# Godaikanal Observatory

## BULLETIN NO. CXXI

### SUMMARY OF PROMINENCE OBSERVATIONS FOR THE YEAR 1942.

PART I

*Summary of prominence observations for the First Half of the year 1942.*

As in the previous bulletin, the summary given in this bulletin is based on the data computed from Kodaikanal observations supplemented by those derived from the photographs obtained from the co-operating observatories of Mt. Wilson and Meudon for days on which incomplete or no photograp could be obtained at Kodaikanal.

*Calcium Prominences at the limb*.—K-Prominence photographs were taken at Kodaikanal on 162 days and photographs for 20 days were received from Mt. Wilson making the data available for 177 days which were counted as 159½ effective days after weighting the photographs according to their quality. The mean daily areas (in square minutes of arc) and mean daily numbers computed from those photographs are given below. The data from Kodaikanal records only are also given for comparison with bulletins issued prior to 1st January 1923, *i.e.*, before the co-operation of other observatories came into force.

| | Combined data | | Kodaikanal data only | |
|---|---|---|---|---|
| | Mean daily areas | Mean daily numbers | Mean daily areas | Mean daily numbers |
| North | 1·78 | 6·08 | 1·79 | 6·21 |
| South | 1·95 | 6·10 | 1·88 | 6·08 |
| TOTAL | 3·73 | 12·18 | 3·67 | 12·29 |

Compared with figures for the last half year, the areas show a slight increase of 2 per cent while the number remain practically the same.

The latitudinal distribution of the areas and numbers is illustrated in the following diagram where the thick line represents the areas and the broken line the numbers. The ordinate represents tenths of square minutes of arc for the full line and numbers for the broken line. The curve shows maxima of activity in the zones 0° to 10° and 25° to 35° in both the hemispheres for areas, while the numbers show practically uniform distribution over the range 0° to 50°.

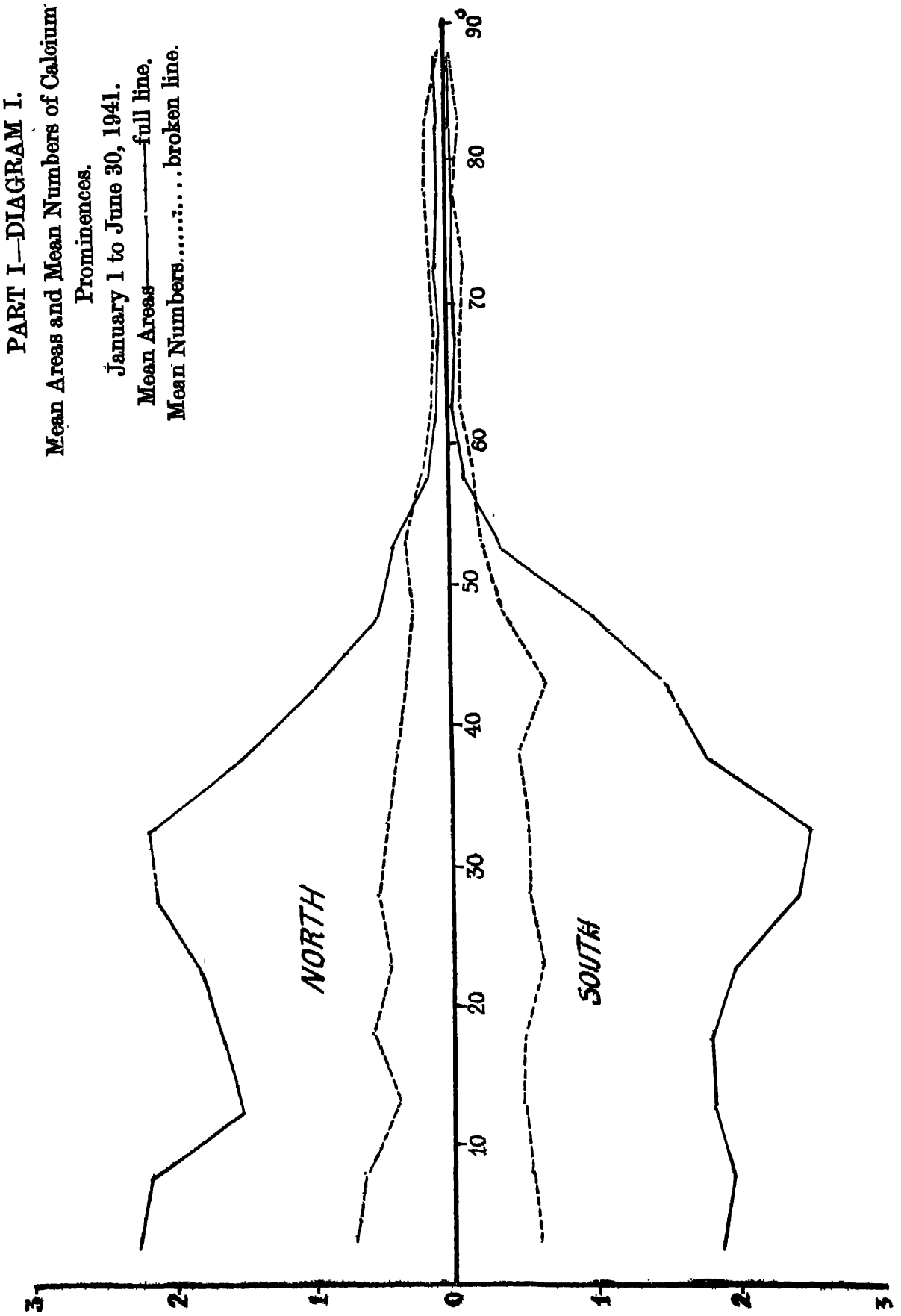
PART I—DIAGRAM I.

Mean Areas and Mean Numbers of Calcium Prominences.

January 1 to June 30, 1941.

Mean Areas——————full line.

Mean Numbers.....broken line.



The monthly, quarterly and half-yearly means of areas, numbers, heights and extents of prominences are given in table I.

