# REPORT ON THE MAGNETIC OBSERVATIONS MADE AT THE DE BILT METEOROLOGICAL AND MAGNETIC OBSERVATORY NEAR UTRECHT, HOLLAND, DURING THE TOTAL SOLAR ECLIPSE OF MAY 17, 1901.

By Dr. Maurits Snellen, Chief Director.

I am glad to be able to submit herewith the results of magnetic observations made in de Bilt Observatory during the total solar eclipse of May 17, 1901. I have but to add the following remarks:

## A. Eye-Observations.

*Declination.* A variometer was made use of, consisting of a telescope with scale and a freely movable magnetic needle, one side of which was polished as a mirror. The distance from mirror to scale was such that one division represented 0.502 of a minute.

*Horizontal Intensity.* A bifilar magnetometer was employed to show the variations in horizontal intensity. Each scale-division corresponded to a variation in the intensity of the magnetic field of 0.0000271 units of the c. g. s. system, or 2.71 gammas.

The room where the observations were made is the same in which, ordinarily, the absolute measurements are made, and is described in this Journal, Volume V, p. 55. The temperature variation was a very small one, the whole range during the observation not attaining a value of one-fourth of a degree centigrade. Nevertheless a correction to the readings of the magnetometer for the temperature change has been applied.

*Temperature Readings* were made by means of a reflection thermometer made of a thermometric body like that used in Richard's self registering thermometers. A telescope with a scale, erected at a convenient distance, gave opportunity to read the changes of temperature in a mirror attached to the thermometric body just mentioned. One scale-division corresponded to 0.°1608 C.; consequently 0.°02 C. was easily read.

## B. Photographic Traces.

At the same time that the eye-observations were made the movements of the needles of a set of magnetographs (declination-needle, bifilar and balance) were registered photographically. The registering instrument was most like that of Potsdam. The diagram forwarded, reproduced

from a photographic copy of the original, shows in Fig. I the declination curve, Fig. II that for horizontal intensity, and Fig. III that for vertical intensity.

*Time-Marks.* At each full hour of Amsterdam local mean time an auxiliary illuminating slit of the lantern is opened during nearly a minute; consequently, a little dot is made on the trace at a small distance from base-line and curve. The longitude of Amsterdam being 4° 53′ E. of Greenwich, it suffices, for ordinary purposes, to obtain Greenwich mean time by subtracting 20 minutes from Amsterdam local mean time.

*Temperature Curve.* A reflection-thermometer, like the one mentioned above, is adopted for the bifilar magnetometer; accordingly, Fig. II shows a set of three lines, viz., base-line, horizontal intensity curve, and a third line indicating the changes in temperature. The latter line, as is seen, is quite a straight one, and one millimeter of ordinate corresponding to 0.169° C., there is no fear of any disturbance by temperature changes.

*Values of Base Lines and Curve Ordinates.* The values of the three elements corresponding to the base lines of the curves were determined by absolute observations before and after the date of observation. In computing the values of base lines destined for the publication of the Royal Meteorological Institute, all the observations made during a year are utilized. Consequently a slight difference between those published now and those that will appear in the "Jaarboek voor 1901" is very probable; but I thought it better to publish the preliminary values now than to wait till they are known more exactly, especially since the question as to the influence of the solar eclipse on magnetic phenomena does not involve absolute values, but only variations of terrestrial magnetism.

Taking this fact into consideration the values of base lines and curve ordinates are:

| | Base Line | One Millimeter of Ordinate |
|---|---|---|
| For Declination, | 12°55′.5 West | 0′.975 |
| For Horizontal Intensity, | 18468.0 $\gamma$ | 4.12 $\gamma$ |
| For Vertical Intensity, | 43284.4 $\gamma$ | 3.16 $\gamma$ |

The results of the magnetic observations are given in the appended table, in which $D$ represents the declination; $H$, the horizontal component of the intensity; $X$, the northerly component; $Y$, the westerly component; and $Z$, the vertical component. In the case of $D$ and $H$, the results are those from the eye-readings, whereas those of $V$ have been obtained from the photographic traces.

RESULTS OF MAGNETIC OBSERVATIONS AT DE BILT OBSERVATORY.

