ROYAL GREENWICH OBSERVATORY

SUNSPOT AND GEOMAGNETIC-STORM DATA

DERIVED FROM GREENWICH OBSERVATIONS

1874-1954

LONDON:
HER MAJESTY'S STATIONERY OFFICE
1955

QC
836
.G7
c.3

ROYAL GREENWICH OBSERVATORY

SUNSPOT AND GEOMAGNETIC-STORM DATA

DERIVED FROM GREENWICH OBSERVATIONS

1874-1954

COMPILED UNDER THE DIRECTION OF

SIR HAROLD SPENCER JONES, Sc.D., F.R.S.

ASTRONOMER ROYAL

Published by Order of the Board of Admiralty
in Obedience to Her Majesty's Command

LONDON:

HER MAJESTY'S STATIONERY OFFICE

1955

Library
Boulder Laboratories
National Bureau of Standards
Boulder, Colorado
FEB 23 1956
QC836
.G7
cop. 3
Binned

CONTENTS

Page

INTRODUCTION v

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ 1874-1954

Annual Values 5
Monthly Values 7
List of Spotless Days 17

MEAN HELIOGRAPHIC LATITUDES OF SUNSPOTS 1874-1954
(North and South with Corresponding Areas)

Annual Values 24
Values of each Solar Synodic Rotation 26
Latitude-Time Diagram .. .. *facing* 38

CATALOGUES OF THE LARGER SUNSPOTS 1874-1954

Sunspots of Mean Area >500 Units in order of date occurrence 43
Sunspots of Mean Area >1500 Units in order of size 60
Notes on special features 62

CATALOGUES OF GEOMAGNETIC STORMS 1874-1954

Catalogue I: Great Storms 75
Notes on special features 80
Catalogue II: Small Storms 83

APPENDICES

(1) Great Storms recorded at Greenwich, 1840-1874 102
(2) Diagram: Comparative Sunspot and Geomagnetic (S_q) Curves, 1841-1950 *facing* 106

Blank page retained for pagination

GREENWICH SUNSPOT AND GEOMAGNETIC-STORM DATA, 1874-1954

INTRODUCTION

This compilation of sunspot and geomagnetic-storm data has been made in the hope that it will be useful to those investigating solar-terrestrial relationships. The sunspot data have been extracted from the annual volumes of the *Greenwich Photoheliographic Results** covering the whole period of eighty years of the Greenwich measures of the areas and positions of sunspots commencing in April 1874. To meet requests for sunspot data for comparison with meteorological, magnetic or ionospheric data, the mean daily areas of sunspots and faculæ for each *calendar month* over the whole period have been incorporated, the unit period adopted in the *Greenwich Photoheliographic Results* having always been that of the Sun's synodic rotation, averaging 27.3 days.

For the tabulation of geomagnetic storms, the annual volumes of the *Greenwich Magnetic and Meteorological Observations* have been freely used, but the catalogues have been based primarily on the examination of the magnetograms themselves obtained at Greenwich up to 1926, and since that year at Abinger, Surrey. Earlier catalogues of geomagnetic storms for the period 1874 April to 1927 (the preparation of which was initiated by a former Chief Assistant, Professor W. M. H. Greaves) were published in the *Greenwich Photoheliographic Results* 1927 (pp. C 131-39). Those are now superseded by the present catalogues 1874-1954 given in an improved form. The onset of the storm has been given more accurately whenever justified by the character of the trace-movements and the accuracy of the time scale, (regular quick-run recording was commenced in 1938). Notes have been appended to a number of the "great" storms. Any statistically associated sunspot has been tabulated according to its position within the inclusive limits of -3.0 to +5.0 days (1 day = 13°.2 of solar longitude) from the Sun's central meridian at storm onset, instead of -4.0 to +4.0 days as in the 1927 catalogues. The addition in the present catalogues of a column giving the longitude of the Sun's central meridian at the time of storm onset will serve to disclose recurrence tendencies.

The contents of this volume are arranged under four chief headings, as follows:

AREAS OF SUNSPOTS AND FACULÆ

(a) Yearly values of the mean daily areas of sunspots and of faculæ from 1874 to 1953. The projected areas are expressed in millionths of the Sun's disk, and the areas corrected for the effect of surface foreshortening are expressed in millionths of the Sun's hemisphere.

---

* or, up to 1900, included under the title "Results: Spectroscopic and Photographic Observations."

There are also tabulated (1) the annual mean value of the range in the diurnal inequalities in magnetic Declination at Greenwich, obtained from "quiet" days. The values from 1874 to 1888 inclusive have been derived from the mean diurnal inequalities from all days (excluding some days of very great disturbance) using an empirical correction. (2) The annual mean daily sunspot "number" (R) as published in *Astronomische Mitteilungen* by the Federal Observatory, Zurich. Acknowledgment is made to the Director of the Federal Observatory for permission to reprint these values and the monthly values given in the next section.

(b) Mean daily areas of sunspots and faculæ for each calendar month from 1874 April to 1954 June, the area units being as in (a).

Use was made of punched cards in deriving, *ab initio*, the monthly mean daily areas of sunspots and faculæ. Acknowledgment is made for the help given by the Statistical Branch of the Admiralty in transferring the daily areas published in the *Greenwich Photoheliographic Results* to punched cards.

Two additional columns of this table give (1) the monthly mean value of the range in the diurnal inequalities in D at Greenwich from "quiet" days. These values are subject to seasonal effects. Using an empirical correction, the values from 1874 to 1888 inclusive have been derived from the mean diurnal inequalities from all days (excepting days of great disturbance). (2) The monthly mean daily sunspot "number" (R) as published from Zurich.

(c) List of recorded days on which no sunspots were found on the photographs.

SUNSPOT LATITUDES

(a) Yearly values of the mean latitudes of sunspots (for northern and southern latitudes separately), weighted according to the areas (corrected for foreshortening) together with their respective mean daily areas for the years 1874-1953.

(b) Weighted latitudes of sunspots, as above, for each synodic rotation of the Sun from Rotation 275 (1874) to Rotation 1347 (1954).

(c) The unweighted latitude distribution of sunspots during the 11-year cycle in diagrammatic form known as "Maunder's Butterfly Diagram" 1874-1953. Corresponding graphs of (1) the mean daily areas of sunspots and (2) the range of the diurnal inequalities in Declination (data from all days) are given for comparison.

CATALOGUE OF THE LARGER SUNSPOTS

(a) Catalogue in order of date of 761 sunspot groups having a mean area during their partial or complete disk passage of not less than 500 millionths of the Sun's hemisphere, the data being abstracted from the Greenwich *Results* 1874 to 1954 June. Geomagnetic storms recorded at Greenwich-Abinger and associated in time are tabulated. Notes are appended to groups with unusual characteristics and association with notable solar flares.

(b) A list of great sunspots (> 1500 millionths of the Sun's hemisphere) arranged in order of size.

CATALOGUES OF GEOMAGNETIC STORMS

(a) Catalogue I. Great Geomagnetic Storms recorded at Greenwich-Abinger from 1874 April to 1954 June having measured ranges of not less than 60′ in D or 300γ in H or Z (112 storms). Notes are appended on the occurrence of notable antecedent flares, special storm characteristics and associated auroral displays. There is also tabulated the sunspot of largest mean area within -3.0 to +5.0 days (1 day = 13°.2 of solar longitude) of the Sun's central meridian at storm onset.

(b) Catalogue II. The smaller storms with ranges not less than 30′ in D or 150γ in H or Z (697 storms). The largest sunspot (if any) is tabulated as for Catalogue I.

Geomagnetic observations were begun at Greenwich in 1840, photographic registration of D, H and Z being introduced towards the end of 1847. It is therefore of interest to add in an appendix the following list.

(c) Catalogue of Great Geomagnetic Storms recorded from 1840 to 1874 March, together with notes and references. The occurrence of a large sunspot in the central region of the Sun's disk at the time of storm onset has been tabulated. Acknowledgment is made to the Royal Astronomical Society for kind permission to examine Schwabe's records of sunspots which are in the possession of the Society. The latter part of the period is covered first by the published observations of Carrington and then by Kew data, and the Ely photographs*.

(d) Finally, as the second appendix, there is given a diagram showing the variation of S_q range with the sunspot cycle for the period 1841 to 1950, (for explanation, see p. 106).

The above four sections with their respective sub-sections are each preceded by an explanation of the tables or catalogues.

Over the past fifty years, the sunspot data (including the observation of solar flares from 1930) have been used, in conjunction with the Greenwich magnetic records, for investigating solar effects on the Earth's magnetic field.

The following is a list of papers on this subject prepared by members of the Observatory staff and communicated by the Astronomer Royal.

1. Areas of Faculæ and Sunspots compared with the Diurnal Ranges of Magnetic Declination, Horizontal Force and Vertical Force as observed at the Royal Observatory, Greenwich in the years 1873 to 1902. *Monthly Notices of the Royal Astronomical Society* **63**, 462, 1903.

2. "Great" Magnetic Storms, 1875 to 1903, and their association with Sunspots as recorded at the Royal Observatory, Greenwich. *M.N.* **64**, 205, 1904. (In addition to this paper by E. W. Maunder, investigations by him into the 27-day recurrence tendency of geomagnetic storms were published in *M.N.* **65**, 2, 1904 and *M.N.* **65**, 538, 1905).

---

*These were taken at Canon Selwyn's Observatory at Ely, 1863 to 1873, (*M.N.* **36**, 145, 1876). Prints of the original negatives are in the possession of the Royal Greenwich Observatory.

3. Large Magnetic Storms and Large Sunspots. *M.N.* **88**, 556, 1928.

4. Magnetic Storms and Solar Activity, 1874 to 1927. *M.N.* **89**, 84, 1928.

5. On the Recurrence of Magnetic Storms. *M.N.* **89**, 641, 1929.

6. Bright Solar Eruptions and Radio Fadings during the years 1935-36. *M.N.* **97**, 594, 1937.

7. Solar Flares and Magnetic Storms. *M.N.* **103**, 244, 1943: second paper *M.N.* **104**, 4, 1944.

8. "Sudden Commencements" in the Greenwich Magnetic Records (1879-1944) and related Sunspot data. *M.N. Geophysical Supplement* **5**, 159, 1948.

9. Geomagnetic "Crochet" Occurrence at Abinger, 1936-46, and allied Solar and Radio Data. *M.N. Geophys. Supp.* **5**, 200, 1948.

10. Observational Aspects of the Sunspot - Geomagnetic Storm Relationship. *M.N. Geophys. Supp.* **5**, 321, 1949.

11. Observational Aspects of Solar Corpuscular Radiation. Septième Rapport de la Commission pour l'Étude des Relations entre les Phénomènes Solaires et Terrestres (1951) p. 107. (This continues the list of great solar flares given in paper No. 7).

12. The Distribution of Great and Small Geomagnetic Storms in the Sunspot Cycle. *Journal of Geophysical Research*, **59**, 203, 1954.

The contents of the present work have been prepared collectively by the following members of the staff of the Solar Department: H. W. Newton (Head of Solar Department), H. Barton, P. S. Laurie, A. S. Milsom, N. Rhodes and Miss H. Howe. Helpful voluntary assistance was given by A. Edwards. In the preparation of the Catalogues of Geomagnetic Storms and in other tables where magnetic data are given, the Superintendent of the Magnetic and Meteorological Department (H. F. Finch) collaborated in the checking of the data from the original records.

H. Spencer Jones

Royal Greenwich Observatory,
Herstmonceux Castle, Sussex.

1955 February.

ROYAL GREENWICH OBSERVATORY

Mean Daily Areas of Sunspots and Faculæ

1874-1954

(1) Annual Values

(2) Monthly Values

(3) List of Spotless Days

GREENWICH SUNSPOT AND GEOMAGNETIC-STORM DATA, 1874-1954

Blank page retained for pagination

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ

1874-1954

(1) *Annual Values.* The first table giving the annual mean daily areas of sunspots and faculæ has been compiled from the annual volumes of the *Greenwich Photoheliographic Results.* The annual values for the first twelve years have been taken from revised data in "Photoheliographic Results, 1874 to 1885: Supplementary Results" published in 1907, after additional photographs had been obtained from observatories abroad (Harvard College, Melbourne, Dehra Dûn and Mauritius) to fill many of the gaps in the early Greenwich series.

The values for 1874 refer to a period of eight months from 1874 April 27 to December 18. A number of the early photographs were unsatisfactory for the measurement of faculæ.

It will be seen from the second column of the table that a marked improvement in the number of days represented by a solar photograph was effected from 1878.

From 1886 to 1909 when the contributing observatories were mainly Greenwich, Dehra Dûn, Mauritius, and later Kodaikanal, the number of unrepresented days averaged fewer than three per year, excluding the years 1902 and 1903 for which the unrepresented days were respectively 16 and 15. The remaining forty-five years, covered by photographs from Greenwich, the Cape, and Kodaikanal (together with an occasional reproduction on glass, kindly supplied by the Naval Observatory, Washington, and the Mount Wilson Observatory) are virtually complete, one day only per year being missed in 1911, 1912, 1916 and 1918.

In preparing this table, the annual mean daily areas were re-derived, for check purposes, from the daily values that had been transferred to punched cards for deriving monthly mean daily areas given in the second table. No interpolated daily values were, however, used. A few discrepancies, mainly in the earlier years, between the values now given and those hitherto published, are due either to this exclusion of interpolated values, to errata, or to arithmetical slips revealed by the punched card summation.

The measured areas are given both as projected areas, i.e. as measured directly on the photograph and expressed in millionths of the Sun's apparent disk, and as corrected areas, i.e. corrected for the effect of surface foreshortening and expressed in millionths of the Sun's visible hemisphere.

In the ninth column, headed ΔD, is tabulated an annual value of the range of the monthly diurnal inequalities in declination for Greenwich - Abinger, derived from "quiet" days. (See note on diagram in Appendix 2 at the end of this volume).

In the last column is given the annual mean daily sunspot "number", *R*, (unsmoothed) as published from Zurich.

(2) *Monthly Values.* The monthly mean daily areas have been derived from the daily totals as published in the annual volumes of the *Greenwich Photoheliographic Results.* As in the preceding table, from 1874 to 1885 the data published in 1907 in the *Supplementary Results* have been used, and all published errata since then have been incorporated. In forming the means for each month, no interpolated values have been used for days unrepresented by a photograph.

As already noted from the second column of the preceding table of annual values, the number of days unrepresented by a photograph is satisfactorily small from 1878 onwards. Even in the preceding period, 1874 April to 1877 December, the number of cases is only five in which the monthly mean daily area of sunspots depends on fewer than half the number of days in the month, viz. 1874 April (10 days); October (15); December (9); 1875 January (11); December (12). The total number of cases during this period in which representation fell below two-thirds of the possible number of days in any one month was 21 out of 45 months. The actual dates unrepresented by photographs can be ascertained from the annual volumes.

The respective units of area, viz. projected areas expressed in millionths of the Sun's apparent disk, and corrected areas expressed in millionths of the Sun's visible hemisphere, are the same as in the preceding table of annual values.

The eighth column, headed ΔD, gives the range of the monthly mean diurnal inequalities for declination, derived from "quiet" days at Greenwich and later at Abinger.

The last column gives the monthly mean daily sunspot "number", *R*, (observed, not smoothed), as published from Zurich.

(3) *List of Spotless Days.* The table gives the dates on which there were no recorded sunspots on the photograph. The number in brackets after the year is the percentage number of spotless days of all days represented by photographs. A plot of these values shows up the epochs of sunspot minima very clearly. (*Monthly Notices* **74**, 112, (Plate 4), 1913). Dates within brackets indicate that no faculæ were present in addition to the absence of sunspots.

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH YEAR FROM 1874 TO 1953

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

Year	Number of Days represented	Mean of Daily Areas						ΔD	Sunspot Number R
		Projected			Corrected for Foreshortening				
		Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1874	141	121	820	826	84	604	1011	9.04	44.7
75	262	57	342	428	40	249	505	7.60	17.1
76	271	31	175	217	22	126	257	7.44	11.3
77	235	26	150	138	19	108	162	6.82	12.3
78	347	6	32	62	4	22	67	6.69	3.4
79	318	10	54	123	7	38	136	6.75	6.0
1880	340	124	585	800	91	441	923	7.88	32.3
81	348	196	940	1703	140	681	1951	9.02	54.3
82	343	256	1330	2019	188	1000	2154	8.68	59.7
83	340	248	1586	1582	175	1154	1864	9.10	63.7
84	315	210	1478	1707	148	1079	2034	9.56	63.5
85	359	145	1123	1243	100	807	1487	8.72	52.2
86	363	71	527	473	50	380	579	8.22	25.4
87	361	37	243	256	26	179	304	7.65	13.1
88	359	20	125	204	14	89	239	7.03	6.8
89	360	18	103	107	13	78	131	6.49	6.3
1890	361	21	133	273	16	99	304	6.77	7.1
91	363	120	745	1302	86	569	1415	8.23	35.6
92	362	255	1596	3235	186	1214	3267	9.72	73.0
93	362	327	1983	2287	234	1464	2404	10.15	84.9
94	364	319	1728	1666	230	1282	1877	8.97	78.0
95	364	237	1330	2059	169	974	2278	8.87	64.0
96	364	127	745	1243	90	543	1410	7.94	41.8
97	364	122	695	977	88	514	1149	6.66	26.2
98	363	93	532	767	64	375	891	6.67	26.7
99	364	27	159	297	18	111	337	6.70	12.1
1900	360	22	101	150	17	75	180	6.42	9.5
01	359	14	41	23	9	29	30	6.26	2.7
02	349	14	86	163	10	62	178	5.83	5.0
03	350	69	446	875	52	350	970	6.80	24.4
04	363	93	655	1646	67	490	1768	7.67	42.0
05	364	230	1637	2433	163	1191	2612	8.50	63.5
06	364	158	1047	2207	114	778	2320	7.89	53.8
07	365	221	1453	1859	160	1082	1999	8.19	62.0
08	366	148	952	2000	106	697	2098	8.22	48.5
09	364	172	942	1304	124	694	1355	7.19	43.9
1910	365	67	357	984	49	264	971	7.02	18.6
11	364	16	88	458	12	64	459	6.40	5.7
12	365	10	50	201	7	37	210	6.05	3.6
13	365	2	10	87	1	7	95	6.26	1.4
14	365	40	195	396	31	152	454	5.97	9.6
15	365	186	920	1289	137	697	1521	7.45	47.4
16	365	186	978	1512	135	724	1785	8.76	57.1
17	365	346	2101	1882	247	1537	2305	10.09	103.9
18	364	255	1504	1526	188	1118	1882	9.18	80.6
19	365	253	1437	1445	182	1052	1729	8.55	63.6

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH YEAR FROM 1874 TO 1953

Year	Number of Days represented	Mean of Daily Areas						ΔD	Sunspot Number R
		Projected			Corrected for Foreshortening				
		Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1920	366	156	837	1052	112	618	1219	7.99	37.6
21	365	110	571	647	79	420	739	7.11	26.1
22	365	63	346	358	45	252	415	6.55	14.2
23	365	15	74	189	10	55	222	6.09	5.8
24	366	62	361	498	46	276	575	6.81	16.7
25	365	189	1102	1510	141	830	1750	7.36	44.3
26	365	284	1651	2159	217	1262	2556	8.69	63.9
27	365	248	1417	1812	186	1058	2212	8.96	69.0
28	366	333	1884	2134	244	1390	2589	8.72	77.8
29	365	334	1695	2190	245	1242	2567	8.85	65.0
1930	365	145	705	1378	106	516	1630	7.43	35.7
31	365	79	372	679	57	275	801	7.33	21.2
32	366	46	216	335	35	163	400	7.03	11.1
33	365	24	120	225	18	88	267	6.81	5.7
34	365	27	142	297	22	119	354	7.19	8.7
35	365	152	810	910	117	624	1100	7.60	36.1
36	366	288	1529	2106	217	1141	2545	9.09	79.7
37	365	509	2795	2851	375	2074	3505	9.74	114.4
38	365	501	2706	2578	371	2019	3205	10.20	109.6
39	365	404	2163	1907	295	1579	2349	8.85	88.8
1940	366	279	1434	1224	200	1039	1523	8.64	67.8
41	365	167	913	1041	120	658	1288	7.60	47.5
42	365	112	591	666	79	423	809	7.24	30.6
43	365	73	410	462	53	295	568	7.27	16.3
44	366	30	160	284	23	126	344	6.84	9.6
45	365	102	560	774	78	429	940	7.53	33.2
46	365	389	2381	1793	291	1817	2188	9.36	92.6
47	365	558	3559	2326	405	2637	2894	11.57	151.6
48	366	419	2618	1849	314	1977	2331	10.26	136.3
49	365	485	2873	2140	356	2129	2597	10.48	134.7
1950	365	274	1638	1421	203	1222	1754	9.06	83.9
51	365	259	1552	1145	188	1136	1379	8.66	69.4
52	366	96	548	594	70	404	711	7.55	31.5
53	365	35	197	278	25	146	331	6.88	13.9

In both this and the following table, the mean daily areas are given to the nearest unit. Thus, in the next table of monthly mean daily areas, a value <0.5 unit is entered as 0. The complete absence of spots throughout any particular month can be ascertained from the third table of this section.

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1874								
Apr.	18	148	0	11	98	0	12.0	32.0
May	103	880	159	71	638	191	10.8	44.6
June	59	546	152	41	385	265	10.4	38.2
July	262	1678	1354	173	1152	1587	10.9	67.8
Aug.	197	1210	1469	146	962	1899	11.3	61.3
Sept.	75	510	1520	66	490	1755	9.9	28.0
Oct.	101	652	1110	70	445	1351	7.1	34.3
Nov.	108	646	587	68	457	716	7.2	28.9
Dec.	35	304	226	21	192	283	4.2	29.3
1875								
Jan.	27	150	836	19	105	1041	4.3	14.6
Feb.	113	598	531	80	422	583	5.3	22.2
Mar.	82	515	726	67	436	852	9.0	33.8
Apr.	81	535	559	54	389	640	11.1	29.1
May	36	234	289	24	151	360	9.9	11.5
June	116	673	339	79	460	375	9.3	23.9
July	18	119	300	11	76	421	8.2	12.5
Aug.	32	175	313	24	137	363	9.7	14.6
Sept.	9	63	310	6	43	383	7.9	2.4
Oct.	31	220	374	22	156	428	6.8	12.7
Nov.	68	344	315	44	236	342	5.2	17.7
Dec.	38	277	256	27	211	308	4.3	9.9
1876								
Jan.	58	381	240	40	286	269	5.0	14.3
Feb.	88	495	134	55	327	195	4.9	15.0
Mar.	67	339	422	47	240	510	7.5	31.2
Apr.	2	26	242	1	18	285	9.2	2.3
May	15	61	260	9	41	303	8.6	5.1
June	3	17	127	3	19	144	9.7	1.6
July	19	104	326	13	75	344	10.2	15.2
Aug.	10	56	107	6	37	125	10.1	8.8
Sept.	32	176	244	20	117	284	7.9	9.9
Oct.	35	207	173	31	182	237	6.6	14.3
Nov.	23	118	160	19	96	200	5.4	9.9
Dec.	42	255	45	33	189	51	4.3	8.2
1877								
Jan.	35	268	123	27	197	155	4.4	24.4
Feb.	13	68	113	12	64	136	4.7	8.7
Mar.	15	112	131	11	78	176	6.7	11.7
Apr.	28	151	193	20	108	238	8.8	15.8
May	26	123	193	17	86	224	7.8	21.2
June	26	113	146	16	69	152	9.2	13.4
July	2	10	75	1	6	91	9.4	5.9
Aug.	8	36	90	8	36	112	9.7	6.3
Sept.	24	111	240	17	87	243	7.8	16.4
Oct.	31	157	84	18	111	81	6.1	6.7
Nov.	89	528	174	61	358	227	4.3	14.5
Dec.	5	29	88	5	29	96	3.3	2.3

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1878								
Jan.	5	22	44	3	14	46	3.6	3.3
Feb.	2	19	43	1	11	39	5.0	6.0
Mar.	14	81	102	8	46	97	7.2	7.8
Apr.	0	1	22	0	0	25	9.3	0.1
May	15	86	110	10	57	103	7.6	5.8
June	10	53	165	7	41	174	9.7	6.4
July	0	1	29	0	0	27	8.7	0.1
Aug.	0	0	9	0	0	12	9.3	0.0
Sept.	17	82	88	12	57	110	8.2	5.3
Oct.	1	10	75	1	10	79	5.2	1.1
Nov.	7	35	47	5	23	59	3.9	4.1
Dec.	0	1	14	1	2	22	3.8	0.5
1879								
Jan.	0	2	57	0	1	66	3.5	0.8
Feb.	0	0	48	0	0	59	4.4	0.6
Mar.	0	0	50	0	0	65	6.9	0.0
Apr.	15	85	152	9	58	176	8.3	6.2
May	1	8	116	1	5	127	8.3	2.4
June	7	28	11	5	18	10	9.0	4.8
July	13	88	205	9	57	216	9.2	7.5
Aug.	12	55	132	10	42	132	10.2	10.7
Sept.	13	60	100	9	43	99	8.0	6.1
Oct.	21	112	219	17	90	293	6.1	12.3
Nov.	28	164	202	21	127	233	4.3	12.9
Dec.	12	65	205	7	37	175	3.9	7.2
1880								
Jan.	65	338	604	58	300	705	4.0	24.0
Feb.	92	448	897	67	328	919	5.3	27.5
Mar.	34	163	697	27	141	758	8.0	19.5
Apr.	56	254	716	39	218	725	10.5	19.3
May	122	578	620	84	409	662	9.1	23.5
June	146	677	611	104	478	750	9.9	34.1
July	52	266	1136	41	208	1335	9.6	21.9
Aug.	195	944	792	145	732	945	9.6	48.1
Sept.	305	1306	976	216	949	1143	10.1	66.0
Oct.	138	653	962	111	548	1223	8.8	43.0
Nov.	140	687	734	99	480	894	5.9	30.7
Dec.	139	687	870	99	488	1038	4.9	29.6
1881								
Jan.	189	798	1203	138	597	1381	5.4	36.4
Feb.	223	892	2422	172	669	2712	6.5	53.2
Mar.	208	974	2155	140	662	2336	9.6	51.5
Apr.	147	683	1748	105	530	2032	10.6	51.7
May	108	502	1316	83	378	1459	10.5	43.5
June	194	958	1790	132	660	1971	12.2	60.5
July	288	1376	2178	199	955	2335	11.4	76.9
Aug.	194	984	1804	142	713	2053	12.1	58.0
Sept.	232	1165	1702	170	853	2067	10.9	53.2
Oct.	179	987	1470	123	705	1762	8.4	64.0
Nov.	225	1147	1199	163	840	1434	6.3	54.8
Dec.	170	867	1600	120	641	2011	5.9	47.3

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R	Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ				Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1882							′		**1886**							′	
Jan.	85	476	1193	64	366	1340	5.9	45.0	Jan.	100	754	646	66	544	819	7.4	29.9
Feb.	163	901	1619	118	677	1877	6.4	69.3	Feb.	68	437	557	46	313	669	6.5	25.9
Mar.	247	1264	2055	180	929	2183	9.7	67.5	Mar.	184	1447	751	130	1032	902	9.4	57.3
Apr.	414	2465	2680	303	1858	2792	12.1	95.8	Apr.	114	827	573	85	624	715	10.4	43.7
May	399	1978	2431	308	1520	2569	12.0	64.1	May	115	920	687	85	695	810	10.6	30.7
June	140	813	1792	92	535	1783	9.9	45.2	June	72	507	501	56	398	625	9.9	27.1
July	123	660	2654	85	481	2780	9.4	45.4	July	89	604	369	57	395	462	9.7	30.3
Aug.	179	903	1921	124	643	1881	10.5	40.4	Aug.	24	162	392	17	114	458	9.9	16.9
Sept.	290	1346	2006	226	1073	2133	10.5	57.7	Sept.	38	293	488	25	194	595	8.0	21.4
Oct.	366	1814	1962	276	1394	2101	8.3	59.2	Oct.	13	84	237	8	57	316	7.7	8.6
Nov.	530	2586	2248	378	1931	2495	5.9	84.4	Nov.	0	3	291	0	2	347	6.6	0.3
Dec.	73	465	1535	58	367	1756	5.0	41.8	Dec.	39	278	202	25	189	256	5.2	12.4
1883									**1887**								
Jan.	205	1271	1764	143	892	1955	5.3	60.6	Jan.	17	119	239	11	82	307	5.6	10.3
Feb.	164	1075	1721	110	735	1901	7.6	46.9	Feb.	15	99	292	11	75	345	7.1	13.2
Mar.	125	882	1284	87	631	1475	9.2	42.8	Mar.	4	33	278	4	31	332	7.4	4.2
Apr.	237	1619	1295	156	1097	1472	11.4	82.1	Apr.	9	65	170	6	46	202	9.1	6.9
May	74	450	1025	58	351	1214	10.2	32.1	May	57	358	337	37	261	367	9.5	20.0
June	309	2034	1121	213	1451	1371	10.9	76.5	June	74	407	283	51	302	324	9.7	15.7
July	431	2770	1826	296	2066	2088	12.3	80.6	July	75	456	270	55	371	325	10.2	23.3
Aug.	144	860	1381	100	640	1690	10.6	46.0	Aug.	28	238	271	18	163	325	9.6	21.4
Sept.	279	1562	1206	205	1180	1493	11.2	52.6	Sept.	28	189	241	18	122	289	8.5	7.4
Oct.	391	2341	2083	296	1793	2706	10.1	83.8	Oct.	9	88	236	6	54	272	6.8	6.6
Nov.	366	2337	2112	253	1736	2488	6.6	84.5	Nov.	11	62	204	8	52	243	5.0	6.9
Dec.	279	1979	2231	190	1386	2565	5.3	75.9	Dec.	104	771	248	77	568	316	5.6	20.7
1884									**1888**								
Jan.	299	2312	2610	215	1746	3122	6.3	91.5	Jan.	29	176	273	20	121	337	5.2	12.7
Feb.	327	2074	2637	247	1564	2999	8.1	86.9	Feb.	18	132	250	13	91	298	5.6	7.1
Mar.	261	1793	1881	174	1230	2263	11.4	86.8	Mar.	20	120	300	15	88	354	7.6	7.8
Apr.	278	2168	1783	200	1597	2034	13.2	76.1	Apr.	5	31	210	4	26	254	8.2	5.1
May	230	1602	1621	158	1204	2033	11.3	66.5	May	47	258	207	35	192	237	8.8	7.0
June	92	734	785	60	530	901	12.4	51.2	June	7	52	269	4	32	284	9.3	7.1
July	140	942	1339	101	698	1645	10.8	53.1	July	3	26	174	2	22	212	9.2	3.1
Aug.	142	1073	1158	97	787	1267	10.4	55.8	Aug.	11	75	157	9	65	189	9.1	2.8
Sept.	240	1507	1484	170	1117	1796	10.9	61.9	Sept.	23	151	215	16	99	259	7.2	8.8
Oct.	219	1383	1584	155	991	1988	9.4	47.8	Oct.	2	9	86	2	11	100	6.8	2.1
Nov.	85	598	1729	59	417	2118	6.6	36.6	Nov.	62	370	209	42	257	225	5.4	10.7
Dec.	170	1230	1592	115	849	1912	5.9	47.2	Dec.	20	122	111	13	80	131	4.3	6.7
1885									**1889**								
Jan.	119	747	1701	82	530	1929	6.0	42.8	Jan.	1	4	87	0	2	100	3.6	0.8
Feb.	228	1526	1432	154	1083	1808	6.0	71.8	Feb.	8	48	46	5	28	58	5.2	8.5
Mar.	136	1079	1260	91	747	1522	9.5	49.8	Mar.	5	33	128	4	28	144	6.7	7.0
Apr.	144	1219	1097	99	855	1313	11.2	55.0	Apr.	6	39	55	4	27	64	8.6	4.3
May	186	1454	1643	128	1059	1904	11.0	73.0	May	2	13	58	2	14	70	8.4	2.4
June	268	2431	1313	180	1702	1699	11.7	83.7	June	54	295	113	39	217	130	8.6	6.4
July	183	1533	1622	131	1155	1957	11.7	66.5	July	41	232	171	30	170	197	8.2	9.7
Aug.	105	830	1291	71	598	1503	11.4	50.0	Aug.	61	365	192	45	282	252	8.4	20.6
Sept.	113	893	885	78	646	1105	9.6	39.6	Sept.	22	115	142	16	90	174	7.1	6.5
Oct.	132	953	1247	98	719	1451	7.3	38.7	Oct.	2	17	93	1	12	116	6.4	2.1
Nov.	94	602	817	67	425	940	5.9	33.3	Nov.	0	0	51	0	0	67	4.9	0.2
Dec.	45	294	654	31	221	774	4.5	21.7	Dec.	12	71	145	11	66	186	3.9	6.7

