV show large irregularities. It is thus advantageous to consider first the inequalities for the year and the three seasons. All the seasonal inequalities in Table XXII have the maximum (*i.e.*, westerly extreme) at 9 h. (L.M.T.). The minimum (or extreme easterly position) appears at 19 h. in the case of the year, equinox and summer. The winters of 1912 and of the two years combined show minima at 21 h., while the winter of 1913 has the minimum at 20 h.; thus a later hour for the minimum in winter may be a real phenomenon. In any case the easterly extreme occurs at a much later hour than in temperate latitudes of the southern hemisphere.

In all days and in quiet days, at all seasons, the regular changes are most rapid between 0 h. and 6 h. G.M.T. (10 h. to 16 h. L.M.T.) when the magnet is swinging to the east. But in disturbed days the return movement to the west during the midnight hours appears equally rapid. The way in which the rapidity of night as compared with day movements increases with disturbance is shown very clearly in Plate XII.

Comparing corresponding months of 1912 and 1913 in Tables XXII and XXIII, it is seen that the range and A.D. are much larger in every case in 1912. In August this might arise from the want of data from the later part of the month in 1913, but in the other months it can be explained only by a real, large difference between the two years. The difference is in the direction to be expected from the fact that 1913, with a Wolfer's sunspot frequency of only 1·4, was a year of sunspot minimum. But the sunspot frequency, 3·6, for 1912 is not so much greater as to suggest anything like the difference actually observed. At Cape Evans the reduction in range in 1912, as compared with 1911 (sunspot frequency 5·7), was also very large, considering the small decline in sunspot frequency.

In view of the rapid change characteristic of the two years, we cannot expect to get more than a general idea of the normal annual variation of the amplitude of the diurnal inequality. What is suggested, however, by Tables XXII and XXIII, viz., a maximum in December and minimum in June, is *a priori* probably true. Leaving out August, 1913, as abnormal, we see that in both years the range and A.D. were each least in June. While the October range exceeds the November range in Tables XXII and XXIII, the November A.D. is the larger. This is favourable to the view that normally there is a continual rise in amplitude to a maximum in December (midsummer), and a continual fall to a minimum in June (midwinter). As usual, the range and A.D. from the 4 equinoctial months combined do not differ much from those for the whole year.

The quiet day D inequalities in Table XXIV are perhaps on the whole less regular than those from all days. In individual months the hour of the minimum (easterly extreme) appears more variable than that of the maximum. In some months when it occurs at an exceptionally late hour, *e.g.*, April and December, 1912, or June and July, 1913, there is a suggestion of an earlier minimum about the usual hour. The difference between 1912 and 1913 is much less conspicuous in the quiet day than in the all day inequalities. In Table XXIV, June, 1912, has a smaller range and A.D. than June, 1913, and the July range in 1913 equals that in 1912. The range in May, 1913, and the A.D. in April and May, 1913, are slightly less than in June, 1913; but when the two years are combined June stands out as the month of minimum amplitude; the maximum coming in December. The annual variation in the amplitude is much emphasised in quiet days. In Table XXIII the ratio borne by the December to the June figure is 3·6 for the range and 3·3 for the A.D., but in Table XXIV it is 7·0 for the range and 5·5 for the A.D. Again, the ratio borne by the summer to the winter figure is, in Table XXIII, 2·3 for the range and 2·2 for the A.D., while in Table XXIV it is 3·7 for the range and 3·0 for the A.D.

The diurnal inequalities for the disturbed days in Table XXV do not, after all, show much more irregularity than those for the quiet days. The hour of the maximum (westerly extreme) in individual months is more irregular in Table XXV than in Tables XXIII and XXIV, but the seasonal diurnal inequalities are fully as smooth for the disturbed as for the quiet days. The difference in type between the disturbed and quiet day inequalities for the year is small. The minimum (easterly extreme) occurs earlier in the quiet days.

The seasonal effect on the amplitude, though still considerable for disturbed days, is much less than for quiet days. The ratio of the December to the June figure in Table XXV is 2·6 for the range and 2·5 for the A.D.; while the ratio of the summer to the winter figure is 1·6 for the range and 1·5 for the A.D. In both years the July range is slightly less than the June range, but the June A.D. is decidedly the smaller. Accident inevitably plays a considerable part in the amplitude of disturbed day inequalities for individual months, and small differences possess little significance.

The force perpendicular to the magnetic meridian required to alter D in Adelie Land by 1′ was approximately 0·9γ. Thus multiplication of the ranges and A.D.s in Tables XXII to XXV by 0·9 gives a close approximation to the results that would be obtained if declination changes were replaced by the corresponding changes of force.

TABLE XXII.—Diurnal Inequality of Westerly

Hour. L.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.	13.
1912.	′	′	′	′	′	′	′	′	′	′	′	′	′
April......	+ 2·6	+ 10·4	+ 12·5	+ 15·4	+ 22·8	+ 29·3	+ **34·0**	+ 31·5	+ 25·5	+ 26·7	+ 21·7	+ 15·8	+ 7·8
May	+ 1·9	+ 3·8	+ 4·2	+ 5·8	+ 11·3	+ 20·4	+ 26·2	+ 26·1	+ **29·7**	+ 24·9	+ 24·7	+ 8·1	— 1·9
June	— 2·0	— 1·3	+ 2·4	+ 6·0	+ 8·2	+ 14·9	+ 19·2	+ **19·6**	+ 17·5	+ 16·8	+ 11·6	+ 10·8	+ 2·4
July	+ 0·7	+ 6·7	+ 6·5	+ 6·4	+ 7·5	+ 11·3	+ 14·6	+ **22·8**	+ 21·6	+ 20·8	+ 15·9	+ 11·9	+ 4·0
August	— 2·3	— 0·3	+ 4·6	+ 11·3	+ 15·1	+ 20·6	+ 24·1	+ 33·9	+ 38·1	+ **38·3**	+ 29·2	+ 19·7	+ 2·1
September	— 1·1	+ 2·2	+ 7·9	+ 9·1	+ 13·4	+ 25·2	+ 28·9	+ 25·8	+ **33·7**	+ 31·2	+ 31·3	+ 22·1	+ 8·3
October	+ 2·7	+ 6·6	+ 15·6	+ 14·8	+ 15·3	+ 25·7	+ 36·6	+ 46·0	+ **57·1**	+ 48·3	+ 28·9	+ 17·7	+ 0·2
November	— 3·0	+ 2·9	+ 7·0	+ 11·9	+ 20·7	+ 31·5	+ 36·7	+ 48·7	+ **50·9**	+ 38·6	+ 42·6	+ 35·0	+ 11·7
December	— 6·0	— 7·4	— 0·6	+ 3·7	+ 16·0	+ 35·4	+ 54·5	+ 61·3	+ **67·4**	+ 52·8	+ 45·6	+ 16·8	— 1·8
1913.													
January	— 3·0	+ 4·2	+ 9·8	+ 12·0	+ 17·4	+ 31·1	+ 35·0	+ 40·1	+ **44·3**	+ 32·9	+ 28·3	+ 16·8	+ 9·9
February	+ 0·7	+ 6·7	+ 8·7	+ 11·6	+ 13·5	+ 19·4	+ 28·2	+ 29·5	+ **31·1**	+ 27·5	+ 26·5	+ 16·5	+ 7·8
March	— 1·4	+ 3·7	+ 6·2	+ 9·2	+ 14·8	+ 19·7	+ 25·2	+ **28·5**	+ 25·5	+ 25·5	+ 15·9	+ 15·2	+ 5·2
April	— 1·5	+ 3·0	+ 6·7	+ 12·2	+ 16·7	+ 19·4	+ 24·7	+ 26·5	+ **28·2**	+ 18·6	+ 7·7	+ 7·0	— 0·1
May	+ 0·3	+ 5·8	+ 7·9	+ 4·9	+ 10·8	+ 15·7	+ 18·6	+ 18·1	+ **20·0**	+ 14·8	+ 13·1	+ 6·5	— 0·9
June	+ 0·5	+ 3·1	+ 3·5	+ 4·9	+ 7·2	+ 10·0	+ **13·8**	+ 11·7	+ 9·7	+ 9·6	+ 6·2	+ 5·2	+ 0·4
July	— 1·5	+ 3·5	+ 7·8	+ 5·9	+ 7·6	+ 10·7	+ 12·8	+ 14·9	+ **16·0**	+ 10·7	+ 7·6	+ 7·1	+ 0·4
August	— 0·9	+ 2·1	+ 1·7	+ 1·0	+ 2·1	+ 5·0	+ 5·4	+ 8·3	+ **11·9**	+ 10·6	+ 5·3	+ 2·3	— 2·3
Two Years.													
January	— 3·0	+ 4·2	+ 9·8	+ 12·0	+ 17·4	+ 31·1	+ 35·0	+ 40·1	+ **44·3**	+ 32·9	+ 28·3	+ 16·8	+ 9·9
February	+ 0·7	+ 6·7	+ 8·7	+ 11·6	+ 13·5	+ 19·4	+ 28·2	+ 29·5	+ **31·1**	+ 27·5	+ 26·5	+ 16·5	+ 7·8
March	— 1·4	+ 3·7	+ 6·2	+ 9·2	+ 14·8	+ 19·7	+ 25·2	+ **28·5**	+ 25·5	+ 25·5	+ 15·9	+ 15·2	+ 5·2
April	+ 0·6	+ 6·7	+ 9·6	+ 13·8	+ 19·8	+ 24·4	+ **29·4**	+ 29·0	+ 26·9	+ 22·7	+ 14·7	+ 11·4	+ 3·9
May	+ 1·1	+ 4·8	+ 6·0	+ 5·3	+ 11·0	+ 18·0	+ 22·4	+ 22·1	+ **24·8**	+ 19·8	+ 18·9	+ 7·3	— 1·4
June	— 0·7	+ 0·9	+ 3·0	+ 5·5	+ 7·7	+ 12·5	+ **16·5**	+ 15·7	+ 13·6	+ 13·2	+ 8·9	+ 8·0	+ 1·4
July	— 0·4	+ 5·1	+ 7·2	+ 6·2	+ 7·6	+ 11·0	+ 13·7	+ **18·9**	+ 18·8	+ 15·8	+ 11·8	+ 9·5	+ 2·2
August	— 1·6	+ 0·9	+ 3·1	+ 6·1	+ 8·6	+ 12·8	+ 14·7	+ 21·1	+ **25·0**	+ 24·4	+ 17·2	+ 11·0	— 0·1
September	— 1·1	+ 2·2	+ 7·9	+ 9·1	+ 13·4	+ 25·2	+ 28·9	+ 25·8	+ **33·7**	+ 31·2	+ 31·3	+ 22·1	+ 8 3
October	+ 2·7	+ 6 6	+ 15·6	+ 14·8	+ 15·3	+ 25·7	+ 36·6	+ 46·0	+ **57·1**	+ 48·3	+ 28·9	+ 17·7	+ 0·2
November	— 3·0	+ 2·9	+ 7·0	+ 11·9	+ 20·7	+ 31·5	+ 36·7	+ 48·7	+ **50·9**	+ 38·6	+ 42·6	+ 35·0	+ 11·7
December	— 6·0	— 7·4	— 0·6	+ 3·7	+ 16·0	+ 35·4	+ 54·5	+ 61·3	+ **67·4**	+ 52·8	+ 45·6	+ 16·8	— 1·8
Year	— 1·0	+ 3·1	+ 7·0	+ 9·1	+ 13·8	+ 22·2	+ 28·5	+ 32·2	+ **34·9**	+ 29·4	+ 24·2	+ 15·6	+ 3·9
Winter	— 0·4	+ 2·9	+ 4·8	+ 5·8	+ 8·7	+ 13·6	+ 16·8	+ 19·5	+ **20·6**	+ 18·3	+ 14·2	+ 9·0	+ 0·5
Equinox	+ 0·2	+ 4·8	+ 9·8	+ 11·7	+ 15·8	+ 23·7	+ 30·0	+ 32·3	+ **35·8**	+ 31·9	+ 22·7	+ 16·6	+ 4·4
Summer	— 2·8	+ 1·6	+ 6·2	+ 9·8	+ 16·9	+ 29·3	+ 38·6	+ 44·9	+ **48·4**	+ 38·0	+ 35·7	+ 21·3	+ 6·9
Winter, 1912	— 0·4	+ 2·2	+ 4·4	+ 7·4	+ 10·5	+ 16·8	+ 21·0	+ 25·6	+ **26·7**	+ 25·2	+ 20·4	+ 12·6	+ 1·7
„ 1913	— 0·4	+ 3·6	+ 5·2	+ 4·2	+ 6·9	+ 10·4	+ 12·7	+ 13·3	+ **14·4**	+ 11·4	+ 8·1	+ 5·3	— 0·6
2nd Equinox	— 0·3	+ 3·9	+ 9·1	+ 11·3	+ 15·0	+ 22·5	+ 28·8	+ 31·7	+ **36·1**	+ 30·9	+ 21·0	+ 15·5	+ 3·4

Declination. All Days. L.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour L.M.T.
													1912.
′	′	′	′	′	′	′	′	′	′	′	′	′	
− 5·4	− 22·8	− 24·2	− 27·5	− 34·3	− 33·6	− 33·6	− 33·1	− 22·9	− 14·1	− 4·5	68·3	21·33	April.
− 3·7	− 16·8	− 18·1	− 21·2	− 21·3	− 19·8	− 22·8	− 27·4	− 16·6	− 11·3	− 6·5	57·1	15·60	May.
− 5·6	− 10·0	− 11·8	− 10·3	− 13·1	− 11·0	− 10·7	− 15·3	− 18·2	− 12·1	− 7·9	37·8	10·78	June.
− 6·4	− 9·9	− 13·4	− 15·9	− 15·6	− 14·0	− 16·9	− 19·8	− 16·1	− 17·1	− 6·2	42·6	12·58	July.
− 9·3	− 17·4	− 25·8	− 25·6	− 21·8	− 26·7	− 28·9	− 32·0	− 24·7	− 15·2	− 7·0	70·3	19·75	August.
− 6·4	− 13·6	− 25·3	− 28·4	− 29·5	− 30·0	− 32·1	− 30·6	− 22·4	− 10·6	− 3·9	65·8	19·92	September.
− 12·6	− 27·8	− 35·1	− 38·2	− 40·7	− 42·6	− 39·6	− 33·0	− 22·3	− 17·3	− 5·7	99·7	26·27	October.
− 11·1	− 22·3	− 39·4	− 43·6	− 43·4	− 42·0	− 41·5	− 36·2	− 26·9	− 20·5	− 8·4	94·5	28·19	November.
− 24·8	− 33·9	− 37·1	− 36·9	− 38·9	− 41·0	− 33·0	− 34·1	− 27·5	− 18·3	− 12·0	108·4	29·45	December.
													1913.
− 8·4	− 19·1	− 18·3	− 25·7	− 27·3	− 31·2	− 36·2	− 38·5	− 33·4	− 26·9	− 13·6	82·8	23·47	January.
− 6·2	− 16·7	− 23·7	− 30·6	− 30·1	− 27·9	− 25·6	− 21·0	− 21·7	− 15·2	− 9·1	61·7	18·98	February.
− 5·3	− 13·0	− 21·0	− 26·4	− 21·2	− 24·3	− 20·8	− 23·0	− 17·8	− 15·2	− 5·5	54·9	16·23	March.
− 8·0	− 16·1	− 20·0	− 16·4	− 16·0	− 19·5	− 19·3	− 16·4	− 16·8	− 15·8	− 5·1	48·2	14·24	April.
− 6·8	− 8·5	− 11·6	− 12·9	− 15·6	− 15·7	− 16·6	− 16·0	− 15·4	− 11·2	− 5·2	36·6	11·37	May.
− 3·1	− 4·2	− 7·9	− 8·6	− 8·6	− 9·7	− 11·1	− 10·5	− 12·8	− 7·4	− 2·1	26·6	7·16	June.
− 3·6	− 7·4	− 9·7	− 9·7	− 11·3	− 11·1	− 11·9	− 10·6	− 13·2	− 11·1	− 4·0	29·2	8·75	July.
− 4·9	− 7·7	− 8·7	− 5·0	− 4·9	− 5·3	− 5·1	− 3·1	− 2·4	− 0·9	− 3·4	20·6	4·60	August.
													Two Years.
− 8·4	− 19·1	− 18·3	− 25·7	− 27·3	− 31·2	− 36·2	− 38·5	− 33·4	− 26·9	− 13·6	82·8	23·47	January.
− 6·2	− 16·7	− 23·7	− 30·6	− 30·1	− 27·9	− 25·6	− 21·0	− 21·7	− 15·2	− 9·1	61·7	18·98	February.
− 5·3	− 13·0	− 21·0	− 26·4	− 21·2	− 24·3	− 20·8	− 23·0	− 17·8	− 15·2	− 5·5	54·9	16·23	March.
− 6·7	− 19·4	− 22·1	− 22·0	− 25·6	− 26·5	− 26·4	− 24·7	− 19·8	− 14·9	− 4·8	55·9	17·74	April.
− 5·2	− 12·6	− 14·8	− 17·0	− 18·4	− 17·7	− 19·7	− 21·7	− 16·0	− 11·2	− 5·8	46·5	13·46	May.
− 4·4	− 7·1	− 9·8	− 9·5	− 10·9	− 10·4	− 10·9	− 12·9	− 15·5	− 9·8	− 5·0	32·0	8·91	June.
− 5·0	− 8·7	− 11·5	− 12·8	− 13·4	− 12·6	− 14·4	− 15·2	− 14·6	− 14·1	− 5·1	34·1	10·65	July.
− 7·1	− 12·6	− 17·3	− 15·3	− 13·4	− 16·0	− 17·0	− 17·6	− 13·6	− 8·1	− 5·2	42·6	12·08	August.
− 6·4	− 18·6	− 25·3	− 28·4	− 29·5	− 30·0	− 32·1	− 30·6	− 22·4	− 10·6	− 3·9	65·8	19·92	September.
− 12·6	− 27·8	− 35·1	− 38·2	− 40·7	− 42·6	− 39·6	− 33·0	− 22·3	− 17·3	− 5·7	99·7	26·27	October.
− 11·1	− 22·3	− 39·4	− 43·6	− 43·4	− 42·0	− 41·5	− 36·2	− 26·9	− 20·5	− 8·4	94·5	28·19	November.
− 24·8	− 33·9	− 37·1	− 36·9	− 38·9	− 41·0	− 33·0	− 34·1	− 27·5	− 18·3	− 12·0	108·4	29·45	December.
− 8·6	− 17·6	− 23·0	− 25·5	− 26·1	− 26·8	− 26·4	− 25·7	− 21·0	− 15·2	− 7·0	61·7	18·66	Year.
− 5·4	− 10·3	− 13·4	− 13·7	− 14·0	− 14·2	− 15·5	− 16·8	− 14·9	− 10·8	− 5·3	37·4	11·22	Winter.
− 7·7	− 19·7	− 25·9	− 23·7	− 29·3	− 30·8	− 29·7	− 27·8	− 20·6	− 14·5	− 5·0	66·6	19·98	Equinox.
− 12·6	− 23·0	− 29·6	− 34·2	− 34·9	− 35·5	− 34·1	− 32·5	− 27·4	− 20·2	− 10·8	83·9	24·80	Summer.
− 6·2	− 13·5	− 17·3	− 18·2	− 17·9	− 17·9	− 19·8	− 23·6	− 18·9	− 13·9	− 6·9	50·3	14·54	Winter, 1912.
− 4·6	− 7·0	− 9·5	− 9·1	− 10·1	− 10·5	− 11·2	− 10·1	− 11·0	− 7·7	− 3·7	25·6	7·96	„ 1913.
− 8·1	− 18·9	− 25·4	− 27·3	− 26·9	− 29·1	− 28·0	− 25·7	− 19·8	− 14·7	− 5·0	65·2	19·10	2nd Equinox.

TABLE XXIII.—Diurnal Inequality of Westerly

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1912.													
April	+ 23·0	+ 18·8	+ 14·0	+ 0·6	− 13·1	− 24·0	− 23·0	− 26·3	− 30·0	− 29·5	− 31·5	− **31·6**	− 17·3
May	+ 20·7	+ 13·0	+ 2·7	− 6·7	− 15·9	− 15·3	− 18·8	− 21·6	− 17·8	− 17·8	− **21·7**	− 20·4	− 9·4
June	+ 13·5	+ 11·4	+ 5·5	− 2·4	− 7·8	− 12·3	− 11·9	− 11·5	− 13·3	− 10·3	− 15·8	− **16·1**	− 14·1
July	+ 18·8	+ 15·0	+ 7·8	− 1·1	− 9·7	− 13·4	− 16·9	− 16·4	− 14·8	− 17·8	− 19·2	− 18·2	− **20·2**
August	+ 34·2	+ 24·1	+ 11·8	− 3·0	− 14·4	− 21·8	− 28·2	− 21·5	− 22·6	− 29·3	− **30·0**	− 29·5	− 20·0
September	+ 31·5	+ 27·9	+ 12·3	+ 1·6	− 13·0	− 23·9	− 28·3	− 27·5	− 29·7	− 31·0	− **32·8**	− 28·6	− 15·6
October	+ 32·1	+ 26·4	+ 9·4	− 6·9	− 19·9	− 32·5	− 39·2	− 39·5	− **43·4**	− 41·8	− 31·5	− 29·0	− 18·9
November	+ 37·7	+ 42·6	+ 23·2	− 1·5	− 17·0	− 26·9	− 43·2	− 43·1	− **45·0**	− 41·7	− 38·7	− 31·7	− 23·4
December	+ 47·4	+ 32·4	+ 3·2	− 14·0	− 31·4	− 37·5	− 40·5	− 38·6	− **42·6**	− 36·5	− 32·3	− 34·0	− 23·3
1913.													
January	+ 37·9	+ 21·8	+ 15·2	− 1·0	− 14·5	− 17·9	− 22·4	− 24·9	− 30·6	− 33·5	− **36·9**	− 36·8	− 31·5
February	+ 26·0	+ 20·4	+ 9·9	+ 0·4	− 11·4	− 21·8	− 26·4	− **31·7**	− 29·6	− 26·6	− 21·9	− 22·5	− 17·9
March	+ 22·9	+ 15·8	+ 13·2	− 1·0	− 9·4	− 17·5	− 25·2	− 24·4	− 21·3	− **25·6**	− 22·5	− 20·1	− 18·5
April	+ 13·0	+ 7·0	+ 2·9	− 1·5	− 9·8	− 15·6	− 17·0	− 13·7	− 15·0	− **19·0**	− 15·1	− 16·5	− 16·3
May	+ 14·7	+ 9·7	+ 3·2	− 3·1	− 7·9	− 9·8	− 12·2	− 14·2	− 15·9	− 16·1	− **16·4**	− **16·4**	− 12·9
June	+ 8·0	+ 4·7	+ 3·6	− 2·0	− 4·6	− 7·3	− 8·4	− 8·3	− 9·5	− 10·0	− 11·0	− **12·2**	− 10·4
July	+ 8·4	+ 8·3	+ 4·6	− 1·8	− 6·4	− 8·1	− 9·6	− 10·3	− 11·3	− 11·8	− 11·2	− **12·6**	− 11·5
August...	+ 8·0	+ 1·7	+ 1·4	− 5·4	− 6·6	− **9·6**	− 7·1	− 5·9	− 6·3	− 7·3	− 6·4	− 5·0	− 5·3
Two Years.													
January	+ 37·9	+ 21·8	+ 15·2	− 1·0	− 14·5	− 17·9	− 22·4	− 24·9	− 30·6	− 33·5	− **36·9**	− 36·8	− 31·5
February	+ 26·0	+ 20·4	+ 9·9	+ 0·4	− 11·4	− 21·8	− 26·4	− **31·7**	− 29·6	− 26·6	− 21·9	− 22·5	− 17·9
March	+ 22·9	+ 15·8	+ 13·2	− 1·0	− 9·4	− 17·5	− 25·2	− 24·4	− 21·3	− **25·6**	− 22·5	− 20·1	− 18·5
April	+ 18·0	+ 12·9	+ 8·4	− 0·4	− 11·5	− 19·8	− 20·0	− 20·0	− 22·5	− **24·3**	− 23·3	− 24·1	− 16·8
May	+ 17·7	+ 11·4	+ 3·0	− 4·9	− 11·9	− 12·6	− 15·5	− 17·9	− 16·9	− 17·0	− **19·1**	− 18·4	− 11·2
June	+ 10·8	+ 8·0	+ 4·6	− 2·2	− 6·2	− 9·8	− 10·1	− 9·9	− 11·4	− 10·2	− 13·4	− **14·2**	− 12·3
July	+ 13·6	+ 11·7	+ 6·2	− 1·4	− 8·0	− 10·8	− 13·3	− 13·4	− 13·1	− 14·8	− 15·2	− 15·4	− **15·8**
August	+ 21·1	+ 12·9	+ 6·6	− 4·2	− 10·5	− 15·7	− 17·6	− 13·7	− 14·5	− **18·3**	− 18·2	− 17·2	− 12·7
September	+ 31·5	+ 27·9	+ 12·3	+ 1·6	− 13·0	− 23·9	− 28·3	− 27·5	− 29·7	− 31·0	− **32·8**	− 28·6	− 15·6
October	+ 32·1	+ 26·4	+ 9·4	− 6·9	− 19·9	− 32·5	− 39·2	− 39·5	− **43·4**	− 41·8	− 31·5	− 29·0	− 18·9
November	+ 37·7	+ 42·6	+ 23·2	− 1·5	− 17·0	− 26·9	− 43·2	− 43·1	− **45·0**	− 41·7	− 38·7	− 31·7	− 23·4
December	+ 47·4	+ 32·4	+ 3·2	− 14·0	− 31·4	− 37·5	− 40·5	− 38·6	− **42·6**	− 36·5	− 32·3	− 34·0	− 23·3
Year	+ 26·4	+ 20·4	+ 9·6	− 3·0	− 13·7	− 20·6	− 25·1	− 25·4	− 26·7	− **26·8**	− 25·5	− 24·3	− 18·2
Winter	+ 15·8	+ 11·0	+ 5·1	− 3·2	− 9·1	− 12·2	− 14·1	− 13·7	− 14·0	− 15·1	− **16·5**	− 16·3	− 13·0
Equinox	+ 26·1	+ 20·8	+ 10·8	− 1·7	− 13·4	− 23·4	− 28·2	− 27·8	− 29·2	− **30·7**	− 27·5	− 25·4	− 17·4
Summer	+ 37·3	+ 29·3	+ 12·9	− 4·0	− 18·6	− 26·0	− 33·1	− 34·6	− **37·0**	− 34·6	− 32·5	− 31·2	− 24·0
Winter, 1912	+ 21·8	+ 15·9	+ 7·0	− 3·3	− 12·0	− 15·7	− 19·0	− 17·8	− 17·1	− 18·8	− **21·7**	− 2[illegible]·0	− 15·9
„ 1913	+ 9·8	+ 6·1	+ 3·2	− 3·1	− 6·4	− 8·7	− 9·3	− 9·7	− 10·7	− 11·3	− 11·3	− **11·6**	− 10·0
2nd Equinox	+ 24·9	+ 19·3	+ 9·4	− 1·9	− 13·0	− 22·4	− 27·4	− 26·3	− 27·4	− **29·4**	− 25·5	− 23·6	− 17·3

Declination. All Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
													1912.
′	′	′	′	′	′	′	′	′	′	′	′	′	
− 10·0	− 1·8	+ 5·0	+ 7·5	+ 12·0	+ 17·0	+ 22·2	+ 28·1	+ **34·3**	+ 29·9	+ 25·7	65·9	19·84	April.
− 7·4	− 2·6	+ 0·9	+ 2·7	+ 3·6	+ 8·4	+ 18·3	+ 24·6	+ 26·5	+ **28·4**	+ 25·9	50·1	14·63	May.
− 11·0	− 4·6	− 0·5	+ 1·2	+ 6·9	+ 6·3	+ 12·0	+ 18·2	+ **21·1**	+ 17·7	+ 17·5	37·2	10·95	June.
− 13·2	− 5·2	+ 3·0	+ 6·3	+ 7·4	+ 8·5	+ 12·7	+ 20·3	+ 19·4	+ **24·5**	+ 22·3	44·7	13·84	July.
− 10·9	− 3·7	− 1·6	+ 1·5	+ 8·4	+ 11·6	+ 20·2	+ 21·1	+ 28·2	+ 35·6	+ **39·9**	69·9	19·71	August.
− 6·6	− 1·1	+ 0·6	+ 5·3	+ 9·8	+ 11·8	+ 17·8	+ 30·9	+ 27·5	+ 29·3	+ **31·8**	64·6	19·84	September.
− 13·5	− 0·5	+ 4·6	+ 9·3	+ 17·2	+ 13·2	+ 20·3	+ 30·9	+ 41·8	+ 49·4	+ **60·8**	104·2	26·33	October.
− 16·4	− 4·8	− 1·7	+ 6·4	+ 10·0	+ 11·9	+ 26·2	+ 35·4	+ 45·4	+ **52·5**	+ 43·6	97·5	27·92	November.
− 17·2	− 9·4	− 7·0	− 3·8	+ 5·7	+ 13·0	+ 31·8	+ 46·5	+ 55·9	+ **70·3**	+ 62·0	112·9	30·68	December.
													1913.
− 19·5	− 8·0	+ 1·6	+ 6·4	+ 9·3	+ 14·3	+ 23·1	+ 32·6	+ 35·3	+ 44·3	+ 35·8	81·2	23·13	January.
− 13·0	− 2·7	+ 3·4	+ 8·9	+ 11·9	+ 13·0	+ 16·8	+ 25·9	+ **31·4**	+ 29·7	+ 27·5	63·1	18·78	February.
− 11·1	− 5·2	+ 0·3	+ 6·5	+ 6·4	+ 13·9	+ 16·7	+ 22·5	+ 26·6	+ **30·8**	+ 25·6	56·4	16·79	March.
− 10·1	− 3·3	0·0	+ 4·4	+ 7·7	+ 11·3	+ 15·6	+ 20·8	+ 24·5	+ **26·5**	+ 19·8	45·6	12·76	April.
− 9·5	− 2·4	+ 4·3	+ 6·5	+ 5·8	+ 7·5	+ 13·1	+ 15·8	+ **19·6**	+ 18·1	+ 18·4	36·0	11·40	May.
− 4·7	0·0	+ 2·3	+ 3·5	+ 4·9	+ 6·7	+ 8·7	+ 13·2	+ **13·4**	+ 11·6	+ 8·3	25·6	7·39	June.
− 7·9	− 2·6	+ 0·8	+ 6·3	+ 6·9	+ 6·4	+ 8·9	+ 11·5	+ 13·2	+ **16·0**	+ 13·6	28·6	8·75	July.
− 5·4	− 1·9	+ 5·6	+ 5·6	+ 2·3	+ 2·6	+ 6·9	+ 4·3	+ 8·9	+ 10·3	+ **14·1**	23·7	6·00	August.
													Two Years.
− 19·5	− 8·0	+ 1·6	+ 6·4	+ 9·3	+ 14·3	+ 23·1	+ 32·6	+ 35·3	+ **44·3**	+ 35·8	81·2	23·13	January.
− 13·0	− 2·7	+ 3·4	+ 8·9	+ 11·9	+ 13·0	+ 16·8	+ 25·9	+ **31·4**	+ 29·7	+ 27·5	63·1	18·78	February.
− 11·1	− 5·2	+ 0·3	+ 6·5	+ 6·4	+ 13·9	+ 16·7	+ 22·5	+ 26·6	+ **30·8**	+ 25·6	56·4	16·79	March.
− 10·1	− 2·6	+ 2·5	+ 6·0	+ 9·8	+ 14·2	+ 18·9	+ 24·5	+ **29·4**	+ 28·2	+ 22·7	53·7	16·29	April.
− 8·5	− 2·5	+ 2·6	+ 4·6	+ 4·7	+ 8·0	+ 15·7	+ 20·2	+ 23·1	+ **23·3**	+ 22·1	42·4	13·03	May.
− 7·9	− 2·3	+ 0·9	+ 2·4	+ 5·9	+ 6·5	+ 10·4	+ 15·7	+ **17·2**	+ 14·6	+ 12·9	31·4	9·16	June.
− 10·6	− 3·9	+ 1·9	+ 6·3	+ 7·2	+ 7·5	+ 10·8	+ 15·9	+ 16·3	+ **20·3**	+ 18·0	36·1	11·31	July.
− 8·1	− 2·8	+ 2·0	+ 3·6	+ 5·4	+ 7·1	+ 13·5	+ 12·7	+ 18·6	+ 23·0	+ **27·0**	45·3	12·79	August.
− 6·6	− 1·1	+ 0·6	+ 5·3	+ 9·8	+ 11·8	+ 17·8	+ 30·9	+ 27·5	+ 29·3	+ **31·8**	64·6	19·84	September.
− 13·5	− 0·5	+ 4·6	+ 9·3	+ 17·2	+ 13 2	+ 20·3	+ 30·9	+ 41·8	+ 49·4	+ **60·8**	104·2	26·33	October.
− 16·4	− 4·8	− 1·7	+ 6·4	+ 10·0	+ 11·9	+ 26·2	+ 35·4	+ 45·4	+ **52·5**	+ 43·6	97·5	27·92	November.
− 17·2	− 9·4	− 7·0	− 3·8	+ 5·7	+ 13·0	+ 31·8	+ 46·5	+ 55·9	+ **70·3**	+ 62·0	112·9	30·68	December.
− 11·9	− 3·8	+ 1·0	+ 5·2	+ 8·6	+ 11·2	+ 18·5	+ 26·1	+ 30·7	+ **34·6**	+ 32·5	61·4	18·74	Year.
− 8·8	− 2·9	+ 1·9	+ 4·2	+ 5·8	+ 7·3	+ 12·6	+ 16·1	+ 18·8	+ **20·3**	+ 20·0	36·8	11·57	Winter.
− 10·3	− 2·3	+ 2·0	+ 6·8	+ 10·8	+ 13·3	+ 18·4	+ 27·2	+ 31·3	+ 34·4	+ **35·2**	65·9	19·77	Equinox.
− 16·5	− 6·2	− 0·9	+ 4·5	+ 9·2	+ 13·0	+ 24·5	+ 35·1	+ 42·0	+ **49·2**	+ 42·2	86·2	24·93	Summer.
− 10·6	− 4·0	+ 0·4	+ 2·9	+ 6·6	+ 8·7	+ 15·8	+ 21·0	+ 23·8	+ **26·6**	+ 26·4	48·3	14·74	Winter, 1912.
− 6·9	− 1·7	+ 3·3	+ 5·5	+ 5·0	+ 5·8	+ 9·4	+ 11·2	+ 13·8	+ **14·0**	+ 13·6	25·6	8·39	,, 1913.
− 10·3	− 2·5	+ 1·4	+ 6·4	+ 10·3	+ 12·6	+ 17·6	+ 26·3	+ 30·1	+ 34·0	+ **34·5**	63·9	18·91	2nd Equinox.

TABLE XXIV.—Diurnal Inequality of Westerly

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1912.	′	′	′	′	′	′	′	′	′	′	′	′	′
April	+ 21·0	+ 13·2	+ 1·2	− 7·8	− 14·2	− 14·0	− 14·8	− 10·8	− 12·2	− 14·0	− 15·0	**− 15·2**	− 12·0
May	+ 12·0	+ 6·4	+ 4·6	− 6·6	**− 12·4**	− 8·0	− 12·0	− 11·2	− 12·2	− 8·0	− 9·8	− 8·4	− 7·0
June	**+ 7·4**	+ 2·8	0·0	− 5·8	**− 6·8**	− 5·8	− 4·8	− 6·4	− 4·6	− 5·0	− 3·4	− 1·2	+ 1·4
July	**+ 13·2**	+ 11·4	+ 7·2	0·0	− 7·0	− 8·4	**− 12·0**	− 6·8	− 9·2	− 7·6	− 4·2	− 5·8	− 9·4
August	+ 15·8	+ 6·0	− 1·0	− 9·4	− 13·6	− 14·4	**− 15·8**	− 8·6	− 5·6	− 9·4	− 6·8	− 7·6	− 8·8
September	+ 17·8	+ 17·0	− 6·4	− 8·4	− 13·6	**− 20·0**	− 16·8	− 13·8	− 10·6	− 11·2	− 10·6	− 13·0	− 4·0
October	+ 32·6	+ 15·3	+ 4·8	− 11·6	− 19·8	− 24·4	**− 25·0**	− 17·8	− 18·6	− 15·0	− 11·6	− 14·8	− 10·4
November	+ 24·2	+ 10·0	+ 3·6	− 17·0	− 30·6	− 11·4	**− 35·6**	− 24·0	− 22·8	− 21·0	− 13·0	− 10·2	− 10·6
December	+ 25·4	+ 20·8	+ 4·4	− 13·6	− 28·4	− 30·0	− 27·2	− 21·2	− 24·8	− 27·4	− 30·6	**− 30·8**	− 16·4
1913.													
January	+ 25·2	+ 5·2	+ 7·0	− 5·6	− 18·6	− 16·0	− 18·0	− 20·2	**− 25·8**	− 21·0	− 25·6	− 19·0	− 21·4
February	+ 18·0	+ 10·4	− 14·8	− 18·0	− 21·2	**− 23·0**	− 21·4	− 17·6	− 17·4	− 13·0	− 11·8	− 11·0	− 7·2
March	+ 20·6	+ 10·2	− 1·4	− 5·8	− 14·6	− 16·0	− 17·2	− 15·6	− 11·4	**− 21·8**	− 17·6	− 14·8	− 9·8
April	+ 8·4	+ 4·4	− 3·6	+ 3·0	− 2·2	0·0	− 1·6	+ 0·8	+ 1·0	+ 1·6	+ 2·2	− 11·8	**− 13·0**
May	**+ 9·0**	+ 1·0	− 2·0	− 7·0	− 7·2	**− 8·6**	− 4·6	− 3·0	− 2·8	− 4·0	− 2·4	− 7·2	− 2·6
June	+ 6·4	+ 3·4	+ 3·2	− 1·0	− 3·0	− 4·8	− 4·8	− 3·0	− 3·0	− 3·8	− 5·2	− 10·2	**− 11·6**
July	+ 1·4	+ 1·8	+ 0·8	− 5·0	− 6·4	− 5·6	− 4·0	− 5·8	− 4·2	− 3·2	− 4·0	**− 9·4**	− 6·4
Two years.													
January	+ 25·2	+ 5·2	+ 7·0	− 5·6	− 18·6	− 16·0	− 18·0	− 20·2	**− 25·8**	− 21·0	− 25·6	− 19·0	− 21·4
February	+ 18·0	+ 10·4	− 14·8	− 18·0	− 21·2	**− 23·0**	− 21·4	− 17·6	− 17·4	− 13·0	− 11·8	− 11·0	− 7·2
March	+ 20·6	+ 10·2	− 1·4	− 5·8	− 14·6	− 16·0	− 17·2	− 15·6	− 11·4	**− 21·8**	− 17·6	− 14·8	− 9·8
April	+ 14·7	+ 8·8	− 1·2	− 2·4	− 8·2	− 7·0	− 8·2	− 5·0	− 5·6	− 6·2	− 6·4	**− 13·5**	− 12·5
May	+ 10·5	+ 3·7	+ 1·3	− 6·8	**− 9·8**	− 8·3	− 8·3	− 7·1	− 7·5	− 6·0	− 6·1	− 7·8	**− 4·8**
June	+ 6·9	+ 3·1	+ 1·6	− 3·4	− 4·9	− 5·3	− 4·8	− 4·7	− 3·8	− 4·4	− 4·3	**− 5·7**	− 5·1
July	+ 7·3	+ 6·6	+ 4·0	− 2·5	− 6·7	− 7·0	**− 8·0**	− 6·3	− 6·7	− 5·4	− 4·1	− 7·6	− 7·9
August	+ 15·8	+ 6·0	− 1·0	− 9·4	− 13·6	− 14·4	**− 15·8**	− 8·6	− 5·6	− 9·4	− 6·8	− 7·6	− 8·8
September	+ 17·8	+ 17·0	− 6·4	− 8·4	− 13·6	**− 20·0**	− 16·8	− 13·8	− 10·6	− 11·2	− 10·6	− 13·0	− 4·0
October	+ 32·6	+ 15·8	+ 4·8	− 11·6	− 19·8	− 24·4	**− 25·0**	− 17·8	− 18·6	− 15·0	− 11·6	− 14·8	− 10·4
November	+ 24·2	+ 10·0	+ 3·6	− 17·0	− 30·6	− 11·4	**− 35·6**	− 24·0	− 22·8	− 21·0	− 13·0	− 10·2	− 10·6
December	+ 25·4	+ 20·8	+ 4·4	− 13·6	− 28·4	− 30·0	− 27·2	− 21·2	− 24·8	− 27·4	− 30·6	**− 30·8**	− 16·4
Year	+ 18·2	+ 9·8	+ 0·2	− 8·7	− 15·8	− 15·2	**− 17·2**	− 13·5	− 13·4	− 13·5	− 12·4	− 13·0	− 9·9
Winter	+ 10·1	+ 4·8	+ 1·5	− 5·5	− 8·8	− 8·8	**− 9·2**	− 6·7	− 5·9	− 6·3	− 5·3	− 7·2	− 6·7
Equinox	+ 21·4	+ 13·0	− 1·0	− 7·0	− 14·0	**− 16·8**	**− 16·8**	− 13·0	− 11·5	− 13·5	− 11·5	− 14·0	− 9·2
Summer	+ 23·2	**+ 11·6**	0·0	− 13·6	− 24·7	− 20·1	**− 25·6**	− 20·8	− 22·7	− 20·6	− 20·3	− 17·8	− 13·9
Winter, 1912	**+ 12·2**	+ 6·7	+ 2·7	− 5·5	− 9·9	− 9·2	**− 11·1**	− 8·3	− 7·9	− 7·5	− 6·1	− 5·8	− 6·0
" 1913	+ 5·6	+ 2·1	+ 0·7	− 4·3	− 5·5	− 6·3	− 4·5	− 3·9	− 3·3	− 3·7	− 3·9	**− 8·9**	− 6·9
2nd Equinox	+ 19·9	+ 11·9	− 1·6	− 5·7	− 12·5	**− 15·1**	**− 15·1**	− 11·6	− 9·9	− 11·6	− 9·4	− 13·6	− 9·3

Declination. Quiet Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour · G.M.T.
′	′	′	′	′	′	′	′	′	′	′	′	′	**1912.**
−10·6	−1·2	0·0	+0·6	+5·2	+6·0	+8·0	+13·4	+22·8	+25·4	+26·0	41·2	11·86	April.
−3·0	+0·4	+2·4	+3·8	+3·2	+4·0	+20·0	+10·2	+7·0	+11·6	+14·2	32·4	8·27	May.
−2·4	+0·4	−1·8	+3·2	+3·0	+1·8	+6·8	+4·4	+6·2	+7·4	+3·6	14·2	4·02	June.
−6·6	−3·0	+1·6	+4·4	+5·0	+5·4	+7·2	+2·4	+6·8	+6·4	+8·0	25·2	6·62	July.
−1·4	+1·4	+1·6	+3·4	+2·4	+5·2	+5·6	+11·4	+15·8	+18·2	+16·4	34·0	8·57	August.
+1·4	+6·2	+6·0	+1·8	+8·8	+7·4	+4·6	+9·2	+9·2	+16·2	+21·2	41·2	10·63	September.
−8·2	+1·4	+0·8	+0·2	+2·0	+4·2	+6·8	+11·8	+22·0	+31·4	+41·6	66·6	14·69	October.
−7·4	−2·0	−11·8	−2·4	−0·6	+3·6	+21·2	+25·4	+34·6	+52·4	+46·2	88·0	18·40	November.
−12·4	−6·6	−5·6	−1·6	+0·4	+14·4	+32·6	+39·2	+40·6	+58·6	+42·0	89·4	23·12	December.
													1913.
−13·8	−5·2	−3·6	−1·6	+8·6	+3·4	+20·2	+25·6	+40·6	+46·8	+32·6	72·6	17·94	January.
−5·4	−1·4	+0·8	+1·6	+2·6	+6·4	+10·0	+25·4	+31·8	+41·6	+34·4	64·6	15·26	February.
−4·2	−1·6	+5·6	+4·2	+7·6	+8·2	+7·6	+15·2	+20·4	+28·4	+22·2	50·2	12·58	March.
−7·4	−4·0	−2·0	−2·2	−2·0	−0·2	+2·6	+3·6	+2·6	+10·4	+11·8	24·8	4·27	April.
−0·6	−0·2	+3·4	+3·6	+1·4	+3·6	+4·2	+3·4	+7·2	+7·2	+8·6	17·6	4·37	May.
−4·6	−0·2	+5·4	+3·4	+3·0	+3·4	+4·8	+7·0	+3·0	+6·8	+7·2	13·8	4·67	June.
−2·8	−1·8	+0·6	+0·6	−0·4	+3·4	+3·4	+7·0	+12·8	+15·8	+11·0	25·2	4·90	July.
													Two years.
−13·8	−5·2	−3·6	−1·6	+8·6	+3·4	+20·2	+25·6	+40·6	+46·8	+32·6	72·6	17·94	January.
−5·4	−1·4	+0·8	+1·6	+2·6	+6·4	+10·0	+25·4	+31·8	+41·6	+34·4	64·6	15·26	February.
−4·2	−1·6	+5·6	+4·2	+7·6	+8·2	+7·6	+15·2	+20·4	+28·4	+22·2	50·2	12·58	March.
−9·0	−2·6	−1·0	−0·8	+1·6	+2·9	+5·3	+8·5	+12·7	+17·9	+18·9	32·4	7·54	April.
−1·8	+0·1	+2·9	+3·7	+2·3	+3·8	+12·1	+6·8	+7·1	+9·4	+11·4	21·9	6·23	May.
−3·5	+0·1	+1·8	+3·3	+3·0	+2·6	+5·8	+5·7	+4·6	+7·1	+5·4	12·8	4·20	June.
−4·7	−2·4	+1·1	+2·5	+2·3	+4·4	+5·3	+4·7	+9·8	+11·1	+9·5	19·1	5·75	July.
−1·4	+1·4	+1·6	+3·4	+2·4	+5·2	+5·6	+11·4	+15·8	+18·2	+16·4	34·0	8·57	August.
+1·4	+6·2	+6·0	+1·8	+8·8	+7·4	+4·6	+9·2	+9·2	+16·2	+21·2	41·2	10·63	September.
−8·2	+1·4	+0·8	+0·2	+2·0	+4·2	+6·8	+11·8	+22·0	+31·4	+41·6	66·6	14·69	October.
−7·4	−2·0	−11·8	−2·4	−0·6	+3·6	+21·2	+25·4	+34·6	+52·4	+46·2	88·0	18·40	November.
−12·4	−6·6	−5·6	−1·6	+0·4	+14·4	+32·6	+39·2	+40·6	+58·6	+42·0	89·4	23·12	December.
−5·9	−1·1	−0·1	+1·2	+3·4	+5·5	+11·4	+15·7	+20·8	+28·3	+25·2	45·5	11·64	Year.
−2·9	−0·2	+1·8	+3·2	+2·5	+4·0	+7·2	+7·1	+9·3	+11·4	+10·7	20·6	6·13	Winter.
−5·0	+0·9	+2·9	+1·4	+5·0	+5·7	+6·1	+11·2	+16·1	+23·5	+26·0	42·8	11·10	Equinox.
−9·8	−3·8	−5·1	−1·0	+2·7	+6·9	+21·0	+28·9	+36·9	+49·8	+38·8	75·4	18·32	Summer.
−3·4	−0·3	+1·0	+3·6	+3·4	+4·0	+10·0	+7·0	+9·0	+10·8	+10·6	23·3	6·75	Winter, 1912
−2·7	−4·6	+3·1	+2·5	+1·3	+3·5	+4·1	+5·8	+7·7	+9·9	+8·9	18·8	4·58	„ 1913.
−4·6	+0·5	+2·6	+1·0	+4·1	+4·9	+5·4	+10·0	+13·6	+21·6	+24·2	39·3	9·99	2nd Equinox.

