

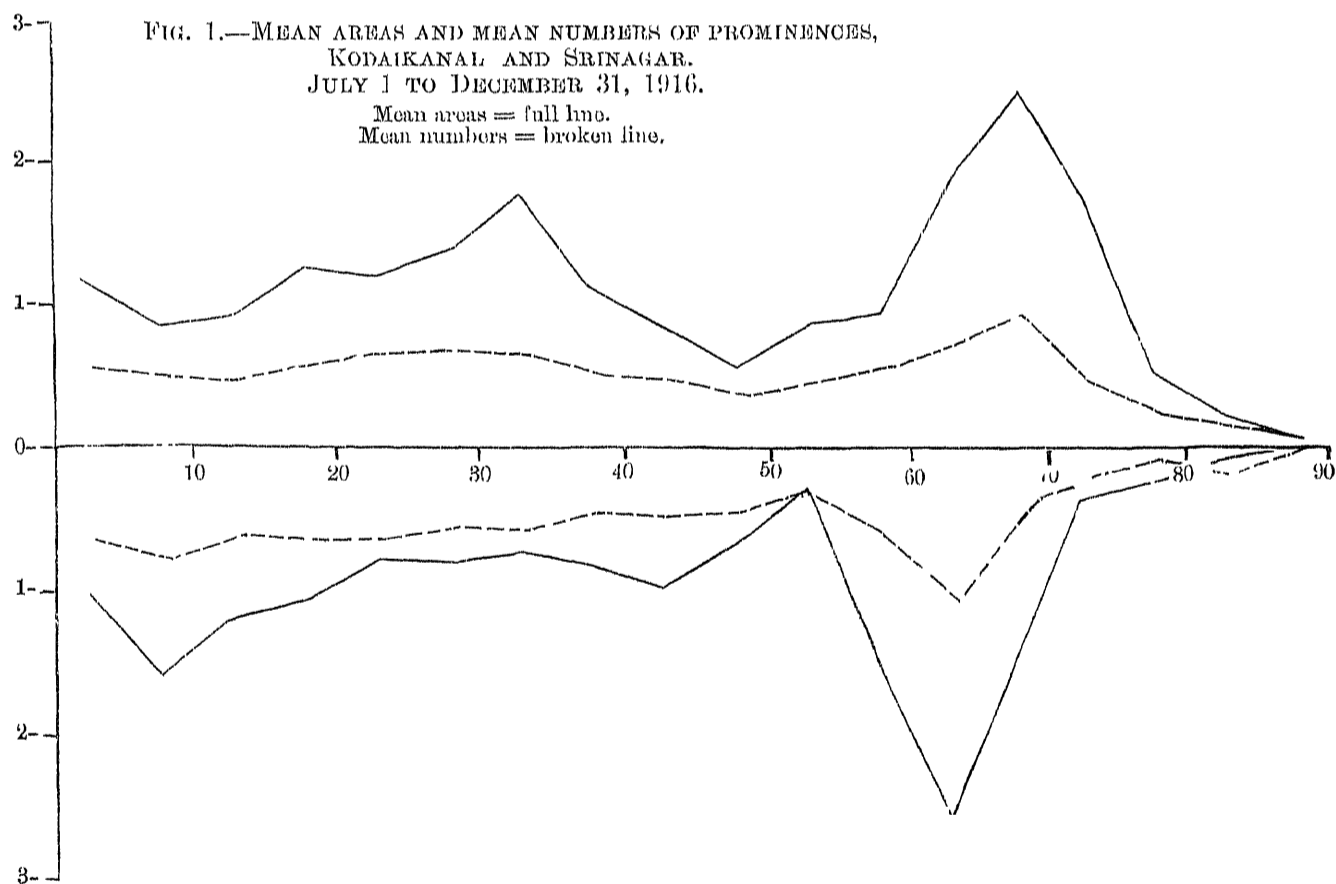
Kodaikanal Observatory.

BULLETIN No. LVI.

SUMMARY OF PROMINENCE OBSERVATIONS FOR THE SECOND HALF OF THE YEAR 1916.

In this bulletin the spectroheliograms obtained at Srinagar until the end of October by the Kashmir expedition under Mr. J. Evershed, F.R.S., the Director, have been used to supplement the Kodaikanal series. Visual observations at Kodaikanal were practically confined to displacements of the hydrogen lines and to metallic prominences, as the position angles, heights, and areas can now be much more satisfactorily determined from the photographs. For those days when Kodaikanal photographs of prominences were incomplete, imperfect or wanting, the photographs taken at Srinagar were substituted when available. This inclusion of the Srinagar photographs up to the end of October raises the total number of days of observations from 163 to 169, and the number of effective days from 152 to 162.

