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RESULTS OF MAGNETIC AND ELECTRIC OBSERVATIONS MADE DURING THE SOLAR ECLIPSE OF JUNE 8, 1918.

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1. The solar eclipse of June 8, 1918, since somewhat over one-third of the belt of totality was situated in the United States, offered an exceptional opportunity for astronomical and geophysical observations of various kinds. The Department of Terrestrial Magnetism of the Carnegie Institution of Washington confined its attention to magnetic, electric and allied observations. An appeal for cooperative work by institutions favorably situated, was published by L. A. Bauer in the March 1918 issue of this Journal, and the proposed program of work was communicated to interested persons, universities and observatories. As a result of this appeal, data have been obtained at a sufficient number of stations, both inside and outside the entire belt of totality. We desire to record here our appreciation of the effective cooperation received, as well as of the promptness with which the data have been forwarded to us.

2. It will be seen from Fig. 1 that the path, or belt, of totality passed about midway between the existing magnetic observatories, the positions of which are shown by the mark +. Thus Kakioka (Japan), Sitka (Alaska), Meanook and Agincourt (both in Canada), and Cheltenham (Maryland) were to the north of the belt; Apia (Samoa), Honolulu (Hawaii), and Tucson (Arizona) were to the south of the belt. Antipolo (Philippines) and Lukiapang (China) were just west of the beginning of the belt, while Vieques (Porto Rico) was just east of the end of it.

3. Another interesting circumstance about the present eclipse was the fact that it was the repetition of the one of May 28, 1900.

Fig. 1.—Photograph by L. A. Bauer at Corona, Colorado, before Totality.
(Showing Solarized Crescent and Weather Conditions.)

Fig. 2.—Photograph by L. B. Aldrich at Lakin, Kansas.
(Reproduced with the permission of the Smithsonian Institution.)

VIEWS OF SOLAR ECLIPSE, JUNE 8, 1918.

The belt of totality of the latter passed through the southeastern part of the United States during the morning hours, whereas that for the eclipse of June 8, 1918 passed through the United States from northwest to southeast during the *afternoon* hours. Thus, conditions were in a certain sense reversed for the two eclipses as far as the regular diurnal variation of the Earth's magnetism is concerned. It may be recalled that we began our first systematic observations for the study of a possible magnetic effect during a total solar eclipse with the eclipse of May 28, 1900.¹ (See Fig. 2.)

4. The following is the general scheme of work which was proposed; however, detailed directions and observation forms were also supplied to all who had signified their willingness to participate in the observations. The adoption of a definite program of observation and of an explicit observation-record assisted greatly in securing the desired uniformity and in simplifying the labor of reduction. The latter work, as far as was necessary, was performed at the Department of Terrestrial Magnetism by Messrs. L. A. Bauer, C. R. Duvall, H. M. W. Edmonds, H. B. Hedrick, H. W. Fisk, C. C. Ennis, S. J. Mauchly, W. J. Peters, and D. M. Wise.

GENERAL SCHEME OF WORK.

1. Simultaneous magnetic observations of any or all of the elements according to the instruments at the observer's disposal, every minute from June 8, 1918, 7 P. M. to 1 A. M. June 9, Greenwich civil mean time, or from June 8, 7^h to 13^h Greenwich astronomical mean time.

(To insure the highest degree of accuracy, the observer should begin work early enough to have everything in complete readiness in proper time. See precautions taken in previous eclipse work as described in the journal *Terrestrial Magnetism*, Vol. V., page 146, and Vol. VII., page 16. *Past experience has shown it to be essential that the same observer make the readings throughout the entire interval.*)

2. At magnetic observatories, all necessary precautions should be taken to insure that the self-recording instruments will be in good operation not only during the proposed interval but also for some time before and after, and eye-readings should be taken in addition wherever it is possible and convenient. (*It is recommended that, in general, the magnetograph be run on the usual speed throughout the interval, and that, if a change in recording speed be made, every precaution possible be taken to guard against instrumental changes likely to affect the continuity of the base line.*)

3. Atmospheric-electric observations should be made to the extent possible with the observer's equipment and personnel at his disposal.