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R	Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ				Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1890							′		**1894**							′	
Jan.	8	45	165	7	42	195	3.9	5.3	Jan.	379	2142	1300	276	1576	1504	6.0	83.2
Feb.	0	2	53	0	1	72	5.0	0.6	Feb.	350	2010	1643	257	1487	1799	8.6	84.6
Mar.	15	81	198	12	72	227	6.7	5.1	Mar.	161	853	1206	112	623	1340	10.3	52.3
Apr.	1	15	50	1	9	56	9.3	1.6	Apr.	390	2169	1634	282	1604	1806	13.1	81.6
May	5	32	122	3	22	142	8.3	4.8	May	459	2402	1941	351	1840	2140	12.5	101.2
June	2	11	81	2	9	93	8.5	1.3	June	499	2448	1671	345	1851	1872	10.3	98.9
July	27	161	257	22	140	311	9.4	11.6	July	427	2345	2228	309	1741	2527	10.9	106.0
Aug.	39	256	167	24	158	187	9.5	8.5	Aug.	295	1646	1526	206	1165	1697	12.2	70.3
Sept.	46	312	445	34	229	488	6.6	17.2	Sept.	175	893	1553	128	666	1805	8.9	65.9
Oct.	51	311	761	39	246	729	5.9	11.2	Oct.	316	1687	2157	226	1228	2539	6.3	75.5
Nov.	46	273	484	30	181	552	4.4	9.6	Nov.	152	816	1477	105	585	1624	5.3	56.6
Dec.	15	96	482	12	78	571	3.9	7.8	Dec.	228	1348	1630	169	1038	1839	3.9	60.0
1891									**1895**								
Jan.	46	255	535	33	212	608	4.0	13.5	Jan.	222	1291	1988	158	942	2197	2.9	63.3
Feb.	75	383	596	52	268	700	4.3	22.2	Feb.	234	1243	1978	170	937	2194	6.9	67.2
Mar.	33	170	587	29	159	714	9.1	10.4	Mar.	235	1410	1854	165	1018	2117	9.5	61.0
Apr.	88	477	748	63	354	800	8.7	20.5	Apr.	257	1412	2217	190	1074	2556	11.9	76.9
May	122	755	1192	85	553	1217	11.4	41.1	May	207	1194	2320	156	902	2584	10.9	67.3
June	129	842	1524	86	594	1588	10.3	48.3	June	272	1562	2342	191	1143	2561	14.6	71.5
July	220	1313	2184	164	1022	2376	10.9	58.8	July	104	591	1966	79	465	2235	11.8	47.8
Aug.	84	631	1456	66	551	1635	9.8	33.2	Aug.	330	1918	2171	231	1376	2449	11.9	68.9
Sept.	253	1669	1525	184	1287	1689	10.1	53.8	Sept.	211	1167	2153	146	832	2346	9.6	57.7
Oct.	140	867	1870	91	605	1895	9.0	51.5	Oct.	314	1765	2058	212	1232	2194	6.9	67.9
Nov.	142	866	1640	98	637	1840	6.7	41.9	Nov.	194	981	1737	139	722	1847	4.6	47.2
Dec.	105	671	1659	77	538	1811	3.9	32.2	Dec.	267	1414	1925	189	1037	2057	3.9	70.7
1892									**1896**								
Jan.	257	1547	2692	201	1253	2778	6.4	69.1	Jan.	69	357	1229	50	285	1399	7.2	29.0
Feb.	369	2242	2967	278	1788	3021	7.1	75.6	Feb.	178	1173	971	137	899	1145	5.3	57.4
Mar.	170	1028	3111	135	810	3212	9.7	49.9	Mar.	106	737	1237	80	544	1494	9.1	52.0
Apr.	204	1301	3463	146	994	3468	10.2	69.6	Apr.	98	602	1060	68	423	1324	10.9	43.8
May	321	2077	3816	228	1542	3771	13.0	79.6	May	47	284	817	28	181	954	9.5	27.7
June	201	1448	2805	145	1118	3041	13.4	76.3	June	195	1144	1065	140	821	1212	9.5	49.0
July	437	2522	3189	325	1921	3172	12.6	76.8	July	114	689	1277	83	513	1416	9.7	45.0
Aug.	304	1963	3119	215	1429	3166	13.2	101.4	Aug.	73	398	1148	49	274	1256	9.4	27.2
Sept.	184	1292	2962	135	1005	3165	10.9	62.8	Sept.	265	1600	1818	186	1183	2005	11.0	61.3
Oct.	205	1260	4114	143	911	4080	9.5	70.5	Oct.	78	427	1366	54	304	1471	6.9	28.4
Nov.	224	1279	3383	155	954	3215	4.9	65.4	Nov.	156	782	1271	113	609	1446	4.0	38.0
Dec.	190	1199	3142	129	865	3073	6.1	78.6	Dec.	159	813	1635	102	533	1773	3.6	42.6
1893									**1897**								
Jan.	275	1642	2356	188	1158	2408	7.0	75.0	Jan.	304	1837	1514	214	1335	1764	3.5	40.6
Feb.	271	1683	2100	204	1284	2235	6.6	73.0	Feb.	244	1237	1539	177	913	1821	4.0	29.4
Mar.	213	1279	1937	153	964	2146	11.4	65.7	Mar.	125	692	1079	94	524	1258	9.1	29.1
Apr.	251	1629	2375	171	1179	2389	12.7	88.1	Apr.	95	498	1198	71	384	1401	9.9	31.0
May	232	1548	2646	166	1178	2742	14.1	84.7	May	102	601	831	69	398	972	9.1	20.0
June	272	1894	2800	191	1379	2876	12.0	88.2	June	47	258	540	37	217	655	7.8	11.3
July	327	2081	2643	238	1574	2778	13.0	88.8	July	87	518	757	62	364	889	8.5	27.6
Aug.	523	3153	2950	376	2340	3140	12.2	129.2	Aug.	90	605	984	70	493	1116	9.4	21.8
Sept.	399	2346	2293	278	1644	2473	11.7	77.9	Sept.	186	1003	1214	127	701	1408	6.3	48.1
Oct.	374	1992	2198	273	1504	2317	9.2	79.7	Oct.	22	127	700	14	83	815	5.7	14.3
Nov.	281	1828	1336	199	1313	1430	7.5	75.1	Nov.	7	43	553	6	34	692	4.2	8.4
Dec.	502	2684	1764	367	2028	1876	4.2	93.8	Dec.	162	959	875	121	750	1069	2.3	33.3

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R	Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ				Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1898							′		**1902**							′	
Jan.	100	557	956	70	411	1124	2.5	30.2	Jan.	25	167	74	15	98	91	3.8	5.2
Feb.	145	790	982	94	524	1201	3.5	36.4	Feb.	0	1	13	0	0	14	3.2	0.0
Mar.	165	886	880	118	625	1041	6.3	38.3	Mar.	39	227	150	30	180	186	6.9	12.4
Apr.	39	216	790	29	159	913	7.6	14.5	Apr.	0	0	135	0	0	131	8.1	0.0
May	54	317	762	41	248	955	11.1	25.8	May	11	53	153	8	39	180	6.0	2.8
June	15	93	644	10	65	755	8.4	22.3	June	1	6	206	1	6	200	6.7	1.4
July	13	72	360	8	48	434	8.8	9.0	July	0	0	55	0	0	56	9.0	0.9
Aug.	128	703	649	85	479	757	9.2	31.4	Aug.	1	4	35	0	3	38	8.9	2.3
Sept.	187	1157	810	131	858	948	8.5	34.8	Sept.	18	97	153	14	79	175	6.0	7.6
Oct.	146	889	1010	96	606	1096	6.8	34.4	Oct.	38	231	278	26	162	307	6.5	16.3
Nov.	82	476	836	56	318	916	4.3	30.9	Nov.	31	200	372	21	150	401	3.0	10.3
Dec.	45	243	531	33	172	566	3.3	12.6	Dec.	0	6	289	0	4	316	1.9	1.1
1899									**1903**								
Jan.	51	307	456	33	216	487	2.6	19.5	Jan.	6	43	221	4	31	221	3.2	8.3
Feb.	13	68	243	8	40	273	4.0	9.2	Feb.	30	163	604	24	130	679	4.6	17.0
Mar.	64	382	441	46	281	483	7.6	18.1	Mar.	40	258	422	30	212	440	6.9	13.5
Apr.	39	210	326	27	144	381	10.2	14.2	Apr.	74	447	900	57	337	968	8.5	26.1
May	12	70	211	9	51	261	9.3	7.7	May	13	106	869	10	88	970	9.0	14.6
June	52	308	394	33	203	461	9.9	20.5	June	21	135	637	14	106	697	12.0	16.3
July	43	261	494	32	197	535	8.1	13.5	July	72	381	1338	50	274	1373	8.4	27.9
Aug.	0	2	226	0	1	244	8.4	2.9	Aug.	31	175	1303	20	117	1374	7.2	28.8
Sept.	8	45	135	5	25	158	8.8	8.4	Sept.	16	89	758	16	87	843	7.4	11.1
Oct.	18	120	158	12	75	183	5.4	13.0	Oct.	186	1469	833	147	1205	989	6.8	38.9
Nov.	9	44	248	6	33	316	3.4	7.8	Nov.	199	1241	1162	152	943	1392	5.3	44.5
Dec.	12	77	218	8	54	253	2.2	10.5	Dec.	124	751	1421	93	597	1650	2.4	45.6
1900									**1904**								
Jan.	14	90	162	9	58	182	3.5	9.4	Jan.	87	542	989	64	412	1090	3.3	31.6
Feb.	18	133	327	13	114	376	3.5	13.6	Feb.	67	500	906	45	345	1034	5.3	24.5
Mar.	35	185	234	28	151	250	6.6	8.6	Mar.	78	495	1203	57	376	1350	9.6	37.2
Apr.	27	140	265	18	97	318	8.2	16.0	Apr.	190	1274	1547	128	901	1633	10.2	43.0
May	41	207	331	25	128	418	8.1	15.2	May	48	342	1851	36	268	2003	10.2	39.5
June	50	159	100	42	118	126	9.0	12.1	June	59	482	1570	40	330	1620	10.4	41.9
July	16	56	138	17	52	178	8.8	8.3	July	88	702	2023	62	511	2028	9.4	50.6
Aug.	4	16	24	2	11	29	9.1	4.3	Aug.	97	781	1973	68	576	2110	10.7	58.2
Sept.	10	29	92	7	23	119	7.9	8.3	Sept.	38	299	1750	31	255	1850	8.8	30.1
Oct.	47	183	86	37	138	103	6.5	12.9	Oct.	128	871	1867	92	635	1970	7.3	54.2
Nov.	5	16	61	3	12	72	3.6	4.5	Nov.	83	524	1479	70	470	1700	3.8	38.0
Dec.	0	0	12	0	0	20	2.2	0.3	Dec.	147	1021	2474	111	778	2716	3.1	54.6
1901									**1905**								
Jan.	0	0	0	0	0	0	3.5	0.2	Jan.	200	1424	2056	148	1101	2200	3.8	54.8
Feb.	2	8	19	2	7	25	3.0	2.4	Feb.	404	2833	2522	274	1983	2648	5.9	85.8
Mar.	6	19	25	4	13	31	7.1	4.5	Mar.	219	1884	2190	147	1298	2348	10.1	56.5
Apr.	0	0	0	0	0	0	9.0	0.0	Apr.	91	596	2212	62	408	2330	9.8	39.3
May	125	306	48	78	208	63	8.4	10.2	May	143	947	1998	98	668	2237	10.7	48.0
June	13	63	31	8	42	44	8.6	5.8	June	150	949	2147	101	651	2368	9.7	49.0
July	0	1	41	0	1	47	7.9	0.7	July	285	2033	2490	213	1585	2746	12.1	73.0
Aug.	0	0	5	0	0	6	8.6	1.0	Aug.	218	1508	3016	163	1159	3255	12.0	58.8
Sept.	0	0	2	0	0	3	7.1	0.6	Sept.	139	924	2623	101	696	2768	9.6	55.0
Oct.	4	18	29	2	15	34	6.1	3.7	Oct.	383	2929	2455	272	2060	2662	8.2	78.7
Nov.	12	62	64	9	48	93	3.5	3.8	Nov.	368	2620	2974	264	1946	3146	6.5	107.2
Dec.	0	0	4	0	0	7	2.2	0.0	Dec.	174	1055	2529	128	794	2650	3.5	55.5

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R	Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ				Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1906							′		**1910**							′	
Jan.	151	1020	2729	106	726	2789	4.7	45.5	Jan.	115	552	1015	80	382	1047	4.3	26.4
Feb.	81	542	2134	58	395	2299	6.3	31.3	Feb.	174	910	1024	118	633	1029	4.1	31.5
Mar.	214	1430	2461	152	1057	2590	8.6	64.5	Mar.	67	355	1076	53	287	1053	8.7	21.4
Apr.	142	933	2484	100	688	2695	10.1	55.3	Apr.	11	75	746	11	70	748	10.2	8.4
May	204	1431	2253	153	1105	2421	9.9	57.7	May	79	456	1036	58	327	1002	8.4	22.2
June	143	969	2541	110	748	2669	11.4	63.2	June	20	111	1007	20	118	997	9.7	12.3
July	335	2087	2951	231	1447	3011	11.0	103.6	July	50	262	1177	34	186	1118	6.8	14.1
Aug.	145	973	2370	107	739	2390	8.6	47.7	Aug.	45	248	873	33	182	855	8.7	11.5
Sept.	111	730	1684	73	516	1772	7.8	56.1	Sept.	86	513	1119	75	434	1083	8.4	26.2
Oct.	13	101	1345	11	99	1419	7.0	17.8	Oct.	142	749	1192	98	512	1181	6.4	38.3
Nov.	114	774	1445	79	561	1561	5.5	38.9	Nov.	7	42	890	4	24	876	5.0	4.9
Dec.	237	1510	2056	181	1207	2197	3.7	64.7	Dec.	10	47	650	7	37	662	3.7	5.8
1907									**1911**								
Jan.	242	1633	2219	176	1197	2373	5.3	76.4	Jan.	12	53	596	9	39	570	3.5	3.4
Feb.	540	3356	2222	380	2453	2395	6.9	108.2	Feb.	21	110	560	16	89	577	4.0	9.0
Mar.	181	1121	2466	130	809	2636	10.0	60.7	Mar.	18	110	664	12	71	644	7.9	7.8
Apr.	138	938	1954	99	701	2088	12.6	52.6	Apr.	65	346	695	48	260	695	8.4	16.5
May	128	814	1430	90	608	1577	10.5	42.9	May	23	135	619	17	102	625	7.8	9.0
June	183	1276	1322	138	949	1413	9.4	40.4	June	6	37	349	5	30	356	7.4	2.2
July	172	1159	1397	125	883	1490	9.6	49.7	July	3	21	380	2	12	381	10.3	3.5
Aug.	143	1016	1360	109	824	1478	8.6	54.3	Aug.	9	41	463	6	28	467	8.9	4.0
Sept.	271	1871	1987	195	1410	2159	9.3	85.0	Sept.	15	79	359	10	53	364	7.8	4.0
Oct.	239	1612	1953	179	1193	2111	8.2	65.4	Oct.	7	30	257	4	18	260	5.2	2.6
Nov.	237	1432	1941	174	1075	2064	5.2	61.5	Nov.	15	85	287	10	57	297	3.1	4.2
Dec.	208	1384	2089	144	1003	2238	3.0	47.3	Dec.	5	21	273	3	15	282	2.5	2.2
1908									**1912**								
Jan.	101	648	2282	75	507	2406	3.4	39.2	Jan.	0	0	212	0	0	219	2.4	0.3
Feb.	56	346	2344	42	270	2467	5.7	33.9	Feb.	0	0	179	0	0	198	3.5	0.0
Mar.	42	299	1706	31	218	1807	10.0	28.7	Mar.	15	80	159	10	57	171	6.4	4.9
Apr.	136	954	1908	97	707	2006	11.9	57.6	Apr.	21	100	170	17	88	188	8.3	4.5
May	95	643	1569	74	509	1680	10.2	40.8	May	4	32	278	3	21	258	7.6	4.4
June	130	962	1764	84	631	1819	10.2	48.1	June	19	102	348	15	84	365	7.8	4.1
July	64	438	1957	51	351	2054	10.5	39.5	July	3	16	202	2	10	215	7.6	3.0
Aug.	362	2418	2228	256	1750	2336	11.5	90.5	Aug.	0	0	98	0	0	101	8.7	0.3
Sept.	380	2367	2170	273	1701	2351	9.4	86.9	Sept.	13	67	214	9	47	241	8.9	9.5
Oct.	78	495	2763	57	369	2842	8.9	32.3	Oct.	16	79	250	11	55	263	6.1	4.6
Nov.	178	1059	1775	119	718	1819	3.7	45.5	Nov.	1	4	132	0	3	133	2.9	1.1
Dec.	151	805	1548	119	638	1604	3.0	39.5	Dec.	23	122	172	15	82	170	2.1	6.4
1909									**1913**								
Jan.	300	1691	1315	208	1192	1385	4.3	56.7	Jan.	2	15	212	2	15	222	3.3	2.3
Feb.	181	1045	1867	130	774	1927	3.0	46.6	Feb.	6	31	128	5	23	127	3.8	2.9
Mar.	238	1407	1933	171	1027	1999	7.2	66.3	Mar.	0	1	115	0	1	122	6.7	0.5
Apr.	110	685	1354	74	471	1387	11.6	32.3	Apr.	1	5	72	1	3	79	8.5	0.9
May	143	696	1321	102	503	1339	9.0	36.0	May	0	0	49	0	0	52	8.5	0.0
June	66	371	945	50	283	1024	8.6	22.6	June	0	0	57	0	0	55	8.6	0.0
July	138	803	1284	95	564	1324	9.2	35.8	July	3	12	72	2	7	79	8.2	1.7
Aug.	36	182	1111	25	129	1180	9.8	23.1	Aug.	0	0	19	0	0	26	8.3	0.2
Sept.	187	910	1031	160	802	1101	7.6	38.8	Sept.	1	4	55	1	4	61	7.5	1.2
Oct.	220	1172	1192	160	867	1235	7.9	58.4	Oct.	5	21	52	3	15	64	6.2	3.1
Nov.	217	1137	1170	149	794	1220	4.5	55.8	Nov.	0	4	63	1	5	76	3.8	0.7
Dec.	220	1175	1153	163	893	1166	3.7	54.2	Dec.	6	31	151	4	18	176	2.1	3.8

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R	Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ				Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1914							′		**1918**							′	
Jan.	4	16	159	3	13	178	1.8	2.8	Jan.	342	2332	1410	258	1797	1752	5.5	96.0
Feb.	3	16	100	2	11	108	3.2	2.6	Feb.	169	1104	1303	119	800	1612	5.5	65.3
Mar.	6	24	161	10	39	198	7.3	3.1	Mar.	197	1147	991	143	854	1252	9.9	72.2
Apr.	92	392	398	67	287	463	7.7	17.3	Apr.	242	1332	1310	177	979	1614	11.6	80.5
May	16	71	398	14	70	444	7.9	5.2	May	228	1236	1562	174	952	1939	13.7	76.7
June	44	225	514	32	172	564	8.5	11.4	June	158	783	1405	115	568	1734	11.8	59.4
July	11	56	377	10	47	400	7.0	5.4	July	337	1811	1451	235	1282	1792	11.5	107.6
Aug.	69	384	469	56	297	568	8.2	7.7	Aug.	384	2371	1917	292	1805	2359	12.4	101.7
Sept.	76	439	605	59	344	699	7.6	12.7	Sept.	210	1255	1564	155	944	1928	10.1	79.9
Oct.	16	54	417	10	33	473	4.9	8.2	Oct.	293	1689	1842	209	1229	2246	8.8	85.0
Nov.	59	261	531	47	222	626	4.4	16.4	Nov.	254	1473	1825	181	1041	2238	5.8	83.4
Dec.	86	408	612	60	295	713	3.0	22.3	Dec.	237	1440	1722	184	1098	2106	2.9	59.2
1915									**1919**								
Jan.	81	403	773	61	302	932	3.3	23.0	Jan.	152	874	1422	111	623	1779	5.1	48.1
Feb.	187	845	918	148	671	1105	3.2	42.3	Feb.	306	1917	1603	220	1363	2022	5.2	79.5
Mar.	119	578	1082	98	483	1253	8.6	38.8	Mar.	278	1616	1574	201	1190	1892	8.3	66.5
Apr.	248	1285	1109	180	965	1311	9.3	41.3	Apr.	187	1011	1209	131	707	1489	10.3	51.8
May	143	690	906	106	528	1060	9.8	33.0	May	394	2286	1348	281	1651	1692	10.1	88.1
June	282	1330	1040	198	972	1251	10.3	68.8	June	460	2534	1488	330	1877	1880	12.5	111.2
July	325	1667	1512	246	1308	1807	10.1	71.6	July	200	1189	2318	147	902	2672	12.6	64.7
Aug.	279	1348	1900	193	946	2149	10.9	69.6	Aug.	349	1895	1264	256	1385	1496	10.9	69.0
Sept.	226	1046	1770	159	750	2002	9.5	49.5	Sept.	247	1409	1524	188	1095	1738	9.7	54.7
Oct.	157	869	1529	113	647	1845	8.1	53.5	Oct.	188	1048	1394	134	774	1589	9.6	52.8
Nov.	105	543	1636	82	445	1954	3.2	42.5	Nov.	189	1069	1126	132	761	1323	4.9	42.0
Dec.	77	448	1274	58	359	1554	3.1	34.5	Dec.	92	456	1068	65	326	1190	3.6	34.9
1916									**1920**								
Jan.	121	713	1457	84	510	1657	3.2	45.3	Jan.	288	1694	1086	197	1167	1253	4.8	51.1
Feb.	173	961	1483	123	713	1804	5.1	55.4	Feb.	145	784	1429	100	553	1663	6.3	53.9
Mar.	243	1280	1702	178	951	2080	8.6	67.0	Mar.	347	1944	1355	246	1416	1600	9.2	70.2
Apr.	198	1077	2198	142	806	2536	12.9	71.8	Apr.	80	410	980	63	328	1076	10.0	14.8
May	311	1531	1539	206	1038	1713	12.5	74.5	May	77	394	945	57	301	1105	8.4	33.3
June	296	1491	1202	229	1157	1429	11.9	67.7	June	145	713	1146	103	539	1268	12.7	38.7
July	168	814	1451	117	572	1693	11.9	53.5	July	109	552	920	78	407	1066	10.5	27.5
Aug.	87	440	1185	65	339	1427	11.1	35.2	Aug.	46	228	731	35	184	818	10.4	19.2
Sept.	106	568	1292	81	466	1511	9.5	45.1	Sept.	189	1048	735	149	852	900	8.3	36.3
Oct.	180	1002	1090	127	722	1335	8.6	50.7	Oct.	171	832	1218	124	618	1396	7.6	49.6
Nov.	172	902	1644	120	638	1971	5.2	65.6	Nov.	152	818	1142	112	603	1389	4.4	27.2
Dec.	182	980	1906	148	794	2264	4.3	53.0	Dec.	119	611	955	84	439	1110	3.6	29.9
1917									**1921**								
Jan.	247	1458	1889	173	1046	2210	5.6	74.7	Jan.	134	645	924	95	491	1063	3.4	31.5
Feb.	328	2012	1787	226	1415	2182	6.7	71.9	Feb.	85	430	820	63	318	949	3.9	28.3
Mar.	268	1541	1737	196	1153	2219	10.1	94.8	Mar.	104	529	782	75	393	849	7.2	26.7
Apr.	210	1247	1617	150	920	1986	12.0	74.7	Apr.	103	555	782	80	449	909	10.2	32.4
May	365	2098	1832	246	1446	2238	11.3	114.1	May	147	774	712	107	604	850	9.6	22.2
June	410	2321	2227	298	1717	2706	13.2	114.9	June	108	572	777	73	387	886	8.8	33.7
July	372	2219	2652	263	1556	3163	13.7	119.8	July	165	841	880	113	577	967	9.8	41.9
Aug.	652	3987	2841	471	2978	3523	14.3	154.5	Aug.	73	395	465	51	271	535	9.5	22.8
Sept.	380	2481	2546	282	1875	3045	12.6	129.4	Sept.	90	409	530	68	333	597	7.8	17.8
Oct.	203	1261	1236	154	977	1553	10.3	72.2	Oct.	86	425	361	62	311	407	7.8	18.2
Nov.	214	1432	1001	151	1028	1252	5.9	96.4	Nov.	126	678	353	91	505	406	4.2	17.8
Dec.	496	3112	1201	352	2297	1562	5.8	129.3	Dec.	100	579	391	69	397	466	2.9	20.3