The distribution of prominences observed and photographed during the half-year ending December 31, 1916, is represented in the accompanying diagram. The full line gives the mean daily areas and the broken line the mean daily numbers for each zone of 5° of latitude. The ordinates represent tenths of a square minute of arc for the full line and numbers for the broken line.



The noteworthy features of the distribution are the minimum near 50° and the maximum near 65° . This maximum has moved another 5° nearer to the poles compared with the previous half-year; the northern zone is about 5° ahead of the southern, as is also clearly shown in the prominences projected on the disc as absorption markings. The maximum near 30° which has been noted for several preceding half-years has almost disappeared.

The mean daily areas and daily numbers (corrected for partial observations) are given in the table below, where the data for Kodaikanal alone are given separately for the sake of uniformity with previous bulletins.

| | | | | Mean daily areas (square minutes) | Mean daily numbers. |
|---|-------|----|-----|--------------------------------------|------------------------|
| Kodaikanal and Srinagar observations (162 effective days). | North | .. | .. | 1.98 | 9.28 |
| | | .. | .. | 1.60 | 8.81 |
| | Total | .. | .. | 3.58 | 18.09 |
| Kodaikanal observations (152 effective days) | North | .. | ... | 2.04 | 9.37 |
| | | .. | .. | 1.61 | 8.92 |
| | Total | .. | .. | 3.65 | 18.29 |

The above figures show a decrease of 6.5 per cent in areas and of 6.2 per cent in numbers, when compared with those of the previous half-year. The distribution in latitude shows that the diminution in area affects practically all latitudes but is especially marked in the south between 20° and 40° .

There has been an excess of prominence activity in the northern hemisphere, namely 55.3 per cent in areas and 51.2 per cent in numbers. The excess of activity in the northern hemisphere is also to be seen in metallic prominences, in the displacements of the hydrogen lines in prominences and in the H α absorption markings.

The monthly, quarterly, and half-yearly frequencies and the mean heights and extents of prominences recorded at Kodaikanal and Srinagar are given in the following table. The frequencies are derived from the number of effective days.

Abstract for the second half of 1916.

| Month | Number of days of observations | | Number of prominences. | Mean daily frequency. | Mean height. | Mean extent |
|------------------|--------------------------------|-----------|------------------------|-----------------------|--------------|-------------|
| | Total. | Effective | | | | |
| 1916. | | | | | " | " |
| July | 30 | 30 | 433 | 14.4 | 32.3 | 2.51 |
| August | 30 | 29 | 489 | 16.9 | 35.6 | 2.46 |
| September | 26 | 24 | 415 | 17.3 | 33.0 | 2.34 |
| October | 29 | 27 | 479 | 17.7 | 36.7 | 2.46 |
| November | 27 | 26 | 566 | 21.8 | 32.1 | 2.54 |
| December | 27 | 26 | 547 | 21.0 | 34.5 | 3.32 |
| Third quarter | 86 | 83 | 1337 | 16.1 | 33.7 | 2.44 |
| Fourth quarter | 83 | 79 | 1592 | 20.2 | 34.3 | 2.78 |
| Second half-year | 169 | 162 | 2929 | 18.1 | 34.0 | 2.62 |

Distribution east and west of the sun's axis.

Areas show a preponderance at the western limb, and numbers at the eastern limb as shown below. The most probable excess due to chance when 2929 prominences are observed is ± 0.62 per cent, and the occurrences of 51.25 per cent and 47.90 per cent at either limb are respectively 2.5 and 13.2 times less likely than 50 per cent at each limb.—

| 1916 July to December | | East. | West. | Percentage east. |
|-------------------------------|--------|-------|-------|------------------|
| Numbers observed | | 1501 | 1428 | 51.25 |
| Total areas in square minutes | | 2780 | 3024 | 47.90 |

Metallic prominences.