4. Meteorological observations in accordance with the observer's equip-

¹BAUER, L. A.: Résumé of magnetic observations made chiefly by the United States Coast and Geodetic Survey on the day of the total solar eclipse, May 28, 1900; *Terr. Mag.*, vol. 5, 1900, pp. 143-165.

ment should be made at convenient periods (as short as possible) throughout the interval. It is suggested that, at least, temperature be read every fifth minute (directly after the magnetic reading for that minute).

5. Observers in the belt of totality are requested to take the magnetic reading every thirty seconds during the interval, 10 minutes before and 10 minutes after the time of totality, and to read temperature also every thirty seconds, between the magnetic readings.

5. In accordance with this scheme, cooperative observations were secured by the United States Coast and Geodetic Survey at their 5 observatories, and at 3 field stations in the belt of totality,² viz., Green River, Wyoming; Mena, Arkansas; and Orlando, Florida; by the Dominion Astronomical Observatory of Canada at a field station at Rivière du Loup, Quebec³; by the Canadian Meteorological Service at its 2 magnetic observatories, Agincourt and Meanook⁴; by Prof. W. J. Raymond of the University of California, at Berkeley; by Prof. J. M. Kuehne of the University of Texas, near Austin; by Prof. C. T. Knipp of the University of Illinois, at Urbana; by Prof. H. B. Wahlin of the University of Missouri, at Columbia; and by Prof. G. L. Hosmer of the Massachusetts Institute of Technology, at Woburn, a suburb of Boston. Professors Raymond, Kuehne, Knipp, Wahlin and Hosmer were associated with the Department of Terrestrial Magnetism, which furthermore assigned observers at 4 points along the path of totality, viz.: Goldendale, Washington; Corona, Colorado; Lakin, Kansas; and Brewton, Alabama. Observations were also made by the Department at Lake Moraine, Colorado, just south of the path of the eclipse, at the standardizing magnetic observatory at Washington, D. C., and at Watheroo, Australia. It is possible to include in the discussion also data from the magnetic observatories at Lukiapang (China), and Antipolo (Philippine Islands).⁵

Goldendale was the observing station for the astronomical observations of the Lick Observatory; Green River was the station of the Mt. Wilson Observatory and of the Yerkes Observatory; and Lakin was the station of the Smithsonian Institution. There were thus obtained both astronomical and geophysical data at 3 stations in the belt of totality.

6. The circumstances of the eclipse and details regarding the work at such stations will be given later, but for convenience all the

²See report by D. L. HAZARD, this issue, pp. 111-120.

³See report by C. A. FRENCH, this issue, p. 121.

⁴See report by R. F. Stupart, this issue, pp. 121-125.

⁵See the respective reports by J. DE MOIDREY and M. SADERA MASÓ, pp. 126 and 137.

stations included in this report are given here, arranged in 3 groups as follows:

I	II	III
Field Stations Within Belt of Totality	Field Stations Outside Belt of Totality	Observatory Stations
1. Goldendale, Wash.	8. Berkeley, Cal.	14. Lukiapang, China
2. Green River, Wyo.	9. Lake Moraine, Colo.	15. Antipolo, Philippine Is.
3. Corona, Colo.	9a. Urbana, Ill.	16. Kakioka, Japan
4. Lakin, Kansas	9b. Columbia, Mo.	17. Apia, Samoa
5. Mena, Arkansas	10. Austin, Texas	18. Honolulu, Hawaii
6. Brewton, Alabama	11. Washington, D. C.	19. Sitka, Alaska
7. Orlando, Florida	12. Woburn, Mass.	20. Meanook, Canada
	13. Rivière du Loup, Can.	21. Tucson, Arizona
		22. Agincourt, Canada
		23. Cheltenham, Maryland
		24. Vieques, Porto Rico
		25. Watheroo, Australia.

An endeavor was made to distribute the stations within the belt of totality in the United States with some degree of uniformity, from the Pacific to the Atlantic coast. (See Fig. 2.)