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R	Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ				Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1922									**1926**								
Jan.	25	115	395	18	90	478	3.6	11.8	Jan.	548	3287	3318	438	2695	3922	5.1	71.8
Feb.	122	639	444	89	493	534	4.0	26.4	Feb.	430	2437	2753	328	1922	3142	7.1	70.0
Mar.	293	1754	948	210	1236	1098	6.9	54.7	Mar.	300	1771	2620	216	1273	2987	10.6	62.5
Apr.	24	114	657	17	85	740	8.8	11.0	Apr.	103	536	2401	92	469	2840	10.2	38.5
May	36	187	447	23	124	499	9.3	8.0	May	271	1498	2450	196	1086	2885	12.0	64.3
June	6	22	273	4	16	321	9.6	5.8	June	313	1761	2294	232	1277	2752	12.8	73.5
July	38	188	228	24	117	256	9.2	10.9	July	200	1146	1655	151	842	2021	10.2	52.3
Aug.	20	97	159	17	87	189	6.6	6.5	Aug.	182	1065	1614	146	875	1964	11.1	61.6
Sept.	14	75	115	10	57	145	7.7	4.7	Sept.	294	1640	1521	218	1216	1818	8.4	60.8
Oct.	12	55	167	12	64	200	6.1	6.2	Oct.	292	1830	1358	229	1419	1656	6.3	71.5
Nov.	39	209	215	31	176	251	4.0	7.4	Nov.	171	906	1667	121	650	2005	6.3	60.5
Dec.	122	693	257	84	479	282	3.0	17.5	Dec.	311	1951	2291	235	1440	2714	4.2	79.4
1923									**1927**								
Jan.	15	85	362	15	94	406	3.1	4.5	Jan.	388	2459	2256	288	1810	2750	4.8	81.6
Feb.	1	3	176	0	2	216	3.8	1.5	Feb.	327	1963	2788	230	1365	3326	5.8	93.0
Mar.	7	25	128	5	16	146	5.9	3.3	Mar.	203	1125	2108	159	902	2540	11.0	69.6
Apr.	13	48	156	8	30	176	8.9	6.1	Apr.	341	1833	2312	257	1379	2776	15.1	93.5
May	5	23	164	4	19	192	7.7	3.2	May	262	1309	1953	193	967	2417	11.8	79.1
June	26	125	116	15	74	153	9.4	9.1	June	202	1203	1813	147	874	2187	10.0	59.1
July	7	39	226	5	29	264	7.1	3.5	July	218	1125	1392	158	812	1725	11.8	54.9
Aug.	0	3	179	0	2	211	8.2	0.5	Aug.	217	1281	1230	175	1030	1571	10.1	53.8
Sept.	36	187	172	25	134	213	7.5	13.2	Sept.	277	1543	1569	212	1173	1948	9.2	68.4
Oct.	33	164	197	23	117	229	5.6	11.6	Oct.	181	1037	1483	146	819	1840	8.9	63.1
Nov.	25	144	215	18	113	249	3.4	10.0	Nov.	231	1424	1484	160	975	1779	5.4	67.2
Dec.	8	39	171	5	26	207	2.4	2.8	Dec.	139	760	1456	112	623	1788	3.4	45.2
1924									**1928**								
Jan.	0	2	166	0	2	200	2.9	0.5	Jan.	364	2091	1567	255	1509	1902	4.8	83.5
Feb.	19	106	48	12	68	54	3.8	5.1	Feb.	270	1496	1529	206	1146	1890	6.7	73.5
Mar.	6	33	139	7	33	156	6.5	1.8	Mar.	361	2158	1915	282	1694	2380	9.1	85.4
Apr.	36	220	114	24	149	149	8.5	11.3	Apr.	333	1844	2210	248	1368	2584	10.8	80.6
May	51	290	387	40	247	450	7.6	20.8	May	292	1726	2271	213	1243	2661	11.4	76.9
June	82	552	402	63	427	482	9.5	24.0	June	349	1894	2259	243	1359	2796	11.1	91.4
July	90	488	752	64	359	856	10.5	28.1	July	470	2585	2602	352	1936	3155	11.9	98.0
Aug.	102	512	751	71	360	814	9.1	19.3	Aug.	353	1844	2472	256	1332	3026	11.4	83.8
Sept.	97	564	790	68	423	891	9.9	25.1	Sept.	514	3062	2497	374	2213	3061	10.3	89.7
Oct.	102	592	837	77	469	975	7.4	25.6	Oct.	252	1371	2389	183	993	2904	9.1	61.4
Nov.	110	735	753	83	588	884	3.3	22.5	Nov.	182	1059	2020	137	794	2419	4.1	50.3
Dec.	45	243	814	36	192	958	2.6	16.5	Dec.	247	1462	1853	179	1078	2259	4.2	59.0
1925									**1929**								
Jan.	7	44	648	6	36	748	3.5	5.5	Jan.	243	1430	1756	170	980	2116	4.8	68.9
Feb.	72	438	999	52	314	1082	4.8	23.2	Feb.	240	1126	1849	173	822	2240	7.0	64.1
Mar.	50	306	685	37	231	767	6.6	18.0	Mar.	270	1419	1764	203	1058	2092	9.4	50.2
Apr.	69	351	1076	58	312	1285	8.5	31.7	Apr.	253	1309	1902	198	1037	2250	11.7	52.8
May	154	930	946	119	703	1138	7.6	42.8	May	253	1198	2186	178	849	2524	11.4	58.2
June	145	818	1443	112	648	1687	11.7	47.5	June	320	1534	2474	247	1199	2889	11.2	71.9
July	113	624	1490	77	426	1720	9.6	38.5	July	292	1415	2554	213	1027	2895	11.3	70.2
Aug.	111	603	1456	83	474	1712	9.4	37.9	Aug.	226	1037	2450	163	744	2787	11.3	65.8
Sept.	178	932	2053	140	760	2371	9.8	60.2	Sept.	83	367	2275	63	278	2647	10.5	34.4
Oct.	305	1713	2226	225	1305	2548	7.7	69.2	Oct.	347	1880	1805	241	1310	2109	8.3	54.0
Nov.	311	1984	2414	226	1433	2765	4.8	58.6	Nov.	654	3290	2195	490	2479	2594	4.8	81.1
Dec.	742	4404	2671	547	3260	3153	4.3	98.6	Dec.	820	4271	3039	592	3084	3631	4.7	108.0

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1930								
Jan.	309	1495	2862	230	1141	3361	4.5	65.3
Feb.	199	909	2636	149	684	3102	7.0	49.2
Mar.	178	917	1938	128	657	2261	7.5	35.0
Apr.	164	791	1570	117	562	1875	11.0	38.2
May	149	684	1387	108	490	1647	10.8	36.8
June	95	415	1026	65	279	1208	9.2	28.8
July	53	203	795	41	153	975	6.8	21.9
Aug.	81	369	675	59	283	811	8.9	24.9
Sept.	102	500	1046	76	368	1241	9.1	32.1
Oct.	182	999	674	121	682	818	6.7	34.4
Nov.	168	895	1100	122	661	1300	5.0	35.6
Dec.	70	298	922	55	239	1073	2.9	25.8
1931								
Jan.	36	188	710	31	180	825	1.9	14.6
Feb.	222	1115	710	159	812	872	4.0	43.1
Mar.	154	782	861	108	553	1031	8.2	30.0
Apr.	115	550	930	92	432	1126	9.2	31.2
May	90	400	763	66	292	925	9.7	24.6
June	49	239	822	36	178	996	10.4	15.3
July	40	156	826	28	109	937	10.3	17.4
Aug.	27	113	559	19	83	650	10.2	13.0
Sept.	43	182	572	33	149	656	8.5	19.0
Oct.	27	125	377	20	94	432	7.9	10.0
Nov.	85	371	496	63	263	573	3.9	18.7
Dec.	69	312	533	45	204	605	3.3	17.8
1932								
Jan.	38	170	543	28	127	627	4.1	12.1
Feb.	36	193	202	25	123	246	5.2	10.6
Mar.	41	183	365	31	150	434	7.0	11.2
Apr.	70	313	217	49	223	272	8.3	11.2
May	89	438	362	66	323	434	9.4	17.9
June	100	472	661	73	344	806	7.6	22.2
July	35	150	489	25	116	548	10.3	9.6
Aug.	24	111	196	17	80	242	9.5	6.8
Sept.	3	11	81	3	9	101	8.0	4.0
Oct.	19	94	294	14	71	350	7.3	8.9
Nov.	26	128	203	24	125	262	4.6	8.2
Dec.	71	333	395	59	266	460	3.1	11.0
1933								
Jan.	51	237	542	39	180	634	3.7	12.3
Feb.	156	838	579	114	608	704	3.3	22.2
Mar.	46	216	480	36	162	562	7.0	10.1
Apr.	4	18	283	3	15	341	9.6	2.9
May	5	21	224	4	16	268	10.6	3.2
June	13	59	165	8	39	192	9.0	5.2
July	3	10	147	3	12	177	8.1	2.8
Aug.	0	1	40	0	0	44	10.1	0.2
Sept.	8	31	87	5	20	102	9.1	5.1
Oct.	14	61	56	8	37	68	5.5	3.0
Nov.	1	3	86	1	4	101	2.8	0.6
Dec.	0	1	36	0	1	37	3.1	0.3

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1934								
Jan.	8	40	57	8	43	75	3.1	3.4
Feb.	17	73	248	13	59	302	4.9	7.8
Mar.	5	19	137	3	11	160	8.1	4.3
Apr.	73	411	242	61	355	288	9.3	11.3
May	80	443	562	65	373	666	8.4	19.7
June	27	139	384	19	100	449	9.0	6.7
July	25	129	465	20	106	554	10.2	9.3
Aug.	22	119	356	17	97	422	8.8	8.3
Sept.	5	19	315	5	21	368	9.2	4.0
Oct.	6	18	203	6	21	255	7.4	5.7
Nov.	18	105	208	13	81	247	4.7	8.7
Dec.	41	187	384	34	153	456	3.1	15.4
1935								
Jan.	73	381	733	59	312	877	3.4	18.9
Feb.	58	283	676	49	256	793	4.6	20.5
Mar.	56	273	533	40	197	652	7.9	23.1
Apr.	32	159	537	26	126	643	9.3	12.2
May	89	478	615	68	362	726	8.9	27.3
June	174	930	834	133	690	1030	11.4	45.7
July	139	708	832	114	572	1030	11.0	33.9
Aug.	98	507	1008	83	445	1242	10.2	30.1
Sept.	133	658	1262	109	545	1539	7.9	42.1
Oct.	202	1056	1252	142	741	1506	8.3	53.2
Nov.	374	2082	1210	277	1557	1457	4.7	64.2
Dec.	397	2167	1411	301	1662	1687	3.5	61.5
1936								
Jan.	368	2219	2020	275	1647	2406	4.0	62.8
Feb.	319	1571	2036	253	1234	2478	3.9	74.3
Mar.	295	1462	2121	226	1128	2519	7.9	77.1
Apr.	272	1428	2049	203	1045	2527	13.1	74.9
May	153	758	1904	115	566	2332	14.3	54.6
June	211	1091	1568	156	804	1923	12.0	70.0
July	154	771	1791	126	629	2141	11.6	52.3
Aug.	263	1306	1955	193	952	2346	11.8	87.0
Sept.	226	1111	2118	183	924	2575	11.3	76.0
Oct.	289	1479	2457	213	1085	3019	9.6	89.0
Nov.	482	2784	2243	343	1938	2702	4.8	115.4
Dec.	431	2381	2989	319	1745	3553	4.8	123.4
1937								
Jan.	571	3115	3017	410	2253	3690	5.0	132.5
Feb.	528	2989	3362	405	2347	4114	6.9	128.5
Mar.	304	1571	2632	221	1143	3200	8.6	83.9
Apr.	544	3073	2261	394	2257	2845	11.3	109.3
May	548	2993	2472	422	2337	3045	11.7	116.7
June	698	3655	2740	518	2712	3411	13.7	130.3
July	804	4547	3187	592	3363	3978	13.8	145.1
Aug.	612	3264	3570	467	2504	4407	13.1	137.7
Sept.	379	1937	3045	287	1504	3743	13.8	100.7
Oct.	594	3484	2650	407	2364	3326	8.6	124.9
Nov.	233	1188	2982	168	853	3572	6.2	74.4
Dec.	285	1700	2328	208	1240	2779	3.8	88.8

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R	Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ				Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1938									**1942**								
Jan.	524	2903	1988	401	2265	2428	5.6	98.4	Jan.	92	526	1061	64	362	1249	4.0	35.6
Feb.	422	2464	2823	296	1744	3356	8.0	119.2	Feb.	261	1397	876	178	991	1036	4.0	52.8
Mar.	369	1991	2952	276	1474	3635	12.4	86.5	Mar.	259	1278	959	185	924	1181	8.7	54.2
Apr.	568	2990	2948	446	2366	3615	14.4	101.0	Apr.	258	1383	902	180	978	1162	10.1	60.7
May	625	3162	2896	457	2329	3566	11.2	127.4	May	70	362	625	53	276	799	9.9	25.0
June	384	1848	2331	274	1323	2952	12.6	97.5	June	28	122	632	20	89	781	9.3	11.4
July	790	4295	2811	575	3163	3611	14.4	165.3	July	52	269	461	36	188	579	8.7	17.7
Aug.	391	2051	2939	317	1678	3740	12.0	115.7	Aug.	61	322	559	46	242	653	7.3	20.2
Sept.	419	2263	2602	294	1603	3325	12.2	89.6	Sept.	28	147	453	20	109	555	10.3	17.2
Oct.	432	2590	2326	316	1917	2847	9.9	99.1	Oct.	53	279	522	45	232	640	7.6	19.2
Nov.	616	3368	2092	435	2413	2607	6.2	122.2	Nov.	124	730	479	82	485	557	3.9	30.7
Dec.	465	2508	2238	356	1917	2780	4.0	92.7	Dec.	71	353	484	49	253	553	3.0	22.5
1939									**1943**								
Jan.	324	1625	2180	234	1159	2751	3.9	80.3	Jan.	18	91	349	14	72	427	3.8	12.4
Feb.	297	1415	1996	219	1031	2413	4.8	77.4	Feb.	141	861	442	92	552	540	5.3	28.9
Mar.	202	996	1566	153	763	1907	8.3	64.6	Mar.	144	842	514	108	629	634	8.2	27.4
Apr.	530	2747	2040	383	2000	2584	11.8	109.1	Apr.	190	1078	674	131	753	785	9.7	26.1
May	471	2303	2065	351	1751	2612	9.9	118.3	May	62	309	810	51	249	1000	10.4	14.1
June	313	1563	2199	229	1131	2740	11.6	101.0	June	13	55	551	8	37	685	10.3	7.6
July	487	2735	1897	353	1962	2359	12.4	97.6	July	53	326	421	39	242	533	9.1	13.2
Aug.	611	3292	1747	446	2327	2175	13.3	105.8	Aug.	39	205	504	28	143	624	7.3	19.4
Sept.	702	4210	1815	523	3165	2229	11.7	112.6	Sept.	57	272	357	49	242	457	8.0	10.0
Oct.	467	2632	2064	339	1921	2447	9.5	88.1	Oct.	66	337	218	45	235	265	7.1	7.8
Nov.	303	1686	1828	208	1171	2161	5.4	68.1	Nov.	34	174	324	24	127	388	4.9	10.2
Dec.	141	728	1509	105	550	1827	3.3	42.1	Dec.	67	411	380	47	285	478	3.0	18.8
1940									**1944**								
Jan.	321	1603	1496	225	1159	1841	4.5	50.5	Jan.	6	31	213	5	26	255	4.2	3.7
Feb.	251	1357	1241	176	964	1532	3.7	59.4	Feb.	0	1	159	0	2	188	4.9	0.5
Mar.	376	2006	1048	273	1468	1318	9.4	83.3	Mar.	38	202	261	27	145	310	6.5	11.0
Apr.	176	860	1262	130	642	1596	13.0	60.7	Apr.	0	0	175	0	1	210	8.5	0.3
May	192	944	840	136	668	1060	10.9	54.4	May	3	11	49	2	9	57	9.1	2.5
June	357	1791	1190	254	1297	1469	12.5	83.9	June	10	53	197	9	52	246	9.3	5.0
July	215	1136	1155	170	893	1435	11.0	67.5	July	6	23	264	6	25	319	9.2	5.0
Aug.	532	2721	1390	372	1900	1750	13.5	105.5	Aug.	27	118	516	18	78	612	9.0	16.7
Sept.	272	1318	1459	192	946	1825	10.1	66.5	Sept.	62	311	326	48	250	416	7.5	14.3
Oct.	262	1403	1123	195	1058	1407	7.5	55.0	Oct.	44	228	471	36	194	560	7.5	16.9
Nov.	165	854	1286	114	594	1536	4.3	58.4	Nov.	47	237	284	34	177	357	3.3	10.8
Dec.	217	1178	1207	157	858	1524	3.5	68.3	Dec.	118	694	485	90	538	587	3.2	28.4
1941									**1945**								
Jan.	106	660	927	77	484	1138	3.6	45.6	Jan.	44	222	595	35	182	727	4.1	18.5
Feb.	118	688	962	83	479	1180	4.6	44.5	Feb.	22	109	504	18	92	622	5.0	12.7
Mar.	129	716	871	93	519	1081	8.0	46.4	Mar.	126	710	517	93	515	630	8.6	21.5
Apr.	95	469	886	69	347	1117	8.8	32.8	Apr.	140	778	674	106	585	808	9.6	32.0
May	63	283	1186	46	206	1466	9.2	29.5	May	71	357	802	56	283	965	8.6	30.6
June	237	1134	1157	162	776	1424	9.0	59.8	June	97	511	914	77	399	1083	8.4	36.2
July	261	1384	1155	190	997	1464	11.7	66.9	July	126	679	844	93	506	1071	10.6	42.6
Aug.	221	1212	1216	166	908	1542	11.5	60.0	Aug.	71	379	682	51	271	816	9.9	25.9
Sept.	308	1853	1197	225	1348	1456	9.9	65.9	Sept.	97	536	660	81	451	826	9.0	34.9
Oct.	225	1221	954	152	829	1199	7.3	46.3	Oct.	256	1487	952	195	1114	1151	8.8	68.8
Nov.	146	821	862	112	642	1069	3.8	38.3	Nov.	86	473	1129	71	399	1365	4.8	46.0
Dec.	89	517	1083	63	362	1308	3.7	33.7	Dec.	82	439	992	60	325	1195	3.0	27.4

MEAN DAILY AREAS OF SUNSPOTS AND FACULÆ FOR EACH CALENDAR MONTH, 1874-1954

Month	Projected Area			Area Corrected for Foreshortening			ΔD	R
	Umbræ	Whole Spots	Faculæ	Umbræ	Whole Spots	Faculæ		
1946								
Jan.	266	1483	1044	218	1237	1285	3.7	47.6
Feb.	695	3807	1660	547	3091	1967	6.2	86.2
Mar.	304	1853	1909	249	1551	2285	8.2	76.6
Apr.	311	1781	1759	245	1433	2099	11.4	75.7
May	258	1568	1644	179	1085	2036	13.7	84.9
June	159	920	1697	121	716	2101	12.7	73.5
July	529	3948	1943	386	2912	2433	12.6	116.2
Aug.	518	3048	1595	374	2291	2011	13.1	107.2
Sept.	409	2513	1794	300	1860	2181	11.7	94.4
Oct.	317	1847	2073	230	1345	2565	9.5	102.3
Nov.	397	2514	2024	284	1852	2461	5.0	123.8
Dec.	524	3370	2371	383	2514	2820	4.9	121.7
1947								
Jan.	495	3075	2437	368	2308	2984	4.0	115.7
Feb.	588	3914	2094	401	2721	2526	9.3	133.4
Mar.	800	4828	1909	568	3596	2394	13.1	129.8
Apr.	766	5198	1958	562	3950	2507	15.0	149.8
May	819	5034	2607	607	3741	3182	15.1	201.3
June	385	2429	2611	299	1934	3239	15.8	163.9
July	513	3262	2724	375	2451	3402	15.0	157.9
Aug.	631	4410	2844	461	3214	3594	16.0	188.8
Sept.	452	2740	2415	324	1992	3091	15.3	169.4
Oct.	530	3263	2295	382	2380	2890	9.5	163.6
Nov.	358	2255	1821	261	1686	2209	5.8	128.0
Dec.	353	2282	2161	251	1643	2663	4.4	116.5
1948								
Jan.	240	1427	2040	185	1113	2548	5.7	108.5
Feb.	207	1310	1548	169	1090	1998	7.4	86.1
Mar.	278	1600	1653	215	1261	2102	11.3	94.8
Apr.	733	4479	2132	552	3432	2732	14.6	189.7
May	663	4250	2289	510	3305	2978	14.0	174.0
June	523	3517	2155	379	2559	2680	12.1	167.8
July	392	2412	2189	284	1766	2739	16.1	142.2
Aug.	415	2797	1866	307	2075	2299	11.9	157.9
Sept.	420	2548	1877	306	1865	2322	9.6	143.3
Oct.	347	2287	1688	267	1745	2124	9.5	136.3
Nov.	229	1353	1406	169	1006	1759	6.4	95.8
Dec.	575	3402	1327	414	2477	1674	4.5	138.0
1949								
Jan.	469	2894	1834	360	2240	2206	5.7	119.1
Feb.	890	5081	2233	631	3640	2691	8.5	182.3
Mar.	710	4314	2034	534	3277	2493	12.1	157.5
Apr.	456	2475	1983	340	1882	2453	13.7	147.0
May	311	1656	1987	227	1217	2437	14.7	106.2
June	394	2134	2311	290	1606	2858	14.8	121.7
July	395	2368	2326	294	1752	2825	13.6	125.8
Aug.	502	3067	2019	372	2265	2436	12.6	123.8
Sept.	507	2981	2369	374	2185	2806	12.1	145.3
Oct.	427	2584	2208	297	1815	2622	8.3	131.6
Nov.	487	3060	2236	362	2313	2744	6.1	143.5
Dec.	307	2050	2162	222	1486	2616	3.5	117.6
1950								
Jan.	316	1866	1862	238	1416	2278	4.7	101.6
Feb.	414	2538	1799	309	1927	2262	7.0	94.8
Mar.	357	2078	1815	284	1660	2330	10.1	109.7
1950								
Apr.	535	3331	1729	376	2359	2155	13.3	113.4
May	349	2049	1809	268	1578	2230	12.7	106.2
June	232	1371	1559	173	1048	1931	11.7	83.6
July	287	1630	1506	221	1256	1837	12.7	91.0
Aug.	252	1549	1185	175	1069	1496	11.6	85.2
Sept.	117	648	1106	88	488	1350	10.4	51.3
Oct.	133	753	1049	100	571	1220	7.0	61.4
Nov.	169	1051	774	117	745	942	3.6	54.8
Dec.	138	868	875	96	610	1048	4.2	54.1
1951								
Jan.	190	1139	809	126	746	1005	4.1	59.9
Feb.	129	809	944	100	627	1173	3.6	59.9
Mar.	215	1082	965	163	845	1210	6.6	55.9
Apr.	379	2260	1122	267	1599	1347	10.1	92.9
May	654	3898	1147	480	2835	1422	14.5	108.5
June	532	3344	1312	391	2477	1628	13.3	100.6
July	174	1013	1662	134	780	1942	11.0	61.5
Aug.	155	909	1283	112	664	1534	11.2	61.0
Sept.	237	1390	1317	166	960	1548	12.6	83.1
Oct.	170	1005	1240	126	757	1427	7.2	51.6
Nov.	147	877	1033	111	666	1205	5.4	52.4
Dec.	125	885	890	84	602	1091	3.9	45.8
1952								
Jan.	122	666	879	84	464	1034	5.3	40.7
Feb.	71	441	658	49	305	774	4.4	22.7
Mar.	34	200	519	24	142	636	7.2	22.0
Apr.	78	452	638	600	354	782	10.7	29.1
May	53	288	592	46	257	703	10.4	23.4
June	100	536	670	71	393	800	9.7	36.4
July	144	884	746	105	654	906	8.9	39.3
Aug.	163	912	647	121	689	768	11.1	54.9
Sept.	71	416	584	53	307	720	8.9	28.2
Oct.	83	485	437	58	339	518	6.9	23.8
Nov.	115	645	358	82	455	421	4.4	22.1
Dec.	111	636	396	82	477	470	2.5	34.3
1953								
Jan.	77	411	488	53	289	577	4.5	26.5
Feb.	3	14	325	2	10	381	4.3	3.9
Mar.	14	79	358	12	70	420	7.5	10.0
Apr.	95	589	271	66	406	324	8.0	27.8
May	34	219	256	29	196	314	10.1	12.5
June	59	314	308	41	218	370	8.5	21.8
July	20	103	226	15	81	280	8.6	8.6
Aug.	67	360	292	50	269	351	9.2	23.5
Sept.	36	193	342	26	141	416	7.8	19.3
Oct.	12	61	260	9	47	299	7.2	8.2
Nov.	2	12	155	2	9	182	4.2	1.6
Dec.	1	8	54	1	6	64	3.1	2.5
1954								
Jan.	0	1	46	0	1	54	3.2	0.0
Feb.	0	2	48	0	1	58	5.2	0.2
Mar.	46	252	111	28	157	130	8.8	10.8
Apr.	1	3	59	0	3	70	8.1	1.8
May	0	1	25	0	1	33	9.7	0.7
June	0	2	18	0	2	19	8.9	0.2

Values for *R* for 1954 given in the last column are provisional.

LIST OF SPOTLESS DAYS, 1874-1954

1874 (8.5)

Apr. (20-23)
June (8), (9)
Oct. (26), (27), 28, (29)
Dec. (3), 4

1875 (25.1)

Jan. 6, 27, (28), 30, 31
Feb. (15), (16), 17
Apr. 23, 24
May 9-11, (12), 13-15, 17-21, (23), 31
June (12), 14, (15)
July 16, 18, (19), 20, (21), 22, 23
Aug. (9), 10, 11, 13, (14), 16, (17-19)
Sept. 1, 2, (3), (4), (6-8), (13), 17, 18, (21), (22), 24, 25
Oct. 11, 12, (13), (17)
Nov. (6), 8, (10), (12), 13
Dec. 8

1876 (38.0)

Jan. (1), 13
Feb. 8, (23), 24, (25)
Mar. (3), 4, 8, 31
Apr. 2, 3, (5), 7, 20, 21, (22), 23-26 (27-29)
May 1-4, (5), 6, 16, 17, (18), (19), 20-22, (29-31)
June 1, 3, 4, (6-9), (12-16), 18-20, (30)
July 12-15, 17, (18), 29
Aug. 1-3, (4), (5), (8), 9, (10), (11), (14), 15, (21)
Sept. 6, (7), (8), (12), (20), 21, 22, 25, 26
Oct. (9), (10), (31)
Nov. (1), (7), (8), (24), (27), (28), 29, (30)
Dec. (1), (2), 6, (7), (12), 13, (14), (30)

1877 (43.4)

Jan. (3-5), 29
Feb. 19, (20), (21), (23), (24)
Mar. (14), (16), 23, 24, 27, (28), (29), 31
Apr. 4, 5, (9), (11), 12, (13), (14)
May 28, 29, (30), (31)
June (12), 14-16, (17-22), 27
July (6), (7), (9), 10-12, (13), (17), 20, 21, (23-26), (29), 30, 31
Aug. (4), (7), (9), (12), 14, (16-18), (20), (21)
Sept. 1, (22), 24
Oct. (2), (3), 5, 6, (8), (9),

1877 *(continued)*

Oct. (11), (12), (15), (16), 17, (18), (20), (23), 24
Nov. 8, 10, 12, (20)
Dec. (5-8), (10-14), (17), (18), (26), (28)

1878 (81.3)

Jan. (1-5), 7, (8), (9), 10, (11-13), (16), 17, (18-22), (29-31)
Feb. (1), (2), (9-13), 14, (15-25), (28)
Mar. (1-3), (7), 8, 9, (10), 19, (20-28), 29, (30)
Apr. (1), (2), 3, (4), (6-13), 14, (15-30)
May (1), (4-9), 10, (11-25)
June (7-9), (11), 12, (13-20) 21, 22, (23-25), (30)
July (1-6), (8-13), (15), 16, 17, (18-25), 27, (28-31)
Aug. (1-5), 6, 7, (8-15), 16, (17), (19), (21-31)
Sept. (1), 14, (15-28), 29, 30
Oct. 1, (2-7), 8, (9-11), 12, 13, (14-18), 19, (20), 21, (22-28)
Nov. (10-15), 16, (17), (18), 19, (23-28), 29, (30)
Dec. (1-15), 16, 17, (18), (21-31)

1879 (74.2)

Jan. (1-11), (13-18), 19-22, (23-29)
Feb. 1-3, (4), (5), 6, (7-11), 12, (13), (14), (17-28)
Mar. (1-11), 12, (13), 14, (15), 16, 17, (18), 19, (20-24), 25-27, (28-31)
Apr. (1-6), 7, 8, (9-11), (25-30)
May (1-7), (13-16), 17, (18), 19, (21-30)
June (1-4), (6), (7), 9, (10-13) 14, (16-25)
July 7, (8-10), 18, (21-26), (28), (29), 30, (31)
Aug. (1), (2), (4-9), (14-16), (18), (20-22), (25), (26)
Sept. 8, (9-11), (13-23), (30)
Oct. 4, (5), 6, (23), (24), 25, (26-31)
Nov. (1-3), 6, 19, (21-24), (26)
Dec. (5), 6, (7-15), (24), (26-31)

1880 (16.1)

Jan. (1), (2), (22), (23), 25, 27, (28)
Feb. 14-16, (17), 18, (19), (20)

1880 *(continued)*

Mar. 5, 20, (21-24), 25, (26), (28)
Apr. (10), (11), 17, (18), 19-23, (24)
May 15-17, (18), 19, 22, (23)
June (5), 14
July 12, 14, 15, 17, 19
Aug. (25-27)
Nov. (6), (7), (10-12)

1881 (2.0)

Jan. 15, (16)
Aug. 14-16
Oct. 31
Dec. 24

1882 (0.6)

July 9
Dec. 4

1883 (2.4)

Feb. 23
Mar. 5, 6
May 27, 28
Sept. 24, 25
Dec. 5

1884 (0.3)

Nov. 8

1885 (2.8)

Mar. 23
Oct. 15, 16
Nov. 25, 27, 30
Dec. 1, 6-8

1886 (16.5)

Jan. 24-29
Feb. 24
Apr. 13, (14)
May 15-19
June 13, (14), 15
July 10-12
Aug. 21, 22
Sept. 24, (28), 29
Oct. 13, 14, 31
Nov. 1-11, 18-25, 27, (28), 29, 30
Dec. 1-5, (6), (7), 8, 9

1887 (29.4)

Jan. (9), (11-13), 14-18
Feb. 7, 8, (9), 10-16
Mar. 3-5, (6), 7-9, (12), (13), 14, (15), 16, 28, 29
Apr. 5, (7), 8-10, (11), 14, 17

1887 *(continued)*

May 23, (24), 25, 27
June 26
July (19-22)
Aug. 11, 12, 23-26, 29, 30, (31)
Sept. (1), (2), 5-12, 25, 26, (27), (28), 29, 30
Oct. 1, 7-11, (12-16), 17, 30
Nov. 2-4, 21, 22, (23-25), 26-30
Dec. (1), 2, 28-30

1888 (43.2)

Jan. 26, (27-29)
Feb. (4), 5-10, (11), 12-17
Mar. 2, (3), 4, 5, (6), (7), 8, 24, 26-30
Apr. 6-9, (10), 11-14, (15), (19), (20), 30
May (1), 2-5, (7-9), 10, 24-26, (27-31)
June (1), (2), 3, (4-6), 7, 8, 20, 21, (22), (23), 30
July (1), 2-5, 8, 9, (12), (18), (20-25), 26-28, 31
Aug. 3, (4-7), 11, (17), (19), (20), 23, (24)
Sept. 17, (18-20), 30
Oct. 1, 2, 4-6, (7), (8), 9-11, (12), 13, 14, (15), 16, 17, (18-23), 24, 28, (29), (30), 31
Nov. (1), 2-4, (5), 23, (26)
Dec. 10-13, (14), (23), 24, 25, (26), (28), (29), (31)