The following metallic prominences were recorded in the half-year:—

TABLE I.—LIST OF METALLIC PROMINENCES OBSERVED AT KODAIKANAL, JULY TO DECEMBER 1916.

| Date | Hour I S T | | Base. | Latitude | | Limb | Height | Remarks |
|-----------|---------------|---------|-------|----------|-------|------|--------|---|
| | h. | m. | | North | South | | | |
| 1916 | | | | | | | | |
| July | 1 | 8 40 | | | | W | 15± | D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ faint. D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ , 5316.8, 5276.2 |
| | 5 | 8 26 | 10 | 22 | 12 | W | 90 | |
| August | 10 | 8 50 | 6 | | 18 | W | 45 | D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ , 5316.8, 6677. D ₁ , D ₂ , b ₁ , b ₂ very bright 6677, D ₁ , D ₂ , 5323.1, 5316.9, 5383.8, 5276.2, 5270.6, 5269.8, b ₁ , b ₂ , b ₃ , b ₄ , 5234.9, 5227.4, 5227.0, 5208.8, 5206.2, 5204.8, 5197.8, 5018.6, 5016, 4924.1. |
| | 14 | 10 3 | 2 | 13 | | E | 10 | |
| | 25 | 8 50 | 12 | 24 | | W | 150 | |
| | | 9 to 10 | | | | | | |
| September | 22 | 10 10 | 1 | 17.5 | | W | 15 | D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ . D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ |
| | 25 | 9 32 | | 25 | | W | 20 | |
| November | 1 | 8 25 | 5 | | 18.5 | E | 65 | D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ , 5316.8. 6677. D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ . 6677, D ₁ , D ₂ , 5363.0, 5316.8, 5276.2, 5234.8, 5197.8, b ₁ , b ₂ , b ₃ , b ₄ , 5018.6, 5016, 4924.1. |
| | 2 | 8 52 | | 20 | | E | 20 | |
| | 13 | 8 18 | 2 | 16 | | W | 15 | |
| | 28 | 9 0 | | 16 | | E | 30 | |
| December | 2 | 8 42 | | | 10 | W | 10 | D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ , 5316.8 slightly bright. Whole prominence seen in D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ , 5316.8. 4924.1, 5016, 5018.6, b ₁ , b ₂ , b ₃ , b ₄ , 5197.8, 5234.8, 5276.2, 5284.2, 5316.8, 5363.0, D ₁ , D ₂ , 6677, 7065. D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ , 5316.8. Do. Do. D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ , 5316.8, 5234.8, 5276.2, 5363.0 D ₁ , D ₂ , b ₁ , b ₂ , b ₃ , b ₄ , 5316.8. Do. Do. Do. Do. Do. |
| | 4 | 8 37 | 8 | 33 | | E | 25 | |
| | 6 | 8 35 | | 27 | | W | 15± | |
| | 10 | 8 52 | 4 | | 43 | W | 30 | |
| | 10 | 8 58 | | 5 | | W | 60 | |
| | 10 | 8 59 | | 10 | | W | low | |
| | 10 | 8 59 | 2 | 16 | | W | 25 | |
| | 17 | 8 38 | 4 | 35 | | W | 30 | |
| | 18 | 8 55 | 4 | 15 | | W | 35 | |
| | 19 | 8 38 | | | 33 | W | 145 | |
| | 23 | 8 22 | 3 | 17.5 | | E | 40 | |
| | 25 | 8 35 | 4 | | 41 | E | 40 | |
| | 27 | 8 58 | 6 | 12 | | E | 15 | |
| 30 | 8 36 | 3 | 10.5 | | E | 60 | | |

The total was 25 against 33 in the preceding half-year. Their distribution, north and south, and extreme and mean latitudes are given below :—

| | Number. | Mean latitude. | Extreme latitudes. |
|----------------|---------|----------------|--------------------|
| North | 17 | 18.7 | 35, 5 |
| South | 8 | 23.9 | 43, 10 |

Nine of these were observed on the eastern hemisphere and the remaining sixteen on the western.

Displacements of the hydrogen lines.

Particulars of the displacements observed are given in Table II.

TABLE II.—DISPLACEMENTS OF THE HYDROGEN LINES.

