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RESULTS OF MEASURES

MADE AT THE

ROYAL OBSERVATORY, GREENWICH,

UNDER THE DIRECTION OF

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ASTRONOMER ROYAL,

OF

PHOTOGRAPHS OF THE SUN

TAKEN AT

GREENWICH, IN INDIA, AND IN MAURITIUS,

IN THE YEAR

1902.

(EXTRACTED FROM THE GREENWICH OBSERVATIONS, 1902.)

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GREENWICH PHOTOHELIOGRAPHIC RESULTS, 1902.

INTRODUCTION.

§ 1. *Measures of Positions and Areas of Sun Spots and Faculæ on Photographs taken at the Royal Observatory, Greenwich, at Dehra Dûn in India, and at the Royal Alfred Observatory, Mauritius, in the year* 1902; *with the deduced Heliographic Longitudes and Latitudes.*

The photographs from which these measures were made were taken either at Greenwich; at Dehra Dûn, North-West Provinces, India; or at the Royal Alfred Observatory, Mauritius.

The photographs of the Greenwich series were taken with the Thompson Photoheliograph throughout the year. This instrument is a photographic refractor of 9 inches aperture, presented to the Royal Observatory by Sir Henry Thompson, which has been fitted with an enlarging doublet by Ross, and with a camera and shutter for rapid exposure, so as to take photographs of the Sun on a scale of about 7·5 inches to the solar diameter. It has been mounted on the tube of the 26-inch Thompson Photographic refractor throughout the year.

The photographs have been taken throughout the year on gelatine dry plates, "Lantern" plates supplied by R. W. Thomas and Co. being used, with hydroquinone development.

The Indian photographs, which have been forwarded by the Solar Physics Committee to fill the gaps in the Greenwich series, were taken under the superintendence of the Deputy Surveyor-General, Trigonometrical Survey of India, with a Dallmeyer Photoheliograph giving an image of the Sun nearly 8 inches in diameter. In the process adopted at Dehra Dûn, bromo-iodized collodion wet-plates have been generally used in connexion with iron development; but several "Lantern" dry-plates have also been taken.

The Mauritius photographs were taken under the superintendence of Mr. T. F. Claxton, Director of the Royal Alfred Observatory, Mauritius, with a Dallmeyer Photoheliograph, giving an image of the Sun about 8 inches in diameter. At the Mauritius Observatory bromo-iodized gelatine dry plates have been used with alkaline development.

Photographs of the Sun were taken at Greenwich on 177 days, and Indian photographs on 162 days with Mauritius photographs on 10 days have been received from the Solar Physics Committee to complete the total of 349 days for which there are either Greenwich, Indian, or Mauritius photographs of the Sun available for measurement in 1902.

The *first* column on each page contains the Greenwich civil time at which each photograph was taken, expressed by the day of the year and decimals of a day, reckoning from Greenwich mean midnight January 1d. 0h., and also by the day of the month (civil reckoning), which latter is placed opposite the total area of Spots and Faculæ for the day. The photographs taken in India are distinguished by the letter I., and those taken in Mauritius by the letter M.

The *second* column contains the initials of the two persons measuring the photograph; the initial on the left being that of the person who measured the photograph on the left of the centre of the measuring instrument, and that on the right being that of the person who measured on the right of the centre.

The following are the signatures of those persons who measured the photographs for the year 1902:—

E. W. Maunder	- - M	R. Fowler - - -	RF
	A. H. Smith - - -	-	AS

The *third* column gives the No. of the group, and the letter for the spot. The groups are numbered in order of their appearance.

The *next two* columns give the distance from the centre of the Sun in terms of the Sun's radius, and the position-angle from the Sun's axis, reckoned from the Sun's north pole in the direction n, f, s, p, both results being corrected for the effects of astronomical refraction.

The measures of the photographs were made with a large position-micrometer specially constructed by Messrs. Troughton and Simms for the measurement of

photographs of the Sun up to 12 inches in diameter. In this micrometer the photograph is held with its film-side uppermost on three pillars fixed on a circular plate, which can be turned through a small angle, about a pivot in its circumference, by means of a screw and antagonistic spring acting at the opposite extremity of the diameter. The pivot of this plate is mounted on the circumference of another circular plate, which can be turned by screw-action about a pivot in its circumference, 90° distant from that of the upper plate, this pivot being mounted on a circular plate with position-circle which rotates about its centre. By this means small movements in two directions at right angles to each other can be readily given, and the photograph can be accurately centred with respect to the position-circle. When this has been done, a positive eyepiece, having at its focus a glass diaphragm ruled with cross-lines into squares, with sides of one-hundredth of an inch (for measurement of areas), is moved along a slide diametrically across the photograph, the diaphragm being nearly in contact with the photographic film, so that parallax is avoided. The distance of a spot or facula from the centre of the Sun is read off by means of a scale and vernier to 1-250th of an inch (corresponding to 0·001 of the Sun's radius for photographs having a solar diameter of 8 inches). The position-angle is read off on a large position-circle which rotates with the photographic plate. The photograph is illuminated by diffused light reflected from white paper placed at an angle of 45° between the photograph and the plate below.

The following is the process of measurement of a photograph:—By means of the screws attached to the circular plates carrying the pillars which hold the photograph, the image of the Sun is centred as accurately as possible by rotation. The position-circle is then set to the readings 0°, 90°, 180°, and 270° in succession, and the scale readings taken for the two limbs. The scale being so adjusted that its zero coincides with the centre of rotation of the position-circle, the mean of the eight readings for the limb gives the mean radius of the Sun directly.

At the principal focus of the photoheliograph are two cross-spider-lines which serve to determine the zero of position-angles on the photograph.

The zero of position-angles for the Photoheliograph employed at Greenwich has been determined by the measurement of a plate which has been exposed to the Sun's rays twice, with an interval of about 100 seconds between the two exposures, the instrument being firmly clamped. Two images of the Sun, overlapping each other by about a fifth part of the Sun's diameter, were therefore produced upon the plate, and the exposures having been so given that the line joining the cusps passed approximately through the centre of the plate, the inclination of the

wires of the photoheliograph to this line was measured with the position-micrometer, and a small correction for the inclination of the Sun's path was then applied. The following tables give the correction for zero of position for the mean of the two wires as thus determined :—

Date, Greenwich Civil Time.		Correction for Zero.
	d h	° ′
1902 January	25. 12	+ 0. 25
February	5. 13	+ 0. 23
	20. 12	+ 0. 19
March	13. 11	+ 0. 28
April	2. 10	+ 0. 25
May	3. 10	+ 0. 25½
	28. 10	+ 0. 20
June	19. 10	+ 0. 21½
July	8. 11	+ 0. 30
	26. 10	+ 0. 26
August	15. 15	+ 0. 32
	29. 10	+ 0. 23
September	13. 10	+ 0. 23
	29. 14	+ 0. 35
October	14. 14	+ 0. 39
	29. 10	+ 0. 22
November	1. 13	+ 0. 32
	18. 12	+ 0. 20
December	2. 12	+ 0. 31
	15. 13	+ 0. 31
	30. 11	+ 0. 22
1903 January	14. 10	+ 0. 22

A correction of $+0^{\circ}\cdot4$ for zero of position has been applied throughout the year.

The zero of the position-circle of the micrometer has been determined from the readings of the position-circle for the four extremities of the two wires. The resulting combined correction is applied to all position-circle readings for spots and faculæ, so as to give true position-angles.

In the use of the photoheliographs at Dehra Dûn and in Mauritius the position circle has always been set to the zero as determined by allowing the diurnal motion to carry a spot or the Sun's limb along the horizontal wire, and the accuracy of the adjustment has been tested at short intervals. No correction for zero of position of the wires has therefore been applied for the reduction of the photographs taken in India or in Mauritius.

The uncorrected distance from the Sun's centre for spots and faculæ is read off directly to 1-250th of an inch by means of a scale and vernier, the zero of

the scale of the new micrometer being adjusted to coincide with the centre of the instrument.

Two sets of measures of the Sun's limb and of spots and faculæ on each photograph have been taken, and the mean of the two sets adopted.

No correction has been applied to the photographs on account of distortion.

The correction for the effect of refraction has been thus found, the Sun's image being assumed to be sensibly an ellipse. The refraction being sensibly $c \tan z$ where $c = \sin 57''{\cdot}5 = \frac{1}{3600}$ nearly, and z is the apparent zenith-distance, we shall have—

$$\frac{\text{Vertical Diameter}}{\text{Horizontal Diameter}} = \frac{1 - c \sec^2 z}{1 - c} = 1 - c \tan^2 z;$$

and thus the effect of refraction will be to diminish any vertical ordinate y by the quantity $c \tan^2 z$. Resolving this along and perpendicular to the radius vector r, and putting v for the position-angle of the vertex, we have for δr and $\delta \theta$, the corrections to radius vector and position-angle for the effect of refraction—

$$\delta r = + c \,.\, \tan^2 z \times r \,.\, \cos^2 (\theta - v) = + c \,.\, \tan^2 z \times r \times \frac{1 + \cos 2 (\theta - v)}{2},$$

$$\delta \theta = - c \,.\, \tan^2 z \,.\, \sin (\theta - v) \,.\, \cos (\theta - v) = - c \,.\, \tan^2 z \, \frac{\sin 2 (\theta - v)}{2}.$$

The quantity δr thus found is the correction, on the supposition that a horizontal diameter of the Sun is taken as the scale. But, as the mean of two diameters at right angles has been used, the scale itself requires the correction $\delta \mathrm{R} = + c \,.\, \tan^2 z \times \mathrm{R} \times \frac{1}{2} \left\{ \frac{1 + \cos 2 (\theta_0 - v)}{2} + \frac{1 + \cos 2 (\theta_0 + 90^\circ - v)}{2} \right\} = + \frac{1}{2} c \,\mathrm{R} \,.\, \tan^2 z$, where R is the Sun's mean radius and θ_0, $\theta_0 + 90^\circ$ the position-angles of the two diameters measured. Thus the final correction to r becomes—

$$\delta r = + c \,.\, \tan^2 z \times r \times \frac{\cos 2 (\theta - v)}{2}.$$

The quantities $c \tan^2 z$, $- \frac{\sin 2 (\theta - v)}{2}$, and $\frac{\cos 2 (\theta - v)}{2}$ have been tabulated for use as follows, $c \tan^2 z$ being expressed in circular measure and in arc for application to distances and position-angles respectively :—

$c \tan^2 z$.

z.	In Circular Measure.	In Arc.	z.	In Circular Measure.	In Arc.	z.	In Circular Measure.	In Arc.
°		′	°		′	°		′
80	·0089	31	70	·0021	7	60	·0008	3
79	·0073	25	69	·0019	6½	58	·0007	2
78	·0061	21	68	·0017	6	56	·0006	2
77	·0052	18	67	·0015	5½	54	·0005	2
76	·0045	15	66	·0014	5	52	·0005	2
75	·0039	13	65	·0013	4½	50	·0004	1
74	·0034	11½	64	·0012	4	45	·0003	1
73	·0030	10	63	·0011	4	40	·0002	1
72	·0026	9	62	·0010	3	30	·0001	0
71	·0023	8	61	·0009	3			

Factors for Refraction.

$\theta - v$	$\theta - v$	$-\frac{\text{Sin } 2(\theta-v)}{2}$	$\frac{\text{Cos } 2(\theta-v)}{2}$	$\theta - v$	$\theta - v$	$-\frac{\text{Sin } 2(\theta-v)}{2}$	$\frac{\text{Cos } 2(\theta-v)}{2}$
°	°			°	°		
0	180	·00	+ ·50	90	270	·00	− ·50
5	185	− ·09	+ ·49	95	275	+ ·09	− ·49
10	190	− ·17	+ ·47	100	280	+ ·17	− ·47
15	195	− ·25	+ ·43	105	285	+ ·25	− ·43
20	200	− ·32	+ ·38	110	290	+ ·32	− ·38
25	205	− ·38	+ ·32	115	295	+ ·38	− ·32
30	210	− ·43	+ ·25	120	300	+ ·43	− ·25
35	215	− ·47	+ ·17	125	305	+ ·47	− ·17
40	220	− ·49	+ ·09	130	310	+ ·49	− ·09
45	225	− ·50	·00	135	315	+ ·50	·00
50	230	− ·49	− ·09	140	320	+ ·49	+ ·09
55	235	− ·47	− ·17	145	325	+ ·47	+ ·17
60	240	− ·43	− ·25	150	330	+ ·43	+ ·25
65	245	− ·38	− ·32	155	335	+ ·38	+ ·32
70	250	− ·32	− ·38	160	340	+ ·32	+ ·38
75	255	− ·25	− ·43	165	345	+ ·25	+ ·43
80	260	− ·17	− ·47	170	350	+ ·17	+ ·47
85	265	− ·09	− ·49	175	355	+ ·09	+ ·49
90	270	·00	− ·50	180	360	·00	+ ·50

The position-angle of the vertex v is readily taken from a globe.

The distance from centre in terms of the Sun's radius given in the *fourth* column

is then readily found by dividing the measured distance r_0, as corrected for refraction, by the measured mean radius of the Sun, R; and the position-angle from the Sun's axis given in the *fifth* column is obtained by applying to the position-angle (from the N. point) corrected for refraction the position-angle of the Sun's axis derived from the *Auxiliary Tables for determining the Angle of Position of the Sun's Axis, and the Latitude and Longitude of the Earth referred to the Sun's Equator*, by Warren De La Rue, F.R.S.

The *sixth* and *seventh* columns give the heliographic longitude and latitude of the spot, which are thus computed.* Let r be the measured distance of a spot from the centre of the Sun's apparent disk, R the measured radius of the Sun on the photograph, (R) the tabular semidiameter of the Sun in arc, and ρ, ρ' the angular distances of a spot from the centre of the apparent disk as viewed from the Sun's centre and from the Earth respectively. Then we have—

$$\rho' = \frac{r}{R}(R); \text{ and } \sin(\rho + \rho') = \frac{r}{R},$$

$$\text{whence } \rho = \sin^{-1}\frac{r}{R} - \rho'.$$

Log. sin ρ and log. cos ρ, as computed from this formula, are given in *Tables for the Reduction of Solar Observations No.* 2, by Warren De La Rue, F.R.S. Then, if D, λ are the heliographic latitudes of the Earth and the spot respectively, referred to the Sun's equator, and L, l the heliographic longitudes reckoned from the ascending node of the Sun's equator on the ecliptic, and χ the position-angle from the Sun's axis, we have by the ordinary equations of spherical trigonometry—

$$\sin\lambda = \cos\rho \sin D + \sin\rho \cos D \cos\chi$$
$$\sin(L - l) = \sin\chi \sin\rho \sec\lambda.$$

The quantities L and D are derived from Warren De La Rue's *Auxiliary Tables* before referred to, in the computation of which the following formulæ have been used—

$$\tan L = \cos I \tan(\odot - N)$$
$$\sin D = \sin I \sin(\odot - N)$$

where I is the inclination of the Sun's equator to the ecliptic, N the longitude of the ascending node, and $\odot$ the longitude of the Sun.

* "Researches on Solar Physics: Heliographical Positions and Areas of Sun Spots observed with the Kew Photoheliograph during the years 1862 and 1863," by W. De La Rue, B. Stewart, and B. Loewy. *Phil. Trans.*, 1869.

The position-angle χ is given by the formula—

$$\chi = P + G + H$$

where P is the position-angle from the north point of the Sun, and G and H two auxiliary angles given by the formulæ—

$$\tan G = \tan \omega \cos \odot$$
$$\tan H = \tan I \cos (\odot - N)$$

where ω is the obliquity of the ecliptic.