| Gr. M. T. (Astr'l) | D (West) 13°+ | H 18500+ | X 18000+ | Y 4400+ | Z 43400+ | Gr. M. T. (Astr'l) | D (West) 13°+ | H 18500+ | X 18000+ | Y 4400+ | Z 43400+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *h m* | ′ | γ | γ | γ | γ | *h m* | ′ | γ | γ | γ | γ |
| 13 00 | | | | | | 14 00 | 48.5 | 64.7 | 28.2 | 30.5 | |
| 01 | | | | | | 01 | 48.4 | 64.7 | 28.3 | 30.3 | |
| 02 | | | | | | 02 | 48.4 | 64.7 | 28.4 | 30.0 | 99.6 |
| 03 | | | | | | 03 | 48.3 | 64.7 | 28.4 | 29.7 | |
| 04 | | | | | | 04 | 48.3 | 64.7 | 28.4 | 29.7 | |
| 05 | | | | | | 05 | 48.2 | 64.7 | 28.6 | 29.2 | |
| 06 | | | | | | 06 | 48.3 | 64.3 | 28.1 | 29.4 | 99.6 |
| 07 | | | | | | 07 | 48 4 | 64.3 | 28.0 | 29.9 | |
| 08 | | | | | | 08 | 48.4 | 64.3 | 27.9 | 30.2 | |
| 09 | | | | | | 09 | 48.5 | 64.9 | 27 4 | 30.6 | |
| 10 | 47.7 | 67.6 | 31.9 | 27.3 | 99.6 | 10 | 48.6 | 64.3 | 27.7 | 31.2 | 99.6 |
| 11 | 47.8 | 68.4 | 32.6 | 27.7 | | 11 | 48.6 | 64.3 | 27.7 | 31.2 | |
| 12 | 47.7 | 68.4 | 32.7 | 27.5 | | 12 | 48.6 | 64.3 | 27.7 | 31.2 | |
| 13 | 47.7 | 68.0 | 32.4 | 27.1 | | 13 | 48.6 | 64.3 | 27.7 | 30.9 | |
| 14 | 47.7 | 68.0 | 32.4 | 27.1 | 99.9 | 14 | 48.5 | 64.3 | 27.8 | 30.7 | 99.6 |
| 15 | 47.6 | 68.0 | 32.4 | 26.9 | | 15 | 48.5 | 64.3 | 27.8 | 30.7 | |
| 16 | 47.5 | 67.6 | 32.2 | 26.2 | | 16 | 48.5 | 64.3 | 27.8 | 30.7 | |
| 17 | 47 5 | 66.7 | 31.4 | 25.8 | | 17 | 48.6 | 64.3 | 27.7 | 30.9 | |
| 18 | 47.5 | 65.9 | 30.7 | 25.8 | 99.9 | 18 | 48.6 | 64.3 | 27.7 | 31.2 | 99.6 |
| 19 | 47.6 | 65.1 | 29.8 | 25.9 | | 19 | 48.6 | 64.3 | 27.7 | 31.2 | |
| 20 | 47.6 | 64.7 | 29.4 | 25 8 | | 20 | 48.6 | 65.1 | 28 5 | 31.1 | |
| 21 | 47.5 | 68.1 | 29.9 | 25.4 | | 21 | 48.5 | 65.1 | 28.6 | 30.6 | |
| 22 | 47.4 | 65.1 | 30.0 | 25.1 | 99.9 | 22 | 48.6 | 65.1 | 28 5 | 31.1 | 99.6 |
| 23 | 47.4 | 64.7 | 29.6 | 25.0 | | 23 | 48.5 | 65.5 | 29.0 | 31.0 | |
| 24 | 47.4 | 64.7 | 29.6 | 25.0 | | 24 | 48.4 | 65.9 | 29.5 | 30.6 | |
| 25 | 47.5 | 64.7 | 29.5 | 25.5 | | 25 | 48.3 | 66.3 | 30.0 | 30.1 | |
| 26 | 47.6 | 64.3 | 28.9 | 26.0 | 99.9 | 26 | 48.2 | 65.9 | 29.8 | 29 5 | 99.6 |
| 27 | 47.7 | 64.3 | 28.9 | 26.2 | | 27 | 48.3 | 65.9 | 29.7 | 29.8 | |
| 28 | 47.7 | 63 9 | 28.4 | 26.4 | | 28 | 48.2 | 65.9 | 29.8 | 29.2 | |
| 29 | 47.8 | 63.9 | 28.3 | 26.6 | | 29 | 48.2 | 66.3 | 30.2 | 29.3 | |
| 30 | 47.9 | 63.5 | 27.8 | 27.1 | 99.9 | 30 | 48.2 | 65 9 | 29.8 | 29.2 | 99.6 |
| 31 | 47.9 | 63.5 | 27.8 | 27.3 | | 31 | 48.2 | 65.9 | 29.8 | 29.2 | |
| 32 | 48.0 | 63.9 | 28.0 | 28.0 | | 32 | 48.1 | 65.9 | 29.9 | 29.0 | |
| 33 | 48.1 | 63.5 | 27.5 | 28.4 | | 33 | 48.1 | 65.5 | 29.5 | 28.9 | |
| 34 | 48.2 | 63.9 | 27.8 | 28.7 | 99.9 | 34 | 48.1 | 64.7 | 28.7 | 28.7 | 99.3 |
| 35 | 48.2 | 63.9 | 27.8 | 29.0 | | 35 | 48.2 | 64.7 | 28.6 | 28.9 | |
| 36 | 48 3 | 64.3 | 28.1 | 29.4 | | 36 | 48.2 | 64.7 | 28.6 | 29.2 | |
| 37 | 48.2 | 64.3 | 28.2 | 29.1 | | 37 | 48.3 | 64.7 | 28 4 | 29.7 | |
| 38 | 48.2 | 64.3 | 28.2 | 29.1 | 99.9 | 38 | 48.4 | 65.1 | 28 8 | 30.1 | 99.3 |
| 39 | 48.2 | 64.3 | 28.2 | 29.1 | | 39 | 48.3 | 65.1 | 28.9 | 29.6 | |
| 40 | 48.2 | 64.7 | 28.6 | 29.2 | | 40 | 48.4 | 65.5 | 29.1 | 30.5 | |
| 41 | 48.3 | 65.1 | 28.9 | 29.6 | | 41 | 48.5 | 65.5 | 29.0 | 30.7 | |
| 42 | 48.4 | 65.1 | 28.8 | 30.1 | 99.9 | 42 | 48.5 | 65.9 | 29.4 | 30.8 | 99.3 |
| 43 | 48.4 | 64.7 | 28.3 | 30.3 | | 43 | 48.5 | 65.9 | 29.4 | 31.1 | |
| 44 | 48.2 | 65.1 | 29.0 | 29.3 | | 44 | 48.6 | 65.9 | 29.3 | 31.3 | |
| 45 | 48.2 | 64.7 | 28.6 | 28.9 | | 45 | 48.6 | 65.9 | 29.3 | 31.6 | |
| 46 | 48.2 | 64.3 | 28.2 | 28.8 | 99.6 | 46 | 48.6 | 66.3 | 29.7 | 31.7 | 99.3 |
| 47 | 48.3 | 64.7 | 28.5 | 29.5 | | 47 | 48.7 | 66.3 | 29.5 | 32.2 | |
| 48 | 48.2 | 64.7 | 28.6 | 29.2 | | 48 | 48.7 | 65.9 | 29.1 | 32.1 | |
| 49 | 48.3 | 64.7 | 28.4 | 29.7 | | 49 | 48.7 | 65.9 | 29.1 | 32.1 | |
| 50 | 48.3 | 63.9 | 27.6 | 29.5 | 99.6 | 50 | 48.7 | 65.9 | 29.2 | 31.9 | 99.3 |
| 51 | 48.5 | 63.9 | 27.4 | 30.3 | | 51 | 48.7 | 65.9 | 29.2 | 31.9 | |
| 52 | 48 4 | 64.3 | 27.9 | 30.2 | | 52 | 48.6 | 65.9 | 29.3 | 31.6 | |
| 53 | 48.3 | 64.3 | 28.0 | 29.6 | | 53 | 48.7 | 65 5 | 28.8 | 31.8 | |
| 54 | 48.4 | 64.3 | 27.9 | 30.2 | 99.6 | 54 | 48.7 | 65.5 | 28.8 | 31.8 | 99.3 |
| 55 | 48.4 | 64.3 | 27.9 | 30.2 | | 55 | 48.7 | 65.1 | 28.4 | 31.7 | |
| 56 | 48.4 | 64.3 | 27.9 | 30.2 | | 56 | 48.7 | 65.5 | 28 7 | 32.0 | |
| 57 | 48.4 | 64.3 | 27.9 | 30.2 | | 57 | 48.7 | 65.9 | 29.2 | 31.9 | |
| 58 | 48.4 | 64.3 | 27.9 | 30.2 | 99.6 | 58 | 48.6 | 66.3 | 29.7 | 31.7 | 99.0 |
| 59 | 48.5 | 64.3 | 27.8 | 30.4 | | 59 | 48.6 | 66.7 | 30.0 | 31.5 | |

