

GREENWICH
PHOTO-HELIOGRAPHIC RESULTS

1954

LONDON
HER MAJESTY'S STATIONERY OFFICE

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RESULTS OF MEASURES
MADE AT THE ROYAL GREENWICH OBSERVATORY
OF
PHOTOGRAPHS OF THE SUN
*TAKEN AT HERSTMONCEUX, THE CAPE
AND KODAIKANAL IN THE YEAR*
1954

UNDER THE DIRECTION OF
SIR HAROLD SPENCER JONES, Sc.D., F.R.S.
ASTRONOMER ROYAL

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INTRODUCTION

The photographs from which these measures were made were taken at the Royal Greenwich Observatory, the Royal Observatory, Cape of Good Hope, and the Kodaikanal Observatory, Southern India.

The photographs of the Sun obtained at Greenwich were taken with the 4-inch Photoheliograph, of which the original object-glass had been replaced in 1910 by a Grubb photographic objective. The equivalent focal length of the photoheliograph with its present enlarging system (supplied in 1926 by Ross, Ltd.) is $67\frac{1}{2}$ feet, the diameter of the Sun's image at the secondary focus being approximately $7\frac{1}{2}$ inches. On 1949 May 2 this photoheliograph was moved from Greenwich to Herstmonceux Castle, Sussex. Subsequent photographs continue to be designated "Greenwich" photographs.

The photographs of the Sun obtained at the Cape Observatory were taken under the superintendence of Her Majesty's Astronomer at the Cape, Dr. R. H. Stoy, and those from Kodaikanal under the superintendence of the Director, Dr. A. K. Das. At the Cape Observatory the instrument employed was a 4-inch photoheliograph giving an image of the Sun about $7\frac{1}{2}$ inches in diameter; at Kodaikanal a Cooke photo-visual objective of 6 inches aperture was used, the image of the Sun which was obtained being of about the same size.

Photographs of the Sun were available for measurement on 365 days in 1954, those finally selected for measurement being supplied by the different observatories as under:

Greenwich	..	..	..	..	268
Cape	..	..	..	..	91
Kodaikanal	..	..	..	..	6
Total	..	..	..	..	<u>365</u>

The names of the measurers of the photographs for the year 1954 were as follows:

H. Barton	A. S. Milsom
P. S. Laurie	N. Rhodes

At the primary focus of the photoheliographs at Greenwich and the Cape two spider-wires are fixed by which the zero of position-angles on the photographs can be determined. These wires are inclined at an angle of 45° to the celestial equator. In the Kodaikanal instrument there is one wire fixed parallel to the equator.

INTRODUCTION TO GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954.

The precise zero of position-angles for the photoheliographs has been determined by three different methods.

(i) *Zero Photographs.* Plates were exposed 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 thus produced upon the plates. The exposures were so made that the line joining the cusps passed approximately through the centre of the plates and the inclinations of the two spider-wires to this line were measured. A small correction for the inclination of the Sun's path has been applied. Two or three zero photographs were usually taken each month at Greenwich, the Cape, and Kodaikanal.

(ii) *Transits.* At Greenwich and the Cape, transits of the Sun were taken visually, the times of contact of the first and second limbs of the Sun with the two wires being noted by an eye-and-ear method. The ratio of the time taken by the Sun to pass over the NE - SW wire to the time taken to pass over the SE - NW wire was used in order to find the angle made by the Sun's path with the bisectors of the wires. From this, again incorporating a correction to allow for the inclination of the Sun's path, the orientation of the wires with respect to the N - S line could be inferred. Transits were usually taken at Greenwich and the Cape on four or more days during each month.

(iii) *Supplementary Zero Photographs.* At Greenwich supplementary partial images of the Sun were occasionally recorded on otherwise normal photographs, a second exposure being made after clamping the instrument firmly for 130 seconds. The small portion of the Sun's limb visible at the western edge of the plate could be used, together with the main image which it does not intersect, to deduce the orientation of the wires in a way similar to that used for the zero photographs. Six to ten supplementary zero photographs were taken at Greenwich each month. The values for the zero of position-angles deduced from them were given half weight in the adoption of zero-corrections to be used in the reduction of photographs.

The following table gives the zero-corrections determined by the various methods at Greenwich and the Cape during 1954, together with the adopted values.

Greenwich	(i)	(ii)	(iii)	Adopted Value
1954	o /	o /	o /	o /
January	-0 33	-0 33	-0 26	-0 30
February	-0 26	-0 27	-	-0 30
March	-0 28	-0 26	-0 22	-0 27
April	-0 19	-0 21	-0 22	-0 21
May	-0 23	-0 23	-0 28	-0 21
June	-0 19	-0 20	-0 26	-0 21
July	-0 16	-0 20	-0 23	-0 21
August	-0 25	-0 19	-0 26	-0 21
September 1 - 21	-0 21	-0 23	-0 32	-0 21
September 22 - October 25	-0 07	-0 04	-0 01	-0 03
October 26 - 31	-0 01	0 00	+0 06	0 00
November	0 00	0 00	-0 11	0 00
December	+0 05	-0 01	+0 07	0 00

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Cape	(i)	(ii)	Adopted Value
1954	o /	o /	o /
January	+0 24	+0 33	+0 33
February	+0 25	+0 34	+0 33
March	+0 31	+0 32	+0 33
April	+0 31	+0 32	+0 33
May	+0 35	+0 33	+0 33
June	+0 31	+0 35	+0 33
July	+0 30	+0 31	+0 30
August	+0 25	+0 31	+0 30
September	+0 37	+0 32	+0 30
October	+0 37	+0 34	+0 30
November	+0 25	+0 32	+0 30
December	+0 23	+0 32	+0 30

In the case of the Kodaikanal photographs individual values were adopted, as indicated by the appropriate zero photographs.

The measures of the photographs were made with a large position-micrometer that can be used for 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 a similar screw-action about a pivot in its circumference. This pivot, 90° distant from that of the upper plate, is mounted on a third circular plate, with a position-circle graduated in divisions of 30 minutes of arc, which may be rotated 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 centre of rotation of the position-circle. When this has been done, a Ramsden eyepiece, having at its anterior 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 adjusted so that the centre of the eyepiece moves diametrically across the photograph, the diaphragm being nearly in contact with the photographic film, so that parallax is negligible. The distance of a spot or facula from the centre of the disk is read from a scale and vernier to $1/250$ th of an inch, corresponding to 0.001 of the Sun's radius for images 8 inches in diameter. The position-angle is read from the 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° below the photograph.

All photographs were measured independently by two measurers.

In the case of large or complex groups of spots, the chief components were measured individually; so also in the case of groups near to the east or west limbs of the Sun where the effects of foreshortening are appreciable. In other cases the position of the centre of a group was estimated by the measurer at the micrometer. In this respect a difference has been made from the practice during years prior to 1916 when, in the Daily Results (§1.), components of groups were given separately, and in the Ledgers (§3.) combination into groups was made.

INTRODUCTION TO GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954.

When required, corrections have been applied to the measured distances and position-angles to allow for differential refraction. The details of this correction were given in the *Introduction* for 1909. It is necessary to apply this correction to about twenty per cent of the photographs taken at Greenwich in the months October to March.

§1. *Positions and Areas of Sunspots and Faculae for each Day in the Year 1954.*

In this section the measured positions and areas of sunspots and faculae are given for each day. The positions of sunspots are referred firstly to a system of apparent polar co-ordinates on the Sun's disk and secondly to a system of heliographic co-ordinates. The positions of faculae are given only in apparent polar co-ordinates.

The calculations of heliographic longitude and latitude are made from formulae given by W. de la Rue, B. Stewart and B. Loewy, *Phil. Trans.*, 1869. The system of heliographic co-ordinates may be defined as follows. The inclination of the Sun's axis to the ecliptic is assumed to be $82^{\circ}45'$, the longitude of the ascending node of the Sun's equator on the ecliptic for 1954.0 to be $75^{\circ}07'.1$, and the period of the Sun's sidereal rotation to be 25.38 days. The meridian which passed through the ascending node on 1854 January 1, Greenwich mean noon, is taken as the zero meridian and longitudes increase from east to west. The mean synodic rotation-period is 27.2753 days; synodic rotation-periods are counted from 1853 November 9, in continuation of Carrington's series.

Let r be the measured distance of a spot from the centre of the Sun's apparent disk and χ the position-angle of the spot from the Sun's axis, R the measured radius of the Sun on the photograph, S the tabular semi-diameter 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. ρ - the heliocentric angle - is obtained from the following equations:

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

If B_0 and ϕ are the heliographic latitudes and L_0 and λ the heliographic longitudes of the Earth and the spot respectively.

$$\begin{aligned} \sin \phi &= \cos \rho \sin B_0 + \sin \rho \cos B_0 \cos \chi \\ \sin (L_0 - \lambda) &= \sin \chi \sin \rho \sec \phi \end{aligned}$$

χ is found from the position-angle measured eastwards from the north point of the Sun's disk by subtracting P , the position-angle of the north end of the Sun's axis also measured eastwards from the north point. The three quantities P , B_0 and L_0 for the time of the exposure of each photograph are derived from the *Ephemeris for Physical Observations of the Sun*, given on p. 332 of the *Nautical Almanac* for 1954.

§2. *General Catalogue of Groups of Sunspots for 1954.*

This catalogue first contains particulars of every group of sunspots which lasted for two or more days during 1954. The group numbers are in continuation of those given in 1953 and previous years; the Mount Wilson group numbers are also given. The table includes an indication of those groups which may be considered to be members of "recurrent series" of groups, as contained in Ledger I below (§3.).

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Spot groups seen on one day only are given in a separate table, where they receive a distinctive numeration.

"Revival" groups of spots have been tabulated in series in a table following the General Catalogue.

§3. *Ledgers of the Areas and Heliographic Positions of Groups of Sunspots for 1954.*

The groups of which details are given in these ledgers have been abstracted from a general ledger of all spot groups seen throughout the year. Apart from the groups, there are printed in a similar manner details of individual components of the principal groups. This has been done in all cases where it appeared probable that an individual component lasted to the second or third rotation after its first appearance.

Ledger I. - Recurrent Groups. The groups contained in this ledger were selected upon the following plan, reference being made to the General Catalogue:- If any spot when first seen was 60° or more to the east of the central meridian, the catalogue and, if necessary, the Daily Results also (§1.), were searched some fifteen to sixteen days earlier to ascertain whether a spot group of similar heliographic longitude and latitude was then near the west limb of the Sun. Similarly, if any spot group when last seen was 60° or more to the west of the central meridian, a search was made fifteen to sixteen days later. When there appeared to be a case of probable continuity between groups in consecutive rotations of the Sun, the character of the groups, their areas and their longitude and latitude have been carefully compared before accepting them as a recurrent group.

Ledger II. - Non-Recurrent Groups. This ledger contains those groups lasting for six days or longer which are not members of recurrent series.

§4. *Total Areas, Mean Areas and Mean Heliographic Latitudes of Sunspots and Faculae in the Year 1954.*

This section contains total areas of sunspots and faculae for each day in the year, together with mean areas and mean heliographic latitudes of sunspots and faculae for each Rotation of the Sun during 1954. Similar annual mean values are also given.

§5. *Observations of Solar Filaments made with the Spectrohelioscopes in the Year 1954.*

This section contains (1) measures of line-of-sight velocities of dark $H\alpha$ filaments seen on the Sun's disk near sunspots and (2) observations of solar flares in $H\alpha$ light. The observations were made principally with a spectrohelioscope lent by the Mount Wilson Observatory in the autumn of 1929 and set up at Greenwich in the south attic of the Main Building and, since 1950 February, at Herstmonceux in a spectrohelioscope room forming the ground floor of the dome housing the photo-heliograph. The instrument is of a type described by G. E. Hale in the *Astrophysical Journal*, 70, 265, 1929. The spectrum is formed by a Rowland grating ruled with 14,438 lines to the inch. The first order spectrum around $H\alpha$ is normally used, the scale being 1 mm. = 4.35 Å. The width of the second slit is usually 0.1 mm. The diameter of the monochromatic image of the Sun's disk at the second slit is about 50 mm., of which a portion 28 mm. x 6 mm. is rendered visible by the rotating rectangular prisms. The eyepiece used gives an overall magnification of x40, approximately. A second spectrohelioscope of similar design, presented in 1949 by Mr. A.M. Newbegin, is also available when required so that simultaneous observations can be made by two observers. The observations during 1954 were made by H. Barton, P. S. Laurie and N. Rhodes.

ROYAL GREENWICH OBSERVATORY

*Positions and Areas
of Sunspots and Faculae*

For each day in the year

1954

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR 1954.

Col. 1. (1) Time when photograph was taken expressed in days and decimals of a day reckoning from midnight at commencement of year. (2) Place of observation - Greenwich (G), Cape of Good Hope (C), Kodaikanal (K). (3) Date of photograph.

Col. 2. Number of spot group in order of appearance and in continuation of the group-numbers given in previous years. Groups seen on one day only are distinguished by the number of the rotation during which they were observed and by a letter given in the order of their appearance. When there is no number in the second column it is to be understood that there is a facula unaccompanied by a spot.

Col. 3. Distance of spot group or faculae from Sun's centre in terms of the Sun's radius.

Col. 4. Position angle of spot group or faculae measured from the north pole of the Sun's axis in the direction *N.*, *E.*, *S.*, *W.*, *N.*

Col. 5. Heliographic longitude of the spot group derived from the measures.

Col. 6. Heliographic latitude of the spot group similarly derived.

Col. 7. Area of umbrae corrected for foreshortening and expressed in millionths of the Sun's visible hemisphere.

Col. 8. Area of whole spots composing the group similarly expressed.

Col. 9. Area of each group of faculae similarly expressed. The positions of faculae 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.

In line with the date of each day is given in brackets for the time of photograph, the position angle of the Sun's axis from the north point, the heliographic longitude and latitude of the centre of the disk and the total areas of spots and faculae for the day.