It will be seen that G is the inclination of two planes through the line joining the centres of the Earth and Sun passing through the poles of the Earth and of the ecliptic respectively, and that H is the inclination of two planes through the same line and the poles of the Sun and of the ecliptic. The values assumed for I, N, ω in the computation of the tables are 7°.15′, 74°.24′, and 23°.27′·5 respectively.

The heliographic longitude of the spot is found from *l*, the heliographic longitude from node, by subtracting the reduction to the prime meridian, which is the longitude of the node at the epoch of the photograph, referred to the assumed prime meridian, the latter being the meridian which passed through the ascending node at mean noon, 1854 Jan. 1. The period of rotation assumed is 25·38 days.

The heliographic longitude and latitude of the centre of the Sun's disk at the time of the exposure of each photograph are also given (in brackets) in the *sixth* and *seventh* columns respectively. The longitude of the centre of the disk is found by subtracting the reduction to the prime meridian from L, the longitude of the centre from the node. The latitude of the centre is of course the same as D, the heliographic latitude of the Earth.

The measures of areas given in the *last three* columns were made with a glass diaphragm ruled into squares, with sides of one-hundredth of an inch, and placed as nearly as possible in contact with the photographic film. The integral number of squares and parts of a square contained in the area of a spot or facula was estimated by the observer, two independent sets of measures being made by two observers. The mean of the two sets of measures has been taken for each photograph. The factor for converting the areas, as measured in ten-thousandths of a square inch, into millionths of the Sun's visible hemisphere, allowing for the effect of foreshortening, has been inferred by means of a table of double entry, giving the equivalent of one square for different values of the Sun's radius, and for different distances of the spot or facula from the Sun's centre as measured by means of the position-micrometer.

The individual spots in a group have in some cases not been measured separately, but combined into a cluster of two or three small spots close together, the position of the centre of gravity and the aggregate area of the cluster being given. The actual number of individual spots is usually stated in the notes.

§ 2. *Ledgers of Areas and Heliographic Positions of Groups of Sun Spots deduced from the measurement of the Solar photographs for each day in the year* 1902.

In these ledgers the daily results for each group are collected together from the measures of the individual spots and given in a condensed form. The first column gives, for each day on which the group was observed, the Greenwich civil time at which each photograph was taken, expressed by the day of the month (civil reckoning) and the decimals of a day reckoning from Greenwich mean midnight. The second and third columns give the sums, for each day, of the projected areas of all the umbræ and whole spots comprised in the group, the projected area being the area as it is measured upon the photograph, uncorrected for foreshortening, and expressed in millionths of the Sun's apparent disk. The fourth and fifth columns give the sums for each day of the areas of all the umbræ and whole spots comprised in the group, corrected for foreshortening, and expressed in millionths of the Sun's visible hemisphere. The sixth and seventh columns give the mean longitude and latitude of the group, found by multiplying the longitude and latitude of each separately measured component of the group by its area, and dividing the sum of the products by the sum of the areas. The last column gives the mean longitude of the group from the central meridian, and is found by subtracting the longitude of the centre of the disk from the mean longitude of the group. At the foot of these daily results for each group are given the mean areas of umbræ and whole spots and the mean longitude and latitude for the period of observation.

§ 3. *Total Projected Areas of Sun Spots and Faculæ for each day, and Mean Areas and Mean Heliographic Latitude of Sun Spots and Faculæ for each Rotation of the Sun, and for the year* 1902.

This section requires no further explanation.

W. H. M. CHRISTIE.

Royal Observatory, Greenwich.
1904, *April* 30.

ROYAL OBSERVATORY, GREENWICH.

MEASURES OF POSITIONS AND AREAS

OF

SUN SPOTS AND FACULÆ

ON

PHOTOGRAPHS

TAKEN WITH THE

PHOTOHELIOGRAPHS

AT GREENWICH, IN INDIA, AND IN MAURITIUS,

WITH THE DEDUCED

HELIOGRAPHIC LONGITUDES AND LATITUDES.

1902.

MEASURES of POSITIONS and AREAS of SUN SPOTS and FACULÆ on PHOTOGRAPHS taken at the ROYAL OBSERVATORY, GREENWICH, at DEHRA DÛN in INDIA, and at the ROYAL ALFRED OBSERVATORY, MAURITIUS, in the Year 1902.

NOTE.—The Greenwich Civil Time at which the Photograph was taken is expressed by the Day of the Year and decimals of a day, reckoning from Midnight, January $1^d\ 0^h$.
For convenience of reference, the Month and Day of the Month (Civil Reckoning) are added.
The letter I. signifies that the photograph was taken in India; the letter M. that the photograph was taken in Mauritius; the time given is Greenwich Civil Time.
The position-angles are reckoned from the North Pole of the Sun's Axis in the direction N., E., S., W., N.
The Groups of Spots are numbered in the order of their appearance. When there is no number in the third column, it is to be understood that there is a Facula unaccompanied by a Spot. The positions of Faculæ relative to the Spots with which they are associated are indicated by the letters *n*, *s*, *p*, *f*, *c*, denoting respectively north, south, preceding, following, concentric. The longitude and latitude of the centre of the disk are given in brackets.
The Areas of Spots and Faculæ are expressed in millionths of the Sun's visible Hemisphere.

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots: Area of UMBRA for each Spot (and for Day).	Spots: Area of WHOLE for each Spot (and for Day).	Faculæ: Area for each Group (and for Day).
1902.				°	°	°			
Jan. 1		No	Spots	or Faculæ.					
1·190	RF, M		0·804	241·8	160·7	−24·3			
I.			0·885	52·7	55·3	+30·5			49
Jan. 2		Centre			(109·9)	(− 3·3)	(0)	(0)	27 (76)
2·182	RF, M		0·901	245·3	159·9	−23·7			85
I.									
Jan. 3		Centre			(96·8)	(− 3·4)	(0)	(0)	(85)
3·192	RF, M		0·967	245·7	158·7	−24·4			197
I.									
Jan. 4		Centre			(83·5)	(− 3·6)	(0)	(0)	(197)
4·257	RF, M	4963	0·873	97·4	8·7	− 8·3	0	15	
I.		4963	0·887	97·4	7·0	− 8·3	0	9	174*c*
		4963	0·893	97·1	6·3	− 8·0	0	8	
Jan. 5		Centre			(69·5)	(− 3·7)	(0)	(32)	(174)
5·189	RF, M	4963	0·708	97·7	12·3	− 8·1	17	105	
		4963	0·717	96·8	11·5	− 7·5	2	21	
I.		4963	0·725	99·0	10·9	− 9·2	5	10	
		4963	0·729	98·1	10·5	− 8·5	1	12	
		4963	0·748	97·5	8·9	− 8·1	12	37	
Jan. 6		Centre			(57·2)	(− 3·8)	(37)	(185)	(0)
6·331	RF, M	4963	0·534	99·3	10·1	− 8·2	53	406	
I.									
Jan. 7		Centre			(42·1)	(− 3·9)	(53)	(406)	(0)
7·177	RF, M	4963	0·341	103·0	11·6	− 8·2	66	402	
I.									
Jan. 8		Centre			(31·1)	(− 4·0)	(66)	(402)	(0)
8·187	RF, M	4963	0·125	118·7	11·4	− 7·5	47	246	
I.		4963	0·176	114·8	8·4	− 8·2	31	244	
Jan. 9		Centre			(17·7)	(− 4·1)	(78)	(490)	(0)
9·186	RF, M	4964	0·815	307·4	51·0	+26·7	3	7	39*p*
		4963*a*	0·129	244·0	11·4	− 7·4	40	235	
		4963	0·149	229·4	11·3	− 9·7	0	9	
I.		4963	0·105	225·0	9·0	− 8·4	25	112	
Jan. 10		Centre			(4·7)	(− 4·2)	(68)	(363)	(39)
10·186	RF, M		0·911	302·0	51·2	+26·8			74
I.		4963*a*	0·344	261·1	11·4	− 7·0	26	234	
		4963	0·301	258·1	8·7	− 7·6	18	99	
Jan. 11		Centre			(351·5)	(− 4·3)	(44)	(333)	(74)
11·168	RF, M	4963*a*	0·549	264·3	11·7	− 6·8	29	146	
I.		4963	0·547	261·9	11·5	− 8·1	7	42	
		4963	0·533	261·9	10·6	− 8·0	7	47	
		4963	0·516	262·8	9·5	− 7·5	9	64	
Jan. 12		Centre			(338·5)	(− 4·4)	(52)	(299)	(0)
12·166	RF, M	4963	0·731	265·9	12·3	− 6·1	1	2	
I.		4963	0·731	265·2	12·3	− 6·6	2	7	
		4963*a*	0·719	263·3	11·2	− 8·0	24	244	
Jan. 13		Centre			(325·3)	(− 4·5)	(27)	(253)	(0)
13·287	RF, M		0·869	268·9	10·9	− 3·2			121
I.		4963	0·876	264·9	11·8	− 6·6	3	7	173*c*
		4963*a*	0·867	263·9	10·8	− 7·5	21	215	
Jan. 14		Centre			(310·6)	(− 4·6)	(24)	(222)	(294)
14·175	RF, M		0·956	267·1	11·8	− 4·1			65
I.		4963	0·962	263·5	13·3	− 7·6	12	61	247*sf*
Jan. 15		Centre			(298·9)	(− 4·7)	(12)	(61)	(312)

Group 4963, January 5–15. Three small faint spots on January 5. The group has greatly increased by January 6 and has become a short compact stream of spots. On January 7 it is seen as a single large composite spot, which has divided again into several distinct spots by January 10, of which, *a*, the leader, is the darkest, best defined and most regular.
Group 4964, January 10. A very small faint spot.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
15·184	RF, M		0·925	65·0	222·0	+20·9			632
I.									
Jan. 16		Centre			(285·6)	(−4·8)	(0)	(0)	(632)
Jan. 17 to Jan. 19		No Spots or Faculæ.							
19·181	RF, M		0·953	115·3	160·2	−25·7			203
I.									
Jan. 20		Centre			(232·9)	(−5·2)	(0)	(0)	(203)
20·240	RF, M		0·884	117·0	157·7	−26·3			194
I.									
Jan. 21		Centre			(219·0)	(−5·3)	(0)	(0)	(194)
21·175	RF, M		0·822	120·3	153·6	−27·7			95
I.									
Jan. 22		Centre			(206·7)	(−5·3)	(0)	(0)	(95)
Jan. 23 to Jan. 27		No Spots or Faculæ.							
27·283	RF, M		0·874	241·2	186·2	−27·9			67
I.			0·902	321·5	174·0	+41·5			68
Jan. 28		Centre			(126·3)	(−5·8)	(0)	(0)	(135)
Jan. 29		No Spots or Faculæ.							
29·274	RF, M		0·912	244·3	151·5	−59·2			59
I.			0·940	94·5	30·8	− 6·3			66
Jan. 30		Centre			(101·1)	(−6·0)	(0)	(0)	(125)
30·178	RF, M		0·928	242·4	156·4	−27·9			81
I.			0·922	340·4	120·8	+55·1			35
			0·935	95·4	18·6	− 7·2			80
Jan. 31		Centre			(88·1)	(−6·1)	(0)	(0)	(196)
31·178	RF, M		0·943	239·6	145·7	−30·7			29
I.									
Feb. 1		Centre			(74·9)	(−6·1)	(0)	(0)	(29)
1902.				°	°	°			
Feb. 2		No Spots or Faculæ.							
33·239	RF, M		0·888	252·5	110·9	−18·4			22
I.			0·940	165·3	4·0	−69·9			28
Feb. 3		Centre			(47·9)	(−6·2)	(0)	(0)	(50)
Feb. 4		No photograph.							
Feb. 5		No Spots or Faculæ.							
36·203	RF, M		0·829	305·3	56·6	+24·3			58
I.									
Feb. 6		Centre			(8·8)	(−6·4)	(0)	(0)	(58)
Feb. 7 to Feb. 8		No Spots or Faculæ.							
Feb. 9		No photograph.							
Feb. 10		No Spots or Faculæ.							
41·286	RF, M		0·919	95·0	234·8	− 7·2			41
I.									
Feb. 11		Centre			(301·9)	(−6·7)	(0)	(0)	(41)
42·196	RF, M		0·824	93·1	234·2	− 6·4			122
I.									
Feb. 12		Centre			(289·9)	(−6·8)	(0)	(0)	(122)
43·178	RF, M	4965	0·622	94·9	238·3	− 8·4	0	6	
I.		4965	0·646	94·9	236·5	− 8·4	0	5	
			0·902	100·7	211·9	−12·6			61
Feb. 13		Centre			(276·9)	(−6·8)	(0)	(11)	(61)
Feb. 14 to Feb. 28		No Spots or Faculæ.							