1889 (58.6)

Jan. (1), (2), 3, (4), 5-9, (10-14), 18, (19), (20), 21, 22, (23-31)
Feb. (7-10), 11-13, (14-20), 21
Mar. 3, 4, (18), (19), 20, 21, (22-25), 26-30, (31)
Apr. 13, (14-22), 23, (24-30)
May (1-4), (11), (12), 13, (14), (15), 16-18, (19-26), (28-31)
June (1), 2, 3, (4-11), 12-14, (15)
July (1-7), 9, 10, (11)
Aug. 21, (22-26)
Sept. (9-12), 13-15, (16-22), 23
Oct. 5, (6), (7), (12-15), 19-22, (24-26), 27, (28-31)
Nov. 1, (2), (3), 4, (5-13), 14, 15, (16), (17), 18-21, (22-28), 29, (30)
Dec. (1-11), (14-17)

1890 (47.6)

Jan. 8, (10), 11-13, (14), (15), 16, (23), 24-27, (28), 29

LIST OF SPOTLESS DAYS, 1874-1954

1890 *(continued)*

Feb. (2), 3, (4), 5-8, (9-12), 13, (14), 15-18, (19-26), 27
Mar. (1), (2), 3, 15, (16), 17, (18), (19), 21, (24), 25, (26-31)
Apr. (1), (2), 3, (4-9), 14, 18, 19, (20-24), 25, 26, (27)
May (2), 3-5, (6), (7), (14), (15), (25), (26), 27, 28, (29), 31
June 1, (2), 3, 4, (11-21), 22, (23-25), 26-30
July (1-3), 15, 16, (17), (18), 19, (20), (21)
Aug. 8-10, (12-19), 20, 21, (22), (23)
Sept. 21-23
Oct. 3, 4, 9-15, (16), 17, 18
Nov. 2, 3, (4-6), 15-21
Dec. 5, 6, 10, 12

1891 (5.2)

Jan. 3-5, (7-9), 10, (11), 12, 13, (14)
Feb. 4, 5, 7, 8
Mar. 3, 26-28

1896 (2.2)

Apr. 15-17
May (16), 17
Aug. 7, 8
Oct. 5

1897 (8.8)

Mar. 21
Apr. 23, 24
May 13-19
June 7, 8, 10-12, 17, 19
Oct. 14. 24-30
Nov. 10, 11, 17, 19, 23, 24
Dec. 25

1898 (13.5)

Feb. 1-3
Mar. (20), (21), 23-25, 30
Apr. 16-21
May 5
June 5, 7, 9. 10, 12, 13
July 3-14, 18
Aug. 20, 24, 25
Dec. 14, 15, 18, 21-28

1899 (33.8)

Jan. 20
Feb. (12), 13-18, (23-25), 26
Mar. (5), (6), 7, (8), 9, 10
Apr. 8

1899 *(continued)*

May (5), 6-11, 14, (15), (16), 17
June (2), 3, 21, 22
July 17, (18), (19), 20-23, (24), 25, 31
Aug. (3-6), 7, (8), 9-11, (12), (13), 14-18, (19), (20), 21, (22-24), 25-27, (29)
Sept. (1-3), 5, 6, (7), 8, (9-11), 12, 15, 16, (17), 21, 23-25
Oct. 3-5, (6-8), (13-15), 17, (18-20), 21, (22)
Nov. 3, 4, (5-10), 22-24
Dec. (10), 11, 22-27, (28)

1900 (53.1)

Jan. (3-8), 9-11, (20), (22), (23)
Feb. (15), 16, (17-21), 22, 23, (24-27)
Mar. (1), 2, (12), 13-15, (16-22), 23, 24
Apr. (16), 17, 18
May 9, (10), 11-13, 16-20
June (4-11), 12, (13), 14, (27), (28)
July 2, (5-10), 11, 12, (13), (14), (26-30), 31
Aug. (1-6), (14-19), 20, (21), 22, (23-31)
Sept. (1), (2), (12), 13-15, (16), 17, (18), 19-22, (23-30)
Oct. 1-3, (4-6), 13, (14), (15), (31)
Nov. (1-5), 6, 7, (8-12), (15-17), 24, 25, (26-30)
Dec. (1), 2, (3), 4, 5, (6-8), 9, (10), 11, (12-31)

1901 (80.5)

Jan. (1-12), (15-23), (25-31)
Feb. (1-3), (10), (11), (13-26), 28
Mar. (1), (2), (11-26), 27, (28-31)
Apr. (1), (2), (4-30)
May (1-18)
June (1), (2), (4-15), (27-30)
July (1-7), (9-11), 12, 13, (14-21), (25-31)
Aug. (1), (2), (4), (6-21), 22, (23-31)
Sept. 1, (2-11), (13-30)
Oct. (1-6), (13), 14, (15-27)
Nov. (2-5), 6-8, (9-12), (26-30)
Dec. (1-10), 11, (12), (13), 14, (15-31)

1902 (70.8)

Jan. (1), 2-4, 16, (17-19), 20-22, (23-27), 28, (29), 30, 31
Feb. 1, (2), 3, (5), 6, (7), (8), (10), 11, 12, (14-28)
Mar. 1, (15-19), 20, (21-29), 30, 31
Apr. 1, 2, (3-6), 8-10, (11-20), 21, (22-25), 26-28, (29), (30)
May (1), 2, (3), (4), 6, (7-14), (16-20), (22)
June (5-13), 14, 15, (16-19), 20-22, 24, 25, (26-30)
July (1-3), (6), 7, (8-10), 11-14, (15-19), 20, 21, (22-29), (31)
Aug. (2-6), (10-13), 15, 16, (19), (21), 22, (23), (25), 26, (28), 29, 30, (31)
Sept. 1, 2, (3), (4), (6-8), 9, (10-13), 14, 15, (16), 17
Oct. 3, 4, (17), (18), 19, 20, 31
Nov. 1-7, (8), (9), 10, 11, (12), (13), 29, 30
Dec. 1, (4-6), 7-11, 13, 15, 18, 20-23, (24-26), 27-30, (31)

1903 (14.3)

Jan. 1, 2, 9-14, (15), 16, 17, (27)
Feb. 5
Mar. 6-8, 11, 15, 16, (17), 18
Apr. 15-18
May 8, (9), 10, 11, 29, 31
June 1-3, (4), (6), 7, 9, 29
Aug. 31
Sept. 2-7, 19-22

1905 (0.8)

May 24
July 28, 30

1906 (1.4)

Oct. 13, 17-19, 28

1907 (0.3)

Nov. 29

1908 (1.6)

Jan. 28
Mar. 26
Oct. 16-19

1909 (1.4)

Apr. 10

1909 *(continued)*

June 3
July 11
Aug. 28
Dec. 12

1910 (17.8)

Feb. 4-10
Apr. 4-8, 22, 25, 27, 28
June 16, 19-22
July 22-25
Aug. 20-25, 28, 29
Sept. 15, 16
Oct. 15
Nov. 5, 6, 8-13, 15, 27-30
Dec. 1-8, 16, 23-27, 29, 31

1911 (50.3)

Jan. 1, 2, 15-29, 31
Feb. 2-8, 21-25
Mar. 14, 17-23, 26, 27
Apr. 16-20
May 10-19, 24
June 6-20, 24-28
July 5-11, 17-24, 27, 28, 30, 31
Aug. 2-4, 18-31
Sept. 11-21, 23-30
Oct. 1, 9, 10, 12-31
Nov. 5-8, 13, 15-20
Dec. 3-14, (15), 16, (17), 25, 26, 31

1912 (67.1)

Jan. 1, 2, (3), 4-10, (11), 12, (13), 14-19, (20-23), 24-31
Feb. 1-4, (5), (6), 7, 8, (9), 10-14, (15), (16), 17-22, (23), 24-29
Mar. 1, (2), 3, 5, 6, 19, (20-25), 26-29, (30), (31)
Apr. 2-6, 15, 16, (17-20), 22, (23-28), 29
May 11, 12, 15-19, 20, 21, (22), (23), 24, 25
June 4-10, (11-15), 29, 30
July 1, 14-16, 19, (21), (22), 23-26, (27), 28-30, (31)
Aug. (1-9), 10-12, (13), 14-24, (25), 26, (27), (29-31)
Sept. (1-3), 4, 5, 21-24, (29), 30
Oct. 1-4, 12, 13, (14), 15-17, 21, 22, (23-26), 27-31
Nov. (1), 2-6, (7), 8-13, (14), 15, (20-24), 25, 26, (27), (28), 29, 30
Dec. 1, (2-5), 6, 7, (8), 9-11, 23-28

LIST OF SPOTLESS DAYS, 1874-1954

1913 (85.2)

Jan. 3, 4, (5), 6-10, (11), (12), 19, 20, (21), 22, 23, (24), 28-31
Feb. 1-4, (5-9), 10, (11), (12), 13-15, (16), 17, 18, 28
Mar. 1-3, (4), 5, (6-10), 11, (12), 15, (16), 17-22, (23-26), 27-31
Apr. (1-4), 8-11, (12), (13), 14, (15), 16, 17, (18), (19), 20-27, (28-30)
May (1-3), 4-6, (7-17), 18-22, (23-25), 26, (27), (28), 29, 30, (31)
June (1), 2, (3-6), 7, (8), 9, 10, (11-16), 17-21, (22-24), 25, 26, (27), (28), 29, (30)
July (1-6), 7, (8), 15-18, (19-22), 23-25, (26-28), 29, (30), (31)
Aug. (1), (2), 3, 4, (5-17), 18, (19), (20), 21, (22-27), 28, (29-31)
Sept. (1-5), 6, 10, (11-24), 25-27, (28-30)
Oct. (1-3), 4, 5, (9), 10, (11), 12, 13, (14), (15), 16, 17, (18), 19, (20), (21), 22, (23), 24
Nov. (1), 2-5, (6-10), 11, (12), (13), 14, 15, (16-19), 20-23, (26-28), 29, (30)
Dec. 1, (2), 3, (4), 5, 6, (7), (8), 15-17, (18), 19, (20), 21-25, (26-29)

1914 (39.2)

Jan. (7), 8, 10-13, (14-16), 17, 18, (19), 20, (21), 22-24, (25-27), 28, 29, (30), 31
Feb. 1, 7, (8-11), 12, 13, (14-16), 17, (19), (20), (22), 23, (24-26), (28)
Mar. 1, (2), 3-8, (9), (10), 11, (19), 20-24, (25), (26), 27-29
Apr. 15
May 7-9, (10), 11-13, (14), (15), 16, (17), 18-20, 26-28, 31
June (1), (2), 3-7, 23-30
July 14, 15, 20, (24), 25-28
Aug. 1-12, 27-29
Sept. 1-7, 23
Oct. 4-8, 12, 14, 16-18
Nov. 16, 17

1915 (1.6)

Apr. 17
May 11-13, 17, 19

1916 (0.8)

Aug. 25, 27
Oct. 2

1920 (1.1)

Apr. 24
Sept. 18-20

1921 (8.5)

Mar. 6
Apr. 30
May 5-7
Aug. 6-8, 10
Sept. 5, 6, 8, 9
Oct. 2-4, (5), 6, 7
Nov. 3-8, (9), 11
Dec. 4, 5, (7), 8

1922 (29.6)

Jan. 1, (2), 24-26, (27-29), 31
Apr. 12-14, (15), (16), 17, 19-21
May 10, (12), (13), 14-23
June 2-5, (6), (10), 18, 20, 26-30
July 1-3, 13, 15-18, 29-31
Aug. 1, 8, (9), 10, (11), 12-16, (17-20), 22
Sept. 2-6, 8-10, (11), 12, 25, 26, 28
Oct. 6, (7), 8, 15, 22, (23-25), 26, (27), (28)
Nov. (18), 19, 23, 24, (26)
Dec. 12-14, (15-17), 18, 19, 21

1923 (46.8)

Jan. 5-10, (11), (12), 13-15, (16), (17), 18-20, 24, (25), (26), 27
Feb. 1-3, (4), (5), 6-11, 17, 18, (21), (22), 24-28
Mar. 1, 2, (3-5), 6, (7), 8-11, (12), 13, 14, (18), (19), (21), 27, 28
Apr. 4-7, (8), 9, 11-13, (16)
May 1-10, 15-19, 22
June (6), 7-10, (11), 12, (13), 14-17
July 4-7, (8), 9, 10, 12-15, (16), 17-21
Aug. 2, 5, 6, 8-11, (12), (13), 14, 15, 17-19, (22), (23), 24-27, (28), 29-31
Sept. (20), 21, 22, (23)
Oct. 7, 8
Nov. 17-20, (21), 22, 23, 30
Dec. 1, 2, 4-7, (8-10), 11-15, (16), 17, 29, (30), 31

1924 (26.5)

Jan. 1, 2, (3), 4, 7-19, (20), 21, 22, 24, 25, (27), 29-31
Feb. 1, 2, 4, 5, (6), 7, 8, (9-11), 13, (14), (17-19), 20, 21, (22), 23, 24
Mar. 5-9, (10), (11), 12, (13), (14), 15, 16, (17-19), 20, 25, (26), 27-31
Apr. 1-4, (5), (7-9), (11-13), 15, 29, 30
May 1-3, 5
Nov. 3, 4, 6, 8-10, 13
Dec. 2, 6, 30

1925 (5.2)

Jan. 1, 9, 10, 14, 15, 27, 29, 30
Feb. 25-27
Mar. 6-10
June 20
Aug. 15, 16

1926 (0.5)

July 16, 18

1930 (1.1)

Aug. 5
Nov. 13
Dec. 7, 8

1931 (11.5)

Jan. 1, 29-31
Feb. 1
June 13, 15-17, 19-21, 23-26
July 19, 20
Aug. 8, 10, 15, 16, 23-25
Oct. 10, (11), 13, 16-18
Nov. 2, 10, 11, 13, (14), (15), 16, 17
Dec. 3-5

1932 (24.9)

Jan. 11, 12, 14, 20
Feb. 8, 9, 13, (14), 15-19, 21
Mar. 11-14, (15), 23, 24
Apr. 6, (7), 8, 9, 14, 19, 20
May (2), 3, 4, (5), (6)
June 2
July 15, 16, (17), 19, 23-26
Aug. (12-14), 15, 16, (17), 18-21, (22)
Sept. 5, 6, (7), (8), 9, (10), (11), 13, (14), 15-17, (18), (20), 23, 26
Oct. 2, (4), (5), (8), (9), 10, 11
Nov. 6, 8-10, 23-26, (27), (28)
Dec. (22), 23, (24), (25), 26

1933 (64.7)

Jan. 1, (2), 18, 19, (20), (21), 22-27
Feb. 14, (16), (17), 18-20, (21), 22-24, (25), 26
Mar. 13, (14-16), 17-19, (20), 21
Apr. 3-5, 7-9, (10), (11), 12-16, 22-28. (30)
May 1, 3-7, (8), (11), 12-15, (16), (17), 18, 28-31
June 1, 8, 9, (10), 11, 12, (23), 24, (25-28), 29, 30
July 1, (2), 3, (4), 14-23, (24), 25, (26), 27, (28), 29, (30), (31)
Aug. 1-3, (4), (5), 6, (7), (8), (10), 11, (13-22), 23-25, (26), (27), 28, (29), (30), 31
Sept. 1, 5, 11, (12), 13-17, (18-20), (25), (26)
Oct. 1, 2, (3), 4-6, (7), (8), 9, 11, 13, (14-16), 17-20, (21-25)
Nov. (2), (3), 4, (5), (6), 7, 8, (9), 10, 11, (12), (13), 14, (15), 16-19, (20-25), 26-28, (29), (30)
Dec. (1-3), 4, (5-7), 8, 9, (10), (12), (13), 14-16, (17-19), 20, 21, (22-31)

1934 (39.7)

Jan. (1-7), 8, (9-11), (19), (20), 21, (22), 23, 24, (25-27), 28
Feb. 4, 20-22, (23), 26-28
Mar. (1-3), 5, 12, 14-16, 18, (19-21), 22, (23), (24), 31
Apr. 6, 7, (9-11), 12, (13), 30
May 2, 3, 30, (31)
June 1-8, (9), 10, 11, 13, 14, 27, (28-30)
July 1-5, 22, 23, 27, (30), 31
Aug. 1-6, 20-22, 25, 26, (28), 29, 31
Sept. 4-11, 14, 18, (19), 20-23, 25, 27
Oct. 2, 5-10, 21, 24
Nov. 13, (14), 15, 16, (17-19), 20, 21, (24)
Dec. 9-13, (14), 15-19

1935 (5.8)

Mar. 25, 28-31
Apr. 1, 2, 5-7, 26-28
May 18-23, 26
July (29)

LIST OF SPOTLESS DAYS, 1874-1954

1941 (2.2)

Aug. 15
Nov. 7-11
Dec. 20, 21

1942 (4.4)

Jan. 27, 28
Mar. 9, 10
May 31
June 12, (29), 30
July (18), 24
Oct. 4, (5), 6, (25)
Nov. 16, 19

1943 (13.2)

Jan. 5, 15
Feb. 6
June 4-6, 20, 29
July 2-6, 20, 23
Aug. (2)
Sept. 1-6, 13, (14), 15, (16), 17, 25
Oct. (13), (14), 15, 16, (17), 20, 21, (22), (23)
Nov. 6, (7), 8, (9), 10, 11, (12), 19
Dec. 29-31

1944 (44.0)

Jan. (1-3), 4-16, (17), (18), 19
Feb. (4), 5-9, (10), (11), 12, (13), (14), 15, (16), 17-19, (20), 21-24, (25-27), 28, 29
Mar. (1), (2), (4), 5-8, (9), 10, (11), (12), 13, 31
Apr. (1), 2-5, (6), (9-11), 12-14, (15), 16-24, 25, 26, 27, (28), 29, (30)
May 1, 2, (3), (4), 5, (6-8), 9-12, (13-16), 17, (18-23), 24, (25-27)
June 3, (4), 9, (11-13), 14, 29
July (7-9), 12-15, (16), 17, 18, 21, 22, (23), 25, 31
Aug. 1-4, 31
Sept. 1, 4-7
Oct. 13, (14), 20, 21, (22), (23)
Nov. 7-10, (11)
Dec. 1-3, (4)

1945 (3.8)

Jan. 3, 4
Feb. 10-12, 22
Apr. 11-13
July 2, 3
Aug. 22, 26
Sept. 15

1950 (0.5)

Dec. 21-23

1952 (6.6)

Feb. 26-29
Mar. 1-4, 20, 22, 23
May 10, (12)
Sept. 8, 11, 12, 14, 15
Oct. 17, 18
Nov. 3, 4, 29
Dec. (28)

1953 (40.6)

Jan. 25-27, (28), 29-31
Feb. 1, 12-18, (19-21), 22, (23), (24), 25, (26), 27, 28
Mar. 1-4, (6), (7), 9-11, 14, 17, 26
Apr. (12-14), 15-17, (19), 20, 21
May 8-11, (12-16), 17
June 13
July 1, (3), (4), 5-8, 22-29, (30), (31)
Aug. 1, 24, 25, (26), (27), 28-31
Sept. 1-4, 28-30

1953 *(continued)*

Oct. 1-3, 5, (18), 19, (20), 21-25, (29), 30
Nov. (5-7), 8, (9), 10-12, (13-16), 17-19, (22-24), 25, 28-30
Dec. (1-4), 5, 6, 9, (10-12), 13, 14, (15), 16, 17, (18), 19, (20-24)

1954 (80.1)

Jan. 1-3, (4), (5), 6, (7-10), (12-16), 17, (19), (20), 21, (22), (23), (25-31)
Feb. (1), 2, (3-8), 12, (13-16), 17, 18, (19-21), 22, 23, (24-28)
Mar. (5), 6, (7-10), 11, 24, (25), (26), 27, (28), (29), 30, (31)
Apr. (1-5), (10-14), 17, 18, (19), 21, 22, (23-28), 29, 30
May (1-3), 4, (5-8), (10), 11, 12, (13), (15-17), 18, 19, (20-31)
June (5-12), 13, (14-21), (23-30)

ROYAL GREENWICH OBSERVATORY

Mean Heliographic Latitudes of Sunspots

(North and South with Corresponding Areas)

1874-1954

(1) Annual Values

(2) Values for each Solar Synodic Rotation

(3) Latitude-Time Diagram

GREENWICH SUNSPOT AND GEOMAGNETIC-STORM DATA, 1874-1954

Blank page retained for pagination

MEAN HELIOGRAPHIC LATITUDES OF SUNSPOTS

1874-1954

I - ANNUAL VALUES

II - VALUES FOR EACH SOLAR SYNODIC ROTATION

The tabulated data have been reprinted from the annual volumes of the *Greenwich Photoheliographic Results*. For the period 1874 to 1885, the tables published in the 1907 *Supplementary Results* pp. 318-321 have been used, as superseding earlier tables up to 1885. Published errata and a few other corrections found when compiling the following complete tables have been incorporated.

The abridged headings in the following tables correspond to those given in the *Greenwich Photoheliographic Results*. Two subsidiary columns have, however, been added in the present table of annual values to give, for each hemisphere, the ratio of the mean daily area to that for the two hemispheres combined. The tabulated mean daily areas and mean weighted latitudes have been derived as follows:-

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 (1) the year (first table) and (2) for each synodic rotation of the Sun (second table), and are expressed in millionths of the Sun's visible hemisphere.

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 the 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 the latitude, has been similarly divided.

The rotations adopted in the second table correspond to the synodic rotation of the Sun. 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 1854 January 1*, 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.

A subsidiary table to the annual values gives the separation of spots around each sunspot minimum, when old and new cycle spots occur together in their distinctive latitudes.

---

*This definition has always been used in the *Nautical Almanac*, although Carrington's zero meridian passed the ascending node twelve hours earlier.

MEAN HELIOGRAPHIC LATITUDES OF SUNSPOTS FOR EACH YEAR 1874-1953

Year	Spots North of Equator			Spots South of Equator			Mean (weighted) Latitudes	
	Area	Area N / Area (N + S)	Latitude	Area	Area S / Area (N + S)	Latitude	Spots N - S	Spots N + S
			°			°	°	°
1874	263	.436	9.03	340	.564	12.19	- 2.93	10.81
1875	145	.584	12.00	103	.415	10.11	+ 2.81	11.22
1876	40	.31	11.83	87	.69	10.87	- 3.77	11.17
1877	38	.35	9.69	70	.65	9.51	- 2.74	9.57
1878	21	.95	7.60	1	.05	7.12	+ 6.90	7.58
1879	11	.29	21.14	27	.71	22.32	- 9.34	21.96
1880	269	.611	19.99	171	.389	19.10	+ 4.79	19.64
1881	454	.668	18.20	226	.332	18.50	+ 6.00	18.30
1882	442	.442	15.96	557	.558	19.28	- 3.69	17.81
1883	339	.294	10.99	815	.706	13.92	- 6.60	13.06
1884	478	.443	10.65	601	.557	11.74	- 1.82	11.26
1885	280	.347	10.54	526	.653	12.43	- 4.44	11.77
1886	76	.199	9.93	305	.801	10.50	- 6.42	10.38
1887	44	.246	8.80	135	.754	8.35	- 4.10	8.45
1888	20	.22	7.10	69	.78	7.46	- 4.27	7.39
1889	5	.06	7.26	73	.94	11.90	-10.68	11.61
1890	53	.53	22.20	46	.47	21.75	+ 1.73	21.99
1891	401	.704	20.49	169	.296	19.91	+ 8.52	20.31
1892	607	.500	15.09	607	.500	21.69	- 3.29	18.39
1893	518	.354	14.90	946	.646	14.23	- 3.93	14.47
1894	543	.424	12.31	739	.576	15.56	- 3.75	14.18
1895	565	.580	14.26	409	.420	12.54	+ 3.01	13.54
1896	203	.374	13.60	340	.626	14.77	- 4.15	14.33
1897	196	.381	8.32	318	.619	7.73	- 1.62	7.96
1898	110	.293	9.82	266	.707	10.77	- 4.75	10.49
1899	23	.21	6.18	88	.79	10.43	- 6.95	9.54
1900	26	.35	6.61	49	.65	8.34	- 3.12	7.74
1901	22	.77	8.59	7	.23	16.27	+ 2.82	10.37
1902	42	.67	18.81	21	.33	15.29	+ 7.48	17.64
1903	136	.389	18.06	214	.611	21.15	- 5.94	19.93
1904	270	.551	16.32	220	.449	16.89	+ 1.39	16.58
1905	752	.631	11.67	440	.369	15.55	+ 1.62	13.10
1906	538	.692	13.99	240	.308	14.01	+ 5.35	13.99
1907	488	.451	10.12	593	.549	13.77	- 2.98	12.12
1908	316	.453	10.42	381	.547	10.34	- 0.92	10.38
1909	300	.432	9.44	394	.568	9.91	- 1.55	9.71
1910	66	.250	8.55	198	.750	11.18	- 6.27	10.53
1911	17	.27	7.89	47	.73	5.99	- 2.30	6.49
1912	1	.02	20.53	36	.98	7.78	- 7.18	8.06
1913	5	.67	24.81	2	.33	20.08	+ 9.81	23.23
1914	99	.65	21.11	53	.35	23.06	+ 5.71	21.79
1915	379	.544	17.95	318	.456	19.75	+ 0.77	18.77
1916	470	.649	15.14	254	.351	17.05	+ 3.83	15.81
1917	860	.560	13.82	677	.440	15.66	+ 0.84	14.63
1918	609	.545	11.97	509	.455	13.69	+ 0.29	12.75
1919	559	.531	9.85	493	.469	11.79	- 0.28	10.76
1920	208	.337	11.31	410	.663	9.98	- 2.83	10.43
1921	261	.621	7.27	159	.379	8.92	+ 1.13	7.90
1922	161	.639	8.82	91	.361	6.62	+ 3.23	8.02
1923	33	.60	13.88	22	.40	17.32	+ 1.34	15.26
1924	232	.838	22.19	45	.162	25.54	+14.49	22.73
1925	517	.623	20.70	313	.377	19.37	+ 5.60	20.20
1926	663	.525	19.27	599	.475	17.98	+ 1.60	18.66
1927	379	.358	17.75	679	.642	13.54	- 2.33	15.05

MEAN HELIOGRAPHIC LATITUDES OF SUNSPOTS FOR EACH YEAR 1874-1953

Year	Spots North of Equator			Spots South of Equator			Mean (weighted) Latitudes	
	Area	Area N / Area (N + S)	Latitude	Area	Area S / Area (N + S)	Latitude	Spots N − S	Spots N + S
			°			°	°	°
1928	727	.523	11.93	663	.477	15.23	− 1.02	13.50
1929	654	.527	10.73	588	.473	10.27	+ 0.82	10.51
1930	286	.554	10.60	230	.446	8.96	+ 1.88	9.87
1931	200	.727	7.91	75	.273	9.39	+ 3.21	8.31
1932	123	.755	8.22	40	.245	8.62	+ 4.06	8.32
1933	86	.98	10.60	2	.02	8.35	+10.23	10.56
1934	44	.37	16.45	74	.63	28.09	−11.49	23.75
1935	205	.329	22.42	419	.671	23.72	− 8.57	23.30
1936	463	.406	19.36	678	.594	21.02	− 4.63	20.35
1937	1317	.635	17.63	757	.365	15.96	+ 5.36	17.02
1938	899	.445	15.55	1120	.555	14.17	− 0.94	14.79
1939	649	.411	14.64	931	.589	12.57	− 1.39	13.42
1940	500	.481	11.65	540	.519	10.72	+ 0.03	11.17
1941	427	.648	11.31	232	.352	8.67	+ 4.28	10.38
1942	252	.596	9.32	171	.404	8.45	+ 2.14	8.99
1943	249	.844	9.01	46	.156	15.87	+ 5.11	10.09
1944	42	.34	19.00	83	.66	22.81	− 8.70	21.53
1945	121	.281	20.13	309	.719	20.26	− 8.92	20.22
1946	1127	.620	20.74	690	.380	18.79	+ 5.73	20.00
1947	992	.376	16.58	1645	.624	17.86	− 4.91	17.38
1948	936	.473	14.92	1041	.527	13.53	− 0.06	14.19
1949	1178	.553	14.30	951	.447	12.14	+ 2.49	13.33
1950	771	.630	13.62	452	.370	13.05	+ 3.77	13.41
1951	730	.643	11.62	406	.357	10.78	+ 3.62	11.32
1952	195	.484	7.60	208	.516	8.37	− 0.64	8.00
1953	107	.738	9.90	38	.262	9.75	+ 4.72	9.86

SUNSPOT MINIMA: LATITUDES OF OLD- AND NEW-CYCLE SPOTS

For any year at or adjacent to sunspot minimum, in which there were both old- and new-cycle spots, a subdivision according to their respective latitudes has been made in the following table. The distinctive latitudes of the two categories can be clearly seen in the latitude-time diagram facing p. 38, and the division has received confirmation, since the minimum of 1913, from the Mount Wilson observations of the magnetic polarities of sunspots.

Year	Cycle	Spots North of Equator		Spots South of Equator		Mean (weighted) Latitudes	
		Area	Latitude	Area	Latitude	Spots N − S	Spots N + S
			°		°	°	°
1878, 1879	No subdivision necessary.						
1889	Old	4	5.04	48	6.46	− 5.48	6.35
	New	1	23.99	25	22.42	−21.35	22.41
1901	Old	22	8.62	2	6.81	+ 7.38	8.48
	New	<0.1	34.67	5	20.32	−20.02	20.39
1902	Old	0	..	9	7.73	− 7.73	7.73
	New	42	18.81	12	20.84	+10.01	19.29
1913	Old	0.3	4.62	1	9.52	− 5.81	8.27
	New	5	26.09	2	25.21	+12.55	25.86
1923	Old	21	6.62	14	11.60	− 0.63	8.60
	New	12	27.08	8	27.45	+ 4.91	27.23
1934	Old	19	4.10	1	4.37	+ 3.79	4.11
	New	26	25.44	74	28.31	−14.46	27.57
1943	Old	249	9.01	27	8.33	+ 7.33	8.95
	New	0	..	20	26.13	−26.13	26.13
1944	Old	7	4.17	6	7.61	− 1.14	5.72
	New	35	22.18	77	24.02	− 9.63	23.45
1954	Division required when data for year are complete.						