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POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																	
U. T.	Group No.	MEASURES		POSITION		AREA			U. T.	Group No.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ			Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ
1954 39.293 C Feb.9	17125	.758	322.3 (-15.3)	236.2 (203.5)	+31.3 (- 6.6)	6 (6)	26 (26)	72 c (72)	1954 53.681 G Feb.23	17125	.897	103.8 (-20.0)	0 (14.1)	0 (- 7.1)	0 (0)	0 (0)	134 (134)
40.429 G Feb.10	17125	.847 .894	314.1 118.5 (-15.7)	234.0 (188.6)	+31.5 (- 6.6)	0 (0)	8 (8)	145 c 144 (289)	Feb.24 Feb.25 Feb.26 Feb.27 Feb.28	No spots or faculæ							
41.304 C Feb.11	17125	.923	307.6 (-16.0)	235.3 (177.0)	+30.9 (- 6.7)	0 (0)	5 (5)	93 c (93)	59.372 G Mar.1	17126	.929 .698	280.2 242.5 (-21.6)	341.7 (299.1)	-24.1 (- 7.2)	3 (3)	15 (15)	123 (123)
42.320 C Feb.12		.953 .889	302.3 289.0 (-16.4)	(163.7)	(- 6.7)	(0)	(0)	137 109 (246)	60.360 G Mar.2	17126	.775 .828	230.2 245.3 (-21.8)	341.6 (286.1)	-24.4 (- 7.2)	31 (31)	161 (161)	61 171 c (232)
Feb.13 Feb.14 Feb.15 Feb.16		No spots or faculæ							61.304 C Mar.3	17126	.931	247.3 (-22.1)	343.1 (273.6)	-23.7 (- 7.2)	23 (23)	155 (155)	225 c (225)
47.394 C Feb.17		.909 .958	300.9 93.5 (-18.1)	(96.9)	(- 6.9)	(0)	(0)	138 163 (301)	62.380 G Mar.4	17126	.988	247.0 (-22.3)	342.7 (259.5)	-23.8 (- 7.2)	14 (14)	88 (88)	192 c (192)
48.362 C Feb.18		.914 .878	309.2 92.1 (-18.4)	(84.1)	(- 7.0)	(0)	(0)	116 121 (237)	Mar.5	No spots or faculæ							
Feb.19 Feb.20 Feb.21		No spots or faculæ							64.373 G Mar.6		.927 .907	263.0 145.4 (-22.8)	(233.2)	(- 7.2)	(0)	(0)	116 109 (225)
52.525 G Feb.22		.975	261.5 (-19.7)	(29.3)	(- 7.1)	(0)	(0)	155 (155)	Mar.7 Mar.8 Mar.9 Mar.10	No spots or faculæ							

Group 17125. Feb. 9 - 11. A pair of small spots on February 9; a tiny spot on February 10 and 11.
 Group 17126. Mar. 1 - 4. A small spot on March 1; a regular spot followed by a companion on the other days.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR

U. T.	Group No.	MEASURES		POSITION		AREA			U. T.	Group No.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae			Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae
1954			o	o	o				1954			o	o	o			
69.395		.941	248.2					128	79.420	17127	.838	265.0	92.1	- 8.0	36	296	427 c
G		.932	303.4					114	G		.799	102.7					110
Mar.11			(-23.8)	(167.0)	(- 7.2)	(0)	(0)	(242)	Mar.21		.882	117.6	(34.9)	(- 7.0)	(36)	(296)	(695)
70.600	17127	.875	96.2	89.7	- 8.9	6	36	109 c	80.645	17127	.965	265.1	93.9	- 6.5	27	175	293 c
G			(-24.0)	(151.2)	(- 7.2)	(6)	(36)	(109)	G			(-25.5)	(18.7)	(- 7.0)	(27)	(175)	(293)
Mar.12									Mar.22								
71.303	17127	.780	94.6	90.2	- 9.0	69	299	146 c	81.406	17127	.981	261.4	88.2	- 9.7	0	10	293 c
C			(-24.1)	(141.9)	(- 7.2)	(69)	(299)	(146)	G			(-25.6)	(8.7)	(- 6.9)	(0)	(10)	(293)
Mar.13									Mar.23								
72.456	17127	.569	94.5	91.9	- 8.5	91	507		82.488		.884	153.7					141
G			(-24.3)	(126.7)	(- 7.2)	(91)	(507)	(0)	G		.939	74.9					121
Mar.14									Mar.24			(-25.7)	(354.4)	(- 6.9)	(0)	(0)	(262)
73.302	17127	.404	94.1	91.6	- 8.3	97	627		Mar.25		No spots or faculae						
C			(-24.5)	(115.5)	(- 7.2)	(97)	(627)	(0)	Mar.26		No spots or faculae						
Mar.15																	
74.307	17127	.195	96.8	91.1	- 8.3	120	712		85.348		.945	282.5					162
C			(-24.6)	(102.3)	(- 7.1)	(120)	(712)	(0)	G			(-25.9)	(316.7)	(- 6.8)	(0)	(0)	(162)
Mar.16									Mar.27								
75.409	17127	.046	236.4	90.0	- 8.5	122	585		Mar.28		No spots or faculae						
G	17128	.876	76.9	28.6	+ 7.9	2	9	115 c	Mar.29		No spots or faculae						
Mar.17		.885	175.8	(87.8)	(- 7.1)	(124)	(594)	(215)									
76.303	17127	.248	264.2	90.4	- 8.3	86	464		88.348		.908	312.5					132
C	17128	.775	75.3	27.2	+ 6.7	0	3	114 c	G			(-26.1)	(277.1)	(- 6.6)	(0)	(0)	(132)
Mar.18			(-24.9)	(76.0)	(- 7.1)	(86)	(467)	(114)	Mar.30								
77.303	17127	.486	266.7	92.0	- 7.8	88	419		Mar.31		No spots or faculae						
C	17128	.624	69.5	26.9	+ 6.8	3	8		Apr.1		No spots or faculae						
Mar.19			(-25.1)	(62.8)	(- 7.1)	(91)	(427)	(0)	Apr.2		No spots or faculae						
78.305	17127	.667	265.3	91.6	- 8.3	59	311	80 p	Apr.3		No spots or faculae						
C		.938	97.8					129	Apr.4		No spots or faculae						
Mar.20		.946	114.3	(49.6)	(- 7.0)	(59)	(311)	(373)			No spots or faculae						

Group 17127. Mar. 12 - 23. A stream of normal type, developing from a pair of small spots on March 12. The intermediate spots have died out by March 21.

Group 17128. Mar. 17 - 19. A tiny spot.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																	
U.T.	Group NO.	MEASURES		POSITION		AREA			U.T.	Group NO.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ			Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ
1954			o	o	o				1954			o	o	o			
Apr.5			No spots or faculæ						Apr.19			No spots or faculæ					
95.344	17129	.990	94.3	102.7	- 5.2	0	14	180sp									
G		.932	83.6					86	109.302	1345b	.521	290.5	29.9	+ 6.0	1	10	
Apr.6			(-26.4)	(184.8)	(- 6.2)	(0)	(14)	(266)	G								
									Apr.20			(-25.7)	(0.6)	(- 5.2)	(1)	(10)	(0)
96.333	17129	.944	93.2	100.9	- 5.0	3	25	236 c									
G																	
Apr.7			(-26.4)	(171.8)	(- 6.2)	(3)	(25)	(236)	110.728		.917	268.4					162
									G								
									Apr.21			(-25.6)	(341.7)	(- 5.0)	(0)	(0)	(162)
97.391	17129	.822	91.8	102.4	- 5.0	4	17	195 c									
G																	
Apr.8			(-26.4)	(157.8)	(- 6.1)	(4)	(17)	(195)	111.304		.959	271.3					125
									G		.862	282.7					122
									Apr.22			(-25.5)	(334.1)	(- 5.0)	(0)	(0)	(247)
98.398	1345a	.522	278.3	175.5	- 0.8	0	1										
G	17129	.645	90.0	104.4	- 4.6	1	6	103 f									
Apr.9			(-26.4)	(144.5)	(- 6.0)	(1)	(7)	(103)	Apr.23								
									Apr.24								
Apr.10									Apr.25								
Apr.11									Apr.26								
Apr.12			No spots or faculæ						Apr.27								
Apr.13									Apr.28								
Apr.14																	
									118.320		.939	111.2					72
104.433	17130	.637	271.9	104.3	- 3.1	1	6		G								
G		.955	100.7					120	Apr.29			(-24.6)	(241.4)	(- 4.3)	(0)	(0)	(72)
Apr.15			(-26.1)	(64.9)	(- 5.6)	(1)	(6)	(120)									
									119.339		.862	112.8					100
105.273	17130	.777	270.9	104.6	- 2.8	3	16	124 c	G								
G		.879	100.5					82	Apr.30			(-24.4)	(228.0)	(- 4.2)	(0)	(0)	(100)
Apr.16			(-26.1)	(53.8)	(- 5.5)	(3)	(16)	(206)									
									May 1								
106.326		.910	266.2					214	May 2								
G									May 3								
Apr.17			(-26.0)	(39.9)	(- 5.4)	(0)	(0)	(214)									
107.318		.951	265.5					187	123.580		.849	88.0					149
G									G		.938	95.8					169
Apr.18			(-25.9)	(26.8)	(- 5.3)	(0)	(0)	(187)	May 4			(-23.6)	(171.9)	(- 3.8)	(0)	(0)	(318)

Group 17129. Apr. 8 - 9. One or two tiny spots.
 Group 17130. Apr. 15 - 16. A small spot.

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954.

C 7

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																	
U. T.	Group No.	MEASURES		POSITION		AREA			U. T.	Group No.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae			Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae
1954			o		o				1954			o		o			
May 5	1346a	.970	305.6	180.0	+33.3	0	14	158 c	May 20	17131	.496	299.6	187.0	+13.6	3	13	
May 6									May 21								
May 7									May 22								
May 8									May 23								
			No spots or faculae									No spots or faculae					
128.304 G									May 24								
May 9			(-22.6)	(109.5)	(-3.3)	(0)	(14)	(158)	May 25								
May 10			No spots or faculae						May 26								
130.302 G		.942	284.4					160	May 27								
May 11			(-22.1)	(83.0)	(-3.0)	(0)	(0)	(160)	May 28								
131.313 G		.874	269.5					116	May 29								
May 12			(-21.9)	(69.7)	(-2.9)	(0)	(0)	(116)	May 30								
May 13			No spots or faculae						May 31								
133.108 K	1346b	.169	36.9	45.3	+5.0	3	11		151.633 G	17131	.496	299.6	187.0	+13.6	3	13	
May 14									June 1								
May 15									June 2								
May 16									June 3								
May 17			(-21.4)	(45.9)	(-2.7)	(3)	(11)	(0)*	152.343 C		.620	293.0	187.2	+13.5	3	14	
			No spots or faculae						153.531 G		.791	288.5	186.2	+14.3	0	7	84 c
137.325 G		.953	261.0					93	June 4		.863	303.9	179.9	+28.5	0	9	67 c
May 18		.950	110.7					101				(-14.4)	(125.5)	(-0.3)	(0)	(15)	(172)
			(-20.2)	(350.1)	(-2.3)	(0)	(0)	(194)	June 5								
138.330 G		.947	124.1					77	June 6								
May 19			(-19.9)	(336.9)	(-2.2)	(0)	(0)	(77)	June 7								
			No spots or faculae						No spots or faculae								

Group 17131. June 1 - 4. A pair of tiny spots on June 1 and 2; a single spot on June 3 and 4.

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																	
U. T.	Group No.	MEASURES		POSITION		AREA			U. T.	Group No.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ			Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ
1954			o		o				1954			o		o			
June 8									June 30								
June 9									July 1			No spots or faculæ					
June 10			No spots or faculæ						July 2								
June 11																	
June 12									183.337	1348b	.778	120.3	55.4	-20.9	6	28	83 c
163.481		.896	117.3					109	C								
June 13			(-10.7)	(4.0)	(+ 0.9)	(0)	(0)	(109)	July 3			(- 1.9)	(101.2)	(+ 3.1)	(6)	(28)	(83)
June 14									July 4								
June 15									July 5			No spots or faculæ					
June 16									July 6								
June 17									July 7								
June 18			No spots or faculæ						188.311	17132	.466	319.6	54.7	+24.2	1	8	
June 19									G			(+ 0.4)	(35.4)	(+ 3.7)	(1)	(8)	(0)
June 20									July 8								
June 21									189.335	17132	.617	305.5	55.0	+24.1	1	7	
									C			(+ 0.9)	(21.8)	(+ 3.8)	(1)	(7)	(0)
172.405	1348a	.895	282.2	308.9	+11.8	0	6	91 c	July 10			No spots or faculæ					
G		.920	133.6					122	July 11								
June 22			(- 6.8)	(245.9)	(+ 1.9)	(0)	(6)	(213)									
June 23									192.334	17133	.493	320.5	2.5	+26.1	1	8	
June 24									G			(+ 2.2)	(342.1)	(+ 4.1)	(1)	(8)	(0)
June 25									July 12								
June 26			No spots or faculæ						193.299	17133	.625	308.3	2.4	+26.2	3	24	
June 27									G			(+ 2.7)	(329.4)	(+ 4.2)	(3)	(24)	(0)
June 28									July 13								
June 29									194.540	17133	.818	298.4	5.6	+25.5	4	20	98 c
									G	1349a	.527	267.2	344.6	+ 2.2	1	5	
									July 14			(+ 3.2)	(313.0)	(+ 4.3)	(5)	(25)	(98)

Group 17132. July 8 - 9. A tiny spot.
 Group 17133. July 12-16. A small spot with a tiny companion on July 13.

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																		
U. T.	Group No.	MEASURES		POSITION		AREA			U. T.	Group No.	MEASURES		POSITION		AREA			
		Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae			Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae	
1954			o	o	o				1954			o	o	o				
195.305 G July 15	17133	.905	295.6	6.8	+25.0	6	35	153 c	208.302 G July 28	17135	.413	82.5	106.6	+ 8.0	1	8		
			(+3.6)	(302.8)	(+ 4.4)	(6)	(35)	(153)				(+9.1)	(130.9)	(+ 5.5)	(1)	(8)	(0)	
196.448 C July 16	17133 17134	.982 .078	295.4 10.5	7.5 286.9	+25.8 + 8.9	5 4	28 12	185 f	209.354 G July 29	17135	.907 .885 .129	255.3 287.7 67.6						149 135
			(+4.0)	(287.7)	(+ 4.5)	(9)	(40)	(185)				(+9.6)	110.0	+ 8.4	0	13		
													(116.9)	(+ 5.6)	(0)	(13)	(284)	
197.239 K July 17	17134	.187	293.7	287.1	+ 8.9	3	18		210.337 C July 30	17135	.090 .905	306.4 75.0	108.1	+ 8.7	2	10		187
			(+4.4)	(277.2)	(+ 4.6)	(3)	(18)	(0)				(+10.0)	(103.9)	(+ 5.7)	(2)	(10)	(187)	
July 18	}	No spots or faculae							July 31	No spots or faculae								
July 19		No spots or faculae							No spots or faculae									
July 20		No spots or faculae							No spots or faculae									
201.304 G July 21		.909 .790	276.0 96.6					151 75	212.513 C Aug. 1	17136	.901 .890 .985	276.7 261.5 65.5			25	127	203 c	
			(+6.2)	(223.4)	(+ 4.9)	(0)	(0)	(226)				(+10.9)	353.7	+25.1	(25)	(127)	(485)	
													(75.2)	(+ 5.8)				
202.317 G July 22		.968	276.2					100	213.329 C Aug. 2	17136	.948	64.8	352.5	+25.7	26	136	402 c	
			(+6.6)	(210.0)	(+ 5.0)	(0)	(0)	(100)				(+11.2)	(64.4)	(+ 5.9)	(26)	(136)	(402)	
July 23	}	No spots or faculae							214.431 C Aug. 3	17136	.850 .842 .923	277.4 64.3 83.5	353.3	+24.8	15	107	315 c	
July 24		No spots or faculae											(+11.6)	(49.8)	(+ 6.0)	(15)	(107)	(597)
205.331 C July 25	17135	.879	82.7	108.5	+ 8.9	11	64	231 c	215.338 G Aug. 4	17136	.930 .729	276.6 61.2	353.2	+24.8	18	83	190 f	
			(+7.9)	(170.2)	(+ 5.3)	(11)	(64)	(231)				(+12.0)	(37.8)	(+ 6.0)	(18)	(83)	(444)	
206.712 G July 26	17135	.683	83.0	108.8	+ 8.7	4	28		216.446 C Aug. 5	17136	.567 .897	53.0 115.4	353.3	+25.2	12	66	124	
			(+8.5)	(151.9)	(+ 5.4)	(4)	(28)	(0)				(+12.4)	(23.2)	(+ 6.1)	(12)	(66)	(124)	
207.303 G July 27	17135	.611	83.1	106.4	+ 8.5	1	11		217.658 G Aug. 6	17136	.396	32.7	353.5	+25.4	18	110		
			(+8.7)	(144.1)	(+ 5.4)	(1)	(11)	(0)				(+12.9)	(7.1)	(+ 6.2)	(18)	(110)	(0)	

Group 17134. July 16 - 17. A close pair of tiny spots.