Group 4965, February 13. A pair of very small faint spots.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots: Area of UMBRA for each Spot (and for Day).	Spots: Area of WHOLE each Spot (and for Day).	Faculæ: Area for each Group (and for Day).
1902.				°	°	°			
59·244	RF, M		0·944	138·4	356·7	−47·8			61
I.									
Mar. 1		Centre			(65·4)	(−7·2)	(0)	(0)	(61)
60·247	RF, M		0·998	63·7	330·1	+25·5			159
		4966	0·465	136·3	31·4	−26·3	0	1	
I.		4966	0·467	135·1	30·9	−26·0	0	5	
		4966	0·487	135·9	30·0	−27·1	0	2	
Mar. 2		Centre			(52·3)	(−7·2)	(0)	(8)	(159)
61·626	RF, M		0·931	272·1	102·2	− 0·7			217
			0·881	305·6	87·1	+26·6			84
			0·749	316·7	69·1	+27·1			121
		4967	0·512	357·3	35·5	+23·4	4	18	
		4967	0·522	1·4	33·2	+24·1	2	14	
		4968	0·925	58·5	333·3	+25·5	0	2	} 194c
		4968	0·944	59·8	329·6	+25·4	0	3	
Mar. 3		Centre			(34·0)	(−7·2)	(6)	(37)	(616)
62·249	RF, M	4967	0·549	340·6	37·3	+24·0	2	10	
		4967	0·547	346·8	33·7	+25·0	3	23	
I.		4967	0·529	348·3	32·5	+23·9	1	5	
		4968	0·869	55·8	333·5	+25·0	3	15	}
		4968	0·874	57·6	332·2	+23·8	2	17	} 452c
		4968	0·897	56·4	329·8	+25·9	7	49	
Mar. 4		Centre			(25·8)	(−7·2)	(18)	(119)	(452)
63·222	RF, M		0·929	311·7	70·2	+34·4			36
		4969	0·646	312·7	43·3	+19·7	3	19	
		4967	0·627	324·0	36·8	+23·8	0	2	
		4967	0·621	326·5	35·1	+24·5	0	4	
I.		4967	0·616	327·8	34·2	+24·6	4	36	
		4967	0·606	329·1	33·0	+24·5	0	4	
		4967	0·602	330·1	32·3	+24·6	1	4	
		4967	0·616	331·5	32·1	+25·9	2	11	
		4968	0·767	47·4	334·4	+25·7	24	65	
		4968	0·769	50·4	332·9	+23·9	30	98	
		4968	0·802	49·3	330·6	+26·2	7	71	
		4968	0·810	50·9	329·1	+25·5	14	67	
		4968	0·802	52·6	329 0	+24·0	1	3	
		4968	0·801	53·2	328·8	+23·6	0	4	
Mar. 5		Centre			(13·1)	(−7·2)	(86)	(388)	(36)
Mar. 6		No photograph.							
1902.				°	°	°			
65·193	RF, M	4967	0·834	306·2	34·7	+24·6	0	15	213c
		4968	0·575	20·0	334·6	+25·5	20	114	
I.		4968	0·553	21·7	334·2	+23·7	33	202	
		4968	0·572	23·8	332·5	+24·4	8	28	
		4968	0·594	27·7	329·5	+24·7	15	113	
		4968	0·621	27·9	328·3	+26·2	35	167	
Mar. 7		Centre			(347·1)	(−7·3)	(111)	(639)	(213)
66·183	RF, M	4968	0·527	359·0	334·5	+24·4	55	316	
		4968	0·529	2·8	332·4	+24·4	8	102	
I.		4968	0·562	6·3	330·1	+26·6	3	74	
		4968	0·539	9·5	328·4	+24·7	42	184	
		4968	0·567	10·1	327·6	+26·6	18	112	
Mar. 8		Centre			(334·0)	(−7·3)	(126)	(788)	(0)
67·458	RF, M		0·983	297·2	31·6	+24·9			83
		4968*a*	0·586	331·4	335·0	+24·0	98	500	
		4968	0·604	337·9	331·9	+26·9	0	7	
		4968	0·595	340·8	329·8	+27·0	44	290	
		4968	0·575	343·0	328·0	+26·1	14	103	
		4968	0·546	342·1	327·7	+23·9	34	213	
Mar. 9		Centre			(317·2)	(−7·3)	(190)	(1113)	(83)
68·178	RF, M	4968*a*	0·668	320·2	335·5	+24·5	70	375	
I.		4968	0·636	330·6	328·0	+26·8	23	173	
		4968	0·608	329·5	327·4	+24·7	28	149	
Mar. 10		Centre			(307·6)	(−7·2)	(121)	(697)	(0)
69·182	RF, M	4968*a*	0·783	309·0	336·2	+24·2	52	339	}
I.		4968	0·734	317·8	328·5	+26·9	3	11	} 410c
		4968	0·713	315·9	327·5	+24·7	6	23	
Mar. 11		Centre			(294·5)	(−7·2)	(61)	(373)	(410)
70·269	RF, M	4968*a*	0·897	301·2	337·0	+23·8	49	283	}
I.		4968*a*	0·876	301·9	334·2	+23·4	16	170	} 899c
		4968	0·829	306·5	327·2	+24·7	3	11	
Mar. 12		Centre			(280·2)	(−7·2)	(68)	(464)	(899)
71·481	RF, M	4968*a*	0·974	296·1	336·2	+23·3	40	558	490*nf*
Mar. 13		Centre			(264·2)	(−7·2)	(40)	(558)	(490)
72·185	RF, M		0·969	299·7	324·8	+26·4			624
I.		4968*a*	0·996	294·2	336·1	+23·2	47	147	} 164c
		4968*a*	0·991	294·2	333·3	+22·7	19	62	
Mar. 14		Centre			(255·0)	(−7·2)	(66)	(209)	(788)

Group 4966, March 2. A cluster of very small faint spots.
Group 4967, March 3–7. A number of small unstable spots in a straight stream.
Group 4968, March 3–14. A pair of very small faint spots on March 3. The group rapidly increases in size and has become a broad short stream of irregular spots by March 7. The preceding portion of the group has coalesced to form a very large elliptical spot, *a*, by March 9. The following portion of the group rapidly diminishes. *a* is measured in two portions on March 12 and 14.
Group 4969, March 5. A small spot *wp* Group 4967.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
Mar. 15 to Mar. 19		No Spots or Faculæ.							
78·634	RF, M		0·959	102·6	95·4	−14·0			108
Mar. 20		Centre			(169·8)	(−7·0)	(0)	(0)	(108)
Mar. 21 to Mar. 29		No Spots or Faculæ.							
88·172	RF, M		0·969	62·4	333·5	+24·6			580
I. Mar. 30		Centre			(44·1)	(−6·6)	(0)	(0)	(580)
89·526	RF, M		0·895	57·5	330·0	+25·2			686
Mar. 31		Centre			(26·3)	(−6·5)	(0)	(0)	(686)
90·640	RF, M		0·797	49·5	329·2	+26·4			591
Apr. 1		Centre			(11·6)	(−6·4)	(0)	(0)	(591)
91·418	RF, M		0·730	43·3	327·3	+26·8			820
Apr. 2		Centre			(1·3)	(−6·3)	(0)	(0)	(820)
Apr. 3 to Apr. 6		No Spots or Faculæ.							
Apr. 7		No photograph.							
97·209	RF, M		0·841	309·3	332·2	+28·1			272
I.			0·940	57·0	221·5	+28·2			109
Apr. 8		Centre			(284·8)	(−6·0)	(0)	(0)	(381)
98·486	RF, M		0·897	304·0	324·3	+26·8			552
			0·840	49·9	221·1	+28·7			62
Apr. 9		Centre			(268·0)	(−6·0)	(0)	(0)	(614)
99·168	RF, M		0·950	301·1	324·7	+27·0			397
I. Apr. 10		Centre			(259·0)	(−5·9)	(0)	(0)	(397)
1902.				°	°	°			
Apr. 11 to Apr. 20		No Spots or Faculæ.							
110·218	RF, M		0·948	58·8	47·2	+27·4			75
I. Apr. 21		Centre			(113·0)	(−5·0)	(0)	(0)	(75)
Apr. 22 to Apr. 25		No Spots or Faculæ.							
115·525	RF, M		0·968	59·0	332·5	+28·4			173
Apr. 26		Centre			(43·0)	(−4·5)	(0)	(0)	(173)
116·532	RF, M		0·908	53·1	332·3	+30·7			224
Apr. 27		Centre			(29·7)	(−4·4)	(0)	(0)	(224)
117·429	RF, M		0·839	53·6	328·6	+27·0			531
Apr. 28		Centre			(17·7)	(−4·3)	(0)	(0)	(531)
Apr. 29 to May 1		No Spots or Faculæ.							
121·259	RF, M		0·913	309·9	24·4	+33·7			132
I. May 2		Centre			(327·2)	(−3·9)	(0)	(0)	(132)
May 3 to May 4		No Spots or Faculæ.							
124·473	RF, M		0·852	296·1	339·0	+19·9			115
			0·814	313·8	328·2	+31·6			359
		4970	0·536	15·5	275·4	+27·4	0	6	
May 5		Centre			(284·7)	(−3·6)	(0)	(6)	(474)
125·483	RF, M		0·896	307·9	327·1	+31·4			413
May 6		Centre			(271·3)	(−3·5)	(0)	(0)	(413)

Group 4970, May 5. A very small faint spot.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic		Spots.		Faculæ.
					Longitude.	Latitude.	Area of UMBRA for each Spot (and for Day).	Area of WHOLE for each Spot (and for Day).	Area for each Group (and for Day).
1902.				°	°	°			
May 7 to May 14		No Spots or Faculæ.							
May 15		No photograph.							
May 16 to May 20		No Spots or Faculæ.							
140·401	RF, M	4971	0·576	41·3	49·5	+23·9	0	9	
		4971	0·596	44·8	46·9	+23·3	0	5	
May 21		Centre			(74·0)	(−1·8)	(0)	(14)	(0)
May 22		No Spots or Faculæ.							
May 23		No photograph.							
143·168 I.	RF, M	4972	0·947	63·0	329·1	+24·9	8	31	826*f*
		4972*a*	0·958	62·4	327·1	+25·8	17	131	
May 24		Centre			(37·4)	(−1·5)	(25)	(162)	(826)
144·384	RF, M	4972	0·843	58·5	328·8	+25·3	0	9	1204*f*
		4972*a*	0·863	58·3	326·7	+26·1	24	161	
May 25		Centre			(21·3)	(−1·3)	(24)	(170)	(1204)
145·445	RF, M	4972	0·725	51·9	328·2	+25·6	0	6	
		4972*a*	0·748	52·3	326·2	+26·2	25	144	
		4973	0·809	55·0	319·5	+26·8	0	5	1320*c*
		4973	0·838	54·8	316·6	+28·1	0	7	
May 26		Centre			(7·3)	(−1·2)	(25)	(162)	(1320)
146·400	RF, M	4972*a*	0·628	43·6	325·9	+26·0	26	161	655*c*
May 27		Centre			(354·6)	(−1·1)	(26)	(161)	(655)
147·401	RF, M	4972*a*	0·519	28·1	325·7	+26·2	44	158	
May 28		Centre			(341·4)	(−1·0)	(44)	(158)	(0)
148·429	RF, M	4972*a*	0·458	4·9	325·3	+26·1	36	109	
		4972	0·459	7·1	324·2	+26·1	0	5	
May 29		Centre			(327·8)	(−0·9)	(36)	(114)	(0)

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic		Spots.		Faculæ.
					Longitude.	Latitude.	Area of UMBRA for each Spot (and for Day).	Area of WHOLE for each Spot (and for Day).	Area for each Group (and for Day).
1902.				°	°	°			
149·141 I.	RF, M	4972*a*	0·464	347·1	324·9	+26·1	18	103	
			0·938	95·4	248·8	− 5·3			204
May 30		Centre			(318·3)	(−0·7)	(18)	(103)	(204)
150·482	RF, M	4972*a*	0·575	320·0	324·7	+25·5	20	69	
May 31		Centre			(300·6)	(−0·6)	(20)	(69)	(0)
151·576	RF, M	4972*a*	0·711	308·0	324·4	+25·5	16	63	583*c*
June 1		Centre			(286·2)	(−0·5)	(16)	(63)	(583)
152·469	RF, M	4972*a*	0·818	302·0	324·3	+25·4	11	47	1343*nf*
June 2		Centre			(274·3)	(−0·4)	(11)	(47)	(1343)
153·481	RF, M		0·932	243·4	327·3	−24·8			51
		4972*a*	0·912	298·1	323·6	+25·3	6	32	1324*nf*
			0·880	5·9	250·3	+60·5			107
June 3		Centre			(260·9)	(−0·3)	(6)	(32)	(1482)
154·125 I.	RF, M	4972*a*	0·959	296·7	323·7	+25·4	5	21	889*nf*
June 4		Centre			(252·4)	(−0·2)	(5)	(21)	(889)
June 5 to June 13		No Spots or Faculæ.							
164·138 I.	RF, M		0·882	53·0	64·5	+31·4			95
June 14		Centre			(119·9)	(+1·1)	(0)	(0)	(95)
165·577 M.	RF, M		0·880	212·8	144·8	−46·7			173
June 15		Centre			(100·9)	(+1·2)	(0)	(0)	(173)
June 16 to June 19		No Spots or Faculæ.							
170·206 M.	RF, M		0·873	241·4	96·2	−23·7			146
June 20		Centre			(39·6)	(+1·8)	(0)	(0)	(146)

Group 4971, May 21. Two very small faint spots.
Group 4972, May 24–June 4. A large regular spot, *a*, with small companions on May 24, 25, 26 and 29.
Group 4973, May 26. A pair of very small faint spots following Group 4972.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
171·448	RF, M		0·901	60·6	321·6	+27·1			354
June 21		Centre			(23·2)	(+1·9)	(0)	(0)	(354)
172·434	RF, M		0·867	302·5	66·4	+28·8			59
			0·829	57·4	318·2	+27·7			607
June 22		Centre			(10·1)	(+2·0)	(0)	(0)	(666)
173·445	RF, M	4974	0·885	60·1	297·3	+27·2	0	10	72*f*
		4974	0·886	59·7	297·2	+27·6	0	3	
June 23		Centre			(356·7)	(+2·1)	(0)	(13)	(72)
174·455	RF, M		0·826	57·1	291·8	+28·0			36
June 24		Centre			(343·4)	(+2·2)	(0)	(0)	(36)
175·413	RF, M		0·886	267·7	32·8	− 0·9			176
June 25		Centre			(330·7)	(+2·3)	(0)	(0)	(176)
June 26 to July 3		No Spots or Faculæ.							
184·475	RF, M	4975	0·660	304·4	247·6	+24·6	1	10	
July 4		Centre			(210·7)	(+3·4)	(1)	(10)	(0)
July 5		No photograph.							
July 6		No Spots or Faculæ.							
187·512	RF, M		0·953	116·2	101·9	−23·5			129
July 7		Centre			(170·5)	(+3·7)	(0)	(0)	(129)
July 8 to July 10		No Spots or Faculæ.							
191·410	RF, M		0·921	233·8	178·7	−30·9			58
			0·945	118·0	52·4	−24·7			201
July 11		Centre			(118·9)	(+4·1)	(0)	(0)	(259)
1902.				°	°	°			
192·425	RF, M		0·870	122·3	51·3	−25·3			518
July 12		Centre			(105·5)	(+4·2)	(0)	(0)	(518)
193·467	RF, M		0·776	127·4	49·0	−24·9			188
July 13		Centre			(91·7)	(+4·3)	(0)	(0)	(188)
194·425	RF, M		0·718	46·9	40·7	+32·8			106
July 14		Centre			(79·1)	(+4·4)	(0)	(0)	(106)
July 15 to July 19		No Spots or Faculæ.							
200·207 I.	RF, M		0·806	333·2	5·8	+50·0			201
July 20		Centre			(2·6)	(+4·9)	(0)	(0)	(201)
201·207 I.	RF, M		0·906	240·0	48·2	−25·6			225
July 21		Centre			(349·3)	(+5·0)	(0)	(0)	(225)
July 22 to July 29		No Spots or Faculæ.							
July 30		No photograph.							
July 31		No Spots or Faculæ.							
Aug. 1		No photograph.							
Aug. 2 to Aug. 6		No Spots or Faculæ.							

Group 4974, June 23. A small spot, with a very small companion.
Group 4975, July 4. A small faint spot.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots: Area of UMBRA for each Spot (and for Day).	Spots: Area of WHOLE for each Spot (and for Day).	Faculæ: Area for each Group (and for Day).
1902.				°	°	°			
218·132 I.	RF, M	4976	0·671	219·1	153·4	−25·7	0	7	
Aug. 7		Centre			(125·5)	(+6·3)	(0)	(7)	(0)
Aug. 8		No photograph.							
Aug. 9		No photograph.							
Aug. 10 to Aug. 13		No Spots or Faculæ.							
Aug. 14		No photograph.							
226·603	RF, M		0·870	65·0	313·2	+25·0			72
Aug. 15		Centre			(13·4)	(+6·7)	(0)	(0)	(72)
227·148 I.	RF, M		0·826	63·8	311·4	+25·3			125
			0·921	69·9	298·5	+21·1			122
Aug. 16		Centre			(6·2)	(+6·7)	(0)	(0)	(247)
228·130 I.	RF, M	4977a	0·817	68·6	298·7	+21·4	3	13	
		4977	0·828	66·9	297·7	+22·9	0	2	183c
		4977	0·843	66·5	296·1	+23·4	1	4	
Aug. 17		Centre			(353·3)	(+6·8)	(4)	(19)	(183)
229·180 I.	RF, M	4977a	0·669	65·7	298·8	+21·1	4	10	57c
Aug. 18		Centre			(339·4)	(+6·8)	(4)	(10)	(57)
Aug. 19		No Spots or Faculæ.							
231·501	RF, M	4978	0·587	26·3	289·6	+38·1	0	13	
		4978	0·611	27·3	287·7	+39·2	0	12	
Aug. 20		Centre			(308·8)	(+6·9)	(0)	(25)	(0)
Aug. 21		No Spots or Faculæ.							