STATIONS AND OBSERVATIONS OF THE DEPARTMENT OF TERRESTRIAL MAGNETISM

7. *Goldendale, Washington*, having been selected as observing station by the astronomical party of the Lick Observatory and by a party from the Weather Bureau, was chosen as the most western station. The observations were in charge of H. W. Fisk, who was assisted by C. C. Ennis of the Department and by G. W. Borden, county engineer, and M. H. Spalding, both of whom were employed for the occasion. An attempt was made here to observe changes in all three magnetic elements by the use of the ordinary field equipment. Three stations were therefore chosen in the city park where rapid temperature changes were reduced in some measure by the shade of a grove of large pine trees. For declination and inclination observations, the instruments were set up in the usual field tents. For the horizontal intensity a very convenient place was found in the "Blockhouse", a log structure built in pioneer days for defense purposes and more recently removed to the park for preservation. It has no windows other than very narrow slits, or port-holes, and the only door opens in the northwest end where the direct rays of the Sun cannot enter until late in the afternoon. As the blockhouse was well shaded by the pines, it was found that the temperature changes were very slow during the middle of the day. As a further protection, the instrument was packed in cotton in a specially constructed

housing of fiber board, so that uncertainties from this source were practically eliminated.

8. The instrument at Goldendale was the magnetometer portion of magnetometer-inductor No. 26, the inductor parts and the base being used at the inclination station. The deflecting magnet was placed at the shortest practical distance, and the whole instrument was firmly clamped to the top of a post set in the earth-floor of the blockhouse. Readings were then made every minute in the same manner as for declination. At the inclination station, an earth inductor of the magnetometer-inductor type designed for field use by the Department of Terrestrial Magnetism was employed. By making use of the micrometer, provided for setting the vertical circle, it was found possible to make readings at short intervals with sufficient accuracy to follow the diurnal changes quite closely, but, unfortunately, a mechanical difficulty developed from continued use of the instrument over so long a period, the exact nature of which was not recognized in time; hence, the inclination results were rendered of small value for the purpose intended. With some additional precautions and a slight modification of procedure, there is reason to believe that this type of field instrument can be successfully used to observe diurnal variation in inclination. The weather conditions on June 8 at Goldendale were favorable for good observations all day; the light cirrus clouds which gathered during the forenoon very fortunately parted at the moment of totality so that the eclipse was visible in a clear sky.

9. *Corona, Colorado*, a station of the Denver and Salt Lake railroad, the so-called "Moffat Road," was about 65 miles west of Denver, on the summit of the divide where the railroad crosses the Rocky Mountains; it was selected especially on account of the high altitude, about 11,800 feet. This was L. A. Bauer's station, who associated with him in the work Prof. E. Waite Elder and Mr. R. Sutton, both of the East End High School of Denver. Mr. Britt, the telegraph operator at Corona, also cooperated by making some astronomical observations with a newly purchased 3.5-inch refracting telescope. The weather conditions though unsatisfactory (hail, rain and clouds) during the first half of the time of the eclipse, were good throughout the greater part of totality. (See Pl. I, Fig. 1, and Fig. 4.)

10. *Lakin, Kansas*, the main station of the Department, was not

Fig. 3.—H. W. Fisk's Station at Goldendale, Washington.

Fig. 4.—L. A. Bauer's Station at Corona, Colorado; Altitude, 11,800 feet.

far from the center of the portion of the eclipse-path situated in the United States. This station had also been selected by the Smithsonian Institution party in charge of Mr. L. B. Aldrich. Complete magnetic and atmospheric-electric observations were made at this station. The party was in charge of S. J. Mauchly, who was assisted by D. M. Wise, A. Thomson, and M. B. Smith. A complete set of magnetograph instruments of the Eschenhagen pattern was installed in an abandoned farm building, and kept in continuous operation from June 5 to 26 by D. M. Wise, who also made during the eclipse-period a series of eye-readings of declination with a field-magnetometer. The atmospheric-electric observations were made during the period June 2 to 13 by S. J. Mauchly, A. Thomson, and M. B. Smith; the observations, in general, comprised potential gradient, positive and negative conductivity, ionic content of positive sign, and penetrating radiation. (See Figs. 5 and 6.)

11. At *Brewton, Alabama*, C. W. Hewlett of the North Carolina State Normal and Industrial College, employed for the occasion by the Department, made declination-observations during the eclipse and on the preceding and following days. The weather was heavy and threatening all day, rain falling a part of the time, though at the time of totality there was no rain.