TABLE XXV.—Diurnal Inequality of Westerly

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11	12.	13.
1912.	′	′	′	′	′	′	′	′	′	′	′	′	′
April	+ **42·4**	+ 23·0	+ 29·2	+ 16·4	− 13·4	− 35·2	− 40·6	− 56·2	− **66·6**	− 48·0	− 62·0	− 45·4	− 19·2
May	+ 52·4	+ 30·4	+ 3·6	− 5·0	− 33·4	− 43·4	− 53·2	− **68·4**	− 49·2	− 47·8	− 57·0	− 56·6	− 4·8
June	+ 15·4	+ 30·2	+ 15·0	− 0·4	− 7·6	− 24·0	− 26·2	− 33·8	− 40·4	− 25·2	− **43·8**	− 41·8	− 33·2
July	+ 41·2	+ 27·0	+ 13·4	+ 0·4	− 12·2	− 21·2	− 34·0	− 35·6	− 28·2	− **44·8**	− 44·4	− 37·6	− 39·8
August	+ 51·6	+ 62·2	+ 24·2	+ 2·6	− 14·0	− 26·2	− 48·0	− 39·2	− 44·2	− 57·0	− 48·6	− **57·6**	− 49·4
September	+ 57·2	+ 44·6	+ 28·8	+ 16·8	− 1·0	− 25·6	− 45·8	− 45·2	− 57·0	− **69·0**	− 61·0	− 47·0	− 32·8
October	+ 10·6	+ 34·8	+ 23·6	+ 5·2	− 14·0	− 46·2	− 63·6	− 51·4	− **92·4**	− 92·0	− 74·2	− 75·4	− 64·8
November	+ 67·4	+ **85·6**	+ 77·2	+ 26·6	+ 5·0	− 16·4	− 59·8	− 83·6	− **93·6**	− 92·6	− 82·6	− 80·2	− 75·4
December	+ 51·6	+ 28·0	− 7·4	− 23·4	− 35·2	− 52·6	− 56·4	− 67·4	− 64·4	− **67·8**	− 66·8	− 66·6	− 41·4
1913.													
January	+ 52·0	+ 16·2	+ 33·6	+ 9·8	− 13·6	− 14·4	− 30·2	− 39·6	− 50·6	− 56·4	− 78·0	− **85·6**	− 71·4
February	+ 29·6	+ 38·6	+ **51·8**	+ 38·8	+ 9·8	− 18·4	− 38·0	− **65·0**	− 54·4	− 49·6	− 42·4	− 44·6	− 28·4
March	+ 23·0	+ 11·2	+ 11·8	− 6·0	− 12·8	− 30·6	− **53·6**	− 50·4	− 39·4	− 39·6	− 36·6	− 36·6	− 28·6
April	+ 18·2	− 2·4	+ 3·0	− 8·0	− 15·4	− 29·0	− 31·6	− 26·8	− 28·8	− **44·2**	− 22·8	− 26·0	− 39·2
May	+ 28·2	+ 17·8	+ 1·2	− 9·6	− 15·8	− 22·0	− 37·4	− 41·8	− **45·2**	− 39·2	− 29·4	− 30·6	− 35·4
June	+ 10·8	+ 11·6	+ 3·2	− 1·4	− 7·0	− 14·8	− 22·4	− **24·4**	− 23·4	− 24·2	− 20·6	− 19·6	− 10·4
July	+ 17·0	+ 17·2	+ 11·2	+ 4·8	− 4·6	− 8·0	− 17·4	− 23·0	− 23·2	− 20·6	− 16·2	− 30·0	− **33·8**
Two Years.													
January	+ 52·0	+ 16·2	+ 33·6	+ 9·8	− 13·6	− 14·4	− 30·2	− 39·6	− 50·6	− 56·4	− 78·0	− **85·6**	− 71·4
February	+ 29·6	+ 38·6	+ **51·8**	+ 38·8	+ 9·8	− 18·4	− 38·0	− **65·0**	− 54·4	− 49·6	− 42·4	− 44·6	− 28·4
March	+ 23·0	+ 11·2	+ 11·8	− 6·0	− 12·8	− 30·6	− **53·6**	− 50·4	− 39·4	− 39·6	− 36·6	− 36·6	− 28·6
April	+ 30·3	+ 10·3	+ 16·1	+ 4·2	− 14·4	− 32·1	− 36·1	− 41·5	− **47·7**	− 46·1	− 42·4	− 35·7	− 29·2
May	+ 40·3	+ 24·1	+ 2·4	− 7·3	− 24·6	− 32·7	− 45·3	− **55·1**	− 47·2	− 43·5	− 43·2	− 43·6	− 20·1
June	+ 13·1	+ 20·9	+ 9·1	− 0·9	− 7·3	− 19·4	− 24·3	− 29·1	− 31·9	− 24·7	− **32·2**	− 30·7	− 21·8
July	+ 29·1	+ 22·1	+ 12·3	+ 2·6	− 8·4	− 14·6	− 25·7	− 29·3	− 25·7	− 32·7	− 30·3	− 33·8	− **36·8**
August	+ 51·6	+ 62·2	+ 24·2	+ 2·6	− 14·0	− 26·2	− 48·0	− 39·2	− 44·2	− 57·0	− 48·6	− **57·6**	− 49·4
September	+ 57·2	+ 44·6	+ 28·8	+ 16·8	− 1·0	− 25·6	− 45·8	− 45·2	− 57·0	− **69·0**	− 61·0	− 47·0	− 32·8
October	+ 10·6	+ 34·8	+ 23·6	+ 5·2	− 14·0	− 46·2	− 63·6	− 51·4	− **92·4**	− 92·0	− 74·2	− 75·4	− 64·8
November	+ 67·4	+ **85·6**	+ 77·2	+ 26·6	+ 5·0	− 16·4	− 59·8	− 83·6	− **93·6**	− 92·6	− 82·6	− 80·2	− 75·4
December	+ 51·6	+ 28·0	− 7·4	− 23·4	− 35·2	− 52·6	− 56·4	− 67·4	− 64·4	− **67·8**	− 66·8	− 66·6	− 41·4
Year	+ 38·0	+ 33·2	+ 23·6	+ 5·7	− 10·9	− 27·4	− 43·9	− 49·7	− 54·0	− **55·9**	− 53·2	− 53·1	− 41·7
Winter	+ 33·5	+ 32·3	+ 12·0	− 0·8	− 13·6	− 23·2	− 35·8	− 38·2	− 37·2	− 39·5	− 38·6	− **41·4**	− 32·0
Equinox	+ 30·3	+ 25·2	+ 20·1	+ 5·0	− 10·5	− 33·6	− 49·8	− 47·1	− 59·1	− **61·7**	− 53·6	− 48·7	− 38·9
Summer	+ 50·1	+ 42·1	+ 38·8	+ 13·0	− 8·5	− 25·5	− 46·1	− 63·9	− 65·7	− 66·6	− 67·4	− **69·3**	− 54·2
Winter, 1912	+ 40·2	+ 37·5	+ 14·1	− 0·6	− 16·8	− 28·7	− 40·3	− 44·2	− 40·5	− 43·7	− **48·4**	− 48·4	− 31·8
„ 1913	+ 18·7	+ 15·5	+ 5·2	− 2·1	− 9·1	− 14·9	− 25·7	− 29·7	− **30·6**	− 28·0	− 22·1	− 26·7	− 26·5
2nd Equinox	+ 27·2	+ 22·0	+ 16·8	+ 2·0	− 10·8	− 32·9	− 48·7	− 43·5	− 54·4	− **61·2**	− 48·7	− 46·3	− 41·4

Declination Disturbed Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
′	′	′	′	′	′	′	′	′	′	′	′	′	**1912.**
— 4·6	+ 2·0	+ 18·0	+ 14·0	+ 20·8	+ 32·2	+ 41·4	+ 38·2	+ 39·6	+ 38·8	+ 34·2	109·0	32·56	April.
— 4·4	— 3·6	+ 2·4	+ 5·0	+ 1·8	+ 23·6	+ 37·2	+ 48·2	+ **90·4**	+ 73·0	+ 60·0	158·8	35·62	May.
— 24·2	— 13·6	— 3·2	+ 0·4	+ 19·0	+ 16·4	+ 35·4	+ **56·4**	+ 52·6	+ 36·6	+ 41·0	100·2	26·49	June.
— 25·0	— 17·8	— 5·0	+ 12·2	+ 12·2	+ 17·0	+ 36·8	+ **53·8**	+ 31·4	+ 50·8	+ 47·0	98·6	28·70	July.
— 35·2	— 8·8	— 16·0	— 8·4	+ 15·0	+ 13·4	+ 52·0	+ 47·8	+ 43·8	+ 64·6	+ **75·2**	132·8	37·71	August.
— 12·8	— 8·2	— 9·2	+ 19·4	+ 20·2	+ 16·6	+ 32·6	+ **77·6**	+ 47·6	+ 32·6	+ 19·0	146·6	34·48	September.
— 35·6	— 13·0	+ 13·0	+ 23·8	+ 53·0	+ 39·4	+ 44·6	+ 79·0	+ 95·8	+ 90·0	+ **110·6**	203·0	51·92	October.
— 50·8	— 31·0	— 3·4	+ 34·8	+ 40·2	+ 27·2	+ 43·2	+ 59·0	+ 80·4	+ 81·4	+ 39·0	179·2	55·68	November.
— 32·6	— 20·2	— 12·4	— 9·6	+ 21·0	+ 37·4	+ 66·6	+ 88·4	+ 99·6	+ **137·8**	+ 96·2	205·6	52·12	December.
													1913.
— 33·6	— 10·4	+ 24·0	+ 26·6	+ 30·6	+ 34·2	+ 43·2	+ **65·2**	+ 47·2	+ 59·6	+ 43·0	150·8	40·37	January.
— 20·6	+ 1·2	+ 11·8	+ 19·2	+ 22·4	+ 18·4	+ 29·6	+ 30·4	+ 19·2	+ 19·0	+ 21·4	116·8	30·11	February.
— 15·4	— 6·6	— 4·8	+ 19·2	+ 14·2	+ 33·0	+ 49·0	+ 62·2	+ **62·6**	+ 47·8	+ 29·2	116·2	30·17	March.
— 22·2	— 5·6	— 3·0	+ 4·8	+ 21·3	+ 39·0	+ 35·4	+ 45·4	+ 51·6	+ **55·2**	+ 31·6	99·4	25·46	April.
— 2[illegible]·4	— 13·2	+ 18·0	+ 18·2	+ 18·8	+ 24·0	+ 35·4	+ 46·6	+ **51·8**	+ 42·2	+ 44·3	97·0	23·87	May.
— 9·6	— 2·2	+ 0·2	+ 2·2	+ 6·0	+ 18·4	+ 23·4	+ 26·2	+ **39·2**	+ 25·6	+ 15·0	63·6	15·03	June.
— 29·6	— 5·2	— 4·0	+ 10·0	+ 20·2	+ 13·4	+ 18·2	+ 28·2	+ 23·0	+ **29·2**	+ 21·0	63·0	17·88	July.
													Two Years.
— 33·6	— 10·4	+ 24·0	+ 26·6	+ 30·6	+ 34·2	+ 43·2	+ **65·2**	+ 47·2	+ 59·6	+ 43·0	150·8	40·37	January.
— 20·6	+ 1·2	+ 11·8	+ 19·2	+ 22·4	+ 18·4	+ 29·6	+ 30·4	+ 19·2	+ 19·0	+ 21·4	116·3	30·11	February.
— 15·4	— 6·6	— 4·8	+ 19·2	+ 14·2	+ 33·0	+ 49·0	+ 62·2	+ **62·6**	+ 47·8	+ 29·2	116·2	30·17	March.
— 13·4	— 1·3	+ 7·5	+ 9·4	+ 31·3	+ 35·6	+ 33·4	+ 41·3	+ 45·6	+ **47·0**	+ 32·9	94·7	28·37	April.
— 15·4	— 8·4	+ 10·2	+ 11·6	+ 10·3	+ 23·8	+ 36·3	+ 47·4	+ **71·1**	+ 57·6	+ 52·4	126·2	32·25	May.
— 16·9	— 7·9	— 1·5	+ 1·3	+ 12·5	+ 17·4	+ 29·4	+ 41·3	+ **45·9**	+ 31·1	+ 28·0	78·1	20·78	June.
— 27·3	— 11·5	— 4·5	+ 11·1	+ 16·2	+ 15·2	+ 27·5	+ **41·0**	+ 27·2	+ 40·0	+ 31·0	77·8	23·29	July.
— 35·2	— 8·8	— 16·0	— 8·4	+ 15·0	+ 13·4	+ 52·0	+ 47·3	+ 43·8	+ 64·6	+ **75·2**	132·8	37·71	August.
— 12·8	— 8·2	— 9·2	+ 19·4	+ 20·2	+ 16·6	+ 32·6	+ **77·6**	+ 47·6	+ 32·6	+ 19·0	146·6	34·48	September.
— 35·3	— 13·0	+ 13·0	+ 23·8	+ 53·0	+ 39·4	+ 44·6	+ 79·0	+ 95·8	+ 90·0	+ **110·6**	203·0	51·92	October.
— 50·8	— 31·0	— 3·4	+ 34·8	+ 40·2	+ 27·2	+ 43·2	+ 59·0	+ 80·4	+ 81·4	+ 39·0	179·2	55·68	November.
— 32·6	— 20·2	— 12·4	— 9·6	+ 21·0	+ 37·4	+ 66·6	+ 88·4	+ 99·6	+ **137·8**	+ 96·2	205·5	52·12	December.
— 25·8	— 10·6	+ 1·2	+ 13·2	+ 23·1	+ 26·0	+ 41·0	+ 56·8	+ 57·2	+ **59·0**	+ 48·4	114·9	35·52	Year.
— 23·7	— 9·1	— 3·0	+ 3·9	+ 13·5	+ 17·5	+ 36·3	+ 44·4	+ 47·0	+ **48·3**	+ 47·4	89·7	28·01	Winter.
— 19·3	— 7·4	+ 1·6	+ 17·9	+ 27·2	+ 31·1	+ 41·1	+ **65·1**	+ 62·9	+ 54·3	+ 47·9	126·8	35·81	Equinox.
— 34·4	— 15·1	+ 5·0	+ 17·7	+ 28·5	+ 29·3	+ 45·6	+ 60·7	+ 61·6	+ **74·1**	+ 49·9	143·7	43·06	Summer.
— 22·3	— 10·9	— 5·4	+ 2·2	+ 12·0	+ 17·7	+ 40·3	+ 51·5	+ 54·5	+ **56·2**	+ 55·8	104·6	31·83	Winter, 1912.
— 21·9	— 6·9	+ 4·7	+ 10·1	+ 15·0	+ 18·6	+ 25·7	+ 33·7	+ **33·0**	+ 32·3	+ 26·9	68·6	20·36	,, 1913.
— 21·5	— 8·4	— 1·0	+ 16·8	+ 27·3	+ 32·0	+ 40·4	+ **66·0**	+ 64·4	+ 56·4	+ 47·6	127·2	34·90	2nd Equinox.

Section 7.—Horizontal Force.—The H diurnal inequalities, as may be seen on comparing Plates XII and XIII, are less regular than those for D. The daily minimum in Table XXVI appears at 14 h. in the inequalities for the year, winter and equinox, and in 9 months out of the 16; January, 1913, is the only month in which the value at 14 h. is much above the minimum. The hour of maximum is much more variable. In individual months it seems almost a matter of chance at what hour it presents itself between 11 p.m. and 6 a.m. In many months there is a marked tendency towards two maxima, one near midnight, the other 5 or 6 hours later. This appears even in the diurnal inequality for the year, where the value 12·6γ at 0 h. is exceeded by the value 12·7γ at 6 h. The phenomenon is specially conspicuous in the summer months. The winter and equinoctial inequalities show little variation in the value between 1 h. and 5 h.

The range is unduly small in August, 1913, for the same reason as in the case of D. The reduction in amplitude in 1913, as compared with 1912, is small in May, but in the other months is similar to the reduction already described in D. The maximum is clearly at midsummer, probably in December, the minimum at midwinter. July has a slightly smaller range than June in both years in Table XXVI, and in 1912 in Table XXVII, but in 1913 the June A.D. is the smaller in both tables, and the June range the smaller in Table XXVII. The excess of the summer range over the equinoctial range is small in Table XXVII, and almost evanescent in Table XXVI, and in Table XXVII the equinoctial A.D. is actually the larger. This does not, however, mean that the forces causing the diurnal inequality are as large in the equinoctial as in the summer months, but that the hours of occurrence of the maximum and minimum in January differed so much from those in February and November that there was considerable cancelling out in the seasonal inequality. The irregularities in January may be ascribed to the reduced number of days' record available, the first half of the month not being represented. The absence of data for December and the first half of January, the time of year when the diurnal movements are presumably largest, would naturally tend to reduce the range of the summer inequality.

In the quiet day H inequalities in Table XXVIII, the hours of occurrence of the maximum and minimum in individual months show great irregularity. Even the seasonal inequality curves in Plate XIII are far from smooth. Many of the individual months show two maxima and two minima, with a few hours only intervening in either case. Even in the diurnal inequality for the year there are maxima at 15 h. and 20 h. G.M.T., with intermediate lower values, and minima at 2 h. and 7 h. G.M.T., with intermediate appreciably higher values. These phenomena are not improbably accidental, as they are largely due to the contribution from the summer months. The summer curve in Plate XIII is a testimony to the irregularities at that season. The January contribution was particularly irregular. Owing to lack of trace for the first half of the month, only one of the real international quiet days was available. One of the substituted days, the 22nd, with an international character of 0·4, showed considerable disturbance in Adelie Land, and it might have been better to be content with 4 or even 3 quiet days. The seasonal influence on the amplitude is exceedingly conspicuous in Table XXVIII. The range and A.D. in July, 1912, and in May, June, and July, 1913, would not be large for a station in temperate latitudes.

The disturbed day H inequalities in Table XXIX show great irregularity in the incidence of maxima and minima in individual months, but not more so than did the quiet day inequalities. The tendency towards two maxima separated by a few hours of lower values is particularly prominent in the summer months. It is a conspicuous feature in the summer inequality in Plate XIII, where it is mainly due to the contributions from November, 1912, and February, 1913. As with D, the annual variation in the amplitude, though well marked, is much smaller for disturbed than for quiet days. For the ratio of the summer to the winter amplitude we find from Tables XXVII, XXVIII and XXIX—

	Range.	A.D.
Quiet days	3·3	2·9
All days	1·7	1·6
Disturbed days	1·3	1·2

TABLE XXVI.—Diurnal Inequality of

Hour L.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.	13.
1912.	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
April	+ 14·2	+ 15·2	+ 16·4	+ 13·7	+ 13·4	+ 10·5	+ 10·6	+ 3·2	+ 3·2	− 1·0	− 7·6	− 5·3	− 18·3
May	+ 12·7	+ 9·2	+ 8·6	+ 11·0	+ 11·2	+ 12·0	+ 6·4	+ 3·3	+ 2·6	− 3·4	− 13·0	− 9·7	− 11·6
June	+ 11·8	+ 10·8	+ 8·6	+ 9·9	+ 10·9	+ 9·2	+ 8·0	+ 7·5	− 0·1	− 6·2	− 8·5	− 13·7	− 12·5
July	+ 11·0	+ 10·9	+ 7·8	+ 10·4	+ 9·2	+ 7·8	+ 7·4	+ 5·9	− 0·6	− 5·6	− 7·9	− 11·1	− 12·4
August	+ 16·8	+ 15·3	+ 18·5	+ 17·1	+ 14·4	+ 14·4	+ 13·7	+ 8·3	− 1·8	− 8·1	− 14·4	− 20·4	− 18·8
September	+ 13·7	+ 12·2	+ 14·6	+ 13·8	+ 14·4	+ 12·2	+ 16·8	+ 18·1	+ 11·3	+ 3·1	− 12·4	− 19·9	− 30·9
October	+ 19·9	+ 18·7	+ 18·6	+ 21·0	+ 21·2	+ 16·2	+ 14·7	+ 4·1	− 4·1	− 8·4	− 16·5	− 17·8	− 17·1
November	+ 15·7	+ 12·0	+ 12·5	+ 16·0	+ 22·9	+ 28·6	+ 27·8	+ 19·5	+ 8·8	+ 10·9	− 15·9	− 28·6	− 30·6
1913.													
January	+ 15·6	+ 14·3	+ 13·4	+ 7·2	+ 10·6	+ 8·5	+ 15·1	+ 13·1	+ 3·4	− 3·3	− 3·6	− 1·4	+ 8·1
February	+ 11·1	+ 9·9	+ 7·3	+ 5·5	+ 10·3	+ 15·2	+ 14·3	+ 9·8	+ 6·5	+ 2·5	− 1·5	− 6·6	− 9·8
March	+ 10·7	+ 10·5	+ 8·6	+ 9·1	+ 9·8	+ 11·5	+ 9·5	+ 10·4	+ 5·3	− 1·0	− 2·9	− 10·4	− 16·1
April	+ 10·4	+ 10·0	+ 9·3	+ 9·3	+ 7·6	+ 7·7	+ 6·4	+ 4·2	+ 2·7	− 1·8	− 6·7	− 9·6	− 13·1
May	+ 8·5	+ 5·6	+ 9·1	+ 8·6	+ 8·4	+ 7·7	+ 3·3	+ 5·1	+ 1·3	− 2·7	− 5·7	− 7·6	− 13·3
June	+ 5·9	+ 5·7	+ 5·4	+ 4·5	+ 6·9	+ 6·6	+ 4·0	+ 2·5	+ 1·6	− 2·3	− 7·3	− 7·5	− 9·7
July	+ 7·3	+ 8·1	+ 6·7	+ 4·4	+ 4·5	+ 4·6	+ 4·8	+ 2·5	+ 0·2	− 2·6	− 7·3	− 8·8	− 8·6
August	+ 2·7	+ 3·4	+ 3·3	+ 3·1	+ 4·6	+ 4·1	+ 2·9	+ 3·1	+ 0·1	− 3·4	− 7·0	− 6·4	− 4·9
Two years.													
January	+ 15·6	+ 14·3	+ 13·4	+ 7·2	+ 10·6	+ 8·5	+ 15·1	+ 13·1	+ 3·4	− 3·3	− 3·6	− 1·4	+ 8·1
February	+ 11·1	+ 9·9	+ 7·3	+ 5·5	+ 10·3	+ 15·2	+ 14·3	+ 9·8	+ 6·5	+ 2·5	− 1·5	− 6·6	− 9·8
March	+ 10·7	+ 10·5	+ 8·6	+ 9·1	+ 9·8	+ 11·5	+ 9·5	+ 10·4	+ 5·3	− 1·0	− 2·9	− 10·4	− 16·1
April	+ 12·3	+ 12·6	+ 12·8	+ 11·5	+ 10·5	+ 9·1	+ 8·5	+ 3·7	+ 2·9	− 1·4	− 7·1	− 7·5	− 15·7
May	+ 10·6	+ 7·4	+ 8·8	+ 9·8	+ 9·8	+ 9·8	+ 4·8	+ 4·2	+ 2·0	− 3·0	− 9·4	− 8·7	− 12·5
June	+ 8·9	+ 8·2	+ 7·0	+ 7·2	+ 8·9	+ 7·9	+ 6·0	+ 5·0	+ 0·7	− 4·2	− 7·9	− 10·6	− 11·1
July	+ 9·1	+ 9·5	+ 7·3	+ 7·4	+ 6·8	+ 6·2	+ 6·1	+ 4·2	− 0·2	− 4·1	− 7·6	− 10·0	− 10·5
August	+ 9·8	+ 9·4	+ 10·9	+ 10·1	+ 9·5	+ 9·3	+ 8·3	+ 5·7	− 0·8	− 5·7	− 10·7	− 13·4	− 11·9
September	+ 13·7	+ 12·2	+ 14·6	+ 13·8	+ 14·4	+ 12·2	+ 16·8	+ 18·1	+ 11·3	+ 3·1	− 12·4	− 19·9	− 30·9
October	+ 19·9	+ 18·7	+ 18·6	+ 21·0	+ 21·2	+ 16·2	+ 14·7	+ 4·1	− 4·1	− 8·4	− 16·5	− 17·8	− 17·1
November	+ 15·7	+ 12·0	+ 12·5	+ 16·0	+ 22·9	+ 28·6	+ 27·8	+ 19·5	+ 8·8	+ 10·9	− 15·9	− 28·6	− 30·6
11 months	+ 12·5	+ 11·3	+ 11·1	+ 10·8	+ 12·2	+ 12·2	+ 12·0	+ 8·9	+ 3·3	− 1·3	− 8·7	− 12·3	− 14·4
Year	+ 12·6	+ 11·6	+ 11·1	+ 10·7	+ 12·4	+ 12·7	+ 12·6	+ 9·3	+ 3·5	− 0·9	− 8·5	− 12·3	− 14·1
Winter	+ 9·6	+ 8·6	+ 8·5	+ 8·6	+ 8·8	+ 8·3	+ 6·3	+ 4·8	+ 0·4	− 4·2	− 8·9	− 10·7	− 11·5
Equinox	+ 14·1	+ 13·5	+ 13·6	+ 13·8	+ 14·0	+ 12·2	+ 12·4	+ 9·1	+ 3·8	− 1·9	− 9·7	− 13·9	− 20·0
Summer	+ 14·1	+ 12·1	+ 11·1	+ 9·6	+ 14·6	+ 17·4	+ 19·1	+ 14·1	+ 6·2	+ 3·4	− 7·0	− 12·2	− 10·8
Winter, 1912	+ 13·1	+ 11·6	+ 10·9	+ 12·1	+ 11·4	+ 10·9	+ 8·9	+ 6·2	0·0	− 5·8	− 11·0	− 13·7	− 13·8
,, 1913	+ 6·1	+ 5·7	+ 6·1	+ 5·2	+ 6·1	+ 5·8	+ 3·8	+ 3·3	+ 0·8	− 2·7	− 6·8	− 7·6	− 9·1
2nd Equinox	+ 13·7	+ 12·8	+ 12·8	+ 13·3	+ 13·2	+ 11·9	+ 11·8	+ 9·2	+ 3·8	− 2·0	− 9·6	− 14·4	− 19·3

Horizontal Force. All Days. L.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour L.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	**1912.**
− **23·4**	− 23·0	− 15·9	− 14·2	− 14·3	− 13·4	− 6·7	+ 1·0	+ 11·6	+ 15·7	+ 14·3	39·8	11·92	April.
− 11·8	− **13·2**	− 12·4	− 12·1	− 9·4	− 6·4	− 3·8	+ 1·1	+ 7·2	+ 9·3	+ 11·9	25·9	8·89	May.
− **14·6**	− 10·3	− 11·6	− 12·4	− 9·1	− 6·9	− 0·6	+ 3·5	+ 7·5	+ 10·5	+ 8·6	26·4	8·89	June.
− **12·8**	− 11·2	− 11·0	− 8·2	− 7·2	− 3·1	− 2·8	− 2·8	+ 5·1	+ 10·1	+ **11·6**	24·4	8·08	July.
− **25·6**	− 21·9	− 18·1	− 14·9	− 9·4	− 3·4	− 0·1	+ 1·0	+ 6·7	+ 14·2	+ 16·6	44·1	13·08	August.
− 26·2	− 21·4	− 23·4	− 15·1	− 12·6	− 5·0	− 1·1	+ 6·9	+ 7·6	+ 10·2	+ 13·2	49·0	14·00	September.
− 28·3	− 27·6	− **28·8**	− 16·2	− 12·4	− 7·6	− 0·9	+ 6·6	+ 12·7	+ 13·8	+ 20·2	50·0	15·56	October.
− 26·2	− 25·6	− 25·8	− 21·6	− 14·3	− 11·1	− 4·7	− 1·3	+ 8·7	+ 9·4	+ 13·2	59·2	17·15	November.
													1913.
+ 2·2	− 10·2	− 17·6	− 19·1	− 23·5	− **25·7**	− 15·3	− 4·6	+ 2·9	+ 3·1	+ 6·5	41·3	10·35	January.
− **19·1**	− 18·5	− 13·1	− 14·8	− 18·2	− 12·7	− 6·4	− 1·2	+ 4·9	+ 12·3	+ 12·0	34·3	10·15	February.
− **17·1**	− 14·6	− 16·0	− 15·3	− 11·7	− 7·2	− 1·5	+ 1·1	+ 5·1	+ **12·0**	+ 10·7	29·1	9·50	March.
− 15·5	− **16·6**	− 16·1	− 10·3	− 6·0	− 3·9	− 2·6	+ 2·3	+ 6·0	+ 12·4	+ **14·2**	30·8	8·53	April.
− **15·5**	− 9·2	− 6·2	− 4·7	− 5·5	− 3·7	− 1·8	+ 2·3	+ 5·6	+ 4·0	+ 6·4	24·6	6·33	May.
− **10·3**	− 4·6	− 3·7	− 4·6	− 3·3	− 2·9	− 1·0	+ 1·7	+ 1·0	+ 4·9	+ 6·3	17·2	4·76	June.
− **8·8**	− 7·0	− 4·6	− 4·5	− 4·4	− 2·3	− 0·8	+ 1·8	+ 2·9	+ 6·6	+ 5·2	16·9	4·97	July.
− 6·4	− 3·7	− 3·0	− 0·6	− 1·6	− 1·4	− 1·3	+ 1·0	+ 2·6	+ 4·0	+ 4·0	11·6	3·28	August.
													Two years.
+ 2·2	− 10·2	− 17·6	− 19·1	− 23·5	− **25·7**	− 15·3	− 4·6	+ 2·9	+ 3·1	+ 6·5	41·3	10·35	January.
− **19·1**	− 18·5	− 13·1	− 14·8	− 18·2	− 12·7	− 6·4	− 1·2	+ 4·9	+ 12·3	+ 12·0	34·3	10·15	February.
− **17·1**	− 14·6	− 16·0	− 15·3	− 11·7	− 7·2	− 1·5	+ 1·1	+ 5·1	+ **12·0**	+ 10·7	29·1	9·50	March.
− 19·4	− **19·8**	− 16·0	− 12·3	− 10·2	− 8·7	− 4·7	+ 1·7	+ 8·8	+ 14·0	+ **14·2**	34·0	10·22	April.
− **13·7**	− 11·2	− 9·3	− 8·4	− 7·5	− 4·6	− 2·8	+ 1·7	+ 6·4	+ 6·6	+ 9·1	24·3	7·59	May.
− **12·4**	− 7·5	− 7·7	− 8·5	− 6·2	− 4·9	− 0·8	+ 2·6	+ 4·2	+ 7·7	+ 7·5	21·3	6·82	June.
− **10·8**	− 9·1	− 7·8	− 6·4	− 5·8	− 2·7	− 1·8	− 0·5	+ 4·0	+ 8·3	+ 8·4	20·3	6·44	July.
− **16·0**	− 12·8	− 10·5	− 7·7	− 5·5	− 2·4	− 0·7	+ 1·0	+ 4·7	+ 9·1	+ 10·3	26·9	8·17	August.
− 26·2	− 21·4	− 23·4	− 15·1	− 12·6	− 5·0	− 1·1	+ 6·9	+ 7·6	+ 10·2	+ 13·2	49·0	14·00	September.
− 28·3	− 27·6	− **28·8**	− 16·2	− 12·4	− 7·6	− 0·9	+ 6·6	+ 12·7	+ 13·8	+ 20·2	50·0	15·56	October.
− 26·2	− 25·6	− 25·8	− 21·6	− 14·3	− 11·1	− 4·7	− 1·3	+ 8·7	+ 9·4	+ 13·2	59·2	17·15	November.
− **17·0**	− 16·2	− 16·0	− 13·2	− 11·6	− 8·4	− 3·7	+ 1·3	+ 6·4	+ 9·7	+ 11·4	29·5	10·25	11 months.
− **16·8**	− 16·4	− 16·2	− 13·7	− 12·2	− 9·1	− 4·1	+ 1·0	+ 6·3	+ 9·6	+ 11·3	29·5	10·38	Year.
− **13·2**	− 10·2	− 8·8	− 7·7	− 6·2	− 3·7	− 1·5	+ 1·2	+ 4·8	+ 7·9	+ 8·8	22·8	7·22	Winter
− **22·8**	− 20·9	− 21·1	− 14·7	− 11·7	− 7·1	− 2·1	+ 4·1	+ 8·5	+ 12·5	+ 14·6	37·4	12·17	Equinox.
− 14·4	− 18·1	− **18·8**	− 18·5	− 18·7	− 16·5	− 8·8	− 2·4	+ 5·5	+ 8·3	+ 10·6	37·9	12·18	Summer.
− **16·2**	− 14·5	− 13·3	− 11·9	− 8·6	− 5·0	− 1·8	+ 0·7	+ 6·6	+ 11·0	+ 12·2	29·3	9·63	Winter, 1912.
− **10·2**	− 6·1	− 4·4	− 3·6	− 3·7	− 2·6	− 1·2	+ 1·7	+ 3·0	+ 4·9	+ 5·5	16·3	4·83	" 1913.
− **21·8**	− 20·1	− 21·1	− 14·2	− 10·7	− 5·9	− 1·5	+ 4·2	+ 7·8	+ 12·1	+ **14·6**	36·4	11·74	2nd Equinox.

TABLE XXVII.—Diurnal Inequality of

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1912.	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
April	− 6·7	− 3·0	− 12·2	− 21·5	− **23·7**	− 17·9	− 15·1	− 13·4	− 14·7	− 10·4	− 2·6	+ 5·5	+ 14·0
May	− 9·3	− 9·7	− 11·6	− 12·3	− 12·1	− **13·3**	− 11·6	− 11·4	− 9·3	− 3·6	− 3·0	+ 5·1	+ 7·8
June	− 7·1	− 10·9	− 13·1	− **13·7**	− 12·6	− 10·8	− 12·3	− 9·8	− 8·2	− 3·9	+ 1·7	+ 5·7	+ 10·1
July	− 9·3	− 10·4	− 12·7	− 13·0	− **13·4**	− 10·8	− 10·4	− 7·0	− 5·4	− 4·1	− 2·5	+ 2·8	+ 8·2
August	− 12·4	− 18·7	− 18·8	− 23·5	− **24·7**	− 18·6	− 18·3	− 12·6	− 5·1	− 2·1	− 0·1	+ 3·7	+ 10·3
September	− 6·1	− 16·2	− 24·6	− **29·0**	− 23·1	− 21·1	− 18·3	− 13·1	− 7·7	− 3·8	+ 4·6	+ 6·8	+ 10·1
October	− 11·1	− 20·9	− 16·1	− 25·9	− 28·0	− **29·1**	− 24·1	− 12·2	− 11·6	− 4·7	+ 4·7	+ 7·9	+ 18·4
November	+ 2·4	− 25·9	− 30·3	− **31·0**	− 22·2	− 27·1	− 25·3	− 18·0	− 13·1	− 9·2	− 2·6	+ 2·6	+ 10·2
1913.													
January	− 3·0	− 2·6	+ 1·1	+ 8·0	− 0·9	− 14·2	− 19·9	− 17·5	− **28·8**	− 16·7	− 12·7	− 1·1	+ 4·0
February	+ 0·8	− 6·9	− 3·1	− 16·5	− **18·3**	− 15·1	− 14·3	− 16·1	− 16·0	− 10·5	− 3·7	+ 2·0	+ 8·0
March	− 1·8	− 4·0	− 14·3	− **17·4**	− 16·9	− 14·3	− 16·5	− 14·2	− 9·1	− 4·5	+ 0·5	+ 2·9	+ 8·2
April	− 3·6	− 7·1	− 11·9	− 13·3	− 16·0	− **17·7**	− 13·1	− 8·4	− 4·7	− 3·5	− 0·6	+ 2·4	+ 9·7
May	− 4·6	− 6·8	− 10·1	− **15·8**	− 12·8	− 7·4	− 5·0	− 3·8	− 6·4	− 3·3	+ 0·3	+ 4·8	+ 4·4
June	− 4·9	− 8·7	− 8·1	− **11·0**	− 7·2	− 3·7	− 3·8	− 4·0	− 3·3	− 1·5	− 0·1	+ 2·4	+ 2·3
July	− 5·4	− 8·0	− 8·7	− **9·1**	− 8·2	− 5·5	− 4·1	− 4·4	− 4·2	− 1·2	+ 0·6	+ 1·9	+ 4·8
August	− 4·7	− **6·7**	− 4·4	− **6·7**	− 4·6	− 3·7	− 0·9	− 0·9	− 0·4	− 1·6	+ 0·1	+ 2·3	+ 3·9
Two Years.													
January	− 3·0	− 2·6	+ 1·1	+ 8·0	− 0·9	− 14·2	− 19·9	− 17·5	− **28·8**	− 16·7	− 12·7	− 1·1	+ 4·0
February	+ 0·8	− 6·9	− 3·1	− 16·5	− **18·3**	− 15·1	− 14·3	− 16·1	− 16·0	− 10·5	− 3·7	+ 2·0	+ 8·0
March	− 1·8	− 4·0	− 14·3	− **17·4**	− 16·9	− 14·3	− 16·5	− 14·2	− 9·1	− 4·5	+ 0·5	+ 2·9	+ 8·2
April	− 5·2	− 5·1	− 12·0	− 17·4	− **19·9**	− 17·8	− 14·1	− 10·9	− 9·7	− 7·0	− 1·6	+ 4·0	+ 11·9
May	− 7·0	− 8·3	− 10·9	− **14·0**	− 12·5	− 10·4	− 8·3	− 7·6	− 7·8	− 3·4	− 1·4	+ 5·0	+ 6·1
June	− 6·0	− 9·8	− 10·6	− **12·3**	− 9·9	− 7·2	− 8·0	− 6·9	− 5·7	− 2·7	− 0·8	+ 4·0	+ 6·2
July	− 7·3	− 9·2	− 10·7	− **11·0**	− 10·8	− 8·2	− 7·2	− 5·7	− 4·8	− 2·7	− 0·9	+ 2·3	+ 6·5
August	− 8·5	− 12·7	− 11·6	− **15·1**	− 14·6	− 11·1	− 9·6	− 6·7	− 2·7	− 1·8	0·0	+ 3·0	+ 7·1
September	− 6·1	− 16·2	− 24·6	− **29·0**	− 23·1	− 21·1	− 18·3	− 13·1	− 7·7	− 3·8	+ 4·6	+ 6·8	+ 10·1
October	− 11·1	− 20·9	− 16·1	− 25·9	− 28·0	− **29·1**	− 24·1	− 12·2	− 11·6	− 4·7	+ 4·7	+ 7·9	+ 18·4
November	+ 2·4	− 25·9	− 30·3	− **31·0**	− 22·2	− 27·1	− 25·3	− 18·0	− 13·1	− 9·2	− 2·6	+ 2·6	+ 10·2
11 months	− 4·8	− 11·1	− 13·0	− **16·5**	− 16·1	− 16·0	− 15·1	− 11·7	− 10·6	− 6·1	− 1·0	+ 3·6	+ 8·8
Year	− 4·4	− 11·1	− 12·8	− **16·2**	− 15·9	− **16·2**	− 15·4	− 12·2	− 11·4	− 6·6	− 1·6	+ 3·4	+ 8·7
Winter	− 7·2	− 10·0	− 10·9	− **13·1**	− 11·9	− 9·2	− 8·3	− 6·7	− 5·2	− 2·7	− 0·4	+ 3·6	+ 6·5
Equinox	− 6·0	− 11·5	− 16·7	− **22·4**	− 22·0	− 20·6	− 18·2	− 12·6	− 9·5	− 5·0	+ 2·1	+ 5·4	+ 12·2
Summer	+ 0·1	− 11·8	− 10·8	− 13·2	− 13·8	− 18·8	− **19·8**	− 17·2	− 19·3	− 12·1	− 6·3	+ 1·2	+ 7·4
Winter, 1912	− 9·5	− 12·4	− 14·0	− 15·6	− **15·7**	− 13·4	− 13·1	− 10·2	− 7·0	− 3·4	− 1·0	+ 4·3	+ 9·1
„ 1913	− 4·9	− 7·5	− 7·8	− **10·6**	− 8·2	− 5·1	− 3·4	− 3·3	− 3·6	− 1·9	+ 0·2	+ 2·9	+ 3·9
2nd Equinox	− 5·6	− 12·0	− 16·7	− **21·4**	− 21·0	− 20·5	− 18·0	− 12·0	− 8·3	− 4·1	+ 2·3	+ 5·0	+ 11·6

Horizontal Force. All Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	**1912.**
+ 14·7	+ 13·7	+ 14·1	+ 15·9	+ 14·4	+ 12·5	+ 11·5	+ 10·5	+ 4·9	+ 3·6	+ 5·9	39·6	11·77	April.
+ 11·1	+ 12·1	+ 12·0	+ 7·8	+ 10·1	+ 10·9	+ **12·6**	+ 9·4	+ 4·6	+ 3·3	+ 0·3	25·9	8·93	May.
+ 9·3	+ 10·3	+ **11·9**	+ 9·3	+ 8·9	+ 9·4	+ 9·8	+ 7·4	+ 7·7	+ 4·3	− 3·5	25·6	8·82	June.
+ 10·9	+ 10·7	+ 11·4	+ 10·0	+ **11·5**	+ 11·0	+ 9·7	+ 7·0	+ 7·3	+ 1·2	− 2·7	24·9	8·47	July.
+ 15·8	+ 16·9	+ 15·3	+ 17·3	+ 16·0	+ **17·5**	+ 14·6	+ 13·7	+ 11·3	+ 7·0	− 4·6	42·2	13·29	August.
+ 10·3	+ 12·9	+ 13·2	+ 12·9	+ 13·8	+ 12·8	+ 11·2	+ 14·6	+ 16·1	+ **17·0**	+ 6·7	46·0	13·58	September.
+ 15·4	+ 21·5	+ 17·8	+ 20·4	+ 18·2	+ **22·4**	+ 18·3	+ 15·8	+ 9·5	− 0·6	− 7·7	51·5	15·93	October.
+ 9·0	+ 16·3	+ 13·9	+ 13·2	+ 13·4	+ 19·9	+ 27·3	+ **30·4**	+ 25·0	+ 12·4	+ 8·5	61·4	17·05	November.
													1913.
+ 3·5	+ 11·9	+ 14·3	+ 14·9	+ 10·3	+ 4·7	+ 8·2	+ 7·5	+ **17·5**	+ 8·5	+ 2·5	46·3	9·76	January.
+ 13·7	+ 11·8	+ 10·0	+ 9·3	+ 4·7	+ 7·3	+ 13·3	+ **14·3**	+ 13·2	+ 5·6	+ 6·4	32·6	10·04	February.
+ 13·2	+ 10·1	+ 11·6	+ 9·1	+ 8·3	+ 8·5	+ 10·8	+ 10·3	+ 10·3	+ 7·0	+ 1·7	30·6	9·40	March.
+ 12·3	+ 13·1	+ 9·1	+ 9·7	+ 9·5	+ 9·1	+ 8·7	+ 6·0	+ 5·6	+ 4·8	− 0·3	30·8	8·34	April.
+ 5·0	+ 9·0	+ 4·7	+ 8·7	+ 8·7	+ 8·4	+ **9·5**	+ 4·6	+ 4·9	+ 4·2	− 1·2	25·3	6·43	May.
+ 6·2	+ **6·4**	+ 5·7	+ 5·5	+ 4·8	+ 5·6	+ 7·2	+ 5·1	+ 2·6	+ 2·6	− 0·2	17·4	4·70	June.
+ 5·8	+ 5·5	+ **8·4**	+ 8·0	+ 5·5	+ 4·1	+ 4·5	+ 4·8	+ 4·1	+ 1·4	− 0·5	17·5	4·95	July.
+ **5·7**	+ 2·9	+ 1·7	+ 2·4	+ 2·0	+ 3·0	+ 3·3	+ 3·4	+ 2·6	+ 1·0	− 1·4	12·4	2·93	August.
													Two Years.
+ 3·5	+ 11·9	+ 14·3	+ 14·9	+ 10·3	+ 4·7	+ 8·2	+ 7·5	+ **17·5**	+ 8·5	+ 2·5	46·3	9·76	January.
+ 13·7	+ 11·8	+ 10·0	+ 9·3	+ 4·7	+ 7·3	+ 13·3	+ **14·3**	+ 13·2	+ 5·6	+ 6·4	32·6	10·04	February.
+ **13·2**	+ 10·1	+ 11·6	+ 9·1	+ 8·3	+ 8·5	+ 10·8	+ 10·3	+ 10·3	+ 7·0	+ 1·7	30·6	9·40	March.
+ **13·5**	+ 13·4	+ 11·6	+ 12·8	+ 12·0	+ 10·8	+ 10·1	+ 8·3	+ 5·3	+ 4·2	+ 2·8	33·4	10·06	April.
+ 8·0	+ 10·6	+ 8·4	+ 8·3	+ 9·4	+ 9·7	+ **11·0**	+ 7·0	+ 4·8	+ 3·8	− 0·4	25·0	7·67	May.
+ 7·8	+ 8·4	+ **8·8**	+ 7·4	+ 6·8	+ 7·5	+ 8·5	+ 6·2	+ 5·1	+ 3·4	− 1·8	21·1	6·74	June.
+ 8·3	+ 8·1	+ **9·9**	+ 9·0	+ 8·5	+ 7·5	+ 7·1	+ 5·9	+ 5·7	+ 1·3	− 1·6	20·9	6·67	July.
+ **10·7**	+ 9·9	+ 8·5	+ 9·9	+ 9·0	+ 10·3	+ 8·9	+ 8·6	+ 6·9	+ 4·0	− 3·0	25·8	**8·09**	August.
+ 10·3	+ 12·9	+ **13·2**	+ **12·9**	+ 13·8	+ 12·8	+ 11·2	+ 14·6	+ 16·1	+ **17·0**	+ 6·7	46·0	**13·58**	September.
+ 15·4	+ 21·5	+ 17·8	+ 20·4	+ 18·2	+ **22·4**	+ 18·3	+ 15·8	+ 9·5	− 0·6	− 7·7	51·5	15·93	October.
+ 9·0	+ 16·3	+ 13·9	+ 13·2	+ 13·4	+ 19·9	+ 27·3	+ **30·4**	+ 25·0	+ 12·4	+ 8·5	61·4	17·05	November.
+ 10·3	+ **12·3**	+ 11·6	+ 11·6	+ 10·4	+ 11·0	+ 12·2	+ 11·7	+ 10·9	+ 6·1	+ 1·3	28·8	10·16	11 months.
+ 10·2	+ 12·3	+ 11·7	+ 11·6	+ 10·3	+ 11·0	+ **12·6**	+ 12·2	+ 11·5	+ 6·3	+ 1·7	28·8	10·30	Year.
+ 8·7	+ **9·2**	+ 8·9	+ 8·6	+ 8·4	+ 8·7	+ 8·9	+ 6·9	+ 5·6	+ 3·1	− 1·7	22·3	7·27	Winter.
+ 13·1	+ **14·5**	+ 13·6	+ 13·8	+ 13·1	+ 13·6	+ 12·6	+ 12·3	+ 10·3	+ 6·9	+ 0·9	36·9	12·40	Equinox.
+ 8·7	+ 13·3	+ 12·7	+ 12·5	+ 9·5	+ 10·6	+ 16·3	+ 17·4	+ **18·6**	+ 8·8	+ 5·8	38·4	11·92	Summer.
+ 11·8	+ 12·5	+ **12·6**	+ 11·1	+ 11·6	+ 12·2	+ 11·7	+ 9·4	+ 7·7	+ 3·9	− 2·6	28·3	9·83	Winter, 1912.
+ 5·7	+ 6·0	+ 5·1	+ **6·2**	+ 5·3	+ 5·3	+ 6·1	+ 4·5	+ 3·6	+ 2·3	− 0·8	16·8	4·76	„ 1913.
+ 12·8	+ **14·4**	+ 12·9	+ 13·0	+ 12·5	+ 13·2	+ 12·3	+ 11·7	+ 10·4	+ 7·1	+ 0·1	35·8	11·62	2nd Equinox.