TABLE I

| Months | Number of days (effective) | Areas (Sq. mts.) | Numbers | Daily means | | Mean height | Mean extent |
|---|---|---|---|---|---|---|---|
| | | | | Areas | Numbers | | |
| 1942 | | | | | | " | ° |
| January . . . . | 28½ | 111·5 | 342 | 3·88 | 11·90 | 31·26 | 4·76 |
| February . . . . | 26½ | 90·4 | 329 | 3·41 | 12·42 | 29·94 | 4·53 |
| March . . . . | 28 | 86·3 | 342 | 3·08 | 12·21 | 32·50 | 4·21 |
| April . . . . | 27½ | 111·0 | 337 | 4·00 | 12·14 | 31·28 | 4·54 |
| May . . . . | 27 | 108·4 | 357 | 4·02 | 13·22 | 31·68 | 4·35 |
| June . . . . | 21½ | 88·7 | 288 | 4·08 | 10·94 | 36·37 | 4·58 |
| First Quarter . . . | 83½ | 288·2 | 1013 | 3·46 | 12·16 | 31·23 | 4·50 |
| Second Quarter . . | 76½ | 308·1 | 932 | 4·03 | 12·10 | 33·11 | 4·49 |
| First half year . . . | 159½ | 596·3 | 1945 | 3·73 | 12·17 | 32·17 | 4·50 |

Both areas and numbers show an eastern defect as is seen from the following table :—

| | East | West | Percentage East |
|---|---|---|---|
| Total areas (square minutes) . . . . . | 279·2 | 317·0 | 46·83 |
| Total numbers . . . . . | 926 | 1019 | 47·61 |

An eruptive prominence photographed on May 1 on the east limb reached a maximum height of 8½ minutes of arc.

*Observations with the Prominence Spectroscope* :—Details of metallic prominenes observed during this half year are given in table II.

TABLE II

| Date | Time I.S.T.* | Base | Latitude | | Limb | Height | Lines |
|---|---|---|---|---|---|---|---|
| | | | North | South | | | |
| *January* | H. M. | ° | ° | ° | | ' | |
| 4 . . . . . | 9 5 | .. | 15 | .. | E | 10 | 4 and 10 only. |
| 19 . . . . . | 8 40 | .. | 26 | .. | E | 10 | 4 and 10 only. |
| 30 . . . . . | 8 45 | 2 | .. | 8 | E | 10 | 4 and 10 only. |
| *February* | | | | | | | |
| 15 . . . . . | 10 10 | .. | .. | 7 | W | 10 | 4 and 10 only. |
| 17 . . . . . | 9 0 | .. | 7 | .. | E | 10 | 4 and 10 only. |

| Date | Time * I.S.T. | Base | Latitude | | Limb | Height | Lines |
|---|---|---|---|---|---|---|---|
| | | | North | South | | | |
| *March* | H. M. | | ° | ° | | | |
| 3 . . . . . | 9 7 | 1 | 15·5 | .. | W | 15 | 1 to 12. |
| 6 . . . . . | 9 50 | 5 | 3·5 | .. | W | 25 | 1 to 12. |
| 6 . . . . . | 10 0 | 1 | .. | 3·5 | W | 40 | 1 to 12. |
| 7 . . . . . | 11 0 | 10 | 6 | .. | W | 50 | 1 to 12. |
| 8 . . . . . | 8 55 | 1 | 9·5 | .. | W | 15 | 1 to 12. |
| 21 . . . . . | 9 0 | 2 | 9 | .. | E | 50 | 4 and 10 only. |
| 21 . . . . . | 9 0 | .. | 6 | .. | E | 20 | 4 and 10 only. |
| 24 . . . . | 9 25 | 1 | 14·5 | .. | E | 15 | 1 to 12. |
| *April* | | | | | | | |
| 4 . . . . . | 8 50 | 1 | 6·5 | .. | W | 20 | 4 and 10 only. |
| 9 . . . . . | 10 5 | 1 | 12·5 | | E | 15 | 4 and 10 only. |
| 12 . . . . . | 8 49 | | .. | 7 | E | 10 | 4 and 10 only. |
| 29 . . . . . | 8 35 | 2 | 11 | .. | W | 10 | 4 and 10 only. |
| 30 . . . . . | 9 5 | 3 | .. | 11·5 | E | 10 | 4 and 10 only. |
| 60 . . . . . | 9 0 | 2 | . | 15 | E | 10 | 4 and 10 only. |

* I. S. T. = G. M. T. $+5^{h}\,30^{m}$

Note.—The key to the wave lengths of the metallic lines is given below:—

| No. | λ(A°) | Element | No. | λ(A°) | Element |
|---|---|---|---|---|---|
| 1 . . . . . | 4924·1 | $Fe^{+}$ | 7 . . . . . | 5276·2 | $Fe^{+}$ |
| 2 . . . . . | 5016·0 | He | 8 . . . . . | 5316·8 | $Fe^{+}$ |
| 3 . . . . . | 5018·6 | Fe | 9 . . . . . | 5303·0 | $Fe^{+}$ |
| 4 . . . . . | $b_4$, $b_3$ $b_2$, $b_1$. | Mg. $Fe^{+}$ | 10 . . . . . | $D_2$, $D_1$ | Na |
| 5 . . . . . | 5234·8 | Fe | 11 . . . . . | 6677 | He |
| 6 . . . . . | 5276·0 | Cr | 12 . . . . . | 7065 | He |

The distribution of metallic prominences was as follows :—

| | 1°-10 | 11°-20 | 21°-30 | 31°-40 | Mean latitude | Extreme latitudes |
|---|---|---|---|---|---|---|
| North . . . . . | 7 | 5 | 1 | .. | 10°·9 | 3°·5 & 26° |
| South . . . . . | 4 | 2 | .. | .. | 8° ·7 | 3°.5 &15° |

Particulars of displacements observed in the chromosphere and the prominences with the spectroscope are given in the following table :—