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots: Area of UMBRA for each Spot (and for Day).	Spots: Area of WHOLE for each Spot (and for Day).	Faculæ: Area for each Group (and for Day).
1902.				°	°	°			
233·424	RF, M		0·899	57·7	219·9	+32·0			51
Aug. 22		Centre			(283·3)	(+7·0)	(0)	(0)	(51)
Aug. 23		No Spots or Faculæ.							
235·593	RF, M	4979	0·431	301·0	277·6	+19·3	0	3	
		4979	0·427	303·2	277·0	+20·1	0	4	
		4979	0·405	299·3	276·4	+18·0	3	5	
Aug. 24		Centre			(254·7)	(+7·1)	(3)	(12)	(0)
Aug. 25		No Spots or Faculæ.							
237·602	RF, M		0·945	289·7	300·1	+20·9			72
			0·898	292·7	292·5	+23·5			65
Aug. 26		Centre			(228·1)	(+7·1)	(0)	(0)	(137)
Aug. 27		No photograph.							
Aug. 28		No Spots or Faculæ.							
240·414	RF, M		0·971	292·8	268·7	+23·8			146
			0·937	62·1	120·6	+28·6			57
Aug. 29		Centre			(190·9)	(+7·2)	(0)	(0)	(203)
241·182 I.	RF, M		0·881	60·7	119·4	+29·2			46
Aug. 30		Centre			(180·8)	(+7·2)	(0)	(0)	(46)
Aug. 31		No Spots or Faculæ.							
243·490	RF, M		0·916	252·4	213·7	−12·9			64
Sept. 1		Centre			(150·3)	(+7·2)	(0)	(0)	(64)
244·220 I.	RF, M		0·969	254·6	213·9	−12·9			93
Sept. 2		Centre			(140·7)	(+7·2)	(0)	(0)	(93)
Sept. 3 to Sept. 4		No Spots or Faculæ.							

Group 4976, August 7. A very faint small spot.
Group 4977, August 17–18. A small spot, *a*, with two very small companions on August 17.
Group 4978, August 20. A pair of very faint small spots.
Group 4979, August 24. Three very small spots.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
Sept. 5		No	photo	graph.					
Sept. 6 to Sept. 8		No	Spots	or Fac	ulæ.				
251·191 I.	RF, M		0·954	246·7	116·9	−19·6			33
Sept. 9		Centre			(48·7)	(+7·3)	(0)	(0)	(33)
Sept. 10 to Sept. 13		No	Spots	or Fac	ulæ.				
256·133 I.	RF, M		0·909	97·6	279·0	− 3·8			323
Sept. 14		Centre			(343·3)	(+7·2)	(0)	(0)	(323)
257·193 I.	RF, M		0·798	100·6	277·7	− 4·0			193
Sept. 15		Centre			(329·3)	(+7·2)	(0)	(0)	(193)
Sept. 16		No	Spots	or Fac	ulæ.				
259·428	RF, M		0·945	102·4	230·9	− 9·2			63
Sept. 17		Centre			(299·9)	(+7·1)	(0)	(0)	(63)
260·447	RF, M	4980*a*	0·358	41·4	271·6	+22·4	0	8	
		4980	0·384	44·1	269·6	+22·7	0	2	
		4980	0·390	45·5	268·9	+22·6	0	2	
		4980*b*	0·417	47·0	267·1	+23·2	0	7	
Sept. 18		Centre			(286·4)	(+7·1)	(0)	(19)	(0)
261·438	RF, M	4980*a*	0·276	8·9	270·7	+22·8	8	19	
		4980	0·273	13·9	269·3	+22·4	0	4	
		4980	0·278	16·3	268·5	+22·5	0	3	
		4980	0·288	18·8	267·5	+22·8	0	3	
		4980*b*	0·290	20·5	267·0	+22·7	8	16	
Sept. 19		Centre			(273·3)	(+7·1)	(16)	(45)	(0)
262·416	RF, M	4980*a*	0·316	328·7	270·5	+22·6	6	27	
		4980*b*	0·291	339·6	266·7	+22·8	3	23	
Sept. 20		Centre			(260·4)	(+7·1)	(9)	(50)	(0)
1902.				°	°	°			
263·448	RF, M	4980*a*	0·474	304·8	271·5	+22·0	3	14	
		4980*a*	0·463	306·4	270·5	+22·4	5	11	
		4980	0·454	309·8	269·0	+23·3	0	5	
		4980	0·445	312·6	267·7	+24·0	0	4	
		4980*b*	0·423	309·6	267·3	+22·2	10	32	
		4980	0·429	313·6	266·5	+23·7	1	5	
		4980	0·412	314·5	265·4	+23·4	0	4	
		4981*a*	0·988	70·7	164·0	+20·1	0	100	214*c*
			0·992	121·1	169·3	−29·6			184
Sept. 21		Centre			(246·8)	(+7·0)	(19)	(175)	(398)
264·469	RF, M	4980*a*	0·623	296·9	270·0	+22·0	0	16	
		4980*b*	0·582	298·6	266·6	+22·0	0	10	
		4981*a*	0·942	70·6	161·9	+20·6	12	86	438*c*
		4982*a*	0·968	113·8	161·9	−20·9	75	313	613*c*
Sept. 22		Centre			(233·3)	(+7·0)	(87)	(425)	(1051)
265·229	RF, M		0·858	262·6	281·5	− 2·7			76
		4980*a*	0·744	292·9	272·0	+21·6	0	3	380*c*
I.		4980*b*	0·704	294·7	266·8	+22·2	0	2	
		4981*a*	0·878	71·1	161·4	+20·0	21	77	278*f*
		4982*a*	0·921	116·9	161·6	−21·4	43	294	420*f*
			0·929	6·1	202·5	+73·9			59
			0·903	127·3	168·0	−29·3			163
Sept. 23		Centre			(223·3)	(+7·0)	(64)	(376)	(1376)
266·488	RF, M		0·870	292·2	267·1	+22·7			200
		4981*a*	0·718	68·3	161·3	+20·3	10	33	304*c*
		4981	0·741	70·2	159·1	+19·2	0	8	
		4982*a*	0·788	123·5	161·9	−20·9	42	202	
		4982	0·817	120·6	158·2	−20·0	3	13	447*c*
		4982	0·857	119·8	153·8	−21·1	2	10	
Sept. 24		Centre			(206·5)	(+6·9)	(57)	(266)	(951)
267·446	RF, M		0·947	291·9	266·4	+23·0			245
		4982	0·634	135·9	165·9	−20·9	3	15	
		4982	0·648	131·7	163·2	−19·5	2	6	
		4982	0·680	135·8	163·1	−23·2	0	3	
		4982	0·671	133·8	162·7	−21·7	0	4	286*c*
		4982*a*	0·673	131·9	161·7	−20·9	34	159	
		4982	0·679	130·3	160·6	−20·3	5	18	
		4982	0·723	127·6	156·4	−20·7	0	6	
		4982	0·760	126·3	153·0	−21·5	4	10	
Sept. 25		Centre			(194·0)	(+6·9)	(48)	(221)	(531)

Group 4980, September 18–23. Several small spots in a straight stream on September 18. The first and last spots, *a* and *b*, are the largest and best defined, and alone remain after September 21.
Group 4981, September 21–24. A spot, *a*, which steadily diminishes in size. A small companion is seen near it on September 24.
Group 4982, September 22–October 2. A large elliptical spot, *a*, followed on September 24 and succeeding days by several small spots in a straight stream. On September 25, and again on September 28 and succeeding days, *a* is also preceded by a stream of small spots.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
268·462	RF, M	4982*a*	0·551	146·3	161·6	−20·7	33	183	
		4982	0·559	143·5	159·9	−20·1	0	3	
		4982	0·557	143·0	159·8	−19·9	0	5	
		4982	0·568	143·1	159·3	−20·5	0	6	
		4982	0 580	143·8	159·1	−21·4	0	4	
		4982	0·587	143·6	158·7	−21·7	0	5	
Sept. 26		Centre			(180·6)	(+6·9)	(33)	(206)	(0)
269·472	RF, M	4982*a*	0·474	168·3	161·4	−20·8	23	164	
		4982	0·472	164·0	159·4	−20·1	0	8	
Sept. 27		Centre			(167·3)	(+6·8)	(23)	(172)	(0)
270·488	RF, M	4982	0·458	195·8	161·5	−19·3	0	23	
		4982*a*	0·480	194·1	161·1	−20·9	29	119	
Sept. 28		Centre			(153·9)	(+6·8)	(29)	(142)	(0)
271·562	RF, M	4982	0·598	215·3	161·6	−22·8	1	9	
		4982	0·564	217·8	161·2	−20·1	0	7	
		4982*a*	0·564	216·3	160·5	−20·6	18	93	
		4982	0·541	214·5	158·7	−20·0	1	7	
Sept. 29		Centre			(139·7)	(+6·8)	(20)	(116)	(0)
272·149	RF, M	4982	0·660	227·5	163·1	−20·7	0	2	
		4982	0·637	226·3	161·2	−20·3	2	5	
I.		4982*a*	0·638	224·7	160·5	−21·1	13	59	
		4982	0·614	223·5	158·6	−20·4	0	2	
Sept. 30		Centre			(131·9)	(+6·7)	(15)	68)	(0)
273·287	RF, M		0·711	294·0	161·1	+21·6			89
		4982	0·791	238·4	162·6	−19·8	0	2	
I.		4982	0·783	237·0	161·3	−20·4	0	5	59*sp*
		4982*a*	0·780	236·2	160·8	−20·9	15	36	
			0·856	131·3	69·2	−30·0			30
Oct. 1		Centre			(117·0)	(+6·7)	(15)	(43)	(178)
274·147	RF, M		0·827	290·8	161·3	+20·9			185
I.		4982*a*	0·874	241·4	160·7	−21·1	8	33	501*c*
			0·814	80·5	50·8	+11·6			58
Oct. 2		Centre			(105·6)	(+6·6)	(8)	(33)	(744)
275·197	RF, M		0·905	289·1	157·2	+20·1			190
			0·941	243·9	157·2	−21·9			292
I.			0·653	84·0	50·9	+ 8·9			20
			0·752	73·5	43·1	+16·8			44
			0·876	73·9	30·2	+17·3			49
Oct. 3		Centre			(91·8)	(+6·6)	(0)	(0)	(595)
276·247	RF, M		0·982	290·8	158·4	+21·6			97
I.			0·983	246·1	153·5	−22·0			58
Oct. 4		Centre			(77·9)	(+6·5)	(0)	(0)	(155)
277·124	RF, M	4983*a*	0·930	81·4	357·5	+10·3	13	47	
I.		4983	0·939	80·9	356·0	+10·7	1	5	351*c*
		4983*b*	0·959	81·7	352·3	+ 9·8	20	99	
Oct. 5		Centre			(66·4)	(+6·4)	(34)	(151)	(351)
278·155	RF, M	4983*a*	0·812	81·8	358·2	+10·4	23	147	
		4983	0·827	81·4	356·6	+10·9	0	2	
I.		4983	0·828	82·4	356·6	+ 9·9	0	12	515*c*
		4983	0·839	81·0	355·4	+11·0	0	3	
		4983*b*	0·872	82·9	351·8	+ 9·3	31	238	
Oct. 6		Centre			(52·8)	(+6·4)	(54)	(402)	(515)
279·153	RF, M	4984*a*	0·425	50·0	19·2	+21·7	4	7	
		4984*b*	0·452	50·4	17·5	+22·5	0	5	
I.		4983*a*	0·658	81·8	358·3	+10·2	33	185	
		4983*b*	0·735	82·7	352·1	+ 9·6	22	164	
Oct. 7		Centre			(39·6)	(+6·5)	(59)	(361)	(0)
280·429	RF, M	4984*a*	0·262	6·5	20·9	+21·4	10	22	
		4984*b*	0·291	18·4	17·0	+22·2	2	13	
		4983	0·396	85·0	359·4	+ 7·8	0	16	
		4983*a*	0·403	79·6	359·1	+ 9·9	27	194	
		4983	0·430	80·5	357·3	+ 9·8	1	2	
		4983	0·435	81·8	357·0	+ 9·2	0	2	
		4983	0·476	79·1	354·4	+10·7	0	3	
		4983	0·476	82·9	354·3	+ 8·9	16	55	
		4983	0·491	78·3	353·5	+11·3	1	6	
		4983	0·510	81·0	352·1	+10·0	6	33	
		4983	0·543	81·4	349·8	+ 9·9	6	34	
			0·792	105·0	332·4	− 7·8			34
			0·836	101·9	327·5	− 6·3			71
Oct. 8		Centre			(22·7)	(+6·3)	(69)	(380)	(105)