Group 17135. July 25 - 30. Small changing spots.

Group 17136. Aug. 1 - 9. Return of Group 17133. A small regular spot with a companion on August 2. After August 4 it begins to break up and die out.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																		
U. T.	Group No.	MEASURES		POSITION		AREA			U. T.	Group No.	MEASURES		POSITION		AREA			
		Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ			Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ	
1954			o	o	o				1954			o	o	o				
218.421	17136	.338	8.1	354.0	+25.7	15	72		231.391		.960	82.6					192	
G									G									
Aug.7			(+13.1)	(357.0)	(+ 6.2)	(15)	(72)	(0)	Aug.20			(+17.7)	(185.6)	(+ 6.9)	(0)	(0)	(192)	
219.400	17136	.359	331.3	355.0	+24.5	4	26		232.313	17138	.607	186.3	177.8	-30.1	5	23		
C		.903	43.7					174	G		.892	82.0					151	
Aug.8			(+13.5)	(344.1)	(+ 6.3)	(4)	(26)	(174)	Aug.21			(+18.0)	(173.4)	(+ 6.9)	(5)	(23)	(151)	
220.616	17136	.532	307.4	355.6	+24.5	5	34		233.292	17138	.647	201.1	176.1	-30.3	27	98		
G	17137	.497	169.0	322.1	-22.7	16	65		G									
Aug.9			(+14.0)	(328.0)	(+ 6.4)	(21)	(99)	(0)	Aug.22			(+18.3)	(160.5)	(+ 6.9)	(27)	(98)	(0)	
221.282		.950	240.8					137	234.327	17138	.727	215.2	175.7	-30.3	37	187		
G	17137	.490	186.6	322.7	-22.6	25	128		G									
Aug.10			(+14.2)	(319.2)	(+ 6.4)	(25)	(128)	(137)	Aug.23			(+18.6)	(146.8)	(+ 7.0)	(37)	(187)	(0)	
222.414		.780	296.6					101	235.465	17138	.832	226.1	175.5	-30.2	37	162	164 c	
G	17137	.562	211.5	322.6	-22.3	28	120		G									
Aug.11			(+14.6)	(304.2)	(+ 6.5)	(28)	(120)	(101)	Aug.24			(+18.9)	(131.7)	(+ 7.0)	(37)	(162)	(164)	
223.323		.875	294.9					178	236.343	17138	.903	231.4	174.7	-30.3	16	73	256 c	
C	17137	.656	224.7	321.9	-21.7	25	119		G									
Aug.12			(+14.9)	(292.2)	(+ 6.5)	(25)	(119)	(178)	Aug.25			(+19.2)	(120.1)	(+ 7.1)	(16)	(73)	(256)	
224.424		.931	297.3					344	237.324	17138	.961	233.3	172.8	-32.3	4	16	430 c	
G	17137	.809	236.2	324.1	-22.2	4	31	69 c	G									
Aug.13			(+15.3)	(277.7)	(+ 6.6)	(4)	(31)	(413)	Aug.26			(+19.5)	(107.2)	(+ 7.1)	(4)	(16)	(430)	
225.310		.945	300.1					189	238.318	1350a	.619	107.1	57.8	- 4.8	1	8		
G	17137	.899	240.9	324.0	-22.5	0	6	209 c	G									
Aug.14			(+15.6)	(266.0)	(+ 6.6)	(0)	(6)	(398)	Aug.27			(+19.7)	(94.1)	(+ 7.1)	(1)	(8)	(0)	
226.351		.960	243.0					370	Aug.28		No spots or faculæ							
G																		
Aug.15			(+16.0)	(252.2)	(+ 6.7)	(0)	(0)	(370)										
Aug.16									240.359		.951	63.8					165	
									G									
Aug.17									Aug.29			(+20.3)	(67.1)	(+ 7.1)	(0)	(0)	(165)	
Aug.18		No spots or faculæ								241.302		.883	63.6					206
Aug.19									G		.970	57.6					162	
									Aug.30			(+20.6)	(54.6)	(+ 7.2)	(0)	(0)	(368)	

Group 17137. Aug. 9 - 14. A small stream, appearing suddenly near the central meridian and dying out before reaching the limb.
 Group 17138. Aug.21 - 26. A short variable stream which is dying out as it passes round the limb.

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POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																		
U.T.	Group No.	MEASURES		POSITION		AREA			U.T.	Group No.	MEASURES		POSITION		AREA			
		Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae			Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae	
1954			o	o	o				1954			o	o	o				
242.303		.787	62.6					120	256.305	17139	.931	241.0	279.1	-23.6	0	9	150 c	
G		.910	57.7					149	G									
Aug.31			(+20.8)	(41.4)	(+ 7.2)	(0)	(0)	(269)	Sept.14			(+23.9)	(216.5)	(+ 7.2)	(0)	(9)	(150)	
Sept.1	}	No spots or faculae							257.430			.951	240.3					173
Sept.2		No spots or faculae							G	17140	.314	355.1	203.3	+25.3	0	4		
Sept.3		No spots or faculae							Sept.15			(+24.1)	(201.6)	(+ 7.2)	(0)	(4)	(173)	
246.716	1351a	.956	291.7	57.3	+22.8	0	8	118 c	258.455	17140	.402	322.9	203.6	+25.6	0	7		
G	17139	.941	117.3	278.3	-22.6	3	21	171 c	G									
Sept.4			(+21.9)	(343.1)	(+ 7.2)	(3)	(29)	(289)	Sept.16			(+24.3)	(188.1)	(+ 7.2)	(0)	(7)	(0)	
247.429		.984	292.7					123	259.370	17140	.519	307.1	203.0	+24.6	0	2		
G	17139	.913	120.5	274.5	-24.0	0	2	231 p	G									
Sept.5			(+22.1)	(333.7)	(+ 7.2)	(0)	(2)	(354)	Sept.17			(+24.4)	(176.0)	(+ 7.2)	(0)	(2)	(0)	
248.322	17139	.805	125.2	276.6	-22.6	0	4	123 c	Sept.18	No spots or faculae								
G																		
Sept.6			(+22.3)	(321.9)	(+ 7.2)	(0)	(4)	(123)	261.341		.935	261.1					56	
Sept.7	}	No spots or faculae							G		.814	294.3					77	
Sept.8		No spots or faculae							Sept.19			(+24.7)	(150.0)	(+ 7.1)	(0)	(0)	(133)	
251.510		.914	297.8					132	262.298		.899	293.3					102	
G		.795	304.2					112	G		.961	63.7					280	
Sept.9			(+23.0)	(279.8)	(+ 7.2)	(0)	(0)	(244)	Sept.20			(+24.9)	(137.4)	(+ 7.1)	(0)	(0)	(382)	
Sept.10	No spots or faculae							263.309		.916	64.6						374	
253.327		.931	68.8					177	264.313		.823	60.8					257	
G									G									
Sept.11			(+23.4)	(255.8)	(+ 7.2)	(0)	(0)	(177)	Sept.22			(+25.2)	(110.8)	(+ 7.0)	(0)	(0)	(257)	
254.326		.832	69.0					142	Sept.23	No spots or faculae								
G									Sept.24	No spots or faculae								
Sept.12			(+23.6)	(242.6)	(+ 7.2)	(0)	(0)	(142)		No spots or faculae								
255.301	17139	.843	234.7	278.7	-24.5	0	5	109 c	267.324	1351b	.912	135.0	18.2	-36.1	0	5	64 c	
G									C									
Sept.13			(+23.7)	(229.8)	(+ 7.2)	(0)	(5)	(109)	Sept.25			(+25.5)	(71.0)	(+ 6.9)	(0)	(5)	(64)	

Group 17139. Sept. 4 - 14. Intermittent. A pair of tiny spots on September 4; a single spot on the other days.
 Group 17140. Sept.15 - 17. A single spot on September 15 and 17; a pair on September 16.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																	
U. T.	Group No.	MEASURES		POSITION		AREA			U. T.	Group No.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae			Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae
1954			o		o		o		1954			o		o			
Sept.26		No spots or faculae							278.345		.765	208.9					146
								G		.781	46.1						205
269.403		.881	60.1						Oct.6	.884	51.1						123
G										(+26.3)	(285.6)	(+ 6.4)	(0)	(0)	(474)		
Sept.27			(+25.7)	(43.6)	(+ 6.9)	(0)	(0)	(146)									
270.416		.970	122.5						279.351	.793	220.2						198
G									G	.780	48.3						125
Sept.28			(+25.8)	(30.2)	(+ 6.8)	(0)	(0)	(172)	Oct.7	(+26.3)	(272.3)	(+ 6.4)	(0)	(0)	(323)		
271.330		.865	113.9						280.443	.893	228.5						284
G		.902	52.5						C								
Sept.29		.941	125.8						Oct.8	(+26.3)	(257.9)	(+ 6.3)	(0)	(0)	(284)		
			(+25.9)	(18.2)	(+ 6.8)	(0)	(0)	(667)									
272.109		.825	294.9						281.374	.920	230.0						267
K		.889	129.7						G								
Sept.30			(+26.0)	(7.9)	(+ 6.8)	(0)	(0)	(367)	Oct.9	(+26.4)	(245.7)	(+ 6.2)	(0)	(0)	(267)		
273.394		.922	295.2						282.301	.954	233.6						159
G		.814	137.1						C								
Oct.1			(+26.0)	(350.9)	(+ 6.7)	(0)	(0)	(365)	Oct.10	(+26.4)	(233.4)	(+ 6.2)	(0)	(0)	(159)		
274.410		.935	300.3						283.352	.951	299.8						136
G		.797	311.2	25.3	+36.2	2	11		G	.967	80.6						193
17141	1352a	.989	58.3	253.4	+32.3	0	23	380 c	Oct.11	(+26.4)	(219.6)	(+ 6.1)	(0)	(0)	(329)		
		.752	147.7														
Oct.2			(+26.1)	(337.5)	(+ 6.6)	(2)	(34)	(611)	284.343	.749	308.0	250.4	+31.9	0	10	93 c	
									G	.665	165.0	194.6	-33.8	0	5		
275.340		.559	218.8	347.0	-19.6	2	11		17144	.926	81.0	138.2	+10.7	0	19	381 c	
G	1352b	.948	57.7	253.5	+32.6	3	28	397 c	Oct.12	(+26.4)	(206.5)	(+ 6.1)	(0)	(34)	(474)		
Oct.3	17141		(+26.2)	(325.3)	(+ 6.6)	(5)	(39)	(397)									
276.344		.993	53.7	226.0	+36.7	0	16	195 p	285.351	.791	311.9						450
G		.905	55.0						G	.652	178.9	192.3	-34.5	4	24		
Oct.4	17142		(+26.2)	(312.0)	(+ 6.5)	(0)	(16)	(725)	Oct.13	.820	80.9						164
										(+26.3)	(193.2)	(+ 6.0)	(4)	(24)	(614)		
277.333		.921	53.7	232.8	+35.9	0	8	150 c	286.424	.882	308.1						554
C		.798	51.9						G	.678	195.7	191.9	-34.8	3	24		
Oct.5	17142		(+26.3)	(299.0)	(+ 6.5)	(0)	(8)	(535)	17143	.572	77.6	144.3	+11.9	1	5		
									17144	.870	63.1	119.4	+26.2	4	17	97 c	
									17145	(+26.3)	(179.0)	(+ 5.9)	(8)	(46)	(651)		

Group 17141. Oct. 2 - 12. Intermittent. A few small spots on October 2 and 3; a single spot on October 12.
 Group 17142. Oct. 4 - 5. Tiny spots.
 Group 17143. Oct.12 - 17. Two or three tiny spots.
 Group 17144. Oct.12 - 14. A pair of spots on October 12; a single spot on October 14.
 Group 17145. Oct.14 - 17. A pair of small spots of which only one remains on October 17.

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																	
U.T.	Group No.	MEASURES		POSITION		AREA			U.T.	Group No.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae			Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae
1954			°	°	°				1954			°	°	°			
287.607		.946	305.9					470	296.591		.941	297.3					80
G	17143	.751	210.1	190.8	-35.2	6	23	92 c	G	17147	.911	223.5					127
Oct.15	17145	.729	58.9	119.5	+26.2	9	37	64 c	Oct.24		.454	9.8	39.7	+31.5	5	12	(207)
			(+26.3)	(163.4)	(+ 5.8)	(15)	(60)	(626)				(+25.6)	(44.9)	(+ 5.1)	(5)	(12)	
288.305		.949	310.9					336	297.449		.458	350.3	38.8	+31.7	4	15	
C	17143	.818	218.9	192.9	-35.0	4	18	153 c	G	17147							
	17145	.620	54.5	120.2	+25.9	9	39		Oct.25			(+25.6)	(33.6)	(+ 5.0)	(4)	(15)	(0)
Oct.16	17146	.817	120.7	105.6	-20.8	3	9	110 f									
			(+26.3)	(154.2)	(+ 5.8)	(16)	(66)	(599)									
289.493	17143	.923	228.8	195.8	-34.4	0	5	129 f	298.348		.952	234.4					135
G	17145	.427	37.8	121.9	+25.1	1	7		G	17147	.516	332.8	37.9	+31.9	2	12	
Oct.17	17146	.662	130.7	106.3	-20.7	0	6		Oct.26			(+25.4)	(21.8)	(+ 4.9)	(2)	(12)	(135)
			(+26.2)	(138.6)	(+ 5.7)	(1)	(18)	(129)									
290.303		.929	228.0					172	299.501		.865	296.5					131
C	17147	.992	58.0	43.1	+32.4	0	34		G		.927	124.9					174
Oct.18		.882	64.1					85	Oct.27			(+25.3)	(6.6)	(+ 4.8)	(0)	(0)	(305)
			(+26.2)	(127.9)	(+ 5.6)	(0)	(34)	(257)									
291.396		.969	230.8					98	300.578		.933	293.4					115
G	17147	.946	57.8	42.7	+32.1	6	17	170 f	G		.881	130.2					227
Oct.19			(+26.1)	(113.5)	(+ 5.5)	(6)	(17)	(268)	Oct.28		.933	55.4					156
												(+25.2)	(352.4)	(+ 4.7)	(0)	(0)	(498)
292.464	17147	.866	55.9	41.9	+31.9	7	15	154 f	301.477		.888	304.6					138
G									G		.812	140.1					122
Oct.20			(+26.0)	(99.4)	(+ 5.4)	(7)	(15)	(154)	Oct.29		.875	52.6					109
												(+25.0)	(340.5)	(+ 4.6)	(0)	(0)	(369)
293.579		.814	277.7					209	302.384		.896	305.5					217
G	17147	.748	51.3	41.5	+31.7	7	10	124 f	G		.992	54.8					183
Oct.21		.919	51.8					89	Oct.30			(+24.9)	(328.5)	(+ 4.5)	(0)	(0)	(400)
			(+25.9)	(84.7)	(+ 5.3)	(7)	(10)	(422)									
294.400		.906	278.9					254	303.306		.953	302.7					122
G	17147	.760	299.6					59	C		.958	54.4					292
Oct.22		.649	45.5	41.1	+31.4	6	15	80 f	Oct.31			(+24.8)	(316.4)	(+ 4.4)	(0)	(0)	(414)
		.912	17.9					148	304.292		.882	125.8					134
			(+25.9)	(73.8)	(+ 5.3)	(6)	(15)	(541)	C		.900	51.0					206
									Nov.1			(+24.6)	(303.4)	(+ 4.3)	(0)	(0)	(340)
295.432		.966	281.0					104	305.388		.793	47.8					90
G	17147	.842	298.8					125	G		.936	51.0					241
Oct.23		.535	32.7	40.4	+31.6	2	12		Nov.2			(+24.4)	(288.9)	(+ 4.2)	(0)	(0)	(331)
			(+25.8)	(60.2)	(+ 5.2)	(2)	(12)	(229)									