| Date. | Hour I.S.T | Latitude. | | Limb. | Displacement. | | | Remarks. |
|--------|------------|-----------|-------|-------|---------------|---------|--------------------------|---|
| | | North. | South | | Red. | Violet. | Both ways. | |
| 1916. | h. m | ° | ° | | Å | Å | Å | |
| July 1 | 8 40 | | 12 | W | Slight | | | |
| 2 | 8 27 | 32 | | W | Do. | | | At top Height 100" at 8 ^h 27 ^m , 75" at 8 ^h 52 ^m and 35" at 10 ^h 6 ^m |
| 5 | 8 15 | 9 | | E | | 0.5 | | |
| 5 | 8 4 | | 35 | E | | Slight | | |
| 6 | 8 33 | | 84.5 | W | | Do | | No prominence |
| 6 | 8 30 | | 58.5 | W | | Do | | |
| 6 | 8 17 | 85 | | W | Slight | | | |
| 8 | 8 20 | 21 | | W | | | Slight | Over whole prominence (70" high). |
| 9 | 10 7 | | 76.5 | W | | Slight | | |
| 9 | 10 0 | 22 | | W | | Do | | |
| 12 | 8 27 | | 31.5 | W | Slight | | | |
| 13 | 9 35 | | 9 | E | | 0.5 | | Over upper half of prominence (160" in height) |
| 18 | 8 26 | 67.5 | | E | | 0.5 | | |
| 18 | 8 35 | | 50 | E | | 0.5 | | Over whole prominence (height 20"). Amount 1 Å at 8 ^h 38 ^m . No displacement at 8 ^h 45 ^m |
| 18 | 8 24 | | 75 | W | Slight | | | |
| 20 | 9 1 | 52.5 | | E | | Slight | | |
| 20 | 9 8 | 11 | | E | * | * | Slight | On southern half of prominence base 16", height 75". * slightly to red at base at 7 ^h E and 1 Å to violet over the whole prominence to the south of it at 9 ^h 10 ^m . |
| 20 | 8 56 | | 85 | E | Slight | | | |
| 20 | 8 48 | 25.5 | | W | | Slight | | |
| 20 | 8 45 | 35 | | W | | | Slight | No prominence. |
| 21 | 8 50 | 12.5 | | E | Slight | | | |
| 22 | 8 43 | 67.5 | | E | | Slight | | |
| 23 | 8 58 | | 13 | W | | | Slight | |
| 24 | 10 30 | 67 | | E | Slight | | | |
| 24 | 10 20 | 23.5 | | W | | 3 | | At base. Slight at 10 ^h 22 ^m No prominence here. 2 Å at 8 ^h 59 ^m . |
| 26 | 8 56 | | 78.5 | E | 1 | | | At top. |
| 26 | 8 42 | | 9.5 | W | 2 | | | At the end of the streamer flowing north |
| 31 | 9 50 | 15 | | E | | 1 | | Over whole prominence, height 40" ± |
| 31 | 8 58 | | 29 | E | 0.5 | | | Displacement gone at 9 ^h 27 ^m . |
| 31 | 9 25 | 10.5 | | W | | 1 | | |
| 31 | 9 15 | 16 | | W | | | 2 to red and 1 to violet | There appeared to be dark C also displaced contiguous to bright C towards violet. This feature was not visible at 9 ^h 27 ^m . |