Group 4983, October 5–16. Several spots in a sinuous stream. *a* and *b*, the first and last spots, are the largest. *a* has become a large regular spot by October 9. *b* has broken up by October 8. *a* remains alone by October 14.
Group 4984, October 7–9. Two small spots, *a* and *b*. A very small spot accompanies *b* on October 9.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots: Area of UMBRA for each Spot (and for Day).	Spots: Area of WHOLE for each Spot (and for Day).	Faculæ: Area for each Group (and for Day).
1902.				°	°	°			
281·299	RF, M	4984*a*	0·318	326·7	22·0	+21·4	3	8	
		4984	0·297	338·4	18·1	+23·5	0	1	
I.		4984*b*	0·299	339·5	17·7	+22·4	0	1	
		4983*a*	0·228	73·3	358·5	+ 9·8	34	170	
		4983	0·266	78·5	356·0	+ 9·1	2	8	
		4983	0·289	80·3	354·5	+ 8·7	10	62	
		4983	0·296	74·2	354·4	+10·6	1	20	
		4983	0·313	76·2	353·3	+10·2	2	7	
		4983	0·326	78·4	352·4	+ 9·6	2	8	
		4983	0·379	79·3	349·1	+ 9·8	2	3	
Oct. 9		Centre			(11·2)	(+6·2)	(56)	(288)	(0)
282·458	RF, M	4983	0·075	274·0	0·3	+ 9·1	0	3	
		4983*a*	0·081	321·4	358·9	+ 9·8	30	155	
		4983	0·057	309·3	358·6	+ 8·2	0	4	
		4983	0·052	327·2	357·6	+ 8·6	1	4	
		4983	0·053	13·6	355·3	+ 9·1	0	4	
		4983	0·085	33·7	353·3	+10·2	0	3	
		4983	0·083	42·7	352·7	+ 9·6	0	5	
		4983	0·131	43·3	350·8	+11·5	0	4	
Oct. 10		Centre			(356·0)	(+6·1)	(31)	(182)	(0)
282·146	RF, M	4983*a*	0·216	287·7	358·9	+ 9·6	26	144	
I.		4983	0·162	289·5	355·8	+ 9·1	1	8	
Oct. 11		Centre			(346·9)	(+6·0)	(27)	(152)	(0)
284·496	RF, M	4983*a*	0·501	278·8	359·1	+ 9·2	36	161	
		4983	0·384	282·7	351·4	+10·3	0	10	
Oct. 12		Centre			(329·1)	(+5·9)	(36)	(171)	(0)
285·305	RF, M		0·872	292·4	18·9	+22·4			77
I.		4983*a*	0·653	278·1	359·2	+ 9·8	29	161	
		4983	0·547	280·0	351·5	+10·4	0	2	
Oct. 13		Centre			(318·4)	(+5·9)	(29)	(163)	(77)
286·565	RF, M	4983*a*	0·842	277·4	359·3	+ 9·4	28	143	187*c*
Oct. 14		Centre			(301·7)	(+5·8)	(28)	(143)	(187)
287·287	RF, M	4983*a*	0·912	278·3	358·4	+10·0	26	130	340*f*
I.			0·776	146·9	261·0	−35·5			56
Oct. 15		Centre			(292·3)	(+5·8)	(26)	(130)	(396)
288·609	RF, M	4983*a*	0·996	278·9	0·1	+ 9·3	0	122	423*nf*
Oct. 16		Centre			(274·9)	(+5·7)	(0)	(122)	(423)
1902. Oct. 17 and Oct. 18		No Spots or Faculæ.							
291·538	RF, M		0·971	115·6	308·3	−23·2			131
Oct. 19		Centre			(236·2)	(+5·5)	(0)	(0)	(131)
292·298	RF, M		0·813	61·5	173·7	+26·1			49
I.			0·924	117·8	163·7	−23·1			137
Oct. 20		Centre			(226·2)	(+5·4)	(0)	(0)	(186)
293·468	RF, M	4985	0·612	300·5	245·3	+22·4	6	10	
		4985	0·587	306·7	241·9	+25·0	0	3	
		4985	0·573	307·4	240·7	+24·9	0	5	
			0·814	122·7	163·0	−22·5			174
Oct. 21		Centre			(210·7)	(+5·3)	(6)	(18)	(174)
294·439	RF, M	4985	0·766	293·1	246·7	+20·9	0	3	
		4985	0·760	294·4	245·9	+21·8	0	3	
		4985	0·750	295·2	244·9	+22·2	0	3	
		4986	0·661	130·7	165·5	−21·1	0	3	
		4986	0·676	130·2	164·3	−21·5	3	8	
		4986	0·666	127·7	164·0	−19·7	0	7	125*c*
		4986	0·677	126·7	162·9	−19·6	0	4	
		4986	0·699	128·9	162·2	−21·8	0	3	
		4986	0·705	128·3	161·5	−21·7	2	5	
Oct. 22		Centre			(197·9)	(+5·2)	(5)	(39)	(125)
295·146	RF, M		0·823	295·4	242·7	+23·7			228
		4986	0·568	141·1	166·1	−21·5	8	41	
I.		4986	0·590	139·8	164·5	−22·0	1	10	
		4986	0·575	136·6	163·8	−20·0	0	14	
		4986	0·584	137·4	163·7	−20·8	1	9	
		4986	0·612	137·8	162·8	−22·4	4	17	
		4986	0·614	134·5	160·8	−20·9	7	34	
Oct. 23		Centre			(188·6)	(+5·1)	(21)	(125)	(228)
296·491	RF, M		0·950	292·9	242·9	+23·3			87
		4986	0·440	175·8	168·9	−20·9	17	91	
		4986	0·440	173·0	167·6	−20·8	10	69	
		4986	0·445	166·5	164·6	−20·6	2	5	
		4986	0·463	166·5	164·3	−21·7	13	83	
		4986	0·442	160·3	161·8	−19·6	3	11	
		4986	0·471	158·3	160·2	−20·9	12	81	
		4987	0·969	109·6	98·0	−17·5	0	15	283*c*
		4987*a*	0·971	110·1	97·5	−18·1	0	12	
			0·944	1·9	163·9	+75·2			78
Oct. 24		Centre			(170·9)	(+5·0)	(57)	(367)	(448)

Group 4985, October 21–22. A few very small spots.
Group 4986, October 22–30. Three close pairs of very small spots on October 22. The group rapidly increases in size and has become a fine straight stream by October 24. The leader, *a*, has become a large regular spot by October 26, and has divided into two portions by October 29, which are measured together on October 30. The following portion of the group has disappeared by this last date.
Group 4987, October 24–30. A pair of very faint spots on October 24. Only one of these, *a*, remains on October 26. A short stream of small spots has formed preceding *a* by October 28. *a* has disappeared by October 29.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for each Day).	Spots. Area of WHOLE for each Spot (and for each Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
297·192	AS, M	4986*a*	0·456	198·9	170·7	−20·6	11	118	
		4986	0·444	195·6	169·0	−20·3	1	18	
		4986	0·456	193·3	168·1	−21·4	11	22	
M.		4986	0·448	191·3	167·1	−21·1	0	5	
		4986	0·453	186·0	164·6	−21·8	3	36	
		4986	0·439	179·3	161·4	−21·1	7	63	
		4987*a*	0·931	114·0	96·9	−20·2	0	8	
Oct. 25		Centre			(161·7)	(+4·9)	(33)	(270)	321*c* (321)
298·146	RF, M	4986*a*	0·547	218·8	170·5	−20·7	24	203	
		4986	0·525	215·2	167·9	−20·8	0	7	
		4986	0·523	212·6	166·7	−21·5	1	5	
I.		4986	0·513	210·6	165·3	−21·5	3	9	
		4986	0·506	209·2	164·4	−21·5	1	12	
		4986	0·492	206·1	162·5	−21·5	6	26	
		4986	0·495	202·2	160·7	−22·5	1	3	
		4986	0·470	203·4	160·6	−20·8	6	15	
		4986	0·443	203·8	160·0	−19·1	6	18	
		4986	0·480	200·5	159·5	−21·9	1	3	
		4986	0·465	200·7	159·2	−21·0	5	14	
		4987*a*	0·838	115·4	96·5	−18·1	0	8	527*gf*
Oct. 26		Centre			(149·1)	(+4·8)	(54)	(323)	(527)
299·140	RF, M	4986	0·683	237·4	173·0	−17·8	0	6	
		4986*a*	0·681	233·0	171·3	−20·3	30	201	
		4986	0·632	228·3	171·2	−20·7	0	2	
I.		4986	0·688	230·7	170·9	−21·9	0	1	
		4986	0·676	231·0	170·2	−21·2	0	1	
		4986	0·685	229·5	170·2	−22·5	0	2	
		4986	0·648	234·3	169·5	−18·2	0	2	
		4986	0·666	230·3	169·2	−21·2	0	1	
		4986	0·669	228·5	168·7	−22·3	0	2	
		4986	0·641	230·1	167·5	−20·2	1	5	
		4986	0·638	228·8	166·8	−20·8	0	1	
		4986	0·626	226·5	165·1	−21·4	6	41	
		4986	0·591	223·7	161·8	−21·0	9	44	
		4986	0·595	220·9	160·8	−22·4	0	2	
		4986	0·571	222·2	160·1	−20·7	2	9	
		4986	0·562	220·9	159·1	−20·8	3	9	
		4987*a*	0·721	122·0	95·9	−18·9	0	4	493*c*
Oct. 27		Centre			(136·0)	(+4·7)	(51)	(333)	(493)
300·120	RF, M	4986*a*	0·806	240·8	171·3	−20·1	34	243	
		4986	0·776	238·4	167·8	−20·7	2	13	
		4986	0·767	238·9	167·2	−20·0	6	14	
I.		4986	0·761	236·4	165·8	−21·5	0	19	
		4986	0·749	235·7	164·5	−21·5	5	19	
1902.				°	°	°			
300·120	RF, M	4986	0·733	236·2	163·4	−20·5	1	4	
		4986	0·705	235·0	160·8	−20·2	5	14	
		4986	0·713	232·7	160·5	−21·9	0	5	
		4986	0·688	234·9	159·5	−19·6	0	4	
I.		4988	0·736	217·0	154·4	−32·0	0	7	862*c*
		4988	0·738	213·7	152·4	−33·8	1	14	
		4987	0·546	141·0	101·5	−20·8	5	27	
		4987	0·550	139·1	100·5	−20·3	0	7	
		4987	0·558	136·9	99·2	−19·8	2	16	
		4987*a*	0·588	132·2	95·7	−19·1	0	5	
Oct. 28		Centre			(123·0)	(+4·6)	(61)	(411)	(862)
301·426	RF, M		0·898	288·2	169·5	+18·3			81
			0·849	226·3	152·5	−32·8			100
		4986*a*	0·940	247·3	172·5	−19·5	26	136	
		4986*a*	0·940	246·1	172·3	−20·6	12	52	
		4986	0·917	245·4	168·4	−20·4	1	7	
		4986	0·913	244·7	167·7	−20·9	0	18	1066*c*
		4986	0·902	243·2	165·7	−21·8	1	13	
		4986	0·885	242·3	163·2	−21·9	0	5	
		4987	0·422	175·8	103·9	−20·3	4	16	
		4987	0·446	166·8	99·6	−21·2	0	6	
Oct. 29		Centre			(105·8)	(+4·5)	(44)	(253)	(1247)
302·532	RF, M		0·917	234·2	145·1	−23·2			214
		4986*a*	0·996	248·9	173·8	−20·5	0	147	646*f*
		4987	0·478	205·8	104·0	−21·1	3	6	
Oct. 30		Centre			(91·2)	(+4·4)	(3)	(153)	(860)
303·545	RF, M		0·972	80·2	1·0	+10·6			200
Oct. 31		Centre			(77·8)	(+4·3)	(0)	(0)	(200)
304·519	RF, M		0·907	80·8	359·9	+10·1			277
Nov. 1		Centre			(65·1)	(+4·2)	(0)	(0)	(277)
305·484	RF, M		0·811	242·6	101·8	−19·2			319
			0·807	77·3	358·7	+12·6			497
Nov. 2		Centre			(52·3)	(+4·1)	(0)	(0)	(816)
306·146	RF, M		0·852	241·8	97·2	−21·4			795
I.									
Nov. 3		Centre			(43·6)	(+4·0)	(0)	(0)	(795)

Group 4988, October 28. Two small spots.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
307·505	RF, M		0·972	252·4	100·1	−16·1			156
			0·941	243·2	91·8	−23·6			339
Nov. 4		Centre			(25·6)	(+3·9)	(0)	(0)	(495)
308·159 I.	RF, M		0·969	244·1	85·8	−23·9			151
Nov. 5		Centre			(17·0)	(+3·8)	(0)	(0)	(151)
309·450	RF, M		0·869	75·1	299·9	+14·7			85
Nov. 6		Centre			(359·9)	(+3·7)	(0)	(0)	(85)
310·470	RF, M		0·945	10·6	313·7	+71·3			41
Nov. 7		Centre			(346·5)	(+3·6)	(0)	(0)	(41)
Nov. 8 and Nov. 9		No Spots or Faculæ.							
313·187 I.	RF, M		0·765	279·2	0·4	+ 9·2			250
Nov. 10		Centre			(310·7)	(+3·3)	(0)	0)	(250)
314·268 I.	RF, M		0·868	283·9	356·4	+13·7			324
Nov. 11		Centre			(296·5)	(+3·2)	(0)	(0)	(324)
Nov. 12 and Nov. 13		No Spots or Faculæ.							
317·132	RF, M	4989*a*	0·563	302·2	289·1	+19·8	0	5	
		4989	0·552	302·8	288·9	+19·8	0	1	
I.		4989	0·537	304·9	286·7	+20·3	1	5	
		4990*a*	0·979	75·3	180·4	+15·0	0	23	176*sp*
		4990*b*	0·985	74·8	178·5	+15·5	0	21	
Nov. 14		Centre			(258·8)	(+2·8)	(1)	(55)	(176)
318·164	RF, M		0·918	292·1	310·9	+21·3			35
		4989*a*	0·740	295·0	290·6	+20·1	5	16	137*c*
I.		4989	0·693	297·9	286·0	+21·0	0	4	
		4990*a*	0·904	74·9	180·9	+14·8	0	11	542*c*
		4990*b*	0·920	74·9	178·6	+15·0	1	17	
		4991	0·967	112·1	172·2	−20·6	0	12	
		4992	0·959	71·8	171·8	+18·3	4	30	286*s*
Nov. 15		Centre			(245·2)	(+2·7)	(10)	(90)	(1000)
1902.				°	°	°			
319·501	RF, M	4989*a*	0·903	290·8	291·1	+19·9	0	9	149*c*
		4990*a*	0·730	72·0	181·8	+14·9	4	16	484*c*
		4990*b*	0·746	71·8	180·4	+15·2	2	11	
		4991	0·852	116·2	172·9	−20·6	7	19	612*s*
		4992	0·827	70·2	172·9	+17·8	2	7	
		4992	0·832	69·9	172·4	+18·1	0	4	
Nov. 16		Centre			(227·5)	(+2·6)	(15)	(66)	(1245)
320·466	RF, M		0·960	291·1	287·9	+20·9			174
		4990*a*	0·563	66·7	182·5	+15·0	5	13	
		4990*b*	0·581	66·7	181·2	+15·4	5	15	
		4990	0·581	69·2	180·8	+14·0	0	8	
			0·837	122·7	163·7	−25·3			438
			0·895	52·1	155·8	+34·6			160
Nov. 17		Centre			(214·7)	(+2·5)	(10)	(36)	(772)
321·465	RF, M	4990*a*	0·375	54·4	183·2	+14·7	26	95	
		4990	0·360	58·4	182·8	+13·0	0	8	
		4990	0·386	60·1	181·5	+13·2	7	47	
		4990	0·398	56·8	181·4	+14·7	6	18	
			0·733	123·7	160·5	−22·2			353
Nov. 18		Centre			(201·5)	(+2·3)	(39)	(168)	(353)
322·373	RF, M	4990	0·227	21·9	184·7	+14·3	1	30	
		4990	0·251	23·6	183·7	+15·4	29	143	
I.		4990	0·230	26·8	183·6	+14·0	7	24	
		4990	0·276	30·7	181·3	+15·9	7	19	
		4990	0·268	34·5	180·7	+14·9	3	28	
		4990	0·250	38·9	180·5	+13·4	13	109	
		4990	0·298	39·1	178·5	+15·5	1	12	
Nov. 19		Centre			189·7	(+2·2)	(61)	(365)	(0)
323·163	RF, M		0·973	257·4	254·9	−11·7			54
		4990	0·246	332·3	186·1	+14·6	9	49	
		4990	0·226	336·2	184·7	+14·0	5	25	
I.		4990	0·245	339·5	184·4	+15·3	25	106	
		4990	0·199	342·5	182·8	+13·0	0	4	
		4990	0·241	347·2	182·5	+15·7	18	31	
		4990	0·216	346·3	182·3	+14·2	0	9	
		4990	0·237	353·0	181·0	+15·7	0	4	
		4990	0·216	352·3	181·0	+14·4	1	8	
		4990	0·224	356·3	180·2	+15·0	0	7	
		4990	0·201	0·9	179·1	+13·6	19	125	
		4990	0·238	2·6	178·7	+15·9	2	20	
		4990	0·255	22·1	173·6	+15·7	0	8	
			0·958	109·9	106·4	+19·7			70
Nov. 20		Centre			(179·3)	(+2·1)	(79)	(396)	(124)