TABLE XXVIII.—Diurnal Inequality of

Hour G.M.T.	1.	2	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1912.	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
April	− 4·0	− 9·0	− 4·0	− 5·6	− 5·8	− 5·2	− 9·2	− 4·6	− **9·4**	− 6·8	− 7·6	+ 2·2	+ 9·0
May	− 4·8	− 1·4	− **9·8**	− 3·8	− 3·6	− 7·0	− 7·8	− 4·2	− 6·8	− 2·4	+ 0·2	+ 2·8	+ 5·8
June	− 5·6	− 0·6	− 5·4	− 2·8	− 8·0	− **8·4**	− 3·6	+ 0·2	+ 0·4	+ 1·6	− 0·4	+ 2·8	+ 2·0
July...	− 2·4	+ 0·2	− 0·4	+ 0·6	− 1·8	− 2·4	− 5·8	− 4·8	− 2·0	− **6·6**	− 5·2	− 1·8	+ 2·8
August	+ 1·8	− 4·6	− 4·8	− 6·0	− 0·6	− 1·4	− **8·6**	− 3·4	− 2·2	− 1·0	− 2·6	− 2·2	+ 2·0
September	+ 3·8	− 1·4	+ 2·8	− **11·2**	− 5·6	− 4·8	− 7·4	− 7·6	− 6·4	− 6·8	− 1·6	− 3·8	− 2·4
October	+ 5·2	− 0·8	− 4·2	− 5·4	− 1·4	− 12·6	− **16·6**	− 5·2	− 7·0	− 3·6	+ 3·2	+ 2·0	+ 14·0
November	− 13·2	− 11·2	− 7·6	+ 1·4	+ 2·6	+ 2·4	− 4·0	+ 0·6	− 1·6	− 3·0	− 5·2	− 12·4	− 8·2
1913.													
January	− 19·2	− **27·8**	− 12·2	+ 7·6	+ 10·2	+ 1·0	− 6·6	− 12·6	− 14·2	− 16·4	− 16·8	− 10·8	− 5·8
February	− **17·4**	− 5·4	− 1·8	− 1·0	− 8·4	− 13·8	− 7·4	− 3·8	− 4·8	+ 0·2	− 0·4	+ 1·6	+ 5·4
March	− 3·8	− 2·4	− 4·6	− **9·4**	− 4·8	− 4·0	− 6·4	− 7·2	− 7·4	− 4·0	− 0·2	+ 5·4	+ 7·4
April	− 8·2	− 8·0	− 10·2	− 7·4	− 8·0	− **11·6**	− 9·6	− 6·4	− 4·8	− 4·4	− 1·0	+ 2·0	+ 4·2
May	− **5·0**	− 1·2	+ 0·2	− 3·6	− 1·2	0·0	− 1·4	− 1·8	− 1·0	− 2·6	+ 0·8	− 1·6	+ 1·2
June	− 2·2	− 4·0	− 4·6	− 6·0	− 1·2	− 2·6	− 3·0	− **6·4**	− 3·8	− 1·4	− 1·2	− 1·6	+ 2·2
July	− 3·8	− 4·6	− **5·2**	− 2·2	− 2·4	− 3·4	− 1·8	− 1·4	+ 0·6	+ 1·8	+ 2·4	+ 1·2	+ 0·4
Two Years.													
January	− 19·2	− **27·8**	− 12·2	+ 7·6	+ 10·2	+ 1·0	− 6·6	− 12·6	− 14·2	− 16·4	− 16·8	− 10·8	− 5·8
February	− **17·4**	− 5·4	− 1·8	− 1·0	− 8·4	− 13·8	− 7·4	− 3·8	− 4·8	+ 0·2	− 0·4	+ 1·6	+ 5·4
March	− 3·8	− 2·4	− 4·6	− **9·4**	− 4·8	− 4·0	− 6·4	− 7·2	− 7·4	− 4·0	− 0·2	+ 5·4	+ 7·4
April	− 6·1	− 8·5	− 7·1	− 6·5	− 6·9	− 8·4	− **9·4**	− 5·5	− 7·1	− 5·6	− 4·3	+ 2·1	+ 6·6
May	− **4·9**	− 1·3	− 4·8	− 3·7	− 2·4	− 3·5	− 4·6	− 3·0	− 3·9	− 2·5	+ 0·5	+ 0·6	+ 3·5
June	− 3·9	− 2·3	− 5·0	− 4·4	− 4·6	− **5·5**	− 3·3	− 3·1	− 1·7	+ 0·1	− 0·8	+ 0·6	+ 2·1
July	− 3·1	− 2·2	− 2·8	− 0·8	− 2·1	− 2·9	− **3·8**	− 3·1	− 0·7	− 2·4	− 1·4	− 0·3	+ 1·6
August	+ 1·8	− 4·6	− 4·8	− 6·0	− 0·6	− 1·4	− **8·6**	− 3·4	− 2·2	− 1·0	− 2·6	− 2·2	+ 2·0
September	+ 3·8	− 1·4	+ 2·8	− **11·2**	− 5·6	− 4·8	− 7·4	− 7·6	− 6·4	− 6·8	− 1·6	− 3·8	− 2·4
October	+ 5·2	− 0·8	− 4·2	− 5·4	− 1·4	− 12·6	− **16·6**	− 5·2	− 7·0	− 3·6	+ 3·2	+ 2·0	+ 14·0
November	− 13·2	− 11·2	− 7·6	+ 1·4	+ 2·6	+ 2·4	− 4·0	+ 0·6	− 1·6	− 3·0	− 5·2	− 12·4	− 8·2
11 months.	− 5·5	− 6·2	− 4·7	− 3·6	− 2·2	− 4·9	− **7·1**	− 4·9	− 5·2	− 4·1	− 2·7	− 1·6	+ 2·4
Year	− 6·4	− 6·9	− 4·9	− 3·1	− 1·9	− 4·7	− **7·0**	− 4·9	− 5·3	− 4·3	− 3·1	− 2·0	+ 1·9
Winter	− 2·5	− 2·6	− 4·4	− 3·7	− 2·4	− 3·3	− **5·1**	− 3·2	− 2·1	− 1·5	− 1·1	− 0·3	+ 2·3
Equinox	− 0·2	− 3·3	− 3·3	− 8·1	− 4·7	− 7·4	− **9·9**	− 6·4	− 7·0	− 5·0	− 0·7	+ 1·4	+ 6·4
Summer	− **16·6**	− 14·8	− 7·2	+ 2·7	+ 1·5	− 3·5	− 6·0	− 5·3	− 6·9	− 6·4	− 7·5	− 7·2	− 2·9
Winter, 1912	− 2·8	− 1·6	− 5·1	− 3·0	− 3·5	− 4·8	− **6·5**	− 3·1	− 2·7	− 2·1	− 2·0	+ 0·4	+ 3·1
„ 1913	− 3·7	− 3·3	− 3·2	− **3·9**	− 1·6	− 2·0	− 2·1	− 3·2	− 1·4	− 0·7	+ 0·7	− 0·7	+ 1·3
2nd Equinox	− 0·8	− 3·1	− 4·0	− 8·3	− 4·9	− 8·2	− **10·0**	− 6·6	− 6·4	− 4·7	+ 0·1	+ 1·4	+ 5·8

Horizontal Force. Quiet Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	**1912.**
+ **10·4**	+ 8·4	+ 9·0	+ 9·2	+ 9·4	+ 8·2	+ 8·4	+ 6·6	− 0·4	− 6·0	− 2·2	19·8	6·69	April.
+ **12·2**	+ 3·8	+ 5·4	+ 2·2	+ 1·0	+ 3·0	+ 4·8	+ 1·3	+ 5·0	+ 1·8	+ 0·6	22·0	4·24	May.
+ 1·2	+ **6·6**	+ 5·4	+ 2·8	+ 2·4	+ 4·0	+ 0·8	+ 4·0	+ 1·6	− 2·0	+ 0·8	15·0	3·06	June.
+ 4·2	+ 2·4	+ 2·2	+ 1·4	+ 2·6	+ 4·2	+ **4·4**	+ 3·8	+ 4·0	+ 1·0	+ 1·2	11·0	2·84	July.
+ 2·6	+ 4·6	+ 4·6	+ 3·2	+ **5·6**	+ 4·4	+ **5·6**	+ 1·6	+ 5·2	− 1·8	− 0·6	14·2	3·38	August.
− 1·4	− 1·6	− 3·0	− 0·6	− 3·4	+ 0·4	+ 2·8	+ 11·0	+ 17·0	+ 24·2	+ 4·8	35·4	5·66	September.
+ 12·8	+ **14·4**	+ 4·6	+ 8·4	+ 3·4	+ 4·4	+ 1·2	+ 2·4	− 1·0	− 9·4	− 9·4	31·0	6·36	October.
− 9·6	+ 2·4	+ 1·4	+ 3·2	+ 14·8	+ **22·0**	+ 21·2	+ 11·8	+ 16·8	− 7·0	− **18·2**	40·2	8·41	November.
													1913.
− 1·2	+ 13·8	+ 12·4	+ **18·2**	+ 16·0	+ 10·2	+ 8·8	+ 11·6	+ 9·8	+ 10·4	+ 12·0	46·0	11·90	January.
+ 10·2	+ 13·2	+ 9·2	+ 6·0	+ 7·0	+ 12·0	+ **16·0**	+ 10·4	− 1·0	− 9·0	− 15·4	33·4	7·53	February.
+ **10·8**	+ 8·4	+ 7·4	+ 9·4	+ 8·0	+ 6·6	+ 6·0	+ 0·8	− 3·0	− 6·4	− **6·0**	20·2	5·82	March.
+ 8·4	+ 6·4	+ 4·8	+ 6·8	+ 7·4	+ 8·4	+ 8·8	+ 9·4	+ **10·2**	+ 7·6	− **4·4**	21·8	7·02	April.
+ **3·6**	+ 1·8	+ 1·4	+ 1·2	+ 2·0	+ 1·8	+ 2·0	+ 1·2	+ 2·4	+ 1·0	− 2·0	8·6	1·75	May.
+ 4·8	+ 5·2	+ **5·4**	+ 3·6	+ 2·2	+ 2·4	+ 2·8	+ 3·6	+ 1·6	+ 3·6	+ 0·6	11·8	3·17	June.
+ **4·6**	+ 3·4	+ 2·2	+ 1·2	+ 2·4	+ 1·0	+ 1·8	+ 3·8	+ 0·6	− 2·0	− 1·8	9·8	2·33	July.
													Two Years.
− 1·2	+ 13·8	+ 12·4	+ **18·2**	+ 16·0	+ 10·2	+ 8·8	+ 11·6	+ 9·8	+ 10·4	+ 12·0	46·0	11·90	January
+ 10·2	+ 13·2	+ 9·2	+ 6·0	+ 7·0	+ 12·0	+ **16·0**	+ 10·4	− 1·0	− 9·0	− 15·4	33·4	7·53	February.
+ **10·8**	+ 8·4	+ 7·4	+ 9·4	+ 8·0	+ 6·6	+ 6·0	+ 0·8	− 3·0	− 6·4	− 6·0	20·2	5·82	March.
+ **9·4**	+ 7·4	+ 6·9	+ 8·0	+ 8·4	+ 8·3	+ 8·6	+ 8·0	+ 4·9	+ 0·8	− 3·3	18·8	6·59	April.
+ **7·9**	+ 2·8	+ 3·4	+ 1·7	+ 1·5	+ 2·4	+ 3·4	+ 1·4	+ 3·7	+ 1·4	− 0·7	12·8	2·90	May.
+ 3·0	+ **5·9**	+ 5·4	+ 3·2	+ 2·3	+ 3·2	+ 1·8	+ 3·8	+ 1·6	+ 0·8	+ 0·7	11·4	2·88	June.
+ **4·4**	+ 2·9	+ 2·2	+ 1·3	+ 2·5	+ 2·6	+ 3·1	+ 3·8	+ 2·3	− 0·5	− 0·3	8·2	2·21	July.
+ 2·6	+ 4·6	+ 4·6	+ 3·2	+ **5·6**	+ 4·4	+ **5·6**	+ 1·6	+ 5·2	− 1·8	− 0·6	14·2	3·38	August.
− 1·4	− 1·6	− 3·0	− 0·6	− 3·4	+ 0·4	+ 2·8	+ 11·0	+ 17·0	+ **24·2**	+ 4·8	35·4	5·66	September
+ 12·8	+ **14·4**	+ 4·6	+ 8·4	+ 3·4	+ 4·4	+ 1·2	+ 2·4	− 1·0	− 9·4	− 9·4	31·0	6·36	October.
− 9·6	+ 2·4	+ 1·4	+ 3·2	+ 14·8	+ **22·0**	+ 21·2	+ 11·8	+ 16·8	− 7·0	− **18·2**	40·2	8·41	November.
+ 4·4	+ 6·7	+ 5·0	+ 5·6	+ 6·0	+ 7·0	+ **7·1**	+ 6·1	+ 5·1	+ 0·3	− 3·3	14·2	4·65	11 months.
+ 4·1	+ 7·0	+ 5·2	+ 5·9	+ 6·6	+ 7·6	+ **7·8**	+ 6·5	+ 5·4	+ 0·1	− 3·6	14·8	4·80	Year.
+ **4·5**	+ 4·0	+ 3·9	+ 2·3	+ 3·0	+ 3·1	+ 3·5	+ 2·6	+ 3·2	0·0	− 0·2	9·6	2·70	Winter.
+ **7·9**	+ 7·2	+ 4·0	+ 6·3	+ 4·1	+ 4·9	+ 4·7	+ 5·6	+ 4·5	+ 2·3	− 3·5	17·8	4·95	Equinox.
− 0·2	+ 9·8	+ 7·7	+ 9·1	+ 12·6	+ 14·7	+ **15·3**	+ 11·3	+ 8·5	− 1·9	− 7·2	31·9	7·78	Summer.
+ **5·0**	+ **4·4**	+ 4·4	+ 2·4	+ 2·9	+ 3·9	+ 3·9	+ 2·7	+ 3·9	− 0·3	+ 0·5	11·5	3·13	Winter, 1912.
+ **4·3**	+ 3·5	+ 3·0	+ 2·0	+ 2·2	+ 1·7	+ 2·2	+ 2·9	+ 1·5	+ 0·9	− 1·1	8·2	2·21	„ 1913.
+ **7·7**	+ 6·9	+ 3·5	+ 6·0	+ 3·9	+ 5·0	+ 4·7	+ 5·9	+ 5·8	+ 4·0	− 3·7	17·7	5·06	2nd Equinox.

TABLE XXIX.—Diurnal Inequality of

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1912.	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
April	− 18·2	+ 5·4	− 14·4	− 39·8	− 44·2	− 37·4	− 42·4	− 43·6	**− 47·6**	− 21·0	+ 9·2	+ 15·8	+ 26·6
May	− 33·8	− 29·2	− 18·8	− 26·0	− 23·0	− 31·4	− 25·6	**− 40·0**	− 24·0	− 4·8	+ 4·0	+ 21·0	+ 16·4
June	− 6·4	**− 27·4**	− 22·4	− 24·2	− 26·8	− 19·6	− 24·6	− 22·2	− 21·2	− 4·8	+ 16·0	+ 11·8	+ 20·6
July	− 23·8	− 22·6	− 30·0	**− 38·8**	− 38·6	− 20·6	− 15·4	− 15·0	− 12·0	− 5·2	+ 0·4	− 1·8	+ 25·6
August	− 23·8	− 45·4	− 39·8	**− 57·0**	− 46·2	− 32·6	− 27·6	− 32·8	− 19·2	− 15·0	− 2·8	+ 7·2	+ 15·2
September	− 16·8	− 30·8	− 45·4	− 57·4	**− 61·8**	− 44·6	− 42·0	− 27·2	− 19·4	− 8·2	+ 9·0	+ 12·2	+ 17·0
October	− 20·6	− 33·4	− 25·0	− 37·6	− 61·6	**− 68·4**	− 53·4	− 40·8	− 33·4	− 6·8	+ 9·6	+ 23·4	+ 49·4
November	− 4·4	− 68·6	**− 88·2**	− 83·4	− 40·4	− 56·2	− 34·4	− 41·2	− 20·0	− 11·8	+ 3·6	+ 28·4	+ 38·0
1913.													
January	+ 3·2	− 5·6	− 12·8	+ 35·0	+ 5·8	− 34·4	− 41·4	− 26·8	**− 41·8**	− 15·4	− 11·8	+ 2·0	+ 8·4
February	+ 14·4	− 6·2	− 8·8	− 31·8	**− 50·6**	**− 50·6**	− 21·6	− 39·4	− 30·0	− 22·8	− 4·4	+ 11·6	+ 19·0
March	+ 12·8	− 1·0	− 22·0	**− 29·8**	− 12·8	− 8·8	− 22·4	− 19·2	− 16·0	− 7·4	+ 1·2	− 0·4	+ 4·8
April	+ 0·2	− 8·0	− 24·4	− 36·0	**− 37·8**	− 33·0	− 26·0	− 18·0	− 11·2	− 7·6	− 2·8	− 1·6	**+ 25·0**
May	− 12·8	− 16·0	− 29·4	**− 43·0**	− 30·4	− 16·0	− 10·2	− 6·2	− 21·0	− 5·8	+ 5·8	+ 17·4	+ 1·2
June	− 12·0	**− 23·2**	− 11·8	− 23·0	− 18·2	− 6·6	− 15·0	− 14·2	− 9·4	− 2·8	+ 2·4	+ 7·8	+ 11·8
July	− 12·4	− 15·4	− 15·2	**− 21·6**	− 20·0	− 8·0	− 8·4	− 12·4	− 15·0	− 4·0	+ 0·8	+ 2·0	+ 8·2
Two Years.													
January	+ 3·2	− 5·6	− 12·8	+ 35·0	+ 5·8	− 34·4	− 41·4	− 26·8	**− 41·8**	− 15·4	− 11·8	+ 2·0	+ 8·4
February	+ 14·4	− 6·2	− 8·8	− 31·8	**− 50·6**	**− 50·6**	− 21·6	− 39·4	− 30·0	− 22·8	− 4·4	+ 11·6	+ 19·0
March	+ 12·8	− 1·0	− 22·0	**− 29·8**	− 12·8	− 8·8	− 22·4	− 19·2	− 16·0	− 7·4	+ 1·2	− 0·4	+ 4·8
April	− 9·0	− 1·3	− 19·4	− 37·9	**− 41·0**	− 35·2	− 34·2	− 30·8	− 29·4	− 14·3	+ 3·4	+ 7·1	+ 25·8
May	− 23·3	− 22·6	− 24·1	**− 34·5**	− 26·7	− 23·7	− 17·9	− 23·1	− 22·5	− 5·3	+ 4·9	+ 19·2	+ 8·8
June	− 9·2	**− 25·3**	− 17·1	− 23·6	− 22·5	− 13·1	− 19·8	− 18·2	− 15·3	− 3·8	+ 9·2	+ 9·8	+ 16·2
July	− 18·1	− 19·0	− 22·6	**− 30·2**	− 29·3	− 14·3	− 11·9	− 13·7	− 13·5	− 4·6	+ 0·6	+ 0·1	+ 16·9
August	− 23·8	− 45·4	− 39·8	**− 57·0**	− 46·2	− 32·6	− 27·6	− 32·8	− 19·2	− 15·0	− 2·8	+ 7·2	+ 15·2
September	− 16·8	− 30·8	− 45·4	− 57·4	**− 61·8**	− 44·6	− 42·0	− 27·2	− 19·4	− 8·2	+ 9·0	+ 12·2	+ 17·0
October	− 20·6	− 33·4	− 25·0	− 37·6	− 61·6	**− 68·4**	− 53·4	− 40·8	− 33·4	− 6·8	+ 9·6	+ 23·4	+ 49·4
November	− 4·4	− 68·6	**− 88·2**	− 83·4	− 40·4	− 56·2	− 34·4	− 41·2	− 20·0	− 11·8	+ 3·6	+ 28·4	+ 38·0
11 months	− 8·6	− 23·6	− 29·6	**− 35·3**	− 35·2	− 34·7	− 29·7	− 28·5	− 23·7	− 10·5	+ 2·0	+ 11·0	+ 20·0
Year	− 7·5	− 23·8	− 30·2	− 34·6	− 34·6	**− 35·8**	− 29·9	− 29·1	− 24·3	− 11·0	+ 1·5	+ 11·2	+ 20·1
Winter	− 18·6	− 28·1	− 25·9	**− 36·3**	− 31·2	− 20·9	− 19·3	− 21·9	− 17·6	− 7·2	+ 3·0	+ 9·1	+ 14·3
Equinox	− 8·4	− 16·6	− 28·0	− 40·7	**− 44·3**	− 39·2	− 38·0	− 29·5	− 24·6	− 9·2	+ 5·8	+ 10·6	+ 24·2
Summer	+ 4·4	− 26·8	− 36·6	− 26·7	− 28·4	**− 47·1**	− 32·5	− 35·8	− 30·6	− 16·7	− 4·2	+ 14·0	+ 21·8
Winter, 1912	− 22·0	− 31·2	− 27·7	**− 36·5**	− 33·7	− 26·0	− 23·3	− 27·4	− 19·0	− 7·5	+ 4·4	+ 9·6	+ 19·4
„ 1913	− 12·4	− 18·2	− 18·8	**− 29·2**	− 22·9	− 10·2	− 11·2	− 10·9	− 15·1	− 4·2	+ 3·0	+ 9·1	+ 7·1
2nd Equinox	− 6·1	− 18·3	− 29·2	− 40·2	**− 43.5**	− 38·7	− 36·0	− 26·3	− 20·0	− 7·5	+ 4·3	+ 8·4	+ 24·1

Horizontal Force. Disturbed Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	**1912.**
+ 33·0	+ 33·0	+ 32·0	+ **35·4**	+ 25·0	+ 32·4	+ 20·4	+ 17·6	+ 16·2	+ 5·6	+ 1·6	83·0	25·74	April.
+ 20·8	+ 18·4	+ 25·0	+ 21·2	+ 27·6	+ 26·0	+ **41·2**	+ 28·0	− 3·4	+ 5·4	+ 4·2	81·2	21·63	May.
+ 18·2	+ 16·8	+ **23·0**	+ 20·6	+ 22·4	+ 18·2	+ 22·6	+ 8·4	+ 12·2	+ 3·4	− 15·2	50·4	17·88	June.
+ 25·8	+ 19·0	+ 20·4	+ 27·4	+ **32·0**	+ 28·8	+ 22·4	+ 22·4	+ 15·4	+ 3·6	− 17·6	70·8	20·19	July.
+ 29·8	+ **45·2**	+ 32·6	+ 37·6	+ 38·2	+ 44·8	+ 34·6	+ 25·8	+ 19·2	+ 25·8	− 14·0	102·2	29·67	August.
+ 24·8	+ 32·8	+ 28·4	+ 33·4	+ **41·0**	+ 25·4	+ 28·8	+ 24·6	+ 25·0	+ 16·4	+ 34·8	102·8	29·47	September.
+ 40·0	+ 49·8	+ 52·2	+ **52·8**	+ 41·2	+ 45·0	+ 26·6	+ 24·6	− 1·6	− 11·2	− 21·8	121·2	34·59	October.
+ 43·8	+ 53·0	+ 46·8	+ 24·8	+ 15·2	+ 17·0	+ 37·4	+ **59·4**	+ 24·2	+ 18·8	+ 38·4	147·6	37·39	November.
													1913.
+ 2·9	+ 9·6	+ 16·4	+ 17·8	+ 8·0	+ 2·6	+ 12·0	+ 16·8	+ **53·0**	− 3·0	+ 0·8	94·8	16·14	January.
+ 46·0	+ 25·4	+ 6·6	+ 1·6	+ 3·0	+ 7·0	+ 11·8	+ 12·4	+ 27·0	+ 31·4	+ **50·2**	100·8	22·23	February.
+ 16·6	+ 4·4	+ 17·4	+ 10·0	+ 8·4	+ 9·2	+ 14·0	+ 7·4	+ 9·4	+ 6·2	+ **18·6**	48·4	11·68	March.
+ 16·8	+ **32·6**	+ 21·2	+ 23·0	+ 20·6	+ 22·2	+ 19·0	+ 11·4	+ 6·6	+ 6·8	+ 0·6	62·8	17·18	April.
+ 4·2	+ **31·0**	+ 2·8	+ 24·6	+ 26·8	+ 25·4	+ 28·0	+ 10·8	+ 12·4	+ 11·8	− 10·6	74·0	16·82	May.
+ **21·8**	+ 13·0	+ 12·2	+ 12·4	+ 10·8	+ 12·0	+ 16·8	+ 10·8	− 1·0	+ 5·2	− 1·4	45·0	11·48	June.
+ 7·4	+ 16·8	+ 18·0	+ **21·0**	+ 18·4	+ 11·8	+ 9·8	+ 11·6	+ 11·6	+ 2·2	− 2·8	42·6	11·24	July.
													Two Years.
+ 2·9	+ 9·6	+ 16·4	+ 17·8	+ 8·0	+ 2·6	+ 12·0	+ 16·8	+ **53·0**	− 3·0	+ 0·8	94·8	16·14	January.
+ 46·0	+ 25·4	+ 6·6	+ 1·6	+ 3·0	+ 7·0	+ 11·8	+ 12·4	+ 27·0	+ 31·4	+ **50·2**	100·8	22·23	February.
+ 16·6	+ 4·4	+ 17·4	+ 10·0	+ 8·4	+ 9·2	+ 14·0	+ 7·4	+ 9·4	+ 6·2	+ **18·6**	48·4	11·68	March.
+ 24·9	+ **32·8**	+ 26·6	+ 29·2	+ 22·8	+ 27·3	+ 19·7	+ 14·5	+ 11·4	+ 6·2	+ 1·1	73·8	21·05	April.
+ 12·5	+ 24·7	+ 13·9	+ 22·9	+ 27·2	+ 25·7	+ **34·6**	+ 19·4	+ 4·5	+ 8·6	− 3·2	69·1	18·91	May.
+ **20·0**	+ 14·9	+ 17·6	+ 16·5	+ 16·6	+ 15·1	+ 19·7	+ 9·6	+ 5·6	+ 4·3	− 8·3	45·3	14·64	June.
+ 16·6	+ 17·9	+ 19·2	+ **24·2**	+ 22·7	+ 20·3	+ 16·1	+ 17·0	+ 13·5	+ 2·9	− 10·2	54·4	15·64	July.
+ 29·8	+ **45·2**	+ 32·6	+ 37·6	+ 38·2	+ 44·8	+ 34·6	+ 25·8	+ 19·2	+ 25·8	− 14·0	102·2	29·67	August.
+ 24·8	+ 32·8	+ 28·4	+ 33·4	+ **41·0**	+ 25·4	+ 28·8	+ 24·6	+ 25·0	+ 16·4	+ 34·8	102·8	29·47	September.
+ 40·0	+ 49·8	+ 52·2	+ **52·8**	+ 41·2	+ 45·0	+ 26·6	+ 24·6	− 1·6	− 11·2	− 21·8	121·2	34·59	October.
+ 43·8	+ 53·0	+ 46·8	+ 24·8	+ 15·2	+ 17·0	+ 37·4	+ **59·4**	+ 24·2	+ 18·8	+ 38·4	147·6	37·39	November.
+ 25·3	+ **28·2**	+ 25·2	+ 24·6	+ 22·2	+ 21·8	+ 23·2	+ 21·0	+ 17·4	+ 9·7	+ 7·9	63·5	21·62	11 months.
+ 25·7	+ **28·3**	+ 25·1	+ 23·8	+ 21·1	+ 20·7	+ 23·0	+ 21·7	+ 18·8	+ 10·2	+ 9·7	64·1	21·74	Year.
+ 19·7	+ 25·7	+ 20·8	+ 25·3	+ 26·2	+ **26·5**	+ 26·2	+ 18·0	+ 10·7	+ 10·4	− 8·9	62·8	19·66	Winter.
+ 26·6	+ 30·0	+ 31·2	+ **31·4**	+ 28·3	+ 26·7	+ 22·3	+ 17·8	+ 11·0	+ 4·4	+ 8·2	75·7	23·21	Equinox.
+ 30·9	+ 29·3	+ 23·3	+ 14·7	+ 8·7	+ 8·9	+ 20·4	+ 29·5	+ **34·7**	+ 15·7	+ 29·8	81·8	23·81	Summer.
+ 23·7	+ 24·8	+ 25·2	+ 26·7	+ 30·0	+ 29·5	+ **30·2**	+ 21·1	+ 10·9	+ 9·5	− 10·7	66·7	22·08	Winter. 1912.
+ 11·1	+ **20·3**	+ 11·0	+ 19·3	+ 17·0	+ 16·4	+ 18·2	+ 11·1	+ 7·7	+ 6·4	− 4·9	49·5	13·15	,, 1913.
+ 24·6	+ **29·9**	+ 29·8	+ 29·8	+ 27·8	+ 25·5	+ 22·1	+ 17·0	+ 9·9	+ 4·6	+ 8·0	73·4	22·15	2nd Equinox.

Section 8.—*Vertical Force.* — The minimum in Table XXX appears at 13h. in all the seasonal inequalities, except winter 1912, and in ten of the individual months. In January the value at 15h. is a shade smaller than that at 14h. With this exception the minimum when not at 13h. appears at 12h. or 14h. As with H, the time of maximum, or principal maximum, varies more. In the inequalities for the year, equinox and summer it appears at 5 h. or 6 h., but in the inequalities for the winter season it appears at midnight or 1 h. Many of the individual months as well as the seasons show two maxima, one before, the other after midnight. Plate XIV shows the pre-midnight maximum pre-eminent in winter, while the early morning maximum is slightly the higher in equinox and much the higher in summer. But in all the curves the depression after midnight between the two maxima is trifling compared with that occurring near 14h. L.M.T. (3h. to 4h. G.M.T.).

A decline in amplitude in 1913 as compared with 1912 is conspicuous, especially in the winter months. But for the similar phenomenon described in D and H, this might have been suspected to be a consequence of the defective action of the V magnetograph in 1913. The close similarity in type of the inequalities for winter 1912 and winter 1913, is, however, independent testimony to the substantial accuracy of the results for the later year.

The seasonal variation in the amplitude of the V inequality is similar to that exhibited by D and H. In the results from 1912 and 1913 combined, the smallest range and A.D. appear in June in both Tables XXX and XXXI. There is a regular progression in the amplitudes, except that August falls slightly short of July. This may reasonably be ascribed to August, 1913, being represented by only a few days, of less than average disturbance, belonging to the beginning of the month. The excess of the amplitude, whether range or A.D., in the summer over the equinoctial season is as prominent as with D, in spite of December not being represented.

The quiet day V inequalities in Table XXXII show similar phenomena to the all day inequalities in Table XXXI, and the two sets of seasonal curves in Plate XIV have a strong family resemblance. It seems in considerable measure accidental which of the two maxima usually apparent is the principal one. Thus, in 1912, the maxima in April and May at 13h. and 14h. (G.M.T.) respectively are much more prominent that the subsequent maxima at 17h. or 18h. But in 1913 the principal maximum is seen at 19h. in both these months. In July the exact opposite occurs, the principal maximum appearing at 13h. G.M.T. in 1913, but at 21h. in 1912. As with D and H, the decline in amplitude in 1913 as compared with 1912 is not so persistently visible in quiet days as in all days. It is clearly apparent in the May and July quiet day inequalities, but the excess of April, 1912, over April, 1913, is not large, and the range and A.D. are both slightly larger in June, 1913, than in June, 1912. Another difference is that in Table XXXII the January range and A.D. are considerably in excess of those for November, while in Table XXXI it is the other way about. This may be partly due to the character figure of the January quiet days being considerably higher than that of the November quiet days. But the July, 1913, quiet days have as large a mean character figure as the January quiet days, and the July amplitude is very low.

The seasonal variation in amplitude is very prominent in the quiet day inequalities from the two years combined. The three midwinter months May, June and July have nearly equal amplitudes. The marked rise in August is partly due to August, 1913, not being represented. In the matter of amplitude equinox comes nearer to winter than to summer.

In the case of the disturbed days in Table XXXIII the minimum occurs at 3h. or 4h. in 10 of the individual months and in all the seasonal inequalities, except winter 1912, when it occurs at 2h. The hour of the principal maximum is less variable than in the quiet days or even the all days inequalities. It is 14h. G.M.T. in the inequalities for the year and for summer, as well as for winter 1913 and the first combination of equinoctial months. In some individual months, including March, 1913, and May of both years, there are two prominent maxima, a few hours apart, but in the seasonal inequalities illustrated in Plate XIV the principal maximum appears near local midnight. Following this maximum there is a rather well-marked depression in the summer curve, but the second maximum is considerably smaller than the first, instead of being the larger as in all and quiet days.

The reduction in amplitude in 1913 as compared with 1912 is shown in all months in Table XXXIII, especially in June and July. The seasonal influence on the amplitude is fairly well shown in the inequalities from the two years combined, but May, June and July, 1912, and May, 1913, show larger ranges and A.D.s than January, 1913. The November range and A.D. are much in excess of those for January. This phenomenon also appeared in all days, but less prominently. For the ratio of the summer to the winter amplitude we have from Tables XXXI, XXXII and XXXIII—

	Range.	A.D.
Quiet days	2·9	2·9
All days	2·2	2·4
Disturbed days	1·6	1·3

Thus in V, as in D and H, the ratio of the amplitude—whether measured by the range or A.D.—of the summer to the winter inequality is much greater for quiet days and considerably less for disturbed days than it is for all days. In other words, the ratio of the summer to the winter amplitude diminishes as disturbance increases in the days from which the inequalities are calculated. Disturbance in winter plays apparently a rôle which in summer can be played by solar radiation in the absence of disturbance.

TABLE XXX.—Diurnal Inequality of

Hour L.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.	13.
1912.	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
April	+ 18·6	+ 21·0	+ 19·0	+ 15·8	+ 15·5	+ 8·4	+ 9·1	− 0·1	− 8·7	− 13·7	− 27·6	− 37·6	− 47·3
May	+ 14·5	+ 15·4	+ 12·3	+ 12·9	+ 11·8	+ 11·2	+ 9·9	+ 3·0	− 8·6	− 19·2	− 27·2	− 27·1	− 29·6
June	+ 24·5	+ 12·6	+ 7·1	+ 6·6	+ 7·7	+ 4·6	+ 7·5	+ 2·3	− 10·4	− 16·3	− 18·9	− 21·4	− 17·7
July.	+ 23·1	+ 17·4	+ 11·5	+ 14·5	+ 11·1	+ 12·0	+ 8·3	+ 3·3	− 4·5	− 18·0	− 23·6	− 31·6	− 26·9
August	+ 21·2	+ 16·1	+ 14·1	+ 17·4	+ 14·7	+ 16·8	+ 22·0	+ 8·3	+ 2·5	− 12·4	− 19·7	− 35·5	− 37·2
September	+ 10·5	+ 9·2	+ 9·2	+ 15·5	+ 16·8	+ 18·0	+ 22·7	+ 15·1	+ 2·8	− 6·8	− 22·1	− 34·9	− 38·3
October	+ 19·2	+ 17·7	+ 17·7	+ 24·5	+ 32·4	+ 26·9	+ 26·7	+ 20·0	+ 5·0	− 13·8	− 30·2	− 52·1	− 57·4
November	+ 21·1	+ 20·5	+ 25·0	+ 34·6	+ 41·7	+ 43·7	+ 34·3	+ 31·6	+ 14·1	− 5·2	− 44·3	− 72·3	− 68·4
1913.													
January	+ 20·0	+ 19·5	+ 18·4	+ 24·0	+ 31·5	+ 30·9	+ 35·1	+ 22·1	+ 14·4	− 0·6	− 15·4	− 32·0	− 48·1
February	+ 17·0	+ 20·0	+ 19·0	+ 22·7	+ 25·4	+ 26·5	+ 27·8	+ 21·1	+ 12·1	+ 4·0	− 16·7	− 39·2	− 49·6
March	+ 17·8	+ 17·8	+ 21·9	+ 20·4	+ 21·2	+ 20·5	+ 15·2	+ 15·8	+ 4·0	− 8·8	− 20·3	− 35·5	− 43·2
April......	+ 18·7	+ 17·4	+ 16·2	+ 14·7	+ 12·2	+ 8·3	+ 11·2	+ 5·0	− 3·6	− 11·9	− 15·4	− 22·2	− 32·3
May	+ 14·3	+ 17·1	+ 12·2	+ 12·8	+ 10·5	+ 11·6	+ 6·0	+ 2·9	− 8·4	− 11·2	− 18·1	− 22·5	− 23·6
June	+ 10·7	+ 8·7	+ 7·4	+ 5·5	+ 7·7	+ 5·2	+ 3·0	+ 1·7	− 3·8	− 10·9	− 12·9	− 17·5	− 16·0
July.	+ 11·9	+ 8·9	+ 8·1	+ 10·0	+ 8·4	+ 10·0	+ 7·9	+ 3·2	− 0·6	− 5·1	− 10·7	− 14·1	− 16·5
August	+ 11·6	+ 11·0	+ 12·0	+ 11·4	+ 12·0	+ 9·6	+ 6·6	+ 4·6	− 0·2	− 4·8	− 4·0	− 10·0	− 12·6
Two Years.													
January	+ 20·0	+ 19·5	+ 18·4	+ 24·0	+ 31·5	+ 30·9	+ 35·1	+ 22·1	+ 14·4	− 0·6	− 15·4	− 32·0	− 48·1
February	+ 17·0	+ 20·0	+ 19·0	+ 22·7	+ 25·4	+ 26·5	+ 27·8	+ 21·1	+ 12·1	+ 4·0	− 16·7	− 39·2	− 49·6
March	+ 17·8	+ 17·8	+ 21·9	+ 20·4	+ 21·2	+ 20·5	+ 15·2	+ 15·8	+ 4·0	− 8·8	− 20·3	− 35·5	− 43·2
April	+ 18·6	+ 19·2	+ 17·6	+ 15·2	+ 13·8	+ 8·4	+ 10·1	+ 2·4	− 6·2	− 12·8	− 21·5	− 29·9	− 39·8
May	+ 14·4	+ 16·2	+ 12·3	+ 12·8	+ 11·2	+ 11·4	+ 8·0	+ 3·0	− 8·5	− 15·2	− 22·7	− 24·8	− 26·6
June	+ 17·6	+ 10·7	+ 7·2	+ 6·1	+ 7·7	+ 4·9	+ 5·2	+ 2·0	− 7·1	− 13·6	− 15·9	− 19·4	− 16·9
July	+ 17·5	+ 13·1	+ 9·8	+ 12·2	+ 9·8	+ 11·0	+ 8·1	+ 3·2	− 2·6	− 11·5	− 17·2	− 22·8	− 21·7
August	+ 16·4	+ 13·5	+ 13·0	+ 14·4	+ 13·3	+ 13·2	+ 14·3	+ 6·4	+ 1·1	− 8·6	− 11·9	− 22·8	− 24·9
September	+ 10·5	+ 9·2	+ 9·2	+ 15·5	+ 16·8	+ 18·0	+ 22·7	+ 15·1	+ 2·8	− 6·8	− 22·1	− 34·9	− 38·3
October	+ 19·2	+ 17·7	+ 17·7	+ 24·5	+ 32·4	+ 26·9	+ 26·7	+ 20·0	+ 5·0	− 13·8	− 30·2	− 52·1	− 57·4
November	+ 21·1	+ 20·5	+ 25·0	+ 34·6	+ 41·7	+ 43·7	+ 34·3	+ 31·6	+ 14·1	− 5·2	− 44·3	− 72·3	− 68·4
11 months	+ 17·3	+ 16·1	+ 15·6	+ 18·4	+ 20·4	+ 19·6	+ 18·9	+ 13·0	+ 2·6	− 8·4	− 21·7	− 35·1	− 39·5
Year.......	+ 17·5	+ 16·4	+ 16·0	+ 19·1	+ 21·5	+ 20·8	+ 20·0	+ 14·0	+ 3·6	− 7·8	− 22·0	− 36·1	− 40·9
Winter	+ 16·5	+ 13·4	+ 10·6	+ 11·4	+ 10·5	+ 10·1	+ 8·9	+ 3·6	− 4·3	− 12·2	− 16·9	− 22·4	− 22·5
Equinox	+ 16·5	+ 16·0	+ 16·6	+ 18·9	+ 21·0	+ 18·5	+ 18·7	+ 13·3	+ 1·4	− 10·5	− 23·5	− 38·1	− 44·7
Summer	+ 19·4	+ 20·0	+ 20·8	+ 27·1	+ 32·9	+ 33·7	+ 32·4	+ 24·9	+ 13·5	− 0·6	− 25·5	− 47·8	− 55·4
Winter, 1912	+ 20·8	+ 15·4	+ 11·3	+ 12·9	+ 11·3	+ 11·2	+ 11·9	+ 4·2	− 5·3	− 16·5	− 22·4	− 28·9	− 27·9
,, 1913	+ 12·1	+ 11·4	+ 9·9	+ 9·9	+ 9·6	+ 9·1	+ 5·9	+ 3·1	− 3·3	− 8·0	− 11·4	− 16·0	− 17·2
2nd Equinox	+ 16·5	+ 15·5	+ 16·2	+ 18·8	+ 20·6	+ 18·4	+ 19·0	+ 14·0	+ 2·0	− 10·3	− 22·0	− 36·2	− 42·8

Vertical Force. All Days. L.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour L.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	**1912.**
− 44·1	− 34·4	− 16·0	− 0·6	+ 6·3	+ 8·7	+ 18·0	+ 25·5	+ **25·7**	+ 22·8	+ 15·7	73·0	19·17	April.
− 27·0	− 20·1	− 11·3	− 7·5	− 1·2	+ 2·4	+ 7·2	+ 20·8	+ **25·6**	+ 16·3	+ 15·4	55·2	14·90	May.
− 20·3	− 16·1	− 12·3	− 9·2	− 6·2	− 3·7	+ 1·1	+ 9·0	+ 22·9	+ 21·4	+ **25·4**	46·8	12·72	June.
− 29·2	− 18·9	− 10·0	− 10·7	− 4·1	− 0·9	+ 4·7	+ 11·8	+ 12·2	+ 21·8	+ **27·0**	58·6	14·88	July.
− 35·4	− 26·8	− 15·6	− 9·7	− 2·1	+ 1·7	+ 5·2	+ 11·8	+ 14·5	+ 12·8	+ 15·3	59·2	16·20	August.
− 33·9	− 25·9	− 16·9	− 7·3	− 0·3	+ 5·0	+ 9·4	+ 18·1	+ 15·2	+ 10·2	+ 9·0	61·0	15·55	September.
− 50·4	− 39·0	− 20·2	− 14·1	− 7·7	+ 6·0	+ 11·8	+ 19·0	+ 19·2	+ 22·4	+ 16·4	89·8	23·74	October.
− 59·3	− 44·5	− 22·7	− 17·4	− 5·4	− 3·5	+ 4·1	+ 8·7	+ 19·4	+ 24·1	+ 20·0	116·0	28·58	November.
													1913.
− 50·0	− **50·5**	− 36·4	− 25·6	− 17·9	− 10·5	+ 0·8	+ 10·9	+ 18·1	+ 20·0	+ 21·0	85·6	23·90	January.
− **51·6**	− 41·3	− 31·9	− 22·7	− 13·6	− 6·7	+ 1·4	+ 10·0	+ 16·3	+ 24·5	+ 24·9	79·4	22·75	February.
− 40·2	− 37·7	− 27·0	− 18·9	− 5·0	+ 3·9	+ 7·4	+ 15·9	+ 10·5	+ 19·8	+ **24·3**	67·5	19·71	March.
− 29·4	− 23·0	− 14·6	− 8·9	− 1·6	+ 1·0	+ 3·8	+ 6·5	+ 12·9	+ **19·0**	+ 16·6	51 3	13·60	April.
− 21·3	− 13·9	− 9·0	− 6·8	− 5·0	− 1·3	+ 2·9	+ 5·0	+ 13·2	+ 16·0	+ 16·6	40·7	11·76	May.
− 14·0	− 6·6	− 5·8	− 4·2	− 1·7	− 0·5	+ 2·7	+ 4·9	+ 10·8	+ **12·8**	+ 12·7	30·3	7·82	June.
− 14·8	− 13·1	− 8·2	− 7·8	− 4·9	− 2·9	+ 0·6	+ 1·7	+ 4·2	+ **12·6**	+ 11·1	29·1	8·22	July.
− 11·8	− 6·4	− 4·6	− 4·4	− 5·0	− 5·2	− 6·4	− 5·4	− 5·4	− 3·0	+ **12·0**	24·6	7·50	August.
													Two Years.
− 50·0	− **50·5**	− 36·4	− 25·6	− 17·9	− 10·5	+ 0·8	+ 10·9	+ 18·1	+ 20·0	+ 21·0	85·6	23·90	January.
− **51·6**	− 41·3	− 31·9	− 22·7	− 13·6	− 6·7	+ 1·4	+ 10·0	+ 16·3	+ 24·5	+ 24·9	79·4	22·75	February.
− 40·2	− 37·7	− 27·0	− 18·9	− 5·0	+ 3·9	+ 7·4	+ 15·9	+ 10·5	+ 19·8	+ **24·3**	67·5	19·71	March.
− 36·8	− 28·7	− 15·3	− 4·8	+ 2·3	+ 4·9	+ 10·9	+ 16·0	+ 19·3	+ **20·9**	+ 16·2	60·7	16·32	April.
− 24·1	− 17·0	− 10·2	− 7·1	− 3·1	+ 0·5	+ 5·0	+ 12·9	+ **19·4**	+ 16·2	+ 16·0	46·0	13·27	May.
− 17·1	− 11·4	− 9·0	− 6·7	− 4·0	− 2·1	+ 1·9	+ 7·0	+ 16·8	+ 17·1	+ **19·0**	38·4	10·27	June.
− 22·0	− 16·0	− 9·1	− 9·2	− 4·5	− 1·9	+ 2·7	+ 6·7	+ 8·2	+ 17·2	+ **19·0**	41·8	11·54	July.
− 23·6	− 16·6	− 10·1	− 7·1	− 3·6	− 1·8	− 0·6	+ 3·2	+ 4·5	+ 4·9	+ 13·6	41·3	10·98	August.
− 33·9	− 25·9	− 16·9	− 7·3	− 0·3	+ 5·0	+ 9·4	+ 18·1	+ 15·2	+ 10·2	+ 9·0	61·0	15·55	September.
− 50·4	− 39·0	− 20·2	− 14·1	− 7·7	+ 6·0	+ 11·8	+ 19·0	+ 19·2	+ 22·4	+ 16·4	89·8	23·74	October.
− 59·3	− 44·5	− 22·7	− 17·4	− 5·4	− 3·5	+ 4·1	+ 8·7	+ 19·4	+ 24·1	+ 20·0	116·0	28·58	November.
− 37·2	− 29·9	− 19·0	− 12·8	− 5·7	− 0·6	+ 5·0	+ 11·7	+ 15·2	+ 17·9	+ 18·1	59·9	17·49	11 months.
− 38·6	− 31·2	− 19·9	− 13·6	− 6·3	− 1·1	+ 4·7	+ 11·5	+ 15·4	+ 18·3	+ 18·5	62·4	18·12	Year.
− 21·7	− 15·3	− 9·6	− 7·5	− 3·8	− 1·3	+ 2·2	+ 7·4	+ 12·2	+ 13·8	+ **16·9**	39·4	11·46	Winter.
− 40·3	− 32·8	− 19·9	− 11·3	− 2·7	+ 5·0	+ 9·9	+ 17·2	+ 16·0	+ 18·3	+ 16·5	65·7	18·65	Equinox.
− 53·6	− 45·4	− 30·3	− 21·9	− 12·3	− 6·9	+ 2·1	+ 9·9	+ 17·9	+ 22·9	+ 22·0	89·1	24·97	Summer.
− 28·0	− 20·5	− 12·3	− 9·3	− 3·4	− 0·1	+ 4·6	+ 13·3	+ 18·8	+ 18·1	+ **20·8**	49·7	14·54	Winter, 1912.
− 15·5	− 10·0	− 6·9	− 5·8	− 4·2	− 2·5	− 0·1	+ 1·5	+ 5·7	+ 9·6	+ **13·1**	30·3	8·41	" 1913.
− 38·5	− 31·4	− 19·7	− 12·3	− 3·7	+ 4·0	+ 8·1	+ 14·9	+ 14·5	+ 17·8	+ 16·6	63·4	18·08	2nd Equinox.