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1874		°		°	°	°
275 Apr. 27.56	117	8.1	481	8.7	- 5.4	8.6
276 May 24.79	159	11.2	84	8.8	+ 4.3	10.4
277 June 20.99	613	12.1	457	9.0	+ 3.1	10.8
278 July 18.19	861	7.3	314	18.1	+ 0.5	10.2
279 Aug. 14.42	140	2.9	426	15.2	-10.6	12.2
280 Sept. 10.67	43	11.1	745	11.9	-10.7	11.9
281 Oct. 7.95	56	9.5	186	12.9	- 7.7	12.1
282 Nov. 4.23	214	9.5	244	15.6	- 3.9	12.7
283 Dec. 1.55	163	6.3	29	6.8	+ 4.4	6.4
284 Dec. 28.88	128	6.6	79	13.4	- 1.1	9.2
1875						
285 Jan. 25.21	130	17.3	25	12.0	+12.5	16.4
286 Feb. 21.55	373	16.2	157	9.2	+ 8.7	14.1
287 Mar. 20.87	193	13.4	202	14.3	- 0.8	13.8
288 Apr. 17.16	312	9.4	106	10.0	+ 4.5	9.6
289 May 14.39	8	10.4	129	10.3	- 9.2	10.3
290 June 10.60	171	7.0	245	8.3	- 2.0	7.7
291 July 7.80	97	10.2	0	..	+10.2	10.2
292 Aug. 4.01	116	7.4	1	10.3	+ 7.3	7.4
293 Aug. 31.25	19	13.3	3	16.3	+ 9.8	13.6
294 Sept. 27.51	17	10.5	69	8.2	- 4.5	8.7
295 Oct. 24.81	196	11.0	40	7.4	+ 7.9	10.4
296 Nov. 21.11	21	12.0	302	8.7	- 7.3	8.9
297 Dec. 18.42	5	10.2	85	9.9	- 8.8	9.9
1876						
298 Jan. 14.76	44	12.3	279	12.5	- 9.2	12.5
299 Feb. 11.11	18	9.1	253	13.0	-11.6	12.8
300 Mar. 9.44	194	14.7	70	8.6	+ 8.5	13.1
301 Apr. 5.74	9	10.9	10	10.7	- 0.8	10.8
302 May 2.99	0	..	48	13.5	-13.5	13.5
303 May 30.21	2	0.6	3	0.7	- 0.2	0.6
304 June 26.41	23	6.1	57	7.3	- 3.4	7.0
305 July 23.61	4	10.1	32	9.0	- 7.0	9.1
306 Aug. 19.84	0	..	59	11.0	-11.0	11.0
307 Sept. 16.09	2	11.4	143	6.0	- 5.8	6.0
308 Oct. 13.37	33	10.5	144	11.2	- 7.2	11.0
309 Nov. 9.67	19	1.9	62	10.7	- 7.7	8.6
310 Dec. 6.99	233	10.4	0	..	+10.4	10.4
1877						
311 Jan. 3.32	199	9.9	6	8.0	+ 9.4	9.9
312 Jan. 30.66	52	9.2	4	7.5	+ 8.1	9.0
313 Feb. 27.00	14	7.5	86	10.5	- 7.9	10.0
314 Mar. 26.31	2	0.4	83	14.4	-14.0	14.0
315 Apr. 22.58	61	10.9	45	10.3	+ 1.9	10.6
316 May 19.81	14	9.0	77	10.1	- 7.2	9.9
317 June 16.02	4	10.3	10	12.8	- 5.7	12.0
318 July 13.22	4	12.3	2	12.0	+ 2.9	12.2
319 Aug. 9.43	54	8.9	0	..	+ 8.9	8.9
320 Sept. 5.68	45	9.0	27	7.9	+ 2.6	8.6
321 Oct. 2.95	0	..	40	8.1	- 8.1	8.1
1877 *(continued)*		°		°	°	°
322 Oct. 30.24	0	..	403	8.3	- 8.3	8.3
323 Nov. 26.55	0	..	99	10.2	-10.2	10.2
324 Dec. 23.87	2	7.5	0	..	+ 7.5	7.5
1878						
325 Jan. 20.21	16	7.6	12	8.4	+ 0.6	8.0
326 Feb. 16.55	38	6.4	1	8.0	+ 6.2	6.4
327 Mar. 15.88	13	7.7	0	..	+ 7.7	7.7
328 Apr. 12.17	0	..	0	..	..	..
329 May 9.42	81	8.3	0	..	+ 8.3	8.3
330 June 5.63	23	13.6	1	6.7	+13.2	13.5
331 July 2.82	1	15.3	0	..	+15.3	15.3
332 July 30.03	0	..	0	..	..	..
333 Aug. 26.27	61	3.9	0	..	+ 3.9	3.9
334 Sept. 22.53	0	..	0	..	..	..
335 Oct. 19.81	34	10.5	0	..	+10.5	10.5
336 Nov. 16.12	3	4.1	0	..	+ 4.1	4.1
337 Dec. 13.43	0	..	2	1.6	- 1.6	1.6
1879						
338 Jan. 9.77	0	..	1	23.8	-23.8	23.8
339 Feb. 6.11	0	..	0	..	..	..
340 Mar. 5.44	0	..	0	..	..	..
341 Apr. 1.75	0	..	66	20.8	-20.8	20.8
342 Apr. 29.01	6	14.2	0	..	+14.2	14.2
343 May 26.23	0	..	0	..	..	..
344 June 22.44	32	8.3	53	26.6	-13.5	19.8
345 July 19.64	14	10.0	4	17.4	+ 3.5	11.7
346 Aug. 15.86	73	27.9	0	..	+27.9	27.9
347 Sept. 12.11	15	24.6	6	23.1	+11.0	24.2
348 Oct. 9.39	16	20.5	77	22.9	-15.4	22.5
349 Nov. 5.68	13	30.5	127	21.9	-17.2	22.7
350 Dec. 2.99	0	..	37	19.8	-19.8	19.8
351 Dec. 30.32	143	21.4	127	15.7	+ 3.9	18.7
1880						
352 Jan. 26.66	298	22.0	75	17.5	+14.1	21.1
353 Feb. 23.00	87	19.9	93	26.0	- 3.9	23.1
354 Mar. 21.32	60	17.9	47	21.8	+ 0.5	19.6
355 Apr. 17.60	404	23.5	1	28.1	+23.4	23.5
356 May 14.84	281	14.7	4	21.2	+14.1	14.8
357 June 11.04	87	23.4	470	22.2	+15.1	22.4
358 July 8.24	224	17.7	41	33.0	+ 9.9	20.1
359 Aug. 4.45	627	19.0	103	18.1	+13.8	18.8
360 Aug. 31.69	318	20.5	578	17.4	- 4.0	18.5
361 Sept. 27.96	354	19.0	379	19.7	- 1.0	19.4
362 Oct. 25.25	125	20.5	106	15.8	+ 3.9	18.4
363 Nov. 21.56	486	20.9	273	13.8	+ 8.4	18.3
364 Dec. 18.88	317	22.7	120	24.4	+ 9.7	23.2

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1881		°		°	°	°
365 Jan. 15.21	471	17.9	301	16.9	+ 4.4	17.5
366 Feb. 11.56	195	18.6	225	19.3	- 1.7	19.0
367 Mar. 10.88	378	15.9	382	20.1	- 2.2	18.0
368 Apr. 7.18	210	12.5	265	18.0	- 4.5	15.6
369 May 4.44	149	16.9	275	18.7	- 6.2	18.1
370 May 31.65	292	19.0	295	14.9	+ 2.0	16.9
371 June 27.85	523	18.7	281	17.1	+ 6.2	18.2
372 July 25.06	631	20.9	145	17.3	+13.8	20.2
373 Aug. 21.28	847	18.5	241	20.8	+ 9.8	19.0
374 Sept. 17.54	507	17.8	105	17.9	+11.6	17.8
375 Oct. 14.82	444	16.6	141	18.1	+ 8.2	17.0
376 Nov. 11.12	886	16.1	256	19.6	+ 8.1	16.9
377 Dec. 8.44	381	23.0	52	24.7	+17.2	23.3
1882						
378 Jan. 4.77	289	16.0	107	19.6	+ 6.4	17.0
379 Feb. 1.11	340	10.9	337	16.2	- 2.6	13.6
380 Feb. 28.45	116	13.6	836	13.0	- 9.7	13.1
381 Mar. 27.76	339	14.0	1597	22.1	-15.8	20.7
382 Apr. 24.03	652	18.3	1037	23.0	- 7.1	21.2
383 May 21.26	203	18.1	379	15.9	- 4.0	16.6
384 June 17.46	247	15.7	246	15.4	+ 0.2	15.5
385 July 14.66	328	14.8	166	14.0	+ 5.1	14.6
386 Aug. 10.88	651	15.8	208	16.6	+ 8.0	16.0
387 Sept. 7.12	566	12.7	636	22.1	- 5.8	17.7
388 Oct. 4.40	776	16.6	520	22.1	+ 1.1	18.8
389 Oct. 31.69	1142	18.3	873	18.9	+ 2.2	18.6
390 Nov. 28.00	213	14.8	208	14.2	+ 0.5	14.5
391 Dec. 25.32	263	8.1	703	13.8	- 7.9	12.2
1883						
392 Jan. 21.66	469	8.3	324	16.4	- 1.8	11.6
393 Feb. 18.00	143	9.4	165	13.4	- 2.8	11.6
394 Mar. 17.33	363	12.2	710	14.4	- 5.4	13.6
395 Apr. 13.62	233	10.3	522	18.0	- 9.3	15.6
396 May 10.86	172	12.7	424	13.6	- 6.0	13.4
397 June 7.07	545	10.5	1017	15.4	- 6.4	13.7
398 July 4.27	360	10.7	1677	15.1	-10.6	14.3
399 July 31.47	78	13.5	473	13.7	- 9.8	13.6
400 Aug. 27.71	410	11.8	1179	17.1	- 9.7	15.8
401 Sept. 23.97	403	11.5	1075	12.8	- 6.2	12.4
402 Oct. 21.26	416	11.0	1190	11.7	- 5.8	11.5
403 Nov. 17.56	440	14.9	862	11.4	- 2.6	12.6
404 Dec. 14.88	753	12.1	1156	10.8	- 1.8	11.3
1884						
405 Jan. 11.22	932	10.7	784	16.2	- 1.6	13.2
406 Feb. 7.56	859	10.0	575	13.3	+ 0.7	11.3
407 Mar. 5.89	381	10.6	800	11.0	- 4.1	10.9
408 Apr. 2.19	115	9.3	1536	11.7	-10.2	11.5
409 Apr. 29.45	219	10.4	965	10.9	- 7.0	10.8
410 May 26.68	297	11.7	498	10.9	- 2.4	11.2
411 June 22.88	316	11.1	345	10.8	- 0.3	11.0
1884 *(continued)*		°		°	°	°
412 July 20.08	318	6.8	439	7.5	- 1.5	7.2
413 Aug. 16.30	416	9.6	231	13.0	+ 1.5	10.8
414 Sept. 12.55	1074	12.9	404	11.7	+ 6.2	12.6
415 Oct. 9.83	219	12.9	541	12.1	- 4.9	12.3
416 Nov. 6.13	188	8.0	283	8.4	- 1.8	8.2
417 Dec. 3.44	577	8.1	275	10.7	+ 2.0	9.0
418 Dec. 30.77	100	7.7	373	11.2	- 7.2	10.4
1885						
419 Jan. 27.11	298	4.7	880	12.2	- 7.9	10.3
420 Feb. 23.45	169	7.4	631	13.2	- 8.9	12.0
421 Mar. 22.76	493	10.5	298	15.7	+ 0.6	12.6
422 Apr. 19.04	363	12.0	480	10.9	- 1.0	11.4
423 May 16.27	419	12.8	851	12.2	- 4.0	12.4
424 June 12.47	686	10.6	1026	13.4	- 3.8	12.3
425 July 9.67	217	9.3	697	13.1	- 7.8	12.2
426 Aug. 5.89	175	9.8	496	11.4	- 5.9	11.0
427 Sept. 2.13	178	10.2	455	10.8	- 4.9	10.6
428 Sept. 29.40	188	7.9	478	12.6	- 6.9	11.3
429 Oct. 26.70	287	14.4	333	11.5	+ 0.5	12.8
430 Nov. 23.01	106	15.1	14	11.4	+12.0	14.7
431 Dec. 20.33	159	12.6	496	10.3	- 4.7	10.8
1886						
432 Jan. 16.66	13	8.33	335	10.75	-10.05	10.66
433 Feb. 13.00	11	2.13	754	9.04	- 8.88	8.94
434 Mar. 12.33	154	5.06	647	8.80	- 6.13	8.08
435 Apr. 8.63	204	7.58	541	11.87	- 6.54	10.70
436 May 5.88	213	8.77	246	10.45	- 1.57	9.67
437 June 2.09	42	10.49	328	13.90	-11.12	13.51
438 June 29.29	15	16.94	382	12.59	-11.51	12.75
439 July 26.49	70	15.79	135	8.77	- 0.41	11.16
440 Aug. 22.72	153	12.49	53	10.11	+ 6.70	11.88
441 Sept. 18.98	21	12.47	48	12.33	- 4.91	12.37
442 Oct. 16.27	15	16.07	12	10.79	+ 4.25	13.75
443 Nov. 12.57	0	..	2	9.17	- 9.17	9.17
444 Dec. 9.89	67	18.12	165	9.84	- 1.78	12.23
1887						
445 Jan. 6.22	0	..	90	4.37	- 4.37	4.37
446 Feb. 2.56	44	11.09	28	7.81	+ 3.72	9.81
447 Mar. 1.89	24	10.53	4	12.92	+ 7.32	10.86
448 Mar. 29.20	33	13.44	2	4.31	+12.28	12.84
449 Apr. 25.47	165	12.50	144	8.69	+ 2.65	10.73
450 May 22.70	19	5.05	271	8.72	- 7.83	8.48
451 June 18.90	123	6.93	231	10.87	- 4.63	9.49
452 July 16.10	25	8.90	234	7.48	- 5.90	7.62
453 Aug. 12.32	24	8.69	30	9.82	- 1.58	9.32
454 Sept. 8.57	131	4.88	10	6.23	+ 4.11	4.97
455 Oct. 5.84	12	0.55	42	1.75	- 1.25	1.49
456 Nov. 2.14	1	5.73	56	11.65	-11.55	11.62
457 Nov. 29.45	0	..	644	8.05	- 8.05	8.05
458 Dec. 26.77	11	2.65	134	8.50	- 7.65	8.06

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1888		°		°	°	°
459 Jan. 23.11	0	..	15	5.10	- 5.10	5.10
460 Feb. 19.45	66	2.99	91	4.66	- 1.46	3.96
461 Mar. 17.77	23	3.18	11	8.61	- 0.61	4.93
462 Apr. 14.06	0	..	26	7.48	- 7.48	7.48
463 May 11.30	0	..	206	8.01	- 8.01	8.01
464 June 7.51	15	4.75	22	6.15	- 1.74	5.59
465 July 4.71	2	5.95	24	9.80	- 8.65	9.52
466 July 31.91	4	7.48	16	4.07	- 1.99	4.68
467 Aug. 28.15	2	5.03	150	7.25	- 7.10	7.22
468 Sept. 24.42	0	..	8	5.62	- 5.62	5.62
469 Oct. 21.70	141	10.20	65	4.07	+ 5.72	8.27
470 Nov. 18.01	0	..	143	9.98	- 9.98	9.98
471 Dec. 15.33	0	..	24	6.63	- 6.63	6.63
1889						
472 Jan. 11.66	3	10.16	14	3.60	- 1.28	4.71
473 Feb. 8.00	0	..	20	7.18	- 7.18	7.18
474 Mar. 7.34	32	6.08	6	7.16	+ 3.92	6.26
475 Apr. 3.64	18	3.32	1	0.95	+ 3.06	3.18
476 Apr. 30.90	0	..	17	2.03	- 2.03	2.03
477 May 28.12	0	..	160	5.94	- 5.94	5.94
478 June 24.31	0	..	214	6.64	- 6.64	6.64
479 July 21.52	8	2.69	338	13.78	-13.42	13.54
480 Aug. 17.74	0	..	101	19.18	-19.18	19.18
481 Sept. 14.00	0	..	59	21.08	-21.08	21.08
482 Oct. 11.28	2	22.70	0.3	25.20	+15.34	23.08
483 Nov. 7.58	0	..	0	..	..	..
484 Dec. 4.89	6	24.27	70	20.90	-17.21	21.17
1890						
485 Jan. 1.19	34	22.54	11	10.72	+14.58	19.71
486 Jan. 28.54	2	24.47	0	..	+24.47	24.47
487 Feb. 24.87	83	32.76	1	30.43	+32.15	32.74
488 Mar. 24.19	3	25.55	3	26.28	- 2.21	25.94
489 Apr. 20.47	8	24.37	15	28.02	- 9.04	26.70
490 May 17.70	2	20.97	15	26.79	-21.30	26.12
491 June 13.90	0	..	68	23.58	-23.58	23.58
492 July 11.10	32	18.28	83	11.55	- 3.22	13.39
493 Aug. 7.31	231	21.20	9	19.67	+19.66	21.17
494 Sept. 3.56	89	21.39	71	21.33	+ 2.43	21.37
495 Sept. 30.83	4	20.47	243	23.08	-22.37	23.03
496 Oct. 28.12	27	19.49	70	23.94	-11.67	22.68
497 Nov. 24.43	190	20.10	34	27.81	+12.87	21.26
498 Dec. 21.75	10	23.22	49	26.33	-18.11	25.81
1891						
499 Jan. 18.09	105	18.86	135	26.86	- 6.78	23.35
500 Feb. 14.43	242	19.17	28	22.66	+14.84	19.53
501 Mar. 13.76	221	19.73	4	25.38	+19.02	19.81
502 Apr. 10.05	149	22.36	221	20.45	- 3.20	21.22
503 May 7.30	316	18.20	280	20.57	+ 0.01	19.31
504 June 3.51	486	18.40	124	19.32	+10.72	18.58
505 June 30.71	1049	19.67	84	20.87	+16.65	19.76
1891 *(continued)*		°		°	°	°
506 July 27.91	337	21.09	240	18.38	+ 4.66	19.96
507 Aug. 24.14	1161	21.47	31	22.69	+20.29	21.51
508 Sept. 20.41	400	20.78	423	18.64	+ 0.51	19.68
509 Oct. 17.69	284	18.29	4	19.22	+17.79	18.30
510 Nov. 13.99	219	19.48	374	18.78	- 4.67	19.04
511 Dec. 11.31	567	25.09	297	18.46	+10.12	22.81
1892						
512 Jan. 7.64	636	21.99	587	19.09	+ 2.28	20.60
513 Feb. 3.98	514	17.55	1425	26.86	-15.09	24.39
514 Mar. 2.32	401	21.66	442	23.01	- 1.79	22.37
515 Mar. 29.63	394	13.87	406	19.54	- 3.08	16.75
516 Apr. 25.89	530	15.00	831	17.01	- 4.55	16.23
517 May 23.12	657	13.12	661	19.73	- 3.35	16.43
518 June 19.32	1356	13.73	686	27.89	- 0.22	18.49
519 July 16.52	1019	12.50	621	20.72	- 0.07	15.61
520 Aug. 12.74	702	14.97	322	19.55	+ 4.11	16.41
521 Sept. 8.99	632	12.52	522	20.50	- 2.40	16.12
522 Oct. 6.27	348	13.31	435	22.21	- 6.42	18.26
523 Nov. 2.56	334	13.25	591	21.20	- 8.77	18.33
524 Nov. 29.87	361	14.39	486	17.29	- 3.78	16.05
525 Dec. 27.20	183	15.20	674	16.91	-10.06	16.55
1893						
526 Jan. 23.53	318	16.84	1253	16.69	- 9.91	16.72
527 Feb. 19.87	411	11.42	497	14.52	- 2.79	13.12
528 Mar. 19.20	478	15.63	636	14.82	- 1.77	15.17
529 Apr. 15.48	580	17.26	762	16.90	- 2.13	17.06
530 May 12.72	453	17.25	1002	18.58	- 7.42	18.16
531 June 8.92	262	14.35	822	16.71	- 9.21	16.14
532 July 6.12	607	14.44	967	17.10	- 4.95	16.08
533 Aug. 2.33	632	14.93	1751	16.08	- 7.87	15.78
534 Aug. 29.57	538	12.23	1264	11.72	- 4.57	11.87
535 Sept. 25.84	840	12.20	572	12.24	+ 2.31	12.19
536 Oct. 23.13	389	15.18	808	8.30	- 0.67	10.54
537 Nov. 19.43	781	18.52	733	7.06	+ 6.14	12.98
538 Dec. 16.75	585	13.85	1534	10.74	- 3.95	11.60
1894						
539 Jan. 13.09	490	9.96	1063	11.71	- 4.87	11.15
540 Feb. 9.43	236	12.73	1094	26.40	-19.47	23.98
541 Mar. 8.76	790	14.55	142	9.85	+10.83	13.83
542 Apr. 5.06	685	16.44	833	19.50	- 3.29	18.12
543 May 2.31	419	14.80	1451	14.66	- 8.06	14.69
544 May 29.53	955	11.59	1080	14.27	- 2.14	13.01
545 June 25.73	885	10.94	810	13.51	- 0.74	12.17
546 July 22.94	1052	10.29	425	14.33	+ 3.21	11.45
547 Aug. 19.16	465	10.73	271	12.94	+ 2.02	11.54
548 Sept. 15.42	405	12.06	862	12.08	- 4.36	12.07
549 Oct. 12.70	344	11.74	273	12.04	+ 1.21	11.87
550 Nov. 9.00	290	11.80	483	16.17	- 5.69	14.53
551 Dec. 6.31	183	12.00	719	16.28	-10.54	15.41

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1895		°		°	°	°
552 Jan. 2.64	392	12.51	461	14.19	- 1.91	13.42
553 Jan. 29.97	506	13.69	485	11.62	+ 1.30	12.68
554 Feb. 26.32	605	13.07	509	9.02	+ 2.97	11.22
555 Mar. 25.63	551	13.66	261	11.77	+ 5.48	13.05
556 Apr. 21.91	604	19.13	249	15.42	+ 9.05	18.05
557 May 19.14	686	16.41	594	16.68	+ 1.06	16.53
558 June 15.34	615	15.25	348	12.11	+ 5.37	14.12
559 July 12.54	302	12.80	531	9.00	- 1.11	10.38
560 Aug. 8.76	976	13.87	159	10.43	+10.46	13.38
561 Sept. 5.00	521	13.73	347	14.63	+ 2.39	14.09
562 Oct. 2.27	782	14.38	392	15.07	+ 4.54	14.61
563 Oct. 29.56	561	11.56	290	8.04	+ 4.88	10.36
564 Nov. 25.86	340	13.05	447	13.22	- 1.86	13.15
565 Dec. 23.19	171	13.54	460	12.93	- 5.74	13.09
1896						
566 Jan. 19.53	99	11.93	278	15.44	- 8.24	14.52
567 Feb. 15.87	363	14.85	659	16.00	- 5.04	15.59
568 Mar. 14.20	433	15.79	151	15.40	+ 7.71	15.69
569 Apr. 10.49	129	15.09	76	13.36	+ 4.55	14.45
570 May 7.73	3	17.69	298	11.89	-11.63	11.94
571 June 3.95	137	19.56	646	16.94	-10.54	17.40
572 July 1.14	102	19.18	474	18.48	-11.80	18.60
573 July 28.36	43	12.93	166	17.44	-11.16	16.51
574 Aug. 24.58	835	12.99	359	13.53	+ 5.01	13.15
575 Sept. 20.85	89	11.59	201	11.98	- 4.74	11.86
576 Oct. 18.14	75	6.14	719	12.25	-10.51	11.67
577 Nov. 14.44	175	11.80	189	13.90	- 1.55	12.89
578 Dec. 11.75	167	6.14	628	9.28	- 6.03	8.62
1897						
579 Jan. 8.08	265	7.06	1070	7.67	- 4.74	7.55
580 Feb. 4.43	412	8.85	406	4.80	+ 2.07	6.84
581 Mar. 3.77	260	5.20	195	5.57	+ 0.59	5.36
582 Mar. 31.07	267	3.46	124	6.57	+ 0.28	4.44
583 Apr. 27.33	86	3.34	278	12.09	- 8.45	10.03
584 May 24.55	4	2.10	263	10.83	-10.59	10.66
585 June 20.76	6	8.60	283	7.00	- 6.70	7.03
586 July 17.96	222	10.44	425	6.21	- 0.49	7.66
587 Aug. 14.18	57	14.36	508	7.83	- 5.59	8.49
588 Sept. 10.43	191	9.70	232	8.41	- 0.23	8.99
589 Oct. 7.71	17	9.77	7	8.99	+ 4.27	9.54
590 Nov. 4.00	20	7.18	12	9.85	+ 0.87	8.17
591 Dec. 1.32	760	10.29	38	15.03	+ 9.09	10.51
592 Dec. 28.64	281	8.61	142	9.60	+ 2.50	8.94
1898						
593 Jan. 24.98	120	4.72	408	7.70	- 4.86	7.00
594 Feb. 21.32	125	10.50	656	11.45	- 7.92	11.30
595 Mar. 20.64	0	..	150	11.61	-11.61	11.61
596 Apr. 16.92	9	12.68	220	8.59	- 7.76	8.75
597 May 14.16	9	9.06	106	12.22	-10.49	11.96
598 June 10.36	19	15.13	33	10.06	- 0.85	11.92
1898 *(continued)*		°		°	°	°
599 July 7.56	76	10.29	85	12.41	- 1.69	11.41
600 Aug. 3.77	194	10.18	243	11.92	- 2.12	11.14
601 Aug. 31.01	68	8.25	795	11.69	-10.13	11.42
602 Sept. 27.28	164	13.53	389	10.88	- 3.65	11.67
603 Oct. 24.57	432	10.32	84	10.84	+ 6.88	10.41
604 Nov. 20.87	6	6.19	242	10.92	-10.53	10.81
605 Dec. 18.20	5	8.46	178	11.68	-11.17	11.60
1899						
606 Jan. 14.53	0.1	7.95	108	11.05	-11.04	11.05
607 Feb. 10.87	0	..	36	5.39	- 5.39	5.39
608 Mar. 10.20	6	10.76	331	10.02	- 9.67	10.03
609 Apr. 6.50	11	9.52	105	10.82	- 8.85	10.70
610 May 3.76	0	..	44	11.84	-11.84	11.84
611 May 30.97	97	5.95	41	12.90	+ 0.39	8.00
612 June 27.17	150	5.93	152	9.99	- 2.09	7.98
613 July 24.37	0	..	15	11.58	-11.58	11.58
614 Aug. 20.60	0.4	2.95	2	10.43	- 7.94	9.03
615 Sept. 16.86	15	4.18	15	12.20	- 4.14	8.25
616 Oct. 14.14	0.1	6.95	81	9.97	- 9.94	9.96
617 Nov. 10.44	4	3.96	44	7.54	- 6.55	7.23
618 Dec. 7.76	29	7.16	22	11.61	- 0.97	9.09
1900						
619 Jan. 4.09	56	7.84	7	11.32	+ 5.65	8.24
620 Jan. 31.43	105	9.48	10	9.63	+ 7.89	9.50
621 Feb. 27.77	2	4.38	134	11.99	-11.69	11.85
622 Mar. 27.08	15	7.18	72	11.13	- 8.02	10.46
623 Apr. 23.35	24	4.35	130	7.57	- 5.57	7.08
624 May 20.58	56	3.83	11	8.06	+ 1.86	4.53
625 June 16.78	65	4.38	69	6.95	- 1.43	5.70
626 July 13.99	4	8.09	36	6.43	- 5.09	6.58
627 Aug. 10.20	14	3.49	9	13.13	- 3.29	7.43
628 Sept. 6.45	3	7.95	9	4.71	- 1.54	5.52
629 Oct. 3.72	0	..	159	5.56	- 5.56	5.56
630 Oct. 31.01	12	9.52	1	6.95	+ 8.49	9.36
631 Nov. 27.32	0	..	0	..	..	..
632 Dec. 24.64	0	..	0.3	10.20	-10.20	10.20
1901						
633 Jan. 20.98	0	..	7	8.20	- 8.20	8.20
634 Feb. 17.32	15	3.71	1	4.95	+ 3.04	3.81
635 Mar. 16.65	0	..	0	..	..	..
636 Apr. 12.93	0	..	0	..	..	..
637 May 10.18	231	8.66	0	..	+ 8.66	8.66
638 June 6.39	38	9.69	9	19.48	+ 4.30	11.55
639 July 3.59	0.1	2.10	1	1.68	- 1.17	1.73
640 July 30.80	0	..	0	..	..	..
641 Aug. 27.03	0.3	36.37	0	..	+36.37	36.37
642 Sept. 23.29	0	..	5	8.85	- 8.85	8.85
643 Oct. 20.58	0	..	31	14.91	-14.91	14.91
644 Nov. 16.88	0	..	35	20.21	-20.21	20.21
645 Dec. 14.20	0.3	26.70	67	7.95	- 7.82	8.02