Group 4989, November 14–16. A very small spot, *a*, followed by one or two very small spots. *a* alone remains by November 16.
Group 4990, November 14–26. A pair of small spots, *a* and *b*, from November 14 to November 17. The group has entirely changed its appearance by November 18, and has become a compact cluster of irregular spots. The group rapidly extends itself parallel to the equator and has become a fine stream by November 20. It undergoes continual change on the succeeding days.
Group 4991, November 15–16. A small spot.
Group 4992, November 15–16. A small spot *nf* Group 4990. A second spot is seen on November 16.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
324·145	RF, M	4990	0·417	302·8	187·5	+14·9	10	67	
		4990	0·375	304·0	184·9	+14·0	0	8	
I.		4990	0·377	308·3	184·1	+15·4	31	173	
		4990	0·355	306·8	183·3	+14·2	11	73	
		4990	0·320	310·0	180·9	+13·8	4	79	
		4990	0·292	314·8	178·6	+13·8	18	131	
		4990	0·318	320·0	178·5	+16·0	13	37	
			0·911	111·7	103·2	−18·7			218
Nov. 21		Centre			(166·3)	(+2·0)	(87)	(568)	(218)
325·159	RF, M	4990	0·605	291·9	188·2	+14·5	12	54	
		4990	0·559	294·2	184·6	+14·8	49	261	
I.		4990	0·481	295·3	179·4	+13·6	31	182	
		4990	0·491	300·7	178·9	+16·2	1	15	
			0·908	113·4	90·4	−20·3			127
Nov. 22		Centre			(152·9)	(+1·9)	(93)	(512)	(127)
326·444	RF, M	4990	0·808	286·6	188·8	+14·4	7	32	
		4990	0·796	288·6	187·3	+15·7	0	18	
		4990	0·777	287·8	185·7	+14·9	10	116	
		4990	0·772	285·7	185·4	+13·1	2	11	
		4990	0·757	288·9	183·7	+15·3	15	127	308*c*
		4990	0·732	289·2	181·5	+15·1	0	6	
		4990	0·739	288·0	182·2	+14·4	0	9	
		4990	0·730	290·4	181·1	+15·9	1	9	
		4990	0·696	288·3	178·6	+13·8	20	167	
Nov. 23		Centre			(135·9)	(+1·7)	(55)	(495)	(308)
327·263	RF, M		0·795	255·9	176·6	−10·2			118
		4990	0·906	284·9	189·5	+14·2	3	24	
		4990	0·882	284·2	186·4	+13·3	8	72	
I.		4990	0·872	286·4	185·0	+15·1	24	357	1935*c*
		4990	0·844	288·0	181·6	+16·0	11	57	
		4990	0·817	285·7	179·0	+13·7	30	169	
Nov. 24		Centre			(125·2)	(+1·6)	(76)	(679)	(2053)
328·180	RF, M		0·857	239·3	167·3	−25·0			270
		4990	0·964	283·7	187·4	+13·6	0	218	
		4990	0·962	285·7	186·8	+15·5	27	196	
I.		4990	0·961	287·6	186·5	+17·3	1	22	597*c*
		4990	0·936	286·9	181·8	+16·3	19	135	
		4990	0·917	284·7	179·0	+14·1	32	181	
Nov. 25		Centre			(113·1)	(+1·5)	(79)	(752)	(867)
329·279	RF, M		0·909	243·4	160·6	−23·3			265
I.			0·835	289·2	153·9	+16·8			19
		4990	0·991	285·5	180·8	+15·6	0	31	569*nf*
		4990	0·985	283·9	178·4	+13·9	30	248	
		4990	0·970	286·2	174·1	+16·0	0	15	
Nov. 26		Centre			(98·6)	(+1·4)	(30)	(294)	(853)
330·134	RF, M		0·954	247·2	157·8	−21·3			141
I.		4993	0·789	249·8	137·2	−15·0	0	2	32*f*
Nov. 27		Centre			(87·3)	(+1·2)	(0)	(2)	(173)
331·255	RF, M		0·947	237·1	139·7	−30·5			92
I.		4994	0·958	288·3	145·1	+17·8	0	5	71*c*
		4994	0·944	288·0	142·4	+17·3	2	6	
			0·950	4·3	59·1	+72·2			57
Nov. 28		Centre			(72·5)	(+1·1)	(2)	(11)	(220)
332·160	RF, M		0·961	2·7	50·8	+74·6			76
I.			0·942	68·4	351·5	+20·6			47
Nov. 29		Centre			(60·6)	(+1·0)	(0)	(0)	(123)
333·166	RF, M		0·874	248·2	106·0	−18·4			51
I.			0·945	102·9	337·4	−11·9			138
Nov. 30		Centre			(47·4)	(+0·9)	(0)	(0)	(189)
334·157	RF, M		0·904	245·8	77·4	−16·8			141
I.			0·945	354·6	49·8	+70·6			65
			0·859	104·8	336·3	−12·3			70
Dec. 1		Centre			(34·3)	(+0·7)	(0)	(0)	(276)
335·438	AS, M	4994*	0·367	255·7	38·2	− 4·7	0	4	
		4994*	0·349	257·7	37·3	− 3·8	0	4	
Dec. 2		Centre			(17·4)	(+0·5)	(0)	(8)	(0)
Dec. 3		No photograph.							
Dec. 4 to Dec. 6		No Spots or Faculæ.							
340·301	RF, M		0·860	282·4	11·8	+10·6			61
I.									
Dec. 7		Centre			(313·3)	(−0·1)	(0)	(0)	(61)

Group 4993, November 27. A very small faint spot.
Group 4994, November 28. A pair of very small spots.
Group 4994*, December 2. A pair of very small spots.

Measures of Positions and Areas of Sun Spots and Faculæ on Photographs—*continued.*

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1902.				°	°	°			
341·179	RF, M		0·864	281·7	0·7	+10·0			29
I.			0·841	294·2	356·2	+20·0			35
Dec. 8		Centre			(301·7)	(−0·2)	(0)	(0)	(64)
342·164	RF, M		0·939	292·1	356·9	+20·6			35
I.			0·937	343·4	325·5	+63·4			19
Dec. 9		Centre			(288·8)	(−0·3)	(0)	(0)	(54)
343·262	RF, M		0·957	292·3	345·8	+21·2			90
I.			0·993	73·2	191·8	+16·6			304
Dec. 10		Centre			(274·3)	(−0·4)	(0)	(0)	(394)
344·169	RF, M		0·949	71·9	192·1	+16·9			516
I.									
Dec. 11		Centre			(262·4)	(−0·5)	(0)	(0)	(516)
345·477	RF, M	4995	0·819	69·1	192·4	+16·5	0	20	832*nf*
Dec. 12		Centre			(245·1)	(−0·7)	(0)	(20)	(832)
246·162	RF, M		0·785	62·9	188·2	+20·4			160
			0·883	68·5	176·4	+18·4			416
I.			0·915	115·7	172·2	−23·7			112
			0·955	121·9	166·2	−30·5			83
Dec. 13		Centre			(236·2)	(−0·8)	(0)	(0)	(771)
347·185	RF, M	4996	0·418	222·8	240·1	−18·6	0	5	
		4996	0·408	219·0	238·4	−19·3	0	7	
I.			0·778	65·3	174·8	+18·3			591
			0·820	118·8	171·1	−23·8			80
			0·888	124·0	164·5	−30·2			124
			0·923	115·2	157·3	−23·5			137
Dec. 14		Centre			(222·7)	(−0·9)	(0)	(12)	(932)
348·440	RF, M		0·802	127·7	159·1	−30·0			206
			0·927	53·4	143·7	+33·0			130
Dec. 15		Centre			(206·1)	(−1·0)	(0)	(0)	(336)
349·176	RF, M	4997*a*	0·719	303·8	236·7	+22·7	3	20	
I.		4997*b*	0·688	306·9	233·2	+23·5	0	16	
Dec. 16		Centre			(196·5)	(−1·1)	(3)	(36)	(0)
350·186	RF, M	4997*a*	0·855	297·0	238·1	+22·0	4	24	246*c*
I.		4997*b*	0·811	300·2	232·6	+23·3	0	9	
Dec. 17		Centre			(183·1)	(−1·3)	(4)	(33)	(246)
1902.				°	°	°			
351·432	RF, M		0·946	294·7	235·1	+22·7			213
			0·903	114·8	104·0	−22·9			102
Dec. 18		Centre			(166·7)	(−1·5)	(0)	(0)	(315)
Dec. 19		No photograph.							
353·211	RF, M		0·773	294·1	190·7	+17·2			493
I.									
Dec. 20		Centre			(143·3)	(−1·7)	(0)	(0)	(493)
354·259	RF, M		0·872	293·2	187·4	+19·2			1268
I.									
Dec. 21		Centre			(129·5)	(−1·8)	(0)	(0)	(1268)
355·171	RF, M		0·921	291·7	182·1	+19·1			540
I.			0·962	111·5	43·9	−21·2			69
Dec. 22		Centre			(117·4)	(−1·9)	(0)	(0)	(609)
356·295	RF, M		0·961	293·2	174·3	+21·6			522
I.									
Dec. 23		Centre			(102·7)	(−2·1)	(0)	(0)	(522)
Dec. 24 to Dec. 26		No Spots or Faculæ.							
360·438	RF, M		0·841	240·6	102·3	−25·9			131
Dec. 27		Centre			(48·0)	(−2·6)	(0)	(0)	(131)
361·481	RF, M		0·911	246·0	98·7	−22·9			259
			0·948	105·1	323·1	−15·1			284
Dec. 28		Centre			(34·3)	(−2·7)	(0)	(0)	(543)
362·438	RF, M		0·983	251·6	101·2	−18·6			83
			0·853	107·1	323·9	−16·0			347
Dec. 29		Centre			(21·7)	(−2·8)	(0)	(0)	(430)
363·434	RF, M		0·728	109·6	323·3	−16·2			123
			0·878	110·5	308·3	−19·3			259
Dec. 30		Centre			(8·7)	(−2·9)	(0)	(0)	(382)
Dec. 31		No Spots or Faculæ.							

Group 4995, December 12. A small spot.
Group 4996, December 14. A pair of very small spots.
Group 4997, December 16–17. Two small spots, *a* and *b*, which tend to move apart.

ROYAL OBSERVATORY, GREENWICH.

LEDGERS

OF

AREAS AND POSITIONS OF GROUPS OF SUN SPOTS

DEDUCED FROM THE MEASUREMENT

OF THE

SOLAR PHOTOGRAPHS

FOR EACH DAY IN THE YEAR

1902.

AREAS and HELIOGRAPHIC POSITIONS of GROUPS of SUN SPOTS DEDUCED FOR EACH DAY from the MEASUREMENTS of the PHOTOGRAPHS taken at the ROYAL OBSERVATORY, GREENWICH, at DEHRA DÛN IN INDIA, and at the ROYAL ALFRED OBSERVATORY, MAURITIUS, in the YEAR 1902.

NOTE.—The Greenwich Civil Time at which the photograph was taken is expressed by the month, day of the month (civil reckoning), and decimal of a day, reckoned from Greenwich Mean Midnight.

The Projected Area of the Umbræ and Whole Spots is the area as it is measured on the photograph, uncorrected for the effect of foreshortening, and expressed in millionths of the Sun's apparent disk.

The Column "Longitude from Central Meridian" gives the Mean heliographic longitude of the group, reckoned from the meridian passing through the centre of the Sun's disk at the moment of observation; longitudes west of the centre being reckoned as positive.

Dates for which no numbers are given indicate days for which no photographic Record is at present available.

Date. Greenwich Civil Time.	Projected Area of		Area for Group.		Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
	Umbra.	Whole Spot.	Umbra.	Whole Spot.			
Group 4963. Three small faint spots on January 5. The group has greatly increased by January 6, and has become a short compact stream of spots. On January 7, it is seen as a single large composite spot, which has divided again into several distinct spots by January 10, of which *a*, the leader, is the darkest, best defined, and most regular.							
1902. d					°	°	°
Jan. 5·257	0	30	0	32	7·6	− 8·2	−61·9
6·189	52	264	37	185	11·3	− 8·1	−45·9
7·331	88	682	53	406	10·1	− 8·2	−32·0
8·177	124	758	66	402	11·6	− 8·2	−19·5
9·187	155	969	78	490	9·9	− 7·8	− 7·8
10·186	129	712	65	356	10·6	− 7·8	+ 5·9
11·186	84	630	44	333	10·6	− 7·2	+19·1
12·168	88	502	52	299	11·0	− 7·3	+32·5
13·166	38	353	27	253	11·2	− 8·0	+45·9
14·287	23	223	24	222	10·8	− 7·5	+60·2
15·175	6	3	12	61	13·3	− 7·6	+74·4
Means ...	...	...	42	276	10·73	− 7·81	...
Group 4964. A very small faint spot.							
Jan. 10·186	4	8	0	7	51·0	+26·7	+46·3
Means ...	...	...	0	7	51·0	+26·7	...
Group 4965. A pair of very small faint spots.							
Feb. 13·178	0	17	0	11	237·5	− 8·4	−39·4
Means ...	...	...	0	11	237·5	− 8·4	...

Date. Greenwich Civil Time.	Projected Area of		Area for Group.		Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
	Umbra.	Whole Spot.	Umbra.	Whole Spot.			
Group 4966. A cluster of very small faint spots.							
1902. d					°	°	°
Mar. 2·247	0	16	0	8	30·7	−26·3	−21·6
Means ...	...	...	0	8	30·7	−26·3	...
Group 4967. A number of small unstable spots in a straight stream.							
Mar. 3·626	10	56	6	32	34·5	+23·7	+ 0·5
4·249	10	65	6	38	34·5	+24·6	+ 8·7
5·222	13	103	7	61	33·8	+24·8	+20·7
6	No photograph.						
7·193	10	16	0	15	34·7	+24·6	+47·6
Means ...	...	...	5	37	34·38	+24·43	...
Group 4968. A pair of very small faint spots on March 3. The group rapidly increases in size and has become a broad short stream of irregular spots by March 7. The preceding portion of the group has coalesced to form a very large elliptical spot, *a*, by March 9. The following portion of the group rapidly diminishes. *a* is measured in two portions on March 12 and 14.							
Mar. 3·626	0	3	0	5	331·1	+25·4	−62·9
4·249	11	73	12	81	331·0	+25·2	−54·8
5·222	113	411	76	308	331·8	+25·1	−41·3
6	No photograph.						
7·193	182	1012	111	624	331·8	+24·9	−15·3
8·183	214	1332	126	788	331·4	+25·0	− 2·6
9·458	244	1387	190	1113	331·6	+25·0	+14·4

AREAS and HELIOGRAPHIC POSITIONS of GROUPS of SUN SPOTS—*continued.*

Date. Greenwich Civil Time.	Projected Area of		Area for Group.		Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
	Umbra.	Whole Spot.	Umbra.	Whole Spot.			
Group 4968—*continued.*							
1902. d					°	°	°
Mar. 10·178	191	877	121	697	331·9	+25·1	+24·3
11·182	78	471	61	373	335·4	+24·3	+40·9
12·269	62	418	68	464	335·7	+23·7	+55·5
13·481	18	268	40	558	336·2	+23·3	+72·0
14·185	15	46	66	209	335·3	+23·1	+80·3
Means ...	...	...	79	475	333·02	+24·55	...
Group 4969. A small spot *n. p.* Group 4967.							
Mar. 5·222	5	32	3	19	43·3	+19·7	+30·2
Means ...	...	...	3	19	43·3	+19·7	...
Group 4970. A very small faint spot.							
May 5·473	0	9	0	6	275·4	+27·4	− 9·3
Means ...	...	...	0	6	275·4	+27·4	...
Group 4971. Two very small faint spots.							
May 21·401	0	23	0	14	48·6	+23·7	−25·4
Means ...	...	...	0	14	48·6	+23·7	...
Group 4972. A large regular spot, *a*, with small companions on May 24, 25, 26 and 29.							
May 24·168	15	97	25	162	327·5	+25·6	−69·9
25·384	24	173	22	170	326·8	+26·1	−54·5
26·445	33	200	25	150	326·3	+26·2	−41·0
27·400	40	250	26	161	325·9	+26·0	−28·7
28·401	74	268	44	158	325·7	+26·2	−15·7
29·429	64	202	36	114	325·3	+26·1	− 2·5
30·141	32	182	18	103	324·9	+26·1	+ 6·6
31·482	33	113	20	69	324·7	+25·5	+24·1

Date. Greenwich Civil Time.	Projected Area of		Area for Group.		Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
	Umbra.	Whole Spot.	Umbra.	Whole Spot.			
Group 4972—*continued.*							
1902. d					°	°	°
June 1·567	23	90	16	63	324·4	+25·5	+38·2
2·469	13	54	11	47	324·3	+25·4	+50·0
3·481	5	26	6	32	323·6	+25·3	+62·7
4·125	3	12	5	21	323·7	+25·4	+71·3
Means ...	...	...	21	104	325·26	+25·78	...
Group 4973. A pair of very small faint spots following Group 4972.							
May 26·445	0	13	0	12	317·8	+27·6	−49·5
Means ...	...	...	0	12	317·8	+27·6	...
Group 4974. A small spot with a very small companion.							
June 23·445	0	12	0	13	297·3	+27·3	−59·4
Means ...	...	...	0	13	297·3	+27·3	...
Group 4975. A small faint spot.							
July 4·475	1	14	1	10	247·6	+24·6	+36·9
Means ...	...	...	1	10	247·6	+24·6	...
Group 4976. A very faint small spot.							
Aug. 7·132	0	10	0	7	153·4	−25·7	+27·9
Means ...	...	...	0	7	153·4	−25·7	...