TABLE. XXXI.—Diurnal Inequality of

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1912.	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
April	− 14·5	− 30·4	**− 45·5**	− 42·5	− 37·1	− 27·8	− 1·5	+ 3·2	+ 7·9	+ 7·4	+ 23·5	**+ 25·8**	+ 24·2
May	− 23·3	− 27·6	**− 30·5**	− 27·2	− 26·5	− 14·2	− 8·7	− 5·3	+ 0·9	+ 5·2	+ 11·7	**+ 26·0**	+ 19·9
June	− 16·6	**− 21·4**	− 20·7	− 19·6	− 19·2	− 15·9	− 12·6	− 8·2	− 7·1	− 2·6	+ 3·4	+ 13·7	+ 17·6
July	− 20·6	**− 31·1**	− 27·1	− 27·7	− 26·5	− 14·0	− 8·3	− 8·3	− 0·8	+ 0·5	+ 8·9	+ 5·2	+ 17·5
August	− 14·9	− 29·4	− 35·0	**− 39·7**	− 30·5	− 21·1	− 13·5	− 5·1	+ 0·4	+ 3·7	+ 8·8	+ 14·4	+ 13·5
September	− 14·1	− 28·0	**− 39·2**	− 33·7	− 31·3	− 19·3	− 14·3	− 1·5	+ 2·9	+ 7·3	+ 11·7	+ 17·7	+ 11·8
October	− 23·6	− 39·5	**− 55·8**	− 55·2	− 47·6	− 29·6	− 13·8	− 15·8	+ 2·0	+ 9·4	+ 15·1	+ 20·0	+ 20·6
November	− 20·3	− 57·8	**− 67·2**	− 61·1	− 48·8	− 30·0	− 15·2	− 11·5	0·0	+ 1·2	+ 5·3	+ 16·5	+ 19·7
1913.													
January	− 3·1	− 27·0	− 43·4	− 48·0	**− 50·2**	− 45·6	− 26·4	− 22·8	− 13·8	− 5·4	+ 2·4	+ 13·8	+ 17·0
February	− 2·5	− 29·0	− 45·1	**− 51·2**	− 46·0	− 37·1	− 26·5	− 20·6	− 8·3	− 1·3	+ 3·6	+ 11·4	+ 18·8
March	− 14·3	− 26·5	**− 42·8**	− 41·7	− 40·5	− 30·9	− 22·9	− 13·0	+ 1·2	+ 6·2	+ 9·0	+ 12·4	+ 15·0
April	− 13·2	− 18·2	− 25·6	**− 32·0**	− 27·9	− 20·0	− 10·2	− 5·6	− 1·6	+ 3·5	+ 3·4	+ 8·3	+ 16·3
May	− 13·6	− 21·2	**− 24·2**	− 23·9	− 17·6	− 10·7	− 8·1	− 6·1	− 2·6	+ 1·1	+ 3·7	+ 9·7	+ 14·7
June	− 11·9	− 14·6	**− 16·9**	− 15·7	− 9·5	− 6·3	− 5·4	− 2·5	− 0·4	+ 1·2	+ 3·5	+ 7·5	+ 10·8
July	− 8·0	− 13·9	− 14·1	**− 17·0**	− 14·2	− 9·9	− 8·3	− 6·6	− 4·2	− 0·9	+ 1·9	+ 1·2	+ 8·3
August	− 6·4	− 6·0	**− 11·6**	**− 11·6**	− 6·8	− 2·8	− 0·8	− 1·0	− 0·6	− 0·4	− 0·6	+ 1·6	+ 2·6
Two Years.													
January	− 3·1	− 27·0	− 43·4	− 48·0	**− 50·2**	− 45·6	− 26·4	− 22·8	− 13·8	− 5·4	+ 2·4	+ 13·8	+ 17·0
February	− 2·5	− 29·0	− 45·1	**− 51·2**	− 46·0	− 37·1	− 26·5	− 20·6	− 8·3	− 1·3	+ 3·6	+ 11·4	+ 18·8
March	− 14·3	− 26·5	**− 42·8**	− 41·7	− 40·5	− 30·9	− 22·9	− 13·0	+ 1·2	+ 6·2	+ 9·0	+ 12·4	+ 15·0
April	− 13·8	− 24·3	− 35·5	**− 37·2**	− 32·5	− 23·9	− 5·8	− 1·2	+ 3·1	+ 5·5	+ 13·5	+ 17·0	**+ 20·3**
May	− 18·4	− 24·4	**− 27·3**	− 25·5	− 22·0	− 12·5	− 8·4	− 5·7	− 0·9	+ 3·2	+ 7·7	**+ 17·9**	+ 17·3
June	− 14·3	− 18·0	**− 18·8**	− 17·7	− 14·4	− 11·1	− 9·0	− 5·3	− 3·7	− 0·7	+ 3·4	+ 10·6	+ 14·2
July	− 14·3	**− 22·5**	− 20·6	− 22·3	− 20·4	− 12·0	− 8·3	− 7·4	− 2·5	− 0·2	+ 5·4	+ 3·2	+ 12·9
August	− 10·7	− 17·7	− 23·3	**− 25·7**	− 18·7	− 12·0	− 7·2	− 3·1	− 0·1	+ 1·7	+ 4·1	+ 8·0	+ 8·0
September	− 14·1	− 28·0	**− 39·2**	− 33·7	− 31·3	− 19·3	− 14·3	− 1·5	+ 2·9	+ 7·3	+ 11·7	+ 17·7	+ 11·8
October	− 23·6	− 39·5	**− 55·8**	− 55·2	− 47·6	− 29·6	− 13·8	− 15·8	+ 2·0	+ 9·4	+ 15·1	+ 20·0	+ 20·6
November	− 20·3	− 57·8	**− 67·2**	− 61·1	− 48·8	− 30·0	− 15·2	− 11·5	− 0·0	+ 1·2	+ 5·3	+ 16·5	+ 19·7
11 months	− 13·6	− 23·6	**− 38·1**	**− 38·1**	− 33·9	− 24·0	− 14·3	− 9·8	− 1·8	+ 2·4	+ 7·4	+ 13·5	+ 16·0
Year	− 13·2	− 29·4	− 39·2	**− 39·4**	− 35·1	− 25·1	− 15·0	− 10·5	− 2·3	+ 2·1	+ 7·1	+ 13·5	+ 16·2
Winter	− 14·4	− 20·7	− 22·5	**− 22·8**	− 18·9	− 11·9	− 8·2	− 5·4	− 1·8	+ 1·0	+ 5·2	+ 9·9	+ 13·1
Equinox	− 16·4	− 29·6	**− 43·3**	− 41·9	− 38·0	− 25·9	− 14·2	− 7·9	+ 2·3	+ 7·1	+ 12·3	+ 16·8	+ 16·9
Summer	− 8·6	− 37·9	− 51·9	**− 53·4**	− 48·3	− 37·6	− 22·7	− 18·3	− 7·4	− 1·8	+ 3·8	+ 13·9	+ 18·5
Winter, 1912	− 13·9	− 27·4	− 28·3	**− 28·5**	− 25·7	− 16·3	− 10·8	− 6·7	− 1·6	+ 1·7	+ 8·2	+ 14·8	+ 17·1
„ 1913	− 10·0	− 13·9	− 16·7	**− 17·1**	− 12·0	− 7·4	− 5·7	− 4·1	− 2·0	+ 0·2	+ 2·1	+ 5·0	+ 9·1
2nd Equinox	− 16·3	− 28·0	**− 40·9**	− 40·7	− 36·8	− 25·0	− 15·3	− 9·0	+ 1·1	+ 6·6	+ 9·8	+ 14·6	**+ 15·9**

Vertical Force. All Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	**1912.**
+ 20·8	+ 13·7	+ 19·5	+ 18·0	+ 14·3	+ 15·0	+ 10·1	+ 8·3	+ 0·6	− 4·8	− 8·8	71·3	17·72	April.
+ 15·5	+ 14·5	+ 19·9	+ 11·8	+ 12·7	+ 12·2	+ 11·8	+ 11·5	+ 6·1	− 1·2	− 15·3	56·5	14·98	May.
+ 23·0	+ **25·2**	+ 17·5	+ 10·4	+ 10·1	+ 15·0	+ 12·2	+ 7·1	+ 8·5	− 5·3	− 14·6	46·6	13·65	June.
+ 23·9	+ **28·0**	+ 21·0	+ 11·2	+ 15·9	+ 14·7	+ 12·5	+ 9·7	+ 6·2	+ 1·6	− 12·3	59·1	14·73	July.
+ 12·7	+ 18·1	+ 19·7	+ 14·6	+ 13·3	+ 17·5	+ 15·1	+ **19·8**	+ 16·7	+ 6·9	− 6·1	59·5	16·27	August.
+ 9·9	+ 8·6	+ 9·8	+ 10·7	+ 13·3	+ 16·6	+ 14·8	+ **22·7**	+ 16·8	+ 6·7	+ 0·4	61·9	15·13	September.
+ 21·6	+ 16·9	+ 21·0	+ 17·9	+ 18·7	+ 29·6	+ **31·3**	+ 26·9	+ 26·2	+ 11·0	− 7·1	87·1	24·01	October.
+ 23·1	+ 17·3	+ 17·9	+ 16·6	+ 23·4	+ 35·0	+ **41·3**	+ 29·6	+ 29·8	+ 20·5	+ 15·0	108·5	26·00	November.
													1913.
+ 18·7	+ 18·8	+ 22·7	+ 20·6	+ 21·5	+ 24·5	+ 31·0	+ 32·1	+ **34·4**	+ 23·6	+ 4·3	84·6	23·80	January.
+ 27·3	+ 20·0	+ 18·6	+ 20·7	+ 20·3	+ 24·4	+ 26·1	+ 27·0	+ **30·9**	+ 10·2	+ 8·3	82·1	22·30	February.
+ **24·5**	+ 22·1	+ 19·4	+ 18·5	+ 23·1	+ 19·4	+ 20·4	+ 18·9	+ 14·6	+ 11·6	− 3·6	67·3	19·69	March.
+ 15·6	+ 16·7	+ **17·9**	+ 15·7	+ 15·8	+ 14·4	+ 12·3	+ 11·0	+ 9·2	+ 4·8	− 10·6	49·9	13·74	April.
+ **18·1**	+ 15·2	+ 14·9	+ 15·0	+ 11·7	+ 11·6	+ 12·0	+ 8·0	+ 6·1	− 2·7	− 11·3	42·3	11·82	May.
+ **14·6**	+ 12·0	+ 8·8	+ 7·6	+ 6·6	+ 6·2	+ 7·6	+ 3·4	+ 2·4	− 1·9	− 6·8	31·5	7·67	June.
+ **13·2**	+ 11·6	+ 10·0	+ 8·3	+ 9·5	+ 9·8	+ 9·1	+ 10·3	+ 4·8	+ 1·4	− 2·7	30·2	8·20	July.
+ **16·6**	+ 11·4	+ 4·4	+ 4·0	+ 3·2	+ 4·4	+ 1·2	+ 2·8	+ 3·4	− 2·2	− 3·2	28·2	4·57	August.
													Two Years.
+ 18·7	+ 18·8	+ 22·7	+ 20·6	+ 21·5	+ 24·5	+ 31·0	+ 32·1	+ **34·4**	+ 23·6	+ 4·3	84·6	23·80	January.
+ 27·3	+ 20·0	+ 18·6	+ 20·7	+ 20·3	+ 24·4	+ 26·1	+ 27·0	+ **30·9**	+ 10·2	+ 8·3	82·1	22·30	February.
+ **24·5**	+ 22·1	+ 19·4	+ 18·5	+ 23·1	+ 19·4	+ 20·4	+ 18·9	+ 14·6	+ 11·6	− 3·6	67·3	19·69	March.
+ 18·2	+ 15·2	+ 18·7	+ 16·9	+ 15·1	+ 14·7	+ 11·2	+ 9·6	+ 4·9	0·0	− 9·7	57·5	15·32	April.
+ 16·8	+ 14·9	+ 17·4	+ 13·4	+ 12·2	+ 11·9	+ 11·9	+ 9·7	+ 6·1	− 2·0	− 13·3	45·2	13·37	May.
+ **18·8**	+ 18·6	+ 13·1	+ 9·0	+ 8·4	+ 10·6	+ 9·9	+ 5·3	+ 5·4	− 3·6	− 10·7	37·6	10·61	June.
+ 18·6	+ **19·8**	+ 15·5	+ 9·8	+ 12·7	+ 12·3	+ 10·8	+ 10·0	+ 5·5	+ 1·5	− 7·5	42·3	11·50	July.
+ 14·6	+ **14·7**	+ 12·0	+ 9·3	+ 8·2	+ 10·9	+ 8·1	+ 11·3	+ 10·0	+ 2·3	− 4·7	40·4	10·27	August.
+ 9·9	+ 8·6	+ 9·8	+ 10·7	+ 13·3	+ 16·6	+ 14·8	+ **22·7**	+ 16·8	+ 6·7	+ 0·4	61·9	15·13	September.
+ 21·6	+ 16·9	+ 21·0	+ 17·9	+ 18·7	+ 29·6	+ **31·3**	+ 26·9	+ 26·2	+ 11·0	− 7·1	87·1	24·01	October.
+ 23·1	+ 17·3	+ 17·9	+ 16·6	+ 23·4	+ 35·0	+ **41·3**	+ 29·6	+ 29·8	+ 20·5	+ 15·0	108·5	26·00	November.
+ 19·3	+ 17·0	+ 16·9	+ 14·9	+ 16·1	+ 19·1	+ **19·7**	+ 18·5	+ 16·8	+ 7·4	− 2·6	57·8	17·08	11 months.
+ 19·6	+ 17·1	+ 17·1	+ 15·2	+ 16·6	+ 19·8	+ **20·8**	+ 19·4	+ 18·0	+ 8·3	− 1·6	60·2	17·57	Year.
+ **17·2**	+ 17·0	+ 14·5	+ 10·4	+ 10·4	+ 11·4	+ 10·2	+ 9·1	+ 6·7	− 0·5	− 9·0	40·0	11·34	Winter.
+ 18·5	+ 15·7	+ 17·2	+ 16·0	+ 17·5	+ **20·1**	+ 19·4	+ 19·5	+ 15·6	+ 7·3	− 5·0	63·4	18·52	Equinox.
+ 23·0	+ 18·7	+ 19·7	+ 19·3	+ 21·7	+ 28·0	+ **32·8**	+ 29·6	+ 31·7	+ 18·1	+ 9·2	86·2	24·00	Summer.
+ 18·8	+ **21·5**	+ 19·5	+ 12·0	+ 13·0	+ 14·9	+ 12·9	+ 12·0	+ 9·4	+ 0·5	− 12·1	50·0	14·69	Winter, 1912.
+ **15·6**	+ 12·5	+ 9·5	+ 8·7	+ 7·8	+ 8·0	+ 7·5	+ 6·1	+ 4·2	− 1·4	− 6·0	32·7	8·02	,, 1913.
+ 17·9	+ 16·1	+ 17·0	+ 15·7	+ 17·7	+ **20·0**	+ 19·7	+ 19·9	+ 16·7	+ 8·5	− 5·2	60·9	18·10	2nd Equinox.

TABLE XXXII.—Diurnal Inequality of

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1912.	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
April	− 13·8	− 18·6	− 25·2	− 25·0	− **25·8**	− 13·2	+ 10·6	+ 7·4	+ 5·4	+ 4·6	+ 8·2	+ 12·2	+ **15·2**
May	− 10·2	− 15·8	− 19·2	− **20·6**	− 13·8	− 9·0	− 3·8	+ 0·4	− 0·8	+ 5·2	+ 5·6	+ 6·4	+ 8·0
June	− 7·6	− **16·8**	− 15·8	− 15·4	− 8·8	− 2·2	+ 3·0	+ 4·6	− 0·4	+ 3·0	− 1·8	+ 0·2	− 0·2
July	− 9·6	− **21·4**	− 16·6	− 13·6	− 19·2	− 8·8	− 4·4	− 4·0	+ 4·0	+ 1·4	+ 1·6	+ 2·6	+ 10·2
August	− 3·2	− 12·0	− 25·2	− **28·8**	− 22·8	− 16·8	− 6·8	− 7·8	− 2·6	+ 0·6	+ 4·8	+ 4·4	+ **14·0**
September	+ 5·6	− 13·2	− 27·2	− **27·8**	− **27·8**	− 17·0	− 10·6	+ 1·6	− 0·6	− 0·4	+ 2·4	+ 0·6	+ 4·2
October	− 9·6	− 20·2	− **40·6**	− 35·8	− 26·4	− 18·8	− 9·4	− 4·6	+ 3·4	+ 5·8	+ 10·2	+ 15·0	+ 17·2
November	− 7·0	− 26·0	− **48·4**	− 46·2	− 42·6	− 33·0	− 28·0	− 9·0	− 11·2	− 6·6	− 8·6	+ 0·4	+ 6·8
1913.													
January	− 4·2	− 16·5	− 40·7	− 51·2	− **54·7**	− 51·2	− 42·5	− 22·7	− 12·5	− 1·5	+ 6·8	+ 7·8	+ 13·8
February	− 15·0	− 13·5	− 24·0	− 25·8	− **35·7**	− 23·8	− 17·5	− 10·7	− 0·3	0·0	+ 2·2	+ 6·5	+ 11·5
March	− 13·4	− 24·2	− 28·6	− **35·0**	− 27·6	− 17·2	− 10·4	− 3·8	+ 3·4	+ **6·4**	+ 8·6	+ 12·2	+ 11·4
April	− 7·6	− 20·6	− 16·4	− **24·6**	− 22·6	− 13·8	− 4·6	− 0·2	+ 2·0	+ 1·8	+ 4·6	+ 6·4	+ 13·0
May	− 8·4	− 10·0	− **11·4**	− 9·4	− 3·2	0·0	− 0·6	+ 1·2	+ 0·6	+ 0·8	− 0·4	+ 3·0	+ 2·6
June	− 9·2	− **15·2**	− 15·0	− 13·8	− 10·0	− 5·4	− 4·6	− 1·0	− 1·4	+ 0·6	+ 0·8	+ 3·2	+ **11·8**
July	− 3·5	− 7·5	− 6·5	− 6·2	− **8·2**	− 3·7	0·0	− 0·2	+ 0·8	+ 0·3	+ 0·8	+ 4·0	+ **8·3**
Two Years.													
January	− 4·2	− 16·5	− 40·7	− 51·2	− **54·7**	− 51·2	− 42·5	− 22·7	− 12·5	− 1·5	+ 6·8	+ 7·8	+ 13·8
February	− 15·0	− 13·5	− 24·0	− 25·8	− **35·7**	− 23·8	− 17·5	− 10·7	− 0·3	0·0	+ 2·2	+ 6·5	+ 11·5
March	− 13·4	− 24·2	− 28·6	− **35·0**	− 27·6	− 17·2	− 10·4	− 3·8	+ 3·4	+ 6·4	+ 8·6	+ 12·2	+ 11·4
April	− 10·7	− 19·6	− 20·8	− **24·8**	− 24·2	− 13·5	+ 3·0	+ 3·6	+ 3·7	+ **8·2**	+ 6·4	+ 9·3	+ **14·1**
May	− 9·3	− 12·9	− **15·3**	− 15·0	− 8·5	− 4·5	− 2·2	+ 0·8	− 0·1	+ **3·0**	+ 2·6	+ 4·7	+ 5·3
June	− 8·4	− **16·0**	− 15·4	− 14·6	− 9·4	− 3·8	− 0·8	+ 1·8	− 0·9	+ 1·8	− 0·5	+ 1·7	+ 5·8
July	− 6·5	− **14·4**	− 11·5	− 9·9	− 13·7	− 6·2	− 2·2	− 2·1	+ 2·4	+ 0·9	+ 1·2	+ 3·3	+ **9·3**
August	− 3·2	− 12·0	− 25·2	− **28·8**	− 22·8	− 16·8	− 6·8	− 7·8	− 2·6	+ 0·6	+ 4·8	+ 4·4	+ **14·0**
September	+ 5·6	− 13·2	− 27·2	− **27·8**	− **27·8**	− 17·0	− 10·6	+ 1·6	− 0·6	− 0·4	+ 2·4	+ 0·6	+ 4·2
October	− 9·6	− 20·2	− **40·6**	− 35·8	− 26·4	− 18·8	− 9·4	− 4·6	+ 3·4	+ 5·8	+ 10·2	+ 15·0	+ 17·2
November	− 7·0	− 26·0	− **48·4**	− 46·2	− 42·6	− 33·0	− 28·0	− 9·0	− 11·2	− 6·6	− 8·6	+ 0·4	+ 6·8
11 months	− 7·4	− 17·1	− 27·1	− **28·6**	− 26·7	− 18·7	− **11·6**	− 4·8	− 1·4	+ 1·2	+ 3·3	+ 6·0	+ 10·3
Year	− 7·5	− 17·3	− 28·0	− **29·7**	− 28·1	− 20·1	− 13·1	− **5·6**	− 1·9	+ 0·9	+ 3·0	+ 5·9	+ 10·3
Winter	− 6·8	− 13·8	− 16·8	− **17·1**	− 13·6	− 7·8	− 3·0	− 1·8	− 0·3	+ 1·6	+ 2·0	+ 3·5	+ 8·6
Equinox	− 7·0	− 19·3	− 29·3	− **30·9**	− 26·5	− 16·6	− 6·9	− 0·8	+ 2·5	+ 3·7	+ 6·9	+ 9·3	+ 11·7
Summer	− 8·7	− 18·7	− 37·7	− 41·1	− **44·3**	− 36·0	− 29·3	− 14·1	− 8·0	− 2·7	+ 0·1	+ 4·9	+ 10·7
Winter, 1912	− 7·6	− 16·5	− 19·2	− **19·6**	− 16·1	− 9·2	− 3·0	− 1·7	+ 0·1	+ 2·6	+ 2·6	+ 3·4	+ 8·0
„ 1913	− 7·0	− 10·9	− **11·0**	− 9·8	− 7·1	− 3·0	− 1·7	0·0	0·0	+ 0·6	+ 0·4	+ 3·4	+ **7·6**
2nd Equinox	− 6·3	− 19·3	− 28·2	− **30·8**	− 2[illegible]·1	− 16·7	− 8·8	− 1·7	+ 2·0	+ 3·4	+ 6·5	+ 8·6	+ 11·5

Vertical Force. Quiet Days. G.M.T.

14.	15.	16.	17.	18.	19.	20	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	**1912.**
+ 11·6	+ 7·4	+ 6·6	+ 8·6	+ 6·2	+ 2·8	+ 4·6	+ 4·4	+ 5·0	+ 3·0	− 2·6	41·0	10·33	April.
+ **13·8**	+ 6·2	+ 8·2	+ 6·6	+ 9·2	+ 9·2	+ 7·8	+ 5·4	+ 4·2	0·0	− 3·6	34·4	8·04	May.
+ 1·8	+ **9·8**	+ 9·0	+ 7·8	+ 5·8	+ 6·8	+ 7·6	+ 7·6	+ 5·8	− 1·6	− 2·2	26·6	6·07	June.
+ 11·0	+ 12·8	+ 7·0	+ 0·8	+ 2·8	+ 4·2	+ 11·4	+ **14·0**	+ 7·2	+ 6·6	− 0·8	35·4	8·17	July.
+ 9·4	+ 13·4	+ 11·8	+ 11·6	+ 10·2	+ 9·2	+ 7·6	+ 8·2	+ 11·0	+ 7·2	+ 1·0	42·8	10·43	August.
+ 0·6	− 1·0	+ 1·8	+ 8·2	+ 6·6	+ 5·4	+ 10·0	+ 18·4	+ 19·2	+ **24·8**	+ 16·2	52·6	10·47	September.
+ **24·4**	+ 14·8	+ 15·6	+ 11·8	+ 13·6	+ 10·6	+ 12·4	+ 14·0	+ 8·0	− 1·8	− 7·8	65·0	14·66	October.
+ 13·4	+ 5·0	+ 10·6	+ 21·2	+ 36·4	+ 39·8	+ 35·4	+ 31·8	+ **43·2**	+ 16·2	+ 4·0	91·6	22·12	November.
													1913.
+ 21·0	+ 21·8	+ 19·0	+ 22·3	+ 25·5	+ 35·8	+ 40·3	+ **46·0**	+ 18·5	+ 26·0	− 4·5	100·7	25·28	January.
+ 18·7	+ 14·3	+ 11·5	+ 10·5	+ 12·5	+ 15·0	+ 14·8	+ 19·5	+ **19·7**	+ 15·0	− 6·7	55·4	14·36	February.
+ 11·6	+ 11·8	+ 9·4	+ 9·6	+ 10·2	+ 12·4	+ **14·2**	+ **14·2**	+ 11·8	+ 11·8	+ 0·4	49·2	13·32	March.
+ 10·2	+ 9·0	+ 7·6	+ 9·0	+ 7·4	+ **15·0**	+ 8·8	+ 9·4	+ 5·2	+ 5·0	− 5·2	39·6	9·58	April.
+ 4·8	+ 5·2	+ 3·6	+ 4·0	+ 3·2	+ **5·6**	+ 4·4	+ 1·4	+ 3·4	+ 0·4	− 3·2	17·0	3·78	May.
+ 9·6	+ 10·6	+ 9·6	+ 7·0	+ 6·0	+ 5·0	+ 6·6	+ 4·8	+ 4·8	+ 0·2	− 5·0	27·0	6·72	June.
+ 5·5	+ 3·8	+ 2·5	+ 2·0	+ 2·3	+ 1·5	+ 3·0	+ 4·3	− 0·5	− 1·7	− 2·5	16·5	3·32	July.
													Two Years.
+ 21·0	+ 21·8	+ 19·0	+ 22·3	+ 25·5	+ 35·8	+ 40·3	+ **46·0**	+ 18·5	+ 26·0	− 4·5	100·7	25·28	January.
+ 18·7	+ 14·3	+ 11·5	+ 10·5	+ 12·5	+ 15·0	+ 14·8	+ 19·5	+ **19·7**	+ 15·0	− 6·7	55·4	14·36	February.
+ 11·6	+ 11·8	+ 9·4	+ 9·6	+ 10·2	+ 12·4	+ **14·2**	+ **14·2**	+ 11·8	+ 11·8	+ 0·4	49·2	13·32	March.
+ 10·9	+ 8·2	+ 7·1	+ 8·8	+ 6·8	+ 8·9	+ 6·7	+ 6·9	+ 5·1	+ 4·0	− 3·9	38·9	9·76	April.
+ **9·3**	+ 5·7	+ 5·9	+ 5·3	+ 6·2	+ 7·4	+ 6·1	+ 3·4	+ 3·8	+ 0·2	− 3·4	24·6	5·87	May.
+ 5·7	+ **10·2**	+ 9·3	+ 7·4	+ 5·9	+ 5·9	+ 7·1	+ 6·2	+ 5·3	− 0·7	− 3·6	26·2	6·17	June.
+ 8·3	+ 8·3	+ 4·8	+ 1·4	+ 2·6	+ 2·9	+ 7·2	+ 9·2	+ 3·4	+ 2·5	− 1·6	23·7	5·66	July.
+ 9·4	+ 13·4	+ 11·8	+ 11·6	+ 10·2	+ 9·2	+ 7·6	+ 8·2	+ 11·0	+ 7·2	+ 1·0	42·8	10·43	August.
+ 0·6	− 1·0	+ 1·8	+ 8·2	+ 6·6	+ 5·4	+ 10·0	+ 18·4	+ 19·2	+ **24·8**	+ 16·2	52·6	10·47	September.
+ **24·4**	+ 14·8	+ 15·6	+ 11·8	+ 13·6	+ 10·6	+ 12·4	+ 14·0	+ 8·0	− 1·8	− 7·8	65·0	14·66	October.
+ 13·4	+ 5·0	+ 10·6	+ 21·2	+ 36·4	+ 39·8	+ 35·4	+ 31·8	+ **43·2**	+ 16·2	+ 4·0	91·6	22·12	November.
+ 12·1	+ 10·2	+ 9·7	+ 10·7	+ 12·4	+ 13·9	+ 14·7	+ **16·2**	+ 13·5	+ 9·6	− 0·9	44·8	12·00	11 months.
+ 12·6	+ 10·5	+ 10·0	+ 11·3	+ 13·4	+ 15·3	+ 16·0	+ **17·5**	+ 14·7	+ 10·4	− 1·0	47·2	12·67	Year.
+ 8·2	+ **9·4**	+ 8·0	+ 6·4	+ 6·2	+ 6·3	+ 7·0	+ 6·8	+ 5·9	+ 2·3	− 1·9	26·5	6·88	Winter.
+ 11·9	+ 8·5	+ 8·5	+ 9·6	+ 9·3	+ 9·3	+ 10·8	+ **13·4**	+ 11·0	+ 9·7	+ 1·2	44·3	11·44	Equinox.
+ 17·7	+ 13·7	+ 13·7	+ 18·0	+ 24·8	+ 30·2	+ 30·2	+ **32·4**	+ 27·1	+ 19·1	− 2·4	76·7	20·23	Summer.
+ 9·0	+ **10·6**	+ 9·0	+ 6·7	+ 7·0	+ 7·4	+ 8·6	+ 8·8	+ 7·1	+ 3·1	− 1·4	30·2	7·85	Winter, 1912.
+ 6·6	+ **6·5**	+ 5·2	+ 4·3	+ 3·8	+ 4·0	+ 4·7	+ 3·5	+ 2·6	− 0·4	− 3·6	18·6	4·49	,, 1913.
+ 11·7	+ 8·7	+ 8·6	+ 9·7	+ 9·5	+ 10·9	+ 11·4	+ **14·0**	+ 11·0	+ 10·0	+ 0·9	44·8	11·52	2nd Equinox.

TABLE XXXIII.—Diurnal Inequality of

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1912.	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
April	− 33·4	− 40·6	− 67·0	− 59·6	− 46·6	− 37·6	− 31·0	+ 7·4	+ 31·0	+ 31·4	+ 47·0	+ 53·6	+ 49·2
May	− 56·4	− 47·8	− 22·2	− 26·0	− 51·2	− 32·6	− 23·0	− 11·8	+ 19·2	+ 25·0	+ 43·6	+ 83·0	+ 39·8
June	− 26·2	− 33·6	− 47·0	− 35·2	− 36·0	− 35·6	− 36·4	− 24·6	− 18·2	− 7·0	+ 19·2	+ 32·0	+ 58·2
July	− 48·6	− 57·2	− 43·4	− 47·2	− 38·6	− 18·4	− 8·8	− 25·2	− 16·4	+ 1·6	+ 29·0	− 4·4	+ 38·6
August	− 20·0	− 38·6	− 49·6	− 46·4	− 30·6	− 14·8	− 9·6	− 4·0	+ 8·2	+ 10·4	+ 13·0	+ 22·2	+ 14·2
September	− 37·2	− 51·4	− 53·2	− 59·8	− 41·2	− 19·2	− 13·2	− 6·0	+ 11·4	+ 26·8	+ 29·4	+ 37·6	+ 17·2
October	− 15·6	− 39·8	− 53·6	− 77·6	− 93·4	− 57·2	− 30·0	− 30·6	+ 2·6	+ 14·0	+ 26·4	+ 33·0	+ 41·0
November	− 74·4	− 125·6	− 121·8	− 84·0	− 22·2	− 5·4	+ 11·4	+ 2·4	+ 18·6	+ 11·2	+ 18·8	+ 43·4	+ 53·2
1913.													
January	+ 4·4	− 30·6	− 29·0	− 23·4	− 53·0	− 70·4	− 25·4	− 26·6	− 26·4	− 9·0	− 6·4	+ 15·8	+ 34·6
February	− 16·8	− 58·4	− 77·2	− 70·6	− 66·0	− 56·0	− 23·8	− 20·4	+ 0·8	+ 6·4	+ 14·0	+ 27·4	+ 36·2
March	− 30·2	− 38·0	− 69·0	− 51·6	− 53·2	− 51·4	− 49·4	− 31·6	− 7·0	+ 10·4	+ 14·4	+ 23·2	+ 10·8
April	− 36·0	− 24·8	− 38·4	− 40·4	− 38·0	− 33·4	− 18·8	− 11·2	− 8·6	+ 13·6	− 5·6	+ 6·0	+ 41·8
May	− 34·0	− 49·2	− 59·0	− 61·0	− 40·8	− 27·2	− 24·8	− 22·0	− 6·4	+ 3·4	+ 0·6	+ 7·8	+ 50·8
June	− 21·8	− 19·0	− 21·2	− 24·0	− 10·4	− 7·6	− 11·6	− 3·0	+ 0·6	+ 7·2	+ 9·8	+ 11·6	+ 8·8
July	− 10·2	− 22·4	− 19·0	− 24·6	− 23·8	− 14·8	− 14·4	− 11·2	− 12·0	− 1·8	− 3·2	+ 1·8	+ 22·0
Two Years.													
January	+ 4·4	− 30·6	− 29·0	− 23·4	− 53·0	− 70·4	− 25·4	− 26·6	− 26·4	− 9·0	− 6·4	+ 15·8	+ 34·6
February	− 16·8	− 58·4	− 77·2	− 70·6	− 66·0	− 56·0	− 23·8	− 20·4	+ 0·8	+ 6·4	+ 14·0	+ 27·4	+ 36·2
March	− 30·2	− 38·0	− 69·0	− 51·6	− 53·2	− 51·4	− 49·4	− 31·6	− 7·0	+ 10·4	+ 14·4	+ 23·2	+ 10·8
April	− 34·7	− 32·7	− 52·7	− 50·0	− 42·3	− 35·5	− 24·9	− 1·9	+ 11·2	+ 22·5	+ 20·7	+ 29·8	+ 45·5
May	− 45·2	− 48·5	− 40·6	− 43·5	− 46·0	− 29·9	− 23·9	− 16·9	+ 6·4	+ 14·2	+ 22·1	+ 45·4	+ 45·3
June	− 24·0	− 26·3	− 34·1	− 29·6	− 23·2	− 21·6	− 24·0	− 13·8	− 8·8	+ 0·1	+ 14·5	+ 21·8	+ 33·5
July.	− 29·4	− 39·8	− 31·2	− 35·9	− 31·2	− 16·6	− 11·6	− 18·2	− 14·2	− 0·1	+ 12·9	− 1·3	+ 30·3
August	− 20·0	− 38·6	− 49·6	− 46·4	− 30·6	− 14·8	− 9·6	− 4·0	+ 8·2	+ 10·4	+ 13·0	+ 22·2	+ 14·2
September	− 37·2	− 51·4	− 53·2	− 59·8	− 41·2	− 19·2	− 13·2	− 6·0	+ 11·4	+ 26·8	+ 29·4	+ 37·6	+ 17·2
October	− 15·6	− 39·8	− 53·6	− 77·6	− 93·4	− 57·2	− 30·0	− 30·6	+ 2·6	+ 14·0	+ 26·4	+ 33·0	+ 41·0
November	− 74·4	− 125·6	− 121·8	− 84·0	− 22·2	− 5·4	+ 11·4	+ 2·4	+ 18·6	+ 11·2	+ 18·8	+ 43·4	+ 53·2
11 months	− 29·4	− 48·1	− 55·6	− 52·0	− 45·7	− 34·4	− 20·4	− 15·2	+ 0·3	+ 9·7	+ 16·3	+ 27·1	+ 32·9
Year	− 29·3	− 50·1	− 57·3	− 52·6	− 45·8	− 36·8	− 19·8	− 15·2	0·0	+ 9·2	+ 15·7	+ 27·3	+ 33·6
Winter	− 29·6	− 38·2	− 38·9	− 38·8	− 32·7	− 20·7	− 17·3	− 13·2	− 2·1	+ 6·2	+ 15·6	+ 22·0	+ 30·8
Equinox	− 29·4	− 40·5	− 57·1	− 59·7	− 57·5	− 40·8	− 29·4	− 17·5	+ 4·6	+ 18·4	+ 22·7	+ 30·9	+ 28·6
Summer	− 28·9	− 71·5	− 76·0	− 59·3	− 47·1	− 43·9	− 12·6	− 14·9	− 2·3	+ 2·9	+ 8·8	+ 28·9	+ 41·3
Winter, 1912	− 37·8	− 44·3	− 40·5	− 38·7	− 39·1	− 25·3	− 19·4	− 16·4	− 1·8	+ 7·5	+ 26·2	+ 33·2	+ 37·7
„ 1913	− 22·0	− 30·2	− 33·1	− 36·5	− 25·0	− 16·5	− 16·9	− 12·1	− 5·9	+ 2·9	+ 2·4	+ 7·1	+ 27·2
2nd Equinox	− 29·7	− 38·5	− 53·5	− 57·3	− 56·4	− 40·3	− 27·8	− 19·8	− 0·4	+ 16·2	+ 16·2	+ 25·0	+ 27·7

Vertical Force. Disturbed Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	**1912.**
+ 37·0	+ 30·8	+ 18·8	+ 22·6	+ 15·8	+ 26·0	− 1·6	+ 5·4	+ 3·0	− 17·6	− 36·2	120·6	31·26	April.
+ 16·2	+ 13·4	+ 50·4	+ 18·0	+ 10·0	+ 0·2	+ 24·4	− 0·6	− 19·6	− 7·8	− 44·8	139·4	28·62	May.
+ **79·0**	+ 74·0	+ 39·4	+ 12·4	+ 16·2	+ 32·2	+ 17·0	− 10·4	− 1·2	− 28·8	− 41·0	126·0	31·70	June.
+ 53·6	+ **77·6**	+ 38·6	+ 22·4	+ 40·8	+ 32·8	+ 14·0	+ 7·4	− 1·2	− 9·8	− 38·0	134·8	29·73	July.
+ 16·0	+ 15·2	+ **49·4**	+ 17·4	+ 11·8	+ 19·8	− 2·0	+ 19·6	+ 21·0	− 2·4	− 19·6	99·0	19·82	August.
+ 15·8	+ 11·2	+ 9·8	+ 9·8	+ 29·2	+ 31·2	+ 31·8	+ 19·6	+ 9·6	− 7·0	− 3·4	97·4	24·25	September.
+ 26·0	+ 18·8	+ 30·4	+ 21·8	+ 8·6	+ 44·0	+ 29·2	+ 17·8	+ **54·8**	+ 32·4	− 4·8	148·2	33·47	October.
+ **54·8**	+ 44·6	+ 37·8	+ 9·6	+ 16·0	+ 24·2	+ 37·0	+ 36·0	+ 5·6	+ 6·0	+ 4·2	180·4	36·18	November.
													1913.
+ 26·2	+ 16·8	+ 25·0	+ 25·0	+ 26·8	+ 16·4	+ 37·4	+ 24·8	+ **40·2**	+ 10·6	− 4·8	110·6	25·38	January.
+ **70·4**	+ 40·2	+ 19·2	+ 15·8	+ 19·6	+ 23·4	+ 21·8	+ 29·4	+ 52·6	+ 1·2	+ 8·8	147·6	32·35	February.
+ **64·6**	+ 41·6	+ 43·6	+ 40·0	+ 60·8	+ 29·6	+ 24·2	+ 10·4	+ 16·4	+ 5·2	− 13·0	133·6	32·90	March.
+ 20·2	+ 32·2	+ **54·0**	+ 36·2	+ 32·0	+ 15·8	+ 17·6	+ 12·8	− 2·0	+ 1·2	− 28·4	94·4	23·71	April.
+ 48·4	+ 39·4	+ 59·0	+ **62·6**	+ 40·0	+ 31·6	+ 37·2	+ 11·4	+ 1·4	− 26·0	− 44·4	123·6	32·85	May.
+ **23·6**	+ 12·4	+ 11·4	+ 12·8	+ 12·0	+ 5·0	+ 18·8	+ 6·4	− 3·6	− 6·6	− 12·8	47·6	11·75	June.
+ **40·2**	+ 17·0	+ 14·6	+ 13·4	+ 11·2	+ 15·8	+ 14·8	+ 19·4	+ 2·8	− 6·2	− 7·2	64·8	14·32	July.
													Two Years.
+ 26·2	+ 16·8	+ 25·0	+ 25·0	+ 26·8	+ 16·4	+ 37·4	+ 24·8	+ **40·2**	+ 10·6	− 4·8	110·6	25·38	January.
+ **70·4**	+ 40·2	+ 19·2	+ 15·8	+ 19·6	+ 23·4	+ 21·8	+ 29·4	+ 52·6	+ 1·2	+ 8·8	147·6	32·35	February.
+ **64·6**	+ 41·6	+ 43·6	+ 40·0	+ 60·8	+ 29·6	+ 24·2	+ 10·4	+ 16·4	+ 5·2	− 13·0	133·6	32·90	March.
+ 28·6	+ 31·5	+ 36·4	+ 29·4	+ 23·9	+ 20·9	+ 8·0	+ 9·1	− 2·5	− 8·2	− 32·3	98·2	26·47	April.
+ 32·3	+ 26·4	+ **54·7**	+ 40·3	+ 25·0	+ 15·9	+ 30·8	+ 5·4	− 9·1	− 16·9	− 44·6	103·2	30·39	May.
+ **51·3**	+ 43·2	+ 25·4	+ 12·6	+ 14·1	+ 18·6	+ 17·9	− 2·0	− 2·4	− 17·7	− 26·9	85·4	21·14	June.
+ 46·9	+ **47·3**	+ 26·6	+ 17·9	+ 26·0	+ 24·3	+ 14·4	+ 13·4	+ 0·8	− 8·0	− 22·6	87·1	21·70	July.
+ 16·0	+ 15·2	+ **49·4**	+ 17·4	+ 11·8	+ 19·8	− 2·0	+ 19·6	+ 21·0	− 2·4	− 19·6	99·0	19·82	August.
+ 15·8	+ 11·2	+ 9·8	+ 9·8	+ 29·2	+ 31·2	+ 31·8	+ 19·6	+ 9·6	− 7·0	− 3·4	97·4	24·25	September.
+ 26·0	+ 18·8	+ 30·4	+ 21·8	+ 8·6	+ 44·0	+ 29·2	+ 17·8	+ **54·8**	+ 32·4	− 4·8	148·2	33·47	October.
+ **54·8**	+ 44·6	+ 37·8	+ 9·6	+ 16·0	+ 24·2	+ 37·0	+ 36·0	+ 5·6	+ 6·0	+ 4·2	180·4	36·18	November.
+ **39·4**	+ 30·6	+ 32·6	+ 21·8	+ 23·8	+ 24·4	+ 22·8	+ 16·7	+ 17·0	− 0·4	− 14·5	95·0	26·30	11 months.
+ **40·3**	+ 30·9	+ 32·1	+ 21·4	+ 23·6	+ 24·1	+ 23·5	+ 17·8	+ 18·3	+ 0·1	− 13·0	97·6	26·58	Year.
+ 36·6	+ 33·0	+ **39·0**	+ 22·1	+ 19·2	+ 19·7	+ 15·3	+ 9·1	+ 2·6	− 11·2	− 28·4	77·9	22·60	Winter.
+ **33·8**	+ 25·8	+ 30·1	+ 25·3	+ 30·6	+ 31·4	+ 23·3	+ 14·2	+ 19·6	+ 5·6	− 13·4	93·5	28·76	Equinox.
+ **50·5**	+ 33·9	+ 27·3	+ 16·8	+ 20·8	+ 21·3	+ 32·1	+ 30·1	+ 32·8	+ 5·9	+ 2·7	126·5	29·69	Summer.
+ 41·2	+ **45·0**	+ 44·5	+ 17·6	+ 19·7	+ 21·3	+ 13·4	+ 4·0	− 0·2	− 12·2	− 35·8	89·3	25·95	Winter, 1912.
+ **37·7**	+ 22·9	+ 28·3	+ 29·6	+ 21·1	+ 17·5	+ 23·6	+ 12·4	+ 0·2	− 12·9	− 21·5	74·2	19·40	„ 1913.
+ 31·7	+ 26·0	+ **34·5**	+ 27·0	+ 32·7	+ 30·2	+ 25·7	+ 15·2	+ 19·7	+ 8·0	− 12·4	91·8	28·00	2nd Equinox.

TABLE XXXIV.—Diurnal Inequality

	Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
		′	′	′	′	′	′	′	′	′	′	′	′	′
All days.	Year	+ 0·19	+ 0·50	+ 0·56	+ 0·73	+ 0·73	+ **0·77**	+ 0·75	+ 0·60	+ 0·57	+ 0·34	+ 0·10	− 0·14	− 0·40
	Winter	+ 0·33	+ 0·46	+ 0·50	+ **0·61**	+ 0·56	+ 0·44	+ 0·40	+ 0·33	+ 0·26	+ 0·14	+ 0·03	− 0·16	− 0·30
	Equinox	+ 0·27	+ 0·52	+ 0·75	+ **1·04**	+ 1·03	+ 0·99	+ 0·89	+ 0·62	+ 0·49	+ 0·27	− 0·08	− 0·24	− 0·58
	Summer	− 0·03	+ 0·51	+ 0·43	+ 0·55	+ 0·59	+ 0·87	+ 0·95	+ 0·83	+ **0·96**	+ 0·61	+ 0·33	− 0·03	− 0·33
	Winter, 1912 ...	+ 0·44	+ 0·57	+ 0·65	+ 0·73	+ **0·74**	+ 0·64	+ 0·64	+ 0·50	+ 0·35	+ 0·18	+ 0·07	− 0·18	− 0·42
Quiet days.	Year	+ 0·31	+ 0·31	+ 0·18	+ 0·09	+ 0·03	+ 0·19	+ **0·32**	+ 0·24	+ 0·27	+ 0·22	+ 0·16	+ 0·12	− 0·07
	Winter	+ 0·11	+ 0·10	+ 0·19	+ 0·15	+ 0·09	+ 0·15	+ **0·25**	+ 0·16	+ 0·11	+ 0·08	+ 0·06	+ 0·02	− 0·10
	Equinox	− 0·01	+ 0·12	+ 0·10	+ 0·34	+ 0·18	+ 0·34	+ **0·49**	+ 0·32	+ 0·36	+ 0·26	+ 0·05	− 0·05	− 0·30
	Summer	+ **0·82**	+ 0·71	+ 0·28	− 0·23	− 0·18	+ 0·09	+ 0·24	+ 0·24	+ 0·33	+ 0·32	+ 0·38	+ 0·38	+ 0·17
Disturbed days.	Year	+ 0·31	+ 1·09	+ 1·40	+ 1·64	+ 1·65	+ **1·74**	+ 1·48	+ 1·45	+ 1·24	+ 0·58	− 0·04	− 0·51	− 0·94
	Winter	+ 0·88	+ 1·34	+ 1·23	+ **1·76**	+ 1·51	+ 1·02	+ 0·94	+ 1·08	+ 0·89	+ 0·38	− 0·12	− 0·41	− 0·66
	Equinox	+ 0·36	+ 0·75	+ 1·29	+ 1·93	+ **2·12**	+ 1·90	+ 1·87	+ 1·46	+ 1·26	+ 0·51	− 0·24	− 0·47	− 1·16
	Summer	− 0·29	+ 1·20	+ 1·69	+ 1·22	+ 1·34	+ **2·29**	+ 1·63	+ 1·79	+ 1·55	+ 0·86	+ 0·23	− 0·65	− 1·01

TABLE XXXV.—Diurnal Inequality

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
January	− 7·0	− 4·9	− 0·5	+ 8·0	+ 0·7	− 12·2	− 17·4	− 14·7	− **25·4**	− 13·0	− 8·7	+ 2·8	+ 7·3
February	− 2·0	− 9·0	− 4·1	− 16·4	− **17·0**	− 12·7	− 11·4	− 12·6	− 12·7	− 7·6	− 1·4	+ 4·4	+ 9·8
March	− 4·2	− 5·6	− 15·6	− **17·2**	− 15·8	− 12·4	− 13·7	− 11·5	− 6·8	− 1·8	+ 2·9	+ 5·0	+ 10·1
April	− 7·1	− 6·4	− 12·8	− 17·2	− **18·5**	− 15·6	− 11·9	− 8·7	− 7·2	− 4·4	+ 0·9	+ 6·5	+ 13·6
May	− 8·8	− 9·5	− 11·1	− **13·4**	− 11·7	− 9·0	− 6·6	− 5·6	− 6·0	− 1·6	+ 0·6	+ 6·9	+ 7·3
June	− 7·1	− 10·6	− 11·0	− **12·0**	− 9·2	− 6·1	− 6·9	− 5·8	− 4·4	− 1·6	+ 2·2	+ 5·5	+ 7·5
July	− 8·7	− 10·4	− **11·3**	− 10·8	− 9·9	− 7·0	− 5·7	− 4·2	− 3·4	− 1·1	+ 0·7	+ 3·9	+ 8·1
August	− 10·4	− 13·7	− 12·0	− **14·4**	− 13·3	− 9·3	− 7·5	− 5·1	− 1·1	+ 0·2	+ 1·9	+ 4·8	+ 8·4
September	− 9·4	− 19·0	− 25·7	− **29·0**	− 21·6	− 18·4	− 15·2	− 10·1	− 4·5	− 0·5	+ 8·0	+ 9·8	+ 11·7
October	− 14·4	− 23·5	− 17·0	− 25·0	− **25·7**	− 25·5	− 19·8	− 7·9	− 6·9	− 0·2	+ 8·0	+ 10·9	+ 20·3
November	− 1·6	− 30·2	− **32·5**	− 30·6	− 20·2	− 24·1	− 20·5	− 13·3	− 8·2	− 4·7	+ 1·5	+ 5·9	+ 12·6
11 months	− 7·3	− 13·0	− 14·0	− **16·2**	− 14·7	− 13·8	− 12·4	− 9·0	− 7·9	− 3·3	+ 1·5	+ 6·0	+ 10·6
Year.......	− 7·0	− 13·1	− 13·8	− **15·9**	− 14·5	− 14·0	− 12·8	− 9·4	− 8·5	− 3·7	+ 1·1	+ 5·9	+ 10·6
Winter	− 8·7	− 11·0	− 11·4	− **12·7**	− 11·0	− 7·8	− 6·7	− 5·2	− 3·7	− 1·0	+ 1·4	+ 5·3	+ 7·8
Equinox	− 8·8	− 13·6	− 17·8	− **22·1**	− 20·4	− 18·0	− 15·2	− 9·6	− 6·4	− 1·7	+ 5·0	+ 8·1	+ 13·9
Summer.	− 3·5	− 14·7	− 12·4	− 13·0	− 12·2	− 16·3	− **16·4**	− 13·5	− 15·4	− 8·4	− 2·9	+ 4·4	+ 9·9
Winter, 1912	− 11·6	− 13·9	− 14·6	− **15·0**	− 14·2	− 11·5	− 11·0	− 8·1	− 5·1	− 1·4	+ 1·4	+ 6·5	+ 10·7
„ 1913	− 5·9	− 8·1	− 8·1	− **10·2**	− 7·5	− 4·1	− 2·4	− 2·2	− 2·4	− 0·7	+ 1·4	+ 4·1	+ 4·9
2nd Equinox	− 8·2	− 14·0	− 17·6	− **21·0**	− 19·5	− 18·0	− 15·0	− 9·1	− 5·3	− 1·0	+ 5·0	+ 7·5	+ 13·4

of Inclination. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.	
′	′	′	′	′	′	′	′	′	′	′	′	′		
−0·47	**−0·59**	−0·56	−0·55	−0·49	−0·51	−0·59	−0·58	−0·54	−0·30	−0·09	1·36	0·485	Year	All days.
−0·40	**−0·43**	−0·42	−0·41	−0·40	−0·42	**−0·43**	−0·33	−0·27	−0·16	+0·07	1·04	0·344	Winter	
−0·62	**−0·70**	−0·65	−0·66	−0·63	−0·64	−0·60	−0·58	−0·49	−0·33	−0·06	1·74	0·572	Equinox	
−0·39	−0·63	−0·60	−0·59	−0·43	−0·47	−0·75	−0·82	**−0·87**	−0·41	−0·27	1·83	0·552	Summer	
−0·56	−0·59	**−0·60**	−0·54	−0·56	−0·59	−0·57	−0·45	−0·37	−0·20	+0·10	1·34	0·468	Winter, 1912	
−0·18	−0·33	−0·24	−0·27	−0·31	−0·35	**−0·36**	−0·29	−0·24	+0·02	+0·18	0·68	0·220	Year	Quiet days.
−0·21	−0·18	−0·18	−0·10	−0·14	−0·14	−0·16	−0·12	−0·15	0·00	+0·01	0·46	0·123	Winter	
−0·37	−0·35	−0·18	−0·30	−0·19	−0·23	−0·21	−0·25	−0·20	−0·09	+0·18	0·86	0·228	Equinox	
+0·05	−0·47	−0·36	−0·42	−0·58	−0·68	**−0·71**	−0·50	−0·37	+0·14	+0·36	1·53	0·375	Summer	
−1·21	**−1·37**	−1·20	−1·16	−1·02	−1·00	−1·12	−1·06	−0·91	−0·52	−0·52	3·11	1·048	Year	Disturbed days.
−0·92	−1·23	−0·97	−1·24	−1·29	**−1·30**	**−1·30**	−0·90	−0·54	−0·55	+0·39	3·06	0·952	Winter	
−1·28	−1·47	−1·52	**−1·54**	−1·37	−1·29	−1·08	−0·87	−0·51	−0·21	−0·45	3·66	1·121	Equinox	
−1·46	−1·41	−1·12	−0·71	−0·39	−0·40	−0·96	−1·43	**−1·69**	−0·78	−1·51	3·98	1·150	Summer	

of North Component. All Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	
+ 5·6	+ 12·7	+ 14·0	+ **14·1**	+ 9·2	+ 3·2	+ 5·7	+ 4·0	+ 13·6	+ 3·7	− 1·3	39·5	8·74	January.
+ **15·0**	+ 12·0	+ 9·6	+ 8·3	+ 3·4	+ 5·9	+ 11·4	+ 11·4	+ 9·8	+ 2·4	+ 3·5	32·0	8·91	February.
+ **14·3**	+ 10·6	+ 11·5	+ 8·4	+ 7·6	+ 7·0	+ 8·9	+ 7·8	+ 7·4	+ 3·7	− 1·0	31·5	8·78	March.
+ **14·5**	+ 13·6	+ 11·3	+ 12·1	+ 10·9	+ 9·2	+ 8·0	+ 5·6	+ 2·1	+ 1·2	+ 0·4	33·0	9·15	April.
+ 8·8	+ **10·8**	+ 8·1	+ 7·8	+ 8·8	+ 8·8	+ 9·3	+ 4·8	+ 2·3	+ 1·3	− 2·7	24·2	7·15	May.
+ **8·6**	+ **8·6**	+ **8·6**	+ 7·1	+ 6·1	+ 6·8	+ 7·3	+ 4·5	+ 3·2	+ 1·8	− 3·2	20·6	6·49	June.
+ 9·4	+ 8·5	+ **9·6**	+ 8·3	+ 7·7	+ 6·8	+ 5·9	+ 4·2	+ 3·9	− 0·9	− 3·5	20·9	6·41	July.
+ **11·5**	+ 10·0	+ 8·1	+ 9·2	+ 8·2	+ 9·3	+ 7·3	+ 6·9	+ 4·7	+ 1·2	− 5·5	25·9	7·67	August.
+ 10·9	+ 12·9	+ 13·1	+ 12·3	+ 12·7	+ 11·5	+ 9·2	+ 11·2	+ 13·1	+ **13·8**	+ 3·3	42·8	12·79	September.
+ 16·7	+ **21·4**	+ 17·2	+ 19·3	+ 16·3	+ 20·8	+ 16·0	+ 12·4	+ 5·0	− 5·8	− 14·1	47·1	15·42	October.
+ 10·7	+ 16·7	+ 14·0	+ 12·4	+ 12·3	+ 18·5	+ 24·3	+ **22·4**	+ 20·0	+ 6·7	+ 3·8	58·9	15·49	November
+ 11·5	+ **12·5**	+ 11·4	+ 10·8	+ 9·4	+ 9·8	+ 10·3	+ 9·0	+ 7·7	+ 2·6	− 1·8	28·7	9·44	11 months.
+ 11·4	+ **12·6**	+ 11·5	+ 10·9	+ 9·3	+ 9·8	+ 10·6	+ 9·4	+ 8·3	+ 2·8	− 1·5	28·5	9·52	Year.
+ **9·6**	+ 9·5	+ 8·6	+ 8·1	+ 7·7	+ 7·9	+ 7·5	+ 5·1	+ 3·5	+ 0·9	− 3·7	22·3	6·91	Winter.
+ 14·1	+ **14·6**	+ 13·3	+ 13·0	+ 11·9	+ 12·1	+ 10·5	+ 9·3	+ 6·9	+ 3·2	− 2·9	36·7	11·35	Equinox.
+ 10·4	+ 13·8	+ 12·5	+ 11·6	+ 8·3	+ 9·2	+ 13·8	+ 13·9	+ **14·5**	+ 4·3	+ 2·0	30·9	10·72	Summer.
+ 12·7	+ **12·8**	+ 12·5	+ 10·6	+ 10·7	+ 11·1	+ 9·8	+ 7·0	+ 5·0	+ 0·9	− 5·3	27·8	9·31	Winter, 1912.
+ **6·4**	+ 6·1	+ 4·7	+ 5·6	+ 4·7	+ 4·6	+ 5·1	+ 3·3	+ 2·1	+ 0·8	− 2·2	16·6	4·48	„ 1913.
+ 13·8	+ **14·6**	+ 12·7	+ 12·2	+ 11·3	+ 11·8	+ 10·3	+ 8·8	+ 7·1	+ 3·4	− 3·6	35·6	11·01	2nd Equinox.