12. The 4 stations Goldendale, Corona, Lakin and Brewton, as already stated, were situated inside the belt of totality. We next come to the stations outside of the belt where observations were made in the United States by or under the auspices of the Department.

13. *Berkeley, California*, was the station at which Prof. W. J. Raymond of the University of California made declination observations. The following extracts are made from Prof. Raymond's report:

"In accordance with Dr. Bauer's request, observations of magnetic declination were made at the University of California on June 8 from 7 P. M., Greenwich mean time, to 1 A. M. June 9, that is, from 12 noon to 6 P. M., local clock time. The instrument employed was a magnetometer of the type commonly used in physical laboratories for the determination of horizontal intensity. Since it was not adapted to the absolute measurement of declination, the observations were limited to variation in declination. In order to compare the variation on the day of the eclipse with the usual diurnal variation, readings were taken between the hours noted, on June 7, 9 and 18.

"The magnetometer was set up in a garden, located between 600 and 700 meters west of the first abrupt slope of the Contra Costa hills, and about 50

Fig. 5.—S. J. Mauchly's Station at Lakin, Kansas.

Fig. 6.—Magnetograph operated by D. M. Wise at Lakin, Kansas.

meters from the nearest street traffic. The station is about 200 meters east a north-south, double-track electric car-line which maintains frequent but somewhat irregular service. About 1300 meters west of the station is a street on which are two electric lines, each of which operates trains of 2 or 3 to 7 or 8 cars every 20 minutes each way.

"The magnet used has a moment of about 560 units. It was suspended by a strip of phosphor-bronze rolled from a wire 0.0036 cm. in diameter and 38.5 cm. in length. . . . A twist of 180° in the suspending strip deflected the magnet less than $3'.6$ The suspended magnet was shielded from sunlight and from all disturbances, except magnetic ones. A small mirror attached to the magnet permitted its azimuth to be observed by means of a telescope and scale, set up in a fixed position, 261.5 cm. from the mirror. Angles were measured from an arbitrarily assumed meridian, and were estimated to $0'.1$

"Means of the scale readings were computed for intervals of 5 minutes and reduced to angular measure. When these 5-minute mean results were plotted, a periodic variation became apparent, maxima occurring every 20 minutes, and at the same times on successive days. The amplitude of the variation was from $0'.2$ to $0'.4$ early in the afternoon, increasing to nearly $1'$ toward 6 P. M. (Standard Time). Small magnetic disturbances had been expected from the street-car line about 200 meters distant, but it was not expected that the electric trains more than 1300 meters away would affect the needle sensibly. It was found, however, that not only was there coincidence between the time schedule of the trains and the observed periodicity of the curves, but the amplitude of the curves increased with the traffic toward 6 o'clock in the evening."

14. The variations referred to by Prof. Raymond, it may be noted, are in the 5-minute means. The variations in individual readings are of course much larger than the limits he names. In the Berkeley graph (Fig. 7, page 110) the irregular solid line shows these periodic fluctuations as they appear from the 5-minute means. The dotted line running through it is a smoothed curve derived by combining these means in groups of four, that is, all the readings within the 20-minute period, successively, taking numbers 1, 2, 3, and 4 for the first value, numbers 3, 4, 5, and 6 for the second, 5, 6, 7, and 8 for the third and so forth. The resulting curve shown in the dotted line has lost the periodic electric car effect, and with it doubtless some of the short-period details of the diurnal-variation curve, although it plainly shows the characteristic features of curves for the other stations.

15. At the time of the eclipse, W. J. Peters of the Department was at work in the mountains in the neighborhood of Pikes Peak, Colorado. He selected for his eclipse station, a point near *Lake Moraine, Colorado*, at an altitude of about 10,220 feet, where the eclipse was very nearly total, the magnitude being about 0.99. Clouds gathered in the early afternoon, and later about the time

of the eclipse there was a violent thunder storm with rain and hail.