AREAS and HELIOGRAPHIC POSITIONS of GROUPS of SUN SPOTS—*continued.*

Date. Greenwich Civil Time.	Projected Area of		Area for Group.		Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
	Umbra.	Whole Spot.	Umbra.	Whole Spot.			
Group 4977. A small spot, *a*, with two very small companions on August 17.							
1902. d					°	°	°
Aug. 17·130	4	21	4	19	298·0	+22·0	−55·3
18·180	6	14	4	10	298·8	+21·1	−40·6
Means ...	...	...	4	15	298·40	+21·55	...
Group 4978. A pair of very faint small spots.							
Aug. 20·501	0	40	0	25	288·7	+38·6	−20·1
Means ...	...	...	0	25	288·7	+38·6	...
Group 4979. Three very small spots.							
Aug. 24·593	5	22	3	12	276·9	+19·0	+22·2
Means ...	...	...	3	12	276·9	+19·0	...
Group 4980. Several small spots in a straight stream on September 18. The first and last spots, *a* and *b*, are the largest and best defined, and alone remain after September 21.							
Sept. 18·447	0	35	0	19	269·4	+22·7	−17·0
19·438	30	89	16	45	268·9	+22·7	− 4·4
20·416	18	47	9	50	268·8	+22·7	+ 8·4
21·448	34	133	19	75	268·5	+22·5	+21·7
22·469	0	42	0	26	268·7	+22·0	+35·4
23·229	0	7	0	5	270·9	+21·8	+47·6
Means ...	...	...	7	37	269·20	+22·40	...
Group 4981. A spot, *a*, which steadily diminishes in size. A small companion is seen near it on September 24.							
Sept. 21·448	0	32	0	100	164·0	+20·1	−82·8
22·469	7	59	12	86	161·9	+20·6	−71·4
23·229	21	74	21	77	161·4	+20·0	−61·9
24·488	12	58	10	41	160·9	+20·1	−45·6
Means ...	...	...	11	76	162·05	+20·20	...

Date. Greenwich Civil Time.	Projected Area of		Area for Group.		Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
	Umbra.	Whole Spot.	Umbra.	Whole Spot.			
Group 4982. A large elliptical spot, *a*, followed on September 24 and succeeding days by several small spots in a straight stream. On September 25, and again on September 28 and succeeding days, *a* is also preceded by a stream of small spots.							
1902. d					°	°	°
Sept. 22·469	42	160	75	313	161·9	−20·9	−71·4
23·229	34	232	43	294	161·6	−21·4	−61·7
24·488	57	274	47	225	161·3	−20·9	−45·2
25·466	73	329	48	221	161·4	−20·9	−32·6
26·462	56	342	33	206	161·3	−20·7	−19·3
27·472	41	301	23	172	161·3	−20·8	− 6·0
28·488	51	249	29	142	161·2	−20·6	+ 7·3
29·562	34	192	20	116	160·5	−20·7	+20·8
30·169	24	258	15	68	160·6	−21·0	+28·7
Oct. 1·287	20	63	15	43	160·9	−20·8	+43·9
2·147	8	33	8	33	160·7	−21·1	+55·1
Means ...	...	...	32	167	161·15	−20·89	...
Group 4983. Several spots in a sinuous stream. *a* and *b*, the first and last spots, are the largest. *a* has become a large regular spot by October 9. *b* has broken up by October 8, *a* remains alone by October 14.							
Oct. 5·124	22	96	34	151	354·0	+10·0	−72·4
6·155	58	431	54	402	354·3	+ 9·7	−58·5
7·153	57	503	55	349	355·3	+ 9·9	−44·3
8·429	106	620	57	345	356·6	+ 9·7	−26·1
9·299	105	535	53	278	356·9	+ 9·6	−14·3
10·458	59	368	31	182	358·4	+ 9·8	+ 2·4
11·146	55	300	27	152	358·7	+ 9·6	+11·8
12·496	63	298	36	171	358·7	+ 9·3	+29·6
13·305	44	250	29	163	359·1	+ 9·8	+40·7
14·565	31	155	28	143	359·3	+ 9·4	+57·6
15·287	22	104	26	130	358·4	+10·0	+66·1
16·609	0	23	0	122	0·1	+ 9·3	+85·2
Means ...	...	...	36	216	357·48	+ 9·68	...
Group 4984. Two small spots, *a* and *b*. A very small spot accompanies *b* on October 9.							
Oct. 7·153	7	23	4	12	18·5	+22·0	−21·1
8·429	26	66	12	25	20·4	+21·5	− 2·3
9·299	4	17	3	10	21·2	+21·7	+10·0
Means ...	...	...	6	16	20·03	+21·73	...

AREAS and HELIOGRAPHIC POSITIONS of GROUPS of SUN SPOTS—*continued.*

Date. Greenwich Civil Time.	Projected Area of Umbra.	Projected Area of Whole Spot.	Area for Group. Umbra.	Area for Group. Whole Spot.	Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
Group 4985. A few very small spots.							
1902. d					°	°	°
Oct. 21·468	9	28	6	18	243·4	+23·5	+32·7
22·439	0	11	0	9	245·8	+21·6	+47·9
Means ...	...	...	3	14	244·60	+22·55	...
Group 4986. Three close pairs of very small spots on October 22. The group rapidly increases in size, and has become a fine straight stream by October 24. The leader *a*, has become a large regular spot by October 26, and has divided into two portions by October 29, which are measured together on October 30. The following portion of the group has disappeared by this last date.							
Oct. 22·439	7	45	5	30	163·5	−20·8	−34·4
23·146	34	186	21	125	163·6	−21·1	−25·0
24·491	103	606	57	340	165·1	−21·0	− 5·8
25·192	59	468	33	262	167·2	−20·9	+ 5·5
26·146	75	541	54	315	167·6	−20·8	+18·5
27·140	76	494	51	329	168·5	−20·0	+32·5
28·120	66	417	53	335	169·5	−20·3	+46·5
29·426	28	166	40	231	171·4	−20·0	+65·6
30·532	0	20	0	147	173·8	−20·5	+82·6
Means ...	...	...	35	235	167·80	−20·60	...
Group 4987. A pair of very faint spots on October 24. Only one of these, *a*, remains on October 26. A short stream of small spots has formed preceding *a* by October 28. *a* has disappeared by October 29.							
Oct. 24·491	0	13	0	27	97·8	−17·8	−73·1
25·192	0	6	0	8	96·9	−20·2	−64·8
26·146	0	9	0	8	96·5	−18·1	−52·6
27·140	0	5	0	4	95·9	−18·9	−40·1
28·120	12	93	7	55	100·2	−20·3	−22·8
29·426	6	29	4	22	102·7	−20·5	− 3·1
30·532	5	11	3	6	104·0	−21·1	+12·8
Means ...	...	...	2	19	99·14	−19·56	...
Group 4988. Two small spots.							
Oct. 28·120	1	29	1	21	153·1	−33·2	+30·1
Means ...	...	...	1	21	153·1	−33·2	...

Date. Greenwich Civil Time.	Projected Area of Umbra.	Projected Area of Whole Spot.	Area for Group. Umbra.	Area for Group. Whole Spot.	Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
Group 4989. A very small spot, *a*, followed by one or two very small spots. *a* alone remains by November 16.							
1902. d					°	°	°
Nov. 14·132	2	18	1	11	287·8	+20·0	+29·0
15·164	6	30	5	20	289·7	+20·3	+44·5
16·501	0	8	0	9	291·1	+19·9	+63·6
Means ...	...	...	2	13	289·53	+20·07	...
Group 4990. A pair of small spots, *a* and *b*, from November 14 to November 17. The group has entirely changed its appearance by November 18, and has become a compact cluster of irregular spots. The group rapidly extends itself parallel to the equator and has become a fine stream by November 20. It undergoes continual change on the succeeding days.							
Nov. 14·132	0	17	0	44	179·5	+15·2	−79·3
15·164	1	23	1	28	179·5	+14·9	−65·7
16·501	9	36	6	27	181·2	+15·0	−46·3
17·466	18	58	19	36	181·6	+14·9	−33·1
18·465	74	316	39	168	182·5	+14·2	−19·0
19·373	119	710	61	365	182·3	+14·6	− 7·4
20·163	157	852	79	396	182·1	+14·6	+ 2·8
21·145	166	1071	87	568	182·3	+14·6	+16·0
22·159	158	871	93	512	181·4	+14·3	+28·5
23·444	75	643	55	495	182·8	+14·6	+46·9
24·263	78	697	76	679	184·0	+14·6	+58·8
25·180	55	481	79	752	184·2	+14·8	+71·1
26·279	11	104	30	294	178·4	+14·2	+79·8
Means ...	...	...	48	336	181·68	+14·65	...
Group 4991. A small spot.							
Nov. 15·164	0	6	0	12	172·2	−20·6	−73·0
16·501	8	19	7	19	172·9	−20·6	−54·6
Means ...	...	...	4	16	172·55	−20·60	...
Group 4992. A small spot, *n. f.* Group 4990. A second spot is seen on November 16.							
Nov. 15·164	2	17	4	30	171·8	+18·3	−73·4
16·501	2	13	2	11	172·7	+17·9	−54·8
Means ...	...	...	3	21	172·25	+18·10	...

AREAS and HELIOGRAPHIC POSITIONS of GROUPS of SUN SPOTS—*continued.*

Date. Greenwich Civil Time.	Projected Area of		Area for Group.		Mean Longitude of Group.	Mean Latitude of Group.	Longitude from Central Meridian.
	Umbra.	Whole Spot.	Umbra.	Whole Spot.			
Group 4993. A very small faint spot.							
1902. d Nov. 27·134	0	3	0	2	137·2	−15·0	+49·9
Means ...	...	...	0	2	137·2	−15·0	...
Group 4994. A pair of very small spots.							
Nov. 28·255	1	7	2	11	143·6	+17·5	+71·1
Means ...	...	...	2	11	143·6	+17·5	...
Group 4994.* A pair of very small spots.							
Dec. 2·438	0	14	0	8	37·7	− 4·2	+20·3
Means ...	...	...	0	8	37·7	− 4·2	...
Group 4995. A small spot.							
1902. d Dec. 12·477	0	45	0	20	192·4	+16·5	−52·7
Means ...	...	...	0	20	192·4	+16·5	...
Group 4996. A pair of very small spots.							
Dec. 14·185	0	21	0	12	239·1	−19·0	+16·4
Means ...	...	...	0	12	239·1	−19·0	...
Group 4997. Two small spots, *a* and *b*, which tend to move apart.							
Dec. 16·176	4	51	3	36	235·1	+23·1	+38·6
17·186	4	36	4	33	236·6	+22·4	+53·5
Means ...	...	...	4	35	235·85	+22·75	...

ROYAL OBSERVATORY, GREENWICH.

TOTAL PROJECTED AREAS OF SUN SPOTS AND FACULÆ

FOR EACH DAY,

AND

MEAN AREAS AND MEAN HELIOGRAPHIC LATITUDE

OF

SUN SPOTS AND FACULÆ

FOR EACH ROTATION OF THE SUN

AND FOR THE YEAR

1902.

TOTAL PROJECTED AREAS of SUN SPOTS and FACULÆ for EACH DAY in the YEAR 1902.

The Projected Area is the Area as it is measured on the photograph, uncorrected for the effect of foreshortening, and expressed in millionths of the Sun's apparent disk.

The Greenwich Civil Time is expressed by the month, day of the month (civil reckoning), and decimal of a day, reckoned from Greenwich Mean Midnight.

Greenwich Civil Time.	Projected Area.			Greenwich Civil Time.	Projected Area.			Greenwich Civil Time.	Projected Area.			Greenwich Civil Time.	Projected Area.		
	Umbræ.	Whole Spots.	Faculæ.		Umbræ.	Whole Spots.	Faculæ.		Umbræ.	Whole Spots.	Faculæ.		Umbræ.	Whole Spots.	Faculæ.
1902. d				1902. d				1902. d				1902. d			
Jan. 1·5	0	0	0	Feb. 19·3	0	0	0	Apr. 7	No	photo	graph.	May 26·4	33	213	1608
2·2	0	0	85	20·2	0	0	0	8·2	0	0	370	27·4	40	250	101
3·2	0	0	75	21·5	0	0	0	9·5	0	0	556	28·4	74	268	0
4·2	0	0	102	22·5	0	0	0	10·2	0	0	251	29·4	64	202	0
5·3	0	30	160	23·2	0	0	0	11·2	0	0	0	30·1	32	182	144
6·2	52	264	0	24·2	0	0	0	12·4	0	0	0	31·5	33	113	0
7·3	88	682	0	25·5	0	0	0	13·6	0	0	0				
8·2	124	758	0	26·5	0	0	0	14·4	0	0	0				
9·2	155	969	0	27·3	0	0	0	15·2	0	0	0	June 1·6	23	90	828
10·2	132	719	45	28·2	0	0	0	16·2	0	0	0	2·5	13	54	1644
11·2	84	630	62					17·1	0	0	0	3·1	5	26	1330
12·2	88	502	0					18·4	0	0	0	4·1	3	12	644
13·2	38	353	0	March 1·2	0	0	41	19·5	0	0	0	5·6	0	0	0
14·3	23	224	295	2·2	0	16	22	20 5	0	0	0	6·2	0	0	0
15·2	6	34	187	3·6	10	59	543	21·2	0	0	49	7·2	0	0	0
16·2	0	0	485	4·2	21	139	419	22·2	0	0	0	8·2	0	0	0
17·2	0	0	0	5·2	121	546	29	23·4	0	0	0	9·4	0	0	0
18·2	0	0	0	6	No	photo	graph.	24·4	0	0	0	10·2	0	0	0
19·5	0	0	0	7·2	182	1028	234	25·2	0	0	0	11·2	0	0	0
20·2	0	0	125	8·2	214	1333	0	26·5	0	0	88	12·2	0	0	0
21·2	0	0	184	9·5	244	1387	31	27·5	0	0	190	13·1	0	0	0
22·2	0	0	109	10·2	191	1094	0	28·4	0	0	581	14·1	0	0	92
23·2	0	0	0	11·2	78	471	540	29·2	0	0	0	15·6	0	0	166
24·2	0	0	0	12·3	62	427	961	30·2	0	0	0	16·2	0	0	0
25·5	0	0	0	13·5	18	258	337					17·4	0	0	0
26·5	0	0	0	14·2	15	46	355					18·2	0	0	0
27·2	0	0	0	15·4	0	0	0	May 1·4	0	0	0	19·4	0	0	0
28·3	0	0	126	16·4	0	0	0	2·3	0	0	109	20·2	0	0	144
29·5	0	0	0	17·6	0	0	0	3·4	0	0	0	21·4	0	0	317
30·3	0	0	95	18·2	0	0	0	4·4	0	0	0	22·4	0	0	746
31·2	0	0	147	19·4	0	0	0	5·5	0	9	538	23·4	0	12	65
				20·6	0	0	63	6·5	0	0	364	24·5	0	0	41
Feb. 1·2	0	0	19	21·4	0	0	0	7·5	0	0	0	25·4	0	0	163
2·2	0	0	0	22·5	0	0	0	8·5	0	0	0	26·4	0	0	0
3·2	0	0	40	23·5	0	0	0	9·4	0	0	0	27·5	0	0	0
4	No	photo	graph.	24·2	0	0	0	10·5	0	0	0	28·5	0	0	0
5·5	0	0	0	25·5	0	0	0	11·2	0	0	0	29·2	0	0	0
6·2	0	0	51	26·4	0	0	0	12·6	0	0	0	30·5	0	0	0
7·3	0	0	0	27·7	0	0	0	13·1	0	0	0				
8·2	0	0	0	28·5	0	0	0	14·5	0	0	0				
9	No	photo	graph.	29·2	0	0	0	15	No	photo	graph.	July 1·2	0	0	0
10·5	0	0	0	30·2	0	0	293	16·1	0	0	0	2·6	0	0	0
11·3	0	0	32	31·5	0	0	620	17·4	0	0	0	3·5	0	0	0
12·2	0	0	138					18·5	0	0	0	4·5	1	14	0
13·2	0	17	54	April 1·6	0	0	714	19·5	0	0	0	5	No	photo	graph.
14·2	0	0	0	2·4	0	0	1123	20·1	0	0	0	6·5	0	0	0
15·2	0	0	0	3·6	0	0	0	21·4	0	23	0	7·5	0	0	80
16·5	0	0	0	4·4	0	0	0	22·1	0	0	0	8·5	0	0	0
17·5	0	0	0	5·2	0	0	0	23	No	photo	graph.	9·4	0	0	0
18·3	0	0	0	6·5	0	0	0	24·2	15	97	416	10·6	0	0	0
								25·4	24	173	1152	11·4	0	0	178