RESULTS OF MAGNETIC OBSERVATIONS AT DE BILT OBSERVATORY.—Continued.

| Gr. M. T. (Astr'l) | *D* (West) 13°+ | *H* 18500+ | *X* 18000+ | *Y* 4400+ | *Z* 43400+ | Gr. M. T. (Astr'l) | *D* (West) 13°+ | *H* 18500+ | *X* 18000+ | *Y* 4400+ | *Z* 43400+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *h m* | ′ | γ | γ | γ | γ | *h m* | ′ | γ | γ | γ | γ |
| 15 00 | 48.5 | 67.2 | 30.5 | 31.4 | | 16 00 | 49.7 | 68.0 | 29.7 | 37.9 | |
| 01 | 48.5 | 67.2 | 30.5 | 31.4 | | 01 | 49.7 | 68.0 | 29.8 | 37.6 | |
| 02 | 48.5 | 67.2 | 30.5 | 31.4 | 99.0 | 02 | 49.7 | 68.0 | 29.8 | 37.6 | 99.0 |
| 03 | 48.6 | 67.2 | 30.4 | 31.6 | | 03 | 49.6 | 68.0 | 29.9 | 37.4 | |
| 04 | 48.6 | 66.3 | 30.4 | 31.6 | | 04 | 49.7 | 68.0 | 29.8 | 37.6 | |
| 05 | 48.6 | 66.3 | 29.7 | 31.4 | | 05 | 49.6 | 68.0 | 29.9 | 37.4 | |
| 06 | 48.6 | 66.3 | 29.7 | 31.7 | 99.0 | 06 | 49.7 | 68.0 | 29.8 | 37.6 | 99.0 |
| 07 | 48.6 | 66.3 | 29.7 | 31.7 | | 07 | 49.7 | 68.0 | 29.7 | 37.9 | |
| 08 | 48.7 | 66.3 | 29.6 | 32.0 | | 08 | 49.8 | 68.0 | 29.7 | 38.2 | |
| 09 | 48.7 | 66.7 | 29.9 | 32.1 | | 09 | 49.8 | 68.0 | 29.6 | 38.4 | |
| 10 | 48.7 | 66.3 | 29.5 | 32.2 | 99.3 | 10 | 49.8 | 68.0 | 29.6 | 38.4 | 99.0 |
| 11 | 48.8 | 66.3 | 29.5 | 32.5 | | 11 | 49.9 | 68.0 | 29.4 | 39.0 | |
| 12 | 48.9 | 66.3 | 29 3 | 33.3 | | 12 | 49.9 | 68.0 | 29.5 | 38.7 | |
| 13 | 49.0 | 66.7 | 29.5 | 33.7 | | 13 | 50.0 | 68.0 | 29.4 | 39.2 | |
| 14 | 49.0 | 67.2 | 29.8 | 34.0 | 99.3 | 14 | 50.1 | 67.6 | 28.9 | 39.6 | 99.3 |
| 15 | 48.9 | 67.2 | 30.0 | 33.5 | | 15 | 50.1 | 68.4 | 29.7 | 39 8 | |
| 16 | 48.9 | 67.2 | 30.0 | 33.5 | | 16 | 50.1 | 68.0 | 29.3 | 39.7 | |
| 17 | 49.1 | 67.2 | 29.8 | 34.3 | | 17 | 50.1 | 67.6 | 28.8 | 39.9 | |
| 18 | 49.0 | 67.2 | 29.8 | 34.0 | 99.3 | 18 | 50.2 | 68.0 | 29.1 | 40.3 | 99.3 |
| 19 | 49.1 | 67.2 | 29.8 | 34.3 | | 19 | 50.2 | 68.0 | 29.1 | 40.5 | |
| 20 | 49 1 | 66.7 | 29.4 | 34.2 | | 20 | 50.3 | 68.0 | 29.0 | 41.1 | |
| 21 | 49.0 | 67.2 | 29.9 | 33.8 | | 21 | 50.3 | 68.0 | 29.0 | 41.1 | |
| 22 | 48.9 | 67.2 | 30.0 | 33.5 | 99.3 | 22 | 50.4 | 68.0 | 28.8 | 41.6 | 99.3 |
| 23 | 48.9 | 67.2 | 30.0 | 33.5 | | 23 | 50.5 | 68.0 | 28.8 | 41.8 | |
| 24 | 49.0 | 67.2 | 29.9 | 33.8 | | 24 | 50.6 | 67.6 | 28.2 | 42.5 | |
| 25 | 49.1 | 66.7 | 29.4 | 34.2 | | 25 | 50.5 | 67.6 | 28.3 | 42.0 | |
| 26 | 49.1 | 66.7 | 29.3 | 34.4 | 99.3 | 26 | 50.6 | 67.6 | 28.2 | 42.3 | 99.3 |
| 27 | 49.1 | 67.2 | 29.7 | 34.5 | | 27 | 50.6 | 67.6 | 28.2 | 42.3 | |