16. The observations at *Austin, Texas*, were made by Prof. J. M. Kuehne of the University of Texas, using a theodolite-magnetometer built by Berger and Sons. His station was on the grounds of the Esperanza School, about 4 miles north of the State Capitol. There was a light shower during the earlier part of the observations followed by heavy cloudiness later in the afternoon. Prof. C. T. Knipp's observing station at *Urbana, Illinois*, was at the 1917 station of the Coast and Geodetic Survey; the sky was clear and there was no wind. The observations at *Columbia, Missouri*, by Prof. H. B. Wahlin, were made at the Coast and Geodetic Survey station of 1916. The weather conditions were: Cloudiness to begin with, 0.7 and at end, 0.1; moderately strong wind at beginning and none appreciable at end; humidity high.

17. At *Washington, D. C.*, declination observations were made in the standardizing magnetic observatory of the Department by C. R. Duvall.

18. At *Woburn*, a suburb of Boston, Massachusetts, the declination observations were made by Prof. G. L. Hosmer of the Massachusetts Institute of Technology, using an Elliott magnetometer No. 68, belonging to the Institute. His station was about 650 feet east of a north-south electric car-line. At both Washington and Woburn some electric-car effects in the form of small pulsations are noted, though much smaller than those recorded at Berkeley, and it is not probable that the form of the curve as plotted from the 5-minute means is appreciably altered because of their presence.

Geographic Positions and Circumstances of the Eclipse.

19. The geographic positions and local circumstances of the eclipse are given in Table 1. The positions are as observed or as reported by the observers; the eclipse circumstances were deduced from the predictions in the supplement to the American Ephemeris for 1918. The quantities under "Distance" are approximate distances in minutes of arc, north or south of the corresponding points on the center line of the eclipse. The column under "G. M. T." shows the approximate time of mid-totality. The other columns are self-explanatory. For convenient reference there are included in this table the 3 stations (Nos. 2, 5 and 7) at which observations were made by the observers of the United States Coast and Geodetic Survey.

TABLE 1.—*Stations in belt of totality (Group I).*

No.	Station	Latitude	Longitude	Distance	G.M.T.	Duration	Inst.	Chief of Party
		° /	° /	'	h m	s		
1	Goldendale	45 50 N	120 50 W	1.5 N	23 00	117	CIW M13	H. W. Fisk
2	Green River	41 32 N	109 28 W	1.5 S	18	99	CS M17	S. A. Deel
3	Corona	39 57 N	105 42 W	2. N	23	92	CIW M14	L. A. Bauer
4	Lakin	37 53 N	101 18 W	1.5 S	28	84	CIW M10	S. J. Mauchly
5	Mena	34 35 N	94 14 W	2. N	35	70	CS M19	W. M. Merrymon
6	Brewton	31 07 N	87 04 W	3. S	40	59	CIW M 4	C. W. Hewlett
7	Orlando	28 33 N	81 21 W	7. N	42	48	CS M29	J. R. Benton

20. The geographic positions and eclipse circumstances of the field stations outside of the belt of totality, (Group II), are shown in Table 2. The Greenwich mean time and degree of maximum obscuration are given in the columns headed, respectively, "G. M. T." and "Mag." The Canadian station, Rivière du Loup, is likewise given in this table.

TABLE 2.—*Field stations outside belt of totality (Group II).*

No.	Station	Latitude	Longitude	G.M.T.	Mag.	Inst.	Observer
		° /	° /	h m			
8	Berkeley	37 51 N	122 16 W	23 10	0.79	Lab.	W. J. Raymond, Univ. of Cal.
9	Lake Moraine	38 49 N	105 00 W	23 25	0.99	No. 16	W. J. Peters, C. I. W.
9a	Urbana	40 06 N	88 14 W	23 28	0.83	Lab.	C. T. Knipp, Univ. of Ill.
9b	Columbia	38 56 N	92 20 W	23 29	0.89	Lab.	H. B. Wahlin, Univ. of Mo.
10	Austin	30 20 N	97 24 W	23 40	0.87	9710	J. M. Kuehne, Univ. of Texas
11	Washington	38 58 N	77 04 W	23 29	0.74	No. 2	C. R. Duvall, C. I. W.
12	Woburn	42 30 N	71 06 W	23 23	0.63	Kew 68	G. L. Hosmer, Mass. Inst. of Tech.
13	Rivière du Loup	47 52 N	69 34 W	23 16	0.52	No. 20	C. A. French, Dom. Astron. Obs'y

21. Fig. 2 shows the distribution of the various stations in the United States and Canada at which magnetic data were obtained during the eclipse of June 8, 1918.