TABLE XXXVI.—Diurnal Inequality

Hour G.M.T.		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
		γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
Quiet days.	Year	− **8·6**	− 7·4	− 5·4	− 2·0	− 0·6	− 4·0	− 5·6	− 3·5	− 3·9	− 3·0	− 2·0	− 0·6	+ 3·0
	Winter, 1912 ...	− 4·1	− 2·3	− **5·4**	− 2·4	− 2·4	− 3·8	− 5·3	− 2·2	− 1·8	− 1·3	− 1·3	+ 1·0	+ 3·7
	„ 1913 ...	− **4·3**	− 3·5	− 3·2	− 3·4	− 1·0	− 1·3	− 1·6	− 2·8	− 1·0	− 0·3	+ 1·1	+ 0·2	+ 2·0
	Equinox	− 2·9	− 4·3	− 3·8	− 7·6	− 3·5	− 6·5	− **8·3**	− 5·3	− 5·3	− 3·4	+ 1·1	+ 2·8	+ 6·7
	Summer	− **18·9**	− 15·6	− 7·0	+ 4·1	+ 4·0	− 1·7	− 3·3	− 3·1	− 4·5	− 4·4	− 5·7	− 5·7	− 1·5
Disturbed days.	Year	− 12·0	− 29·0	− 34·0	− **35·0**	− 34·1	− 34·2	− 25·7	− 24·3	− 17·4	− 4·5	+ 7·3	+ 16·4	+ 26·2
	Winter, 1912 ...	− 26·1	− 35·0	− 29·0	− **35·6**	− 31·7	− 22·8	− 18·9	− 22·5	− 14·6	− 2·8	+ 9·5	+ 14·7	+ 22·6
	„ 1913 ...	− 14·3	− 19·7	− 19·2	− **28·8**	− 21·8	− 8·6	− 8·4	− 7·7	− 11·7	− 1·2	+ 5·3	+ 11·9	+ 9·9
	Equinox ...	− 8·9	− 20·5	− 30·8	− 40·1	− **42·1**	− 34·9	− 30·6	− 21·5	− 14·1	− 1·0	+ 9·4	+ 13·3	+ 28·3
	Summer ...	− 0·9	− 31·6	− 42·1	− 29·2	− 28·2	− **45·0**	− 27·7	− **28·9**	− 23·4	− 9·6	+ 3·0	+ 21·3	+ 27·8

TABLE XXXVII.—Diurnal Inequality

Hour G.M.T.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
January	+ 33·6	+ 19·2	+ 13·7	0·0	− 13·1	− 17·7	− 22·4	− 24·4	− 30·8	− 32·0	− **34·6**	− 33·1	− 27·8
February	+ 23·4	+ 17·5	+ 8·5	− 1·6	− 12·4	− 21·3	− 25·3	− **30·3**	− 28·4	− 25·1	− 20·1	− 19·9	− 15·1
March	+ 20·3	+ 13·7	+ 10·1	− 3·0	− 10·4	− 17·4	− **24·5**	− 23·5	− 20·2	− 23·5	− 20·2	− 17·7	− 15·6
April	+ 15·5	+ 11·0	+ 6·1	− 2·4	− 12·6	− 19·8	− 19·6	− 19·2	− 21·4	− **22·6**	− 21·1	− 21·1	− 13·6
May	+ 15·0	+ 9·2	+ 1·4	− 6·0	− 12·2	− 12·5	− 14·9	− 16·9	− 16·1	− 15·6	− **17·3**	− 15·9	− 9·3
June	+ 9·0	+ 6·0	+ 2·9	− 3·4	− 6·7	− 9·6	− 10·0	− 9·7	− 10·9	− 9·5	− 11·9	− **12·2**	− 10·3
July	+ 11·3	+ 9·4	+ 4·3	− 2·5	− 8·4	− 10·6	− 12·8	− 12·7	− 12·3	− 13·6	− **13·7**	− 13·5	− 13·4
August	+ 17·9	+ 10·1	+ 4·6	− 5·5	− 11·1	− 15·4	− **16·9**	− 13·1	− 13·3	− 16·6	− 16·3	− 15·1	− 10·5
September	+ 27·5	+ 23·1	+ 8·1	− 2·0	− 14·4	− 23·9	− 27·5	− 26·2	− 27·5	− 28·2	− **28·8**	− 24·8	− 12·8
October	+ 27·4	+ 21·2	+ 6·5	− 9·2	− 21·1	− 32·5	− 38·0	− 36·8	− **40·3**	− 38·0	− 27·7	− 25·0	− 14·8
November	+ 34·1	+ 35·1	+ 17·2	− 5·0	− 17·9	− 27·3	− 41·7	− 40·7	− **41·9**	− 38·4	− 35·0	− 28·1	− 19·8
11 months	+ 21·4	+ 16·0	+ 7·6	− 3·7	− 12·8	− 18·9	− 23·1	− 23·0	− **23·9**	− **23·9**	− 22·4	− 20·6	− 14·8
Year	+ 22·1	+ 16·6	+ 8·0	− 3·6	− 12·9	− 19·2	− 23·6	− 23·8	− **24·7**	− 24·6	− 23·0	− 21·1	− 15·3
Winter	+ 13·3	+ 8·7	+ 3·3	− 4·3	− 9·6	− 12·0	− 13·6	− 13·1	− 13·1	− 13·8	− **14·8**	− 14·2	− 10·9
Equinox	+ 22·7	+ 17·3	+ 7·7	− 4·1	− 14·6	− 23·4	− 27·4	− 26·4	− 27·3	− **28·1**	− 24·4	− 22·1	− 14·2
Summer	+ 30·4	+ 23·9	+ 13·1	− 2·2	− 14·5	− 22·1	− 29·8	− 31·8	− **33·7**	− 31·8	− 29·9	− 27·0	− 20·9
Winter, 1912	+ 18·4	+ 12·8	+ 4·6	− 4·8	− 12·6	− 15·6	− 18·6	− 17·1	− 16·2	− 17·2	− **19·6**	− 18·3	− 13·2
„ 1913	+ 8·2	+ 4·6	+ 2·0	− 4·0	− 6·7	− 8·4	− 8·7	− 9·1	− 10·0	− **10·3**	− 10·1	− 10·0	− 8·5
2nd Equinox	+ 21·7	+ 15·9	+ 6·5	− 4·2	− 14·1	− 22·5	− 26·7	− 25·0	− 25·5	− **26·8**	− 22·6	− 20·6	− 14·1

of North Component. (N.)

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.	
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ		
+ 4·7	+ 7·1	+ 5·2	+ 5·6	+ 6·0	+ 7·3	+ 6·8	+ 5·1	+ 4·0	— 2·2	— 6·0	15·9	4·57	Year.	Quiet days.
+ 5·3	+ 4·4	+ 4·3	+ 2·0	+ 2·5	+ 3·5	+ 2·8	+ 1·9	+ 2·9	— 1·4	— 0·6	10·7	2·86	Winter, 1912	
+ 4·6	+ 3·6	+ 2·7	+ 1·7	+ 2·0	+ 1·3	+ 1·8	+ 2·3	+ 0·7	— 0·2	— 2·0	8·9	2·03	,, 1913	
+ 8·1	+ 6·8	+ 3·2	+ 5·8	+ 3·4	+ 4·4	+ 4·1	+ 4·8	+ 4·3	+ 1·7	— 6·2	16·4	4·76	Equinox	
+ 0·7	+ 10·0	+ 8·2	+ 9·1	+ 12·1	+ **14·1**	+ 13·4	+ 8·5	+ 4·7	— 6·9	— 11·2	33·0	7·43	Summer	
+ **29·0**	+ **29·0**	+ 25·8	+ 22·0	+ 19·5	+ 18·4	+ 19·9	+ 16·4	+ 12·4	+ 4·0	+ 4·1	64·0	20·86	Year	Disturbed days.
+ 25·9	+ 25·8	+ 25·6	+ 26·3	+ **28·5**	+ 27·4	+ 25·7	+ 15·5	+ 5·0	+ 3·5	— 16·5	64·1	21·31	Winter, 1912	
+ 13·3	+ **20·9**	+ 10·4	+ 18·1	+ 15·3	+ 14·3	+ 15·3	+ 7·4	+ 3·6	+ 2·9	— 7·7	49·7	12·40	,, 1913	
+ 26·7	+ **30·6**	+ 29·7	+ 27·8	+ 24·7	+ 21·9	+ 17·7	+ 9·9	+ 3·0	— 1·4	+ 2·9	72·7	20·49	Equinox.	
+ **34·4**	+ 30·5	+ 22·0	+ 11·8	+ 5·3	+ 6·0	+ 16·2	+ 23·8	+ 29·3	+ 9·9	+ 25·9	79·4	22·24	Summer	

of West Component. (W.) All Days. G.M.T.

14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Range.	A.D.	Hour G.M.T.
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	
— 17·1	— 5·8	+ 3·1	+ 7·5	+ 9·6	+ 13·4	+ 21·7	+ 30·1	+ 33·7	+ **40·7**	+ 32·4	75·3	21·56	January.
— 10·0	— 1·0	+ 4·2	+ 9·1	+ 11·2	+ 12·5	+ 16·6	+ 24·9	+ **29·7**	+ 27·3	+ 25·4	60·0	17·53	February.
— 8·4	— 3·5	+ 1·6	+ 6·9	+ 6·7	+ 13·4	+ 16·2	+ 21·4	+ 25·0	+ **28·4**	+ 23·1	52·9	15·61	March.
— 7·5	— 0·8	+ 3·6	+ 6·9	+ 10·2	+ 14·0	+ 18·1	+ 22·9	+ **27·0**	+ 25·8	+ 20·7	49·6	15·15	April.
— 6·7	— 1·0	+ 3·3	+ 5·1	+ 5·3	+ 8·3	+ 15·4	+ 18·9	+ **21·3**	+ **21·3**	+ 19·7	38·6	12·02	May.
— 6·2	— 1·1	+ 1·8	+ 3·0	+ 6·1	+ 6·7	+ 10·3	+ 14·8	+ **16·0**	+ 13·5	+ 11·3	28·2	8·45	June.
— 8·5	— 2·5	+ 2·9	+ 6·7	+ 7·4	+ 7·6	+ 10·5	+ 14·9	+ 15·3	+ **18·3**	+ 15·9	32·0	10·37	July.
— 6·0	— 1·4	+ 2·8	+ 4·4	+ 5·9	+ 7·5	+ 13·1	+ 12·4	+ 17·5	+ 21·1	+ **23·9**	40·8	11·77	August.
— 4·7	+ 0·5	+ 2·1	+ 6·3	+ 10·4	+ 12·1	+ 17·3	+ **29·4**	+ 26·5	+ 28·3	+ 29·3	58·2	18·40	September.
— 10·3	+ 2·1	+ 6·2	+ 10·7	+ 17·6	+ 14·5	+ 20·3	+ 29·5	+ 38·6	+ 44·2	+ **53·6**	93·9	24·42	October.
— 13·6	— 2·4	+ 0·1	+ 7·3	+ 10·5	+ 13·0	+ 26·7	+ 35·3	+ 43·6	+ **48·5**	+ 40·1	90·4	25·97	November.
— 9·0	— 1·5	+ 2·9	+ 6·7	+ 9·2	+ 11·2	+ 16·9	+ 23·1	+ 26·7	+ **28·9**	+ 26·9	52·8	16·46	11 months.
— 9·4	— 1·7	+ 2·9	+ 6·8	+ 9·3	+ 11·3	+ 17·3	+ 23·7	+ 27·5	+ **29·7**	+ 27·3	54·4	16·89	Year.
— 6·8	— 1·5	+ 2·7	+ 4·8	+ 6·2	+ 7·5	+ 12·3	+ 15·2	+ 17·5	+ **18·5**	+ 17·7	33·3	10·64	Winter
— 7·7	— 0·4	+ 3·4	+ 7·7	+ 11·2	+ 13·5	+ 18·0	+ 25·8	+ 29·3	+ **31·7**	+ **31·7**	59·8	18·34	Equinox
— 13·6	— 3·1	+ 2·5	+ 8·0	+ 10·4	+ 13·0	+ 21·7	+ 30·1	+ 35·7	+ **38·8**	+ 32·6	72·5	21·69	Summer.
— 8·1	— 2·1	+ 1·8	+ 3·9	+ 7·3	+ 9·2	+ 15·5	+ 19·9	+ 22·2	+ **24·3**	+ 23·4	43·9	13·61	Winter, 1912.
— 5·5	— 0·8	+ 3·6	+ 5·7	+ 5·1	+ 5·8	+ 9·1	+ 10·6	+ **12·8**	+ **12·8**	+ 12·1	23·1	7·69	,, 1913.
— 7·7	— 0·5	+ 2·8	+ 7·3	+ 10·7	+ 12·9	+ 17·2	+ 24·9	+ 28·2	+ **31·3**	+ 30·9	58·1	17·52	2nd Equinox.

TABLE XXXVIII.—Diurnal Inequality of

	Hour G.M.T.	1.	2	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
		γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
Quiet days.	Year	+ 15·5	+ 7·3	− 0·7	− 7·7	− 14·0	− 12·9	**− 16·2**	− 12·7	− 12·5	− 11·7	− 10·0	− 10·0	− 8·2
	Winter, 1912 ...	**+ 10·6**	+ 5·8	+ 1·8	− 5·3	− 9·3	− 8·8	**− 10·7**	− 7·8	− 7·4	− 7·0	− 5·7	− 5·2	− 5·0
	" 1913 ...	+ 4·6	+ 1·5	+ 0·2	− 4·3	− 5·1	− 5·9	− 4·3	− 3·9	− 3·1	− 3·4	− 3·4	**− 8·0**	− 6·0
	Equinox	+ 17·7	+ 10·3	− 1·9	− 6·1	− 11·8	− 14·5	**− 14·7**	− 11·2	− 9·6	− 10·9	− 8·4	− 12·0	− 7·6
	Summer	+ 18·2	+ 5·9	− 2·1	− 11·8	− 20·9	− 15·5	**− 23·1**	− 19·1	− 20·5	− 17·2	− 15·9	− 12·9	− 12·1
Disturbed days.	Year	+ 34·0	+ 28·8	+ 21·7	+ 3·8	− 12·3	− 27·7	− 43·0	− 48·4	− 50·8	**− 52·3**	− 49·0	− 48·0	− 36·7
	Winter, 1912 ...	+ 33·4	+ 29·9	+ 9·4	− 4·9	− 19·0	− 28·8	− 38·9	**− 42·8**	− 38·5	− 40·0	− 42·8	− 42·2	− 26·2
	" 1913 ...	+ 15·3	+ 11·7	+ 2·4	− 5·3	− 10·9	− 14·6	− 24·3	− 27·9	**− 29·2**	− 25·6	− 19·5	− 22·9	− 22·9
	Equinox	+ 23·7	+ 17·6	+ 11·6	− 3·0	− 14·8	− 34·0	− 47·9	− 42·1	− 51·1	**− 55·7**	− 43·1	− 40·5	− 34·2
	Summer	+ 45·0	+ 38·8	+ 44·2	+ 19·3	− 3·0	− 20·3	− 42·1	− 60·4	**− 62·9**	− 61·3	− 61·2	− 61·2	− 49·8

West Component. (W.)

14.	15.	16.	17.	18.	19.	20	21.	22.	23.	24	Range.	A.D.	Hour G.M.T.	
γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ		
− 4·6	0·0	+ 0·2	+ 1·8	+ 4·0	+ 4·9	+ 10·6	+ 13·5	+ 18·1	+ 23·7	+ 21·2	39·9	10·08	Year	Quiet days.
− 2·5	+ 0·2	+ 1·4	+ 3·5	+ 3·4	+ 4·0	+ 9·4	+ 6·6	+ 8·5	+ 9·6	+ 9·6	21·3	6·21	Winter, 1912	
− 1·9	− 0·2	+ 3·1	+ 2·5	+ 1·4	+ 3·3	+ 3·9	+ 5·5	+ 7·1	+ 9·0	+ 7·8	17·0	4·14	,, 1913	
− 3·2	+ 1·3	+ 2·7	+ 1·6	+ 4·1	+ 5·0	+ 5·4	+ 9·7	+ 12·9	+ 19·8	+ 21·2	35·9	9·32	Equinox	
− 8·0	− 1·4	− 3·5	+ 0·4	+ 4·6	+ 5·8	+ 17·1	+ 24·2	+ 33·0	+ 41·8	+ 32·9	64·9	15·33	Summer	
− 20·4	− 6·5	+ 4·4	+ 16·5	+ 23·6	+ 25·3	+ 38·5	+ 53·1	+ 52·3	+ 50·8	+ 42·2	105·4	32·92	Year	Disturbed days.
− 17·2	− 6·8	− 1·9	+ 5·1	+ 14·3	+ 19·3	+ 39·7	+ 48·6	+ 50·1	+ 51·5	+ 48·7	94·3	29·17	Winter, 1912	
− 18·3	− 3·8	+ 5·5	+ 11·3	+ 15·4	+ 18·6	+ 25·2	+ 31·5	+ 35·0	+ 29·7	+ 23·5	64·2	18·76	,, 1913	
− 16·4	− 4·0	+ 2 6	+ 18·6	+ 27·7	+ 31·7	+ 38·8	+ 61·1	+ 58·9	+ 51·1	+ 43·6	116·8	32·24	Equinox	
− 27·7	− 8·6	+ 12·4	+ 25·8	+ 28·9	+ 24·9	+ 37·1	+ 49·6	+ 47·9	+ 49·8	+ 34·4	112·7	38·19	Summer	

Section 9.—Inclination.—If inclination inequalities in Table XXXIV are compared with corresponding H inequalities in Table XXVII, it will be seen that the hours of maximum in the one coincide or nearly so with the hours of minimum in the other, and conversely. The extent to which the one set of inequalities is the inverse of the other will be realised, on comparing corresponding curves in Plates XIII and XV. Near the magnetic poles there might be an advantage in taking the inclination of the dip needle to the vertical—*i.e.*, the co-dip—as the variable, rather than the inclination to the horizon. Curves representing the diurnal variations of H and the co-dip would be closely alike. The range of the diurnal inequality in I is not very large, even in disturbed days. Thus the absolute determination of I can be effected with very considerable accuracy. This does not mean, however, that dip observations afford at all a satisfactory way of arriving at absolute values of V, because the influence on I of a trifling change in H can neutralise the influence of a large change in V.

Section 10.—North component.—It is obvious *à priori* from the respective sizes of the coefficients of ΔH and ΔD in the formula for ΔN that diurnal inequalities in N and H will usually present a close similarity. This appeals at once to the eye, so far as the seasonal inequalities are concerned, if we compare the N curves in Plate XVI with the corresponding all day H curves in Plate XIII. There is even, in general, a pretty close resemblance between the corresponding inequalities for individual months in Tables XXXV and XXVII. As with H, the time of maximum in N is more variable than the time of minimum, and there is the same tendency towards two maxima separated by a few hours, with an intervening minimum, usually poorly defined. In one or two individual months the range of the N inequality is slightly in excess of that of the corresponding H inequality; but in most months, and in all the seasonal inequalities, the H range is the larger. The A.D. is invariably larger for H than for N, though the excess is usually small.

In comparing the quiet and disturbed day N inequalities in Table XXXVI with the seasonal inequalities of H in Tables XXVIII and XXIX, it must be remembered that, as already explained in sect. 5, "year" does not mean exactly the same combination of months for the two elements. The inequalities for summer and for the winters of 1912 and 1913 are directly comparable; also the equinox for N is the same as the second equinox for H. In the case alike of the quiet and of the disturbed days the N range exceeds the H range in winter, 1913; also in quiet days in summer, N has a larger range than H. In every case the superiority in A.D. lies with H.

Section 11.—West component.—Writing $0 \cdot 9\gamma$ for $1'$ in D, it will be found that the W and D inequalities resemble one another about as closely as the N and H inequalities did. The large loss of H trace during January, 1913, makes the W and D inequalities less comparable for that than the other months. But even in January the inequalities in Tables XXXVII and XXIII have a close resemblance. The absence of December data for W affects the comparability of the W and D inequalities for summer as well as the year. The seasonal inequalities directly comparable in Tables XXXVII and XXIII are those for the several equinoxes and winters. Converting the

D inequalities from angular to c.g.s. measure, it will be found that in the case of the seasons the W and D ranges are closely alike. The A.D., however, is slightly larger for W than for D.

Comparing the W inequalities for quiet and disturbed days in Table XXXVIII with the corresponding D inequalities in Tables XXIV and XXV, converted into c.g.s. measure, it will be found that W has usually the larger A.D., and usually also the larger range, but the excesses are mostly very small.

The close resemblance between the H and N inequalities and between the D and W inequalities is one reason for restricting the number of N and W inequalities, and for exhibiting only all day N and W curves in Plate XVI.

Comparing the seasonal inequalities in Tables XXXVII and XXXI, it will be found that the range and A.D. are both distinctly larger for the all-day V. than the all-day W inequalities, but the excess is usually not very great. The excess is hardly large enough to impress the eye on inspection of Plate XVI, but the lesser amplitude of the N changes in that plate is visible at a glance.

Section 12.—Table XXXIX shows the varying influence of disturbance on the size of the diurnal inequality at different seasons of the year. It gives the ratio borne by the range (R) or average departure (A.D.) of the inequality derived from the 5 monthly disturbed days to the corresponding R. or A.D. of the international quiet days. The ratio would obviously fall if the selected days in either category numbered 10 instead of 5 a month. But 5 has been the recognised number under the international scheme, and has the advantage over 10 that there are few months in which fewer than 5 days of small disturbance in ordinary latitudes present themselves.

TABLE XXXIX.—Ratio of Disturbed Day R or A.D. to Quiet Day R or A.D.

Element.	Year.		Winter.		Equinox.		Summer.		Mean.	
	R.	A.D.	R.	A.D.	R.	A.D	R.	A.D.	R.	A.D.
D	2·5	3·1	4·4	4·6	3·0	3·2	1·9	2·4	3·0	3·3
H	4·3	4·5	6·5	7·3	4·3	4·7	2·6	3·1	4·4	4·9
V	2·1	2·1	2·9	3·3	2·1	2·5	1·6	1·5	2·2	2·4
N	4·0	4·6	6·0	7·4	4·5	4·3	2·4	3·0	4·2	4·8
W	2·6	3·3	4·4	4·7	3·3	3·5	1·7	2·5	3·0	3·5
Mean ...	3·1	3·5	4·8	5·5	3·4	3·6	2·0	2·5	3·4	3·8

According to Table XXXIX, in Adelie Land, the influence of disturbance measured by the percentage increase of the range or A.D. is quite twice as great in winter as in summer, and is at all seasons about twice as large for horizontal force as for vertical force. On the whole, it is decidedly greater for the A.D. than the range. The effect is very similar for D and W, and again for H and N ; but on the whole H seems the element most affected. If the diurnal inequality is derivable from a potential, that potential, so far as high latitudes are concerned, must vary enormously according to the choice of days from which the inequality is derived.

CHAPTER VIII.

VECTOR DIAGRAMS AND FOURIER ANALYSIS.

Section 13.—Plate XVII contains vector diagrams derived from the N, W and V diurnal inequalities. The four horizontal plane (W.N.) vector diagrams on the left of the plate represent the all-day inequalities for the year and seasons, and all 24 hours are represented. These diagrams, except the summer one, have a fairly regular elliptical form, the major axis lying roughly east and west. The time shown is G.M.T., and the diagrams—like those at Cape Evans—are described in the anti-clockwise direction. Except in winter, the area described by the radius vector during the 12 hours commencing at 15h. G.M.T. (0h. 30m. L.M.T.)—*i.e.*, local forenoon—is somewhat smaller than that described during the remaining 12 hours.

The other 5 sets of W.N. diagrams in Plate XVII are limited to 8 points, each having for its W and N co-ordinates means from 3 successive hours G.M.T. For instance, the co-ordinates of the point marked 6 are the arithmetic means of the co-ordinates which the inequalities give for 5h., 6h., and 7h. This course was adopted because when all 24 hours values were used the consequent irregularity tended to defeat the primary object of the diagrams, viz., the clear presentation of the general character of the phenomena. Corresponding quiet day (...), all-day (—) and disturbed day (- -) diagrams are drawn from a common centre, but the summer quiet day diagram had to be omitted, as it unduly confused the figure. The tendency exhibited by all the diagrams to be elongated in one direction—usually a little north of west—is less marked in the disturbed than in the quiet day diagrams. This is, of course, in accordance with Table XXXIX. Separate diagrams are given for winter 1912 and winter 1913. In comparing them some allowance is necessary for the absence in 1913 of quiet and disturbed day data for August. This could explain, however, only a minor part of the reduction apparent.

In all the 8-point diagrams, alike for all days and for quiet and disturbed days, Equinox signifies September and October, 1912, with March and April, 1913, whilst year represents a mean derived from this equinox, from winter, 1912, and from summer.

The upper part of the right hand side of Plate XVII contains eight V N diagrams (*i.e.*, diagrams in the vertical plane which contains the astronomical meridian). Below them are three V W diagrams (*i.e.*, diagrams in the vertical plane perpendicular to the meridian). In all these V N and V W diagrams there are only eight points, the co-ordinates of each representing the arithmetic mean of the inequality figures for three successive hours.

It would, as a matter of fact, have made little difference if the points had represented only 0h., 3h., 6h., &c., the other 16 hours being left wholly out of account. The shape of the V W diagrams allowed quiet day, all day, and disturbed day curves to be drawn from a common centre. This was impossible for the V N diagrams, each of which has an origin to itself. Of the eight drawn only one, representing the year, is for disturbed days. Four are all-day diagrams, representing the year, summer, equinox, and winter, 1912. Three are quiet day diagrams, representing the year, equinox and summer. In these V N diagrams equinox represents the combination of September and October, 1912, with March and April, 1913, and year has the same significance as for the 8-point W N diagrams.

The most abnormal feature in Plate XVII is the extremely elongated shape of the V N diagrams. Those for the quiet days have more of a dog-legged appearance than the others. The elongated shape means that the diurnal variations in V and N follow closely parallel courses, maxima and minima in the two elements occurring at nearly the same hours. This fact appeals to the eye when we compare the N and V curves for the year in Plate XVI. If the V N diagrams reduced to a straight line, it would imply that the force system to which the diurnal changes are ascribable is uniplaner. While this is not actually the case, there is a decided approach to it.

The directions in which the axes of co-ordinates are drawn for the V N and V W diagrams are, so far, arbitrary, and must be noted when considering the significance of the directions in which the diagrams are described. It will be observed that while most of the V N diagrams are described wholly or chiefly in the clockwise direction, the quiet day diagrams for the year and summer are described anti-clockwise.

The V W diagrams are of similar type to the W N diagrams, but the outline is more nearly circular.

Section 14.—The diurnal inequalities were analysed into the equivalent Fourier series—

$$a_1 \cos t + b_1 \sin t + a_2 \cos 2t + b_2 \sin 2t + \ldots$$

$$c_1 \sin (t + a_1) + c_2 \sin (2t + a_2) + \ldots$$

where $c_n = \sqrt{a_n^2 + b_n^2}$, $\tan \alpha_n = \dfrac{a_n}{b_n}$,

t representing the time angle counted from 0 h, G.M.T. The angular equivalent of 1 hour is 15°, 30°, 45° or 60°, according as the Fourier wave has the period 24, 12, 8 or 6 hours. The hourly values employed in the calculations being 60-minute means, correction factors were applied as follows :—1·00286 to the 24-hour term (*i.e.*, to a_1, b_1, &c.), 1·01152 to the 12-hour term, 1·02617 to the 8-hour and 1·04720 to the 6-hour terms. The results appear in Tables XL to XLVII.

TABLE XL.—D. Fourier Co-efficients. All Complete Days. G.M.T.

Month or Season.	a_1.	b_1.	a_2.	b_2.	a_3.	b_3.	a_4.	b_4.
1912.	′	′	′	′	′	′	′	′
April	+ 26·33	— 16·15	+ 2·17	+ 2·51	+ 1·64	— 0·08	— 3·45	+ 0·09
May	+ 19·37	— 12·40	+ 5·57	+ 0·89	+ 2·61	— 1·03	— 1·64	+ 0·47
June	+ 15·19	— 6·37	+ 2·13	— 1·50	+ 1·65	+ 0·86	— 1·72	— 0·64
July	+ 18·88	— 9·27	+ 2·22	+ 0·11	+ 2·85	+ 1·89	— 1·29	— 1·29
August	+ 27·87	— 13·00	+ 6·36	+ 2·13	+ 4·71	+ 1·63	— 1·53	+ 1·70
September	+ 27·37	— 14·85	+ 5·20	+ 4·71	+ 2·01	+ 0·60	— 3·00	+ 1·78
October	+ 34·59	— 22·18	+ 10·23	+ 4·43	+ 5·03	— 0·26	+ 1·75	— 1·82
November	+ 39·15	— 19·35	+ 9·65	+ 5·90	+ 1·23	+ 0·51	— 2·23	— 0·86
December	+ 41·51	— 22·75	+ 16·78	— 3·11	+ 5·55	— 1·62	— 0·45	+ 0·28
1913.								
January	+ 33·54	— 14·35	+ 3·06	— 0·61	+ 5·25	+ 0·33	— 1·87	— 0·22
February	+ 24·84	— 15·09	+ 4·56	+ 2·94	+ 0·88	+ 1·32	— 0·79	— 2·02
March	+ 23·02	— 12·32	+ 3·96	+ 1·54	+ 1·07	+ 0·95	— 1·24	— 1·18
April	+ 17·11	— 10·73	+ 2·41	— 1·99	+ 1·62	— 0·25	— 1·12	— 1·53
May	+ 15·04	— 8·95	+ 1·36	+ 0·15	+ 2·45	— 0·01	— 0·52	— 0·66
June	+ 9·63	— 6·24	+ 0·06	— 0·36	+ 1·13	— 0·16	— 1·57	— 0·52
July	+ 11·51	— 6·60	+ 0·73	— 0·09	+ 1·65	+ 0·88	— 0·25	— 0·94
August	+ 6·66	— 5·37	+ 2·13	— 0·22	+ 2·60	+ 0·92	+ 1·48	— 0·70
Year	+ 25·65	— 14·03	+ 5·50	+ 1·38	+ 2·71	+ 0·35	— 1·14	— 0·50
Winter	+ 15·52	— 8·52	+ 2·57	+ 0·14	+ 2·46	+ 0·62	— 0·88	— 0·32
Equinox	+ 26·68	— 15·70	+ 5·42	+ 2·73	+ 2·44	+ 0·28	— 1·19	— 0·48
Summer	+ 34·76	— 17·88	+ 8·51	+ 1·28	+ 3·23	+ 0·14	— 1·33	— 0·71
Winter, 1912... ...	+ 20·33	— 10·26	+ 4·07	+ 0·41	+ 2·96	+ 0·84	— 1·54	+ 0·06
„ 1913... ...	+ 10·71	— 6·79	+ 1·07	— 0·13	+ 1·96	+ 0·41	— 0·21	— 0·70
2nd Equinox... ...	+ 25·52	— 15·02	+ 5·45	+ 2·17	+ 2·43	+ 0·26	— 0·90	— 0·69

TABLE XLI.—D. Fourier Co-efficients. All Complete Days. G.M.T.

Month or Season.	c_1.	a_1.	c_2.	a_2.	c_3.	a_3.	c_4.	a_4.
1912.	′	° ′	′	°	′	°	′	°
April	30·88	121 31	3·32	40·8	1·64	93	3·45	272
May	22·99	122 37	5·65	80·9	2·80	111	1·71	286
June	16·47	112 45	2·61	125·0	1·86	62	1·83	250
July	21·03	116 8	2·22	87·1	3·42	57	1·82	225
August	30·75	115 0	6·71	71·5	4·98	71	2·28	318
September	31·13	118 29	7·02	47·8	2·10	74	3·48	301
October	41·09	122 40	11·15	66·6	5·04	93	2·52	136
November	43·67	116 18	11·31	58·6	1·33	67	2·39	249
December	47·34	118 44	17·06	100·5	5·78	106	0·53	302
1913.								
January	36·48	113 10	3·11	101·2	5·26	86	1·89	263
February	29·06	121 17	5·43	57·2	1·59	34	2·17	201
March	26·11	118 10	4·25	68·7	1·43	48	1·71	226
April	20·20	122 69	3·13	129·5	1·64	99	1·89	216
May	17·51	120 45	1·37	83·8	2·45	90	0·84	218
June	11·48	122 56	0·37	170·6	1·14	98	1·65	252
July	13·27	119 49	0·73	97·4	1·87	62	0·97	195
August	8·55	128 54	2·14	95·9	2·76	71	1·64	115
Year	29·24	118 41	5·67	75·9	2·74	82	1·24	246
Winter	17·71	118 46	2·57	86·9	2·54	76	0·94	250
Equinox	30·95	120 28	6·07	63·2	2·45	83	1·29	248
Summer	39·09	117 13	8·61	81·5	3·23	88	1·51	242
Winter, 1912...	22·76	116 46	4·09	84·3	3·07	74	1·55	272
" 1913...	12·68	122 22	1·08	97·1	2·00	78	0·74	197
2nd Equinox...	29·61	120 29	5·87	68·3	2·45	84	1·14	233

TABLE XLII.—H. Fourier Co-efficients. All Complete Days. G.M.T.

Month or Season.	a_1.	b_1.	a_2.	b_2.	a_3.	b_3.	a_4.	b_4.
1912.	γ	γ	γ	γ	γ	γ	γ	γ
April	− 2·06	− 17·48	+ 3·27	+ 1·38	+ 0·84	− 0·71	+ 0·97	+ 2·58
May	− 2·44	− 13·10	+ 1·06	− 0·27	− 0·89	− 1·90	− 0·27	+ 0·28
June	− 3·31	− 12·59	+ 1·72	− 0·91	− 0·55	− 1·84	+ 0·32	− 0·35
July	− 3·31	− 12·40	+ 0·09	− 0·97	+ 0·14	− 1·63	− 0·34	+ 0·44
August	− 5·05	− 19·41	+ 1·68	− 2·97	+ 0·79	− 1·41	− 0·97	− 0·21
September	− 2·55	− 19·23	+ 5·79	− 4·86	+ 2·50	− 2·27	+ 1·88	− 1·30
October	− 6·91	− 23·46	+ 2·50	− 1·80	− 1·58	+ 0·07	− 1·56	+ 0·98
November	+ 1·07	− 25·15	+ 5·06	− 6·99	+ 0·50	− 4·40	+ 0·22	+ 0·01
1913.								
January	+ 5·99	− 12·71	− 0·17	+ 6·66	− 0·13	− 3·46	− 0·32	− 4·19
February	+ 1·66	− 14·55	+ 4·33	+ 1·11	− 0·31	+ 2·85	− 1·03	+ 1·26
March	− 0·99	− 14·20	+ 4·08	− 0·42	+ 0·34	− 1·37	− 0·12	+ 0·34
April	− 2·75	− 12·71	+ 2·84	− 0·13	+ 0·82	− 0·50	− 0·90	+ 0·89
May	− 2·13	− 9·50	+ 0·78	− 1·93	+ 0·79	− 0·82	+ 1·08	+ 1·22
June	− 2·02	− 6·87	+ 0·11	− 1·54	+ 0·54	− 1·54	+ 0·43	+ 0·25
July	− 2·41	− 7·21	+ 0·29	− 0·87	+ 0·76	− 1·28	+ 0·40	− 0·51
August	− 1·97	− 3·82	+ 0·36	− 1·33	− 0·02	− 1·52	− 0·08	+ 0·59
Year	− 1·04	− 15·36	+ 2·56	− 0·90	+ 0·25	− 1·40	− 0·08	− 0·11
Winter	− 2·83	− 10·61	+ 0·76	− 1·35	+ 0·19	− 1·49	+ 0·07	+ 0·22
Equinox	− 3·21	− 18·00	+ 3·86	− 1·61	+ 0·52	− 1·04	+ 0·06	+ 0·44
Summer	+ 2·91	− 17·47	+ 3·07	+ 0·26	+ 0·02	− 1·67	− 0·38	− 0·97
Winter, 1912... ...	− 3·53	− 14·37	+ 1·14	− 1·28	− 0·13	− 1·69	− 0·31	+ 0·04
„ 1913... ...	− 2·14	− 6·85	+ 0·38	− 1·42	+ 0·52	− 1·29	+ 0·46	+ 0·39
2nd Equinox... ...	− 3·30	− 17·40	+ 3·80	− 1·80	+ 0·52	− 1·02	− 0·17	+ 0·23

TABLE XLIII.—H. Fourier Co-efficients. All Complete Days. G.M.T.

Month or Season.	c_1.	a_1.	c_2.	a_2.	c_3.	a_3.	c_4.	a_4.
1912.	γ	° ′	γ	°	γ	°	γ	°
April	17·60	186 43	3·55	67·1	1·10	130	2·76	21
May	13·33	190 32	1·10	104·4	2·10	205	0·39	316
June	13·01	194 44	1·95	117·9	1·92	197	0·47	137
July	12·83	194 57	0·98	174·6	1·64	175	0·55	323
August	20·05	194 36	3·42	150·6	1·61	151	1·00	258
September	19·40	187 33	7·55	130·0	3·38	132	2·29	125
October	24·45	196 25	3·08	125·8	1·58	273	1·85	302
November	25·17	177 33	8·63	144·1	4·43	173	0·22	88
1913.								
January	14·04	154 46	6·66	358·5	3·46	182	4·20	184
February	14·65	173 28	4·47	75·6	2·87	354	1·63	321
March	14·23	183 59	4·10	95·9	1·41	166	0·36	341
April	13·00	192 13	2·85	92·6	0·96	122	1·27	315
May	9·73	192 38	2·08	158·0	1·14	136	1·63	41
June	7·17	196 24	1·54	176·0	1·64	161	0·50	60
July	7·60	198 31	0·92	161·6	1·49	149	0·64	142
August	4·30	207 18	1·37	164·9	1·52	181	0·59	352
Year	15·40	183 52	2·71	109·4	1·42	170	0·13	218
Winter	10·98	194 56	1·55	150·6	1·50	173	0 23	18
Equinox	18·27	190 7	4·18	112·6	1·17	153	0·44	8
Summer	17·72	170 33	3·08	85·2	1·67	179	1·04	201
Winter, 1912... ...	14·75	193 48	1·69	138·4	1·65	184	0·30	278
,, 1913... ...	7·18	197 18	1·47	164·9	1·39	158	0·60	50
2nd Equinox... ...	17·72	190 44	4·20	115·4	1·14	153	0·29	323

TABLE XLIV.—V. Fourier Co-efficients. All Complete Days. G.M.T.

Month or Season.	a_1.	b_1.	a_2.	b_2.	a_3.	b_3.	a_4.	b_4.
1912.	γ	γ	γ	γ	γ	γ	γ	γ
April	−19·11	−19·89	+ 5·39	− 9·73	+ 3·59	− 0·10	+ 3·15	+ 3·20
May	−14·70	−17·45	+ 2·36	− 6·46	− 1·23	− 3·08	+ 1·01	− 0·40
June	−10·77	−17·37	+ 1·05	− 0·73	− 0·44	− 4·24	− 1·71	+ 1·20
July	−12·81	−19·51	+ 0·52	− 3·97	+ 1·73	− 4·79	− 1·24	+ 0·39
August	−10·20	−21·94	+ 3·85	− 9·59	+ 2·66	− 3·15	+ 0·14	− 0·32
September	− 9·03	−19·37	+ 5·24	−12·37	+ 1·34	− 2·21	+ 1·60	− 0·21
October	−13·89	−31·64	+ 6·24	−16·40	+ 1·48	− 4·27	+ 1·49	+ 0·95
November	−10·58	−35·84	+ 6·36	−20·13	+ 4·85	− 8·05	+ 5·25	+ 2·48
1913.								
January	− 3·23	−35·30	+10·36	−10·46	+ 2·89	− 3·25	+ 0·24	+ 0·89
February	− 6·26	−32·96	+ 9·59	− 9·63	+ 3·58	− 3·31	+ 0·89	+ 2·46
March	−10·88	−27·58	+ 6·24	− 8·89	+ 3·25	− 1·26	− 0·21	+ 0·42
April	− 9·38	−18·97	+ 2·31	− 5·08	+ 2·37	− 1·38	− 0·58	+ 1·27
May	− 9·88	−15·49	+ 0·17	− 3·31	+ 0·40	− 3·06	+ 0·35	+ 0·82
June	− 7·69	− 9·48	+ 0·38	− 2·03	+ 0·16	− 2·78	+ 0·15	+ 0·63
July	− 4·46	−12·08	+ 0·82	− 2·19	+ 0·56	− 2·08	− 0·46	+ 0·70
August	− 4·47	− 5·93	+ 0·16	− 0·50	+ 1·65	− 2·82	− 0·82	+ 0·79
Year	− 9·36	−24·70	+ 5·11	− 9·43	+ 2·24	− 3·41	+ 0·95	+ 1·09
Winter	− 9·37	−14·91	+ 1·16	− 3·60	+ 0·69	− 3·25	− 0·32	+ 0·48
Equinox	−12·01	−24·50	+ 5·39	−11·27	+ 2·26	− 2·12	+ 1·04	+ 0·85
Summer	− 6·69	−34·70	+ 8·77	−13·41	+ 3·77	− 4·87	+ 2·13	+ 1·94
Winter, 1912... ...	−12·12	−19·07	+ 1·94	− 5·19	+ 0·68	− 3·82	− 0·45	+ 0·21
" 1913... ...	− 6·63	−10·74	+ 0·38	− 2·01	+ 0·69	− 2·69	− 0·20	+ 0·73
2nd Equinox... ...	−10·80	−24·39	+ 5·01	−10·68	+ 2·11	− 2·28	+ 0·57	+ 0·61

TABLE XLV.—V. Fourier Co-efficients. All Complete Days. G.M.T.

Month or Season.	c_1.	a_1.	c_2.	a_2.	c_3.	a_3.	c_4.	a_4.
1912.	γ	° ′	γ	°	γ	°	γ	°
April	27·57	223 52	11·13	151·0	3·59	92	4·49	45
May	22·81	220 6	6·88	159·8	3·31	202	1·08	112
June	20·44	211 48	1·28	124·9	4·26	186	2·09	305
July	23·34	213 18	4·01	172·6	5·10	160	1·30	287
August	24·19	204 56	10·33	158·1	4·12	140	0·35	157
September	21·36	205 0	13·44	157·0	2·58	149	1·61	98
October ...	34·55	203 42	17·55	159·2	4·52	161	1·77	57
November	37·36	196 27	21·13	162·5	9·40	149	5·80	65
1913.								
January	35·44	185 14	14·73	135·3	4·35	138	0·92	15
February ...	33·54	190 45	13·59	135·1	4·87	133	2·61	20
March	29·65	201 32	10·86	145·0	3·49	111	0·47	333
April	21·17	206 19	5·58	155·6	2·74	120	1·40	335
May	16·76	212 32	3·31	177·0	3·08	173	0·89	23
June	12·21	219 4	2·07	169·5	2·79	177	0·66	13
July	12·87	200 16	2·34	159·6	2·15	165	0·84	327
August	7·43	217 1	0·52	162·3	3·27	150	1·14	314
Year	26·42	200 45	10·73	151·5	4·08	147	1·44	41
Winter	17·61	212 9	3·78	162·1	3·32	168	0·57	326
Equinox	27·28	206 7	12·49	154·4	3·10	133	1·34	51
Summer	35·33	190 55	16·02	146·8	6·16	142	2·88	48
Winter, 1912... ...	22·60	212 26	5·54	159·5	3·88	170	0·50	295
„ 1913... ...	12·62	211 40	2·05	169·2	2·77	166	0·76	345
2nd Equinox... ...	26·67	203 53	11·80	154·9	3·11	137	0·84	43

TABLE XLVI.—D, H, and V Fourier Co-efficients. Quiet (q) and Disturbed (d) Days. G.M.T.