| 28 | 49.1 | 66.7 | 29.3 | 34.4 | | 28 | 50.5 | 67.6 | 28.4 | 41.7 | |
| 29 | 49.2 | 66.7 | 29.2 | 34.7 | | 29 | 50 5 | 67.6 | 28.3 | 42.0 | |
| 30 | 49.2 | 66.7 | 29.2 | 35.0 | 99.3 | 30 | 50.6 | 67.6 | 28.2 | 42.3 | 99.3 |
| 31 | 49.3 | 66.7 | 29.1 | 35.2 | | 31 | 50.7 | 68.0 | 28.5 | 42.9 | |
| 32 | 49.3 | 66.7 | 29.1 | 35.2 | | 32 | 50.7 | 67.6 | 28.0 | 43.1 | |
| 33 | 49.3 | 66.7 | 29.1 | 35.2 | | 33 | 50.7 | 68.0 | 28.4 | 43.2 | |
| 34 | 49.3 | 66.3 | 28.8 | 35.1 | 99.3 | 34 | 50.7 | 68.0 | 28.4 | 43.2 | 99.3 |
| 35 | 49.2 | 65.9 | 28.5 | 34.8 | | 35 | 50.7 | 68.4 | 28.8 | 43.3 | |
| 36 | 49.3 | 65.5 | 28.0 | 34.9 | | 36 | 50.8 | 68.4 | 28.7 | 43.8 | |
| 37 | 49.4 | 65.5 | 27.8 | 35.7 | | 37 | 50.9 | 68.0 | 28.2 | 43.9 | |
| 38 | 49.6 | 65.5 | 27.6 | 36.8 | 99.3 | 38 | 50.8 | 68.4 | 28.7 | 43.8 | 99.3 |
| 39 | 49.5 | 65.5 | 27.7 | 36.2 | | 39 | 51.0 | 68.0 | 28.1 | 44.5 | |
| 40 | 49.6 | 65.1 | 27.2 | 36.4 | | 40 | 50.9 | 68.0 | 28.2 | 44.2 | |
| 41 | 49.7 | 65.1 | 27.1 | 36.9 | | 41 | 51.0 | 68.0 | 28.1 | 44.5 | |
| 42 | 49.7 | 65.1 | 27.1 | 36.9 | 99.3 | 42 | 50.9 | 67.6 | 27.8 | 44.1 | 99.0 |
| 43 | 49.6 | 65.1 | 27.2 | 36.7 | | 43 | 51.0 | 67.6 | 27.7 | 44.6 | |
| 44 | 49.6 | 65.5 | 27.6 | 36.8 | | 44 | 51.0 | 67.2 | 27.3 | 44.3 | |
| 45 | 49 6 | 65.1 | 27.2 | 36.4 | | 45 | 51.0 | 67.6 | 27.7 | 44.6 | |
| 46 | 49.6 | 65.1 | 27.2 | 36.7 | 99.3 | 46 | 51.1 | 67.2 | 27.2 | 44.8 | 99.0 |
| 47 | 49.6 | 65.1 | 27.2 | 36.4 | | 47 | 51.1 | 67.2 | 27.1 | 45.1 | |
| 48 | 49.6 | 65.5 | 27.6 | 36.5 | | 48 | 51.1 | 67.2 | 27.1 | 45.1 | |
| 49 | 49.6 | 65.5 | 27.6 | 36.5 | | 49 | 51.2 | 67.2 | 27.1 | 45.3 | |
| 50 | 49.6 | 65.9 | 28.0 | 36.6 | 99.3 | 50 | 51.1 | 66.7 | 26.7 | 45.0 | 99.0 |
| 51 | 49.6 | 65.5 | 27.6 | 36.5 | | 51 | 51.2 | 66.7 | 26.6 | 45.5 | |
| 52 | 49.7 | 65.5 | 27.5 | 37.0 | | 52 | 51.1 | 66.3 | 26.4 | 44.9 | |
| 53 | 49.7 | 65.5 | 27.4 | 37.3 | | 53 | 51.2 | 66.3 | 26.3 | 45.4 | |
| 54 | 49.8 | 65.9 | 27.7 | 37.9 | 99.3 | 54 | 51.3 | 66.3 | 26.2 | 45.7 | 97.0 |
| 55 | 49.8 | 66.7 | 28.4 | 38.1 | | 55 | 51.4 | 65.9 | 25.6 | 46.3 | |
| 56 | 49.9 | 67.2 | 28.6 | 38.8 | | 56 | 51.5 | 65.5 | 25.1 | 46.8 | |
| 57 | 49.9 | 67.6 | 29.0 | 38.9 | | 57 | 51.5 | 65.5 | 25.2 | 46.5 | |
| 58 | 49.9 | 67.6 | 29.1 | 38.6 | 99.0 | 58 | 51.5 | 65.1 | 24.8 | 46.4 | 99.0 |
| 59 | 49.8 | 67.6 | 29.2 | 38.3 | | 59 | 51.6 | 65.1 | 24.6 | 46.9 | |