Magnetic-Declination Data.

22. The readings of the declination values were made by all the observers at the same instants as nearly as conditions would permit, care having been taken to obtain the correction of the time-piece used in each case on Greenwich mean time so that the readings were on the full minute. These readings were then combined in such a way that the means, in general, fall on the multiples of 5 minutes on and after the hour. As a consequence the five-minute means tabulated for the different stations of Group I are directly comparable (Table 3).

TABLE 3.—Five-minute means of declination observations during the solar eclipse, June 8, 1918 (Group I).^a

Greenwich Mean Time	1. Goldendale, Washington	3. Corona, Colorado	4. Lakin, Kansas	6. Brewton, Alabama	Greenwich Mean Time	1. Goldendale, Washington	3. Corona, Colorado	4. Lakin, Kansas	6. Brewton, Alabama
	E 23°+	E 15°+	E 12°+	E 4°+					
h m	'	'	'	'	h m	'	'	'	'
19 01	19.0	42.0	25.4	15.7	22 00	16.2	41.5	25.7	19.0
05	18.5	41.7	25.1	15.5	05	16.4	41.6	25.8	19.3
10	17.8	41.7	25.0	15.5	10	16.6	42.2	26.0	19.3
15	17.7	41.4	24.9	15.5	15	16.9	42.5	26.2	19.5
20	17.2	41.2	24.7	15.4	20	16.9	42.9	26.3	19.6
25	17.1	41.1	24.5	15.3	25	17.2	43.3	26.5	19.7
30	16.7	40.9	24.4	15.4	30	17.1	43.4	26.8	19.7
35	16.5	40.7	24.3	15.5	35	17.4	43.6	27.1	19.8
40	16.4	40.6	24.3	15.6	40	17.4	43.7	27.3	20.0
45	16.2	40.4	24.3	15.6	45	17.2	44.3	27.4	20.1
50	16.2	40.3	24.4	15.9	50	17.4	44.3	27.6	20.1
55	16.3	40.5	24.6	16.1	55	17.4	44.2	27.6	20.1
20 00	16.2	40.3	24.9	16.2	23 00	17.3	44.4	28.0	20.1
05	16.5	40.2	25.0	16.4	05	17.2	44.5	28.3	20.2
10	16.6	40.5	25.2	16.7	10	17.3	44.7	28.7	20.4
15	16.7	40.4	25.1	16.8	15	17.3	44.8	28.8	20.4
20	16.5	39.8	25.0	16.8	20	17.5	45.0	29.0	20.4
25	16.1	39.5	24.9	16.9	25	17.7	45.0	29.3	20.5
30	15.6	39.4	24.7	16.9	30	17.4	45.0	29.2	20.5
35	15.6	39.9	24.6	16.8	35	17.5	45.3	29.4	20.7
40	15.6	41.0	24.4	16.8	40	17.5	45.9	29.6	20.6
45	15.6	41.4	24.4	16.8	45	17.4	45.8	29.7	20.7
50	15.7	41.4	24.5	17.0	50	17.7	46.0	29.9	20.8
55	15.8	41.6	24.5	17.1	55	18.1	46.5	30.0	20.7
21 00	16.4	41.9	24.8	17.3	24 00	18.1	46.6	30.0	21.0
05	16.8	42.6	25.3	17.8	05	18.2	46.6	30.3	21.1
10	16.8	42.9	25.5	18.2	10	18.6	46.7	30.6	21.1
15	16.6	43.0	25.7	18.3	15	18.7	47.1	30.6	21.1
20	16.6	42.8	25.7	18.4	20	18.6	47.1	30.6	21.2
25	16.2	42.1	25.7	18.4	25	18.2	47.2	30.8	21.2
30	16.1	42.1	25.7	18.5	30	18.2	47.2	31.0	21.2
35	16.0	41.8	25.8	18.6	35	18.3	47.3	31.1	21.1
40	16.2	41.9	25.8	18.8	40	18.3	47.2	31.2	21.0
45	15.8	41.5	25.8	18.8	45	18.3	46.9	30.8	20.7
50	15.9	41.2	25.8	18.9	50	18.1	46.6	30.7	20.4
55	15.8	41.2	25.6	19.0	55	17.9	46.3	30.6	20.4
					59	17.8	46.4	30.5	20.4

^aFor the data at the Coast and Geodetic Survey stations, see this issue, pp. 111-120.