TABLE III

| Date 1942 | Time I.S.T. | Latitude North ° | Latitude South ° | Limb | Displacements Red | Displacements Violet | Displacements Both ways | Remarks |
|---|---|---|---|---|---|---|---|---|
| *January* | H. M. | | | | | | | |
| 4 . . . | 9 5 | 15 | .. | E | .. | .. | 0·5 | |
| 18 . . . | 9 20 | 77 | .. | E | 0·5 | .. | .. | At top. |
| 19 . . . | 8 40 | 26 | .. | E | .. | .. | 0·5 | |
| 23 . . . | 8 55 | .. . | 4·5 | E | 0·5 | .. | .. | At top. |
| 26 . . . | 9 15 | .. | 67 | W | .. | 0·5 | .. | |
| 27 . . . | 9 15 | 7 | .. | E | 1 . | .. | .. | In the middle of prominence ; from 5 to 9°. |
| 29 . . . | 9 10 | 11 | .. | W | .. | 1 | .. | At top ; from 10 to 12°. |
| 30 . . . | 8 45 | .. | 8 | E | 0·5 | .. | .. | At top ; from 7 to 9°. |
| *February* | | | | | | | | |
| 5 . . . | 10 10 | 14·5 | .. | W | 1 | .. | | At top, from 13 to 16°. |
| . . | 9 5 | .. | 28 | W | 0·5 | .. | | In the middle of prominence. |
| 18 . . . | 8 40 | 78·5 | .. | E | 0·5 | .. | | In chromosphere. |
| 21 . . . | 8 40 | 4·5 | .. | E | .. | 1 | | In the middle of prominence ; 3 to 6°. |
| 24 . . . | 8 50 | .. | 17 | E | .. | 1 | | At top. |
| *March* | | | | | | | | |
| 3 . . . | 9 0 | 66 | .. | E | :. | 0·5 | | At base. |
| 3 . . . | 9 7 | 15·5 | .. | W | .. | .. | 1 | |
| 6 . . . | 9 50 | 3·5 | .. | W | 3 | .. | | At top ; from 1-6. |
| 6 . . . | 9 50 | 3·5 | .. | W | .. | 1·5 | | In the middle of prominence ; from 1 to 6°. |
| 6 . . . | 10 0 | 3·5 | .. | W | .. | 4 | | At top ; from 1 to 6°. |
| 6 . . . | 9 50 | 10 | .. | W | .. | 1 | | At top. |
| 7 . . . | 10 45 | 6 | .. | W | 5·5 | .. | | From 1 to 11°. |
| 7 . . . | 10 55 | 6 | .. | W | .. | 5·5 | | From 1 to 11°. |
| 8 . . . | 8 45 | | 39 | E | . | 0·5 | | At base. |
| 8 . . . | 8 55 | 5 | .. | W | .. | 1·5 | | At base. |
| 8 . . . | 8 55 | 9 | .. | W | .. | 1 | | At base. |
| 10 . . . | 11 7 | | 72·5 | E | 0·5 | | | At top ; from 71° to 74°. |
| 13 . . . | 9 5 | | 37 | E | .. | 0·5 | | In chromosphere. |
| 20 . . . | 9 59 | 6 | .. | E | .. | 1 | | At top. |
| 21 . . . | 9 0 | 9 | .. | E | 4 | 2 | | To red at top and violet at base from 8° to 10°. |

| Date 1942 | Time I.S.T. | Latitude | | Limb | Displacements | | | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | North | South | | Red | Violet | Both ways | |
| *March* | H. M. | | | | | | | |
| 21 . . . | 9 0 | 6 | | E | 1 | | | In the middle of prominence. |
| 24 . . . | 9 25 | 14·5 | | E | 1 | | | At top. |
| 27 . . . | 11 27 | 10 | | E | | 0·5 | | At top. |
| 27 . . . | 11 25 | | 24 | E | | 0·5 | | At top. |
| 28 . . . | 8 20 | | 40·5 | W | | 0.5 | | At base. |
| 28 . . . | 8 20 | | 40·5 | W | | 1 | | At top |
| 31 . . . | 10 36 | | 45 | E | | 0·5 | | At top. |
| 31 . . . | 10 36 | | 47 | E | | Sl. | | In chromosphere. |
| *April* | | | | | | | | |
| 9 . . . | 10 5 | 12·5 | | E | | 0·5 | | At base. |
| 12 . . . | 8 49 | | 7 | E | Sl. | | | At top. |
| 16 . . . | 9 40 | | 14·5 | W | | | 0·5 | |
| 29 . . . | 8 35 | | 11 | W | | 0·5 | | In the middle of prominence ; from 10° to 12°. |
| 30 . . . | 9 5 | | 11·5 | E | | 0·5 | | From 10 to 13° |
| 30 . . . | 9 0 | | 15 | E | | 0·5 | | From 14 to 16° |
| *May* | | | | | | | | |
| 8 . . . | 9 5 | | 12 | E | | Sl. | | At base. |
| 12 . . . | 9 45 | 9·5 | | E | | 0·5 | | At base. |

The number of displacements observed was 45 as against 11 in the previous half year. The distribution in latitude of these displacements was as follows :—

| Latitude | North | South |
|---|---|---|
| 0°—30° . . . . . | 23 | 11 |
| 31°—60° . . . . . | .. | 6 |
| 61°—20° . . . . . | 3 | 2 |
| Total . . . . . | 26 | 19 |
| East limb . . . . . | 28 | |
| West limb . . . . . | 17 | |

Of these 14 were towards the red, 27 towards the voilet and 4 both ways simultaneously. The largest displacement of the H$\alpha$ line observed was 5·5A° to red and 5·5A° to voilet over an eruptive prominence on March 7, 1942.

Bright reversals of the H$\alpha$ line dark reversals of $D_3$ were observed on the sun's disc on 223 and 144 occasions respectively. Doppler displacements of H$\alpha$ line on the disc were observed on 9 occasions.

These were observed in the region of the active sunspot groups and their distribution was as follows :—

| | N. | S. | E. | W. | Total |
|---|---|---|---|---|---|
| Bright reversals of $H_\alpha$ | 145 | 78 | 113 | 110 | 223 |
| Dark reversals of $D_{3}$ | 105 | 39 | 68 | 76 | 144 |
| Displacement of $H_\alpha$ | 8 | 1 | 5 | 4 | 9 |

*Observations with the spectrohelioscope.*—Observation of prominences, dark markings and bright flocculi were continued with Hale Spectrohelioscope as in previous years. The displacements observed with this Instrument in the prominences and in the $H_\alpha$ dark and bright markings are summarised below :—

| | N. | S. | E. | W. | Towards Red | Towards Violet | Both ways | Total |
|---|---|---|---|---|---|---|---|---|
| Prominences | 68 | 45 | 56 | 57 | 64 | 49 | .. | 113 |
| Dark markings | 88 | 42 | 77 | 53 | 74 | 56 | .. | 130 |
| Bright flocculi | 11 | 1 | 7 | 5 | 6 | 6 | .. | 12 |

The chromospheric eruptions observed during this half year are detailed in Table IV.