Group 17146. Oct. 16 - 17. A tiny spot.
 Group 17147. Oct. 18 - 26. A persistent small spot.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																		
U.T.	Group No.	MEASURES		POSITION		AREA			U.T.	Group No.	MEASURES		POSITION		AREA			
		Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ			Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ	
1954			°	°	°				1954			°	°	°				
306.423		.875	48.8					227	314.300	17150	.667	207.5	192.9	-33.1	33	241		
G									C	17152	.910	114.6	109.4	-20.7	15	99	259 <i>f</i>	
Nov.3			(+24.2)	(275.3)	(+ 4.1)	(0)	(0)	(227)	Nov.11	1353a	.922	84.6	104.2	+ 6.3	0	14	93 <i>c</i>	
												(+22.6)	(171.4)	(+ 3.3)	(48)	(354)	(352)	
307.406		.841	47.8					145										
G		.910	37.4					109										
Nov.4		.946	122.4					134	315.513	G	.926	218.1					144	
			(+24.0)	(262.3)	(+ 4.0)	(0)	(0)	(388)			.885	308.8					164	
308.381		.892	229.3					121		17150	.765	220.7	191.7	-32.8	43	272	151 <i>c</i>	
G	17148	.536	313.3	274.9	+25.0	1	5		Nov.12	17151	.579	315.7	182.3	+27.1	3	24		
		.809	39.3					168		17152	.786	119.7	108.7	-20.7	7	28	161 <i>f</i>	
Nov.5		.915	60.6					113				(+22.3)	(155.4)	(+ 3.1)	(53)	(324)	(620)	
		.921	123.5					140										
			(+23.9)	(249.5)	(+ 3.9)	(1)	(5)	(542)	316.394	G	.920	307.2					171	
309.386		.679	304.3	274.4	+25.4	5	30			17150	.838	226.6	190.2	-33.0	40	223	166 <i>c</i>	
G	17148	.811	126.7					131		17153	.485	346.3	151.5	+31.0	4	22		
Nov.6			(+23.7)	(236.2)	(+ 3.8)	(5)	(30)	(131)	Nov.13	17152	.669	126.5	108.8	-20.9	3	15	91 <i>f</i>	
											.916	63.8					113	
												(+22.0)	(143.8)	(+ 3.0)	(47)	(260)	(541)	
Nov.7		No spots or faculæ								317.410	G	.807	297.2					107
										17150	.906	231.2	187.5	-33.0	26	143	207 <i>p</i>	
311.320		.925	296.8	277.3	+26.1	5	25	146 <i>c</i>		17153	.565	326.8	151.4	+30.8	4	23		
C	17148	.890	80.6					174	Nov.14	17152	.535	139.2	108.5	-21.1	1	5		
Nov.8			(+23.2)	(210.7)	(+ 3.6)	(5)	(25)	(320)				(+21.8)	(130.4)	(+ 2.9)	(31)	(171)	(314)	
312.378		.780	317.2					120	318.418	17150	.971	234.9	188.2	-33.0	30	171	343 <i>c</i>	
G	17148	.978	296.1	274.8	+26.2	0	21	99 <i>c</i>		17151	.913	298.7	181.1	+27.2	0	5	140 <i>c</i>	
	17149	.847	297.6	252.6	+25.1	2	17	102 <i>c</i>	Nov.15		.946	83.7					100	
	17150	.589	179.2	197.4	-32.5	6	33					(+21.5)	(117.1)	(+ 2.8)	(30)	(176)	(583)	
Nov.9		.793	79.7					105										
			(+23.0)	(196.8)	(+ 3.5)	(8)	(71)	(426)	319.293	C	.969	297.0					127	
									Nov.16			(+21.2)	(105.6)	(+ 2.7)	(0)	(0)	(127)	
313.385		.884	283.4					89										
G	17149	.953	295.3	255.3	+25.1	7	21	133 <i>c</i>										
	17150	.614	196.5	195.4	-32.5	23	193		320.434	G	.863	276.9					69	
	17151	.404	358.4	184.2	+27.1	2	17			17154	.867	132.5	40.2	-34.2	2	13	92 <i>c</i>	
Nov.10		.968	112.9	110.7	-21.2	8	61	121 <i>c</i>	Nov.17		.923	56.3					85	
			(+22.8)	(183.5)	(+ 3.4)	(40)	(292)	(343)				(+20.9)	(90.6)	(+ 2.5)	(2)	(13)	(246)	

Group 17148. Nov. 5 - 9. A small spot, not seen on November 7; a pair on November 9.
 Group 17149. Nov. 9 - 10. A pair of tiny spots on November 9; a single spot on November 10.
 Group 17150. Nov. 9 - 15. A pair of spots, appearing just past the central meridian, of which the follower is the most stable.
 Group 17151. Nov. 10 - 15. Intermittent. A few small spots.
 Group 17152. Nov. 10 - 14. A small spot, quickly dying out.
 Group 17153. Nov. 13 - 14. A pair of small spots.
 Group 17154. Nov. 17 - 19. A pair of tiny spots on November 17; a single spot on November 18 and 19.

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																	
U. T.	Group No.	MEASURES		POSITION		AREA			U. T.	Group No.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle.	Long.	Lat.	Umbrae	Whole Spots	Faculae			Dist.	Pos. Angle	Long.	Lat.	Umbrae	Whole Spots	Faculae
1954			o	o	o				1954			o	o				
321.480		.953	275.6					114	333.502		.909	287.3					104
G		.853	283.6					79	G		.887	247.2					97
	17154	.754	138.8	40.8	-32.5	0	3	71 f			.915	46.3					166
Nov.18		.889	78.6	(76.8)	(+ 2.4)	(0)	(3)	66	Nov.30			(+16.5)	(278.3)	(+ 0.9)	(0)	(0)	(367)
			(+20.6)					(330)									
322.291	17154	.694	146.4	38.9	-33.2	1	10	70sf	334.461	1354a	.827	237.4	316.3	-25.9	0	8	78 c
C									G		.853	41.3					128
Nov.19			(+20.4)	(66.1)	(+ 2.3)	(1)	(10)	(70)	Dec.1		.949	53.3	(265.7)	(+ 0.8)	(0)	(8)	(343)
												(+16.2)					
323.391		.812	237.8					122	335.514		.902	61.3					124
C									G		.920	125.6					260
Nov.20			(+20.1)	(51.6)	(+ 2.2)	(0)	(0)	(122)	Dec.2			(+15.7)	(251.8)	(+ 0.7)	(0)	(0)	(384)
324.279		.909	243.3					196	336.420		.850	96.9					61
C									G		.884	43.2					126
Nov.21			(+19.7)	(39.9)	(+ 2.1)	(0)	(0)	(196)			.888	129.4					328
									Dec.3		.921	61.6	(239.9)	(+ 0.6)	(0)	(0)	(652)
												(+15.4)					
325.289		.944	241.2					183	337.479		.771	135.1					105
C		.897	300.7					123	G		.889	130.9					122
Nov.22			(+19.4)	(26.6)	(+ 2.0)	(0)	(0)	(306)	Dec.4			(+15.0)	(225.9)	(+ 0.4)	(0)	(0)	(227)
Nov.23		No spots or faculae															
327.365		.934	233.5					116	338.467		.749	145.2					81
G		.967	57.9					135	G		.839	136.3					158
Nov.24			(+18.7)	(359.2)	(+ 1.7)	(0)	(0)	(251)	Dec.5			(+14.6)	(212.9)	(+ 0.3)	(0)	(0)	(239)
328.362		.934	229.3					146	339.456		.773	135.1					110
G		.928	57.4					152	G		.905	134.7					121
Nov.25			(+18.4)	(346.1)	(+ 1.6)	(0)	(0)	(298)	Dec.6			(+14.1)	(199.9)	(+ 0.2)	(0)	(0)	(231)
329.294		.933	59.0					230	Dec.7	No spots or faculae							
C																	
Nov.26			(+18.1)	(333.8)	(+ 1.5)	(0)	(0)	(230)	341.280		.871	239.4					85
									C			(+13.4)	(175.8)	(- 0.1)	(0)	(0)	(85)
									Dec.8								
330.369		.850	53.5					202	342.421		.901	250.2					136
G									G		.892	117.4					139
Nov.27			(+17.7)	(319.6)	(+ 1.3)	(0)	(0)	(202)	Dec.9		.925	59.6	(160.8)	(- 0.2)	(0)	(0)	(393)
												(+12.9)					
331.305		.756	51.4					125	Dec.10	No spots or faculae							
C		.933	58.4					144									
Nov.28			(+17.3)	(307.3)	(+ 1.2)	(0)	(0)	(269)									
332.295		.819	56.9					77	344.399		.868	311.6					98
C		.898	122.0					138	G		.802	225.0					198
Nov.29		.944	51.2					164	Dec.11		.923	60.5	(134.7)	(- 0.5)	(0)	(0)	(385)
			(+17.0)	(294.2)	(+ 1.1)	(0)	(0)	(379)				(+12.0)					

POSITIONS AND AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR																	
U.T.	Group No.	MEASURES		POSITION		AREA			U.T.	Group No.	MEASURES		POSITION		AREA		
		Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ			Dist.	Pos. Angle	Long.	Lat.	Umbræ	Whole Spots	Faculæ
1954			o	o	o				1954			o	o	o			
345.449		.881	230.5					160	355.446	17156	.465	21.0	338.8	+23.8	2	11	
G		.771	219.2					84	C								
Dec.12		.843	55.7					80	Dec.22		(+7.0)	(349.2)	(-1.9)	(2)	(11)	(0)	
			(+11.6)	(120.9)	(-0.6)	(0)	(0)	(324)									
346.411		.912	229.2					265	356.427	17156	.437	356.0	338.2	+23.8	9	79	
C									G								
Dec.13			(+11.2)	(108.2)	(-0.7)	(0)	(0)	(265)	Dec.23		(+6.5)	(336.3)	(-2.0)	(9)	(79)	(0)	
347.360		.924	228.5					257	357.401	17156	.498	328.5	339.8	+23.0	8	57	
C									G								
Dec.14			(+10.7)	(95.7)	(-0.8)	(0)	(0)	(257)	Dec.24		(+6.0)	(323.4)	(-2.1)	(8)	(57)	(0)	
348.465		.974	230.0					117	358.322	17156	.610	313.6	339.8	+22.9	4	17	
G	17155	.580	358.9	82.0	+34.3	39	182		C								
Dec.15			(+10.2)	(81.2)	(-1.0)	(39)	(182)	(117)	Dec.25		(+5.6)	(311.3)	(-2.2)	(4)	(17)	(0)	
349.430		.610	341.4	81.9	+34.1	71	341		359.101	17156	.715	304.9	340.2	+22.3	4	17	
G	17155	.924	124.3					139	K								
Dec.16			(+9.8)	(68.4)	(-1.1)	(71)	(341)	(139)	Dec.26		(+5.2)	(301.0)	(-2.3)	(4)	(17)	(0)	
350.588		.693	325.5	81.2	+33.6	67	323		360.501		.861	300.9					233
G	17155	.982	65.3					236	G								
Dec.17			(+9.3)	(53.2)	(-1.3)	(67)	(323)	(236)	Dec.27		(+4.6)	(282.6)	(-2.5)	(0)	(0)	(233)	
351.412		.776	316.9	81.6	+33.4	74	359	198 c	361.280		.926	297.4					214
G	17155	.935	63.0	336.2	+24.5	8	52	153 c	C								
Dec.18	17156	.890	41.9					118	Dec.28		(+4.2)	(272.3)	(-2.6)	(0)	(0)	(214)	
			(+8.9)	(42.3)	(-1.4)	(82)	(411)	(469)									
352.308		.859	311.5	81.0	+33.7	47	350	199 c	362.342		.958	299.5					136
C	17155								C	17157	.381	157.1	249.2	-23.1	6	34	
Dec.19	17156	.868	60.4	334.7	+24.5	6	45	86 c	Dec.29		.927	51.5					111
			(+8.5)	(30.5)	(-1.5)	(53)	(395)	(285)			(+3.7)	(258.4)	(-2.7)	(6)	(34)	(247)	
353.440		.939	306.6	79.8	+33.3	70	343	410 c	363.278	17157	.361	192.1	250.7	-23.4	51	282	
G	17155								C		.908	52.2					73
Dec.20	17156	.725	53.7	335.9	+24.1	6	36	65 c	Dec.30		.955	125.1					144
			(+7.9)	(15.6)	(-1.6)	(76)	(379)	(475)			(+3.2)	(246.0)	(-2.8)	(51)	(282)	(217)	
354.299		.982	304.3	79.8	+33.2	70	318	335 c	364.277	17157	.448	218.5	250.5	-23.2	65	437	
C	17155								C		.917	127.1					150
Dec.21			(+7.5)	(4.3)	(-1.7)	(70)	(318)	(335)	Dec.31		(+2.7)	(232.9)	(-2.9)	(65)	(437)	(150)	

Group 17155. Dec. 15 - 21. A regular spot followed by a few variable companions.

Group 17156. Dec. 18 - 26. One or two small changing spots, not seen on December 21.

Group 17157. Dec. 29 - 1956 Jan. 5. A stream, suddenly appearing near the central meridian, with a regular spot as leader.

The follower is a double spot, the two components separating after January 1.

ROYAL GREENWICH OBSERVATORY

*General Catalogue
of Groups of Sunspots*

For the year 1954

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954

GENERAL CATALOGUE OF GROUPS OF SUNSPOTS FOR THE YEAR 1954.