Month or Season.	a_1.	b_1.	a_2.	b_2.	a_3.	b_3.	a_4.	b_4.
Winter, 1912. May to August.								
D q	+ 7·71′	— 6·10′	+ 2·98′	+ 0·05′	+ 1·33′	+ 1·62′	— 0·42′	+ 0·66′
D d	+ 45·89′	—21·65′	+ 7·44′	— 0·13′	+ 2·51′	— 1·17′	— 3·67′	— 0·07′
H q	— 0·53 γ	— 4·57 γ	+ 0·49 γ	+ 0·27 γ	— 0·24 γ	— 0·79 γ	— 0·60 γ	+ 0·16 γ
H d	— 8·33 γ	—31·99 γ	+ 0·64 γ	— 3·50 γ	— 2·37 γ	— 3·05 γ	+ 1·41 γ	— 0·01 γ
V q	— 5·42 γ	—10·73 γ	+ 1·42 γ	— 4·81 γ	+ 2·27 γ	— 2·47 γ	+ 0·07 γ	+ 0·66 γ
V d	—28·99 γ	—29·25 γ	+ 2·76 γ	— 1·51 γ	— 2·43 γ	— 4·68 γ	— 1·85 γ	— 0·74 γ
Winter, 1913. May to July.								
D q	+ 5·43′	— 3·80′	+ 1·24′	— 1·04′	+ 2·43′	+ 0·51′	— 0·73′	— 0·64′
D d	+ 27·09′	—16·61′	+ 0·84′	— 1·54′	+ 0·31′	+ 0·24′	— 0·35′	— 2·20′
H q	— 1·01 γ	— 3·03 γ	— 0·07 γ	— 0·26 γ	— 0·06 γ	— 1·01 γ	— 0·33 γ	— 0·36 γ
H d	— 5·27 γ	—19·00 γ	+ 0·27 γ	— 3·16 γ	+ 0·44 γ	— 2·31 γ	+ 2·06 γ	+ 0·68 γ
V q	— 4·33 γ	— 5·73 γ	— 0·05 γ	— 2·09 γ	+ 0·54 γ	— 2·16 γ	+ 0·19 γ	+ 0·57 γ
V d	—16·59 γ	—25·45 γ	— 2·06 γ	— 1·69 γ	— 0·36 γ	— 3·52 γ	— 1·14 γ	+ 2·71 γ
Equinox. September, October, 1912; March, April, 1913.								
D q	+ 12·60′	— 7·84′	+ 5·86′	+ 0·39′	+ 4·66′	+ 1·49′	+ 0·10′	+ 0·15′
D d	+ 47·49′	—29·47′	+ 1·13′	— 0·13′	— 0·91′	— 3·29′	— 1·30′	— 3·88′
H q	— 0·52 γ	— 7·18 γ	+ 1·64 γ	+ 0·63 γ	— 0·89 γ	— 1·26 γ	— 0·52 γ	+ 0·09 γ
H d	— 6·76 γ	—33·87 γ	+ 7·01 γ	+ 0·39 γ	+ 2·05 γ	+ 1·03 γ	+ 1·06 γ	+ 1·69 γ
V q	— 6·43 γ	—15·45 γ	+ 4·84 γ	— 8·20 γ	+ 4·29 γ	— 1·97 γ	+ 1·09 γ	+ 1·27 γ
V d	—19·51 γ	—37·22 γ	+ 7·23 γ	—11·22 γ	+ 2·19 γ	— 0·23 γ	+ 0·80 γ	— 0·63 γ
Summer.								
D q	+ 23·95′	—15·13′	+ 10·85′	— 4·43′	+ 4·59′	— 2·63′	— 0·13′	— 0·66′
D d	+ 61·29′	—27·34′	— 0·96′	+ 6·64′	+ 1·16′	— 0·33′	— 3·35′	— 4·61′
H q	+ 0·37 γ	— 9·22 γ	— 6·90 γ	— 1·72 γ	— 2·69 γ	— 2·73 γ	— 1·82 γ	— 2·23 γ
H d	+ 0·94 γ	—31·98 γ	+ 14·13 γ	— 0·37 γ	+ 1·43 γ	— 9·32 γ	+ 1·08 γ	— 1·59 γ
V q	— 2·27 γ	—31·11 γ	+ 6·02 γ	—10·98 γ	+ 1·08 γ	— 0·97 γ	— 1·51 γ	+ 2·12 γ
V d	—21·64 γ	—39·18 γ	+ 9·41 γ	—15·36 γ	+ 3·23 γ	—14·22 γ	+ 2·23 γ	+ 2·21 γ

TABLE XLVII.—D, H, and V Fourier Co-efficients. Quiet (q) and Disturbed (d) Days. G.M.T.

Month or Season.		c_1.	a_1.	c_2.	a_2.	c_3.	a_3.	c_4.	a_4.
Winter, 1912. May to August.									
D	q	9·83′	128° 20′	2·98′	89·0°	2·10′	39°	0·78′	328°
	d	50·75′	115 16	7·45′	91·0	2·77′	115	3·67′	269
H	q	4·60 γ	186 38	0·56 γ	60·6	0·82 γ	197	0·62 γ	285
	d	33·06 γ	194 36	3·56 γ	169·7	3·86 γ	218	1·41 γ	90
V	q	12·02 γ	206 47	5·02 γ	163·6	3·36 γ	137	0·66 γ	6
	d	41·17 γ	224 45	3·15 γ	118·6	5·27 γ	207	2·00 γ	248
Winter, 1913. May to July.									
D	q	6·63′	124° 59′	1·62′	130·0°	2·48′	78°	0·97′	229°
	d	31·77′	121 30	1·75′	151·4	0·39′	53	2·23′	189
H	q	3·20 γ	198 26	0·27 γ	195·3	1·01 γ	184	0·48 γ	223
	d	19·72 γ	195 30	3·17 γ	175·1	2·35 γ	169	2·17 γ	72
V	q	7·18 γ	217 5	2·09 γ	181·5	2·22 γ	166	0·60 γ	18
	d	30·37 γ	213 6	2·67 γ	230·6	3·54 γ	186	2·94 γ	337
Equinox. September, October, 1912; March, April, 1913.									
D	q	14·84′	121° 54′	5·87′	86·2°	4·89′	72°	0·18′	36°
	d	55·90′	121 50	1·14′	96·7	3·42′	196	4·10′	199
H	q	7·20 γ	184 6	1·76 γ	69·1	1·54 γ	215	0·52 γ	280
	d	34·53 γ	191 17	7·02 γ	86·8	2·30 γ	63	1·99 γ	32
V	q	16·73 γ	202 37	9·52 γ	149·5	4·72 γ	115	1·67 γ	41
	d	42·02 γ	207 40	13·35 γ	147·2	2·21 γ	96	1·02 γ	128
Summer.									
D	q	28·33′	122° 18′	11·72′	112·2°	5·29′	120°	0·68′	191°
	d	67·11′	114 2	6·70′	351·8	1·20′	106	5·79′	216
H	q	9·22 γ	177 42	7·11 γ	256·1	3·83 γ	225	2·88 γ	219
	d	31·99 γ	178 19	14·14 γ	91·5	9·43 γ	171	1·92 γ	146
V	q	31·19 γ	184 10	11·17 γ	151·3	1·45 γ	132	2·60 γ	325
	d	44·75 γ	208 55	18·02 γ	148·5	14·58 γ	167	3·14 γ	45

Tables XL and XLI are calculated from the all-day D inequalities in Table XXIII. The seasonal values of the a and b co-efficients are the arithmetic means of the values for the months composing the season. The phase angles were all calculated to minutes, but are given only to the nearest degree in the case of the 8-hour and 6-hour waves, and to the nearest 0°·1 in the 12-hour wave. The values of the co-efficients contain a considerable " accidental " element, especially in the case of 8-hour and 6-hour terms in individual months. It would require a large number of years to give smooth results.

The amplitude c_1 of the 24-hour wave in Table XLI shows rather a regular annual variation. Like the range of the diurnal inequality, it is much larger in summer than in winter, equinox holding an intermediate position.

The apparent variations in the phase angle a_1 are not large, and are decidedly irregular. In view of the small difference between the phase angles found for the several seasons, it is not unlikely that the variations apparent are largely accidental, and not representative of the normal year.

The amplitude c_2 of the 12-hour term is of the order of one-fifth of c_1, and like it shows a distinct annual variation, with the maximum in summer and minimum in winter.

The apparent variation of a_2 is very irregular, and the range of values considerable.

Both the amplitudes and the phase angles of the 8-hour and 6-hour waves show an irregular annual variation, but the differences between the phase angles for the several seasons are comparatively small. The value found for c_3 exceeds that found for c_4 in all seasons.

Tables XLII and XLIII for H are calculated from the all-day diurnal inequalitie, in Table XXVII. The seasonal variation in c_1 in Table XLIII, though decided, is less regular than in the case of D in Table XLI. The phase angle a_1, also shows a wider range than in the case of D. As the three lowest values of a_1 occur in summer months, there is presumably a real phase difference between summer and winter. c_2 and a_2 vary rather irregularly from month to month, the value of a_2 for January being very outstanding. As only 15 days' records were available, chance would naturally play a larger part than usual. It is the difference between the phase angles in November, January, and February that is responsible for the summer value of c_2 being exceeded by the equinoctial. The winter months all give low values for c_2.

In the case of the 8-hour wave the February phase angle, and to a lesser extent the October phase angle, appear abnormal. With these exceptions, the values of a_3 are more harmonious than might have been expected, considering the smallness of c_3. The values obtained for c_4, in many of the months are so small that the irregularities in a_4 are not surprising. The insignificance of the seasonal values of c_4 arises in considerable measure from the differences in the phase angles in the months comprising each season.

Tables XLIV and XLV for V are calculated from the all-day diurnal inequalities in Table XXXI. The annual variation in c_1 is pretty regular and well marked, the summer value being double the winter. As a_1 has a lower value in each of the summer months than in any other month, the lower value obtained for that season represents presumably a natural phenomenon. The same phenomenon it will be remembered was observed in H. The differences between the values found for a_1 in Table XLV for corresponding months of 1912 and 1913 are calculated to inspire doubt as to the reality of the apparent difference between the phase angles for winter and equinox. At the same time the values of a_1 obtained independently for the two winters are closely alike, and the similarity of the values for the two equinoxes—though these are not wholly independent—points in the same direction. The values obtained for c_2 are small in the winter months, but in the other seasons the ratio of c_2 to c_1 is much larger than was the case for D or H. As the apparent variation in a_2 is not large, the natural inference is that there is in Adelie Land a substantial 12-hour term in the vertical force. The values obtained for c_3 in the equinoctial and summer months are much smaller than those obtained for c_2; at the same time they are considerably larger than the corresponding values found for D and H. Also there is no excessive irregularity in the values obtained for a_3. There are greater irregularities in both c_4 and a_4, but considering the small size of c_4 in most months this is not surprising.

Section 15.—Tables XLVI and XLVII contrast the Fourier co-efficients calculated from the quiet (q) and disturbed (d) day diurnal inequalities. In view of the small number of days on which the results depend, apparent differences between quiet and disturbed days must be accepted with caution, unless the several seasons give strongly confirmatory results.

In view of the relative amplitudes of the diurnal variation in disturbed and quiet days, a marked excess would naturally be expected in the amplitude of the Fourier waves on disturbed days. In the 24-hour wave this excess is apparent in every case; but like the excess in the inequality range itself it is much less conspicuous in summer than in winter or equinox, especially in the case of V. The disturbed day amplitude is also in general the larger in the 12, 8, and 6 hour waves, but to this there are exceptions. The most striking of these are the equinoctial and summer values of c_2 and c_3 for declination. The exceptions somewhat curiously are fewer for c_4 than for c_3.

The difference between the values of a_1 for the quiet and disturbed days is usually not large. In the case of D the quiet-day angle is always the larger. Also except in equinox the all-day angle is intermediate between the quiet and disturbed day angles. In H and V, on the other hand, the quiet-day value of a_1 is the smaller in 3 cases out of 4, winter 1913 supplying the exceptions, and the all-day angle is in 3 cases out of 4 intermediate.

The results obtained for the 12, 8, and 6 hour waves are somewhat discordant. Sometimes there is a fair agreement between the quiet and disturbed day phase angles when neither approaches closely the all-day angle. The impression produced is that the differences between the quiet and disturbed day phase angles are largely accidental, and cannot be assumed to be normal.

Perhaps the only definite conclusion to be drawn is that the 24-hour wave is dominant in all types of days, and that its phase angle is not much influenced by disturbance.

CHAPTER IX.

ABSOLUTE DAILY RANGES—DAILY MAXIMA AND MINIMA.

Section 16.—As already explained, the daily maximum and minimum and their times of occurrence were measured at Christchurch. Occasionally apparent inconsistencies were noticed in the sheets received in England, some hourly values being larger than the maximum or less than the minimum. This was not surprising, because the hourly values were obtained with a planimeter, while the maximum and minimum were measured with an ordinary scale. Instances noticed were dealt with by correspondence, and it is hoped that if any apparent inconsistencies have survived they are small.

A difficulty of another kind presented itself occasionally with the absolute range (excess of maximum over minimum for the day). Ranges had been assigned at Christchurch to an appreciable number of days for which the trace was incomplete. But in some cases it was probable, and in others certain, that the range obtained would have been exceeded had the trace been complete. The best course in such a case is not always obvious. In some days the trace was incomplete simply because the limits of registration were exceeded. If the average range in D from all the complete days of the month is 2°, while the limits of registration are exceeded on a day when the range actually shown is 5°, the inclusion of that day giving it the range actually shown gives a decidedly nearer approach to the truth in the monthly mean than if the day is excluded. Thus the inclusion of such a day appears the lesser evil. Again, a day may be incomplete simply from an interlude of two or three hours between taking off one sheet and putting on another, and the appearance of the trace on both sides of the gap supports the view that neither maximum nor minimum was lost. On the other hand, the loss of trace may occur at a time when a maximum or minimum is to be expected, or it may extend over so many hours that a considerable disturbance may well have happened.

Each case was considered on its own merits. It would be too much to hope that the right decision was always reached, but it is believed that any uncertainty in the monthly means is small. In a few cases there was certainly an under-estimate, and a + sign is attached to any value supposed to be sensibly too small.

Table XLVIII gives absolute range data derived from days L.M.T. It gives for each month the mean and the greatest and least of the daily ranges for D, H, and V. The force equivalents of the D ranges are included for comparison with the H and V ranges. No distinction was drawn between complete and incomplete days so far as the largest range of the month is concerned, but only complete days were considered for the least range. In the penultimate line the means for 1912 were all derived from the 8 months, April to November, so as to have comparable results for D, H, and V; also August was omitted from the means for 1913. The last line uses only the three months May, June and July—August, 1913, being incomplete—so as to have strictly comparable results for the two years. Whether we take the 3 months, or all the months with the exception of December, 1912, and August, 1913, the 1912 value, whether a mean or a maximum or a minimum, is larger than the 1913 value. Also, the excess is always substantial in the case of the mean or the largest value. On this point there is absolute agreement between the absolute and the inequality ranges.

The mean values of the absolute ranges in Table XLVIII show clearly the same type of annual variation as the inequality ranges. Summer is the time of maximum, winter the time of minimum, and equinox is intermediate. Similar annual variation is also clearly apparent in the least monthly values. In each of the 3 mid-summer months, November, December and January, the mean of the absolute D ranges exceeded 200′ ($3^\circ\frac{1}{3}$), and in no single day did the range fall short of $1\frac{1}{2}^\circ$. In June and July, on the other hand, the mean range was less than 2° in 1912 and less than $1\frac{1}{3}^\circ$ in 1913, and ranges under 30′ were recorded in June, 1912, and in May, July and August, 1913. The seasonal influence is less apparent in the largest monthly ranges. The absolutely largest D range recorded—exceeding $9\frac{1}{3}^\circ$—occurred in December, but the next largest monthly maxima belong to August and May, 1912, and the largest ranges recorded for H and V occurred respectively in July and June, 1912. In short, large magnetic storms in Adelie Land, though most common in summer, are by no means confined to that season.

The enormous size of the largest D angular ranges arises from the low value of H. In terms of force the largest ranges in Table XLVIII are occasionally exceeded in the United Kingdom, though hardly at sunspot minimum. It is the persistency of large disturbance that distinguishes high magnetic latitudes.

For comparison with the other elements, the force values should be taken for D. Using these, we see that the mean D and H ranges are fairly similar. In 1912 the D final mean is the larger, whether from the 8 months or the 3, but in 1913 it is the other way about. The V mean absolute range exceeds the D and H mean ranges in every single month. But the largest V range is the largest range of the month only in 7 out of 16 months. The largest H range exceeds the largest V range in 6 months, and exceeds the largest D range in 10 months out of 16. Thus, relative to the other elements, the H absolute ranges are decidedly more prominent than were the H inequality ranges.

Table XLIX contains data analogous to those in the previous table, but it refers to days G.M.T. Also, it is differently arranged, to facilitate intercomparison of the most and least disturbed days of the month. Tables XLIX and XLVIII being derived from the same data, the differences between them may appear excessive. The differences, however, are probably not wholly matters of accident. The incidence of individual magnetic storms may be largely accidental, but the progress of the disturbance is probably partly influenced by the local time. Whether the maximum and minimum during a magnetic storm will both occur on the same "day" may obviously be more or less probable according to the hour G.M.T. at which the "day" begins.

Table XLVIII.—Absolute Daily Range. L.M.T.

Month.	1912. Mean. D.	D.	H.	V.	Greatest. D.	D.	H.	V.	Least. D.	D.	H.	V.	1913. Mean. D.	D.	H.	V.	Greatest. D.	D.	H.	V.	Least. D.	D.	H.	V.
	′	γ	γ	γ	′	γ	γ	γ	′	γ	γ	γ	′	γ	γ	γ	′	γ	γ	γ	′	γ	γ	γ
January ...	...	...	...	...	...	...	...	...	...	...	...	...	202	182	197	226	406	365	405	330	91	82	77	109
February ...	...	...	...	...	...	...	...	...	...	...	...	...	158	142	156	188	301	271	295	367	81	73	59	92
March ...	...	...	...	...	...	...	...	...	...	...	...	...	131	118	122	172	265	238	337	504	55	50	34	61
April ...	186	167	126	186	407	366	275	490	66	59	45	53	120	108	100	124	325	292	285	373	44	40	30	43
May ...	133	119	94	151	452	407	272	381	32	29	25	45	105	94	85	116	366	329	355	485	18	16	13	20
June ...	111	100	117	171	349	314	381	535+	26	23	16	42	72	64	69	85	164	148	258	225	33	30	18	24
July ...	117	105	98	148	380+	342+	511	436+	35	32	20	53	78	70	76	86	162	146	225	215	25	23	19	27
August ...	104	147	135	166	453	408	359	394	42	38	31	42	60	54	45	67	105	95	91	174	29	26	19	26
September ...	167	150	142	161	410	369	309	351	44	40	75	67	...	...	...	...	...	...	...	...	...	...	...	...
October ...	192	173	170	203	403	363	444	364	82	74	74	122	...	...	...	...	...	...	...	...	...	...	...	...
November ...	224	202	226	266	395	356	476	424	101	91	64	146	...	...	...	...	...	...	...	...	...	...	...	...
December ...	227	204	...	...	567+	510+	...	...	119	107	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mean, omitting last month	162	145	139	181	406	366	378	422	53	48	44	71	124	111	115	142	284	256	309	357	50	45	36	54
Mean, May to July ...	120	108	103	157	394	354	388	451	31	28	20	47	85	76	77	96	231	208	279	308	25	23	17	24

Table XLIX.—Absolute Daily Range. G.M.T.

Month.	1912. D. Mean.	D. Largest.	D. Least.	H. Mean.	H. Largest.	H. Least.	V. Mean.	V. Largest.	V. Least.	1913. D. Mean.	D. Largest.	D. Least.	H. Mean.	H. Largest.	H. Least.	V. Mean.	V. Largest.	V. Least.
				γ	γ	γ	γ	γ	γ	′			γ	γ	γ	γ	γ	γ
January ...	...	...	...	...	...	...	...	...	...	207	400	103	206	405	82	228	359	151
February ...	...	...	...	...	...	...	...	...	...	161	304	76	155	337	64	181	367	74
March ...	...	...	...	...	...	...	...	...	...	138	313	52	127	337	47	170	504	49
April ...	204	407	77	136	275	45	180	490	64	125	261	48	96	322	30	119	421	37
May ...	131	415	41	99	272	25	153	372	56	106	397	21	83	371	15	107	492	20
June ...	114	334	36	119	381	34	160	535+	44	74	190	31	69	248	25	81	225	25
July ...	115	342	24	104	555+	20	149	436+	57	80	244	36	72	213	24	81	215	28
August ...	176	421	42	136	416	34	166	413	48	64	105	32	45	91	23	68	174	28
September ...	179	445	53	150	339	54	163	351	71	...	...	...	...	...	...	...	...	...
October ...	203	470	86	183	444	81	206	427	101	...	...	...	...	...	...	...	...	...
November ...	235	448	106	231	499	72	274	419	146	...	...	...	...	...	...	...	...	...
December ...	246	567+	119	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mean, omitting last month	170	410	58	145	398	46	181	430	73	127	301	52	115	319	41	138	369	55
Mean, May to July ...	120	364	34	107	403	26	154	448	52	87	277	29	75	277	21	90	311	24

Comparing corresponding values in the last two lines of Tables XLVIII and XLIX, it will be found that in 11 cases out of 12 the mean of the least ranges is less for the day L.M.T. than the day G.M.T. In the remaining case the two values are equal. The tendency in the G.M.T. mean range to be the larger is not confined to the least ranges. It is seen in the largest ranges in 9 cases out of 12. In the case of the means derived from the monthly mean ranges, the L.M.T. and G.M.T. values are thrice identical. In 5 instances the G.M.T. value is the larger, and in the remaining 4 instances it is the smaller. None of the differences are large.

TABLE L.—(Absolute Range) ÷ (Inequality Range). L.M.T.

Month.	1912.				1913.				1912 and 1913.
	D.	H.	V.	Mean.	D.	H.	V.	Mean.	Mean.
January	...	...	...	...	2·44	4·76	2·65	3·28	3·28
February	...	...	...	...	2·55	4·56	2·37	3·16	3·16
March	...	...	...	...	2·38	4·18	2·54	3·03	3·03
April	2·72	3·17	2·55	2·81	2·49	3·24	2·42	2·72	2·77
May	2·32	3·63	2·74	2·90	2·86	3·44	2·85	3·05	2·97
June	2·95	4·44	3·66	3·68	2·69	3·98	2·81	3·16	3·42
July	2·74	4·02	2·52	3·09	2·67	4·50	2·97	3·38	3·23
August	2·33	3·07	2·81	2·74	2·93	3·87	2·71	3·17	2·96
September	2·53	2·90	2·63	2·69	...	...	...	...	2·69
October	1·92	3·41	2·26	2·53	...	...	...	...	2·53
November	2·37	3·81	2·29	2·82	...	...	...	...	2·82
December	2·09	...	...	...	...	...	...	...	...
Means	2·49	3·56	2·68	2·91	2·63	4·07	2·66	3·12	2·99

Table L gives the ratio borne by the absolute range to the corresponding inequality range in each month. The L.M.T. data are used. The necessary underestimate in the months when the limits of registration were exceeded is believed to be trifling. The outstanding feature is the large size of the ratios for H as compared with those for D and V. The H ratio is the largest in every single month, and the excess is more conspicuous in the quieter year 1913. At first sight this may seem inconsistent with the conclusion derived from Table XXXIX, that disturbance enhances the H inequality range more than it does the D and V ranges. But it only implies that large as the effect of disturbance is on the H inequality range, it is still more prominent in the H absolute range. Disturbance has two effects—it enhances the absolute range and also the amplitude of the regular diurnal inequality. The latter phenomenon is more particularly characteristic of high latitudes, but even there it is the less prominent of the two.

The values of the D and V ratios in Table L are very similar, the latter being, on the whole, slightly the larger. There is no clearly-marked annual variation in the ratios.

Section 17.—Tables LI to LVI give the number of days when the absolute ranges in D, H and V lay between certain specified limits. Results are given in separate columns for individual months of the two years, and in a third column for the two years combined. It is to the third columns that the particulars given as to the number of days utilised apply. For example, in Table LI: Only one January (1913) was available, and all its 31 days were utilised. Of these, 2 had ranges between 1° and 2°, 14 between 2° and 3°, 8 between 3° and 4°, 1 between 4° and 5°, and 6 exceeded 5°. These figures appear in the columns devoted to 1913 and also in the columns devoted to both the years combined. Again, in Table LI, May, 1912, and May, 1913, were available, and 59 of the 62 May days were utilised. Of ranges under 30′ there was none in 1912 and 1 in 1913, and so 1 in the two years combined. Of ranges between 30′ and 1° there were 8 in 1912 and 6 in 1913, and so 14 in the two years combined, and so on.

The last category, *e.g.*, ranges exceeding 5° in Table LI, includes some days of incomplete record. As data were available both for days L.M.T. and days G.M.T., separate tables have been allotted to the two types of days. The two tables for the same element differ more than might perhaps have been anticipated. The chief difference between the two tables for D is that Table LI (the L.M.T. table) has decidedly more days in the two first categories (ranges not exceeding 1°), and fewer days in the last two categories (ranges exceeding 4°).

It will be seen that there is no instance in either Table LI or Table LII of a range less than 30′ except in the winter season. Even in that season only 1 day in 105 in Table LII, and 1 day in 42 in Table LI had so small a range. At the other end of the scale, 69 days in Table LI and 81 days in Table LII had ranges exceeding 4°. In spite of a considerably smaller total number of days, summer contributed a considerably larger number of ranges exceeding 4° than either equinox or winter. Even in winter more than 1 day in 20 had a range exceeding 5°. In summer 1 day in 6 or 7 had a range exceeding 5°, and fully half the days had ranges larger than 3°. As compared with D ranges from stations in temperate latitudes, the Adelie Land ranges appear enormous. They are quite outstanding even when the comparison is based on the force equivalent. Take, for example, Kew Observatory, where H is roughly 6 times as large as in Adelie

Land. Ranges of 30′ and 4° in Adelie Land will correspond fairly to ranges of 5′ and 40′ respectively at Kew. Thus on the basis of Table LI we should expect at Kew in a year at sunspot minimum 4 days with a range not exceeding 5′, and 33 with a range exceeding 40′. Taking a mean, however, from the two years 1890 and 1900 (either year having a larger sunspot frequency than 1912), we have 34 days with a range not exceeding 5′, and no single day with a range over 40′. For the average year between 1890 and 1900 there were 17 ranges not exceeding 5′, and only 4 ranges above 40′ at Kew.

No direct comparison, unfortunately, is possible with Cape Evans, as declination was not recorded there. A declination magnetograph was in action in Ross Island during the Antarctic Expedition of 1902–3, but the local disturbance makes the interpretation of the results then obtained rather doubtful. If H in the magnetograph hut at Ross Island had the same value as in the absolute hut, which is doubtful, it was 53 per cent. higher than at a station less than 2 miles away on the ice of McMurdo Sound, and fully twice as big as at the station in Adelie Land. In that event declination changes shown on the Ross Island curves would naturally be only two-thirds as large as they would have been but for the local disturbance, and only about 47 per cent. of the changes which the same forces would have caused in Adelie Land. Another obstacle to comparison is the loss of trace on disturbed days at Ross Island through there being no second mirror on the D magnet.

There were 461 days when the D trace at Ross Island was complete except for one or both limits of registration being exceeded. Of these, 31 had a range not exceeding 30′. This gives a percentage six times as large for this category as we get in Table LI. On the basis, however, of equal force, the natural limits for comparison would be 60′ in Adelie Land as against 30′ in Ross Island. On this basis we get 16 per cent. in Adelie Land as compared with 7 per cent. in Ross Island.

Again in Table LI the ranges exceeding 3° numbered 132, *i.e.*, 28 per cent. of the whole. In Ross Island only 16 per cent. of the days had a range exceeding 3°, but 54 per cent. had a range exceeding $1\frac{1}{2}$°.

Finally at Ross Island 39 per cent. of the ranges exceeded 2°. In Table LI, 52 per cent. of the ranges exceed 2°, but only 15 per cent. exceed 4°.

Thus the conclusion we should draw as to the relative sizes of the D ranges in Adelie Land and Ross Island depends entirely on whether we make equal angles or equal forces the basis of comparison. On the former basis the Adelie Land ranges are much the bigger. On the latter basis the preeminence lies, equally decisively with the Ross Island ranges.

Some allowance would presumably be necessary for the difference of the periods; 1902 (sunspot frequency 5·0) and 1903 (frequency 24·4) were not so representative of sunspot minimum as 1912 and 1913.

TABLE LI.—D. Absolute Range. Number of Days (L.M.T.) when Range between Limits Stated.

Month or Season.	Days.	0′ to 30′			30′ to 1°			1° to 2°			2° to 3°			3° to 4°			4° to 5°			≥ 5°		
		1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.
January ...	31	...	0	0	...	0	0	...	2	2	...	14	14	...	8	8	...	1	1	...	6	6
February ...	28	...	0	0	...	0	0	...	10	10	...	9	9	...	6	6	...	2	2	...	1	1
March ...	31	...	0	0	...	3	3	...	12	12	...	11	11	...	4	4	...	1	1	...	0	0
April ...	51	0	0	0	0	5	5	8	13	21	4	6	10	2	4	6	2	1	3	5	1	6
May ...	59	0	1	1	8	6	14	10	15	25	7	4	11	0	0	0	2	2	4	3	1	4
June ...	55	1	0	1	6	16	22	9	11	20	4	3	7	2	0	2	2	0	2	1	0	1
July ...	59	0	2	2	7	10	17	12	16	28	5	3	8	2	0	2	0	0	0	2	0	2
August ...	38	0	1	1	4	4	8	11	2	13	6	0	6	5	0	5	1	0	1	4	0	4
September ...	30	0	...	0	2	...	2	7	...	7	9	...	9	9	...	9	1	...	1	2	...	2
October ...	31	0	...	0	0	...	0	6	...	6	12	...	12	4	...	4	4	...	4	5	...	5
November ...	30	0	...	0	0	...	0	3	...	3	7	...	7	9	...	9	5	...	5	6	...	6
December ...	28	0	...	0	0	...	0	1	...	1	11	...	11	8	...	8	3	...	3	5	...	5
Year ...	471	...	...	5	...	...	71	...	...	148	...	...	115	...	...	63	...	...	27	...	...	42
Winter ...	211	...	...	5	...	...	61	...	...	86	...	...	32	...	...	9	...	...	7	...	...	11
Equinox ...	143	...	...	0	...	...	10	...	...	46	...	...	42	...	...	23	...	...	9	...	...	13
Summer ...	117	...	...	0	...	...	0	...	...	16	...	...	41	...	...	31	...	...	11	...	...	18

TABLE LII.—D. Absolute Range. Number of Days (G.M.T.) when Range between Limits stated.

Month or Season.	Days.	0′ to 30′			30′ to 1°			1° to 2°			2° to 3°			3° to 4°			4° to 5°			5°		
		1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.
January ...	31	...	0	0	...	0	0	...	2	2	...	15	15	...	6	6	...	2	2	...	6	6
February ...	28	...	0	0	...	0	0	...	9	9	...	8	8	...	8	8	...	2	2	...	1	1
March ...	31	...	0	0	...	1	1	...	13	13	...	11	11	...	5	5	...	0	0	...	1	1
April ...	50	0	0	0	0	3	3	4	15	19	7	7	14	2	2	4	3	3	6	4	0	4
May ...	58	0	1	1	4	6	10	13	16	29	8	2	10	0	2	2	2	0	2	2	2	4
June...	55	0	0	0	5	14	19	12	11	23	4	4	8	1	1	2	1	0	1	2	0	2
July ...	60	1	0	1	6	16	22	13	12	25	5	1	6	0	1	1	3	1	4	1	0	1
August ...	38	0	0	0	3	3	6	10	4	14	7	0	7	4	0	4	3	0	3	4	0	4
September ...	30	0	...	0	1	...	1	6	...	6	10	...	10	8	...	8	2	...	2	3	...	3
October ...	31	0	...	0	0	...	0	3	...	3	14	...	14	5	...	5	3	...	3	6	...	6
November ...	30	0	...	0	0	...	0	2	...	2	7	...	7	8	...	8	7	...	7	6	...	6
December ...	27	0	...	0	0	...	0	1	...	1	10	...	10	5	...	5	4	...	4	7	...	7
Year... ...	469	...	...	2	...	...	62	...	...	146	...	...	120	...	...	58	...	...	36	...	...	45
Winter ...	211	...	...	2	...	...	57	...	...	91	...	...	31	...	...	9	...	...	10	...	...	11
Equinox ...	142	...	...	0	...	...	5	...	...	41	...	...	49	...	...	22	...	...	11	...	...	14
Summer ...	116	...	...	0	...	...	0	...	...	14	...	...	40	...	...	27	...	...	15	...	...	20

Tables LIII and LIV show the distribution of H absolute ranges according to size. They refer respectively to days L.M.T. and days G.M.T. The differences between them are small, but in the first category (ranges not exceeding 50γ) the number of L.M.T. days is decidedly the greater. A corresponding difference presented itself in the case of D. Even in Table LIII ranges not exceeding 50γ formed less than 20 per cent. of the total, and no summer day had so small a range. At Kew Observatory, on the other hand, between 1890 and 1900, the percentage of days with ranges not exceeding 50γ was 46 for the whole year, varying from 67 per cent. in winter to 31 per cent. in summer. At Ross Island, in 1902–3, of the 457 days for which the H trace was complete except for the limits of registration being exceeded 88, or 19 per cent., had a range not exceeding 50γ; and no range as small as this was recorded in May, June, or July.

In Tables LIII and LIV ranges exceeding 100γ are much less common in winter than in equinox or summer; and ranges exceeding 250γ are much more common in summer than in equinox. The percentage of days from the periods stated above having ranges exceeding 100γ was 50 for Adelie Land, 40 for Ross Island, and 9½ for Kew. The percentage of days having ranges above 250γ was 10 for Adelie Land and only 0·7 for Kew. In summer 62 per cent. of the ranges in Table LIII exceeded 150γ, while at Ross Island 150γ was exceeded on only 22 per cent. of the days in midsummer (November to January). On the whole, it would appear that H ranges ruled higher at Adelie Land than they did in Ross Island ten years before.

TABLE LIII.—H. Absolute Range. Number of Days (L.M.T.) when Range between Limits stated.

Month or Season.	Days.	0 to 50 γ			50 γ to 100 γ			100 γ to 150 γ			150 γ to 200 γ			200 γ to 250 γ			250 γ to 500 γ			>500 γ		
		1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.
January ...	16	...	0	0	...	1	1	...	4	4	...	4	4	...	4	4	...	3	3	...	0	0
February ...	28	...	0	0	...	7	7	...	7	7	...	8	8	...	2	2	...	4	4	...	0	0
March ...	31	...	5	5	...	7	7	...	10	10	...	6	6	...	2	2	...	1	1	...	0	0
April ...	55	3	7	10	10	9	19	3	11	14	6	1	7	1	1	2	2	1	3	0	0	0
May ...	58	7	11	18	15	12	27	1	3	4	3	0	3	2	1	3	1	2	3	0	0	0
June ...	60	6	14	20	13	11	24	3	3	6	4	1	5	1	0	1	3	1	4	0	0	0
July ...	62	11	13	24	10	11	21	5	3	8	2	2	4	2	2	4	0	0	0	1	0	1
August ...	38	3	5	8	11	2	13	8	0	8	4	0	4	1	0	1	4	0	4	0	0	0
September ...	30	0	...	0	8	...	8	11	...	11	6	...	6	3	...	3	2	...	2	0	...	0
October ...	31	0	...	0	6	...	6	11	...	11	7	...	7	2	...	2	5	...	5	0	...	0
November ...	30	0	...	0	1	...	1	8	...	8	8	...	8	1	...	1	12	...	12	0	...	0
All months ...	439	...	...	85	...	...	134	...	...	91	...	...	62	...	...	25	...	...	41	...	...	1
Winter ...	218	...	...	70	...	...	85	...	...	26	...	...	16	...	...	9	...	...	11	...	...	1
Equinox ...	147	...	...	15	...	...	40	...	...	46	...	...	26	...	...	9	...	...	11	...	...	0
Summer ...	74	...	...	0	...	...	9	...	...	19	...	...	20	...	...	7	...	...	19	...	...	0

TABLE LIV.—H. Absolute Range. Number of Days (G.M.T.) when Range between Limits stated.

Month or Season.	Days.	0 to 50 γ			50 γ to 100 γ			100 γ to 150 γ			150 γ to 200 γ			200 γ to 250 γ			250 γ to 500 γ			>500 γ		
		1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.
January ...	15	...	0	0	...	1	1	...	4	4	...	3	3	...	2	2	...	5	5	...	0	0
February ...	28	...	0	0	...	8	8	...	9	9	...	6	6	...	1	1	...	4	4	...	0	0
March ...	31	...	1	1	...	12	12	...	7	7	...	8	8	...	2	2	...	1	1	...	0	0
April ...	55	1	6	7	11	11	22	4	11	15	4	1	5	3	0	3	2	1	3	0	0	0
May ...	59	5	10	15	16	13	29	3	3	6	3	1	4	1	0	1	2	2	4	0	0	0
June ...	60	7	14	21	12	11	23	2	3	5	4	1	5	2	1	3	3	0	3	0	0	0
July ...	62	9	11	20	12	15	27	6	2	8	1	1	2	2	2	4	0	0	0	1	0	1
August ...	38	3	5	8	9	2	11	11	0	11	3	0	3	1	0	1	4	0	4	0	0	0
September ...	30	0	...	0	7	...	7	7	...	7	11	...	11	3	...	3	2	...	2	0	...	0
October ...	31	0	...	0	5	...	5	9	...	9	7	...	7	4	...	4	6	...	6	0	...	0
November ...	30	0	...	0	2	...	2	6	...	6	6	...	6	3	...	3	13	...	13	0	...	0
All months ...	439	...	...	72	...	...	147	...	...	87	...	...	60	...	...	27	...	...	45	...	...	1
Winter ...	219	...	...	66	...	...	88	...	...	30	...	...	14	...	...	9	...	...	11	...	...	1
Equinox ...	147	...	...	8	...	...	46	...	...	38	...	...	31	...	...	12	...	...	12	...	...	0
Summer ...	73	...	...	0	...	...	11	...	...	19	...	...	15	...	...	6	...	...	22	...	...	0

TABLE LV.—V. Absolute Range. Number of Days (L.M.T.) when Range between Limits stated.

Month or Season.	Days.	0 to 50 γ			50 γ to 100 γ			100 γ to 150 γ			150 γ to 200 γ			200 γ to 250 γ			250 γ to 500 γ			>500 γ		
		1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.
January	24	...	0	0	...	0	0	...	2	2	...	6	6	...	9	9	...	7	7	...	0	0
February	27	...	0	0	...	2	2	...	10	10	...	5	5	...	5	5	...	5	5	...	0	0
March	30	...	0	0	...	7	7	...	9	9	...	7	7	...	3	3	...	3	3	...	1	1
April	51	0	3	3	6	10	16	4	10	14	3	4	7	4	1	5	4	2	6	0	0	0
May	59	2	7	9	11	10	21	8	7	15	1	1	2	3	1	4	5	3	8	0	0	0
June	59	3	5	8	9	18	27	7	5	12	4	0	4	1	2	3	3	0	3	2	0	2
July	52	0	5	5	11	15	26	8	8	16	1	1	2	2	1	3	0	0	0	0	0	0
August	36	1	2	3	7	2	9	6	0	6	8	1	9	4	0	4	5	0	5	0	0	0
September	30	0	...	0	4	...	4	13	...	13	6	...	6	5	...	5	2	...	2	0	...	0
October	31	0	...	0	0	...	0	7	...	7	11	...	11	7	...	7	6	...	6	0	...	0
November	24	0	...	0	0	...	0	1	...	1	5	...	5	7	...	7	11	...	11	0	...	0
All months	423	...	...	28	...	...	112	...	...	105	...	...	64	...	...	55	...	...	56	...	...	3
Winter	206	...	...	25	...	...	83	...	...	49	...	...	17	...	...	14	...	...	16	...	...	2
Equinox	142	...	...	3	...	...	27	...	...	43	...	...	31	...	...	20	...	...	17	...	...	1
Summer	75	...	...	0	...	...	2	...	...	13	...	...	16	...	...	21	...	...	23	...	...	0

TABLE LVI.—V. Absolute Range. Number of Days (G.M.T.) when Range between Limits stated.

Month or Season.	Days.	0 to 50 γ			50 γ to 100 γ			100 γ to 150 γ			150 γ to 200 γ			200 γ to 250 γ			250 γ to 500 γ			>500 γ		
		1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.	1912.	1913.	Both years.
January	24	...	0	0	...	0	0	...	0	0	...	6	6	...	13	13	...	5	5	...	0	0
February	27	...	0	0	...	1	1	...	12	12	...	7	7	...	2	2	...	5	5	...	0	0
March	31	...	1	1	...	5	5	...	10	10	...	7	7	...	5	5	...	2	2	...	1	1
April	51	0	2	2	6	14	20	4	7	11	4	5	9	2	1	3	5	1	6	0	0	0
May	60	0	9	9	11	10	21	11	6	17	0	1	1	4	2	6	4	2	6	0	0	0
June	59	2	8	10	9	15	24	10	5	15	3	0	3	0	2	2	3	0	3	2	0	2
July	51	0	8	8	11	13	24	6	6	12	3	1	4	2	1	3	0	0	0	0	0	0
August	36	1	3	4	7	1	8	9	0	9	7	1	8	1	0	1	6	0	6	0	0	0
September	30	0	...	0	5	...	5	10	...	10	8	...	8	4	...	4	3	...	3	0	...	0
October	31	0	...	0	0	...	0	8	...	8	8	...	8	10	...	10	5	...	5	0	...	0
Novemter	24	0	...	0	0	...	0	2	...	2	3	...	3	8	...	8	11	...	11	0	...	0
All months	424	...	...	34	...	...	108	...	...	106	...	...	64	...	...	57	...	...	52	...	...	3
Winter	206	...	...	31	...	...	77	...	...	53	...	...	16	...	...	12	...	...	15	...	...	2
Equinox	143	...	...	3	...	...	30	...	...	39	...	...	32	...	...	22	...	...	16	...	...	1
Summer	75	...	...	0	...	...	1	...	...	14	...	...	16	...	...	23	...	...	21	...	...	0

The differences between Tables LV and LVI giving the distribution in size of absolute V ranges in L.M.T. and G.M.T. days are small. This time it is the G.M.T. table which has the largest number of ranges in the category 0 to 50γ. No summer day appears in this category. Two of the three days with ranges exceeding 500γ belong to winter, but that is presumably accidental. Ranges exceeding 250γ were most numerous in summer. Relative to the total number of days, ranges exceeding 200γ were decidedly more numerous in equinox than in winter, and fully twice as numerous in summer as in equinox. The relative frequency of small and large V ranges in Adelie Land (Table LV), at Cape Evans (1911–12), in Ross Island (1902–3), and at Kew 1890–1900 was as follows :—

	Ranges $\ngtr 50\gamma$.	Ranges $> 200\gamma$.
Adelie Land	6·6 per cent.	27 per cent.
Cape Evans	20 ,,	10·6 ,,
Ross Island	25 ,,	5·7 ,,
Kew Observatory	89 ,,	0·8 ,,

Ranges exceeding 250γ constitute 14 per cent. of the total in Table LV, the corresponding percentages at Cape Evans, Ross Island and Kew being 6·3, 2·5 and 0·6 respectively.

At Kew, out of 1,095 days in 1890, 1899 and 1900, representing sunspot minimum, only one had a V range exceeding 250γ. It would appear that the Adelie Land V ranges are even more prominent relatively than the ranges of the other elements.

Section 18.—Tables LVII to LXII deal with the distribution in time of the maxima and minima throughout the day L.M.T. In Table LVII for instance, we have the number of days when the extreme westerly position of the declination needle was reached between 0h and 1h L.M.T., between 1h. and 2h., and so on. Results are given for each month, for all 17 months combined, for the 8 winter months, the 5 equinoctial months and the 4 summer months.

In all the seasonal groups in Table LVII the largest number of occurrences is found between 9 h. and 10 h. It will be noticed that 9 h. was the hour of the maximum (westerly extreme) in Table XXII in all the seasons. There is no suggestion in Table LVII of a second maximum in the day. There is no single occurrence in the table between 14h. and 22h. and 59 per cent. of all the occurrences are concentrated between 8h. and 11h.

TABLE LVII.—Declination. Incidence of Extreme Westerly Values.

Hour. L.M.T.	0–1.	1–2.	2–3.	3–4.	4–5.	5–6.	6–7.	7–8.	8–9.	9–10.	10–11.	11–12.	12–13.	13–14.	14–15.	15–16.	16–17.	17–18.	18–19.	19–20.	20–21.	21–22.	22–23.	23–24.	Days Used.
1912.																									
April	0	0	0	0	0	1	3	2	2	6	3	3	0	1	0	0	0	0	0	0	0	0	0	0	21
May	0	1	0	0	0	2	3	3	2	7	5	5	2	0	0	0	0	0	0	0	0	0	0	0	30
June	0	1	0	2	0	1	2	3	4	4	2	3	1	1	0	0	0	0	0	0	0	0	0	1	25
July	2	0	0	0	1	0	4	3	1	7	4	6	0	0	0	0	0	0	0	0	0	0	0	0	28
August	0	0	0	1	1	2	3	2	5	5	9	2	1	0	0	0	0	0	0	0	0	0	0	0	31
September	0	0	1	0	0	0	5	2	3	8	4	6	1	0	0	0	0	0	0	0	0	0	0	0	30
October	0	0	0	0	0	0	0	1	3	18	7	1	1	0	0	0	0	0	0	0	0	0	0	0	31
November	0	0	0	0	0	1	2	0	8	9	5	4	1	0	0	0	0	0	0	0	0	0	0	0	30
December	0	0	0	0	0	0	3	6	10	4	5	3	0	0	0	0	0	0	0	0	0	0	0	0	31
1913.																									
January	0	0	1	0	0	0	2	1	7	7	5	4	2	1	0	0	0	0	0	0	0	0	1	0	31
February	0	0	0	0	1	0	1	3	3	9	8	2	1	0	0	0	0	0	0	0	0	0	0	0	28
March	0	0	1	0	2	0	2	2	2	12	4	2	3	0	0	0	0	0	0	0	0	0	0	1	31
April	0	0	0	1	0	0	1	2	7	6	9	3	0	1	0	0	0	0	0	0	0	0	0	0	30
May	0	1	2	1	0	2	0	4	7	5	4	2	0	0	0	0	0	0	0	0	0	0	0	1	29
June	1	1	0	2	0	1	5	2	2	5	3	5	0	0	0	0	0	0	0	0	0	0	2	1	30
July	0	0	1	1	0	2	2	3	5	10	3	3	1	0	0	0	0	0	0	0	0	0	0	0	31
August	0	0	1	0	0	0	0	1	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	7
All months	3	4	7	8	5	12	38	40	72	125	81	54	14	4	0	0	0	0	0	0	0	0	3	4	474
Winter months	3	4	4	7	2	10	19	21	27	46	31	26	5	1	0	0	0	0	0	0	0	0	2	3	211
Equinox ,, ...	0	0	2	1	2	1	11	9	17	50	27	15	5	2	0	0	0	0	0	0	0	0	0	1	143
Summer ,, ...	0	0	1	0	1	1	8	10	28	29	23	13	4	1	0	0	0	0	0	0	0	0	1	0	120

TABLE LVIII.—Declination. Incidence of Extreme Easterly Values.

Hour. L.M.T.	0–1.	1–2.	2–3.	3–4.	4–5.	5–6.	6–7.	7–8.	8–9.	9–10.	10–11.	11–12.	12–13.	13–14.	14–15.	15–16.	16–17.	17–18.	18–19.	19–20.	20–21.	21–22.	22–23.	23–24.	Days Used.
1912.																									
April	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	3	2	3	5	2	2	1	0	21
May	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	3	5	4	4	30
June	1	1	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	1	2	5	4	5	25
July	1	0	0	0	0	0	0	1	0	0	0	0	0	3	1	1	1	1	0	2	4	4	7	2	28
August	0	0	1	0	0	0	0	0	0	0	1	2	1	0	7	2	3	1	1	2	4	3	2	1	31
September	0	0	0	0	0	0	0	1	0	1	0	0	2	0	6	0	1	2	3	2	5	6	1	0	30
October	0	0	0	0	0	0	0	0	1	1	0	1	1	2	1	2	2	4	6	5	3	1	1	0	31
November	1	0	0	0	0	0	0	0	0	4	0	0	1	0	1	4	3	7	2	2	3	0	1	1	30
December	0	0	0	0	0	2	0	0	0	0	2	0	1	1	2	5	3	4	5	2	1	2	1	0	31
1913.																									
January	1	0	0	0	0	0	0	0	0	1	1	2	1	0	2	0	2	3	2	4	3	4	3	2	31
February	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	2	2	4	3	3	1	4	3	0	28
March	0	0	0	0	0	0	0	0	0	0	2	3	1	0	1	2	3	2	4	3	2	4	1	3	31
April	1	0	0	0	0	0	1	0	0	0	0	1	0	0	2	7	2	0	3	3	2	3	2	3	30
May	2	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	4	1	2	2	5	5	2	3	29
June	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	1	1	2	9	3	6	3	30
July	3	0	0	0	0	0	0	0	0	1	0	0	1	2	4	2	0	0	3	4	1	4	4	2	31
August	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	1	1	7
All months	12	1	1	1	0	2	1	2	1	11	6	9	13	15	34	32	34	34	40	45	50	56	44	30	474
Winter months	9	1	1	1	0	0	0	1	0	4	1	2	4	9	16	9	13	6	9	16	28	30	30	21	211
Equinox ,, ...	1	0	0	0	0	0	1	1	1	2	2	5	4	4	10	12	11	10	19	18	14	16	6	6	143
Summer ,, ...	2	0	0	0	0	2	0	0	0	5	3	2	5	2	8	11	10	18	12	11	8	10	8	3	120

TABLE LIX.—Horizontal Force. Incidence of Maxima.