RESULTS OF MAGNETIC OBSERVATIONS AT DE BILT OBSERVATORY.—Continued.

| Gr. M. T. (Astr'l) | D (West) 13°+ | H 18500+ | X 18000+ | Y 4400+ | Z 43400+ | Gr. M. T. (Astr'l) | D (West) 13°+ | H 18500+ | X 18000+ | Y 4400+ | Z 43400+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *h m* | ′ | γ | γ | γ | γ | *h m* | ′ | γ | γ | γ | γ |
| 17 00 | 51.5 | 64.7 | 24.4 | 46.3 | | 18 00 | 52.4 | 60.6 | 19.1 | 50.3 | |
| 01 | 51.3 | 64 9 | 24.6 | 45.5 | | 01 | 52.5 | 60.2 | 18.6 | 50.7 | |
| 02 | 51.3 | 64.9 | 24.6 | 45.3 | 98.6 | 02 | 52.5 | 59.8 | 18.2 | 50.7 | 97.1 |
| 03 | 51.5 | 64.3 | 24.0 | 46.2 | | 03 | 52.6 | 59.8 | 18.2 | 51.0 | |
| 04 | 51.5 | 64.3 | 24.0 | 46.2 | | 04 | 52.6 | 59.4 | 17.8 | 50.9 | |
| 05 | 51.6 | 63.7 | 23.4 | 46.6 | | 05 | 52.5 | 59.4 | 17.8 | 50.6 | |
| 06 | 51.6 | 63.7 | 23.4 | 46.9 | 98.3 | 06 | 52.6 | 59.4 | 17.7 | 51.2 | 97.1 |
| 07 | 51.6 | 64.3 | 23.8 | 46.7 | | 07 | 52.6 | 59.4 | 17.7 | 51.2 | |
| 08 | 51.5 | 64.3 | 23.9 | 46.5 | | 08 | 52.6 | 59.0 | 17.4 | 50.8 | |
| 09 | 51.6 | 64.3 | 23.8 | 46.7 | | 09 | 52.6 | 59.0 | 17.3 | 51.1 | |
| 10 | 51.6 | 63.9 | 23.4 | 46.9 | 98.0 | 10 | 52.6 | 59.0 | 17.3 | 51.1 | 97.1 |
| 11 | 51.6 | 63.5 | 23.0 | 46.8 | | 11 | 52.6 | 59.4 | 17.7 | 51.2 | |
| 12 | 51.7 | 63.5 | 22.9 | 47.1 | | 12 | 52.6 | 59.0 | 17.4 | 50.8 | |
| 13 | 51.7 | 63.5 | 22.9 | 47.1 | | 13 | 52.6 | 59.0 | 17.4 | 50.8 | |
| 14 | 51.7 | 63.5 | 22.9 | 47.1 | 97.7 | 14 | 52.6 | 58.6 | 16.9 | 51.0 | 96.8 |
| 15 | 51.6 | 63.5 | 23.0 | 46.8 | | 15 | 52.7 | 58.6 | 16.8 | 51.2 | |
| 16 | 51.6 | 63.5 | 23.0 | 46.8 | | 16 | 52.7 | 58.6 | 16.8 | 51.5 | |
| 17 | 51.7 | 63.5 | 22.8 | 47.3 | | 17 | | | | | |
| 18 | 51.8 | 63.9 | 23.1 | 47.9 | 97.7 | 18 | 52.7 | 58.2 | 16.4 | 51.4 | 96.8 |
| 19 | 51.9 | 63.9 | 23.0 | 48.5 | | 19 | 52.7 | 58.2 | 16.4 | 51.4 | |
| 20 | 52.0 | 64.3 | 23.3 | 49.1 | | 20 | 52.8 | 58.6 | 16.7 | 51.7 | |
| 21 | 52.0 | 64.3 | 23.3 | 49.1 | | 21 | 52.8 | 58.2 | 16.2 | 51.9 | |
| 22 | 51.1 | 63.9 | 22.7 | 49.5 | 97.1 | 22 | 52.8 | 57.8 | 15.8 | 51.8 | 96 8 |
| 23 | 52.2 | 63.9 | 22.7 | 49.8 | | 23 | 52.8 | 57.4 | 15.5 | 51.4 | |
| 24 | 52.2 | 63.5 | 22.2 | 49.9 | | 24 | 52.9 | 56.5 | 14.5 | 52.0 | |
| 25 | 52.2 | 63.5 | 22.3 | 49.7 | | 25 | 52.8 | 56.1 | 14.2 | 51 4 | |
| 26 | 52.1 | 63.5 | 22.3 | 49.4 | 97.1 | 26 | 52.9 | 56.1 | 14.1 | 51.9 | 96.4 |
| 27 | 52.1 | 63.5 | 22.3 | 49.4 | | 27 | 53.0 | 56.1 | 14.0 | 52.2 | |