Groups of sunspots, lasting for two or more days, are numbered in the *first* column in continuation of the group-numbers given in 1953 and the previous years. Groups seen only once are not included in this catalogue but are given with a distinctive numeration in a following table on p. C 20.

The *second* column gives the corresponding Mount Wilson group number, as identified from the bi-monthly summaries of the Mount Wilson magnetic observations of sunspots published in *Publications of the Astronomical Society of the Pacific*.

The *third* column gives the U.T. of the central meridian passage of each group as deduced from its mean longitude (given in the *eleventh* column). For those groups which are in existence at the time of the central meridian passage of their longitude, the time is given to O^hO^m , corresponding to $O^{\circ}13$ of solar longitude. In other cases, in which groups disappear before or appear after the central meridian, the deduced time is given to O^h1 .

The *fourth* column gives the duration of each group in days. Intermittent groups, *i.e.*, groups which are not seen upon the photographs of every day between their first and last appearances, are indicated by a fraction, the numerator of which represents the number of days on which they are actually observed, the denominator being the number of days covering the extreme limits of observation.

The *sixth* and *eighth* columns, headed "Longitude from central meridian", give, for the days on which each group was first and last seen respectively, the heliographic longitude from the meridian passing through the centre of the Sun's disk at the time of observation, longitudes west of the centre being reckoned as positive.

The mean areas for umbrae and whole spots entered in the *ninth* and *tenth* columns are corrected for the effect of foreshortening and are expressed in millionths of the Sun's visible hemisphere.

The *eleventh* and *twelfth* columns give the mean heliographic position of the group in longitude and latitude respectively.

The *thirteenth* column gives reference to all groups contained in *Ledger I* and *Ledger II*; for a group in *Ledger I* both its recurrent series number and its order in the series are also given.

With reference to the identification both of recurrent and revival groups, it should be noted that longitudes are based on the ephemeris given in the *Nautical Almanac*, assuming a solar rotation period constant at all latitudes. After an interval of one rotation, recurring groups will, therefore, show in general - apart from any proper motion they may have of their own - apparent drifts in longitude varying in amount according to their respective latitudes. The following table, derived from the formula $\xi = 14.37 - 2.60 \sin^2 \phi$, gives the apparent drift in longitude appropriate to different latitudes after an interval of 27 days, a drift forwards corresponding to an increase in heliographic longitude.

Latitude.....	Drift forwards.	Latitude.....	Drift backwards.
0° ..	.. 5°	20° ..	.. 3°
5° ..	.. 4.5	25° ..	.. 7.5
10° ..	.. 3	30° ..	.. 12.5
15° ..	.. 0.5	35° ..	.. 18

GENERAL CATALOGUE OF SUNSPOTS												
No. of Group		U. T. of Central Meridian Passage	Duration in Days	First Seen		Last Seen		Mean Area Corrected for Foreshortening		Mean Position of Group		Reference to Ledger
G	Mt. W			Date	Long. from Central Meridian	Date	Long. from Central Meridian	Umbræ	Whole Spots	Longitude	Latitude	
		1954		1954	°	1954	°			°	°	
17125	11170	Feb. 6.9	3	Feb. 9	+33	Feb. 11	+58	2	13	235.2	+30.2	II
26	71	26.1	4	Mar. 1	+43	Mar. 4	+83	19	110	342.1	-24.1	
27	72	Mar. 17.14	12	12	-62	23	+80	73	403	91.3	- 8.2	
28	..	22.0	3	17	-59	19	-36	2	7	27.6	+ 7.1	
29	73	Apr. 12.6	4	Apr. 6	-82	Apr. 9	-40	3	16	102.6	- 4.9	
17130	11175	12.4	2	15	+39	16	+51	2	11	104.4	- 3.0	I 1660 (1)
31	79	May 30.6	4	June 1	+26	June 4	+62	2	10	187.1	+13.8	
32	81	July 6.8	2	July 8	+19	July 9	+33	1	8	54.8	+24.2	
33	82	10.6	5	12	+20	16	+80	4	23	5.0	+25.7	
34	84	16.50	2	16	- 1	17	+10	4	15	287.0	+ 8.9	
17135	11185	30.02	6	25	-62	30	+ 4	3	22	108.1	+ 8.5	II
36	86	Aug. 7.67	9	Aug. 1	-82	Aug. 9	+28	14	79	353.8	+25.1	I 1660 (2)
37	87	10.00	6	9	- 6	14	+58	16	78	322.9	-22.3	II
38	88	21.2	6	21	+ 4	26	+66	21	93	175.4	-30.6	II
39	90	Sept. 9.69	5/11	Sept. 4	-65	Sept. 14	+63	0	4	277.4	-23.5	II
17140	11191	15.3	3	15	+ 2	17	+27	0	4	203.3	+25.2	II
41	96	Oct. 8.90	3/11	Oct. 2	-84	Oct. 12	+44	0	3	252.0	+32.2	
42	..	10.3	2	4	-86	5	-66	0	8	232.8	+35.9	
43	98	13.36	6	12	-12	17	+57	3	16	193.0	-34.6	
44	11200	17.3	2/3	12	-68	14	-35	0	8	141.2	+11.3	
17145	11201	18.9	4	14	-60	17	-17	6	25	120.2	+25.8	II
46	02	20.0	2	16	-49	17	-32	2	8	106.0	-20.8	
47	03	24.93	9	18	-85	26	+16	5	14	40.5	+31.7	
48	04	Nov. 3.4	4/5	Nov. 5	+25	Nov. 9	+78	2	16	275.4	+25.7	
49	05	5.0	2	9	+56	10	+72	4	19	254.0	+25.1	
17150	11206	9.7	7	9	+ 1	15	+71	29	182	191.9	-32.8	II
51	07	10.5	3/6	10	+ 1	15	+64	1	8	182.5	+27.1	II
52	08	16.0	5	10	-73	14	-22	7	42	109.2	-20.9	
53	09	12.8	2	13	+ 8	14	+21	4	22	151.4	+30.9	
54	10	21.3	3	17	-50	19	-27	1	9	40.0	-33.3	
17155	11212	Dec. 15.5	7	Dec. 15	+ 1	Dec. 21	+76	63	317	81.0	+33.7	I 1661 (1)
56	13	23.30	8/9	18	-66	26	+39	5	35	338.0	+23.6	II
57	14	29.92	8	29	- 9	Jan. 5	+80	46	282	250.7	-23.3	I 1662 (1)

GENERAL CATALOGUE OF SUNSPOTS

SUNSPOTS SEEN ON ONE DAY ONLY

The groups of sunspots tabulated below were seen on one day only and appear in the *Daily Results* with a distinctive numeration, comprising the number of the rotation during which each was observed and a letter given in order of appearance. These short-lived groups are usually composed of one or two very small spots. The deduced time of central meridian passage of each spot is given in the fourth column of the table.

No. of Group	Date	Longitude from Central Meridian	U.T. of Central Meridian Passage	Area Corrected for Foreshortening		Position of Group		No. of Group	Date	Longitude from Central Meridian	U.T. of Central Meridian Passage	Area Corrected for Foreshortening		Position of Group	
				Umbræ	Whole Spots	Longitude	Latitude					Umbræ	Whole Spots	Longitude	Latitude
	1954	o	1954			o	o		1954	o	1954			o	o
1342a	Jan. 11	-35.8	Jan. 14.2	0	6	187.6	- 2.7	1349a	July 14	+31.6	July 12.1	1	5	344.6	+ 2.2
b	18	-50.1	22.2	0	4	81.9	-37.8								
c	24	-21.5	26.0	2	12	31.2	+ 8.9								
								1350a	Aug. 27	-36.3	Aug. 30.1	1	8	57.8	- 4.8
1345a	Apr. 9	+31.0	Apr. 7.1	0	1	175.5	- 0.8								
b	20	+29.3	18.1	1	10	29.9	+ 6.0	1351a	Sept. 4	+74.2	Aug. 30.1	0	8	57.3	+22.8
								b	25	-52.8	Sept.29.3	0	5	18.2	-36.1
1346a	May 9	+70.5	May 4.0	0	14	180.0	+33.3								
b	14	- 0.6	14.2	3	11	45.3	+ 5.0	1352a	Oct. 2	+47.8	Sept.28.8	2	11	25.3	+36.2
								b	3	+21.7	Oct. 1.7	2	11	347.0	-19.6
1347a	June 4	+54.4	May 31.2	0	9	179.9	+28.5								
								1353a	Nov. 11	-67.2	Nov. 16.4	0	14	104.2	+ 6.3
1348a	June 22	+63.0	June 17.6	0	6	308.9	+11.8								
b	July 3	-45.8	July 6.8	6	28	55.4	-20.9	1354a	Dec. 1	+50.6	Nov. 27.6	0	8	316.3	-25.9

Greenwich Number	Mt. Wilson Number	Greenwich Number	Mt. Wilson Number
1342a	11169	1349a	11183
1345a	11174	1350a	11189
1346b	11177	1352a	11195
1348b	11180		

REVIVAL GROUPS OF SUNSPOTS

Groups of spots occupying the same heliographic position in consecutive disk passages (partial or complete) but with definite breaks in their history are termed 'Revivals'. Such groups have been abstracted from the preceding catalogue and are grouped in series in the following table. When a 'Recurrent' series i.e. *Ledger I* forms part of a 'Revival' series, a reference is given in the last column of the table. Groups that are given in detail in *Ledger II* are also indicated.

No.	No. of Group	U.T. of Central Meridian Passage	Rotation	Duration in Days	First Seen		Last Seen		Area	Mean Position		Reference to Ledger
					Date	Longitude from Central Meridian	Date	Longitude from Central Meridian		Longitude	Latitude	
1	17143 50	1954 Oct. 13.36	1352 1353	6 7	1954 Oct. 12	° -12	1954 Oct. 17	° +57	16 182	° 193	° -35	II II
		Nov. 9.7			Nov. 9	+1	Nov. 15	+71		192	-33	
2	17146 52	Oct. 20.0	1352 1353	2 5	Oct. 16	-49	Oct. 17	-32	8 42	106	-21	
		Nov. 16.0.			Nov. 10	-73	Nov. 14	-22		109	-21	

ROYAL GREENWICH OBSERVATORY

Ledgers of Groups of Sunspots

For the year 1954

Ledger I :

Recurrent Groups

Ledger II :

Non-Recurrent Groups

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954

LEDGERS OF GROUPS OF SUNSPOTS FOR THE YEAR 1954.

LEDGER I. - RECURRENT GROUPS

LEDGER II. - NON-RECURRENT GROUPS

The time (U.T.) at which the photograph was taken is expressed in the *first* column by the day of the year and decimal of a day reckoned from Greenwich mean midnight.

The place where the photograph was taken is also indicated in the *first* column. A photograph taken at Greenwich is indicated by the letter G, and those taken at the Cape and Kodaikanal by the letters C and K respectively.

The projected area of the umbrae and whole spots, given in the *second* and *third* columns, 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 area corrected for foreshortening given in the *fourth* and *fifth* columns is expressed in millionths of the Sun's visible hemisphere.

The longitude given in the *sixth* column is based on the ephemeris given in the *Nautical Almanac*, assuming a daily sidereal motion of $14^{\circ}.18$, due to the Sun's rotation, constant at all latitudes; this corresponds to Carrington's assumed rotation period of 25.38 days.

The proper motion given in the *seventh* column is derived from the difference of longitude thus computed from the measured positions on any given day and the first day on which the group of spots or single spot is visible, after the correction for the motion appropriate to the latitude has been applied according to the formula, $\xi = 14^{\circ}.37 - 2^{\circ}.60 \sin^2 \phi$. A *plus* sign (increasing longitude) indicates a motion forwards, a *minus* sign a motion backwards relative to the position on the first day.

The remaining columns correspond to those with similar headings in the preceding section.

When a group is 80° or more from the Sun's central meridian, the measures for that day are not included in taking the mean area or the mean longitude and latitude of the group. In such cases of close proximity to the Sun's limb, the addition of brackets denotes that only part of the group is visible.