Hour. L.M.T.	0–1.	1–2.	2–3.	3–4.	4–5.	5–6.	6–7.	7–8.	8–9.	9–10.	10–11.	11–12.	12–13.	13–14.	14–15.	15–16.	16–17.	17–18.	18–19.	19–20.	20–21.	21–22.	22–23.	23–24.	Days Used.
1912.																									
April	2	1	1	0	1	0	1	1	1	2	3	4	1	0	0	1	0	0	0	0	1	1	2	2	25
May	1	2	1	0	0	4	2	2	1	0	1	3	2	0	0	0	0	0	0	0	1	1	1	7	29
June	4	1	0	3	0	1	2	3	1	0	1	1	1	1	0	1	1	0	0	0	1	3	2	3	30
July	4	2	0	1	1	0	2	2	0	3	1	2	0	2	0	0	0	0	0	0	0	0	2	9	31
August	2	2	1	2	2	1	2	7	1	5	2	0	1	0	0	0	0	0	0	0	0	0	1	2	31
September	3	0	2	1	0	0	2	1	8	6	3	1	2	0	0	0	0	0	0	0	1	0	0	0	30
October	2	1	0	1	2	1	1	7	0	3	1	4	3	2	1	0	0	0	0	0	0	0	1	1	31
November	2	1	2	0	0	0	2	4	3	3	4	1	4	1	1	0	0	0	0	0	0	1	0	1	30
1913.																									
January	1	0	1	0	0	1	0	1	2	1	1	1	1	3	1	0	0	0	0	0	0	1	0	1	16
February	1	0	1	1	0	2	3	2	2	2	1	1	4	3	2	0	0	0	0	0	0	0	0	3	28
March	2	1	0	0	0	0	0	2	4	4	2	5	2	1	1	1	0	0	0	0	0	1	1	4	31
April	2	1	1	0	0	1	2	1	5	2	1	2	1	0	0	0	0	0	0	0	0	0	3	8	30
May	1	2	2	1	1	2	2	3	3	1	1	0	0	1	1	0	0	0	0	0	1	1	4	2	29
June	4	1	0	0	4	1	5	2	3	1	0	0	1	0	0	0	0	0	0	0	0	1	1	6	30
July	6	0	2	1	0	2	0	1	2	1	1	3	2	0	0	0	0	0	0	0	0	0	3	7	31
August	0	0	1	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7
All months	37	15	15	11	11	16	26	42	36	35	23	28	25	14	7	3	1	0	0	0	5	10	21	58	439
Winter months	22	10	7	8	8	11	15	23	11	12	7	9	7	4	1	1	1	0	0	0	3	6	14	38	218
Equinox ,, ...	11	4	4	2	3	2	6	12	18	17	10	16	9	3	2	2	0	0	0	0	2	2	7	15	147
Summer ,, ...	4	1	4	1	0	3	5	7	7	6	6	3	9	7	4	0	0	0	0	0	0	2	0	5	74

TABLE LX.—Horizontal Force. Incidence of Minima.

Hour. L.M.T.	0–1.	1–2.	2–3.	3–4.	4–5.	5–6.	6–7.	7–8.	8–9.	9–10.	10–11.	11–12.	12–13.	13–14.	14–15.	15–16.	16–17.	17–18.	18–19.	19–20.	20–21.	21–22.	22–23.	23–24.	Days Used.
1912.																									
April	0	0	0	0	0	0	0	1	0	1	3	1	2	6	3	1	0	1	2	1	2	1	0	0	25
May	0	1	0	0	0	0	0	0	0	0	1	5	6	4	4	0	1	1	3	1	2	0	0	0	29
June	0	0	0	0	0	0	0	0	1	0	1	3	3	4	5	3	2	0	3	0	1	4	0	0	30
July	0	0	0	0	0	0	0	0	0	2	1	8	4	3	2	1	1	2	2	0	1	2	1	1	31
August	2	0	0	0	0	0	0	0	0	1	1	7	3	2	9	3	2	0	0	0	0	1	0	0	31
September	0	0	0	0	0	0	0	0	0	1	1	8	9	4	4	1	1	0	0	0	0	1	0	0	30
October	0	0	0	0	1	0	0	1	0	3	3	3	8	7	2	2	0	1	0	0	0	0	0	0	31
November	0	0	0	0	0	0	0	1	3	6	2	5	5	4	2	1	1	0	0	0	0	0	0	0	30
1913.																									
January	0	0	0	0	0	0	0	0	0	2	2	2	3	2	2	2	1	0	0	0	0	0	0	0	16
February	0	0	0	0	0	0	0	0	0	2	3	3	3	5	3	3	3	1	2	0	0	0	0	0	28
March	0	0	0	0	0	0	0	0	1	4	0	5	4	8	2	1	1	2	2	0	0	0	0	1	31
April	1	0	0	0	0	0	0	1	0	2	4	4	4	5	3	1	1	1	1	1	0	1	0	0	30
May	1	1	0	0	0	0	1	0	0	0	2	3	2	5	2	1	0	2	2	1	1	1	1	4	29
June	2	0	0	0	0	0	0	0	0	0	2	0	4	9	3	0	2	3	0	1	1	0	1	2	30
July	2	0	0	0	0	0	0	0	0	0	3	4	9	3	1	0	0	0	1	3	0	1	1	3	31
August	0	0	0	0	0	0	0	1	0	0	1	0	2	2	1	0	0	0	0	0	0	0	0	0	7
All months	8	1	0	0	1	0	1	5	5	24	30	61	71	73	48	20	16	14	18	8	8	12	4	11	439
Winter months	7	1	0	0	0	0	1	1	1	3	12	30	33	32	27	8	8	8	11	6	6	9	4	10	218
Equinox ,, ...	1	0	0	0	1	0	0	3	1	11	11	21	27	30	14	6	3	5	5	2	2	3	0	1	147
Summer ,, ...	0	0	0	0	0	0	0	1	3	10	7	10	11	11	7	6	5	1	2	0	0	0	0	0	74

Table LXI.—Vertical Force. Incidence of Maxima.

Hour. L.M.T.	0–1.	1–2.	2–3.	3–4.	4–5.	5–6.	6–7.	7–8.	8–9.	9–10.	10–11.	11–12.	12–13.	13–14.	14–15.	15–16.	16–17.	17–18.	18–19.	19–20.	20–21.	21–22.	22–23	23–24.	Days Used.
1912.																									
April	0	1	2	0	3	0	0	1	2	1	1	0	0	0	0	0	2	0	1	1	0	4	0	2	21
May	7	3	1	0	0	2	3	1	0	0	0	0	0	1	0	0	0	0	1	0	2	2	1	6	30
June	7	2	0	1	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	6	29
July	3	2	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	3	8	24
August	3	5	0	1	2	0	5	3	1	1	1	0	0	0	0	0	0	0	0	1	1	4	3	0	31
September	0	0	0	0	1	0	3	4	5	5	1	0	0	0	0	0	0	0	0	1	3	5	1	1	30
October	2	1	0	1	1	4	4	5	2	4	1	0	0	0	0	0	0	0	0	0	2	2	2	0	31
November	0	0	1	1	2	3	4	2	3	3	0	0	0	0	0	0	0	0	0	0	1	1	1	2	24
1913.																									
January	1	0	0	0	0	2	3	5	5	4	2	1	0	0	0	0	0	0	0	0	0	2	2	0	27
February	0	1	1	1	1	2	1	8	1	4	3	0	0	0	0	0	0	0	0	0	0	1	0	4	28
March	4	2	0	3	1	3	1	3	2	2	2	0	0	0	0	0	0	0	0	0	1	1	3	3	31
April	5	1	0	1	3	0	1	2	3	2	1	1	0	0	0	0	0	0	0	0	1	0	2	7	30
May	5	0	2	0	1	2	1	4	1	0	0	0	0	0	0	0	0	0	0	0	3	3	3	6	31
June	5	2	1	0	0	1	4	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1	6	6	30
July	6	2	1	4	2	1	4	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	5	31
August	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	5
All months	48	22	11	14	20	24	36	43	26	26	12	2	0	1	0	0	2	0	3	4	17	32	30	60	433
Winter months	36	16	7	7	8	10	19	13	3	1	1	0	0	1	0	0	0	0	2	2	9	16	19	41	211
Equinox ,, ...	11	5	2	5	9	7	9	15	14	14	6	1	0	0	0	0	2	0	1	2	7	12	8	12	143
Summer ,, ...	1	1	2	2	3	7	8	15	9	11	5	1	0	0	0	0	0	0	0	0	1	4	3	6	79

Table LXII.—Vertical Force. Incidence of Minima.

Hour. L.M.T.	0–1.	1–2.	2–3.	3–4.	4–5.	5–6.	6–7.	7–8.	8–9.	9–10.	10–11.	11–12.	12–13.	13–14.	14–15.	15–16.	16–17.	17–18.	18–19.	19–20.	20–21.	21–22.	22–23.	23–24.	Days Used.
1912.																									
April	0	0	0	0	0	0	0	0	1	0	1	2	9	3	2	2	0	0	1	0	0	0	0	0	21
May	0	0	0	0	0	0	0	0	0	1	4	7	10	5	3	0	0	0	0	0	0	0	0	0	30
June	0	0	0	0	0	0	0	0	0	1	2	9	4	9	1	1	2	0	0	0	0	0	0	0	29
July	0	0	0	0	0	0	0	0	0	1	2	13	4	1	2	0	1	0	0	0	0	0	0	0	24
August	0	0	0	0	0	0	0	0	0	0	3	5	8	8	4	0	1	0	1	0	1	0	0	0	31
September	1	0	0	0	0	0	0	0	1	1	2	8	7	6	2	1	0	0	1	0	0	0	0	0	30
October	0	0	0	0	0	0	0	0	0	3	2	8	7	7	2	2	0	0	0	0	0	0	0	0	31
November	0	0	0	0	0	0	0	0	0	1	1	9	5	4	3	1	0	0	0	0	0	0	0	0	24
1913.																									
January	0	0	0	0	0	0	0	0	0	1	2	3	6	8	3	0	1	0	1	1	1	0	0	0	27
February	0	0	0	0	0	0	0	0	0	1	0	8	5	6	3	3	2	0	0	0	0	0	0	0	28
March	0	0	0	0	0	0	0	0	0	1	1	8	10	4	4	3	0	0	0	0	0	0	0	0	31
April	0	0	0	0	0	0	0	0	0	2	4	5	7	10	2	0	0	0	0	0	0	0	0	0	30
May	0	0	0	0	0	0	0	0	0	1	3	13	7	5	2	0	0	0	0	0	0	0	0	0	31
June	0	0	0	0	0	0	0	0	0	1	5	7	5	12	0	0	0	0	0	0	0	0	0	0	30
July	1	0	0	0	0	0	0	0	0	0	2	4	11	5	6	0	0	1	0	0	0	1	0	0	31
August	0	0	0	0	0	0	0	0	1	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0	5
All months	2	0	0	0	0	0	0	0	3	15	35	109	107	94	39	13	7	1	4	1	2	1	0	0	433
Winter months	1	0	0	0	0	0	0	0	1	5	22	58	51	46	18	1	4	1	1	0	1	1	0	0	211
Equinox ,, ...	1	0	0	0	0	0	0	0	2	7	10	31	40	30	12	8	0	0	2	0	0	0	0	0	143
Summer ,, ...	0	0	0	0	0	0	0	0	0	3	3	20	16	18	9	4	3	0	1	1	1	0	0	0	79

Table LVIII deals with the easterly extremes of declination. Their maximum of frequency is by no means as sharply defined as that in Table LVII. The three-hour period containing the largest number of occurrences, 19h. to 22h., accounts for only 32 per cent. of the total. When all the months are combined, 21h.–22h. shows the largest number of occurrences, but the phenomena vary somewhat with the season, the maximum frequency appearing between 18h. and 19h. in the equinoctial group, and between 17h. and 18h. in the summer group of months. There is only one hour 4h.–5h. without a single occurrence, and somewhat curiously it is not an hour in which occurrences of the westerly extreme are numerous. The hour in which westerly extremes were most numerous 9h.–10h. has no less than 11 occurrences of the easterly extreme; and the portion of the day 14h.–22h. which contained no occurrence of the westerly extreme has its mid-point quite 3 hours earlier than the hour of greatest frequency of the easterly extreme. There is thus a decided want of symmetry in the phenomena.

Table LIX, dealing with the incidence of the daily maximum in H, shows in all the months combined, and in, at least, the winter and equinoctial groups of months, two distinct maxima of frequency. The principal maximum is found between 23h. and 24h. in all the months combined and in winter, but in equinox 23h.–24h. has fewer occurrences than 8h.–9h. The data for summer are somewhat erratic, partly, no doubt, owing to the small number of days; but the principal maximum of frequency, if there are two, would seem to fall between 7h. and 14h.

A tendency to two maxima was noticed in the diurnal inequality of H in Table XXVI, but it was not so prominent, except perhaps in summer, as the corresponding phenomenon in Table LIX. Thus, taking the case of the year in Table XXVI, there were maxima of $12{\cdot}7\gamma$ at 6h. and $12{\cdot}6\gamma$ at 1h., the smallest intervening hourly value being $10{\cdot}7\gamma$; but in Table LIX the maxima of frequency are 58 from 23h. to 24h., and 42 from 7h.–8h., one intermediate figure being only 11. There are naturally, also, two minima of frequency in Table LIX, but the minimum in the afternoon is much the best marked, there being no single occurrence between 17h. and 20h. Table LX, dealing with the hour of occurrence of the daily minimum in H, shows only one clear maximum and minimum of frequency. The maximum frequency is found at all seasons between 12h. and 14h., the minimum frequency between 2h. and 6h. The maximum and minimum of frequency in Table LX by no means correspond in time with the minimum and maximum of frequency in Table LIX. If we take the case of all the months combined we have between 17h. and 20h. no single maximum, with the very moderate total of 40 minima; whereas between 11h. and 14h., 67 maxima occurred and 205 minima. This means inevitably that between 11h. and 14h. much cancelling went on between the contributions from different days to the diurnal inequality. Taking the summer season, the 12 hours 5h.–17h. contain 96 per cent. of all the minima, and at the same time 77 per cent. of all the maxima.

Table LXI, relating to the daily maximum in V, like Table LIX, shows two prominent maxima of frequency. The maximum between 23 h. and 24 h. is the largest for the winter group, and also for all the months combined, but in equinox, and especially in summer, the forenoon maximum of frequency is the principal one. The difference between the seasonal phenomena is analogous to that exhibited in the hour of the maximum in the diurnal inequality of V in Table XXX. The minimum of frequency in Table LXI occurs clearly in the early afternoon in all seasons, there being no single occurrence between 14h. and 16h., and only three in all between 12h. and 18h.

Table LXII relating to the daily minimum in V agrees with Table LX in showing only one decided maximum of frequency. It occurs between 11h. and 13h. in all the seasons. There is no single occurrence between 22h. and 24h., or between 1h. and 8h.

The diurnal variation in the frequency of occurrence of the absolute maximum and minimum in different elements may be classified under three types. Thus we have for the Antarctic :—

1st Type.—One prominent maximum of frequency seen :—

In 1902–3 in D maximum, H maximum, V maximum.

,, 1911–12 in E′ maximum and minimum, S′ maximum, V minimum.

,, 1912–13 in D westerly extreme, H minimum, V minimum.

2nd Type.—Two decided maxima of frequency seen :—

In 1902–3 in H minimum.

,, 1911–12 in V maximum.

,, 1912–13 in H maximum, V maximum.

3rd Type (Intermediate).—An indefinite or protracted maximum seen :—

In 1902–3 in D minimum, V minimum.

,, 1911–12 in S′ minimum.

,, 1912–13 in D easterly extreme.

By E′ and S′ in 1911–12 are meant two components of force, the one directed 7°·6 north of east, the other 7°·6 east of south. The mean value of D in 1902–3 was about 153°, counted from north through east. Thus increase of D meant a force having a westerly component. Hence, in the case of D, there was really a general agreement in type between 1902–3 and 1912–13; but the maximum of H in 1902–3 behaved like the minimum of H in 1912–13, and conversely. The reason for this apparent difference will appear presently. In the case of V the phenomena observed in Adelie Land and at Cape Evans are analogous, but the phenomena observed in Ross Island differ.

Table LXIII presents the results as to the incidence of the daily maximum and minimum in the form of an inequality, and compares with this the regular diurnal inequality of the element, presented in a particular way. Take, for example, the figures in the first column under the heading "Declination." They are derived from the results of all the months combined in Tables LVII and LVIII. For the hour 0 to 1 we have 3 occurrences of maximum and 12 of minimum. Regarding the former numeral as positive; the latter as negative, we get for hour 0h.–1h. the figure $+ 3 - 12$; *i.e.*, $- 9$. Similarly for 1h. – 2h. we get $+ 3$ and so on. The arithmetical sum of all such figures for the 24 hours proves to be 824, and the mean from this; *i.e.*, 824/24, is 34·3. The several hourly figures being expressed as percentages of 34·3, we get $- 26$ for 0h.–1h., and $+ 9$ for 1h.–2h. The mean of these two percentage figures, taken as $- 9$, is the entry for 1h. in the first column of Table LXIII.

TABLE LXIII—Frequency of Max.—Min. and Inequality Data as Percentages.

Hour. L.M.T.	D		H		V	
	Max.–Min.	Inequality.	Max.–Min.	Inequality.	Max.–Min.	Inequality.
1	— 9	— 5	+ 98	+ 121	+ 105	+ 97
2	+ 13	+ 17	+ 66	+ 112	+ 51	+ 91
3	+ 18	+ 38	+ 59	+ 107	+ 39	+ 88
4	+ 17	+ 49	+ 48	+ 103	+ 52	+ 105
5	+ 22	+ 74	+ 60	+ 119	+ 68	+ **119**
6	+ 69	+ 119	+ 93	+ **122**	+ 92	+ 115
7	+ 110	+ 153	+ 142	+ 121	+ 122	+ 110
8	+ 159	+ 173	+ 155	+ 90	+ 102	+ 77
9	+ 270	+ **187**	+ 96	+ 34	+ 53	+ 20
10	+ **275**	+ 158	+ 9	— 9	— 19	— 43
11	+ 175	+ 130	— 92	— 82	— 201	— 122
12	+ 67	+ 84	— 180	— 118	— **330**	— 199
13	— 14	+ 21	— **240**	— 136	— 308	— **226**
14	— 65	— 46	— 228	— **162**	— 204	— 213
15	— 96	— 94	— 132	— 158	— 80	— 172
16	— 96	— 123	— 73	— 156	— 27	— 110
17	— 99	— 137	— 66	— 132	— 9	— 75
18	— 108	— 140	— 73	— 118	— 3	— 35
19	— 124	— **144**	— 60	— 88	+ 3	— 6
20	— 138	— 141	— 25	— 39	+ 27	+ 26
21	— **155**	— 138	— 12	+ 10	+ 71	+ 64
22	— 142	— 113	+ 35	+ 61	+ 94	+ 85
23	— 98	— 81	+ 147	+ 93	+ 139	+ 101
24	— 51	— 38	+ **173**	+ 109	+ **163**	+ 102

The figures in the second column are the hourly entries in the all-day diurnal inequality of D for the whole year, expressed as percentages of their numerical mean. For example, the entry under 1 h. in Table XXII is $- 1'\cdot 0$, and the numerical mean (*i.e.*, the A.D.) is 18·66. To the nearest integer $\frac{-1\cdot 0 \times 100}{18\cdot 66} = -5$. In this way we get an inequality which is independent of the unit—whether of force or angle—in terms of which the hourly values of the element in question are expressed.

The results for H and V in Table LXIII are obtained in exactly the same way as those for D.

The two sets of figures for the same element in Table LXIII do not exhibit a very close agreement numerically. The inequality derived from the absolute maximum and minimum is, in each case, of a more peaked character than the other. But there is a somewhat close resemblance in the general nature of the inequalities, and especially in the hours at which the sign of the entries changes. The times of occurrence of the extreme, whether maximum or minimum, which occurs during the day hours are also closely alike.

Both sets of figures for D show clearly only one maximum and minimum in the course of the 24 hours. In the case of H and V there are two maxima and two minima. But the maximum near midnight, while decidedly the larger for the inequality based on the absolute maximum and minimum, is somewhat the smaller for the ordinary inequality. The secondary minimum at 3h. or 4h. is more marked for the absolute maximum and minimum than for the ordinary inequality. Similar sets of figures for the elements E′, S′ and V recorded at Cape Evans in 1911–12 appear in Table LXXII of the magnetic volume of the Scott Expedition. The ranges derived from the two sets of figures are as follows:—

Inequality.	Cape Evans (1911–12).			Adélie Land (1912–1913).		
	E′	S′	V	D	H	V
From absolute maximum and minimum ...	442	368	461	430	413	493
Ordinary diurnal	333	320	339	331	284	345

The max.-min. inequality gives a bigger range than the ordinary inequality in all three elements at both stations.

CHAPTER X.

COMPARISON OF ADELIE LAND DATA WITH DATA FROM CAPE EVANS.

Section 19.—Further comparisons of results from Adelie Land (A) and Cape Evans (E) are embodied in Plate XVIII and in Tables LXIV to LXVII.

The comparison in Plate XVIII is between the inequalities for the winter season (May to August), 1912. The times shown are all G.M.T. Midnight L.M.T. at Cape Evans was about 1 hour 35 minutes earlier than midnight L.M.T. in Adelie Land.

The three pairs of curves at the top of Plate XVIII represent the diurnal inequalities from all days of the rectangular components N, W and V. The maxima and minima tend to be earlier at Cape Evans—a natural consequence of the difference in local time—but the resemblance is rather close, especially for the horizontal components. The Adelie Land V range is considerably the greater.

In the central panel there is a comparison of all day H, D and I inequalities at the two stations. Roughly speaking, the phase is the same for the two D inequalities, but opposite for the two H and the two V inequalities. The significance of this is at once apparent on consulting Figs. 21 and 22.

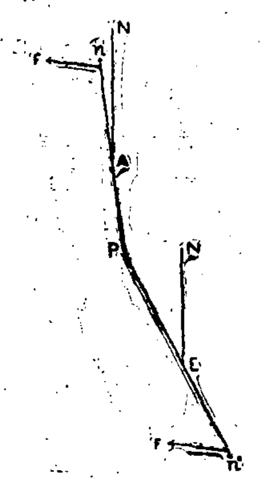


Fig. 21.

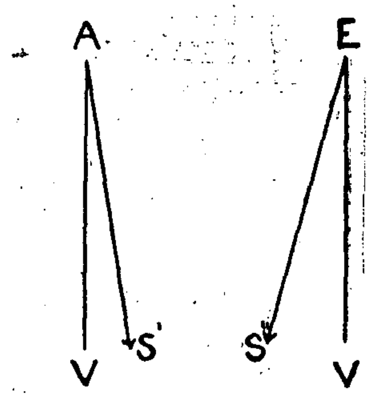


Fig. 22.

A and E in the figure 21 are supposed to represent the Adelie Land and Cape Evans stations, the curvature of the earth being neglected. The magnetic meridians A n′ and E n″ (the letter n representing the north pole of a compass needle) are inclined to the astronomical meridians, AN and EN, at the angles 6° west of north, and 153° east of north. The point of their intersection, if there is no large local disturbance, should approach closely the south magnetic pole P. If equal parallel horizontal forces F act as in the figure, the angles NA n′ and NE n″ will both tend to increase, *i.e.*, we shall have $\triangle D$ positive at both stations. But the component of F along the magnetic meridian at A is directed along A n′, thus increasing H; while the component along the magnetic meridian at E is directed along n″ E, and so diminishes H. As AP and EP are not colinear, the result portrayed is not universally true, but it represents the normal state of affairs.

In Fig. 22 AV and EV are intended to represent the downward drawn verticals in Adelie Land and at Cape Evans, while AS′ and ES″ represent the directions of the dipping needles (the inclination to the vertical being exaggerated). The two stations, it will be remembered, are on opposite sides of the magnetic pole. A common vertically-directed force would alter the dip in the same direction at both stations. But, as has been already pointed out for Adelie Land—and the same is true of Cape Evans—changes of V are unimportant compared with changes of H, unless the former are very much the larger. Two equal parallel horizontal forces acting on S′ and S″ will move the dipping ends of the needles in a common direction. If, for instance, both move to the left, dip will rise at A, but fall at E. Thus the changes in I at the two stations will naturally be in opposite directions.

These illustrations are only rough approximations to the truth, but they will, it is hoped, show that the general character of the curves for D, H and I in Plate XVIII is exactly what we should expect, provided the presence of a magnetic pole has no large determining influence on the diurnal changes of magnetic force in its neighbourhood.

The close resemblance in Plate XVIII of the I curves to the H curves inverted is, of course, in harmony with what has been said above as to the dominant influence of H changes on I changes.

The lower part of Plate XVIII contains all day vector diagrams: NW in the horizontal plane, VN in the vertical plane through the astronomical meridian and VW in the vertical plane perpendicular to the meridian. The times shown are as before all G.M.T. All 24-hour values are used in drawing the NW diagrams; but for the VN and VW diagrams 3-hour mean ordinates have been used, as in the corresponding diagrams in Plate XVII.

The rotation of the vector in both NW diagrams is anti-clockwise, and as befits the difference in local time the Cape Evans radius vector is always ahead. The diagrams naturally are irregular in outline, but there can be no doubt that the Cape Evans diagram is the more nearly circular. The Adelie Land diagram is unmistakably elliptical, the minor axis being not far from the astronomical meridian.

The directions of the co-ordinates axes in the VN and VW diagrams—increasing V up, increasing N to right, and increasing W to left—are so far arbitrary. Hence the directions in which they are described, VN clockwise, VW anti-clockwise, are arbitrary. In both cases, as with the NW diagrams, the Cape Evans radius vector keeps ahead. There is now, however, a very decided difference in shape between the diagrams for the two stations. The VN and VW diagrams at Cape Evans are very similar in form, and their shape is intermediate between that of the VN and VW diagrams at Adelie Land. The VN diagram at the latter station is almost needle-shaped, while the VW diagram is more nearly circular than the NW diagram.

Section 20.—Table LXIV compares the A (Adelie Land) and E (Cape Evans) ranges and average departures in the diurnal inequalities of N, W and V for quiet days, all days and disturbed days of the combined winter months of 1912. The results for W at the two stations are closely alike. For N Cape Evans gives the larger values, especially for the ranges. The Adelie Land figures for V, however, are roughly double those at Cape Evans, except on disturbed days, when the Cape Evans figures are relatively more enhanced.

TABLE LXIV.—Ranges and A.D.'s at Adelie Land (A) and Cape Evans (E). Winter, 1912.

	Range.						A.D.					
	N.		W.		V.		N.		W.		V.	
	A.	E.	A.	E.	A.	E.	A.	E.	A.	E.	A.	E.
	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ	γ
Quiet days	10·7	18·2	21·3	19·0	30·2	12·3	2·86	5·42	6·21	5·36	7·85	3·61
All days	27·8	39·0	43·9	41·5	50·0	24·4	9·31	11·91	13·61	12·03	14·69	7·72
Disturbed days ...	64·0	89·2	94·3	102·9	89·3	58·4	21·31	25·49	29·17	28·69	25·95	16·32

Table LXV makes a more exhaustive comparison of the V ranges and A.D's, giving separate data for the seven months of 1912, represented in the records of both stations. The data refer to the all-day inequalities. Registration was a good deal curtailed during November, 1912, at Cape Evans, and the data are thus less representative for that month than for the others. By A/E is meant the ratio of the Adelie Land range or A.D. to the corresponding value at Cape Evans.

TABLE LXV.—Ranges and A.D's at Adelie Land (A) and Cape Evans (E). V. All Days. L.M.T., 1912.

		April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Mean.
Range	A ...	73·0 γ	55·2 γ	46·8 γ	58·6 γ	59·2 γ	61·0 γ	89·8 γ	116·0 γ	...
	E ...	37·5 γ	32·1 γ	28·9 γ	20·5 γ	25·6 γ	32·7 γ	44·5 γ	69·1 γ	...
	A/E ...	1·95	1·72	1·62	2·86	2·31	1·87	2·02	1·68	2·00
A.D	A ...	19·17 γ	14·90 γ	12·72 γ	14·88 γ	16·20 γ	15·55 γ	23·74 γ	28·58 γ	...
	E ...	10·55 γ	8·49 γ	8·25 γ	6·89 γ	7·82 γ	9·13 γ	12·30 γ	16·95 γ	...
	A/E ...	1·82	1·75	1·54	2·16	2·07	1·70	1·93	1·69	1·83

Obviously, A/E tends to be larger for the range than for the A.D., implying that the Adelie Land diurnal inequality in V is of a more peaked character than that at

Cape Evans. A/E is very sensibly higher in July and August than during the other months. The June values of A/E are, however, the lowest, and those for May are well below the average. Thus a decided seasonal variation in the ratio is not proved.

TABLE LXVI.—Fourier Co-efficients. Diurnal Inequality for Year at Adelie Land (A) Cape Evans (E).

Element.	Place.	c_1	a_1	c_2	a_2	c_3	a_3	c_4	a_4
		γ	° ′	γ	°	γ	°	γ	°
N	A	14·27	195 15	2·22	118·0	1·43	182	0·07	143
	E	35·11	227 53	5·66	162·9	1·60	80	0·20	131
W	A	27·01	122 11	5·35	77·8	2·46	86	1·13	246
	E	35·34	141 20	8·05	83·5	0·75	7	0·61	75
V	A	26·42	200 45	10·73	151·5	4·08	147	1·44	41
	E	22·13	262 16	2·44	181·6	1·89	197	1·15	234

Table LXVI contrasts the Fourier co-efficients from the all-day diurnal inequalities in N, W and V for the year at Adelie Land and Cape Evans. The time used is G.M.T. The results for A (Adelie Land) refer to both years 1912 and 1913, while those for E (Cape Evans) refer to both 1911 and 1912. The object of employing two years' data was to reduce accidental features in the phase angles, and in the relative amplitudes of the 24, 12, 8 and 6-hour Fourier waves. But some allowance for the difference in amplitude at the two stations during the different years would be necessary. Inequality ranges in Adelie Land were larger in 1912 than in 1913, while at Cape Evans they were larger in 1911 than in 1912. Thus amplitudes of Fourier waves derived from the combination of 1911 and 1912 would naturally exceed those derived from the combination of 1912 and 1913. This is mainly responsible for the excess in the values of c_1 and c_2 at Cape Evans for W. It is also partly accountable for the excess in the N values at Cape Evans, and it renders the excess in the V values for Adelie Land less than it would otherwise have been.

On account of the local difference of time, we should expect the Cape Evans phase angles to be the larger: a_1 by 23° 45′; a_2 by 47·5°; a_3 by 71°; a_4 by 95°. The excess actually shown is—

	in N.	in W.	in V.	Mean.
for a_1	32° 38′	19° 9′	61° 31′	37° 46′
for a_2	34·9°	5·7°	30·1°	26·9°

The differences for a_1 and a_2 are in the right direction, but do not agree well with the anticipated amounts. In the case of a_3 and a_4 the differences observed are quite irregular. Presumably there is much that is "accidental" in the shorter period Fourier waves based on one or two years' observations.

TABLE LXVII.—Ratios of Amplitudes of Fourier Waves.

Place.	Declination.			Horizontal Force.			Vertical Force.		
	c_2/c_1	c_3/c_1	c_4/c_1	c_2/c_1	c_3/c_1	c_4/c_1	c_2/c_1	c_3/c_1	c_4/c_1
Adelie Land ...	·194	·094	·042	·176	·092	·008	·406	·154	·055
Cape Evans	·210	·024	·015	·186	·044	·011	·110	·085	·052
Kew Observatory ...	·62	·27	·10	·54	·25	·12	·65	·24	·09

The comparison of Adelie Land and Cape Evans in Table LXVII employs the elements actually recorded at the former station. As in Table LXVI, the Cape Evans data refer to 1911 and 1912, the Adelie Land data to 1912 and 1913. Kew data from ordinary days of 1890 to 1900 are added to give an idea of the phenomena in temperate latitudes. It will be seen that c_2/c_1—*i.e.*, the ratio of the amplitudes of the 12 and 24 hour terms—has closely similar values for D and H at the two Antarctic stations, but the Adelie Land value for V is much the bigger. While c_2/c_1 at Adelie Land is fully twice as big for V as for D or H, at Cape Evans the value of c_2/c_1 for V is considerably the smallest of the three. In every case c_3/c_1 is considerably larger for Adelie Land than for Cape Evans. The same is true of c_4/c_1 in the case of D. But in H and V the values of c_4/c_1 at the two Antarctic stations are much alike.

The Kew figures were added mainly to emphasise a feature common to both antarctic stations, viz., the dominance of the 24-hour term. V in Adelie Land provides a partial exception, but even in that case the 24-hour term is much more dominant than at Kew.

The dominance of the 24-hour term in the Antarctic is not unlikely even greater than the figures suggest. At a station like Kew diurnal inequalities based on 11 years' observations should be practically free from accidental features, but such is not the case with diurnal inequalities from one or two years' observations at highly-disturbed stations. The natural consequence of such accidental features is the exaggeration of some of the Fourier co-efficients of shorter period.

PLATES.

PHOTOGRAPHS AND GRAPHS

The Magnetic Station, Caroline Cove, viewed from the Beach, looking East.

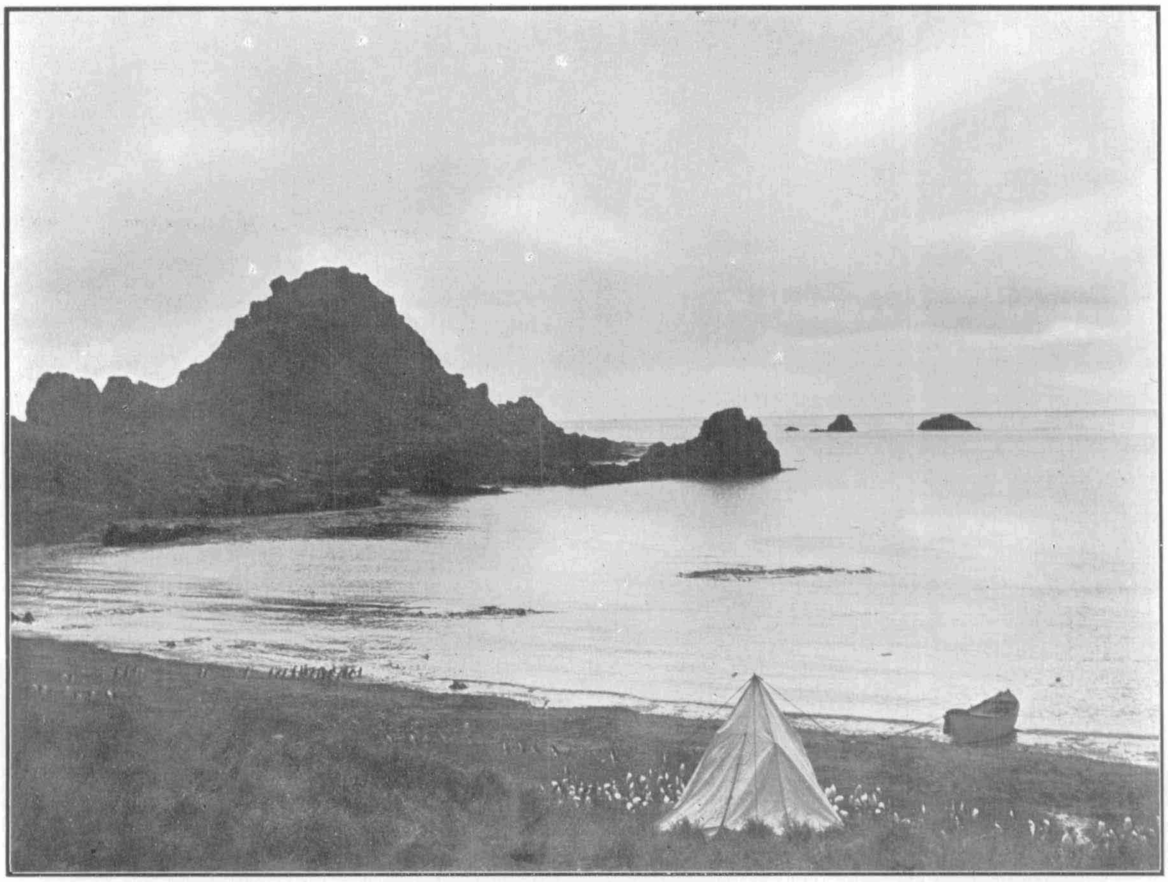


Fig. 1.—Magnetic Station at Caroline Cove, Macquarie Island. View looking West.

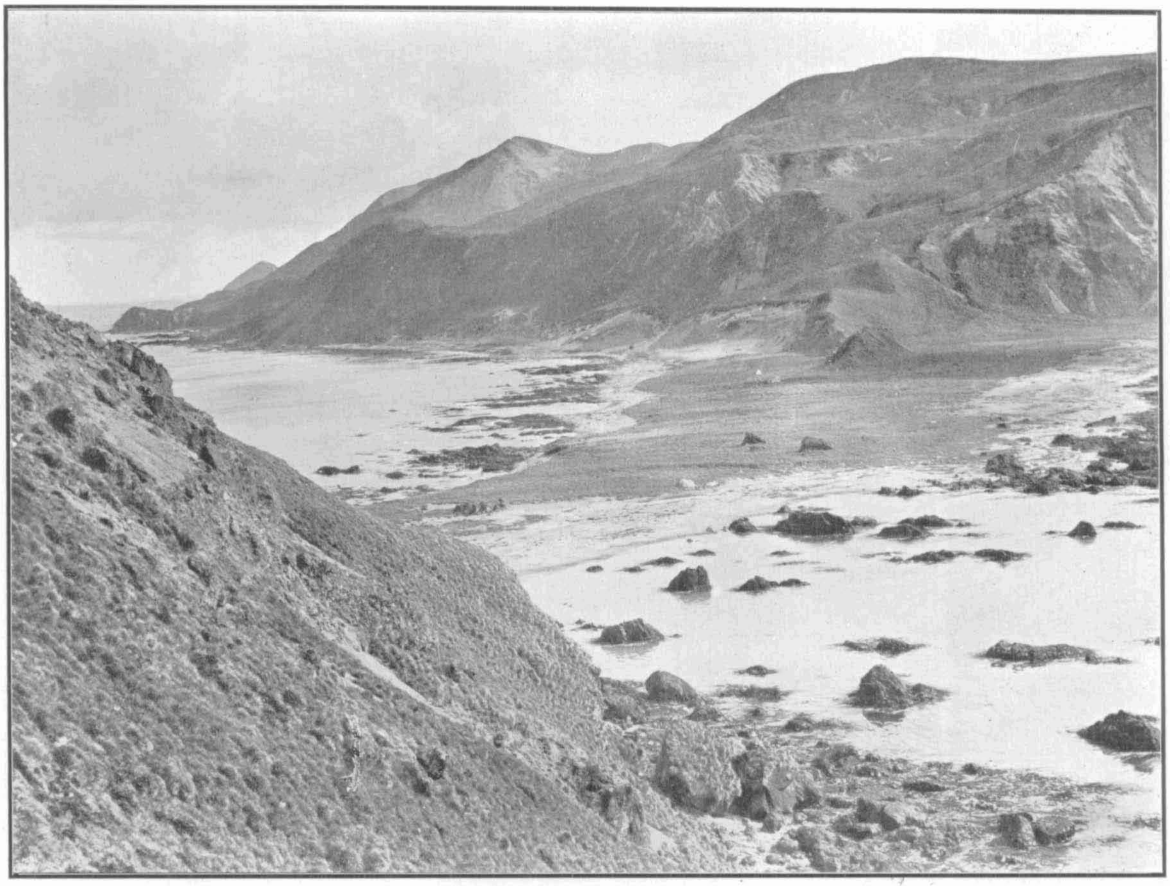


Fig. 2.—View of the North End Spit, Macquarie Island. Showing the Observing Tent pitched at Station A.

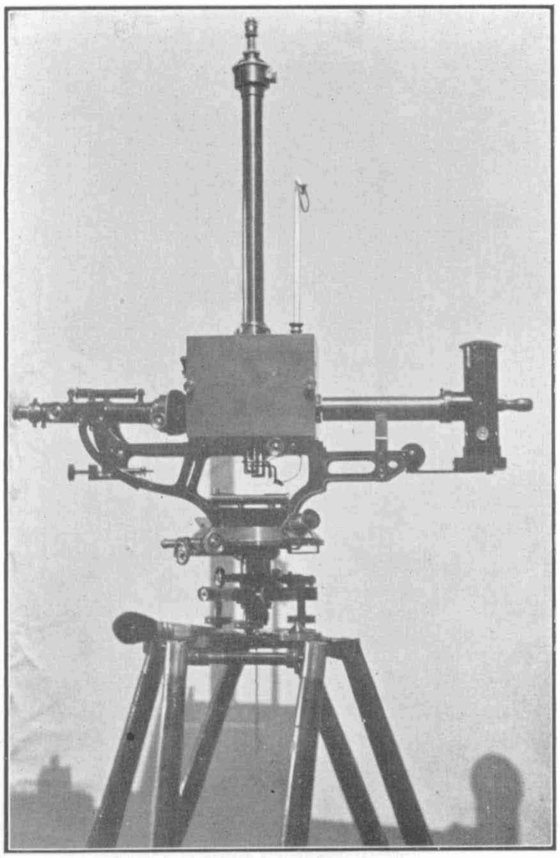


Fig. 1.—Magnetometer.

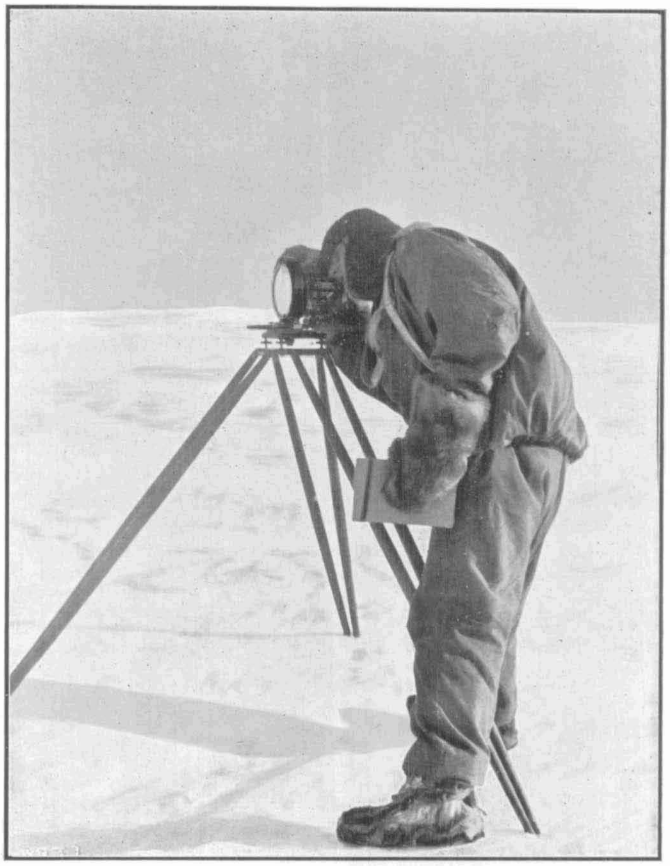


Fig. 2.—The Lloyd-Creak Dip-circle and Observer A. L. Kennedy.

Fig. 3.—The Kew, Land Pattern Dip-circle. E. N. Webb operating the Declinometer.

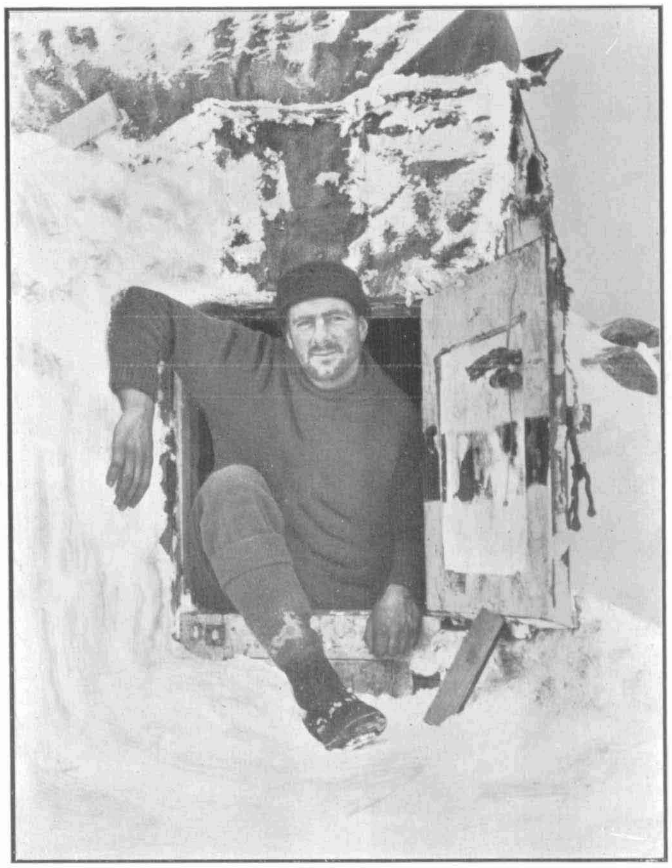


Fig. 4.—Entrance to the Magnetograph House on a fine Spring Day. E. N. Webb climbing out.

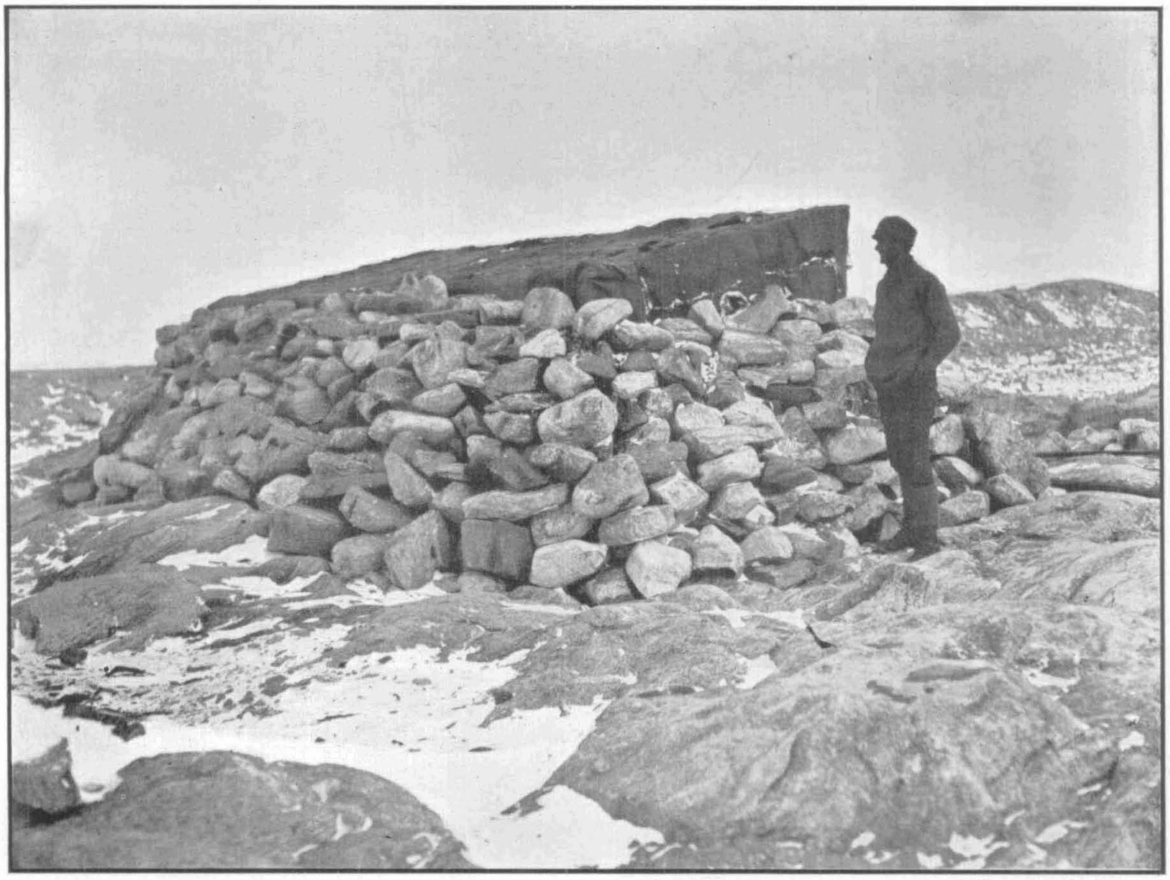


Fig. 1.—The Magnetograph House, Cape Denison, viewed from the South-East.