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1902		°		°	°	°
646 Jan. 10.53	0	..	45	7.41	- 7.41	7.41
647 Feb. 6.87	21	22.88	1	15.53	+21.58	22.63
648 Mar. 6.21	179	24.46	0	..	+24.46	24.46
649 Apr. 2.52	0	..	0	..	..	..
650 Apr. 29.77	21	25.95	0	..	+25.95	25.95
651 May 27.00	28	25.82	0	..	+25.82	25.82
652 June 23.20	1	26.08	0	..	+26.08	26.08
653 July 20.40	0	..	0.3	25.70	-25.70	25.70
654 Aug. 16.62	3	27.50	0	..	+27.50	27.50
655 Sept. 12.87	78	13.10	68	20.95	- 2.73	16.75
656 Oct. 10.15	40	9.88	84	20.73	-10.79	17.21
657 Nov. 6.45	165	14.81	2	17.34	+14.52	14.83
658 Dec. 3.76	3	21.23	1	18.95	+16.46	20.96
659 Dec. 31.09	16	22.51	9	14.92	+ 8.36	19.64
1903						
660 Jan. 27.42	70	23.43	32	18.07	+10.37	21.75
661 Feb. 23.77	67	19.68	26	22.26	+ 8.10	20.40
662 Mar. 23.08	135	21.51	283	18.92	- 5.83	19.75
663 Apr. 19.36	158	19.14	48	15.67	+11.03	18.27
664 May 16.60	24	18.07	9	25.07	+ 5.69	20.08
665 June 12.81	91	20.73	161	19.76	- 5.16	20.11
666 July 10.00	105	20.88	71	20.36	+ 4.31	20.67
667 Aug. 6.21	40	21.26	86	22.56	- 8.79	22.15
668 Sept. 2.46	67	12.38	29	17.98	+ 3.17	14.08
669 Sept. 29.73	228	13.93	973	21.24	-14.55	19.85
670 Oct. 27.02	389	17.12	735	22.47	- 8.76	20.62
671 Nov. 23.33	360	17.80	298	21.94	- 0.20	19.68
672 Dec. 20.64	164	18.72	129	16.59	+ 3.14	17.78
1904						
673 Jan. 16.98	312	16.82	144	14.70	+ 6.87	16.20
674 Feb. 13.32	72	15.69	229	14.02	- 6.92	14.42
675 Mar. 11.65	276	13.63	72	17.39	+ 7.23	14.40
676 Apr. 7.94	302	14.58	717	14.49	- 5.88	14.52
677 May 5.20	72	17.13	145	20.09	- 7.78	19.11
678 June 1.41	267	16.03	72	18.82	+ 8.62	16.63
679 June 28.61	254	15.05	272	18.97	- 2.52	17.05
680 July 25.82	200	15.45	185	16.49	+ 0.10	15.95
681 Aug. 22.05	54	18.77	400	17.62	-13.28	17.76
682 Sept. 18.30	271	18.95	249	19.81	+ 0.39	19.36
683 Oct. 15.59	300	12.26	206	18.34	- 0.15	14.73
684 Nov. 11.89	477	19.06	115	19.98	+11.50	19.24
685 Dec. 9.20	653	17.04	106	20.26	+11.85	17.49
1905						
686 Jan. 5.53	594	11.88	661	15.29	- 2.44	13.68
687 Feb. 1.87	682	13.37	1256	16.75	- 6.14	15.56
688 Mar. 1.20	875	10.52	510	16.48	+ 0.58	12.71
689 Mar. 28.52	175	16.42	246	18.08	- 3.71	17.39
690 Apr. 24.80	439	16.55	343	15.88	+ 2.34	16.26
691 May 22.02	224	11.61	213	14.25	- 0.99	12.90
692 June 18.22	688	9.52	435	14.47	+ 0.23	11.44
1905 *(continued)*		°		°	°	°
693 July 15.43	1142	12.55	530	14.96	+ 3.83	13.31
694 Aug. 11.64	638	12.04	245	17.65	+ 3.81	13.60
695 Sept. 7.89	423	13.69	268	14.38	+ 2.80	13.96
696 Oct. 5.16	2168	11.31	38	13.74	+10.88	11.35
697 Nov. 1.45	1422	9.59	517	14.71	+ 3.11	10.96
698 Nov. 28.76	429	10.55	421	15.31	- 2.25	12.91
699 Dec. 26.08	295	10.94	267	9.02	+ 1.46	10.03
1906						
700 Jan. 22.42	425	14.92	272	10.94	+ 4.83	13.37
701 Feb. 18.77	387	13.21	134	10.54	+ 7.11	12.57
702 Mar. 18.09	905	16.68	414	13.54	+ 7.19	15.70
703 Apr. 14.38	405	14.22	142	21.03	+ 5.09	15.98
704 May 11.62	1068	11.89	144	19.21	+ 8.19	12.76
705 June 7.83	803	14.96	175	10.84	+10.34	14.22
706 July 5.02	1080	14.26	240	13.26	+ 9.26	14.08
707 Aug. 1.23	273	19.35	369	14.31	- 0.01	16.45
708 Aug. 28.47	412	10.88	304	12.78	+ 0.84	11.69
709 Sept. 24.73	16	16.35	119	18.34	-14.14	18.10
710 Oct. 22.02	92	13.70	228	11.70	- 4.40	12.28
711 Nov. 18.33	473	14.16	225	16.68	+ 4.22	14.98
712 Dec. 15.64	1032	11.07	477	15.85	+ 2.56	12.58
1907						
713 Jan. 11.97	832	14.81	632	14.62	+ 2.11	14.73
714 Feb. 8.32	555	12.24	1682	14.45	- 7.83	13.90
715 Mar. 7.65	266	11.10	444	15.00	- 5.21	13.54
716 Apr. 3.95	432	11.29	196	11.81	+ 4.08	11.45
717 May 1.21	171	5.84	484	11.69	- 7.12	10.17
718 May 28.43	50	10.99	963	14.58	-13.31	14.40
719 June 24.63	186	4.18	634	10.08	- 6.84	8.74
720 July 21.84	236	9.21	461	14.71	- 6.62	12.85
721 Aug. 18.06	603	9.12	478	15.50	- 1.77	11.94
722 Sept. 14.31	656	7.84	513	13.82	- 1.67	10.47
723 Oct. 11.59	743	7.88	520	16.64	- 2.21	11.49
724 Nov. 7.89	937	10.91	195	11.91	+ 6.98	11.08
725 Dec. 5.20	504	10.49	565	10.28	- 0.49	10.38
1908						
726 Jan. 1.53	216	11.14	329	7.83	- 0.31	9.14
727 Jan. 28.87	128	16.98	97	12.05	+ 4.45	14.85
728 Feb. 25.21	41	9.61	264	8.16	- 5.77	8.35
729 Mar. 23.53	34	10.92	553	12.05	-10.71	11.99
730 Apr. 19.80	126	11.24	446	11.31	- 6.34	11.30
731 May 17.04	166	10.80	547	8.14	- 3.73	8.76
732 June 13.24	87	10.08	232	12.88	- 6.64	12.12
733 July 10.44	263	11.53	471	14.51	- 5.17	13.44
734 Aug. 6.65	785	8.20	995	10.89	- 2.47	9.70
735 Sept. 2.90	993	9.97	621	7.42	+ 3.28	8.99
736 Sept. 30.17	220	10.36	224	8.31	+ 0.94	9.32
737 Oct. 27.46	659	11.27	90	11.48	+ 8.55	11.30
738 Nov. 23.76	352	11.62	96	13.51	+ 6.22	12.02
739 Dec. 21.09	637	9.69	226	9.95	+ 4.55	9.76

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1909		°		°	°	°
740 Jan. 17.42	615	8.61	480	10.21	+ 0.36	9.31
741 Feb. 13.76	412	8.53	592	10.26	- 2.55	9.55
742 Mar. 13.09	587	10.43	357	11.35	+ 2.20	10.77
743 Apr. 9.39	110	8.22	220	9.52	- 3.61	9.09
744 May 6.64	63	9.92	451	16.19	-13.01	15.42
745 June 2.85	29	6.98	278	8.86	- 7.36	8.68
746 June 30.05	479	7.67	68	4.15	+ 6.20	7.23
747 July 27.25	141	8.98	84	15.45	- 0.11	11.39
748 Aug. 23.48	37	12.36	448	6.25	- 4.84	6.71
749 Sept. 19.74	116	9.80	1054	6.63	- 5.00	6.95
750 Oct. 17.03	200	6.16	346	9.29	- 3.63	8.14
751 Nov. 13.33	402	12.71	488	11.41	- 0.52	12.00
752 Dec. 10.64	443	9.81	422	14.12	- 1.86	11.91
1910						
753 Jan. 6.97	49	5.80	235	10.77	- 7.90	9.91
754 Feb. 3.31	14	14.09	622	10.34	- 9.80	10.42
755 Mar. 2.65	175	16.34	134	12.01	+ 4.05	14.46
756 Mar. 29.96	20	13.65	39	7.55	- 0.30	9.64
757 Apr. 26.23	87	2.53	257	11.69	- 8.08	9.37
758 May 23.45	42	7.73	44	10.31	- 1.57	9.06
759 June 19.66	151	7.96	118	5.44	+ 2.09	6.86
760 July 16.86	1	16.04	190	12.80	-12.58	12.83
761 Aug. 13.07	0	..	167	13.26	-13.26	13.26
762 Sept. 9.32	2	6.36	546	12.26	-12.20	12.24
763 Oct. 6.60	246	6.38	146	9.72	+ 0.40	7.62
764 Nov. 2.89	16	9.69	7	11.43	+ 3.31	10.22
765 Nov. 30.20	0	..	40	6.74	- 6.74	6.74
766 Dec. 27.53	0	..	45	4.63	- 4.63	4.63
1911						
767 Jan. 23.86	0	..	61	12.26	-12.26	12.26
768 Feb. 20.21	2	2.85	91	4.19	- 4.06	4.17
769 Mar. 19.53	51	9.81	128	5.55	- 1.15	6.77
770 Apr. 15.81	0	..	194	5.65	- 5.65	5.65
771 May 13.06	73	8.55	5	6.78	+ 7.54	8.43
772 June 9.26	4	2.11	3	11.08	- 3.27	5.77
773 July 6.46	9	6.48	1	12.12	+ 4.24	7.16
774 Aug. 2.67	6	6.13	25	11.90	- 8.40	10.78
775 Aug. 29.91	58	6.47	1	4.59	+ 6.27	6.44
776 Sept. 26.17	20	6.81	0	..	+ 6.81	6.81
777 Oct. 23.46	0.4	1.70	6	3.69	- 3.32	3.55
778 Nov. 19.77	0	..	63	2.08	- 2.08	2.08
779 Dec. 17.08	5	10.44	7	14.44	- 3.54	12.69
1912						
780 Jan. 13.42	0	..	0	..	..	..
781 Feb. 9.76	0	..	7	11.91	-11.91	11.91
782 Mar. 8.09	0.2	11.90	59	12.47	-12.40	12.47
783 Apr. 4.39	1	12.30	96	10.83	-10.67	10.84
784 May 1.65	1	11.23	17	10.45	- 9.85	10.48
785 May 28.87	1	9.90	76	6.95	- 6.76	6.99
786 June 25.07	0	..	33	5.53	- 5.53	5.53

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1912 *(continued)*		°		°	°	°
787 July 22.27	0	..	0	..	..	..
788 Aug. 18.50	0	..	16	6.08	- 6.08	6.08
789 Sept. 14.75	0	..	98	8.14	- 8.14	8.14
790 Oct. 12.03	0	..	1	4.77	- 4.77	4.77
791 Nov. 8.33	0	..	3	2.63	- 2.63	2.63
792 Dec. 5.64	11	23.72	85	1.89	+ 1.06	4.40
1913						
793 Jan. 1.97	7	23.93	7	13.31	+ 4.83	18.48
794 Jan. 29.31	21	31.47	0	..	+31.47	31.47
795 Feb. 25.65	2	30.89	1	35.20	+10.74	32.20
796 Mar. 24.97	0	..	4	1.96	- 1.96	1.96
797 Apr. 21.24	0	..	0	..	..	..
798 May 18.48	0	..	0	..	..	..
799 June 14.68	4	28.58	0	..	+28.58	28.58
800 July 11.88	3	28.64	0	..	+28.64	28.64
801 Aug. 8.09	0	..	0	..	..	..
802 Sept. 4.33	4	4.63	0	..	+ 4.63	4.63
803 Oct. 1.61	12	19.56	0	..	+19.56	19.56
804 Oct. 28.90	5	18.34	2	27.60	+ 3.44	21.35
805 Nov. 25.21	0	..	19	24.46	-24.46	24.46
806 Dec. 22.53	12	22.40	7	21.69	+ 5.50	22.13
1914						
807 Jan. 18.86	1	25.00	10	12.49	-10.79	13.06
808 Feb. 15.20	2	14.48	1	20.17	+ 5.96	15.88
809 Mar. 14.53	217	29.33	0	..	+29.33	29.33
810 Apr. 10.83	183	19.70	30	24.27	+13.55	20.34
811 May 8.07	11	26.18	1	24.06	+22.86	26.04
812 June 4.29	19	28.44	168	21.90	-16.90	22.55
813 July 1.48	0.1	26.20	50	32.87	-32.78	32.86
814 July 28.69	290	19.43	11	22.27	+17.84	19.54
815 Aug. 24.92	231	18.02	146	21.37	+ 2.74	19.32
816 Sept. 21.18	50	19.26	1	23.50	+18.53	19.33
817 Oct. 18.47	110	22.49	27	20.46	+14.01	22.09
818 Nov. 14.77	195	18.17	173	23.93	- 1.60	20.87
819 Dec. 12.08	171	16.53	92	22.53	+ 2.87	18.63
1915						
820 Jan. 8.41	167	17.28	60	20.95	+ 7.18	18.25
821 Feb. 4.76	350	21.57	399	21.50	- 1.37	21.53
822 Mar. 4.09	272	22.41	134	20.41	+ 8.28	21.75
823 Mar. 31.40	790	18.96	192	21.28	+11.11	19.41
824 Apr. 27.67	419	19.88	111	18.66	+11.81	19.63
825 May 24.89	462	15.97	177	20.71	+ 5.82	17.28
826 June 21.09	441	17.84	866	21.05	- 7.93	19.96
827 July 18.29	253	19.15	1041	18.75	-11.33	18.83
828 Aug. 14.51	479	21.61	452	18.17	+ 2.30	19.94
829 Sept. 10.76	461	11.76	95	18.99	+ 6.51	13.00
830 Oct. 8.04	463	15.70	242	16.19	+ 4.76	15.87
831 Nov. 4.33	177	19.50	250	21.84	- 4.70	20.87
832 Dec. 1.64	151	11.51	177	19.43	- 5.20	15.79
833 Dec. 28.97	313	14.91	259	17.15	+ 0.41	15.92

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1916		°		°	°	°
834 Jan. 25.31	330	15.03	383	17.38	- 2.37	16.29
835 Feb. 21.65	240	19.69	542	17.52	- 6.11	18.19
836 Mar. 19.97	804	14.05	165	19.40	+ 8.34	14.96
837 Apr. 16.25	468	13.70	348	20.58	- 0.92	16.63
838 May 13.49	424	12.45	574	13.43	- 2.43	13.01
839 June 9.70	722	12.61	327	14.34	+ 4.20	13.15
840 July 6.90	591	12.30	15	22.93	+11.42	12.57
841 Aug. 3.11	325	15.93	35	15.43	+12.90	15.88
842 Aug. 30.35	425	21.55	88	15.11	+15.26	20.44
843 Sept. 26.61	677	16.40	78	18.12	+12.82	16.58
844 Oct. 23.90	389	15.12	187	18.23	+ 4.30	16.13
845 Nov. 20.21	333	20.27	276	17.93	+ 2.96	19.21
846 Dec. 17.53	1113	13.97	213	20.02	+ 8.50	14.94
1917						
847 Jan. 13.86	393	17.39	444	16.33	- 0.49	16.83
848 Feb. 10.20	417	19.83	1085	16.22	- 6.21	17.22
849 Mar. 9.53	586	14.14	227	13.38	+ 6.46	13.93
850 Apr. 5.83	695	13.70	366	18.41	+ 2.66	15.29
851 May 3.09	606	12.51	829	17.45	- 4.79	15.36
852 May 30.31	902	14.32	880	15.07	- 0.20	14.69
853 June 26.51	1130	15.17	456	16.49	+ 6.11	15.55
854 July 23.71	2174	14.18	915	16.92	+ 4.97	14.99
855 Aug. 19.94	583	14.01	749	17.76	- 3.86	16.12
856 Sept. 16.19	951	15.51	801	14.19	+ 1.94	14.90
857 Oct. 13.47	493	11.35	656	15.85	- 4.14	13.91
858 Nov. 9.77	512	11.06	701	13.38	- 3.06	12.40
859 Dec. 7.09	1416	9.46	952	12.03	+ 0.82	10.49
1918						
860 Jan. 3.41	808	11.58	1013	15.20	- 3.31	13.59
861 Jan. 30.75	600	6.28	221	16.70	+ 0.09	9.09
862 Feb. 27.09	624	14.39	211	14.61	+ 7.05	14.44
863 Mar. 26.41	558	13.79	394	11.45	+ 3.35	12.82
864 Apr. 22.68	612	16.19	446	13.63	+ 3.62	15.11
865 May 19.91	342	14.64	476	13.35	- 1.64	13.89
866 June 16.12	516	11.35	203	13.40	+ 4.36	11.93
867 July 13.31	863	11.89	590	16.05	+ 0.53	13.56
868 Aug. 9.53	1039	11.74	479	16.64	+ 2.79	13.29
869 Sept. 5.78	470	11.72	618	12.38	- 1.97	12.10
870 Oct. 3.05	882	11.46	349	14.64	+ 4.06	12.36
871 Oct. 30.34	624	11.36	422	13.15	+ 1.48	12.08
872 Nov. 26.65	58	12.98	979	11.03	- 9.69	11.14
873 Dec. 23.97	368	11.38	549	11.57	- 2.36	11.49
1919						
874 Jan. 20.31	965	10.84	242	9.17	+ 6.82	10.51
875 Feb. 16.65	1005	10.00	215	13.16	+ 5.92	10.56
876 Mar. 15.97	372	9.59	417	17.20	- 4.56	13.61
877 Apr. 12.27	440	8.04	594	15.43	- 5.44	12.29
878 May 9.51	1007	12.65	533	10.18	+ 4.75	11.80
879 June 5.72	877	11.78	1014	14.13	- 2.11	13.04
880 July 2.92	221	8.71	747	10.45	- 6.06	10.05
1919 *(continued)*		°		°	°	°
881 July 30.13	549	5.12	970	6.59	- 2.36	6.06
882 Aug. 26.36	298	3.40	658	10.27	- 6.00	8.13
883 Sept. 22.62	361	6.46	559	12.11	- 4.83	9.89
884 Oct. 19.91	604	10.50	272	14.86	+ 2.61	11.86
885 Nov. 16.21	356	11.89	130	16.73	+ 4.23	13.19
886 Dec. 13.53	88	6.92	298	9.07	- 5.42	8.58
1920						
887 Jan. 9.86	166	5.63	1001	9.81	- 7.61	9.21
888 Feb. 6.20	277	8.74	265	12.54	- 1.66	10.60
889 Mar. 4.54	371	10.21	1204	5.91	- 2.11	6.92
890 Mar. 31.84	51	9.07	297	6.34	- 4.06	6.75
891 Apr. 28.11	135	12.22	92	7.03	+ 4.43	10.12
892 May 25.33	425	12.58	72	8.94	+ 9.46	12.05
893 June 21.53	302	13.94	236	14.11	+ 1.63	14.01
894 July 18.73	140	12.39	103	15.99	+ 0.35	13.92
895 Aug. 14.95	32	12.04	543	14.84	-13.35	14.69
896 Sept. 11.20	284	10.66	400	11.75	- 2.46	11.30
897 Oct. 8.48	227	12.12	429	12.84	- 4.20	12.59
898 Nov. 4.78	104	14.74	414	9.80	- 4.88	10.79
899 Dec. 2.09	222	12.14	205	10.77	+ 1.16	11.48
900 Dec. 29.41	118	5.17	468	10.93	- 7.69	9.77
1921						
901 Jan. 25.75	7	10.64	247	11.57	-11.00	11.55
902 Feb. 22.09	83	8.30	154	8.92	- 2.92	8.70
903 Mar. 21.41	455	10.89	121	9.41	+ 6.62	10.58
904 Apr. 17.70	527	3.16	72	14.64	+ 1.02	4.54
905 May 14.93	381	2.98	21	7.77	+ 2.42	3.23
906 June 11.14	490	9.79	212	7.45	+ 4.58	9.09
907 July 8.34	116	8.24	216	9.20	- 3.11	8.87
908 Aug. 4.55	155	11.05	112	7.08	+ 3.46	9.39
909 Aug. 31.79	255	9.80	73	8.16	+ 5.80	9.44
910 Sept. 28.06	164	6.58	3	10.38	+ 6.28	6.65
911 Oct. 25.34	435	6.40	69	6.12	+ 4.68	6.36
912 Nov. 21.65	272	7.62	275	5.76	+ 0.90	6.69
913 Dec. 18.97	76	9.22	163	5.64	- 0.93	6.78
1922						
914 Jan. 15.30	49	10.05	72	6.55	+ 0.20	7.97
915 Feb. 11.64	1122	9.92	365	6.19	+ 5.97	9.01
916 Mar. 10.98	277	9.31	141	6.69	+ 3.90	8.42
917 Apr. 7.28	106	8.19	2	11.12	+ 7.91	8.23
918 May 4.53	69	8.50	0	..	+ 8.50	8.50
919 May 31.75	11	8.83	7	8.29	+ 2.38	8.63
920 June 27.94	14	10.17	92	6.20	- 4.07	6.71
921 July 25.15	5	10.08	28	6.08	- 3.62	6.69
922 Aug. 21.38	23	4.22	103	12.00	- 8.99	10.56
923 Sept. 17.63	14	14.29	35	11.39	- 3.99	12.23
924 Oct. 14.92	5	12.34	132	6.49	- 5.87	6.69
925 Nov. 11.21	5	4.67	179	4.42	- 4.18	4.43
926 Dec. 8.53	542	5.95	30	3.50	+ 5.46	5.83

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1923		°		°	°	°
927 Jan. 4.86	7	5.80	1	1.77	+ 4.76	5.25
928 Feb. 1.20	1	11.23	0.4	7.00	+ 7.29	10.31
929 Feb. 28.54	6	6.06	0.3	26.22	+ 4.45	7.07
930 Mar. 27.85	19	4.91	16	5.91	- 0.05	5.37
931 Apr. 24.12	2	7.05	11	5.40	- 3.32	5.68
932 May 21.35	16	9.70	8	8.84	+ 3.47	9.42
933 June 17.55	95	8.06	9	3.20	+ 7.08	7.64
934 July 14.75	4	5.91	3	25.92	- 7.66	14.44
935 Aug. 10.97	1	20.59	38	27.60	-26.82	27.49
936 Sept. 7.21	46	21.56	84	19.34	- 4.89	20.12
937 Oct. 4.49	34	3.66	78	11.23	- 6.74	8.95
938 Oct. 31.78	81	29.60	43	27.50	+ 9.74	28.87
939 Nov. 28.09	24	28.30	1	22.36	+27.23	28.17
940 Dec. 25.41	6	28.03	0	..	+28.03	28.03
1924						
941 Jan. 21.75	2	26.60	2	20.09	+ 1.85	23.15
942 Feb. 18.09	107	27.30	0.4	15.51	+27.14	27.26
943 Mar. 16.42	1	20.19	1	26.03	- 0.43	22.80
944 Apr. 12.71	36	25.78	142	28.17	-17.28	27.69
945 May 9.95	285	31.48	161	21.70	+12.29	27.95
946 June 6.16	309	30.60	14	24.92	+28.28	30.36
947 July 3.36	362	19.20	5	24.86	+18.56	19.28
948 July 30.57	275	15.32	9	23.80	+14.11	15.58
949 Aug. 26.80	494	18.67	29	25.24	+16.28	19.03
950 Sept. 23.06	295	20.84	159	27.83	+ 3.75	23.29
951 Oct. 20.35	216	21.66	2	25.86	+21.27	21.69
952 Nov. 16.65	663	21.35	1	23.05	+21.33	21.36
953 Dec. 13.97	74	20.77	83	24.24	- 3.08	22.61
1925						
954 Jan. 10.30	42	22.64	5	33.56	+16.29	23.87
955 Feb. 6.64	65	11.79	256	20.19	-13.70	18.49
956 Mar. 5.98	134	20.56	139	21.83	- 1.04	21.21
957 Apr. 2.28	202	21.89	86	25.26	+ 7.76	22.90
958 Apr. 29.55	683	19.30	50	19.12	+16.69	19.28
959 May 26.77	601	21.93	180	21.62	+11.88	21.86
960 June 22.97	82	19.82	334	16.16	- 9.10	16.88
961 July 20.17	247	22.36	106	27.50	+ 7.42	23.90
962 Aug. 16.39	367	21.48	171	19.66	+ 8.38	20.90
963 Sept. 12.64	417	19.07	417	19.91	- 0.42	19.49
964 Oct. 9.92	518	19.32	780	18.41	- 3.34	18.77
965 Nov. 6.22	1186	19.40	428	16.69	+ 9.83	18.68
966 Dec. 3.53	2256	21.87	1182	19.55	+ 7.63	21.07
967 Dec. 30.86	1932	21.12	776	19.84	+ 9.38	20.76
1926						
968 Jan. 27.19	876	19.71	1201	18.21	- 2.22	18.84
969 Feb. 23.54	365	20.18	1306	24.13	-14.47	23.27
970 Mar. 22.85	267	22.12	261	20.32	+ 1.15	21.23
971 Apr. 19.14	292	15.81	725	19.71	- 9.51	18.59
972 May 16.37	392	13.90	562	17.30	- 4.47	15.90
973 June 12.58	945	20.17	150	18.31	+14.90	19.92

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1926 *(continued)*		°		°	°	°
974 July 9.77	195	18.60	796	12.92	- 6.73	14.04
975 Aug. 5.99	120	19.03	633	17.50	-11.68	17.74
976 Sept. 2.23	1059	23.30	214	14.79	+16.89	21.87
977 Sept. 29.50	1225	17.97	266	13.54	+12.34	17.18
978 Oct. 26.79	223	17.61	308	13.75	- 0.59	15.37
979 Nov. 23.09	722	12.64	649	13.62	+ 0.21	13.10
980 Dec. 20.41	725	17.32	975	13.93	- 0.61	15.38
1927						
981 Jan. 16.75	789	20.31	1185	16.17	- 1.60	17.83
982 Feb. 13.09	189	14.47	441	15.40	- 6.42	15.12
983 Mar. 12.42	864	22.67	380	15.11	+11.12	20.36
984 Apr. 8.72	396	15.69	769	15.34	- 4.80	15.46
985 May 5.97	414	16.91	579	14.52	- 1.42	15.52
986 June 2.18	567	16.88	282	11.59	+ 7.42	15.12
987 June 29.38	425	16.75	457	8.97	+ 3.42	12.72
988 July 26.59	90	16.36	755	11.04	- 8.12	11.61
989 Aug. 22.82	141	15.82	1246	14.17	-11.12	14.34
990 Sept. 19.07	283	19.09	657	14.60	- 4.45	15.96
991 Oct. 16.36	152	16.93	515	10.48	- 4.23	11.95
992 Nov. 12.66	191	10.99	730	12.17	- 7.37	11.93
993 Dec. 9.97	222	10.66	579	11.85	- 5.62	11.52
1928						
994 Jan. 6.30	855	12.07	663	14.40	+ 0.51	13.09
995 Feb. 2.64	540	7.77	615	13.69	- 3.66	10.92
996 Feb. 29.98	985	11.74	835	15.60	- 0.81	13.51
997 Mar. 28.29	492	12.80	848	14.06	- 4.20	13.60
998 Apr. 24.56	233	9.83	1053	14.96	-10.47	14.03
999 May 21.79	437	10.13	477	13.70	- 2.32	11.99
1000 June 17.99	1145	12.10	844	19.76	- 1.42	15.35
1001 July 15.19	1047	11.07	649	18.16	- 0.11	13.79
1002 Aug. 11.41	613	11.93	559	13.44	- 0.16	12.65
1003 Sept. 7.65	1254	15.03	1196	15.60	+ 0.08	15.31
1004 Oct. 4.93	837	13.19	139	10.49	+ 9.82	12.80
1005 Nov. 1.22	384	13.91	451	15.21	- 1.83	14.62
1006 Nov. 28.53	760	10.07	345	12.71	+ 2.95	10.90
1007 Dec. 25.85	785	8.65	221	11.46	+ 4.23	9.27
1929						
1008 Jan. 22.19	249	6.55	627	9.49	- 4.93	8.66
1009 Feb. 18.53	226	8.28	961	9.57	- 6.17	9.33
1010 Mar. 17.86	285	7.73	501	10.97	- 4.18	9.79
1011 Apr. 14.14	599	8.02	401	8.72	+ 1.31	8.30
1012 May 11.39	544	12.07	195	11.38	+ 5.88	11.89
1013 June 7.60	434	11.31	908	10.64	- 3.54	10.85
1014 July 4.80	172	7.76	804	10.55	- 7.33	10.06
1015 Aug. 1.01	174	11.78	661	10.24	- 5.65	10.56
1016 Aug. 28.24	68	16.21	205	12.14	- 5.10	13.15
1017 Sept. 24.50	510	9.04	663	14.40	- 4.21	12.07
1018 Oct. 21.79	1210	11.60	658	10.74	+ 3.73	11.30
1019 Nov. 18.10	2306	12.47	776	8.93	+ 7.09	11.58
1020 Dec. 15.41	1569	10.28	487	4.50	+ 6.78	8.91