23. The readings at the stations outside the belt of totality, Group II, were made in the same manner as for Group I, except that there was no period of half-minute readings to correspond with the readings during totality at the stations within the belt. The five-minute means were formed as for Group I; Table 4 gives these mean values.

TABLE 4.—Five-minute means of declination observations during the solar eclipse, June 8, 1918 (Group II)*.

Greenwich Mean Time	8. Berkeley, California	9. Lake Moraine, Colorado	10. Austin, Texas.	11. Washington, D. C.	12. Woburn, Massachusetts	13. Rivière du Loup, Canada		Greenwich Mean Time	8. Berkeley, California	9. Lake Moraine, Colorado	10. Austin, Texas	11. Washington, D. C.	12. Woburn, Massachusetts	13. Rivière du Loup, Canada
	East 18°10' +	East 14° +	East 9° +	West 4° +	West 13° +	West 21° +			East 18°10' +	East 14° +	East 9° +	West 4° +	West 13° +	West 21° +
^b _B	/	/	/	/	/	/		^b _B	/	/	/	/	/	/
19 01	5.1	55.0	05.8	47.3	42.2	34.1		22 00	2.9	55.4	06.4	41.5	34.1	24.8
05	4.5	54.8	05.4	47.4	42.0	34.2		05	2.8	55.6	06.5	41.6	34.0	24.4
10	4.3	54.6	04.8	47.4	41.8	34.0		10	3.5	56.0	06.7	41.6	33.6	24.5
15	4.7	54.4	04.7	47.4	41.4	33.2		15	3.9	56.3	06.7	41.3	33.3	24.6
20	3.7	54.2	04.9	47.5	41.5	33.1		20	4.9	56.6	06.8	41.5	33.6	24.9
25	3.4	54.1	05.0	47.3	41.8	32.8		25	4.4	56.9	07.0	41.4	34.0	25.6
30	3.1	54.0	04.8	47.3	41.3	32.8		30	4.5	57.0	07.1	41.3	33.6	25.7
35	3.3	53.8	04.8	47.2	41.4	32.6		35	5.5	57.2	07.2	41.4	33.7	25.8
40	3.2	53.8	04.8	46.9	40.8	32.5		40	6.1	57.3	07.4	41.3	33.3	25.8
45	3.2	53.7	04.8	46.4	40.2	31.5		45	5.1	57.5	07.4	41.4	33.3	26.2
50	3.2	53.9	04.8	46.2	39.8	30.4		50	5.2	57.6	07.6	41.1	33.3	26.3
55	4.0	54.2	04.8	45.6	39.0	29.1		55	5.7	57.9	07.7	41.2	33.5	26.2
20 00	3.4	54.4	04.8	45.1	38.6	28.8		23 00	5.7	58.1	07.8	41.1	33.3	26.2
05	3.6	54.7	04.8	44.7	38.1	27.6		05	5.1	58.2	08.0	41.1	33.3	26.2
10	3.3	54.9	04.9	44.1	37.1	26.5		10	5.6	58.4	08.2	40.8	33.0	26.2
15	3.4	55.0	04.9	44.0	36.7	26.2		15	5.7	58.7	08.4	40.8	32.5	26.1
20	3.0	55.0	05.2	43.9	36.7	26.7		20	6.0	58.8	08.5	41.0	32.5	25.7
25	1.9	54.8	05.1	43.9	36.8	27.2		25	5.3	59.0	08.6	40.4	32.4	25.5
30	2.0	54.7	05.1	44.1	37.0	28.3		30	5.6	59.0	08.8	40.5	32.1	25.6
35	2.4	54.6	05.0	44.0	37.1	28.0		35	5.6	59.0	08.8	40.3	31.7	25.2
40	3.8	54.4	04.9	43.8	36.5	27.4		40	5.6	59.0	08.9	40.2	31.7	25.1
45	2.4	54.4	04.9	43.8	36.2	26.7		45	6.1	59.3	09.2	40.1	31.7	25.4
50	2.4	54.7	05.0	43.4	36.0	26.2		50	5.6	59.5	09.4	39.9	32.0	25.8
55	2.8	54.6	05.2	43.2	35.6	25.4		55	5.5	59.8	09.5	40.1	32.3	26.5
21 00	3.4	55.1	05.4	42.8	35.0	24.1		24 00	6.1	59.8	09.6	39.9	32.1	25.8
05	3.1	55.4	05.7	42.2	34.3	22.7		05	5.2	60.0	09.8	39.8	32.3	25.1
10	2.7	55.6	06.0	41.7	33.5	21.9		10	5.9	60.2	09.8	39.6	31.8	25.4
15	3.7	55.9	06.1	41.9	33.6	23.3		15	6.8	60.5	10.0	39.8	31.6	25.6
20	3.4	55.8	06.1	42.0	34.0	24.3		20	6.8	60.6	10.1	39.6	31.8	25.7
25	2.0	55.6	06.2	42.1	34.6	24.6		25	6.1	60.6	10.2	39.6	31.9	25.6
30	2.9	55.6	06.3	41.9	34.2	24.5		30	6.3	60.7	10.2	39.7	31.4	25.6
35	2.6	55.6	06.4	41.8	33.9	24.4		35	6.4	60.7	10.1	39.6	31.5	25.9
40	3.0	55.7	06.4	42.0	34.0	24.5		40	6.4	60.6	10.1	39.6	31.8	25.8
45	2.3	55.5	06.4	41.9	34.0	24.8		45	6.4	60.6	10.1	40.0	31.6	26.5
50	3.4	55.6	06.4	41.7	34.3	25.3		50	6.4	60.4	09.9	40.3	32.4	26.9
55	3.5	55.4	06.3	42.0	34.2	25.4		55	6.6	60.2	09.7	40.3	32.4	26.8
								59	7.1	60.3	09.7	40.2	32.3	26.7