| Date. | Hour I.S.T. | | Latitude. | | Limb. | Amount of displacement. | | | Remarks. |
|-----------|----------------|-------|-----------|------|-------|-------------------------|--------|------------|---|
| | | | N. | S. | | Red. | Violet | Both ways. | |
| 1916. | h. | m. | ° | ° | | Å | Å | Å | |
| August | 1 | 9 13 | 19 | | W | 1 | 0.5 | | Form but not the amount of displacement changing. No prominence. |
| | 4 | 8 0 | 12 | | W | | | Slight | |
| | 10 | 8 50 | | 18 | W | | 1 | | |
| | 14 | 10 3 | 13 | | E | | | Slight | 1 A to violet at 10 ^h 4 ^m . |
| | 16 | 9 30 | 9.5 | | E | | Slight | | |
| | 21 | 9 17 | | 24 | E | Slight | | | |
| | 21 | 9 10 | | 19 | W | | | Slight | |
| | 23 | 9 4 | | 1 | W | Slight | | | |
| | 23 | 8 59 | 42 | | W | | Slight | | |
| | 24 | 9 5 | 83 | | E | Slight | | | |
| | 24 | 8 55 | | 19 | E | | | Slight | |
| | 24 | 8 55 | | 25 | E | Slight | | | |
| | 24 | 9 12 | 12 | | W | Do. | | | |
| | 25 | 8 35 | 29 | | W | 1 | | | Prominence at this position detached in Ha. Displacement over whole detached part. At base. At base. |
| | 25 | 8 40 | 18 | | W | | 1 | | Displacements at 9 ^h 15 ^m . |
| | 25 | 9 15 | 24 | | W | | 2 | | |
| | 27 | 8 30 | | 6 | E | 0.5 | | | |
| | 27 | 8 16 | | 63.5 | W | | Slight | | |
| | 27 | 8 5 | 33.5 | | W | | Do. | | |
| | 27 | 8 2 | 77 | | W | | 0.5 | | |
| September | 2 | 8 55 | 55.5 | | W | Slight | | Slight | No prominence. |
| | 3 | 8 48 | 1 | | W | | | | |
| | 3 | 8 40 | 68 | | W | Slight | | | |
| | 4 | 10 54 | 22 | | W | | Slight | | At top ; height 10". |
| | 6 | 8 48 | | 3 | E | 1 | | | |
| | 6 | 8 31 | 10 | | W | 0.5 | | | Not seen at 9 ^h 0 ^m . |
| | 6 | 8 29 | 35 | | W | | Slight | | |
| | 13 | 9 55 | | 41.5 | E | Slight | | | |
| | 18 | 8 37 | | 82.5 | E | Do. | | | |
| | 22 | 10 10 | 17.5 | | W | | 1 | | |
| | 23 | 8 40 | | 19.5 | E | | Slight | | |
| | 24 | 8 36 | 27 | | W | Slight | | | |
| | 25 | 9 32 | 25 | | W | Do. | | | |
| | 25 | 8 12 | 53 | | W | | Slight | | At the southern end of the streamers. Displacements over 5° on the southern side ranging from slight to 2 Å. 8 ^h 20 ^m . Nothing at 8 ^h 25 ^m . |
| | 26 | 11 25 | 19 | | W | | Slight | | |
| | 26 | 11 27 | 24 | | W | | 1.5 | | |
| | 27 | 8 37 | 83 | | E | Slight | | | |
| | 27 | 8 33 | | 81 | E | Do. | | | |
| | 29 | 8 35 | 69 | | E | | Slight | | At top ; height 20" |
| | 29 | 8 25 | 36 | | E | Slight | | | |
| | 30 | 9 6 | 33 | | E | | 1.5 | | |
| October | 1 | 8 29 | 21 | | W | 0.5 | | | At top, height 30". |
| | 2 | 8 40 | | 32 | E | 1 | | Slight | Over the whole prominence ; height 15" |
| | 4 | 11 15 | 18 | | E | Slight | | | |
| | 7 | 8 57 | 25 | | E | | Slight | | |
| | 8 | 9 5 | 18 | | E | | | Slight | |
| | 8 | 8 49 | | 69.5 | E | | Slight | | |
| | 11 | 8 45 | | 3 | E | 1 | | | |
| | 11 | 8 32 | | 35 | E | | | Slight | |
| | 13 | 8 48 | 80.5 | | E | Slight | | | |
| | 13 | 8 50 | 32 | | E | 0.5 | | | |
| | 14 | 9 40 | 18 | | E | | 0.5 | | |
| | 17 | 8 24 | 38 | | E | Slight | | | At top ; height 35". |