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1930		°		°	°	°
1021 Jan. 11.74	861	11.74	339	8.61	+ 5.99	10.85
1022 Feb. 8.09	126	11.89	517	14.43	- 9.26	13.93
1023 Mar. 7.42	246	10.67	337	10.72	- 1.69	10.70
1024 Apr. 3.72	303	12.76	194	7.19	+ 4.97	10.58
1025 Apr. 30.98	301	14.20	182	9.21	+ 5.38	12.32
1026 May 28.20	241	15.11	113	6.70	+ 8.15	12.43
1027 June 24.40	88	9.02	72	6.34	+ 2.08	7.81
1028 July 21.61	50	2.89	160	6.80	- 4.48	5.87
1029 Aug. 17.83	330	10.51	122	9.32	+ 5.16	10.19
1030 Sept. 14.08	420	7.96	79	4.00	+ 6.07	7.33
1031 Oct. 11.36	202	8.78	312	6.03	- 0.20	7.11
1032 Nov. 7.66	284	6.42	389	8.11	- 1.98	7.40
1033 Dec. 4.97	128	9.98	76	10.29	+ 2.44	10.10
1931						
1034 Jan. 1.30	169	6.89	30	18.30	+ 3.08	8.62
1035 Jan. 28.64	539	7.10	99	5.09	+ 5.21	6.79
1036 Feb. 24.98	539	5.68	237	7.91	+ 1.53	6.36
1037 Mar. 24.30	261	8.64	149	6.65	+ 3.09	7.92
1038 Apr. 20.57	245	9.35	30	7.13	+ 7.57	9.11
1039 May 17.81	210	6.46	124	15.65	- 1.73	9.86
1040 June 14.01	58	7.24	65	9.65	- 1.68	8.51
1041 July 11.21	31	6.95	45	8.39	- 2.17	7.81
1042 Aug. 7.42	50	7.04	26	9.64	+ 1.25	7.95
1043 Sept. 3.67	105	11.04	45	5.90	+ 5.98	9.50
1044 Sept. 30.94	25	17.02	63	14.62	- 5.59	15.31
1045 Oct. 28.23	147	10.08	42	7.20	+ 6.26	9.44
1046 Nov. 24.53	300	10.49	2	0.81	+10.41	10.42
1047 Dec. 21.85	12	10.71	81	13.16	-10.05	12.84
1932						
1048 Jan. 18.19	72	12.59	59	12.56	+ 1.32	12.58
1049 Feb. 14.53	238	8.35	5	9.43	+ 8.00	8.37
1050 Mar. 12.86	27	12.77	14	8.38	+ 5.58	11.28
1051 Apr. 9.16	208	9.80	34	8.96	+ 7.16	9.68
1052 May 6.41	310	6.38	57	7.71	+ 4.19	6.59
1053 June 2.62	260	4.52	103	6.64	+ 1.36	5.12
1054 June 29.82	13	11.98	86	8.01	- 5.44	8.52
1055 July 27.02	1	9.29	107	8.40	- 8.31	8.40
1056 Aug. 23.25	1	9.30	30	7.13	- 6.75	7.18
1057 Sept. 19.51	9	9.93	5	4.12	+ 4.85	7.83
1058 Oct. 16.80	75	9.99	6	8.07	+ 8.71	9.85
1059 Nov. 13.10	241	9.01	0	..	+ 9.01	9.01
1060 Dec. 10.41	233	9.84	0.4	0.40	+ 9.82	9.82
1933						
1061 Jan. 6.74	263	9.83	0	..	+ 9.83	9.83
1062 Feb. 3.08	535	12.51	2	11.58	+12.41	12.51
1063 Mar. 2.42	162	8.67	0	..	+ 8.67	8.67
1064 Mar. 29.73	28	5.59	0	..	+ 5.59	5.59
1065 Apr. 26.00	14	10.80	0.4	5.42	+10.30	10.64
1066 May 23.23	33	6.04	2	7.00	+ 5.38	6.08
1067 June 19.43	24	7.11	1	3.90	+ 6.63	6.97
1933 *(continued)*		°		°	°	°
1068 July 16.63	0.1	3.00	0.2	13.10	- 6.70	9.10
1069 Aug. 12.85	1	5.52	10	10.00	- 8.83	9.66
1070 Sept. 9.09	4	14.51	8	4.72	+ 1.48	7.87
1071 Oct. 6.37	45	8.84	1	31.50	+ 8.37	9.10
1072 Nov. 2.66	0	..	0	..	..	..
1073 Nov. 29.97	1	0.90	0	..	+ 0.90	0.90
1074 Dec. 27.30	37	4.69	0	..	+ 4.69	4.69
1934						
1075 Jan. 23.64	67	15.80	4	23.26	+13.76	16.19
1076 Feb. 19.98	0.3	23.43	12	10.61	- 9.88	10.88
1077 Mar. 19.30	11	27.49	38	28.75	-16.56	28.48
1078 Apr. 15.59	6	19.84	393	27.91	-27.19	27.79
1079 May 12.83	119	26.30	257	30.77	-12.67	29.36
1080 June 9.04	105	2.90	6	29.84	+ 1.15	4.34
1081 July 6.23	112	18.32	5	30.15	+16.30	18.82
1082 Aug. 2.44	9	4.43	101	29.18	-26.30	27.06
1083 Aug. 29.68	17	7.63	2	24.52	+ 3.65	9.72
1084 Sept. 25.94	4	23.23	13	22.81	-12.49	22.91
1085 Oct. 23.23	71	21.44	1	22.43	+21.14	21.45
1086 Nov. 19.54	0.4	18.08	92	24.26	-24.06	24.23
1087 Dec. 16.85	31	25.32	218	27.99	-21.25	27.65
1935						
1088 Jan. 13.19	85	27.60	271	21.75	-10.00	23.15
1089 Feb. 9.53	35	14.05	134	18.16	-11.53	17.31
1090 Mar. 8.86	117	13.62	59	19.75	+ 2.40	15.68
1091 Apr. 5.16	37	22.15	112	34.05	-20.01	31.08
1092 May 2.42	35	21.36	339	26.59	-22.14	26.11
1093 May 29.64	121	26.25	433	25.79	-14.42	25.89
1094 June 25.84	84	26.25	725	24.53	-19.27	24.70
1095 July 23.04	118	25.56	120	18.25	+ 3.48	21.87
1096 Aug. 19.27	506	25.20	102	17.85	+17.97	23.96
1097 Sept. 15.52	287	21.98	238	20.12	+ 2.88	21.14
1098 Oct. 12.80	701	21.00	345	26.61	+ 5.30	22.85
1099 Nov. 9.10	475	22.95	1386	23.43	-11.60	23.31
1100 Dec. 6.41	178	17.98	1275	22.30	-17.37	21.77
1936						
1101 Jan. 2.74	557	23.15	1157	25.23	- 9.51	24.56
1102 Jan. 30.08	393	20.83	785	25.78	-10.23	24.13
1103 Feb. 26.42	373	21.22	758	23.51	- 8.76	22.76
1104 Mar. 24.74	454	17.95	777	21.82	- 7.14	20.39
1105 Apr. 21.01	84	19.39	494	22.48	-16.39	22.03
1106 May 18.25	111	16.31	501	20.80	-14.07	19.98
1107 June 14.45	625	20.33	248	18.15	+ 9.39	19.71
1108 July 11.65	383	22.02	324	20.37	+ 2.60	21.26
1109 Aug. 7.86	395	24.70	500	24.06	- 2.55	24.34
1110 Sept. 4.11	306	14.55	637	21.05	- 9.50	18.94
1111 Oct. 1.38	573	18.30	519	16.37	+ 1.83	17.38
1112 Oct. 28.67	443	15.34	1011	14.68	- 5.53	14.88
1113 Nov. 24.98	1046	17.22	1155	17.97	- 1.25	17.62
1114 Dec. 22.30	713	19.10	764	18.15	- 0.17	18.61

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1937		°		°	°	°
1115 Jan. 18.63	1030	18.88	1787	14.58	- 2.35	16.16
1116 Feb. 14.97	1598	15.69	332	18.73	+ 9.77	16.21
1117 Mar. 14.30	840	11.17	307	18.04	+ 3.36	13.00
1118 Apr. 10.60	1547	19.51	761	16.18	+ 7.74	18.41
1119 May 7.85	1657	15.49	925	17.06	+ 3.83	16.05
1120 June 4.06	1483	17.26	1285	14.48	+ 2.52	15.97
1121 July 1.26	2147	20.12	1062	14.52	+ 8.65	18.27
1122 July 28.46	1875	26.01	929	16.33	+11.98	22.80
1123 Aug. 24.69	1571	18.55	222	14.33	+14.48	18.03
1124 Sept. 20.95	2111	11.98	451	16.72	+ 6.93	12.82
1125 Oct. 18.24	540	11.73	607	16.90	- 3.42	14.47
1126 Nov. 14.54	165	15.38	374	17.39	- 7.37	16.78
1127 Dec. 11.86	990	18.03	608	17.83	+ 4.39	17.95
1938						
1128 Jan. 8.19	2187	17.15	183	13.46	+14.78	16.86
1129 Feb. 4.53	486	13.55	1232	17.82	- 8.95	16.62
1130 Mar. 3.86	405	20.26	1125	15.16	- 5.78	16.52
1131 Mar. 31.17	617	24.05	1739	15.40	- 5.06	17.66
1132 Apr. 27.44	617	18.64	1776	16.44	- 7.39	17.01
1133 May 24.66	1065	12.54	386	12.18	+ 5.96	12.45
1134 June 20.86	953	12.02	1992	13.35	- 5.14	12.92
1135 July 18.06	698	10.63	1851	14.98	- 7.97	13.79
1136 Aug. 14.28	727	11.82	533	17.92	- 0.76	14.40
1137 Sept. 10.53	789	15.13	824	11.17	+ 1.70	13.11
1138 Oct. 7.81	1453	17.37	360	12.42	+11.46	16.39
1139 Nov. 4.11	1078	14.72	1495	10.00	+ 0.35	11.98
1140 Dec. 1.42	650	14.92	1288	11.57	- 2.69	12.70
1141 Dec. 28.74	409	15.74	766	13.50	- 3.35	14.28
1939						
1142 Jan. 25.08	342	12.50	643	13.36	- 4.38	13.06
1143 Feb. 21.42	333	16.19	674	15.56	- 5.07	15.77
1144 Mar. 20.74	455	13.45	452	11.80	+ 0.87	12.63
1145 Apr. 17.03	1688	17.71	907	14.22	+ 6.55	16.49
1146 May 14.27	812	12.93	608	14.97	+ 0.98	13.80
1147 June 10.47	437	12.56	896	10.29	- 2.80	11.03
1148 July 7.67	1196	13.18	668	9.20	+ 5.16	11.75
1149 Aug. 3.88	1342	12.35	1033	14.02	+ 0.88	13.08
1150 Aug. 31.12	226	15.07	2867	13.29	-11.22	13.42
1151 Sept. 27.38	692	17.13	1411	11.34	- 1.98	13.25
1152 Oct. 24.67	527	10.55	813	9.91	- 1.86	10.16
1153 Nov. 20.98	176	23.37	645	10.65	- 3.34	13.38
1154 Dec. 18.30	808	12.50	190	11.33	+ 7.97	12.28
1940						
1155 Jan. 14.63	617	10.88	405	11.48	+ 2.02	11 11
1156 Feb. 10.97	337	9.93	744	9.09	- 3.17	9.35
1157 Mar. 9.31	916	12.55	393	9.46	+ 5.94	11.62
1158 Apr. 5.61	231	10.40	322	9.29	- 1.06	9.75
1159 May 2.86	345	13.59	366	8.82	+ 2.06	11.14
1160 May 30.08	189	13.58	937	13.13	- 8.66	13.21
1161 June 26.28	685	11.68	467	14.18	+ 1.20	12.70
1940 *(continued)*		°		°	°	°
1162 July 23.48	770	11.15	913	12.28	- 1.53	11.73
1163 Aug. 19.71	411	11.39	678	8.84	- 1.24	9.80
1164 Sept. 15.96	451	14.51	675	7.93	+ 1.05	10.56
1165 Oct. 13.24	193	13.32	624	11.00	- 5.25	11.55
1166 Nov. 9.54	442	11.68	243	11.96	+ 3.30	11.77
1167 Dec. 6.86	424	9.18	441	10.79	- 1.01	10.00
1941						
1168 Jan. 3.18	289	11.10	150	8.26	+ 4.48	10.13
1169 Jan. 30.52	263	11.99	230	9.69	+ 1.89	10.91
1170 Feb. 26.86	499	11.19	132	12.55	+ 6.23	11.48
1171 Mar. 26.18	47	8.62	171	7.23	- 3.79	7.53
1172 Apr. 22.45	121	17.01	236	4.16	+ 3.03	8.52
1173 May 19.68	296	10.84	236	12.89	+ 0.30	11.75
1174 June 15.89	538	11.77	216	6.39	+ 6.57	10.23
1175 July 13.09	660	11.48	618	6.46	+ 2.81	9.06
1176 Aug. 9.30	391	10.78	251	6.46	+ 4.05	9.09
1177 Sept. 5.55	1196	11.38	221	8.12	+ 8.33	10.87
1178 Oct. 2.82	733	11.09	87	10.89	+ 8.75	11.07
1179 Oct. 30.11	435	10.23	178	14.54	+ 3.03	11.48
1180 Nov. 26.42	150	9.11	331	11.42	- 5.01	10.70
1181 Dec. 23.74	152	13.32	291	8.75	- 1.19	10.31
1942						
1182 Jan. 20.08	261	11.44	138	7.73	+ 4.80	10.16
1183 Feb. 16.42	903	8.01	113	11.83	+ 5.80	8.43
1184 Mar. 15.74	627	7.33	210	9.57	+ 3.08	7.90
1185 Apr. 12.04	704	11.88	345	8.33	+ 5.24	10.71
1186 May 9.28	113	11.70	102	5.04	+ 3.74	8.53
1187 June 5.50	86	7.16	14	9.15	+ 4.81	7.45
1188 July 2.69	2	11.33	193	4.79	- 4.61	4.87
1189 July 29.90	89	9.87	95	3.51	+ 2.98	6.59
1190 Aug. 26.13	69	8.60	129	8.93	- 2.82	8.81
1191 Sept. 22.39	11	12.00	135	9.79	- 8.12	9.96
1192 Oct. 19.68	15	6.54	404	10.29	- 9.71	10.16
1193 Nov. 15.98	305	9.16	154	8.13	+ 3.37	8.80
1194 Dec. 13.30	97	7.75	30	5.38	+ 4.68	7.20
1943						
1195 Jan. 9.63	24	7.65	33	6.20	- 0.28	6.80
1196 Feb. 5.97	703	7.83	6	3.19	+ 7.74	7.80
1197 Mar. 5.31	564	5.22	18	9.60	+ 4.75	5.36
1198 Apr. 1.61	641	7.37	157	11.82	+ 3.59	8.25
1199 Apr. 28.88	235	5.57	53	39.46	- 2.72	11.81
1200 May 26.10	45	7.95	1	3.60	+ 7.68	7.84
1201 June 22.30	232	13.96	7	1.53	+13.53	13.62
1202 July 19.50	101	12.04	51	3.36	+ 6.90	9.14
1203 Aug. 15.72	149	13.80	31	7.04	+10.18	12.63
1204 Sept. 11.97	285	15.32	23	6.70	+13.69	14.68
1205 Oct. 9.25	135	14.68	3	19.87	+13.98	14.78
1206 Nov. 5.55	109	13.11	7	8.74	+11.78	12.84
1207 Dec. 2.86	96	7.43	215	22.33	-13.14	17.73
1208 Dec. 30.18	19	9.50	1	23.80	+ 8.36	9.99

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1944		°		°	°	°
1209 Jan. 26.52	11	9.10	0	..	+ 9.10	9.10
1210 Feb. 22.86	0	..	58	25.48	-25.48	25.48
1211 Mar. 21.18	2	5.50	103	24.30	-23.67	23.91
1212 Apr. 17.47	0	..	0	..	..	..
1213 May 14.70	28	0.50	5	24.35	- 3.34	4.19
1214 June 10.91	38	5.29	4	18.40	+ 3.23	6.43
1215 July 8.11	0.2	18.50	21	26.34	-25.88	26.26
1216 Aug. 4.32	7	13.62	80	14.72	-12.40	14.63
1217 Aug. 31.56	1	9.10	247	23.72	-23.60	23.67
1218 Sept. 27.83	63	21.49	161	24.60	-11.69	23.73
1219 Oct. 25.12	69	20.86	40	14.55	+ 7.76	18.53
1220 Nov. 21.42	182	20.77	306	21.87	- 5.96	21.46
1221 Dec. 18.74	177	23.74	132	26.75	+ 2.15	25.03
1945						
1222 Jan. 15.07	70	22.67	75	10.95	+ 5.26	16.60
1223 Feb. 11.42	46	22.50	195	15.09	- 7.94	16.50
1224 Mar. 10.75	19	30.80	655	24.88	-23.28	25.05
1225 Apr. 7.05	4	27.35	496	12.02	-11.75	12.13
1226 May 4.30	20	28.14	200	19.90	-15.54	20.65
1227 May 31.52	23	28.59	400	24.21	-21.29	24.45
1228 June 27.72	148	22.29	406	20.27	- 8.87	20.81
1229 July 24.92	332	23.32	16	20.27	+21.27	23.18
1230 Aug. 21.15	27	25.24	99	17.15	- 7.96	18.90
1231 Sept. 17.40	388	8.48	625	20.86	- 9.62	16.12
1232 Oct. 14.69	242	24.37	537	23.19	- 8.43	23.56
1233 Nov. 10.99	146	24.69	277	19.55	- 4.30	21.33
1234 Dec. 8.30	131	23.00	163	17.61	+ 0.48	20.01
1946						
1235 Jan. 4.63	905	22.15	471	16.29	+ 8.99	20.14
1236 Jan. 31.97	2514	25.44	594	19.98	+16.77	24.40
1237 Feb. 28.31	943	25.72	657	22.73	+ 5.81	24.49
1238 Mar. 27.62	510	26.60	891	30.48	- 9.71	29.07
1239 Apr. 23.89	487	24.58	796	21.54	- 4.03	22.69
1240 May 21.12	510	19.83	139	20.30	+11.26	19.93
1241 June 17.32	522	24.10	620	22.81	- 1.37	23.40
1242 July 14.52	2721	20.24	1194	21.89	+ 7.39	20.74
1243 Aug. 10.74	1434	18.04	401	16.70	+10.45	17.75
1244 Sept. 6.98	1295	18.17	436	15.04	+ 9.81	17.38
1245 Oct. 4.26	519	15.69	868	14.83	- 3.41	15.15
1246 Oct. 31.55	1192	15.27	704	13.31	+ 4.66	14.54
1247 Nov. 27.86	1052	14.93	1341	10.31	+ 0.78	12.34
1248 Dec. 25.18	1195	19.85	1243	14.77	+ 2.20	17.26
1947						
1249 Jan. 21.52	354	15.06	2413	17.67	-13.48	17.33
1250 Feb. 17.86	912	16.62	3136	19.49	-11.36	18.85
1251 Mar. 17.19	356	15.36	3724	21.62	-18.39	21.07
1252 Apr. 13.48	788	17.69	1424	15.89	- 3.93	16.53
1253 May 10.72	1875	18.15	1676	19.44	+ 0.41	18.76
1254 June 6.93	1320	17.45	561	17.51	+ 7.03	17.47
1255 July 4.13	1684	15.66	911	20.38	+ 3.01	17.32
1947 *(continued)*		°		°	°	°
1256 July 31.34	1385	14.72	1853	15.85	- 2.77	15.37
1257 Aug. 27.57	1054	15.14	977	13.54	+ 1.35	14.37
1258 Sept. 23.83	1367	18.21	933	14.37	+ 4.99	16.65
1259 Oct. 21.12	721	13.97	1084	14.27	- 2.99	14.15
1260 Nov. 17.42	427	15.10	1336	16.17	- 8.60	15.92
1261 Dec. 14.74	564	16.08	1100	18.88	- 7.03	17.93
1948						
1262 Jan. 11.07	170	15.76	815	15.74	-10.30	15.74
1263 Feb. 7.41	731	17.51	440	12.93	+ 6.07	15.79
1264 Mar. 5.75	900	19.36	425	16.88	+ 7.73	18.56
1265 Apr. 2.05	1960	17.19	1548	13.79	+ 3.52	15.69
1266 Apr. 29.32	1088	15.80	2215	14.91	- 4.79	15.20
1267 May 26.54	1436	14.49	934	15.22	+ 2.78	14.78
1268 June 22.74	1368	12.81	705	12.94	+ 4.05	12.86
1269 July 19.94	1015	11.94	1283	12.78	- 1.87	12.41
1270 Aug. 16.16	795	16.10	731	12.73	+ 2.29	14.48
1271 Sept. 12.41	743	11.89	1199	11.75	- 2.71	11.80
1272 Oct. 9.69	1129	12.60	661	10.72	+ 3.98	11.90
1273 Nov. 5.99	429	13.03	543	10.63	- 0.19	11.69
1274 Dec. 3.30	648	14.75	2092	12.30	- 5.90	12.88
1275 Dec. 30.63	1312	19.96	916	11.86	+ 6.88	16.63
1949						
1276 Jan. 26.97	1258	14.57	2226	10.87	- 1.68	12.21
1277 Feb. 23.31	2328	13.22	1338	11.95	+ 4.03	12.76
1278 Mar. 22.63	1215	13.28	715	15.33	+ 2.69	14.04
1279 Apr. 18.91	808	13.25	712	14.21	+ 0.39	13.70
1280 May 16.14	812	10.98	409	9.93	+ 3.98	10.63
1281 June 12.35	709	10.32	849	10.31	- 0.92	10.31
1282 July 9.55	768	15.04	1338	15.26	- 4.21	15.18
1283 Aug. 5.76	1702	13.39	540	14.11	+ 6.77	13.57
1284 Sept. 2.00	605	12.39	1683	13.13	- 6.38	12.94
1285 Sept. 29.27	1344	13.46	543	13.06	+ 5.83	13.34
1286 Oct. 26.56	1314	16.74	688	8.18	+ 8.18	13.80
1287 Nov. 22.86	1128	16.93	611	9.90	+ 7.50	14.46
1288 Dec. 20.18	1022	13.87	213	6.06	+10.44	12.53
1950						
1289 Jan. 16.52	960	14.55	226	11.42	+ 9.60	13.95
1290 Feb. 12.86	1820	12.20	787	14.27	+ 4.21	12.82
1291 Mar. 12.19	1083	18.07	646	12.77	+ 6.55	16.09
1292 Apr. 8.49	1362	13.56	972	14.07	+ 2.06	13.77
1293 May 5.74	1164	11.01	315	12.59	+ 5.98	11.35
1294 June 1.96	521	9.79	570	17.98	- 4.72	14.07
1295 June 29.15	808	13.42	357	13.82	+ 5.08	13.54
1296 July 26.36	433	12.46	826	11.21	- 3.06	11.64
1297 Aug. 22.59	272	15.32	307	10.23	+ 1.78	12.62
1298 Sept. 18.84	354	15.45	212	10.28	+ 5.81	13.51
1299 Oct. 16.13	295	13.47	390	10.75	- 0.31	11.93
1300 Nov. 12.43	475	15.04	331	12.59	+ 3.70	14.04
1301 Dec. 9.74	268	14.94	73	12.10	+ 9.13	14.33

MEAN LATITUDES OF SUNSPOTS FOR EACH SYNODIC ROTATION OF THE SUN 1874-1954

Rotation Number and Commencement	Spots North of Equator		Spots South of Equator		Mean Latitudes	
	Area	Latitude	Area	Latitude	Spots N - S	Spots N + S
1951		°		°	°	°
1302 Jan. 6.07	671	9.17	240	10.56	+ 3.98	9.54
1303 Feb. 2.41	482	10.31	74	11.33	+ 7.43	10.44
1304 Mar. 1.75	753	10.65	134	9.07	+ 7.66	10.41
1305 Mar. 29.06	1183	12.41	266	9.79	+ 8.34	11.93
1306 Apr. 25.33	2350	13.14	535	12.90	+ 8.31	13.10
1307 May 22.56	1660	13.37	1064	13.37	+ 2.92	13.37
1308 June 18.76	302	11.68	1084	10.97	- 6.04	11.13
1309 July 15.96	239	7.82	503	8.32	- 3.11	8.16
1310 Aug. 12.18	236	9.52	284	10.96	- 1.65	10.31
1311 Sept. 8.43	729	10.64	223	6.25	+ 6.68	9.62
1312 Oct. 5.70	234	10.52	574	9.03	- 3.37	9.46
1313 Nov. 1.99	282	13.62	382	9.75	+ 0.17	11.39
1314 Nov. 29.30	549	8.59	65	9.79	+ 6.64	8.72
1315 Dec. 26.63	543	5.66	23	12.61	+ 4.90	5.95
1952						
1316 Jan. 22.96	35	14.36	287	11.13	- 8.38	11.48
1317 Feb. 19.30	20	15.45	112	11.56	- 7.38	12.16
1318 Mar. 17.63	164	5.37	116	5.66	+ 0.81	5.49
1319 Apr. 13.92	75	10.55	254	7.53	- 3.42	8.22
1320 May 11.16	10	10.48	184	6.28	- 5.43	6.49
1321 June 7.37	60	15.67	462	11.00	- 7.93	11.54
1322 July 4.57	120	10.40	519	5.07	- 2.17	6.07
1323 July 31.78	335	10.50	207	9.47	+ 2.87	10.11
1324 Aug. 28.01	209	5.81	301	6.29	- 1.34	6.10
1325 Sept. 24.28	221	9.57	59	6.34	+ 6.22	8.89
1326 Oct. 21.56	278	5.16	40	13.38	+ 2.80	6.21
1952 *(continued)*		°		°	°	°
1327 Nov. 17.87	528	6.09	61	10.30	+ 4.40	6.53
1328 Dec. 15.18	263	9.85	223	9.79	+ 0.83	9.82
1953						
1329 Jan. 11.52	49	6.47	112	8.76	- 4.14	8.06
1330 Feb. 7.86	2	2.91	0.4	10.50	+ 0.51	4.27
1331 Mar. 7.19	93	3.26	27	13.62	- 0.53	5.59
1332 Apr. 3.50	394	7.94	12	8.31	+ 7.46	7.95
1333 Apr. 30.76	215	10.10	0.2	9.33	+10.08	10.10
1334 May 27.98	135	12.03	108	13.75	+ 0.54	12.80
1335 June 24.18	7	12.43	94	8.89	- 7.46	9.13
1336 July 21.38	207	12.48	21	5.00	+10.87	11.79
1337 Aug. 17.60	133	12.51	7	6.52	+11.62	12.23
1338 Sept. 13.86	69	9.70	34	9.30	+ 3.38	9.57
1339 Oct. 11.13	2	14.40	46	7.72	- 6.73	8.02
1340 Nov. 7.43	2	16.00	0.3	4.86	+13.08	14.44
1341 Dec. 4.74	3	0.31	4	9.00	- 5.40	5.63
1954						
1342 Jan. 1.07	0.4	8.90	0.4	16.70	- 2.73	12.45
1343 Jan. 28.41	1	31.30	0	..	+31.30	31.30
1344 Feb. 24.75	1	7.30	180	9.65	- 9.58	9.64
1345 Mar. 24.07	0.4	6.00	3	4.41	- 3.32	4.58
1346 Apr. 20.35	1	20.84	0	..	+20.84	20.84
1347 May 17.58	2	16.41	0	..	+16.41	16.41

Prior to the Greenwich record, the mean daily areas of sunspots for each synodic rotation are given from 1832 in the following publication (1902) sponsored by the Solar Physics Committee -

The Sun's Spotted Area, 1832-1900.

derived from data collected at the Solar Physics Observatory, South Kensington, under the direction of Sir Norman Lockyer.

The spots, however, are not divided according to northern and southern hemispheres, and no mean latitudes are given.

III - LATITUDE TIME DIAGRAM

The latitude-time diagram of sunspot distribution, that became known as the "butterfly diagram", was given by E. W. Maunder in *Monthly Notices* **64**, 760 (Plate 16), 1904. It covered the Greenwich sunspot measures from 1877 to 1902 and included three sunspot minima and the characteristic overlap of old-cycle equatorial spots and new-cycle spots in higher latitudes. An extended diagram covering the period 1874 to 1913 was later given by Maunder in *Monthly Notices* **74**, 114 (Plate 2), 1913.

A much earlier latitude-time diagram had been published by R. C. Carrington in his classical work entitled "Observations of the Spots on the Sun from November 9, 1853 to March 24, 1861 made at Redhill". But in the three plates (Nos. 102, 102a and 102b), the relatively large abscissa scale for time does not produce the striking butterfly-wing effect of the cyclical latitude distribution as presented in Maunder's diagram.

In 1922, for exhibition purposes in London, Maunder's diagram was redrawn and brought up-to-date at the Royal Observatory by Miss A. Crommelin. At the same time, curves for comparison were added for (1) the mean daily area of sunspots, corrected for foreshortening and expressed in millionths of the Sun's hemisphere, per solar synodic rotation, and (2) the monthly mean diurnal inequality in D in minutes of arc at Greenwich from all days, the seasonal variation having been removed.

It is this last diagram, to which three later cycles have now been added by Miss H. Howe, that is reproduced opposite.

The construction of the diagram from the data given in the *Ledgers* of the *Greenwich Photoheliographic Results* follows the method adopted by Maunder for his first diagram *(loc. cit)*. A vertical line, in length equivalent to 1° of the latitude scale, has been drawn at the appropriate latitude (to the nearest degree) representing each centre of a spot group in any particular solar rotation. If the range in latitude of the centre of the group during its appearance exceeded 1°, a longer line has been drawn according to its limits. No indication has been made of the sizes of spots, nor of the occurrence of other spots at the same latitude but at different longitudes in the same rotation (though every group has been examined for latitude extent). The diagram therefore shows an entirely unweighted distribution of spot latitudes with the progress of the sunspot cycle.

It is worth recording that a latitude-time diagram for faculæ is published in *Monthly Notices* **84**, 96 (Plate 3), 1923, covering the Greenwich measures from 1874 to 1917. In this diagram, an attempt has been made to indicate where the larger areas of faculæ occur.