*The data for Urbana, Columbia and Wathroo are given later.

PRELIMINARY DISCUSSION OF DECLINATION-DATA.

24. Figs. 7 and 8 contain the declination-graphs for 22 stations within the entire region of visibility of the solar eclipse of June 8, 1918, as also (Fig. 8) for 2 stations (Antipolo and Porto Rico) just outside the region, one of them on the east side and the other on the west side. At Lukiapang, (Fig. 8), the middle of the eclipse occurred just about sun-rise. The middle of the eclipse, or time of maximum obscuration, is indicated by a heavy vertical bar, whereas the approximate times of beginning and end of the eclipse are shown by light vertical lines. A station at which the eclipse was total is underscored, and the approximate time of duration is given in the parenthesis over the bar indicating the middle of totality. For the stations not in the belt of totality, the magnitude of maximum obscuration is given in the parenthesis below the name of station. Certain local mean times are shown by the light, broken lines intersecting the curves. The curves are plotted in all cases so that an upward movement means deflection of the north end of the declination needle to the east; one division of ordinate represents one minute of arc and one division of abscissa, 15 minutes of time. The plotted data apply to the interval of observation 19^h to 25^h, Greenwich civil mean time, June 8, 1918, or from 19^h June 8 to 1^h June 9; the plotted quantities are those in Tables 3 and 4 and in the tables of the separate reports, published in this issue of the Journal.

25. A number of very interesting features are shown in Figs. 7 and 8, in spite of the fact that June 8 will doubtless be characterized generally by directors of magnetic observatories as a magnetically-quiet day and receive the "character-number" of 0. Mr. Hazard, for example, has informed us that he will give this number as characterizing the magnetic conditions on June 8 at the magnetic observatories of the United States Coast and Geodetic Survey. For several days prior to the day of the eclipse, Sun-spot activity was very pronounced; on June 8 there were still some spots visible but they were near the Sun's western edge. June 10 was quite a disturbed day. In general, we may say that the conditions were favorable for the disclosing of a possible magnetic effect, associated with the solar eclipse, and a study of the available data would seem to indicate that such effects were observed.

(To be continued.)