LEDGER I. - RECURRENT GROUPS OF SUNSPOTS																	
Date U.T. Place	Projected Area		Corrected Area		Longitude and Proper Motion	Latitude	Long. from C.M.	Date U.T. Place	Projected Area		Corrected Area		Longitude and Proper Motion	Latitude	Long. from C.M.		
	Umbræ	Whole Spots	Umbræ	Whole Spots					Umbræ	Whole Spots	Umbræ	Whole Spots					
<p>No. 1660. Latitude +25°4</p> <p>Group 17133 in Rotation 1349 " 17136 " " 1350</p> <p>Group 17133. July 12-16. A small spot with a tiny companion on July 13.</p>								<p>No. 1661. Group 17155 - <i>continued</i></p> <p>Spot a</p>									
192.334 G	2	14	1	8	2.5	0.0	+26.1	+20.4	348.465 G	56	165	34	101	83.5	0.0	+33.4	+2.3
193.299 G	5	37	3	24	2.4	+0.2	+26.2	+33.0	349.430 G	82	358	52	226	83.8	+1.0	+33.6	+15.4
194.540 G	5	23	4	20	5.6	+3.7	+25.5	+52.6	350.588 G	78	326	55	218	83.6	+1.6	+33.1	+30.4
195.305 G	5	30	6	35	6.8	+5.2	+25.0	+64.0	351.412 G	78	369	62	295	82.8	+1.3	+33.2	+40.5
196.448 C	2	11	5	28	7.5	+6.2	+25.8	+79.8	352.308 C	38	293	38	293	82.6	+1.8	+33.2	+52.1
Means	..	..	4	23	5.0	..	+25.7	..	353.440 G	43	200	65	302	81.2	+1.1	+33.0	+65.6
<p>Group 17136. Aug. 1-9. A small regular spot with a companion on August 2. After August 4 it begins to break up and die out.</p>								<p>Group 17161. 1955 Jan. 7-19. A nearly regular spot with a companion touching the leading edge for most of the disk-passage.</p>									
212.513 C	9	45	25	127	353.7	..	+25.1	-81.5	6.279 C	46	274	122	729	66.9	-0.8	+36.0	-73.8
213.329 C	18	89	26	136	352.5	-4.0	+25.7	-71.9	7.286 C	107	671	156	980	65.7	-1.3	+36.1	-61.7
214.431 C	16	116	15	107	353.3	-2.8	+24.8	-56.5	8.491 G	160	883	157	871	64.2	-2.0	+36.1	-47.3
215.338 G	25	114	18	83	353.2	-2.7	+24.8	-44.6	9.282 C	130	984	108	817	63.8	-1.9	+35.9	-37.3
216.446 C	20	109	12	66	353.3	-2.3	+25.2	-29.9	10.283 C	178	1120	128	806	63.0	-2.0	+35.6	-24.9
217.658 G	34	204	18	110	353.5	-1.7	+25.4	-13.6	11.279 C	184	1016	123	681	61.8	-2.5	+35.5	-13.0
218.421 G	28	135	15	72	354.0	-1.0	+25.7	-3.0	12.282 C	142	947	92	616	61.5	-2.1	+35.4	-0.1
219.400 C	8	47	4	26	355.0	+0.3	+24.5	+10.9	13.503 G	160	834	108	560	60.5	-2.2	+35.4	+15.0
220.616 G	9	57	5	34	355.6	+1.2	+24.5	+27.6	14.283 C	119	788	86	569	59.4	-2.8	+35.2	+24.1
Means	..	..	14	79	353.8	..	+25.1	..	15.285 C	117	650	95	526	57.5	-4.0	+35.3	+35.4
<p>No. 1661. Latitude +35°6</p> <p>Group 17155 in Rotation 1354 " 17161 " " 1355 " 17169 " " 1356</p> <p>Group 17155. Dec. 15-21. A regular spot, a, followed by a few small variable companions.</p>								<p>Group 17169. 1955 Feb. 6-16. A group of changing spots.</p>									
348.465 G	65	297	39	182	82.0	0.0	+34.3	+0.8	16.483 G	86	588	90	617	56.4	-4.3	+35.1	+50.1
349.430 G	112	540	71	341	81.9	+0.6	+34.1	+13.5	17.419 G	56	274	79	386	54.4	-5.6	+35.1	+60.4
350.588 G	95	480	67	323	81.2	+0.7	+33.6	+28.0	18.457 G	26	151	73	426	54.1	-5.2	+35.6	+73.8
351.412 G	94	455	74	359	81.6	+1.6	+33.4	+39.3	Means	..	..	109	660	60.7	..	+35.6	..
352.308 C	48	356	47	350	81.0	+1.7	+33.7	+50.5	36.410 G	13	67	28	145	36.0	-10.9	+37.0	-67.9
353.440 G	47	233	70	343	79.8	+1.2	+33.3	+64.2	37.295 C	16	103	21	138	36.5	-9.8	+37.7	-55.8
354.299 C	25	117	70	318	79.8	+1.8	+33.2	+75.5	38.456 G	13	135	13	136	33.7	-11.8	+37.8	-43.3
Means	..	..	63	317	81.0	..	+33.7	..	39.301 C	25	208	22	181	32.3	-12.6	+38.5	-33.6
<p>No. 1661. Latitude +35°6</p> <p>Group 17155 in Rotation 1354 " 17161 " " 1355 " 17169 " " 1356</p> <p>Group 17155. Dec. 15-21. A regular spot, a, followed by a few small variable companions.</p>								<p>Group 17169. 1955 Feb. 6-16. A group of changing spots.</p>									
348.465 G	65	297	39	182	82.0	0.0	+34.3	+0.8	40.453 G	51	352	38	265	31.0	-13.1	+38.1	-19.7
349.430 G	112	540	71	341	81.9	+0.6	+34.1	+13.5	41.391 G	47	316	33	224	29.5	-14.0	+37.9	-8.8
350.588 G	95	480	67	323	81.2	+0.7	+33.6	+28.0	42.415 G	35	176	24	124	29.1	-13.7	+37.9	+4.2
351.412 G	94	455	74	359	81.6	+1.6	+33.4	+39.3	43.396 G	31	140	23	103	28.4	-13.7	+37.3	+16.5
352.308 C	48	356	47	350	81.0	+1.7	+33.7	+50.5	44.293 C	19	90	15	72	27.6	-13.9	+37.8	+27.5
353.440 G	47	233	70	343	79.8	+1.2	+33.3	+64.2	45.422 G	9	31	9	31	28.5	-12.2	+37.4	+43.2
354.299 C	25	117	70	318	79.8	+1.8	+33.2	+75.5	46.404 G	4	17	5	23	27.7	-12.3	+37.2	+55.4
Means	..	..	63	317	81.0	..	+33.7	..	Means	..	..	21	131	30.9	..	+37.7	..

LEDGER I. - RECURRENT GROUPS OF SUNSPOTS

Date U.T. Place	Projected Area		Corrected Area		Longitude and Proper Motion	Latitude	Long. from C.M.	Date U.T. Place	Projected Area		Corrected Area		Longitude and Proper Motion	Latitude	Long. from C.M.		
	Umbræ	Whole Spots	Umbræ	Whole Spots					Umbræ	Whole Spots	Umbræ	Whole Spots					
<p>No. 1662. Latitude -23°6</p> <p>Group 17157 in Rotation 1365 " 17162 " " 1368</p> <p>Group 17157. Dec. 29-1955 Jan. 5. A stream, suddenly appearing near the central meridian, with a regular spot, <i>a</i>, as leader. The follower is a double spot, the two components separating after January 1.</p>								<p>No. 1662. Group 17157 - <i>continued</i></p> <p>Spot <i>a</i></p>									
362.342 C	8	29	4	16	250.5	0.0	-24.0	- 7.9	362.342 C	8	29	4	16	250.5	0.0	-24.0	- 7.9
363.278 C	50	289	27	156	252.6	+2.3	-24.0	+ 6.6	363.278 C	50	289	27	156	252.6	+2.3	-24.0	+ 6.6
364.277 C	58	389	33	222	253.5	+3.4	-23.3	+20.6	364.277 C	58	389	33	222	253.5	+3.4	-23.3	+20.6
0.285 C	56	349	36	227	254.7	+4.9	-23.2	+35.1	0.285 C	56	349	36	227	254.7	+4.9	-23.2	+35.1
1.286 C	42	196	33	155	254.6	+5.0	-23.4	+48.2	1.286 C	42	196	33	155	254.6	+5.0	-23.4	+48.2
2.283 C	25	178	28	196	255.0	+5.6	-23.8	+61.7	2.283 C	25	178	28	196	255.0	+5.6	-23.8	+61.7
3.282 C	10	73	20	143	255.5	+6.3	-23.8	+75.4	3.282 C	10	73	20	143	255.5	+6.3	-23.8	+75.4
<p>362.342 C 12 62 6 34 249.2 0.0 -23.1 - 9.2</p> <p>363.278 C 96 526 51 282 250.7 +1.7 -23.4 + 4.7</p> <p>364.277 C 116 780 65 437 250.5 +1.7 -23.2 +17.6</p> <p>0.285 C 102 634 64 398 251.5 +3.0 -23.3 +31.9</p> <p>1.286 C 75 416 56 307 250.0 +1.7 -23.1 +43.6</p> <p>2.283 C 48 291 48 297 251.3 +3.2 -23.5 +58.0</p> <p>3.282 C 18 132 31 221 251.7 +3.8 -23.8 +71.6</p> <p>4.282 C 0 8 (0 21 246.6 .. -23.3) +79.6</p>								<p>Group 17162. 1955 Jan. 20-26. A small spot, not seen on Jan. 26.</p>									
19.284 C	4	19	7	34	254.7	+9.2	-23.7	-74.7	19.284 C	4	19	7	34	254.7	+9.2	-23.7	-74.7
20.342 C	4	25	4	26	254.4	+9.1	-23.8	-61.1	20.342 C	4	25	4	26	254.4	+9.1	-23.8	-61.1
21.328 C	4	31	3	24	253.9	+8.8	-23.5	-48.6	21.328 C	4	31	3	24	253.9	+8.8	-23.5	-48.6
22.273 C	4	17	3	11	253.6	+8.8	-23.4	-36.5	22.273 C	4	17	3	11	253.6	+8.8	-23.4	-36.5
23.287 C	8	25	5	14	253.0	+8.4	-23.3	-23.7	23.287 C	8	25	5	14	253.0	+8.4	-23.3	-23.7
24.378 G	0	0	0	0	..	..	..	..	24.378 G	0	0	0	0	..	..	..	..
25.410 G	4	22	2	12	252.3	+8.2	-24.9	+ 3.5	25.410 G	4	22	2	12	252.3	+8.2	-24.9	+ 3.5
Means	..	..	46	282	250.7	..	-23.3	..	Means	..	..	3	17	253.6	..	-23.8	..

LEDGER II. - NON-RECURRENT GROUPS OF SUNSPOTS																	
Date U.T. Place	Projected Area		Corrected Area		Longitude and Proper Motion	Latitude	Long. from C.M.	Date U.T. Place	Projected Area		Corrected Area		Longitude and Proper Motion	Latitude	Long. from C.M.		
	Umbræ Spots	Whole Spots	Umbræ Spots	Whole Spots					Umbræ Spots	Whole Spots							
Group 17127								Group 17135									
Mar. 12-23. A stream of normal type, developing from a pair of small spots, a and b, on March 12. The intermediate spots have died out by March 21.								July 25-30. Small changing spots.									
70.600 G	6	35	6	36	89.7	0.0	-8.9	-61.5	205.331 C	11	63	11	64	108.5	0.0	+8.9	-61.7
71.303 C	86	376	69	299	90.2	+0.4	-9.0	-51.7	206.712 G	7	41	4	28	108.8	+0.1	+8.7	-43.1
72.456 G	149	828	91	507	91.9	+1.9	-8.5	-34.8	207.303 G	2	18	1	11	106.4	-2.4	+8.5	-37.7
73.302 C	177	1143	97	627	91.6	+1.5	-8.3	-23.9	208.302 G	2	14	1	8	106.6	-2.3	+8.0	-24.3
74.307 C	235	1396	120	712	91.1	+0.9	-8.3	-11.2	209.354 G	0	25	0	13	110.0	+1.0	+8.4	-6.9
75.409 G	245	1171	122	585	90.0	-0.4	-8.5	+2.2	210.337 C	4	20	2	10	108.1	-1.1	+8.7	+4.2
76.303 C	165	897	86	464	90.4	-0.1	-8.3	+14.4	Means	..	..	3	22	108.1	..	+8.5	..
77.303 C	154	727	88	419	92.0	+1.4	-7.8	+29.2	Group 17137								
78.305 C	86	456	59	311	91.6	+0.8	-8.3	+42.0	Aug. 9-14. A small stream, appearing suddenly near the central meridian and dying out before reaching the limb.								
79.420 G	38	317	36	296	92.1	+1.2	-8.0	+57.2	220.616 G	28	113	16	65	322.1	0.0	-22.7	-5.9
80.645 G	13	88	27	175	93.9	+2.8	-6.5	+75.2	221.282 G	45	224	25	128	322.7	+0.7	-22.6	+3.5
81.406 G	0	4	(0	10	88.2	..	-9.7)	+79.5	222.414 G	46	197	28	120	322.6	+0.8	-22.3	+18.4
Means	..	..	73	403	91.3	..	-8.2	..	223.323 C	38	180	25	119	321.9	+0.3	-21.7	+29.7
Spot a								224.424 G	5	36	4	31	324.1	+2.7	-22.2	+46.4	
70.600 G	4	22	4	22	90.6	0.0	-8.5	-60.6	225.310 G	0	5	0	6	324.0	+2.8	-22.5	+58.0
71.303 C	60	278	47	217	91.4	+0.7	-7.7	-50.5	Means	..	..	16	78	322.9	..	-22.3	..
72.456 G	101	491	61	295	93.0	+2.1	-7.9	-33.7	Group 17138								
73.302 C	113	659	61	356	93.2	+2.2	-7.2	-22.3	Aug. 21-26. A short variable stream which is dying out as it passes round the limb.								
74.307 C	137	698	70	356	93.5	+2.4	-6.4	-8.8	232.313 G	9	37	5	23	177.8	0.0	-30.1	+4.4
75.409 G	77	345	38	172	94.5	+3.2	-5.5	+6.7	233.292 G	41	151	27	98	176.1	-1.2	-30.3	+15.6
76.303 C	64	261	34	138	95.4	+4.0	-5.3	+19.4	234.327 G	51	258	37	187	175.7	-1.1	-30.3	+28.9
77.303 C	64	278	38	167	96.3	+4.8	-5.6	+33.5	235.465 G	41	180	37	162	175.5	-0.8	-30.2	+43.8
78.305 C	43	198	31	145	96.3	+4.6	-5.9	+46.7	236.343 G	14	63	16	73	174.7	-1.1	-30.3	+54.6
79.420 G	18	135	19	140	96.7	+4.9	-5.4	+61.8	237.324 G	2	9	4	16	172.8	-2.6	-32.3	+65.6
80.645 G	9	57	21	131	96.7	+4.7	-5.2	+78.0	Means	..	..	21	93	175.4	..	-30.6	..
Spot b								Group 17139									
70.600 G	2	13	2	14	88.0	0.0	-9.7	-63.2	Sept. 4-14. Intermittent. A pair of tiny spots on September 4; a single spot on the other days.								
71.303 C	26	98	22	82	88.0	-0.1	-8.6	-53.9	246.716 G	2	14	3	21	278.3	0.0	-22.6	-64.8
72.456 G	48	337	30	212	89.3	+1.0	-9.6	-37.4	247.429 G	0	2	0	2	274.5	-3.6	-24.0	-59.2
73.302 C	64	484	36	271	88.6	+0.2	-9.9	-26.9	248.322 G	0	5	0	4	276.6	-1.3	-22.6	-45.3
74.307 C	98	698	50	356	88.6	+0.1	-9.7	-13.7	249.312 G	0	0	0	0	..	..	..	..
75.409 G	133	614	66	307	88.0	-0.7	-10.0	+0.2									
76.303 C	86	531	44	271	88.3	-0.5	-9.8	+12.3									
77.303 C	77	389	43	218	88.7	-0.2	-9.9	+25.9									
78.305 C	39	245	25	157	88.7	-0.4	-10.0	+39.1									
79.420 G	18	164	15	139	89.3	+0.1	-9.7	+54.4									
80.645 G	4	31	6	44	88.8	-0.6	-9.1	+70.1									
81.406 G	0	4	0	10	88.2	-1.3	-9.7	+79.5									