| Date | Hour I S T | | Latitude | | Limb | Amount of displacements | | | Remarks |
|----------|---------------|-------|----------|------|------|--------------------------------|---------------------------------|------------|---|
| | | | N | S | | Red | Violet | Both ways. | |
| 1916. | | | ° | ° | | Å | Å | Å | |
| October | 17 | 8 15 | 8 | | W | 2 | Slight | | To red at top and to violet at base. (Height 20") D ₃ similarly displaced. |
| | 17 | 8 8 | 46 | | W | | Do. | | At base |
| | 20 | 9 28 | 20.5 | | W | 0.5 | | | |
| | 24 | 8 15 | 66.5 | | W | Slight | Slight | | To violet at top, to red a little lower (Height 95") |
| | 24 | 8 31 | 75.5 | | W | | 0.5 | | |
| | 25 | 8 28 | 35 | | E | Slight | | | |
| | 25 | 8 38 | | 19.5 | W | Do. | 1 | | |
| | 25 | 8 41 | 12 | | W | 0.5 | | | |
| | 26 | 8 39 | 58.5 | | W | | Slight | | |
| | 27 | 9 9 | 34.5 | | E | | Do. | | Over whole prominence |
| | 31 | 8 30 | 63.5 | | E | Slight | | | |
| | 31 | 8 35 | 18 | | E | | Slight | | At top. |
| November | 1 | 8 30 | 24 | | E | 1.5 | | | |
| | 1 | 8 25 | | 18.5 | E | Slight | | Slight | At base |
| | 2 | 8 50 | 23.5 | | E | | | | |
| | 2 | 8 28 | 52.5 | | W | 0.5 | | | |
| | 2 | 8 22 | 74.5 | | W | Slight | Slight | | Over whole prominence. To red over the longer streamer and to violet at base of prominence. |
| | 2 | 8 22 | 82 | | W | | Do. | | At base |
| | 3 | 8 28 | 26 | | E | 1 | 0.5 | | To red at base, to violet at top |
| | 4 | 8 30 | 30 | | E | | 3 | | 3 Å at top, 2 Å at base. |
| | 4 | 8 23 | 19.5 | | W | | 1.5 | | |
| | 4 | 8 20 | Equator | | E | 1.5 | | | |
| | 5 | 8 41 | 29 | | E | | | 1 | |
| | 6 | 10 35 | 7.5 | | E | 4 at base | 0.5 at top | | |
| | 6 | 9 37 | | | E | 9 ^h 37 ^m | 10 ^h 35 ^m | | |
| | 6 | 9 8 | 57 | | W | | | Slight | At base |
| | 8 | 10 12 | | 18 | E | Slight | | | |
| | 9 | 9 6 | 19 | | E | | Slight | Slight | |
| | 9 | 8 40 | 57 | | W | 0.5 | | | |
| | 11 | 9 6 | 30 | | E | Slight | | | |
| | 12 | 9 19 | 30 | 30 | E | Do. | | | |
| | 13 | 8 18 | 17 | | W | | 0.5 | | |
| | 14 | 8 27 | 4 | | E | | Slight | | |
| | 14 | 8 49 | 27.5 | | W | | 0.5 | | At base. |
| | 16 | 9 57 | | 83 | E | | Slight | | |
| | 18 | 8 17 | 20 | | W | | Do. | | |
| | 21 | 8 42 | | 22 | E | | | Slight | |
| | 21 | 8 42 | | 24.5 | E | 0.5* | | Do. | * To red at 8 ^h 44 ^m . |
| | 21 | 8 46 | | 35 | E | 0.5 | | | At base. |
| | 21 | 8 17 | 52 | | W | | Slight | | |
| | 26 | 9 52 | | 26 | E | | | Slight | |
| | 27 | 8 45 | 41 | | E | Slight | | | |
| | 27 | 8 28 | 53 | | W | | 0.5 | | No prominence. |
| | 27 | 8 25 | 75 | | W | | Slight | | At base. |
| | 27 | 8 23 | 87.5 | | W | | Do. | | Do |
| | 28 | 8 55 | 6.5 | | E | Slight | | | |
| | 28 | 9 00 | | 16 | E | 1 | 0.5 | | |
| | 28 | 8 38 | 17 | | W | | | Slight | |
| | 30 | 9 8 | 15.5 | | E | | Slight | | |
| December | 1 | 8 57 | | 18.5 | E | 1 at base. | 2 at top. | | |
| | 2 | 8 48 | | 40 | W | 0.5 | | | |
| | 2 | 8 43 | | 18 | W | | | Slight | |
| | 2 | 8 39 | 25 | | W | | Slight | | |
| | 4 | 8 37 | 33 | | E | | 0.5 | | At base. 1A to violet at top at 8 ^h 43 ^m . 3A to violet at top and 0.5 Å to red at base at 8 ^h 45 ^m . |