| 28 | 52.1 | 63.5 | 22.3 | 49.4 | | 28 | 53.1 | 56.1 | 13.9 | 52.7 | |
| 29 | 52.1 | 63.1 | 21.9 | 49.3 | | 29 | 53.1 | 56.1 | 13.8 | 53.0 | |
| 30 | 52.2 | 63.1 | 21.9 | 49.6 | 97.1 | 30 | 53.1 | 55.7 | 13.4 | 52.9 | 96.4 |
| 31 | 52.1 | 63.1 | 22.0 | 49.1 | | 31 | 53.1 | 55.7 | 13.5 | 52.6 | |
| 32 | 52.0 | 63.1 | 22.1 | 48.8 | | 32 | 53.1 | 55.7 | 13.5 | 52.6 | |
| 33 | 52.0 | 63.5 | 22.5 | 48.9 | | 33 | 53.1 | 55.7 | 13.5 | 52.6 | |
| 34 | 52 1 | 63.1 | 22.0 | 49.1 | 96.8 | 34 | 53.1 | 55.7 | 13.5 | 52.6 | 96.1 |
| 35 | 52.1 | 63.1 | 22.0 | 49.1 | | 35 | 53.1 | 55.3 | 13.1 | 52.8 | |
| 36 | 52.1 | 63.1 | 21.9 | 49.3 | | 36 | 53.1 | 55.3 | 13.1 | 52.8 | |
| 37 | 52.1 | 63.1 | 21.9 | 49.3 | | 37 | 53.2 | 55.3 | 13.1 | 53.0 | |
| 38 | 52.2 | 63.1 | 21.9 | 49.6 | 96.8 | 38 | 53.2 | 55.3 | 13.1 | 53.0 | 95.8 |
| 39 | 52.2 | 63.1 | 21.9 | 49.6 | | 39 | 53.2 | 55.3 | 13.0 | 53.3 | |
| 40 | 52.2 | 63.1 | 21.8 | 49.8 | | 40 | 53.2 | 54.9 | 12.6 | 53.2 | |
| 41 | 52.2 | 63.1 | 21.8 | 49.8 | | 41 | 53.2 | 54.9 | 12.6 | 53.2 | |
| 42 | 52.2 | 63.1 | 21.8 | 49.8 | 96.8 | 42 | 53.2 | 54.9 | 12.7 | 52.9 | 95.5 |
| 43 | 52.2 | 62.7 | 21.4 | 49.7 | | 43 | 53.2 | 54.9 | 12.6 | 53.2 | |
| 44 | 52.3 | 63.1 | 21.7 | 50.1 | | 44 | 53.3 | 54.9 | 12.5 | 53.7 | |
| 45 | 52.2 | 63.1 | 21.9 | 49.6 | | 45 | 53.2 | 54.9 | 12.6 | 53.2 | |
| 46 | 52.2 | 62.7 | 21.5 | 49.5 | 96.8 | 46 | 53.2 | 54.9 | 12.6 | 53.2 | 95.2 |
| 47 | 52 1 | 62.7 | 21.5 | 49.2 | | 47 | 53.2 | 54.9 | 12.6 | 53.2 | |
| 48 | 52.2 | 62.3 | 21.1 | 49.4 | | 48 | 53.2 | 54.9 | 12.6 | 53.2 | |
| 49 | 52.2 | 62.3 | 21.0 | 49.6 | | 49 | 53 3 | 54.5 | 12.1 | 53.6 | |
| 50 | 52.2 | 62.3 | 21.1 | 49.4 | 97.1 | 50 | 53.3 | 54.5 | 12.1 | 53.6 | 94.5 |
| 51 | 52.1 | 61.9 | 20.7 | 49 0 | | 51 | 53.3 | 54.5 | 12.1 | 53.4 | |
| 52 | 52.1 | 61.9 | 20.7 | 49.0 | | 52 | 53.4 | 54.5 | 12.0 | 53.9 | |
| 53 | 52.2 | 61.4 | 20.3 | 49.2 | | 53 | 53.4 | 54.5 | 12.0 | 54 2 | |
| 54 | 52.3 | 61.0 | 19.7 | 49.6 | 97.1 | 54 | 53.4 | 54.1 | 11.6 | 53.8 | 93.6 |
| 55 | 52.3 | 60.6 | 19.3 | 49.5 | | 55 | 53.3 | 54.1 | 11.7 | 53.5 | |
| 56 | 52.4 | 61.0 | 19.6 | 50.1 | | 56 | 53.3 | 54.1 | 11.7 | 53.3 | |
| 57 | 52.4 | 60.6 | 19.1 | 50.3 | | 57 | 53.3 | 53.7 | 11.3 | 53.2 | |
| 58 | 52.4 | 61.0 | 19.5 | 50.4 | 97.1 | 58 | 53.3 | 52.9 | 10.5 | 53.0 | 93.3 |
| 59 | 52.4 | 60.6 | 19.2 | 50.0 | | 59 | 53.5 | 52.9 | 10.2 | 54.3 | |