*Table IV*

| Date | Time (I.S.T.) Beginning | Maximum | End | Mean latitude | Mean Long. From C.M. | Intensity | Remarks |
|---|---|---|---|---|---|---|---|
| *February* | H. M. | H. M. | H. M. | ° | ° | | |
| 4 | 08 05 | 08 12 | 08 35 | +12 | 3E | 1 | Spectrohelioscope. |
| 4 | .. | 08 40 | .. | | | | Spectroheliogram. |
| 6 | .. | 08 13 | .. | + 7 | 53W | 1 | Do. |
| 14 | .. | 09 59 | .. | — 13 | 9W | 1 | Do. |
| 16 | .. | 09 27 | .. | + 15 | 26E | 1 | Do. |
| 16 | .. | 09 27 | .. | — 13 | 36W | | Do. |
| 28 | .. | 08 20 | 08 27 | + 5 | 10E | 2 | Spectroheliogram & Spectrohelioscope. |
| 28 | .. | 08 05 | .. | | | | |
| *March* | | | | | | | |
| 3 | .. | 07 53 | .. | — 13 | 15W | 1 | Do. |
| 3 | .. | 07 53 | .. | + 8 | 28W | 2 | Do. |
| 4 | .. | 08 19 | .. | + 7 | 42W | 2 | Do. |
| 14 | .. | 09 48 | .. | + 2 | 17E | 1 | Do. |
| 23 | .. | 08 15 | 08 45 | + 12 | 60E | 2 | Spectrohelioscope & Spectroheliogram. |
| 30 | .. | 08 26 | .. | + 8 | 37W | 2 | Do. |
| 31 | .. | 09 55 | .. | + 7 | 43W | 2 | Do. |

| Date | Time (I. S. T.) Beginning | Maximum | End | Mean latitude | Mean long. from C. M. | Intensity | Remarks |
|---|---|---|---|---|---|---|---|
| *April* | | | | | | | |
| 9 | .. | 08 01 | .. | — 7 | 7E | 1 | spectroheliogram. |
| 10 | .. | 08 03 | .. | — 7 | 7W | 1 | Do. |
| 14 | .. | 08 00 | .. | — 7 | 62W | 1 | Do. |
| 14 | .. | 08 00 | .. | + 10 | 29E | 1 | Do. |
| 14 | .. | 08 00 | .. | + 12 | 41E | 1 | Do. |
| 15 | .. | 07 59 | .. | + 10 | 17E | 1 | Do. |
| 15 | .. | 07 59 | .. | + 12 | 27E | 1 | Do. |
| 15 | .. | 07 59 | .. | — 5 | 70W | 1 | Do. |
| 18 | .. | 08 44 | .. | + 13 | 20W | 2 | Do. |
| 18 | .. | 08 44 | .. | — 9 | 62E | 1 | Do. |
| 19 | .. | 08 09 | .. | + 12 | 36W | 1 | Do. |
| 23 | 11 55 | 12 00 | 12 10 | + 9 | 8W | 1 | spectroheliogram and spectrohelioscope. |
| 23½ | .. | 12 17 | .. | | | | |
| May 4 | .. | 08 19 | .. | + 7 | 52W | 1 | Spectroheliogram. |

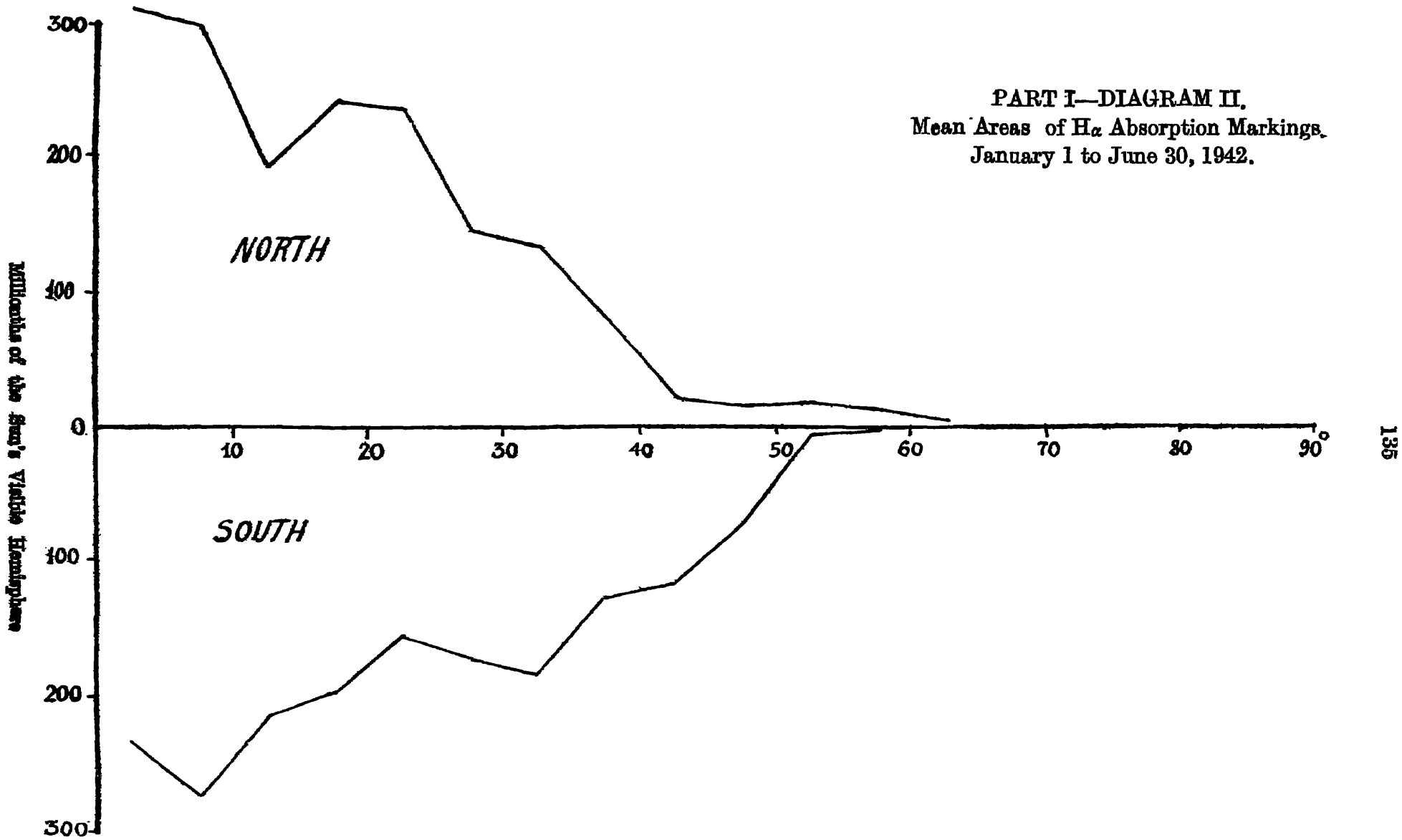
*Prominences projected on the disc as dark markings.*—Hα flocculus plates were taken at Kodaikanal on 156 days and photographs were received for 23 days from Mount Wilson and for 19 days from Meudon. On the whole, data was available for 180 days which were reckoned as 173 effective days. The mean daily areas in millionths of the visible hemisphere (uncorrected for foreshortening) and the mean daily numbers as derived from this data are given below :—

| | Combined data | | Kodaikanal records only | |
|---|---|---|---|---|
| | Mean daily areas | Mean daily numbers | Mean daily areas | Mean daily numbers |
| North | 1703 | 14·56 | 1680 | 14·86 |
| South | 1780 | 14·45 | 1711 | 14·68 |
| Total | 3483 | 29·01 | 3391 | 29·54 |

Compared with the figures for the previous half year, the areas show a decrease of 11 per cent and the numbers 1 per cent.