| Date. | Hour I S.T. | | Latitude | | Limb. | Amount of displacement. | | | Remarks. |
|----------|----------------|-------|----------|------|-------|-------------------------|--------|------------|---|
| | | | N. | S. | | Red. | Violet | Both ways. | |
| 1916. | h | m | ° | ° | | Å | Å | Å | |
| December | 5 | 10 50 | 28 | | W | 2 | Slight | | Slightly to violet at base at 26 ^h 5 10 ^h 52 ^m . No prominence. |
| | 5 | 10 45 | 59.5 | | W | | | Slight | |
| | 6 | 8 35 | 27 | 38 | W | Slight | Slight | | |
| | 9 | 8 57 | | | E | 0.5 | | | At base. |
| | 9 | 8 25 | 65 | | W | | Slight | | On the upper part Height 100". |
| | 10 | 8 57 | | 8 | W | 0.5 | | | |
| | 11 | 8 48 | 9 | | E | | Slight | | |
| | 14 | 8 18 | 88.5 | | E | 0.5 | | | |
| | 14 | 8 32 | 58.5 | | W | | 0.5 | | |
| | 15 | 8 52 | | 17 | E | | 1.5 | | |
| | 15 | 8 42 | | 48 | W | 0.5 | | | |
| | 17 | 8 24 | 20 | | E | Slight | Slight | | To red at top, to violet on lower part. Height 60". |
| | 17 | 8 19 | | 13 | E | Do. | | | |
| | 17 | 8 35 | 25 | | W | Do. | | | |
| | 18 | 8 55 | 15 | | W | | 1.5 | | |
| | 19 | 8 51 | | 26 | E | 0.5 | | | |
| | 19 | 8 38 | | 33 | W | | Slight | | |
| | 19 | 8 38 | | 33 | W | Slight | Do. | | To violet at base, to red at top. Height 145". |
| | 21 | 8 37 | 17 | | E | 0.5 | | | |
| | 21 | 8 47 | | 11 | E | | Slight | | |
| | 21 | 8 54 | | 19 | E | 0.5 | | | |
| | 22 | 8 32 | | 20 | E | 1.5 | | | |
| | 22 | 8 30 | | 26 | E | | Slight | | |
| | 24 | 8 19 | 88 | | | | 0.5 | | |
| | 24 | 8 22 | | 21 | W | | Slight | | |
| | 25 | 8 46 | | 1 | E | Slight | | | |
| | 26 | 8 40 | 6 | | E | Do. | | | |
| | 27 | 8 54 | 17 | | E | Do. | | | |
| | 27 | 8 55 | 13 | | E | 0.5 | 2 | | Only to violet at 8 ^h 58 ^m and nothing at 9 ^h 0 ^m . At top. Height 30". |
| | 27 | 9 4 | | 66.5 | E | | 1 | | No prominence. Both ways lower in chromo- sphere and to red higher up. A prominence 25" at 8 ^h 41 ^m . |
| | 28 | 8 38 | 12 | | E | 3 | | 0.5 | |
| | 28 | 8 41 | 6.5 | | E | 1 | | | |
| | 28 | 8 27 | | 17.5 | W | Slight | | | |
| | 29 | 8 45 | 13 | | E | | Slight | | |
| | 29 | 8 30 | 18 | | E | | 0.5 | | |
| | 30 | 8 39 | 56 | | E | Slight | | | |
| | 30 | 8 36 | 10.5 | | E | Do. | | | |
| | 30 | 8 48 | 10 | | W | Do. | | | |
| | 30 | 8 51 | 47.5 | | W | Do. | | | |
| | 31 | 9 0 | | 61 | E | Do. | | | |
| | 31 | 8 47 | 25 | | W | | 0.5 | | |
| | 31 | 8 45 | 45 | | W | | Slight | | |

The total number observed was 179 against 260 of the preceding half-year. There were 115 in the northern hemisphere and 63 in the southern, 1 being on the equator; 93, or 52 per cent, were in the eastern hemisphere, 85 in the western and 1 on the central meridian.

Eighty-nine of them were to the red, 87 to the violet and 23 both ways simultaneously. Between 0° and 30° there were displacements observed in 105 prominences, between 31° and 60° in 42, and between 61° and 90° in 32.

Reversals and Displacements of the C line on the Disc.

One hundred and eighty-four reversals of the C line near spots, 17 darkenings of the D₃ line, and 44 displacements were recorded. Each of these is a marked decrease on the previous half-year. Their distribution

east and west of the central meridian together with the most probable excess due to chance is given below :—

| | East. | West | Percentage east | Most probable excess |
|-------------------------------------|-------|------|-----------------|----------------------|
| Reversals of C near spots | 104 | 80 | 56.5 | ±2.5% |
| Darkenings of D ₃ | 10 | 7 | 58.8 | ±8.4% |
| Displacements of C . .. | 20 | 22 | 47.6 | ±5.1% |

There was a large preponderance of displacements towards the red, 31 being to the red, 14 to the violet, and 7 both ways simultaneously.

Prominences projected on the disc as absorption markings

The grating spectroheliograph for photographing the absorption markings in H α light was in regular use during the six months. Photographs were obtained on 111 days counted as 93 effective days. The mean daily areas in millionths of the sun's visible hemisphere, corrected for foreshortening, and the mean daily numbers are given below .—

| | Areas | Numbers. |
|---------------------|--------|----------|
| North | 980.6 | 7.51 |
| South | 746.2 | 5.34 |
| Total .. | 1726.8 | 12.85 |