TOTAL PROJECTED AREAS of SUN SPOTS and FACULÆ—*concluded.*

Greenwich Civil Time.		Projected Area.			Greenwich Civil Time.		Projected Area.			Greenwich Civil Time.		Projected Area.			Greenwich Civil Time.		Projected Area.		
		Umbræ.	Whole Spots.	Faculæ.			Umbræ.	Whole Spots.	Faculæ.			Umbræ.	Whole Spots.	Faculæ.			Umbræ.	Whole Spots.	Faculæ.
1902.	d				1902.	d				1902.	d				1902.	d			
July	12·4	0	0	518	Aug.	25·5	0	0	0	Oct.	6·2	58	431	539	Nov.	18·5	74	316	513
	13·5	0	0	241		26·6	0	0	105		7·2	85	526	0		19·4	119	710	0
	14·4	0	0	151		27	No	photo	graph.		8·4	131	686	121		20·2	157	852	66
	15·5	0	0	0		28·5	0	0	0		9·3	109	552	0		21·1	166	1071	182
	16·4	0	0	0		29·4	0	0	112		10·5	59	368	0		22·6	158	871	107
	17·5	0	0	0		30·2	0	0	45		11·1	55	300	0		23·4	75	643	412
	18·5	0	0	0		31·2	0	0	0		12·5	63	298	0		24·3	78	697	2144
	19·5	0	0	0							13·3	44	250	77		25·2	55	481	674
	20·2	0	0	238							14·6	31	155	203		26·3	11	104	486
	21·2	0	0	193	Sept.	1·5	0	0	52		15·3	22	109	398		27·1	0	3	126
	22·2	0	0	0		2·2	0	0	47		16·6	0	23	146		28·3	1	7	141
	23·5	0	0	0		3·5	0	0	0		17·4	0	0	0		29·2	0	0	75
	24·5	0	0	0		4·4	0	0	0		18·3	0	0	0		30·2	0	0	141
	25·2	0	0	0		5	No	photo	graph.		19·5	0	0	64					
	26·4	0	0	0		6·5	0	0	0		20·3	0	0	165					
	27·2	0	0	0		7·5	0	0	0		21·5	9	28	203	Dec.	1·2	0	0	238
	28·4	0	0	0		8·4	0	0	0		22·4	7	56	182		2·4	0	14	0
	29·5	0	0	0		9·2	0	0	20		23·1	34	207	260		3	No	photo	graph.
	30	No	photo	graph.		10·5	0	0	0		24·5	103	619	239		4·4	0	0	0
	31·5	0	0	0		11·3	0	0	0		25·2	59	474	227		5·2	0	0	0
						12·6	0	0	0		26·1	75	550	543		6·2	0	0	0
						13·4	0	0	0		27·1	76	567	651		7·3	0	0	64
Aug.	1	No	photo	graph.		14·1	0	0	272		28·1	80	539	1107		8·2	0	0	68
	2·5	0	0	0		15·2	0	0	232		29·4	35	205	1063		9·2	0	0	37
	3·6	0	0	0		16·4	0	0	0		30·5	5	38	541		10·3	0	0	128
	4·5	0	0	0		17·4	0	0	42		31·5	0	0	97		11·2	0	0	330
	5·2	0	0	0		18·4	0	35	0							12·5	0	45	840
	6·2	0	0	0		19·4	30	89	0							13·2	0	0	738
	7·1	0	10	0		20·4	18	97	0							14·2	0	21	1059
	8	No	photo	graph.		21·4	34	165	110	Nov.	1·5	0	0	236		15·4	0	0	350
	9	No	photo	graph.		22·5	51	260	579		2·5	0	0	965		16·2	4	51	0
	10·6	0	0	0		23·2	55	313	1358		3·1	0	0	842		17·2	4	36	277
	11·4	0	0	0		24·5	69	332	1146		6·5	0	0	307		18·4	0	0	229
	12·1	0	0	0		25·4	73	329	582		5·2	0	0	76		19	No	photo	graph.
	13·2	0	0	0		26·5	56	342	0		4·5	0	0	85		20·2	0	0	628
	14	No	photo	graph.		27·5	41	301	0		7·5	0	0	27		21·3	0	0	1257
	15·6	0	0	72		28·5	51	249	0		8·6	0	0	0		22·2	0	0	464
	16·1	0	0	239		29·6	34	192	0		9·5	0	0	0		23·3	0	0	293
	17·1	4	21	211		30·1	24	104	0		10·2	0	0	323		24·5	0	0	0
	18·1	6	14	85							11·3	0	0	323		25·3	0	0	0
	19·4	0	0	0							12·5	0	0	0		26·2	0	0	0
	20·5	0	40	0	Oct.	1·3	20	63	230		13·4	0	0	0		27·4	0	0	143
	21·4	0	0	0		2·1	8	33	783		14·1	2	35	90		28·5	0	0	400
	22·4	0	0	45		3·2	0	0	504		15·2	10	73	797		29·4	0	0	395
	23·2	0	0	0		4·2	0	0	59		16·5	19	76	1311		30·4	0	0	431
	24·6	5	22	0		5·1	22	96	216		17·5	18	58	720		31·2	0	0	0

MEAN AREAS of SUN SPOTS and FACULÆ, as measured on PHOTOGRAPHS taken at the ROYAL OBSERVATORY, GREENWICH, at DEHRA DÛN, INDIA, and in MAURITIUS, for each ROTATION of the SUN, from 1901 December 14 to 1902 December 31.

The Mean Areas have been formed by taking the Means of the Areas for each day of observation throughout each Rotation of the Sun, the Projected Areas being the Areas as measured on the photographs and expressed in millionths of the Sun's apparent disk, and the Areas corrected for foreshortening being expressed in millionths of the Sun's visible hemisphere.

The rotations adopted in the following table (which is in continuation of those for the years 1873–1901 printed in the Greenwich Observations for 1884 and succeeding years) correspond to the synodic rotation of the Sun, and the commencement of each is defined by the coincidence of the assumed prime meridian with the central meridian, the assumed prime meridian being that meridian which passed through the ascending node at mean noon on January 1, 1854, and the assumed period of the Sun's sidereal rotation being 25·38 days. The rotations adopted in the volumes of Greenwich Observations, 1877 to 1883, correspond, on the other hand, to the sidereal rotation of the Sun, the commencement of each being defined by the coincidence of the assumed prime meridian with the ascending node. The numeration of the rotations is in continuation of Carrington's series (*Observations of Solar Spots made at Redhill* by R. C. Carrington, F.R.S.), No. 1 being the rotation commencing 1853, November 9. The dates of commencement of the rotations are given in GREENWICH CIVIL TIME, reckoning from midnight.

No. of Rotation.	Date of Commencement of each Rotation.		d	No. of Days on which Photographs were taken.	Mean of Daily Areas.					
					Projected.			Corrected for Foreshortening.		
					Umbræ.	Whole Spots.	Faculæ.	Umbræ.	Whole Spots.	Faculæ.
645	1901	December	14·20	28	20·	122·	20	11·	67·	26
646	1902	January	10·53	26	9·2	67·	73	6·1	45·	92
647		February	6·87	26	5·8	30·	49	4·2	22·	60
648		March	6·21	27	37·	224·	195	2·9	179·	210
649		April	2·52	26	0·0	0·0	80	0·0	0·0	92
650		April	29·77	25	2·9	21·	167	3·0	21·	175
651		May	72·00	27	11·	44·	228	6·7	28·	244
652		June	23·20	27	0·1	1·0	62	0·1	0·9	62
653		July	20·40	22	0·0	0·5	23	0·0	0·3	25
654		August	16·62	25	0·6	3·9	29	0·4	2·6	35
655		September	12·87	27	35·	198·	251	16·	146·	279
656		October	10·15	27	28·	177·	318	19·	124·	349
657		November	6·45	27	35·	223·	331	24·	167·	362
658		December	3·76	26	0·3	5·9	314	0·3	3·9	342

MEAN AREAS of SUN SPOTS and FACULÆ, as measured on PHOTOGRAPHS taken at the ROYAL OBSERVATORY, GREENWICH, at DEHRA DÛN, INDIA, and in MAURITIUS, for the YEAR 1902.

The Mean Projected Areas are expressed in millionths of the Sun's apparent disk.

The Mean Areas corrected for foreshortening are expressed in millionths of the Sun's visible hemisphere.

Year.	No. of Days on which Photographs were taken.	Mean of Daily Areas.					
		Projected.			Corrected for Foreshortening.		
		Umbræ.	Whole Spots.	Faculæ.	Umbræ.	Whole Spots.	Faculæ.
1902	349	14	86	163	10	62	178

MEAN HELIOGRAPHIC LATITUDE of SUN SPOTS, as measured on PHOTOGRAPHS taken at the ROYAL OBSERVATORY, GREENWICH, at DEHRA DÛN, INDIA, and in MAURITIUS, for each ROTATION of the SUN, from 1901 December 14 to 1902 December 31.

The numbers given in the accompanying table have been formed as follows:—

The Heliographic Latitude of each Spot for each day has been multiplied by its Area (corrected for foreshortening), and the sum of the products, for Spots North of the Sun's Equator, has been divided by the sum of the corresponding Areas to form Mean Heliographic Latitude of Spotted Area North of Equator; similarly for Spots South of the Equator. In forming the Mean Heliographic Latitude of entire Spotted Area, the algebraic sum of the products for Spots North and South of the Equator has been divided by the sum of the Areas; and for the Mean Distance from the Equator for all Spots, the numerical sum of the products, without regard to the sign of the latitude, has been similarly divided.

The Mean Areas have been formed by dividing the sum of the Daily Areas (corrected for foreshortening) by the number of days of observation for each Rotation of the Sun, and are expressed in millionths of the Sun's visible hemisphere.

No. of Rotation.	Date of Commencement of each Rotation.	No. of Days on which Photographs were taken.	Spots NORTH of the Equator.		Spots SOUTH of the Equator.		Mean Heliographic Latitude of entire Spotted Area.	Mean Distance from Equator of all Spots.
			Mean of Daily Areas.	Mean Heliographic Latitude.	Mean of Daily Areas.	Mean Heliographic Latitude.		
645	1901 Dec. 14·20 d	28	0·3	26·70 °	67·	7·95 °	− 7·82	8·02 °
646	1902 Jan. 10·53	26	0·0	...	45·	7·41	− 7·41	7·41
647	Feb. 6·87	26	21·	22·88	0·7	15·53	+ 21·58	22·63
648	Mar. 6·21	27	179·	24·46	0·0	...	+ 24·46	24·46
649	Apr. 2·52	26	0·0	...	0·0	...	...	...
650	Apr. 29·77	25	21·	25·95	0·0	...	+ 25·95	25·95
651	May 27·00	27	28·	25·82	0·0	...	+ 25·82	25·82
652	June 23·20	27	0·9	26·08	0·0	...	+ 26·08	26·08
653	July 20·40	22	0·0	...	0·3	25·70	− 25·70	25·70
654	Aug. 16·62	25	2·6	27·50	0·0	...	+ 27·50	27·50
655	Sept. 12·87	27	78·	13·10	68·	20·95	− 2·73	16·75
656	Oct. 10·15	27	40·	9·88	84·	20·73	− 10·79	17·21
657	Nov. 6·45	27	165·	14·81	1·5	17·34	+ 14·52	14·83
658	Dec. 3·76	26	3·4	21·23	0·5	18·95	+ 16·46	20·96

MEAN HELIOGRAPHIC LATITUDE of SUN SPOTS, as measured on PHOTOGRAPHS taken at the ROYAL OBSERVATORY, GREENWICH, at DEHRA DÛN, INDIA, and in MAURITIUS, for the YEAR 1902.

YEAR.	No. of Days on which Photographs were taken.	Spots NORTH of the Equator.		Spots SOUTH of the Equator.		Mean Heliographic Latitude of entire Spotted Area.	Mean Distance from Equator of all Spots.
		Mean of Daily Areas.	Mean Heliographic Latitude.	Mean of Daily Areas.	Mean Heliographic Latitude.		
1902	349	42	18·81 °	21	15·29 °	+7·48 °	17·64 °

NOTE.—In the computations for forming the corresponding Tables given in the volumes for 1884 and 1885, the latitudes of the Spots were only taken to the nearest whole degree, the next higher whole degree being adopted whenever the fractional part of the latitude amounted to or exceeded ·5. Thus, under 8°, for example, would be included all Spots from 7°·5 to 8°·4, both inclusive; and the corresponding mean latitude should have been taken as 7°·95 instead of 8°. The Mean Heliographic Latitudes, therefore, both for Spots North and Spots South of the Equator, and the Mean Distances from the Equator of all Spots, both for the rotations and for entire years, require a correction of − 0°·05. The Mean Latitude of the entire Spotted Area requires the following correction:—

$$-0^{\circ}\cdot05 \times \frac{\text{Mean Area N.} - \text{Mean Area S.}}{\text{Mean Area N.} + \text{Mean Area S.}}$$

These corrections have been applied in computing the Mean Heliographic Latitudes and Mean Distance from the Equator given in the above Tables for 1902, and in corresponding Tables for the years 1886 to 1901.