The following diagram illustrates the distribution in latitude of the areas of these markings.

PART I—DIAGRAM II.
Mean Areas of H$\alpha$ Absorption Markings.
January 1 to June 30, 1942.



In the northern hemisphere the areas show maximum activity in the zone 0° to 5°. In addition, the activity shown in the zone 15° to 25° in the previous half year is still maintained, though less marked. In the southern hemisphere the maximum activity is in the zone 5° to 10° with a minor peak at 30° to 35°.

Unlike in the previous half year, the areas and numbers show an eastern preponderance, the percentage east for areas and numbers being 51·35 and 51·97 respectively.

## PART II

### Summary of Prominence observations for the second half of the Year *1942*

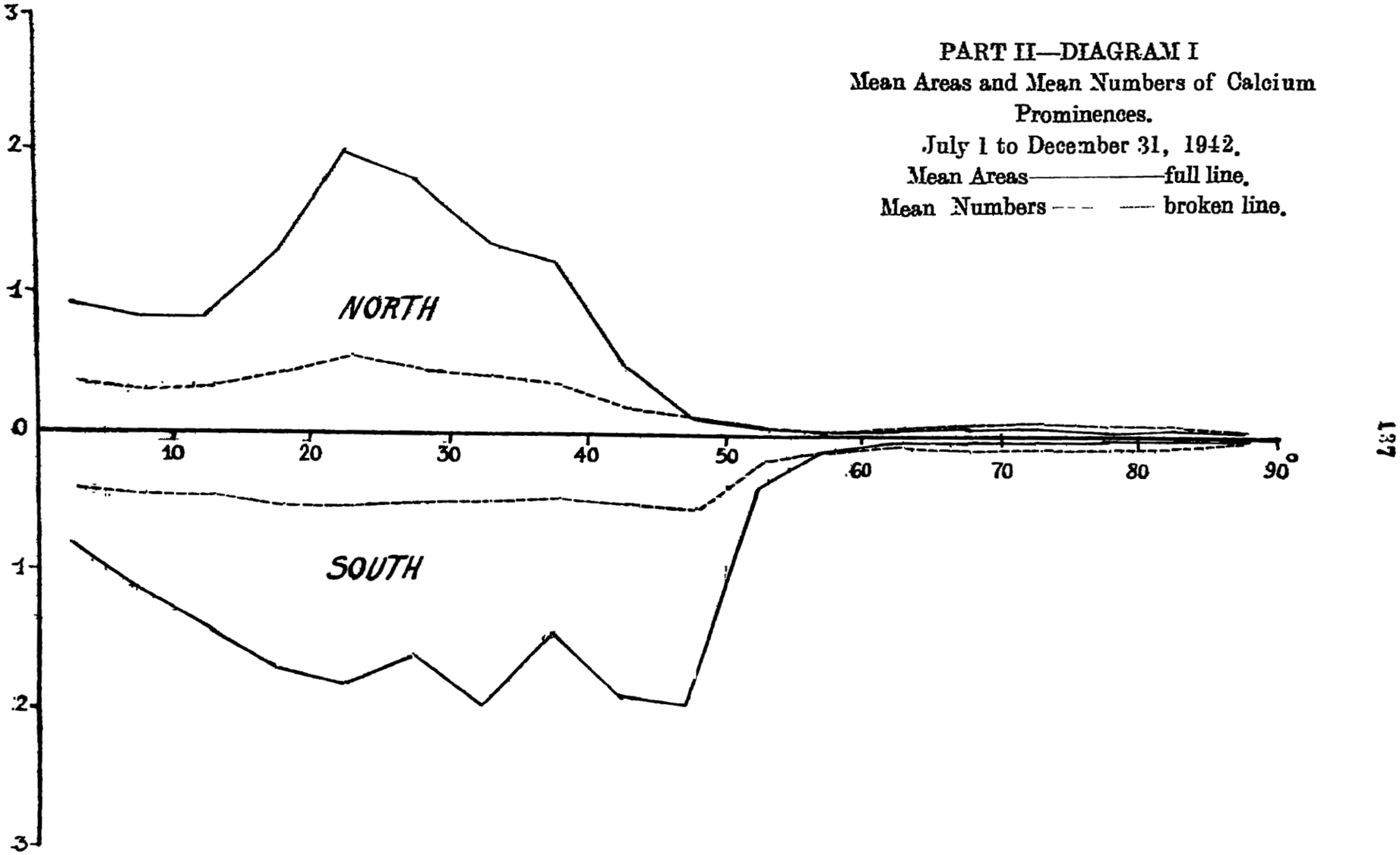
*Calcium Prominences at the limb.*—During the second half of this year K-Prominence plates were taken at Kodaikanal on 126 days and Mount Wilson Observatory supplied plates for 67 days. On the whole, photographs were available for 182 days which were reckoned as 166½ effective days. The mean daily areas and mean daily numbers of prominences derived as usual from the above photographs are given below—

| | Combined data | | Kodaikanal data only | |
|---|---|---|---|---|
| | Mean daily areas | Mean daily numbers | Mean daily areas | Mean daily Numbers |
| North . . . . . | 1·13 | 4·10 | 1·04 | 4·61 |
| South . . . . . | 1·65 | 5·48 | 1·56 | 6·01 |
| Total . . . | 2·78 | 9·58 | 2·60 | 10·62 |

Compared with the figures for the last half year, these means show a large decrease of 25 per cent and 21 per cent respectively for areas and numbers.

The distribution in latitude of the areas and numbers is shown in the following diagram. In the northern hemisphere the peak of activity at 0°—10° shown in the previous half year has now disappeared and the peak in the zone 25° to 35° has shifted 5° towards the equator. In the southern hemisphere peaks of activity are shown in the zones 30° to 35° and 40° to 50°.