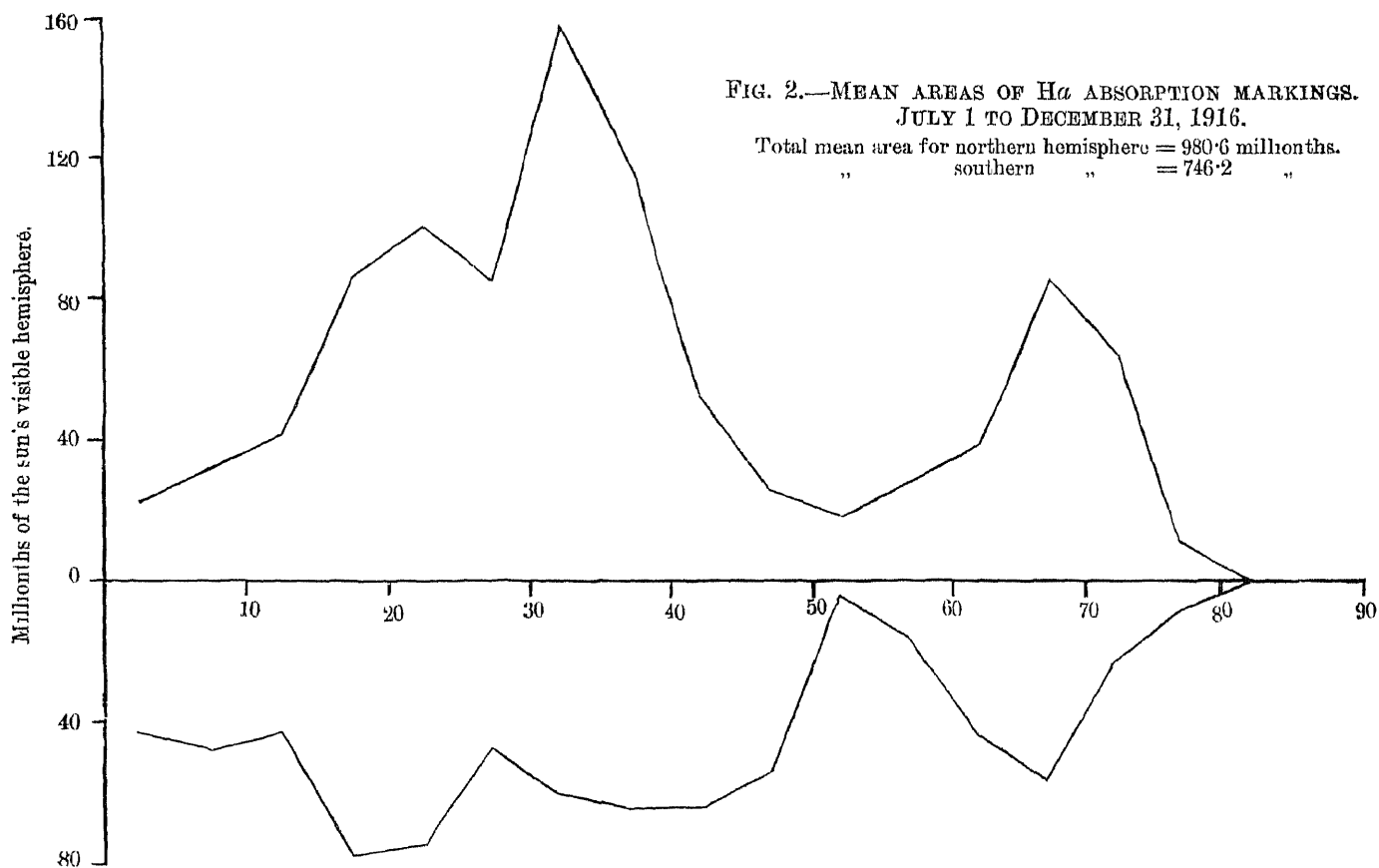
The areas of absorption markings given in Kodaikanal Observatory Bulletins XLVII, I., and LII, for the year 1915 and the first half of 1916 should be multiplied by 2, those given for previous years being correct. They are reproduced correctly below :—

Mean daily areas of H α Absorption markings.

(Millionths of the sun's visible hemisphere.)

| | 1915 January to June. | 1915 July to December. | 1916 January to June |
|----------------|--------------------------|---------------------------|-------------------------|
| North | 1536.4 | 984.0 | 812.2 |
| South | 1214.8 | 1347.8 | 879.8 |
| Total .. | 2751.2 | 2331.8 | 1692.0 |

The distribution of the absorption markings in latitude is shown in the accompanying diagram, and is similar to that in the previous half-year, except that there is a secondary minimum in the belt 25° to 30°.



Contrary to every other form of prominence activity these markings show an increase on the previous half-year. The increase is, however, entirely in the northern hemisphere, both areas and numbers showing a decrease in the southern hemisphere compared with the previous half-year.

The distribution east and west of the central meridian has reverted to the usual excess on the eastern side the percentage on the eastern side being 55.8 in areas and 54.8 in numbers. The most probable excess due to chance is 1.0 per cent on either side, whilst the chances of excesses of 5.8 per cent and 4.8 per cent on either side are respectively 240 and 3100 times less than that of equality on each side.

KODAIKANAL OBSERVATORY,
 6th March 1917.

T. ROYDS,
 Assistant Director.