LEDGER II. - NON-RECURRENT GROUPS OF SUNSPOTS																	
Date U.T. Place	Projected Area		Corrected Area		Longitude and Proper Motion	Latitude	Long. from C.M.	Date U.T. Place	Projected Area		Corrected Area		Longitude and Proper Motion	Latitude	Long. from C.M.		
	Umbræ	Whole Spots	Umbræ	Whole Spots					Umbræ	Whole Spots	Umbræ	Whole Spots					
Group 17139 - <i>continued</i>								Group 17147 - <i>continued</i>									
250.321 C	0	0	0	0	..	..	..	250.321 C	0	0	0	0	..	..	..
251.510 G	0	0	0	0	..	..	..	251.510 G	0	0	0	0	..	..	..
252.309 C	0	0	0	0	..	..	..	252.309 C	0	0	0	0	..	..	..
253.327 G	0	0	0	0	..	..	..	253.327 G	0	0	0	0	..	..	..
254.326 G	0	0	0	0	..	..	..	254.326 G	0	0	0	0	..	..	..
255.301 G	0	5	0	5	278.7	+2.3	-24.5	+48.9	255.301 G	0	5	0	5	278.7	+2.3	-24.5	+48.9
256.305 G	0	7	0	9	279.1	+2.9	-23.6	+62.6	256.305 G	0	7	0	9	279.1	+2.9	-23.6	+62.6
Means	..	..	0	4	277.4	..	-23.5	..	Means	..	..	5	14	40.5	..	+31.7	..
Group 17141								Group 17150									
Oct. 2-12. Intermittent. A few small spots on October 2 and 3; a single spot on October 12.								Nov. 9-15. A pair of spots, appearing just past the central meridian, of which the follower is the most stable.									
274.410 G	0	7	0	23	253.4	..	+32.3	-84.1	312.378 G	9	53	6	33	197.4	0.0	-32.5	+0.6
275.340 G	2	18	3	28	253.5	0.0	+32.6	-71.8	313.385 G	36	304	23	193	195.4	-1.4	-32.5	+11.9
276.344 G	0	0	0	0	..	..	..	..	314.300 C	53	384	33	241	192.9	-3.4	-33.1	+21.5
277.333 C	0	0	0	0	..	..	..	..	315.513 G	55	349	43	272	191.7	-3.9	-32.8	+36.3
278.345 G	0	0	0	0	..	..	..	..	316.394 G	44	247	40	223	190.2	-4.9	-33.0	+46.4
279.351 G	0	0	0	0	..	..	..	..	317.410 G	22	123	26	143	187.5	-7.0	-33.0	+57.1
280.443 C	0	0	0	0	..	..	..	..	318.418 G	15	85	30	171	188.2	-5.7	-33.0	+71.1
281.374 G	0	0	0	0	..	..	..	..	Means	..	..	29	182	191.9	..	-32.8	..
282.301 C	0	0	0	0	..	..	..	..	Group 17151								
283.352 G	0	0	0	0	..	..	..	..	Nov. 10-15. Intermittent. A few small spots.								
284.343 G	0	13	0	10	250.4	+1.8	+31.9	+43.9	313.385 G	4	31	2	17	184.2	0.0	+27.1	+0.7
Means	..	..	0	3	252.0	..	+32.2	..	314.300 C	0	0	0	0	..	..	..	..
Group 17143								Group 17151									
Oct. 12-17. Two or three tiny spots.								Nov. 10-15. Intermittent. A few small spots.									
284.343 G	0	7	0	5	194.6	0.0	-33.8	-11.9	315.513 G	6	39	3	24	182.3	-1.2	+27.1	+26.9
285.351 G	6	36	4	24	192.3	-1.6	-34.5	-0.9	316.394 G	0	0	0	0	..	..	..	..
286.424 G	4	36	3	24	191.9	-1.4	-34.8	+12.9	317.410 G	0	0	0	0	..	..	..	..
287.607 G	9	31	6	23	190.8	-1.7	-35.2	+27.4	318.418 G	0	4	0	5	181.1	-1.3	+27.2	+64.0
288.305 C	4	21	4	18	192.9	+0.9	-35.0	+38.7	Means	..	..	1	8	182.5	..	+27.1	..
289.493 G	0	4	0	5	195.8	+4.5	-34.4	+57.2	Group 17156								
Means	..	..	3	16	193.0	..	-34.6	..	Dec. 18-26. One or two small changing spots, not seen on December 21.								
Group 17147								Group 17156									
Oct. 18-26. A persistent small spot.								Dec. 18-26. One or two small changing spots, not seen on December 21.									
290.303 C	0	9	0	34	43.1	..	+32.4	-84.8	351.412 G	6	37	8	52	336.2	0.0	+24.5	-66.1
291.396 G	4	11	6	17	42.7	0.0	+32.1	-70.8	352.308 C	6	44	6	45	334.7	-1.3	+24.5	-55.8
292.464 G	7	15	7	15	41.9	-0.2	+31.9	-57.5	353.440 G	8	50	6	36	335.9	+0.2	+24.1	-39.7
293.579 G	9	13	7	10	41.5	0.0	+31.7	-43.2	354.299 C	0	0	0	0	..	..	..	..
294.400 G	9	22	6	15	41.1	0.0	+31.4	-32.7	355.446 C	4	19	2	11	338.8	+3.5	+23.8	-10.4
									356.427 G	17	143	9	79	338.2	+3.1	+23.8	+1.9
									357.401 G	13	98	8	57	339.8	+5.0	+23.0	+16.4
									358.322 C	6	27	4	17	339.8	+5.2	+22.9	+28.5
									359.101 K	6	24	4	17	340.2	+5.7	+22.3	+39.2
									Means	..	..	5	35	338.0	..	+25.6	..

ROYAL GREENWICH OBSERVATORY

*Total Areas
of Sunspots and Faculae*

Projected and corrected for foreshortening for each day, and

Mean Areas and Mean Heliographic Latitude

of Sunspots and Faculae

for each rotation of the sun and for the year

1954

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954

TOTAL AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR

The time (U.T.) at which the photograph was taken is expressed by the month, day of month, and decimal of a day, reckoned from Greenwich mean midnight.

The place where the photograph was taken is indicated in the second column. A photograph taken at Greenwich is indicated by the letter G, and those taken at the Cape and Kodaikanal, by the letters C and K respectively.

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 area corrected for foreshortening is expressed in millionths of the Sun's visible hemisphere.

U. T.	Place	Projected Area			Area Corrected for Foreshortening			U. T.	Place	Projected Area			Area Corrected for Foreshortening				
		Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ			Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1954	d							1954	d								
January	1.291	C	0	0	215	0	0	278	February	13.307	C	0	0	0	0	0	0
	2.399	G	0	0	246	0	0	298		14.316	C	0	0	0	0	0	0
	3.319	C	0	0	219	0	0	223		15.291	C	0	0	0	0	0	0
	4.406	G	0	0	0	0	0	0		16.395	C	0	0	0	0	0	0
	5.403	G	0	0	0	0	0	0		17.394	C	0	0	211	0	0	301
	6.389	G	0	0	153	0	0	136		18.362	C	0	0	211	0	0	237
	7.362	C	0	0	0	0	0	0		19.550	C	0	0	0	0	0	0
	8.377	G	0	0	0	0	0	0		20.388	G	0	0	0	0	0	0
	9.330	C	0	0	0	0	0	0		21.419	G	0	0	0	0	0	0
	10.404	G	0	0	0	0	0	0		22.525	G	0	0	70	0	0	155
	11.440	G	0	9	320	0	6	422		23.681	G	0	0	120	0	0	134
	12.279	C	0	0	0	0	0	0		24.372	G	0	0	0	0	0	0
	13.337	C	0	0	0	0	0	0		25.369	G	0	0	0	0	0	0
	14.386	G	0	0	0	0	0	0		26.355	G	0	0	0	0	0	0
	15.281	C	0	0	0	0	0	0		27.300	C	0	0	0	0	0	0
	16.382	G	0	0	0	0	0	0		28.320	C	0	0	0	0	0	0
	17.408	G	0	0	98	0	0	142									
	18.386	G	0	4	70	0	4	63									
	19.283	C	0	0	0	0	0	0	March	1.372	G	4	22	92	3	15	123
	20.279	C	0	0	0	0	0	0		2.360	G	35	180	278	31	161	232
	21.370	C	0	0	100	0	0	118		3.304	C	17	113	191	23	155	225
	22.429	G	0	0	0	0	0	0		4.380	G	4	26	92	14	88	192
	23.419	G	0	0	0	0	0	0		5.348	G	0	0	0	0	0	0
	24.409	G	4	22	0	2	12	0		6.373	G	0	0	180	0	0	225
	25.627	G	0	0	0	0	0	0		7.317	C	0	0	0	0	0	0
	26.280	C	0	0	0	0	0	0		8.581	G	0	0	0	0	0	0
	27.496	G	0	0	0	0	0	0		9.468	G	0	0	0	0	0	0
	28.432	G	0	0	0	0	0	0		10.347	G	0	0	0	0	0	0
	29.454	G	0	0	0	0	0	0		11.395	G	0	0	172	0	0	242
	30.370	G	0	0	0	0	0	0		12.600	G	6	35	106	6	36	109
	31.371	G	0	0	0	0	0	0		13.303	C	86	376	182	69	299	146
February	1.442	G	0	0	0	0	0	0		14.456	G	149	828	0	91	507	0
	2.517	G	0	0	104	0	0	89		15.302	C	177	1143	0	97	627	0
	3.360	G	0	0	0	0	0	0		16.307	C	235	1396	0	120	712	0
	4.383	G	0	0	0	0	0	0		17.409	G	247	1180	208	124	594	215
	5.348	C	0	0	0	0	0	0		18.303	C	165	901	146	86	467	114
	6.291	C	0	0	0	0	0	0		19.303	C	158	740	0	91	427	0
	7.304	C	0	0	0	0	0	0		20.305	C	86	456	306	59	311	373
	8.369	G	0	0	0	0	0	0		21.420	G	38	317	747	36	296	695
	9.293	C	8	34	94	6	26	72		22.645	G	13	88	194	27	175	293
	10.429	G	0	9	278	0	8	289		23.406	G	0	4	122	0	10	293
	11.304	C	0	4	74	0	5	93		24.488	G	0	0	217	0	0	262
	12.320	C	0	0	185	0	0	246		25.302	C	0	0	0	0	0	0
										26.361	G	0	0	0	0	0	0
										27.348	G	0	0	107	0	0	162

TOTAL AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR															
U.T.	Place	Projected Area			Area Corrected for Foreshortening			U.T.	Place	Projected Area			Area Corrected for Foreshortening		
		Umbrae	Whole Spots	Faculae	Umbrae	Whole Spots	Faculae			Umbrae	Whole Spots	Faculae	Umbrae	Whole Spots	Faculae
1954	d							1954	d						
March	28.350	G	0	0	0	0	0	0	0	0	0	0	0	0	0
	29.580	G	0	0	0	0	0	0	0	0	0	0	0	0	0
	30.348	G	0	0	112	0	0	132							
	31.376	G	0	0	0	0	0	0							
April	1.360	G	0	0	0	0	0	0							
	2.314	C	0	0	0	0	0	0							
	3.315	C	0	0	0	0	0	0							
	4.689	G	0	0	0	0	0	0							
	5.347	G	0	0	0	0	0	0							
	6.344	G	0	4	209	0	14	266							
	7.333	G	2	17	152	3	25	236							
	8.391	G	4	20	197	4	17	195							
	9.398	G	2	11	130	1	7	103							
	10.357	G	0	0	0	0	0	0							
	11.368	G	0	0	0	0	0	0							
	12.556	G	0	0	0	0	0	0							
	13.309	G	0	0	0	0	0	0							
	14.306	G	0	0	0	0	0	0							
	15.433	G	2	9	72	1	6	120							
	16.273	G	4	20	232	3	16	206							
	17.326	G	0	0	180	0	0	214							
	18.318	G	0	0	117	0	0	187							
	19.306	G	0	0	0	0	0	0							
	20.302	G	2	18	0	1	10	0							
	21.728	G	0	0	131	0	0	162							
	22.304	G	0	0	196	0	0	247							
	23.602	G	0	0	0	0	0	0							
	24.302	G	0	0	0	0	0	0							
	25.412	G	0	0	0	0	0	0							
	26.306	G	0	0	0	0	0	0							
	27.313	G	0	0	0	0	0	0							
	28.319	G	0	0	0	0	0	0							
	29.320	G	0	0	50	0	0	72							
	30.339	G	0	0	102	0	0	100							
May	1.314	C	0	0	0	0	0	0							
	2.363	G	0	0	0	0	0	0							
	3.305	G	0	0	0	0	0	0							
	4.580	G	0	0	277	0	0	318							
	5.302	G	0	0	0	0	0	0							
	6.303	G	0	0	0	0	0	0							
	7.310	G	0	0	0	0	0	0							
	8.318	G	0	0	0	0	0	0							
	9.304	G	0	7	95	0	14	158							
	10.340	G	0	0	0	0	0	0							
	11.302	G	0	0	109	0	0	160							
	12.313	G	0	0	114	0	0	116							
	13.463	G	0	0	0	0	0	0							
	14.108	K	6	22	0	3	11	0							
	15.441	C	0	0	0	0	0	0							
	16.597	G	0	0	0	0	0	0							
	17.422	G	0	0	0	0	0	0							
	18.325	G	0	0	121	0	0	194							
	19.330	G	0	0	50	0	0	77							
	20.428	G	0	0	0	0	0	0							
May	21.365	G	0	0	0	0	0	0							
	22.371	G	0	0	0	0	0	0							
	23.386	C	0	0	0	0	0	0							
	24.592	G	0	0	0	0	0	0							
	25.330	G	0	0	0	0	0	0							
	26.301	G	0	0	0	0	0	0							
	27.303	G	0	0	0	0	0	0							
	28.300	G	0	0	0	0	0	0							
	29.335	G	0	0	0	0	0	0							
	30.309	G	0	0	0	0	0	0							
	31.348	G	0	0	0	0	0	0							
June	1.633	G	5	23	0	3	13	0							
	2.343	C	4	22	0	3	14	0							
	3.531	G	0	9	103	0	7	84							
	4.301	G	0	14	165	0	15	172							
	5.286	G	0	0	0	0	0	0							
	6.345	C	0	0	0	0	0	0							
	7.306	G	0	0	0	0	0	0							
	8.343	G	0	0	0	0	0	0							
	9.306	G	0	0	0	0	0	0							
	10.441	G	0	0	0	0	0	0							
	11.363	G	0	0	0	0	0	0							
	12.775	G	0	0	0	0	0	0							
	13.481	G	0	0	97	0	0	109							
	14.392	G	0	0	0	0	0	0							
	15.339	G	0	0	0	0	0	0							
	16.550	G	0	0	0	0	0	0							
	17.340	C	0	0	0	0	0	0							
	18.617	G	0	0	0	0	0	0							
	19.602	G	0	0	0	0	0	0							
	20.324	C	0	0	0	0	0	0							
	21.305	G	0	0	0	0	0	0							
	22.405	G	0	5	178	0	6	213							
	23.369	G	0	0	0	0	0	0							
	24.324	G	0	0	0	0	0	0							
	25.158	K	0	0	0	0	0	0							
	26.330	G	0	0	0	0	0	0							
	27.278	G	0	0	0	0	0	0							
	28.350	G	0	0	0	0	0	0							
	29.364	G	0	0	0	0	0	0							
	30.299	G	0	0	0	0	0	0							
July	1.333	C	0	0	0	0	0	0							
	2.371	G	0	0	0	0	0	0							
	3.337	C	7	36	101	6	28	83							
	4.333	G	0	0	0	0	0	0							
	5.305	G	0	0	0	0	0	0							
	6.323	G	0	0	0	0	0	0							
	7.326	G	0	0	0	0	0	0							
	8.311	G	2	14	0	1	8	0							
	9.335	C	2	11	0	1	7	0							
	10.573	C	0	0	0	0	0	0							
	11.312	G	0	0	0	0	0	0							
	12.334	G	2	14	0	1	8	0							
	13.299	G	5	37	0	3	24	0							