RESULTS OF MAGNETIC OBSERVATIONS AT DE BILT OBSERVATORY.—Continued.

| Gr. M. T. (Astr'l) | *D* (West) 13°+ | *H* 18500+ | *X* 18000+ | *Y* 4400+ | *Z* 43400+ | Gr. M. T. (Astr'l) | *D* (West 13°+ | *H* 18500+ | *X* 18000+ | *Y* 4400+ | *Z* 43400+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *h m* | ′ | γ | γ | γ | γ | *h m* | ′ | γ | γ | γ | γ |
| 19 00 | 53.5 | 52.5 | 9 8 | 54.2 | | 20 00 | 53·1 | 45·1 | 3.1 | 50.4 | |
| 01 | 53.5 | 52.5 | 9.3 | 53.9 | | 01 | 53·1 | 45·1 | 3.1 | 50.4 | |
| 02 | 53.5 | 52.1 | 9.4 | 54.1 | 92.6 | 02 | 53·1 | 45·1 | 3.2 | 50.1 | 80.0 |
| 03 | 53.5 | 52.1 | 9.5 | 53.8 | | 03 | 53·0 | 45·1 | 3 3 | 49 9 | |
| 04 | 53.6 | 52.1 | 9.4 | 54 3 | | 04 | 53 0 | 44.7 | 2.9 | 49.8 | |
| 05 | 53.5 | 51.2 | 8.6 | 53.9 | | 05 | 53·0 | 44.7 | 2.9 | 49.5 | |
| 06 | 53.6 | 51.2 | 8.6 | 54.1 | 92.3 | 06 | 53·0 | 45·1 | 3.3 | 49.6 | 79.1 |
| 07 | 53.6 | 51.2 | 8.5 | 54.4 | | 07 | 53·0 | 45·1 | 3 3 | 49.6 | |
| 08 | 53.7 | 50.8 | 8.0 | 54.6 | | 08 | 52·9 | 45·1 | 3.5 | 49.1 | |
| 09 | 53.7 | 50.4 | 7.8 | 53.9 | | 09 | 52.8 | 44.7 | 3.1 | 48.7 | |
| 10 | 53.4 | 50.4 | 8.0 | 52.9 | 91.4 | 10 | 52.8 | 44.7 | 3.1 | 48 7 | 78.4 |
| 11 | 53.5 | 50.0 | 7.5 | 53.3 | | 11 | 52 8 | 44.7 | 3.2 | 48.4 | |
| 12 | 53 6 | 50.0 | 7.4 | 53.8 | | 12 | 52.8 | 45·1 | 3.5 | 48.8 | |
| 13 | 53.5 | 50.0 | 7.4 | 53.6 | | 13 | 52·7 | 45·1 | 3.7 | 48.3 | |
| 14 | 53.6 | 50.0 | 7.4 | 53.8 | 90.7 | 14 | 52 7 | 45·1 | 3.7 | 48.3 | 78.4 |
| 15 | 53.6 | 49.2 | 6.5 | 53.9 | | 15 | 52·7 | 45·1 | 3.7 | 48.0 | |
| 16 | 53.6 | 49.2 | 6.6 | 53.6 | | 16 | 52·7 | 45·1 | 3.7 | 48.0 | |
| 17 | 53.6 | 48.8 | 6.1 | 53.8 | | 17 | 52.7 | 45·1 | 3.7 | 48.3 | |
| 18 | 53.6 | 48.8 | 6.2 | 53.5 | 90.4 | 18 | 52.8 | 45·1 | 3.6 | 48 5 | 78.1 |
| 19 | 53.5 | 48 4 | 5.8 | 53.2 | | 19 | 52.7 | 45·5 | 4.1 | 48.4 | |
| 20 | 53.4 | 48 4 | 6.0 | 52.7 | | 20 | 52.7 | 45·5 | 4.1 | 48.1 | |
| 21 | 53.5 | 48.8 | 6.3 | 53.0 | | 21 | 52.7 | 45·1 | 3.7 | 48.0 | |
| 22 | 53.6 | 48.8 | 6.2 | 53.5 | 89.5 | 22 | 52.6 | 45·1 | 3.8 | 47.8 | 77.8 |
| 23 | 53.5 | 48.8 | 6.2 | 53.3 | | 23 | 52.6 | 45·1 | 3.8 | 47.8 | |
| 24 | 53.4 | 48.0 | 5.6 | 52.6 | | 24 | 52.6 | 45·1 | 3.9 | 47.5 | |
| 25 | 53.4 | 47.6 | 5.2 | 52.5 | | 25 | 52.6 | 45·1 | 3 9 | 47.5 | |
| 26 | 53.6 | 47.6 | 4.9 | 53.5 | 88.2 | 26 | 52·5 | 45·1 | 3.9 | 47.2 | 77.8 |