PART II—DIAGRAM I
Mean Areas and Mean Numbers of Calcium Prominences.
July 1 to December 31, 1942.
Mean Areas——————full line.
Mean Numbers - - -  —— broken line.



The monthly, quarterly, and half-yearly means of areas, numbers, heights and extents of prominences are given in Table I.

*Table I*

| Months | Number of days (effective) | Areas | Numbers | Daily means | | Mean height | Means extent |
|---|---|---|---|---|---|---|---|
| | | | | Areas | Numbers | | |
| *1942* | | | | | | ° | ″ |
| July | 27½ | 80·5 | 249 | 2·95 | 9·14 | 31·32 | 4·31 |
| August | 28½ | 75·6 | 284 | 2·65 | 9·97 | 35·91 | 3·52 |
| September | 28½ | 73·3 | 272 | 2·60 | 9·63 | 36·19 | 3·52 |
| October | 28½ | 76·2 | 255 | 2·70 | 9·03 | 40·42 | 3·78 |
| November | 27½ | 80·1 | 263 | 2·91 | 9·53 | 37·92 | 3·81 |
| December | 26½ | 75·7 | 270 | 2·86 | 10·19 | 34·86 | 3·82 |
| 3rd Qr. | 84 | 229·4 | 805 | 2·73 | 9·58 | 35·47 | 3·78 |
| 4th Qr. | 82½ | 232·0 | 788 | 2·82 | 9·58 | 37·73 | 3·80 |
| Second half year | 166½ | 461 4 | 1593 | 2·78 | 9·58 | 36·60 | 3·79 |

The distribution of prominence areas and numbers east and west af the sun's axis was as follows :—

| | East | West | Percentage East |
|---|---|---|---|
| Total area in sq. min. of arc | 236·7 | 224·6 | 51·32 |
| Total number | 775 | 818 | 48·65 |

Showing an eastern preponderance for areas and defect for numbers.

*Observations with prominence spectroscope.*—Details of metallic prominences observed during this half year are given in table II.

*Table II*

| Date 1942 | Time L.S.T. | | Base | Latitude | | Limb | Height | Lines |
|---|---|---|---|---|---|---|---|---|
| | | | | North | South | | | |
| *July* | H. | M. | ° | ° | ° | | ″ | |
| 11 | 9 | 48 | .. | .. | 9 | W | 10 | 4 and 10 only. |
| *August* | | | | | | | | |
| 6 | 9 | 22 | 1 | 8·5 | | W | 10 | Do. |
| 18 | 8 | 44 | 1 | 28·5 | | W | 15 | Do. |
| *October* | | | | | | | | |
| 26 | 09 | 00 | 2 | .. | 4 | E | 10 | 4 and 10 only. |
| 27 | 10 | 37 | 2 | .. | 9 | E | 30 | 1 to 12. |
| *November* | | | | | | | | |
| 9 | 09 | 50 | 6 | .. | 17 | W | 20 | 1 to 12. |
| 23 | 09 | 40 | 4 | .. | 16 | E | 15 | 4 and 10 only. |

*N.B.*—For key to the wave-lengths refer to Table II, Part I.

The distribution of metallic prominences was as follows :—

| | 1°—10° | 11°—20° | 21°—30° | 31°—40° | Mean latitude | Extreme latitudes |
|---|---|---|---|---|---|---|
| North . . . . . | 1 | 0 | 1 | .. | 18°·5 | 8°·5 & 28°·5 |
| South . . . . . | 3 | 2 | 0 | .. | 11°·0 | 4° and 17° |

Details of the displacements observed with the spectroscope in the chromosphere and prominences are given in the following table.

*Table III*

| Date 1942 | Time I.S.T. | Latitude | | Limb | Displacements | | | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | North | South | | Red | Violet | Both ways | |
| *July* | H. M. | ° | ° | | | | | |
| 11 . . | 09 48 | .. | 9 | W | Sl. | Sl. | | To red at top and to violet at base. |
| *August* | | | | | | | | |
| 6 . . | 09 15 | 2 | .. | E | 0·5 | | | |
| 6 . . | 09 25 | .. | 51·5 | W | | 0·5 | | At base. |
| 20 . . | 10 20 | 6 | .. | E | 1 | | | Do. |
| 20 . . | 10 24 | 2·5 | .. | E | 0·5 | | | Do. |
| 30 . . | 08 45 | 65·5 | .. | W | | Sl. | | In chromosphere. |
| *September* | | | | | | | | |
| 11 . . | 10 43 | .. | 7 | E | 0·5 | | | At base. |
| 28 . . | 09 10 | 78 | .. | W | | 0·5 | | At top. |
| 29 . . | 09 40 | .. | 5 | E | 1 | | | At base. |
| *October* | | | | | | | | |
| 4 . . | 09 25 | .. | 7·5 | W | | 0·5 | | At top. |
| 17 . . | 09 37 | 17 | .. | E | Sl. | | | At base. |
| 18 . . | 10 05 | 3 | .. | E | Sl. | | | Do. |
| 26 . . | 09 00 | .. | 4 | E | 0·5 | | | At top. |
| 27 . . | 10 37 | .. | 9 | E | 2 | | | At base. |
| 27 . . | 10 50 | .. | 51 | W | Sl. | | | At top. |
| *November* | | | | | | | | |
| 6 . . | 09 26 | .. | 24 | E | 0·5 | | | At top. |
| 8 . . | 08 55 | 72·5 | .. | W | | 1 | | |
| 9 . . | 09 50 | .. | 17 | W | 2 | 1·5 | | From 14° to 20°. |
| 10 . . | 09 27 | .. | 7 | W | | 0·5 | | At base. |
| 16 . . | 10 45 | 14 | .. | E | Sl. | Sl. | | To red at base and violet at top. |
| 17 . . | 09 37 | .. | 19 | E | Sl. | | | At base. |
| 20 . . | 09 20 | .. | 50 | E | Sl. | | | At base. |
| 21 . . | 10 07 | .. | 39 | E | | Sl. | | |
| 22 . . | 09 35 | 12 | | W | Sl. | | | |