TOTAL AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR

U.T.	Place	Projected Area			Area Corrected for Foreshortening			U.T.	Place	Projected Area			Area Corrected for Foreshortening		
		Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ			Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ
1954	d							1954	d						
July								September							
14.540	G	7	32	120	5	25	98	6.322	G	0	5	148	0	4	123
15.305	G	5	30	143	6	35	153	7.312	G	0	0	0	0	0	0
16.448	C	9	36	101	9	40	185	8.321	C	0	0	0	0	0	0
17.239	K	6	35	0	3	18	0	9.510	G	0	0	244	0	0	244
18.631	G	0	0	0	0	0	0	10.309	C	0	0	0	0	0	0
19.303	G	0	0	0	0	0	0	11.327	G	0	0	131	0	0	177
20.306	G	0	0	0	0	0	0	12.326	G	0	0	158	0	0	142
21.304	G	0	0	219	0	0	226	13.301	G	0	5	124	0	5	109
22.317	G	0	0	51	0	0	100	14.305	G	0	7	124	0	9	150
23.306	G	0	0	0	0	0	0	15.430	G	0	7	108	0	4	173
24.567	C	0	0	0	0	0	0	16.455	G	0	13	0	0	7	0
25.331	C	11	63	220	11	64	231	17.370	G	0	4	0	0	2	0
26.712	G	7	41	0	4	28	0	18.339	C	0	0	0	0	0	0
27.303	G	2	18	0	1	11	0	19.341	G	0	0	130	0	0	133
28.302	G	2	14	0	1	8	0	20.298	G	0	0	248	0	0	382
29.354	G	0	25	252	0	13	284	21.309	G	0	0	304	0	0	374
30.337	C	4	20	161	2	10	187	22.313	G	0	0	292	0	0	257
31.135	K	0	0	0	0	0	0	23.389	G	0	0	0	0	0	0
								24.451	G	0	0	0	0	0	0
August								25.324	C	0	4	54	0	5	64
1.513	C	9	45	359	25	127	485	26.378	G	0	0	0	0	0	0
2.329	C	18	89	234	26	136	402	27.403	G	0	0	139	0	0	146
3.431	C	16	116	591	15	107	597	28.416	G	0	0	85	0	0	172
4.338	G	25	114	428	18	83	444	29.330	G	0	0	526	0	0	667
5.446	C	20	109	111	12	66	124	30.109	K	0	0	364	0	0	367
6.658	G	34	204	0	18	110	0								
7.421	G	28	135	0	15	72	0	October							
8.400	C	8	47	151	4	26	174	1.394	G	0	0	358	0	0	365
9.616	G	37	170	0	21	99	0	2.410	G	2	20	345	2	34	611
10.282	G	45	224	87	25	128	137	3.340	G	6	36	242	5	39	397
11.414	G	46	197	126	28	120	101	4.344	G	0	4	528	0	16	725
12.323	C	38	180	173	25	119	178	5.333	C	0	6	572	0	8	535
13.424	G	5	36	335	4	31	413	6.345	G	0	0	562	0	0	474
14.310	G	0	5	330	0	6	398	7.351	G	0	0	397	0	0	323
15.351	G	0	0	210	0	0	370	8.443	C	0	0	258	0	0	284
16.325	G	0	0	0	0	0	0	9.374	G	0	0	212	0	0	267
17.323	G	0	0	0	0	0	0	10.301	C	0	0	97	0	0	159
18.321	G	0	0	0	0	0	0	11.352	G	0	0	185	0	0	329
19.297	G	0	0	0	0	0	0	12.343	G	0	34	422	0	34	474
20.391	G	0	0	109	0	0	192	13.351	G	6	36	744	4	24	614
21.313	G	9	37	137	5	23	151	14.424	G	10	62	621	8	46	651
22.292	G	41	151	0	27	98	0	15.607	G	22	82	515	15	60	626
23.327	G	51	258	0	37	187	0	16.305	C	23	92	514	16	66	599
24.465	G	41	180	178	37	162	164	17.493	G	2	26	122	1	18	129
25.343	G	14	63	217	16	73	256	18.303	C	0	9	209	0	34	257
26.324	G	2	9	239	4	16	430	19.396	G	4	11	142	6	17	268
27.318	G	2	13	0	1	8	0	20.464	G	7	15	128	7	15	154
28.327	G	0	0	0	0	0	0	21.579	G	9	13	464	7	10	422
29.359	G	0	0	103	0	0	165	22.400	G	9	22	522	6	15	541
30.302	G	0	0	274	0	0	368	23.432	G	4	20	191	2	12	229
31.303	G	0	0	273	0	0	269	24.591	G	9	22	161	5	12	207
September								25.449	G	7	26	0	4	15	0
1.309	G	0	0	0	0	0	0	26.348	G	4	20	84	2	12	135
2.307	G	0	0	0	0	0	0	27.501	G	0	0	264	0	0	305
3.296	G	0	0	0	0	0	0	28.578	G	0	0	414	0	0	498
4.716	G	2	19	191	3	29	289	29.477	G	0	0	377	0	0	369
5.429	G	0	2	261	0	2	354	30.384	G	0	0	242	0	0	400
								31.306	C	0	0	245	0	0	414

TOTAL AREAS OF SUNSPOTS AND FACULÆ FOR EACH DAY IN THE YEAR

U. T.	Place	Projected Area			Area Corrected for Foreshortening			U. T.	Place	Projected Area			Area Corrected for Foreshortening				
		Umbrae	Whole Spots	Faculae	Umbrae	Whole Spots	Faculae			Umbrae	Whole Spots	Faculae	Umbrae	Whole Spots	Faculae		
1954	d							1954	d								
November	1.292	C	0	0	309	0	0	340	December	1.461	G	0	9	313	0	8	343
	2.388	G	0	0	282	0	0	331		2.514	G	0	0	314	0	0	384
	3.423	G	0	0	220	0	0	227		3.420	G	0	0	596	0	0	652
	4.406	G	0	0	338	0	0	388		4.479	G	0	0	248	0	0	227
	5.381	G	2	9	510	1	5	542		5.467	G	0	0	282	0	0	239
	6.386	G	7	44	154	5	30	131		6.456	G	0	0	245	0	0	231
	7.584	C	0	0	0	0	0	0		7.518	G	0	0	0	0	0	0
	8.320	C	4	19	284	5	25	320		8.280	C	0	0	84	0	0	85
	9.378	G	11	80	403	8	71	426		9.421	G	0	0	336	0	0	393
	10.385	G	48	379	260	40	292	343		10.371	G	0	0	0	0	0	0
	11.300	C	66	478	239	48	354	352		11.399	G	0	0	406	0	0	385
	12.513	G	70	423	627	53	324	620		12.449	G	0	0	347	0	0	324
	13.394	G	55	308	523	47	260	541		13.411	C	0	0	219	0	0	265
	14.410	G	31	171	291	31	171	314		14.360	C	0	0	199	0	0	257
	15.418	G	15	89	329	30	176	583		15.465	G	65	297	54	39	182	117
	16.293	C	0	0	64	0	0	127		16.430	G	112	540	108	71	341	139
	17.434	G	2	13	224	2	13	246		17.588	G	95	480	91	67	323	236
	18.480	G	0	4	301	0	3	330		18.412	G	100	492	481	82	411	469
	19.291	C	2	15	95	1	10	70		19.308	C	54	400	313	53	395	285
	20.391	C	0	0	143	0	0	122		20.440	G	55	283	402	76	379	475
	21.279	C	0	0	165	0	0	196		21.299	C	25	117	178	70	318	335
	22.289	C	0	0	232	0	0	306		22.446	C	4	19	0	2	11	0
	23.464	G	0	0	0	0	0	0		23.427	G	17	143	0	9	79	0
	24.365	G	0	0	154	0	0	251		24.401	G	13	98	0	8	57	0
	25.362	G	0	0	220	0	0	298		25.322	C	6	27	0	4	17	0
	26.294	C	0	0	168	0	0	230		26.101	K	6	24	0	4	17	0
	27.369	G	0	0	215	0	0	202		27.501	G	0	0	238	0	0	233
	28.305	C	0	0	269	0	0	269		28.280	C	0	0	163	0	0	214
	29.295	C	0	0	319	0	0	379		29.342	C	12	62	163	6	34	247
	30.502	G	0	0	313	0	0	367		30.278	C	96	526	149	51	282	217
										31.277	C	116	780	121	65	437	150

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954.

MEAN AREAS OF SUNSPOTS AND FACULÆ FOR EACH ROTATION OF THE SUN,
FROM 1954 JANUARY 1 TO DECEMBER 21

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 1873-1953 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 of the Sun's equator on the ecliptic at mean noon on January 1, 1854, and the assumed period of the Sun's sidereal rotation being 25.38 days. 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 U.T.

No. of Rotation	Date of Commencement of each Rotation	No. of Days on which Photographs were taken	Mean of Daily Areas					
			Projected			Corrected for Foreshortening		
			Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ
1342	1954 January 1.07	27	0	1	53	0	1	62
1343	January 28.41	28	0	2	48	0	1	58
1344	February 24.75	27	53	289	112	32	181	129
1345	March 24.07	28	1	4	62	0	3	74
1346	April 20.35	27	0	1	40	0	1	49
1347	May 17.58	27	0	3	20	0	2	24
1348	June 13.79	27	0	2	10	0	2	11
1349	July 10.98	27	7	39	111	6	34	130
1350	August 7.20	28	13	61	105	9	42	134
1351	September 3.44	27	0	2	134	0	2	160
1352	September 30.71	27	5	21	328	3	18	373
1353	October 28.00	27	12	75	269	10	64	316
1354	November 24.31	28	18	94	246	16	84	280

MEAN AREAS OF SUNSPOTS AND FACULÆ FOR THE YEAR

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
1954	365	9	49	117	6	35	138

MEAN HELIOGRAPHIC LATITUDE OF SUNSPOTS FOR EACH ROTATION OF THE SUN,
FROM 1954 JANUARY 1 TO DECEMBER 21

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 equator, has been divided by the sum of the corresponding areas to form the mean heliographic latitude of spotted area north of the 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 of all spots the numerical sum of the products, without regard to the sign of 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		
1342	1954 January 1.07	27	0.4	8.92	0.4	16.70	- 2.73	12.45
1343	January 28.41	28	1	31.31	0	..	+31.31	31.31
1344	February 24.75	27	1	7.30	180	9.65	- 9.58	9.64
1345	March 24.07	28	0.4	6.00	3	4.41	- 3.32	4.58
1346	April 20.35	27	1	20.80	0	..	+20.80	20.80
1347	May 17.58	27	2	16.41	0	..	+16.41	16.41
1348	June 13.79	27	1	20.67	1	20.89	- 3.08	20.80
1349	July 10.98	27	34	22.17	0	..	+22.17	22.17
1350	August 7.20	28	5	25.20	37	26.48	-20.64	26.34
1351	September 3.44	27	1	24.38	2	24.50	- 9.18	24.46
1352	September 30.71	27	13	29.40	5	31.78	+13.69	30.01
1353	October 28.00	27	8	25.75	56	31.26	+23.89	30.55
1354	November 24.31	28	84	33.08	0.3	25.88	+32.88	33.05

MEAN HELIOGRAPHIC LATITUDE OF SUNSPOTS FOR THE YEAR

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		
1954	365	12	28.84	23	17.20	-1.55	21.16

ROYAL GREENWICH OBSERVATORY

Observations of Solar Filaments

Made with the Spectroheliscopes
in the year 1954

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1954

OBSERVATIONS OF SOLAR FILAMENTS MADE WITH THE SPECTROHELIOSCOPES IN THE YEAR 1954

The following observations relate to dark filaments visible on the Sun's disk in the light of $H\alpha$ in the immediate vicinity of sunspots*.

Measures of line-of-sight velocity are taken with the "line-shifter", whose scale from 0 - 10 divisions = 0.37 A. = 17 km./sec. at $H\alpha$. The zero of the $H\alpha$ line is determined from measures of the darkest part of the line in an undisturbed portion of the Sun near the centre of the disk. The purpose of the observations being to locate large line-of-sight velocities*, measured displacements are interpreted as being due to Doppler effects.

The probable error of a single measure of line-of-sight velocity, as determined from a number of successive readings, is about 3 km./sec., including the probable error of the zero determination. Three or four measures being generally made on each filament, the probable errors of the tabulated values in the third column of the following table do not usually exceed 2 km./sec., except, perhaps in the case of the larger velocities, which have accordingly been rounded off to the nearest 5 km./sec.

In the following table, the headings of which are self-explanatory, particulars are given of each dark filament as follows -

- (1) The measured line-of-sight velocity in km./sec., + indicating motion away from the observer and - motion towards the observer.

Where two values are given it is to be understood, unless otherwise stated in the footnotes, that different velocities were observed along the length of the filament, and that the tabulated values are the extreme velocities measured, which in nearly all cases correspond to the opposite ends of the marking. In those cases in which one end of a filament, showing progressive velocities along its length, appeared to touch a sunspot, the line-of-sight velocity observed at that extremity of the filament is printed in italics.

- (2) (a) The apparent length of the filament in minutes of arc, read by means of a scale inserted in the field, or from a drawing. An asterisk denotes that the marking was small and roughly circular in shape. The diameters of these circular markings are of the order of 10".

* An analysis of the line-of-sight velocities of dark $H\alpha$ markings near sunspots, observed at the Royal Observatory, Greenwich, 1930-33, is given in *Monthly Notices*, 94, 472, 1934. A further paper on the characteristic motions of such filaments associated with solar flares appears in *Monthly Notices*, 102, 2, 1942.

- (b) The apparent least distance in minutes of arc from the centre of the nearest sunspot or group of spots. In those cases indicated by dots in the appropriate column it was not possible to obtain a measure.
- (c) The position of the filament relative to the group of associated sunspots or to a single component of the group. In cases where a sunspot has been so designated in the *Ledgers* in the preceding *Results*, the appropriate letter *a* (the leader of the group) or *b* (the follower) has been added. The abbreviations *n, s, f, p, c*, stand respectively for, north, south, following, preceding, central.
- (3) Particulars of the associated group of sunspots, abstracted from the *General Catalogue*, including the longitude from the Sun's central meridian at the time of observing the filament (deduced from the mean longitude of the sunspots).

Notes have been added of unusual features seen at the time of observation. Filaments which were apparently descending into sunspots with progressive velocities and which showed a definite curvature of shape are also noted.

OBSERVATIONS OF SOLAR FILAMENTS MADE WITH THE SPECTROHELIOSCOPE IN THE YEAR

Dark H α Filament						Associated Group of Sunspots						
Ref. No.	Date and Time U.T.		Measured Line-of-Sight Velocity km./sec.	Length	Least Distance from Sunspot	Position relative to Sunspot or Group	Number of Group	Longitude from Central Meridian	Central Meridian Passage	Latitude	Area	
	d	h		'	'		o	d	o			
1	Mar.	1	10.7	-63 to +45	3.0	0.8	n	17126	+43	Feb. 26.1	-24	110
2		2	9.2	-32	1.0	0.2	c	126	+56			
3		12	14.0	-89 to +90	1.0	0.2	c	127	-60	17.14	- 8	403
4	Oct.	25	11.8	+19	2.2	1.0	s	147	+ 7	Oct. 24.93	+32	14
5	Dec.	15	9.2	-12 to +54	0.7	0.1	c	155	- 1	Dec. 15.5	+34	317
6	Dec.	15	9.3	+36	0.3	1.5	f	17155	- 1	Dec. 15.5	+34	317
7		15	9.3	+30	0.6	1.0	f	155	- 1			

NOTES

Ref.
No.

1. Associated with a Flare 1. This flare has been published with 1953 and hence no list of flares is needed for 1954.

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