

*The Distribution in Latitude of the Absorption Markings
in Ha Spectroheliograms.* By T. Royds, D.Sc.

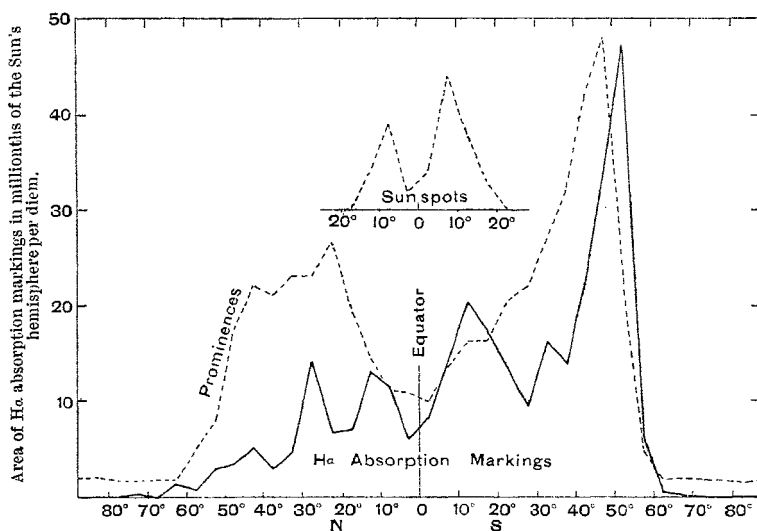
(Communicated by John Evershed.)

The curve accompanying this paper gives the distribution in latitude of all the absorption markings seen in the Ha spectroheliograms obtained at this observatory since the photographic records were begun in April 1911 up to the end of June 1912.* The series is not a very complete one, since photographs cannot be taken except with a fairly bright sun on account of the long exposure required. Ha spectroheliograms have been obtained on 250 out of 427 days on which the instrument was in working order. On 62 plates no absorption markings were visible.

* The curves for 1911 and the first half of 1912 will be given separately in the *Kodaikanal Observatory Bulletin*, No. xxix.

The positions of the markings were obtained by projecting images of the negatives on to 8-inch charts on which were marked the lines of heliographic latitude and longitude at 5° intervals. The absorption markings were then drawn in by hand and their positions read off from the charts. The error in latitude may be one or two degrees. The areas of the drawings were measured and totalled for each zone of 5° .

The areas given are uncorrected for foreshortening; they are expressed in millionths of the Sun's hemisphere and divided by the total number of days on which spectroheliograms were obtained. If the areas are corrected for foreshortening as though the markings are simply a surface phenomenon, the curve obtained shows the



HELIOGRAPHIC LATITUDES—April 1911 to June 1912.

same features, generally speaking, but the ratio of the ordinates increases with the distance from the equator.

The areas of the $H\alpha$ absorption markings in each zone are shown by the continuous line in the diagram. The dotted line shows on a convenient scale the profile areas of the prominences at the solar limb for the same period. The upper curve denotes the number of sunspots in each zone.

Of the total areas of absorption markings 74.1 per cent. occur in the southern hemisphere,* whilst of prominences 57.3 per cent.

* Since the presence of markings in the photographs depends on the position of the secondary slit on the $H\alpha$ line, it is important to consider the effect of a tilt of the slit. The setting is observed at one extremity of the slit, and if the secondary slit is not accurately parallel to the solar line there will be, as a rule, more absorption markings seen near this end of the slit, and fewer at the other. The result would be a systematic excess in the south-east quadrant of the Sun.

are south of the equator. There is a slight preponderance on the west of the central meridian over the east.*

In addition to the marked excess in the southern hemisphere there are the following noteworthy features:—

1. *A conspicuous maximum in the zone 50° to 55° S.*—This is also a striking feature of the prominence curve where the highest point is in the zone 45° to 50° S. At the corresponding north latitude this maximum is much smaller in the prominence curve, and almost absent from the H α markings, the highest point in both cases being somewhat nearer the equator, namely, between 40° and 45° N. The H α maximum between 40° and 45° N. is more prominent in the first half of 1912 than in 1911 (April to December).

2. *Maxima in the zones 5° to 10° N., 10° to 15° S., and a minimum near the equator.*—H α markings frequently attend on sunspots, and this is clearly shown by the close correspondence of the two curves between 20° north and south of the equator. During the first half of 1912 no sunspots were observed north of the equator, and H α markings were less frequent between 0° and 20° N., a maximum being still evident though less prominent.

3. *A maximum in the zone 25° to 30° N.* is a striking feature of the curve of H α markings; a maximum also occurs in the prominence curve in the zone 20° to 25° N. At the corresponding south latitude a minimum occurs, but the absolute ordinate is 65 per cent. of that in the north. It is noteworthy that the above-mentioned maximum is entirely due to markings seen in 1911, and that the prominence maximum also is only present in 1911. In the period 1912 January to June the H α activity in this latitude is insignificant; on the other hand, the activity in the corresponding south latitude is marked, a maximum occurring in the zone 30° to 35° S., in the curve for that half year taken alone. These facts point to the probability that the activity in these latitudes fluctuates considerably. The series of photographs is not sufficiently complete, however, to obtain reliable curves of the monthly activity which would give more conclusive evidence. No sunspots or flocculi have been seen in these latitudes during the period studied. It may be that this activity, so clearly evidenced by the H α absorption markings, is a forerunner of the appearance of spots and flocculi in these latitudes, denoting the commencement of another sunspot cycle.

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* For many years there has been a slight excess of east over west in the case of prominences. See Evershed, *Kodaikanal Observatory Bulletin*, No. xxviii.