*TABLE III—contd.*

| Date 1942 | Time I. S. T. | Latitude | | Limb | Displacements. | | | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | North | South | | Red | Violet | Both ways | |
| *November* | H M | ° | ° | | | | | |
| 24 . . | 09 48 | 1 | .. | E | Sl. 0·5 | | | At base. |
| 24 . . | 09 52 | .. | 17 | E | Sl. | | | Do. |
| 24 . . | 09 36 | 35 | .. | W | 1 | | | At top |
| 25 . . | 09 25 | .. | 41 | W | Sl. | | | In middle ; from 40° to 42°. |
| 30 . . | 09 54 | .. | 49 | W | Sl. | | | |
| 30 . . | 09 43 | .. | 1 | W | | | | |
| *December* | | | | | | | | |
| 1 . . | 10 40 | .. | 33 | E | Sl. | | | At base. |
| 1 . . | 10 40 | .. | 35 | E | | Sl. | | At top. |
| 1 . . | 10 21 | 27 | .. | W | Sl. | | | At top. |
| 6 . . | 09 50 | .. | 45·5 | W | Sl. | | | |
| 26 . . | 09 56 | .. | 47 | W | | 0·5 | | At base. |
| 27 . . | 09 20 | 6 | .. | W | Sl. | | | |

The distribution of these displacements was as follows :—

| Latitude | North | South |
|---|---|---|
| 0°—30° | 10 | 14 |
| 31°—60° | 1 | 10 |
| 61°—90° | 4 | 0 |
| East limb | 12 | |
| West limb | 20 | |

Of these 27 were towards the red and 12 towards the violet.

Seventy two bright reversals of the H$\alpha$ line, and 41 dark reversals of the $D_3$ line were observed with the spectroscope on the sun's disc. The distribution of these is given below :—

| | N. | S. | E. | W. | Total |
|---|---|---|---|---|---|
| Bright reversals of H$\alpha$ | 20 | 52 | 31 | 41 | 72 |
| Dark reversals of $D_3$ | 11 | 30 | 13 | 28 | 41 |

No displacement of the H$\alpha$ line on the disc was observed during the half year.

*Observations with spectrohelioscope.*—The displacements observed with the spectrohelioscope during the second half of 1942 are summarised below :—

| | N. | S. | E. | W. | Total |
|---|---|---|---|---|---|
| Displacements in prominences | 36 | 61 | 51 | 46 | 97 |
| Displacements in dark markings | 35 | 65 | 49 | 51 | 100 |
| Displacements in bright flocculi | 4 | 4 | 4 | 4 | 8 |

| | Displacements towards | | |
|---|---|---|---|
| | Red | Violet | Total |
| Prominences | 55 | 42 | 97 |
| Dark markings | 57 | 43 | 100 |
| Bright flocculi | 6 | 2 | 8 |

The chromospheric eruptions observed during this half year are detailed below:—

*Table IV*

| Date 1942 | Time (I.S.T.) Beginning | Maximum | End | Mean latitude | Mean Long. from C.M. | Intensity | Remarks |
|---|---|---|---|---|---|---|---|
| *July* | H. M. | H. M. | H. M. | ° | ° | | |
| 2 | .. | 09 46 | .. | — 9 | 21E | 2 | From spectroheliogram. |
| 8 | .. | 08 51 | .. | — 9 | 60W | 1 | From spectroheliogram and spectrohelioscope. |
| 15 | .. | 08 05 | .. | + 10 | 55E | 1 | From spectroheliogram. |
| 15 | .. | 08 05 | .. | — 9 | 58 E | 1 | Do. |
| 15 | .. | 08 05 | .. | + 1 | 54W | 1 | Do. |
| 22 | .. | 11 16 | .. | — 10 | 63W | 1 | Do. |
| *August* | | | | | | | |
| 4 | .. | 07 46 | .. | + 12 | 31E | 1 | Do. |
| *September* | | | | | | | |
| 6 | .. | 10 00 | .. | — 6 | 29W | 1 | Do. |
| 7 | 10 30 | 10 40 | 11 00 | — 7 | 43W | 2 | From spectroheliogram and spectrohelioscope. |
| 22 | .. | 08 37 | .. | + 11 | 65E | 1 | From spectroheliogram. |
| 22 | .. | 08 37 | .. | — 11 | 44W | 1 | Do. |
| 22 | .. | 08 37 | .. | — 4 | 48W | 1 | Do. |
| 27 | .. | 14 39 | .. | + 14 | 20E | 1 | Do. |
| *October* | | | | | | | |
| 21 | .. | 09 31 | .. | + 5 | 50E | 1 | Do. |
| *November* | | | | | | | |
| 4 | .. | 12 28 | .. | — 11 | 15W | 2 | Do. |
| 4 | .. | 12 28 | .. | — 10 | 22W | 2 | Do. |
| 5 | .. | 12 00 | 12 40 | — 9 | 31W | 1 | From spectroheliogram and spectrohelioscope. |
| 5 | .. | 12 00 | .. | — 13 | 38W | 1 | From spectroheliogram. |
| 11 | .. | 09 39 | .. | — 11 | 12W | 1 | Do. |
| 21 | .. | 08 39 | .. | — 2 | 26W | 1 | From spectrohelioscope and spectroheliogram. |
| 24 | .. | 08 59 | .. | + 8 | 52E | 1 | From spectroheliogram. |
| 24 | .. | 08 59 | .. | — 7 | 75E | 1 | Do. |
| 24 | .. | 08 59 | .. | — 14 | 75E | 1 | Do. |
| 24 | .. | 08 59 | .. | — 3 | 1W | 2 | Do. |
| 25 | 08 54 | 09 35 | .. | + 8 | 38E | 2 | At points ; from spectrohelioscope and spectroheliogram. |
| 25 | .. | 08 54 | .. | — 8 | 14W | 1 | From spectroheliogram. |
| 26 | .. | 12 37 | .. | + 9 | 25E | 2 | At points ; from spectrohellogram. |