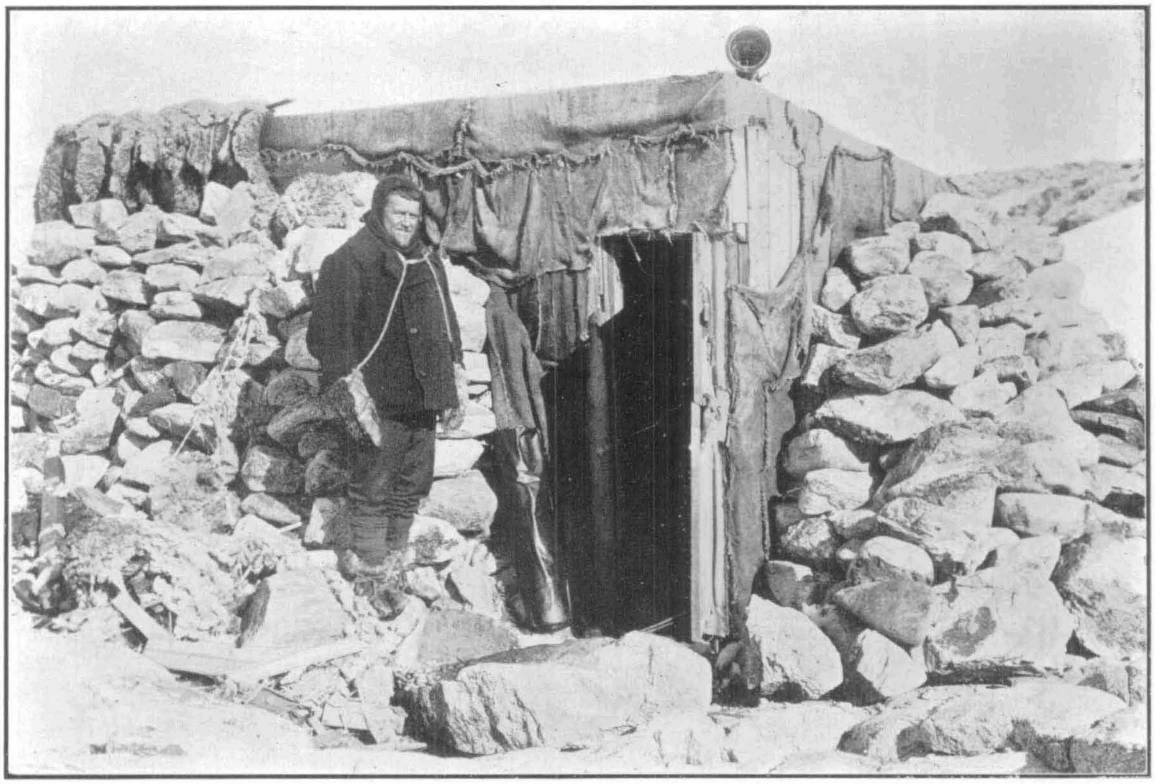


Fig. 2.—A Summer-time View of the North Face of the Magnetograph House, and Observer W. H. Hannam.

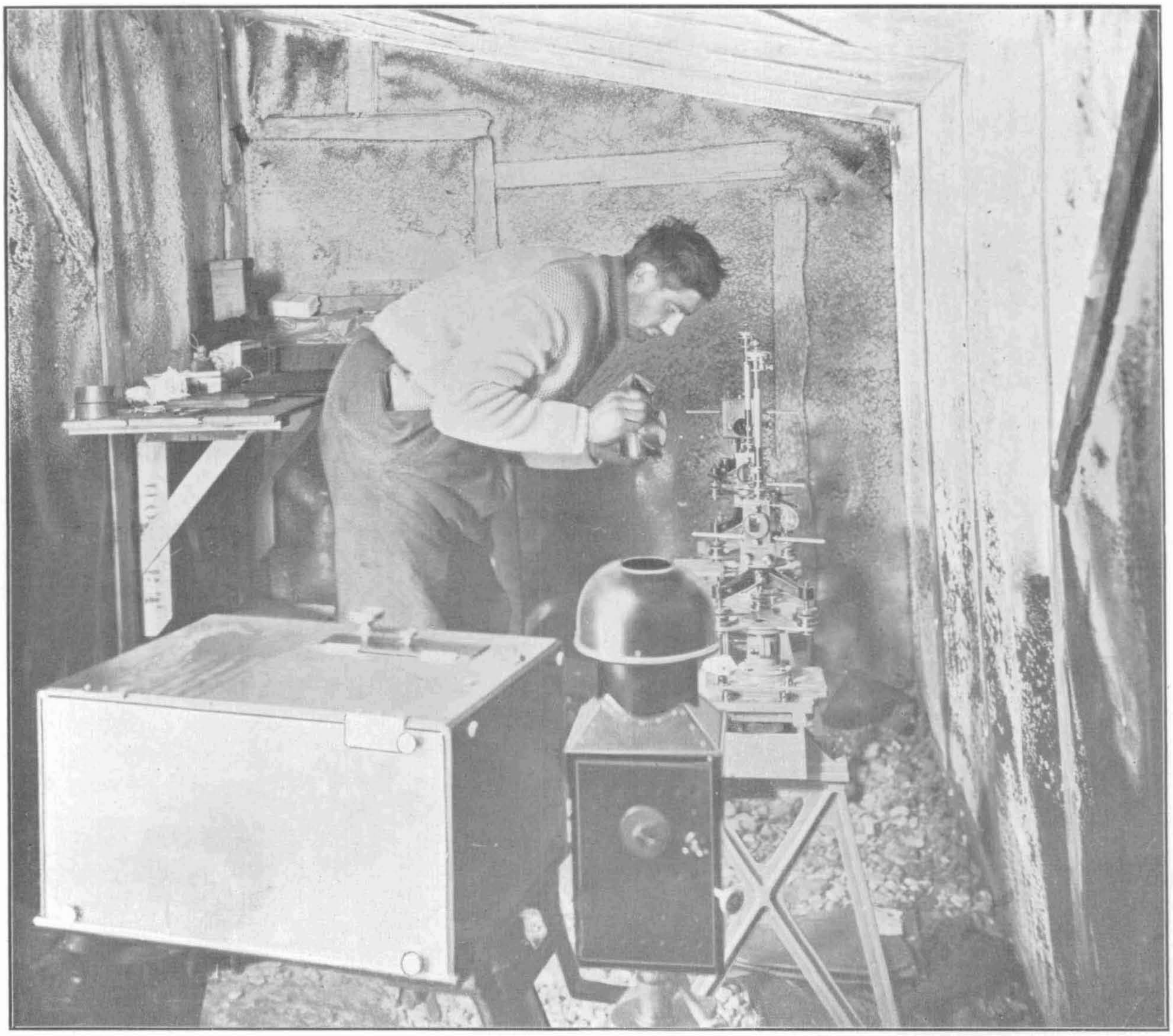


Fig. 1.—The Interior of the Magnetograph House. E. N. Webb in attendance.

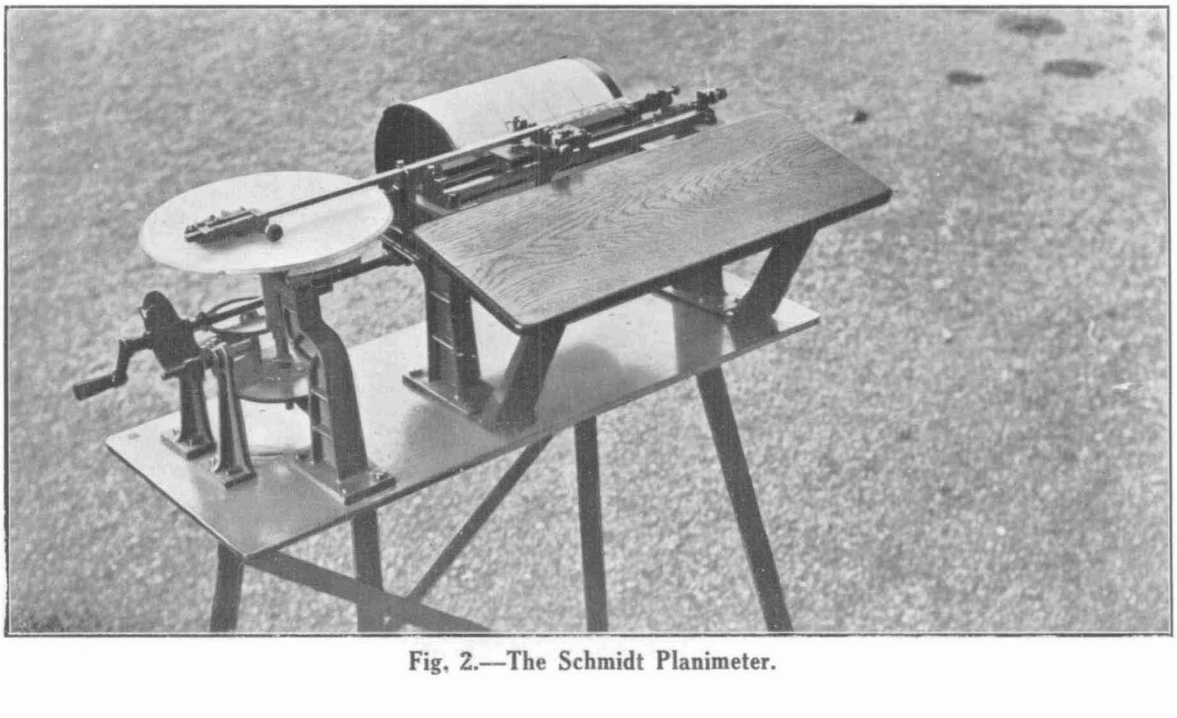


Fig. 2.—The Schmidt Planimeter.

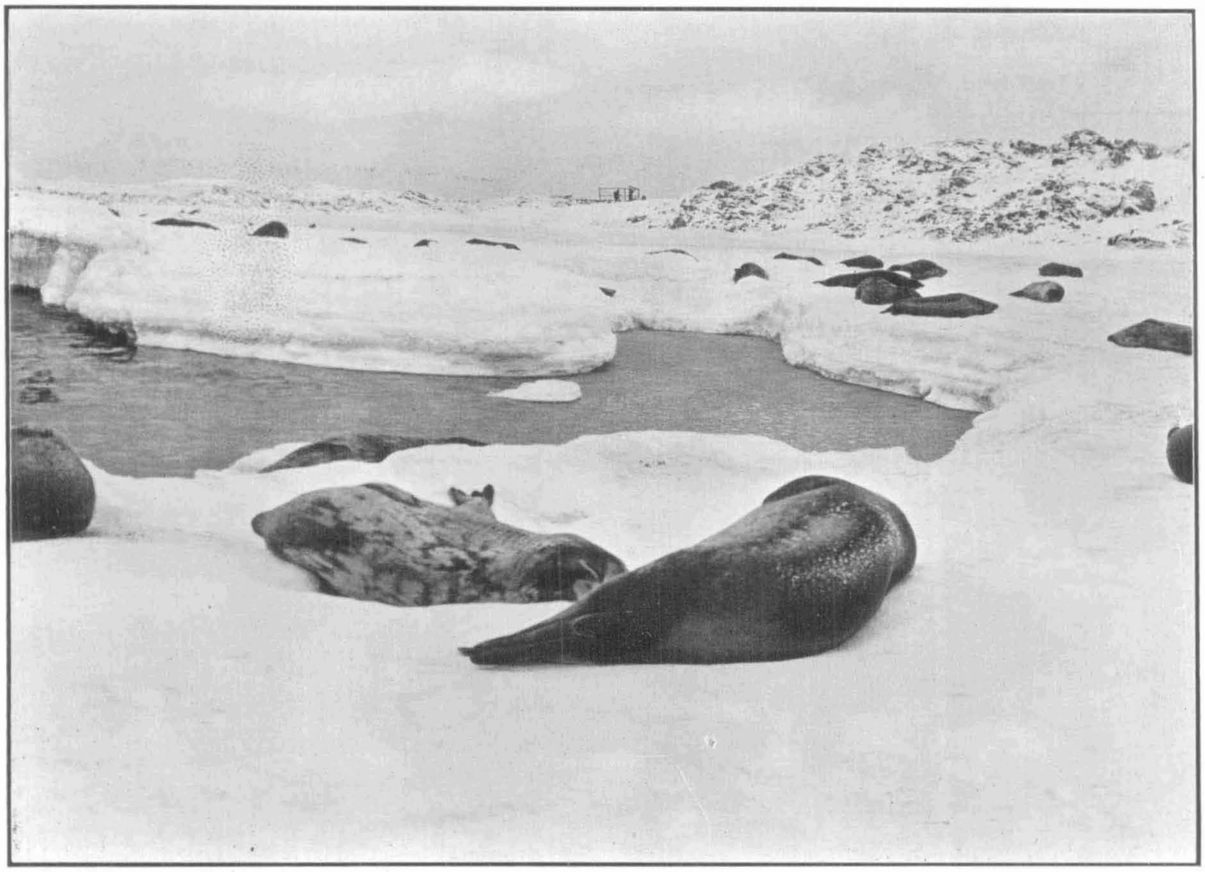
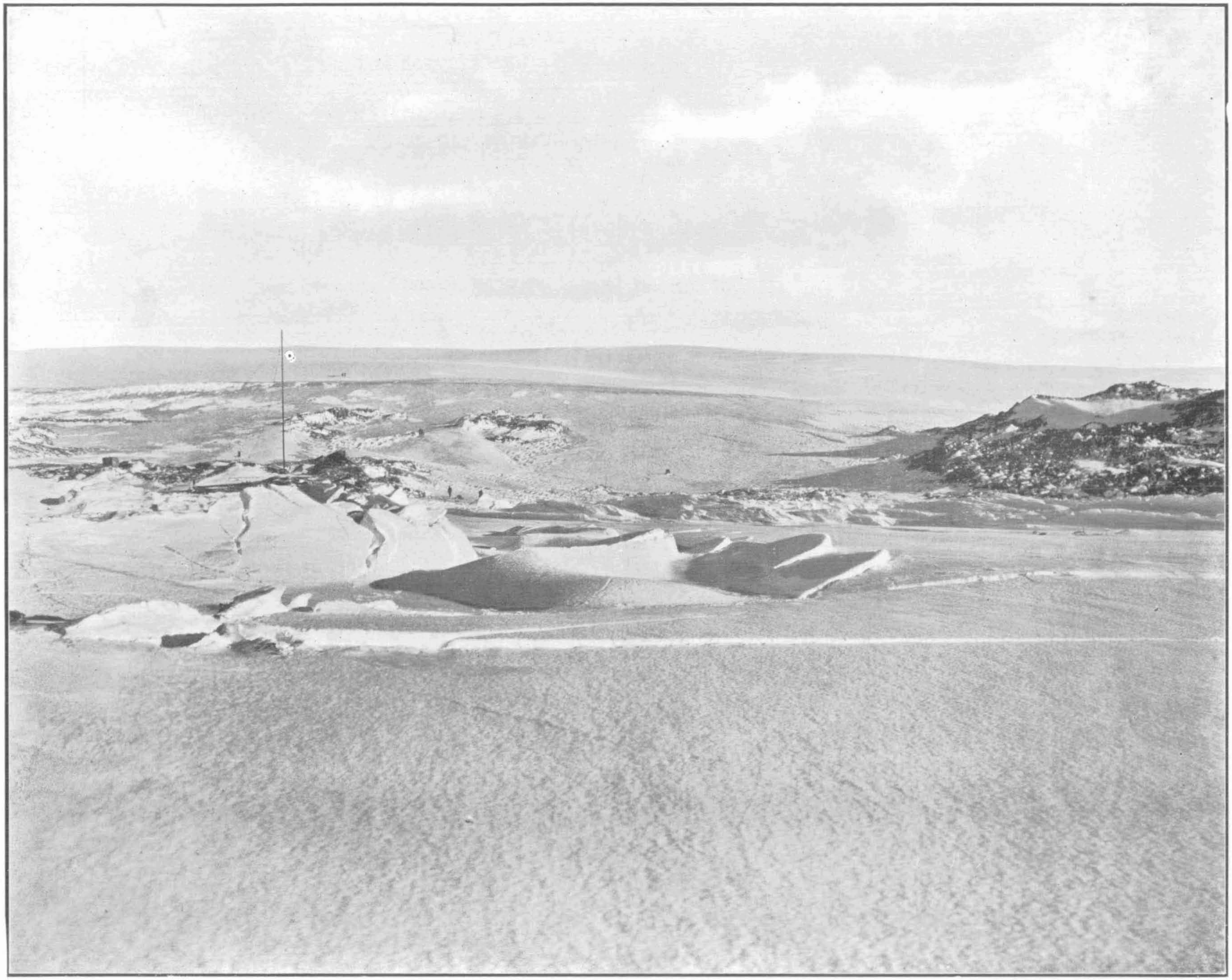


Fig. 1.—Erecting Framework of Magnetograph House on East Side of Boat Harbour, Cape Denison.

Fig. 2.—The Location of the Magnetograph House and Absolute Hut at Cape Denison.



View looking South from the Frozen Bay-Ice at Winter Quarters, Cape Denison, illustrating the location of the Ice Cave (Station B) on the Glacier Slope.

Fig. 1.—C. T. Madigan excavating in Névé Ice a Pit-and-Screen Shelter for Magnetic Observations. An incident on the Eastern Sledge Journey.

Fig. 2.—Station 1E. E. N. Webb Observing with Dip-circle in a Pit-and-Screen Shelter in the Glacier Ice of the Plateau Slopes.

Fig. 1.—Chilly Weather for Observers. The Moisture from the Breath Freezes on the Face.

Fig. 2.—Station 7 on the Antarctic Ice Cap near the South Magnetic Pole.

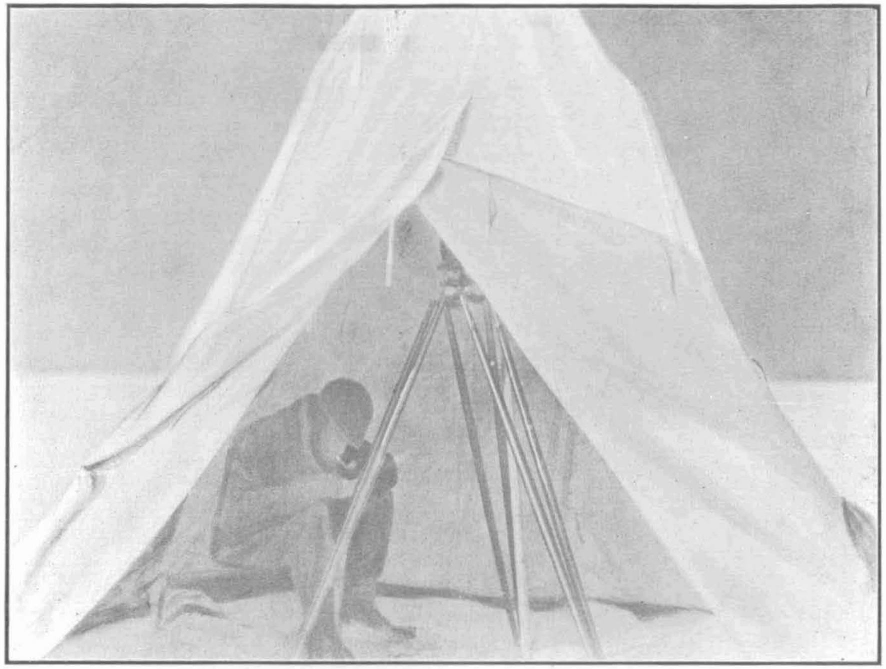


Fig. 1.—A. L. Kennedy Observing on the Shackleton Ice-shelf.

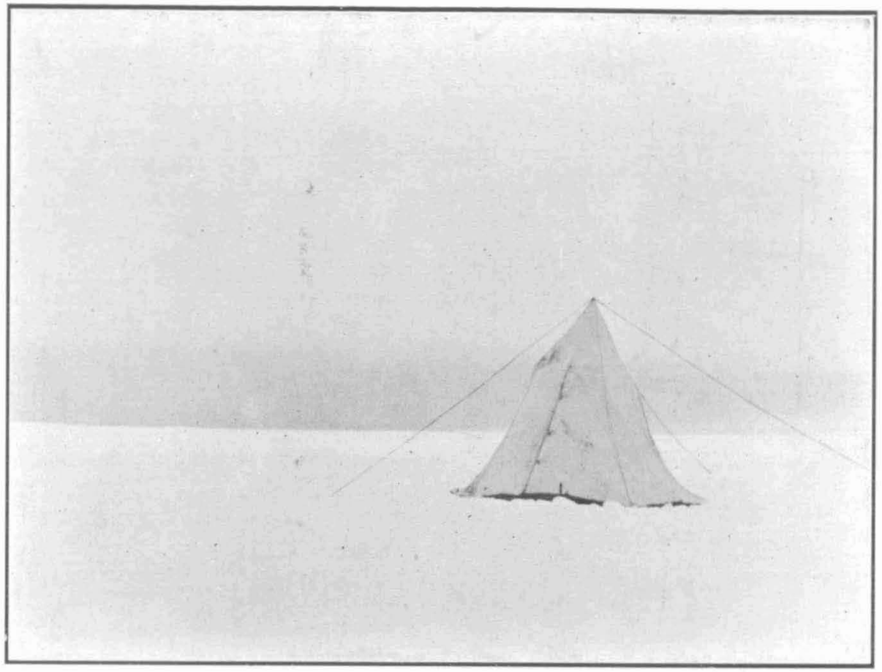


Fig. 2.—Field Service " Magnetic " Tent.

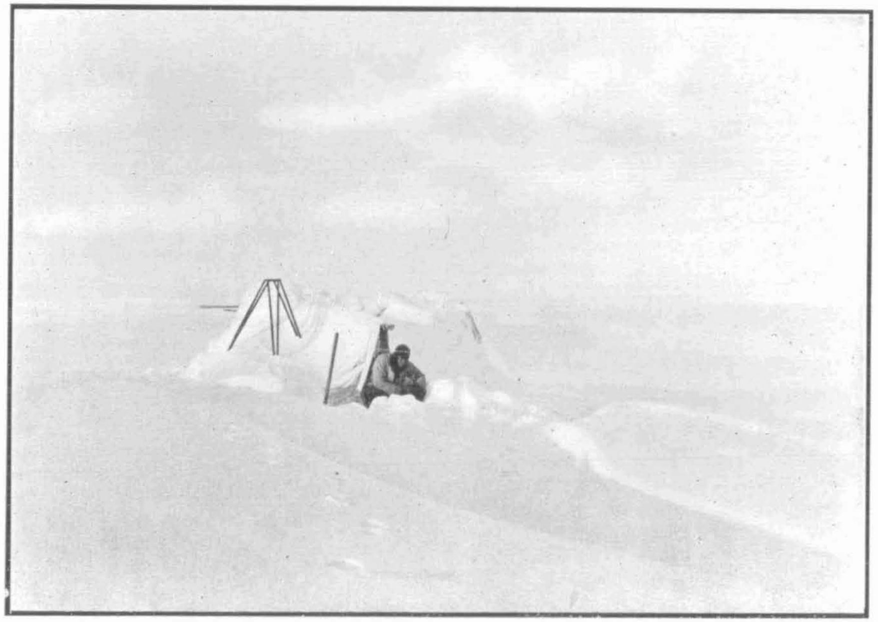
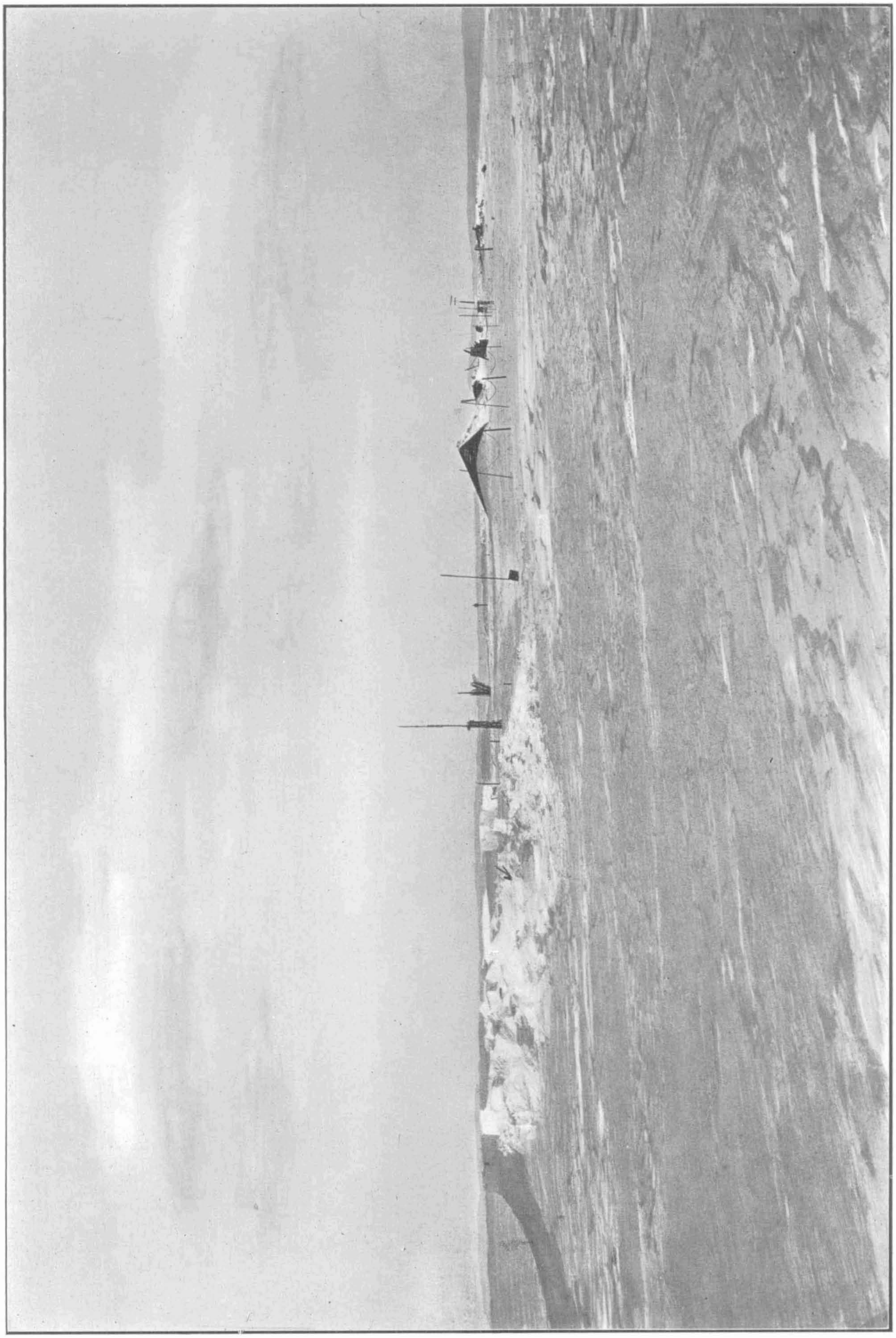


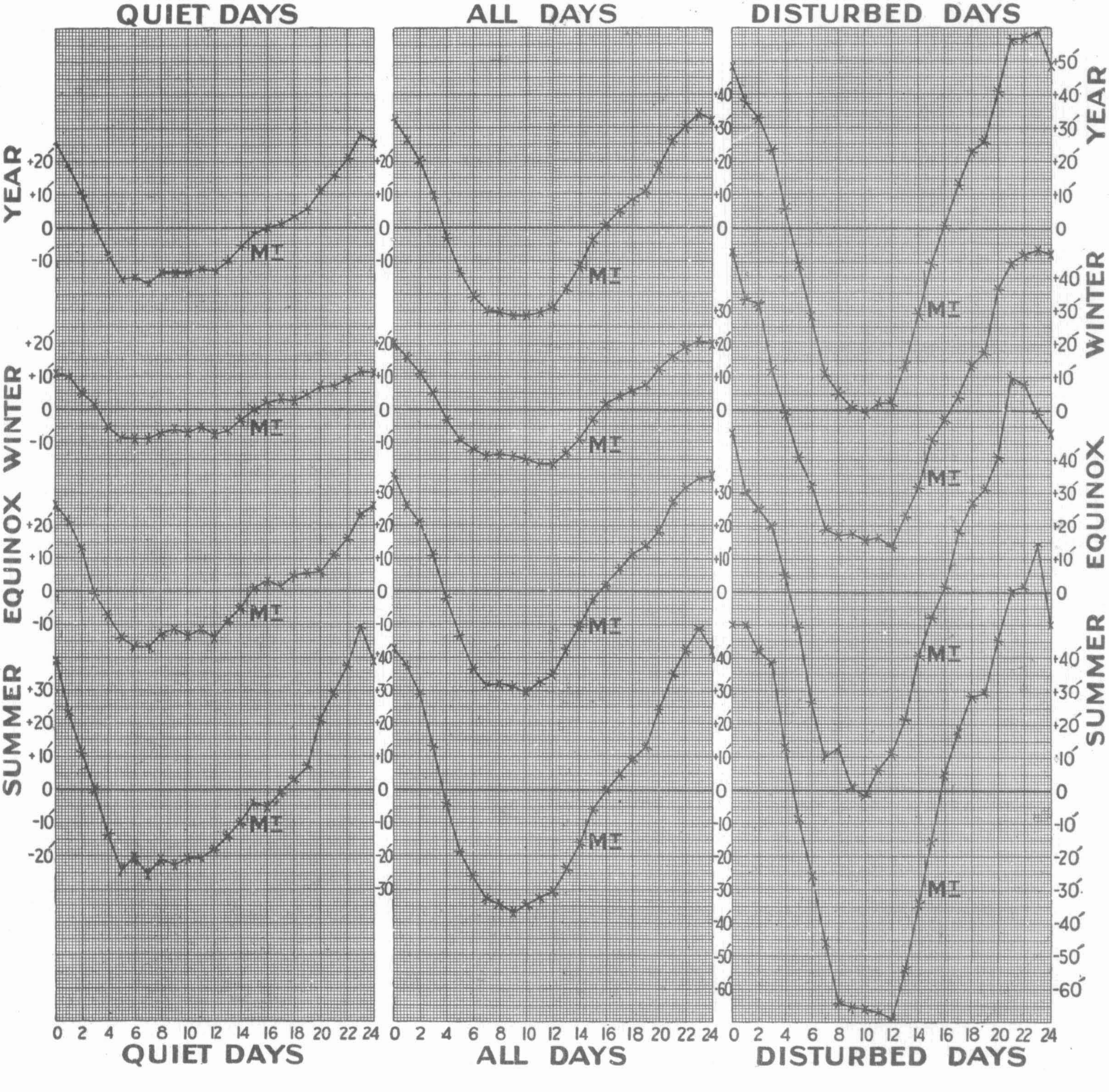
Fig. 3.—" Magnetic " Igloo at " The Grottoes."

Fig. 4.—Kennedy Rescuing Instruments after collapse of Igloo.

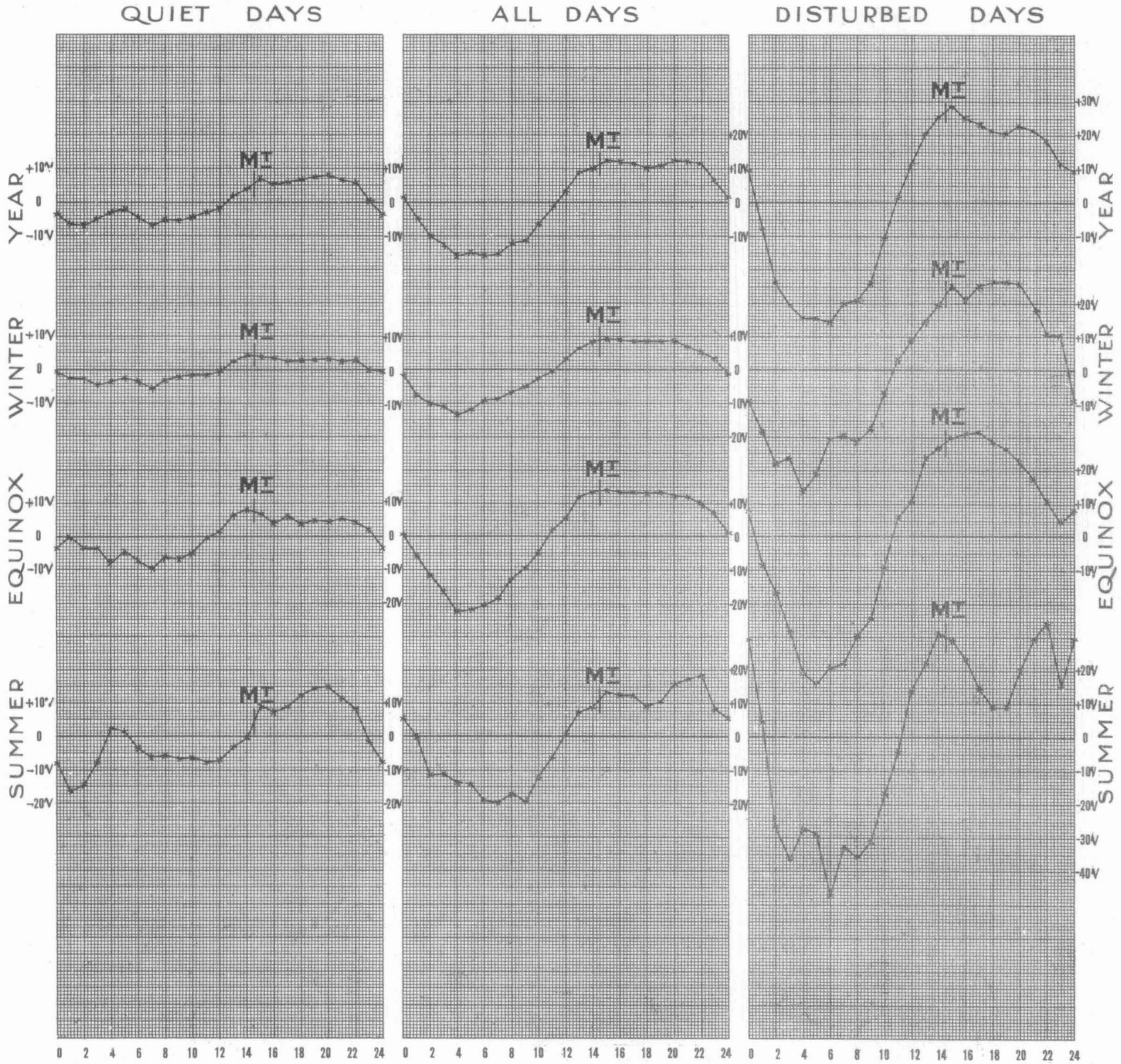


The Vicinity of "The Grottoes," Shackleton Ice-shelf.

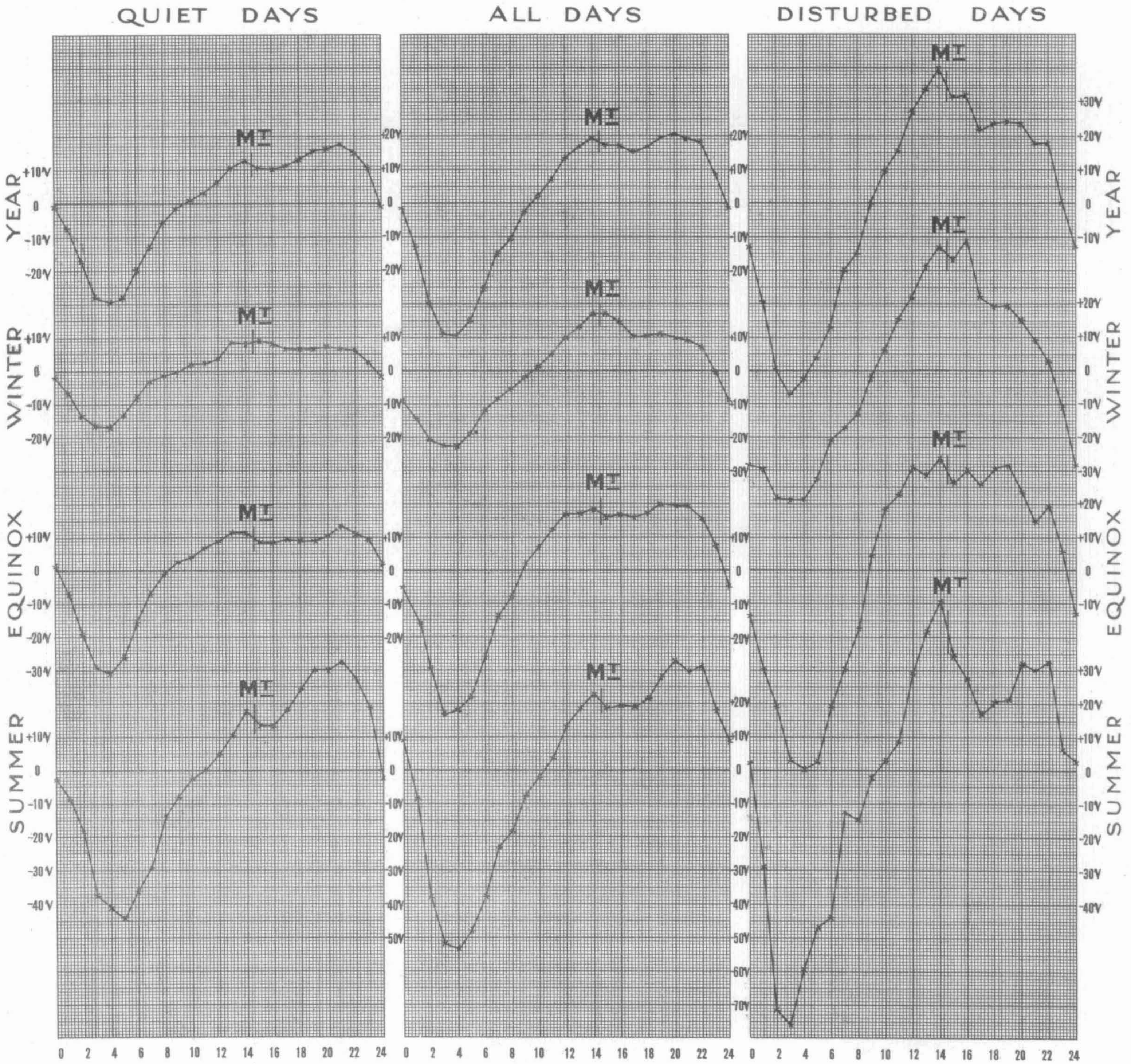
WESTERLY DECLINATION



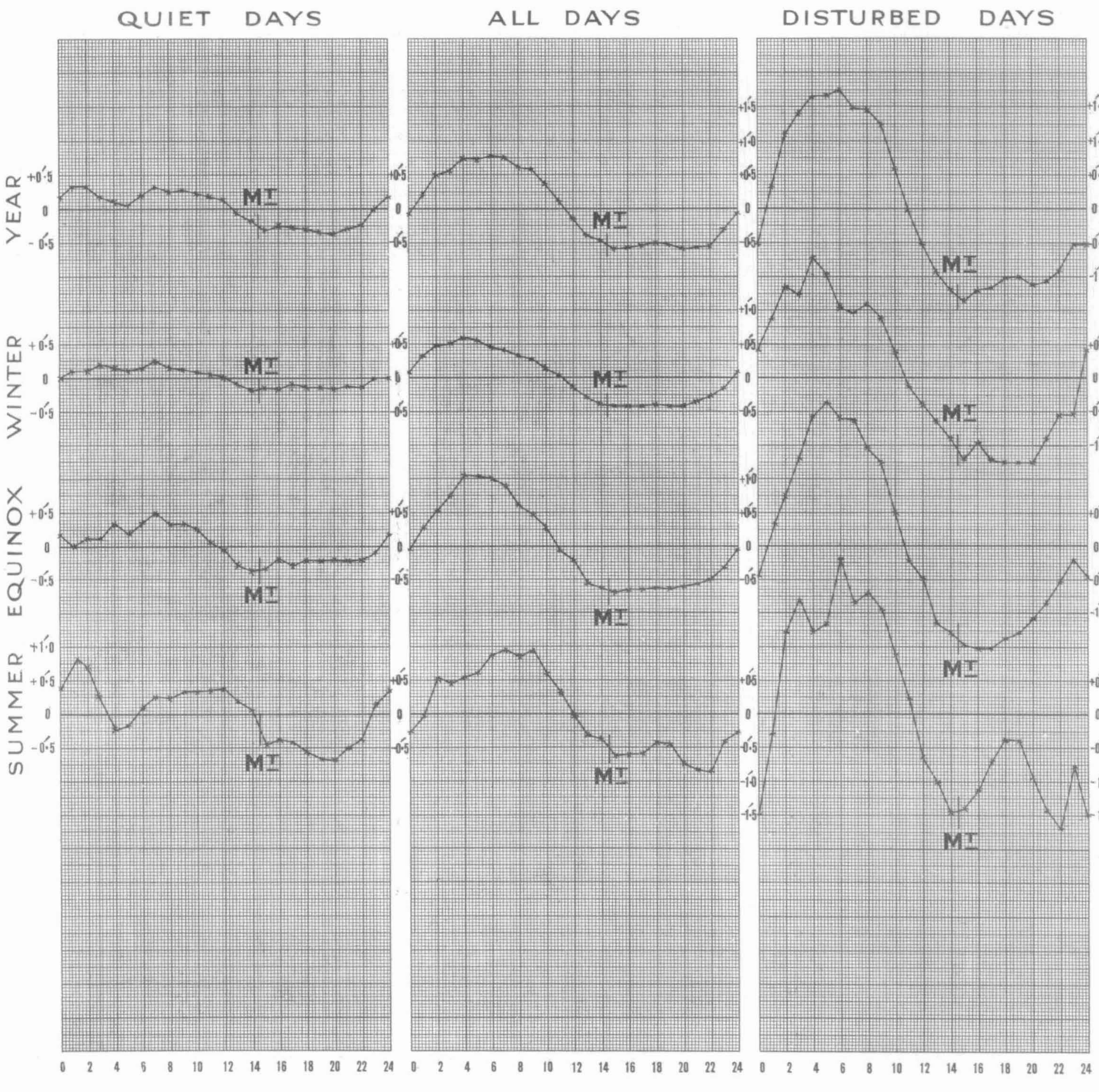
HORIZONTAL FORCE



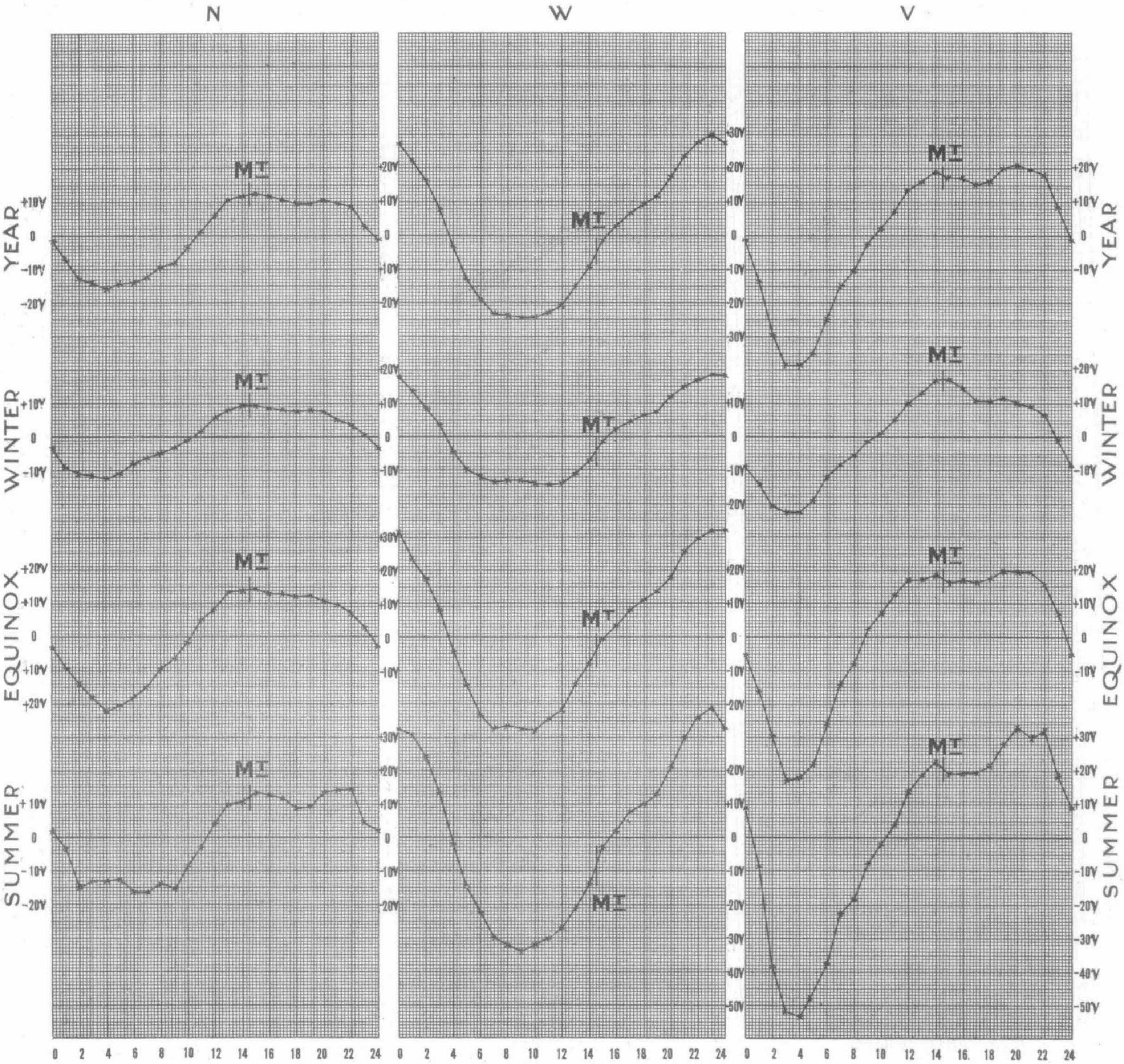
VERTICAL FORCE



INCLINATION



NORTH, WEST & VERTICAL COMPONENTS. ALL DAYS.

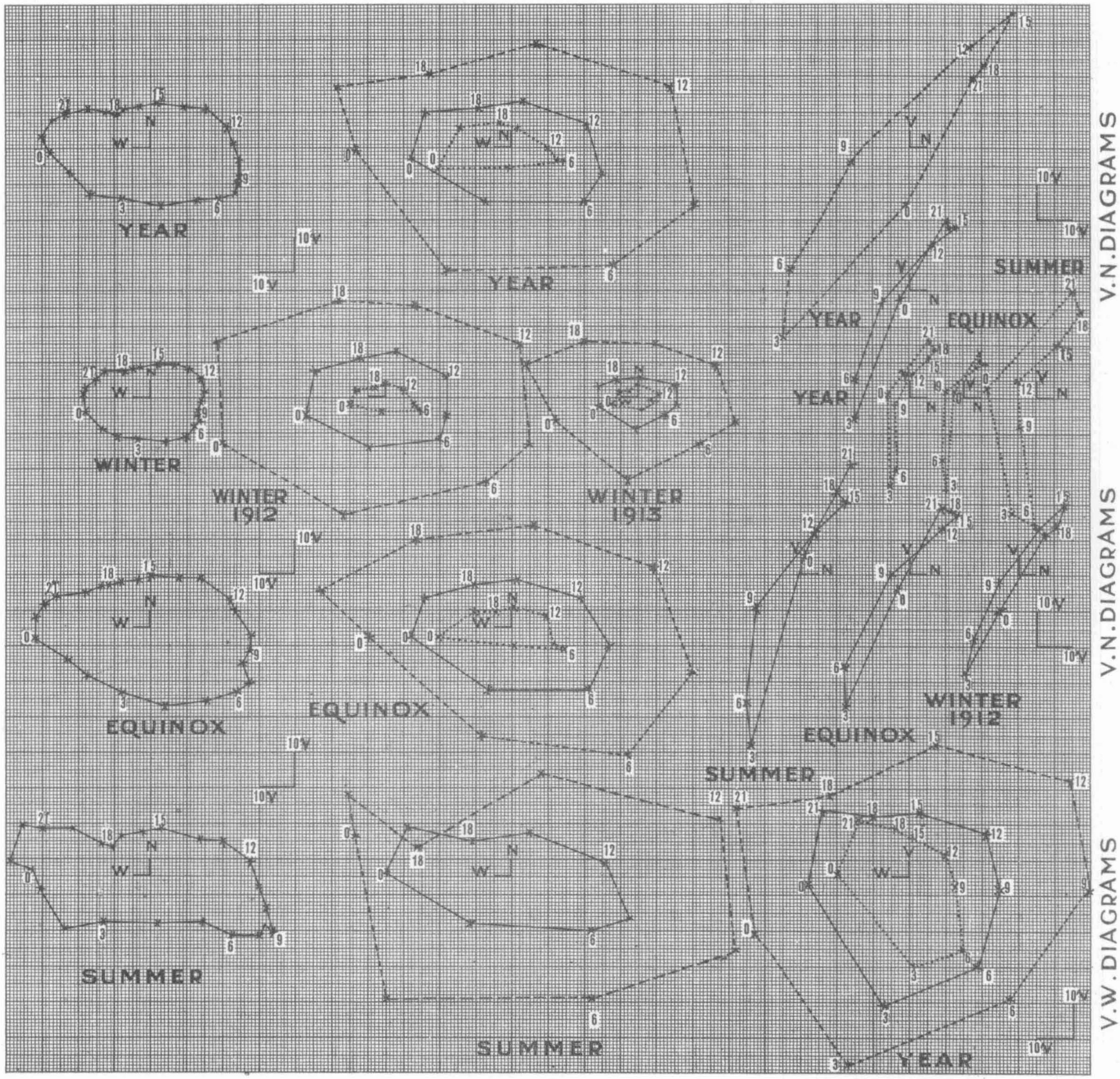


VECTOR DIAGRAMS

DISTURBED DAYS ---------
ALL DAYS ________
QUIET DAYS ....

DIAGRAMS IN HORIZONTAL PLANE

DIAGRAMS IN VERTICAL PLANES



COMPARISON OF ADELIE LAND & CAPE EVANS WINTER 1912.