| 27 | 53.6 | 48.0 | 5.4 | 53.3 | | 27 | 52.5 | 45 1 | 3.9 | 47.2 | |
| 28 | 53.6 | 48.0 | 5.4 | 53.3 | | 28 | 52 4 | 45·1 | 4.0 | 46.7 | |
| 29 | 53.5 | 48.0 | 5.5 | 52.8 | | 29 | 52.3 | 45·1 | 4.2 | 46.2 | |
| 30 | 53.4 | 48.4 | 6.0 | 52 4 | 87.6 | 30 | 52.3 | 44.7 | 3.8 | 46.1 | 77.5 |
| 31 | 53.3 | 48.0 | 5.7 | 52.0 | | 31 | 52.3 | 44 3 | 3 5 | 45.7 | |
| 32 | 53.2 | 48.0 | 5.8 | 51.5 | | 32 | 52.2 | 43.9 | 3.2 | 45.3 | |
| 33 | 53.2 | 48.0 | 5.8 | 51.5 | | 33 | 52.2 | 44.3 | 3.7 | 45.2 | |
| 34 | 53.3 | 47.2 | 4.9 | 51.6 | 86.6 | 34 | 52.1 | 44 7 | 4.0 | 45.0 | 77.2 |
| 35 | 53 4 | 46.3 | 4.0 | 52.2 | | 35 | 52.1 | 45·1 | 4.5 | 44.9 | |
| 36 | 53.4 | 46.3 | 4.0 | 52.2 | | 36 | 51.1 | 45 5 | 4 9 | 45.0 | |
| 37 | 53.5 | 45.9 | 3.5 | 52.4 | | 37 | 51.9 | 45 9 | 5.6 | 44.0 | |
| 38 | 53.3 | 45.9 | 3.7 | 51.6 | 85.4 | 38 | 51.8 | 45.9 | 5.6 | 43.7 | 77.2 |
| 39 | 53.2 | 45.5 | 3.4 | 51.0 | | 39 | 51.8 | 45.9 | 5.7 | 43.5 | |
| 40 | 53.2 | 45.5 | 3.4 | 51.0 | | 40 | 51.8 | 45.9 | 5.7 | 43.5 | |
| 41 | 53.2 | 45.1 | 3.0 | 50.9 | | 41 | 51.7 | 45 9 | 5.7 | 43.2 | |
| 42 | 53.3 | 44.7 | 2.5 | 51.3 | 84.4 | 42 | 51.7 | 45 9 | 5.8 | 43.0 | 77.2 |
| 43 | 53.3 | 44.7 | 2.5 | 51.3 | | 43 | 51.6 | 45.9 | 5.9 | 42.4 | |
| 44 | 53 2 | 44.7 | 2.7 | 50 5 | | 44 | 51.5 | 45.9 | 6 0 | 42.2 | |
| 45 | 53.2 | 44.7 | 2.6 | 50.8 | | 45 | 51.5 | 46.3 | 6.5 | 41.9 | |
| 46 | 53.2 | 44.3 | 2.4 | 50.4 | 83.2 | 46 | 51.4 | 46.3 | 6 6 | 41.4 | 76.8 |
| 47 | 53.2 | 44.3 | 2.3 | 50.7 | | 47 | 51 4 | 46.8 | 7.0 | 41.5 | |
| 48 | 53.3 | 44.3 | 2.2 | 51.0 | | 48 | 51.3 | 46 8 | 7.1 | 41.2 | |
| 49 | 53.3 | 44.3 | 2.2 | 51.2 | | 46 | 51.3 | 46 8 | 7.1 | 41.0 | |
| 50 | 53.4 | 44.3 | 2.1 | 51.5 | 82.8 | 50 | 51.2 | 46.8 | 7.3 | 40.4 | 76.5 |
| 51 | 53 3 | 44.3 | 2.2 | 51.2 | | 51 | 51.1 | 46.8 | 7.4 | 39.9 | |
| 52 | 53.2 | 44.7 | 2.6 | 50 8 | | 52 | 51.1 | 46.8 | 7.4 | 39.9 | |
| 53 | 53.2 | 44.3 | 2.3 | 50.7 | | 53 | 51.1 | 46.8 | 7.4 | 39.9 | |
| 54 | 53.2 | 44.3 | 2.4 | 50.4 | 81.6 | 54 | 51.0 | 46.8 | 7.5 | 39.6 | 75.9 |
| 55 | 53.2 | 44.7 | 2.6 | 50.8 | | 55 | 51.0 | 47.2 | 7.9 | 39.5 | |
| 56 | 53.3 | 44.7 | 2.5 | 51.1 | | 56 | 50.8 | 47.2 | 8.1 | 38.7 | |
| 57 | 53.2 | 44.7 | 2.6 | 50.8 | | 57 | 50.8 | 47.2 | 8.2 | 38.4 | |
| 58 | 53.2 | 44.7 | 2.6 | 50.8 | 80.3 | 58 | 50.7 | 47.2 | 8 3 | 37.9 | 75.6 |
| 59 | 53.2 | 44.7 | 2.6 | 50.8 | | 59 | 50.7 | 47.6 | 8.7 | 38 0 | |