*Table IV—contd.*

| Date 1942 | Time (I.S.T.) Beginning | Maximum | End | Mean latitude | Mean longitude from C.M. | Intensity | Remarks |
|---|---|---|---|---|---|---|---|
| 26 . . . . | .. | 12 37 | .. | — 4 | 48E. | 1 | From spectroheliogram. |
| 26 . . . . | .. | 12 37 | .. | — 8 | 29W | 1 | Do. |
| 27 . . . . | .. | 08 48 | .. | + 8 | 14E | 1 | At points ; from spectroheliogram. |
| 27 . . . . | .. | 08 48 | .. | — 8 | 42W | 1 | From spectroheliogram. |
| 30 . . . . | .. | 09 51 | .. | — 7 | 1E | 2 | Do. |
| 30 . . . . | .. | 09 51 | .. | + 8 | 30W | 1 | Do. |
| *December* | | | | | | | |
| 1 . . . . | .. | 09 54 | .. | — 7 | 10W | 1 | Do. |
| 2 . . . . | 10 15 | 10 35 | 10 45 | — 6 | 25W | 1 | From spectrohelioscope and spectroheliogram. |
| 4 . . . . | .. | 09 16 | .. | — 10 | 35E | 1 | From spectroheliogram. |
| 9 . . . . | .. | 08 59 | .. | + 20 | 31E | 1 | Do. |
| 25 . . . . | .. | 09 17 | .. | + 4 | 60E | 1 | Do. |
| 25 . . . . | .. | 09 17 | .. | — 7 | 60W | 1 | Do. |
| 26 . . . . | .. | 09 01 | .. | + 5 | 46E | 1 | Do. |
| 26 . . . . | .. | 09 01 | .. | — 8 | 74W | 1 | Do. |
| 27 . . . . | .. | 09 24 | .. | + 5 | 33E | 1 | Do. |

*Prominences projected as Hα dark markings on the disc* :—During the half year Hα flocculus photographs were taken at Kodaikanal on 116 days, and photographs for 79 days were received from Mount Wilson Observatory and for 43 days from Meudon, making the data available for 182 days which were counted as 148½ days. The daily means of areas and numbers computed from the photographs are given below :—

| | Combined data | | Kodaikanal Observatory only | |
|---|---|---|---|---|
| | Mean daily areas | Mean daily numbers | Mean daily areas | Mean daily numbers |
| North . . . . . | 1058 | 9·27 | 901 | 8·03 |
| South . . . . . | 1438 | 11·24 | 1178 | 9·80 |
| TOTAL . . . | 2496 | 20·51 | 2079 | 17·83 |

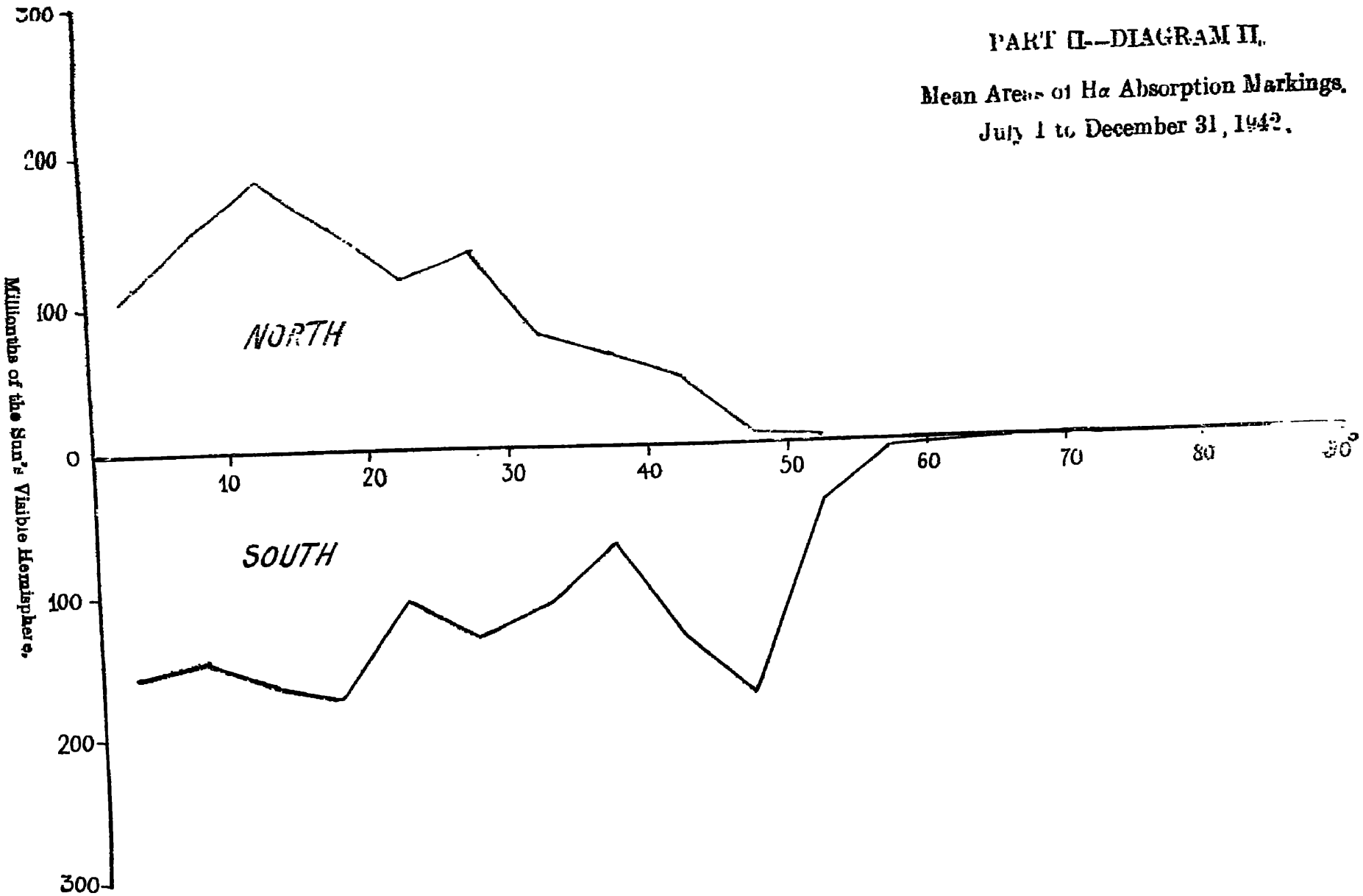
Compared with figures for the previous half year, both areas and numbers show a large decrease of 22 per cent and 29 per cent respectively as in the case of prominences.

The distribution in latitude of the Hα areas is illustrated in the following diagram:—

PART II.—DIAGRAM II.

Mean Areas of Hα Absorption Markings.

July 1 to December 31, 1942.



The curve shows peaks of activity in the zones 10° to 15° and 25° to 30° in the northern hemisphere and at 15° at 20° and 45° to 50° in the southern hemisphere :

Both the areas and numbers show an eastern defect, the percentage east being 48·76 and 48·70 for areas and numbers respectively.

Thanks are due to the co-operating observatories for the photographs supplied by them.

Kodaikanal Observatory,
August 1949.

A K DAS,
Director, Kodaikanal Observatory.

GIPD—DMH—79. Spok.—8-3-52—385