C.B.H. 25839 - Wt. 3450 - Dd. 258-1000 - 7/55

ROYAL GREENWICH OBSERVATORY

Catalogue of the Larger Sunspots

(Mean Area $\geqslant$ 500 Units)

1874-1954

With Classified List of the Greatest Spots

GREENWICH SUNSPOT AND GEOMAGNETIC-STORM DATA, 1874-1954

Blank page retained for pagination

CATALOGUE OF THE LARGER SUNSPOTS

1874-1954

This catalogue of more than 750 groups of sunspots has been compiled from the *Greenwich Photoheliographic Results* from their inception in 1874 April up to 1954 June. This period comprises seven complete 11-year cycles and the declining phase of the earliest cycle with its minimum in 1878.

The spot groups tabulated are all those which had a *mean* area of 500 millionths and upwards of the Sun's hemisphere during their disk passages, the measured daily areas being corrected for surface foreshortening. It may be noted that a single spot or a compact group, of area 500 millionths, when near the centre of the Sun's disk, can usually be seen with the unaided eye provided that the glare from the disk is reduced by a suitable filter.

The selection of such spots was made from the ledger section of the *Greenwich Photoheliographic Results.* From 1916, when the ledgers were divided into I (Recurrent Groups) and II (Non-Recurrent Groups), the required data are also obtainable from the *General Catalogue* of the annual volume.

Prior to 1916, the mean areas and positions of spot groups qualifying for inclusion in the present catalogue have been revised where necessary in accordance with the rule adopted in 1916, *viz.* that the day's measures of any group 80° or more from the central meridian, or otherwise only partly in view, are excluded when taking the mean area and position. Thus, prior to 1916, occasional differences will be found between the values tabulated under area and position and corresponding values already published in the ledgers of the annual volume.

The headings of the following catalogue need only a few supplementary remarks -

The Greenwich group numbers of sunspots are given throughout, and from 1917 the corresponding Mount Wilson numeration is also given.

The U.T. of central meridian passage has been derived from the mean longitude of the spot group. The limiting dates of the visibility of the spots on the disk have not been tabulated but can be found from the ledgers in the annual volumes. Many of these larger spots make a full transit of the disk, so that ideally their dates of visibility are from about 6.5 days before to 6.5 days after the time of central meridian passage. A large extent of a group in longitude may increase, by a day or longer, the duration of visibility. Marked instances of incomplete disk passages (*e.g.* sudden development of a new spot near the central meridian) are recorded in the notes following the catalogue. The interval (to 0.1 year) from January 1.0 of each year to the time of sunspot maximum of the given cycle, appears in brackets at the beginning of the year, a minus sign denoting a date before, and a plus sign a date after sunspot maximum. The epochs of maximum adopted are those in general use as derived from the Zurich sunspot numbers. These epochs are as follows -

1870.6, 1883.9, 1894.1, 1907.0, 1917.6, 1928.4, 1937.4 and 1947.5.

The epoch of 1907.0 is very indefinite. Originally given as 1906.4, it was later revised to 1907.0. The Greenwich areas (smoothed mean values for each synodic rotation) give a double maximum, the first peak being at 1905.7 and the second (about 10 per cent lower) at 1907.3.

The reference numbers of recurrent groups are taken from *Catalogue of Recurrent Groups of Sunspots* 1874 to 1906 published as an appendix to the *Greenwich Photoheliographic Results* for 1906. Yearly additions to that catalogue were made up to the year 1915 in an appropriate table in the annual volume. From 1916 onwards, the recurrent series appear in *Ledger I*. Of the 761 spot groups catalogued in the following table, 604 groups were members of recurrent series. Of these, 400 or 66 per cent were seen in a first solar rotation, 167 or 28 per cent belonged to a second rotation of a series (not necessarily represented in the first rotation by a spot ≥500 millionths), 30 groups or 5 per cent to a third rotation of a series, and 7 groups or 1 per cent to a fourth rotation. The last two columns tabulate any 'great' or 'small' geomagnetic storms with onset time between 3.0 days before and 5.0 days after the central meridian passage of respective sunspot groups. Complete catalogues of such storms recorded from 1874 to 1954 appear in the last section of this volume. The lower range limit for a small storm at Greenwich or Abinger is 30′ in D or 150γ in H or in Z. The lower limit for a great storm is double these ranges.

Following the catalogue of sunspots ≥500 units, is a list of the greatest spots arranged in order of size according to their respective mean area. The order with respect to maximum size on any one day or days is also indicated.

Notes are appended on any special features shown by individual spot groups such as rapid development or decay, unusual duration, complex structure or the occurrence of solar flares though the systematic observations of these did not begin until the cycle commencing after the minimum of 1933.8. A dagger against the reference number in the main catalogue indicates that a note is given.

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number	U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
									Great Storm	Small Storm Ref.No.
		1874.0 ($+3^y.4$)				°	°		1874	
1	98	July 6.8	818	.137	1301	151.4	+11.6	3		
2	104*	July 19.1	652	.170	1075	347.3	+ 6.3	4		
3	106	Aug. 2.9	561	.157	656	152.7	+ 9.6	3		
4	111	Aug. 16.5	831	.141	1244	333.0	-17.9			
5	127	Oct. 4.6	984	.131	1426	44.1	-13.0	9	Oct. 3.6	
6	134	Nov. 6.2	562	.160	820	334.2	-15.4	10		
		1875.0 ($+4^y.4$)							1875	
7	145	Feb. 24.5	648	.207	731	320.6	+18.2	13		1sc
8	157	May 2.3	639	.138	981	159.2	+ 9.2	15		2sc
9	162	June 22.2	549	.189	856	205.9	- 7.6			
		1876.0 ($+5^y.4$)							1876	
10	196	Feb. 16.7	572	.171	711	285.8	-13.3	20		3sc
		1877.0 ($+6^y.4$)							1877	
11	261	Nov. 1.1	611	.164	778	334.9	- 8.1	27		
		1880.0 ($-3^y.9$)							1880	
12	326	May 30.1	574	.221	1155	157.7	+14.2			
13	332	June 23.1	841	.202	1440	199.9	-21.4			
14	342	Aug. 7.2	624	.210	806	323.1	+11.9	34		
15	348	Aug. 17.4	533	.182	821	188.3	+22.6	39		13sc
16	355	Sept. 9.9	615	.228	1058	239.0	-17.8	36		
17	357	Sept.11.3	699	.245	1101	220.4	-16.8	37		14
18	397	Nov. 29.6	920	.190	1449	254.1	+20.7	43		
19	400	Dec. 8.6	568	.180	675	135.3	-13.9			
		1881.0 ($-2^y.9$)							1881	
20	410D	Jan. 24.7	528	.273	725	235.6	-18.6	45		
21	439	Mar. 21.2	606	.213	919	224.2	+14.2	52		
22	485	June 2.1	635	.213	1110	341.0	- 9.7	57		
23	566	Sept. 9.9	519	.191	860	100.7	+13.6	67	Sept.12.5	
24	607	Nov. 21.7	817	.202	1227	220.7	+10.9	75		
		1882.0 ($-1^y.9$)							1882	
25	726	Apr. 17.0	874	.165	2258	92.9	-19.2		Apr. 17.0: 20.0	
26	728	Apr. 13.2	544	.147	940	143.6	-18.2	91	Apr. 17.0	
27†	729	Apr. 19.1	1892	.158	2123	64.7	-28.5	92	Apr. 17.0: 20.0	
28†	759	May 17.3	1160	.216	1723	51.9	-29.2	92		
29	762	May 20.0	874	.161	1218	16.2	-15.4	96		
30	777	June 14.6	594	.185	901	37.6	-12.5			
31	816	Aug. 23.7	609	.205	872	190.0	+13.2	102		
32	830	Sept. 2.1	621	.250	1142	66.2	+20.9	103		
33	838	Sept.19.3	578	.159	815	198.6	+11.4	102		
34	846	Sept.30.6	984	.229	1046	50.2	-21.6	106		23sc
35	864	Oct. 22.3	689	.186	1101	123.8	+19.7	110		
36	868	Oct. 28.4	1030	.204	1318	43.2	-22.4	106		
37	876	Nov. 10.0	774	.189	1163	237.1	-19.3			25sc
38†	885	Nov. 18.8	1928	.211	2425	121.0	+19.2	110	Nov. 17.4: 20.0	25*

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number	U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P. Great Storm	Small Storm Ref.No.
		1883.0 ($-0.^y9$)				°	°		1883	
39	933	Jan. 15.9	659	.135	818	76.1	- 9.1	119		
40	964	Feb. 16.8	654	.127	955	16.2	+ 7.5			
41	987	Apr. 3.4	543	.175	719	135.4	+13.3	125	Apr. 3.4	
42	999	Apr. 17.8	516	.136	715	305.3	-22.4	127		
43	1040	June 1.8	704	.155	1098	70.4	- 7.7	130		
44	1056	June 21.4	675	.164	1104	169.9	-10.2	133		
45	1058	June 28.7	695	.137	1031	74.3	- 9.7	130		
46	1062	July 1.5	1401	.170	1876	36.1	+10.5	134		
47	1074	July 21.4	779	.140	955	133.1	-15.2	132		
48†	1080	July 25.9	1428	.148	1642	73.7	- 9.5	130		
49	1108	Sept. 3.3	737	.176	908	273.4	-15.6			
50	1114	Sept.13.9	974	.201	1094	132.8	-21.8	139	Sept.16.1	
51	1138	Oct. 11.8	805	.185	1670	124.3	+11.8	140		35sc
52	1144	Oct. 18.6	1161	.167	1700	35.2	- 9.8	142		35sc
53	1173	Nov. 14.9	975	.176	1354	35.7	- 8.8	142		
54	1181	Nov. 19.7	624	.106	980	331.3	+17.8	149		37sc
55	1212	Dec. 24.9	526	.063	892	227.9	- 8.8	145		
56†	1216	Dec. 26.8	1031	.146	1465	203.4	- 9.0	153		
		1884.0 ($+0.^y1$)							1884	
57	1235	Jan. 10.2	994	.116	1215	13.2	+14.9	151		
58	1251	Jan. 19.1	563	.112	977	255.9	-18.0			
59	1267	Feb. 5.5	558	.163	753	27.2	-24.5	160		
60	1277	Feb. 15.5	573	.185	728	255.0	+ 7.3			
61†	1343	Mar. 31.7	1219	.119	2246	19.7	-10.0	168		
62	1351	Apr. 9.3	617	.112	856	266.7	-12.9	166		
63	1371	Apr. 27.6	909	.141	1276	24.4	-10.5	168		
64	1381	May 15.1	584	.176	716	153.2	- 7.5	170		
65	1444	July 30.4	583	.153	812	222.8	-11.2			
66	1480	Sept.11.4	692	.171	1744	15.3	+14.1	183		
67	1501	Oct. 8.7	854	.143	995	15.2	+14.2	183		
68	1520	Oct. 28.1	653	.182	967	119.6	-14.4			
69	1561	Dec. 26.5	791	.139	1152	56.3	+ 8.8			
		1885.0 ($+1.^y1$)							1885	
70	1573	Jan. 18.8	545	.169	887	109.5	- 5.8	191		43
71	1614	Mar. 5.1	669	.114	1078	232.2	-17.6	194		
72	1638	Apr. 9.8	783	.109	1126	122.2	+12.2	196		
73	1672	May 24.3	531	.162	614	254.3	+14.0	197	May 25.6	
74	1690	June 7.8	852	.115	1052	61.6	-10.6	198		
75	1694	June 12.7	572	.180	721	356.9	-14.5	202		
76	1706	June 21.5	1541	.089	1917	240.6	+10.8	199		46sc
77	1714	July 5.5	581	.101	1055	55.6	-10.9	198		
78	1715	July 5.7	641	.086	1270	53.0	-18.9	204		
79	1763	Sept.14.0	558	.147	703	203.2	-13.6	210		
80	1773	Oct. 6.9	592	.162	745	261.5	-16.6	211		
81	1795	Nov. 18.9	536	.164	711	53.7	+14.8	213		
		1886.0 ($+2.^y1$)							1886	
82	1828	Jan. 14.4	593	.108	956	29.6	-10.0	217		
83	1847	Mar. 6.0	526	.087	961	83.4	-17.2			
84	1853	Mar. 10.6	651	.144	799	22.9	- 5.0	218		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number	U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
									Great Storm	Small Storm Ref.No.
		1886 *(continued)*				°	°		1886	
85	1878	Apr. 30.6	606	.107	983	69.2	-11.4	222		
86	1880	May 8.1	763	.089	1125	330.5	+ 8.6			49
87	1891	June 6.5	523	.164	770	302.3	-14.8	224		
		1887.0 ($+3.^y1$)							1887	
88	1987	June 11.7	542	.190	787	95.0	- 8.6	228		
89	2021	Dec. 9.8	578	.121	850	223.6	- 7.7	231		
90	2024	Dec. 20.6	745	.144	1030	81.3	- 8.0	232		
		1889.0 ($+5.^y1$)							1889	
91	2090	June 22.0	518	.185	633	30.4	- 5.5	238		
		1890.0 ($-4.^y1$)							1890	
92	2141	Aug. 31.5	601	.160	901	40.7	+21.1	241*		
93	2156	Oct. 26.0	553	.159	1135	28.2	-23.4			
		1891.0 ($-3.^y1$)							1891	
94	2258	July 18.1	549	.175	731	130.2	+20.0	251		
95	2293	Sept. 3.6	1217	.116	1798	221.7	+21.8	260		
96	2315	Oct. 8.1	549	.155	878	126.8	-14.9			78sc
97	2349	Nov. 21.5	705	.159	1162	261.4	-19.4	268		80
98	2369	Dec. 23.8	637	.151	1161	194.9	+28.6	271		
		1892.0 ($-2.^y1$)							1892	
99	2399	Jan. 21.0	592	.128	713	184.4	+28.0	271		
100†	2421	Feb. 11.9	2638	.172	3038	255.7	-28.2	275	Feb. 13.2	
101	2486	Apr. 23.8	575	.136	904	27.0	+10.5	281	Apr. 25.6	
102	2515	May 16.8	705	.142	1044	84.2	-14.1	280	May 18.4	88sc
103	2534	May 30.1	1141	.138	1532	267.4	-19.0			89
104	2564	June 21.1	510	.147	847	337.0	+20.7			
105†	2581	July 10.2	1691	.153	2387	83.4	+11.1	289	July 12.7	
106†	2583	July 14.0	832	.242	1099	32.9	-31.3	291	July 12.7: 16.5	
107	2611	Aug. 5.7	682	.147	1220	93.6	+ 9.9	289		91sc
108	2679	Sept.30.5	520	.154	800	76.2	-23.4	294		
109	2685	Oct. 5.9	736	.167	1158	5.0	+14.9	301		
110	2716	Nov. 1.2	691	.137	1011	18.5	-27.7			93sc
111	2792	Dec. 30.3	633	.147	952	319.6	-23.5			
		1893.0 ($-1.^y1$)							1893	
112	2819	Jan. 22.4	798	.159	1208	14.8	-13.0	{317 {318		
113	2826	Jan. 30.3	1011	.156	1232	270.5	-21.9	314		
114	2838	Feb. 11.7	693	.133	1059	108.2	-11.0			
115	2993	June 3.1	642	.136	868	77.3	-21.2	336		
116†	3046	July 9.1	1116	.142	1466	320.9	-16.4	344		
117	3059	July 9.5	502	.157	772	315.7	+11.6	350		
118†	3106	Aug. 7.4	1640	.161	2621	292.6	-17.6	355		100sc
119	3107	Aug. 7.2	522	.172	852	295.2	+15.3	356		100sc
120	3154	Sept. 2.9	1002	.144	1303	302.2	-10.4	361		
121	3155	Sept. 3.0	575	.209	651	301.8	+14.1	356		
122	3156	Sept. 3.7	538	.156	735	291.7	-19.5	355		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number	U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P. Great Storm	Small Storm Ref.No.
		1893 *(continued)*				°	°		1893	
123	3173	Sept.13.0	611	.162	935	169.3	- 8.8	362		
124	3206	Sept.28.7	598	.166	873	322.0	+ 7.6	364		101, 102sc
125	3244	Oct. 24.8	751	.196	1028	338.4	- 6.7	367		
126	3281	Nov. 22.3	1290	.127	1686	322.1	- 5.2	370		
127	3295	Dec. 5.4	549	.155	745	149.9	+19.3	369		
128	3323	Dec. 29.6	625	.152	888	190.9	-12.1	376		
		1894.0 ($-0.^y1$)							1894	
129	3354	Jan. 15.9	728	.143	1148	322.3	-13.1	379		
130	3412	Feb. 22.6	1277	.170	1742	187.0	-32.0		Feb. 22.9: 25.3	106sc
131	3464	Apr. 2.5	977	.175	1341	33.7	+21.4	391	Mar. 30.7	
132	3478	Apr. 10.5	620	.145	969	288.1	+16.6	396		
133	3488	Apr. 25.8	539	.187	976	86.2	-17.3	398		
134	3496	May 2.9	679	.171	910	351.9	-26.9	395		
135	3518	May 15.8	1085	.174	1920	181.3	-15.4	397		108
136	3520	May 18.4	949	.191	1209	147.8	-12.8	393		
137	3533	May 29.8	531	.207	577	357.0	+12.6	401		
138	3537	June 2.0	502	.185	545	314.4	+15.0	402		
139	3565	June 16.1	686	.181	1570	127.7	+ 9.0	404		
140	3575	June 20.0	1045	.184	1281	75.5	-14.4	407		
141	3624	July 17.1	588	.197	816	76.7	-12.2	407	July 20.2	
142	3652	Aug. 5.3	670	.175	973	183.8	+10.1	408		
143	3668	Aug. 17.1	1336	.172	1910	26.6	+ 6.4	413	Aug. 20.1	
144†	3731	Oct. 8.1	1542	.176	2511	60.2	-12.2			
145	3827	Dec. 10.2	680	.181	1071	308.3	-19.2	423		
146	3829	Dec. 20.9	773	.149	1120	167.9	-14.6	424		
		1895.0 ($+0.^y9$)							1895	
147	3872	Jan. 26.2	589	.158	939	49.2	-10.5	425		
148	3946	Mar. 21.1	557	.135	924	59.2	-10.1	425		
149	3989	Apr. 26.3	719	.202	920	301.8	+23.9	436		
150	4024	May 23.8	732	.164	1198	298.6	+22.2	436		
151	4052	June 11.7	554	.179	792	48.6	-15.6	442		
152	4055	June 16.2	522	.172	716	348.2	+10.5	439		
153	4087	July 8.9	664	.146	920	48.2	- 8.4			
154	4107	Aug. 3.0	541	.172	781	75.7	- 9.0	446		
155	4110	Aug. 7.1	869	.169	1505	22.1	+10.5	447		
156	4123	Aug. 21.0	658	.158	963	198.4	+19.2			
157	4139	Sept. 2.9	633	.205	798	27.7	+10.8	447		
158	4185	Sept.30.4	1059	.152	1722	24.3	-15.4	452		
159	4201	Oct. 24.2	594	.197	783	71.3	+10.9	453		
160	4210	Nov. 1.3	527	.176	1047	323.9	+ 9.4	455		
161	4256	Dec. 27.5	543	.188	968	302.8	-12.9	457		
		1896.0 ($+1.^y9$)							1896	
162	4285	Jan. 29.7	656	.157	1259	225.5	-15.0	462		122
163	4295	Feb. 23.7	699	.157	1058	256.3	+16.0	464		123
164	4296	Feb. 25.7	574	.138	877	230.9	-14.3	462		123
165	4321	Mar. 31.6	527	.163	896	131.1	+16.7			
166	4333	Apr. 7.9	508	.150	847	34.4	+15.9			
167	4361	May 29.5	559	.157	905	71.7	-10.0			
168	4369	June 14.7	556	.187	753	217.4	-15.4	472		
169	4376	June 22.3	570	.161	750	117.3	-20.1	473		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number	U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
									Great Storm	Small Storm Ref.No.
		1896 (continued)				°	°		1896	
170†	4428	Sept.16.7	1954	.147	2458	55.0	+13.2			127sc, 128
171	4456	Nov. 8.7	710	.201	800	76.2	-15.4	477		130
		1897.0 ($+2^y.9$)							1897	
172	4497	Jan. 9.4	2329	.161	2743	342.2	- 6.8	481		
173	4518	Feb. 5.4	886	.213	1032	347.1	- 5.4	481		
174	4572	May 4.9	595	.155	834	259.7	-12.2			
175	4605	Aug. 9.0	859	.144	1201	68.0	- 5.5	489		
176	4619	Sept. 7.7	745	.185	975	35.5	-10.4	491		
177	4665	Dec. 13.4	903	.156	1047	201.3	+11.5			136
		1898.0 ($+3^y.9$)							1898	
178	4688	Feb. 14.5	618	.181	1063	89.2	- 8.3	493		
179	4702	Mar. 11.6	981	.191	1552	119.3	-13.1	497	Mar. 15.0	
180	4769	Aug. 8.0	535	.183	794	304.1	-11.8			
181	4781	Sept. 9.2	1636	.161	2235	239.1	-12.1	501	Sept. 9.5	
182	4791	Oct. 6.3	651	.164	919	240.4	-12.0	501		
183	4801	Oct. 28.7	645	.157	1190	305.3	+14.8			138
		1900.0 ($+5^y.9$)							1900	
184	4915	Mar. 5.2	522	.193	750	288.2	-12.0	507		
185†	4933	June 25.1	570	.575	698	250.3	- 7.0	510		
		1901.0 ($+6^y.9$)							1901	
186	4953	May 25.2	521	.380	699	161.9	+ 8.8	513		
		1903.0 ($-4^y.0$)							1903	
187†	5093	Oct. 11.6	1783	.108	2129	203.2	-21.3	525		150
188	5100	Nov. 5.6	793	.184	942	233.2	+17.0	526		
189	5104	Nov. 10.9	729	.139	925	164.3	-24.6	527		
		1904.0 ($-3^y.0$)							1904	
190	5202	Apr. 14.3	798	.133	936	276.2	-15.8	537		
191	5209	Apr. 27.3	709	.145	880	104.8	-12.9			
192	5339	Oct. 26.5	534	.133	939	216.5	+11.4	552		
193	5366	Nov. 20.6	662	.115	1532	245.6	+28.6	554		
194	5390	Dec. 16.3	528	.134	679	267.0	+16.9	556		
		1905.0 ($-2^y.9$)							1905	
195	5424	Jan. 15.8	981	.140	1583	225.1	+ 9.2	560		
196†	5441	Feb. 4.2	2801	.134	3339	329.5	-15.3	558		155sc
197	5442	Feb. 8.0	508	.159	756	279.0	+12.5	565		
198	5471	Mar. 3.5	989	.129	1441	329.8	-16.9	558		156a
199†	5473	Mar. 8.0	1845	.090	2572	270.9	+10.5	565		
200	5529	May 17.2	744	.163	883	63.7	-15.2	{569 {570		
201	5564	June 25.8	733	.149	1286	259.2	+ 6.4	573		
202	5586	July 11.5	804	.128	1317	52.6	-15.1	570		
203†	5589	July 16.8	1911	.140	2164	342.3	+13.0	575		
204	5597	July 18.5	558	.143	898	319.5	+14.0	578		161sc

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number	U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within -3d.0 to +5d.0 of C.M.P. Great Storm	Small Storm Ref. No.
		1905 *(continued)*				°	°		1905	
205	5611	Aug. 7.0	701	.136	949	60.8	-16.3	570		
206	5620	Aug. 12.7	788	.108	1063	346.6	+12.2	575		
207	5673	Oct. 2.1	653	.153	1425	40.4	+ 6.2	581		
208†	5682	Oct. 20.2	2336	.095	2995	161.9	+13.8	580		
209	5685	Oct. 28.0	1379	.165	1617	58.1	+ 6.6	581		
210	5706	Nov. 13.3	709	.127	1201	203.4	+ 6.3	586		164*a*, 165*sc*
211	5730	Nov. 30.7	719	.113	1525	334.5	-13.5			
		1906.0 (-1.^{y}0)							1906	
212	5785	Jan. 24.5	550	.129	820	332.4	-11.4	596		
213	5791	Feb. 1.1	569	.141	969	233.0	+17.3			
214	5821	Mar. 21.7	512	.107	1074	312.9	+16.6	597		
215	5826	Mar. 24.5	622	.175	716	275.0	+14.1	603		
216†	5869	May 15.8	589	.148	984	304.6	+14.4	608		167
217	5870	May 25.2	539	.135	787	181.0	+ 9.5	607		
218	5871	May 28.9	544	.151	633	131.2	+11.8	609		168*sc*
219	5898	July 4.5	736	.186	907	6.5	+20.9	611		
220	5933	July 30.4	934	.132	1470	24.3	-15.2	617		170*sc*
221	6046	Dec. 18.6	848	.169	926	321.6	-16.0	626		173*sc*
		1907.0 (0.^{y}0)							1907	
222	6059	Jan. 3.9	787	.151	1140	106.8	+ 7.3	628		
223	6076	Jan. 14.8	561	.116	771	323.0	-13.8	626		174*sc*
224	6099	Feb. 2.1	818	.155	1102	81.6	+21.6	636		
225	6103	Feb. 10.1	636	.164	758	336.7	-13.3	631	Feb. 9.6	175*sc*
226	6104	Feb. 7.4	525	.158	766	12.7	-14.1	638	Feb. 9.6	175*sc*
227	6108	Feb. 12.4	1860	.152	2555	306.2	-16.6	632	Feb. 9.6	
228	6118	Feb. 22.6	594	.162	970	172.1	-12.8	639		
229	6140	Mar. 11.5	572	.164	729	309.4	-16.6	632		176*sc*, 177*sc*
230	6159	Apr. 6.7	809	.136	1081	324.2	+11.6			
231	6184	May 9.8	739	.154	994	246.1	-12.6	642		
232	6205	June 19.7	1965	.150	2472	65.6	-14.4	645		
233	6216	July 17.9	919	.134	1305	52.7	- 5.5			
234	6236	Aug. 20.1	602	.148	892	333.5	-23.6	649		
235	6241	Sept. 2.7	885	.125	1290	153.0	+ 7.5	647		
236	6265	Sept.24.2	975	.150	1413	230.0	+ 8.2	656		
237	6283	Oct. 20.9	690	.145	995	237.8	+ 8.8	655		
238	6300	Nov. 15.1	1468	.154	1799	265.1	+11.4	660		
239	6319	Dec. 12.4	776	.126	1010	265.4	+ 9.6	660		
240	6323	Dec. 16.1	643	.171	921	216.9	-15.5	665		
241	6324	Dec. 21.7	520	.169	569	143.2	- 5.0	663		
		1908.0 (+1.^{y}0)							1908	
242	6441	June 2.3	562	.162	692	144.4	- 3.0	676		
243	6490	Aug. 4.7	1053	.127	1733	26.0	-15.0	680		188*sc*
244	6491	Aug. 6.6	605	.157	705	0.3	+11.9			188*sc*
245	6494	Aug. 7.6	512	.188	880	347.4	- 6.8	682		188*sc*, 189*sc*
246†	6499	Aug. 13.4	755	.152	1070	270.6	- 5.5	684		189*sc*
247	6510	Aug. 31.2	1519	.137	1919	35.2	+ 6.6	681		191
248	6519	Sept. 9.0	516	.188	568	279.6	- 5.6	684	Sept.11.9	192
249†	6520 } 6522 }	Sept.10.0	743	.167	1121	265.9	+12.8	685	Sept.11.9	192
250	6526	Sept.20.4	524	.134	849	129.5	+ 8.9			
251	6564	Nov. 11.3	622	.166	868	164.1	+11.8	687		
252	6577	Dec. 8.3	592	.209	672	168.0	+12.1	687		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1909.0 (+2.^{y}0)				°	°		1909	
253	6591		Jan. 3.2	656	.189	926	186.9	+ 8.8	692	Jan. 3.5	198a
254	6607		Jan. 29.4	518	.164	832	202.9	- 8.8			199
255	6642		Mar. 24.6	704	.165	1066	207.7	+11.4	697		201sc
256	6651		Apr. 3.6	502	.171	843	75.7	-10.2	698		
257†	6669		May 13.7	669	.235	920	266.3	-16.4	699	May 14.2	202a
258	6695		July 24.3	635	.164	881	39.4	+ 6.2	703		
259	6723		Sept. 7.9	662	.224	1959	156.7	- 2.4	706		
260†	6728		Sept.23.8	619	.210	908	306.4	- 4.8		Sept.25.4	204a
261	6734		Oct. 4.4	538	.203	676	167.0	- 0.9	706		
262	6738		Oct. 11.0	504	.177	934	80.1	- 9.5			
263	6774		Nov. 27.8	767	.190	1373	168.8	+13.6	714		209
			1910.0 (+3.^{y}0)							1910	
264	6813		Feb. 16.5	564	.195	656	186.0	-13.9	718		
265	6894		Oct. 3.1	717	.187	1139	46.7	-14.1	725		216a
266	6897		Oct. 21.8	509	.175	773	159.9	+ 6.3			217sc, 218
			1914.0 (-3.^{y}6)							1914	
267	7036		Apr. 27.7	524	.195	727	137.4	+18.6			
268	7060		Aug. 19.8	663	.173	817	67.9	+19.4	722		
			1915.0 (-2.^{y}6)							1915	
269	7127		Jan. 6.6	518	.180	754	24.2	+15.2			
270	7169		Feb. 14.0	522	.190	644	238.6	+23.2	730		
271	7223		Apr. 5.0	1006	.169	1133	299.8	+20.2	734		
272	7282		May 28.5	536	.177	760	312.5	+21.9	737		
273	7304		June 20.9	767	.180	1422	2.0	+17.7	740		
274	7313		June 25.6	530	.189	637	300.3	-21.8	739		
275	7330		July 11.5	979	.169	1355	89.8	-20.6	741		
276†	7354		July 25.2	1029	.191	1509	268.4	-19.9	746		
277†	7368		Aug. 4.4	1235	.185	1901	134.0	-17.4	744*		
278†	7446		Sept.26.8	764	.213	1020	148.1	+10.9	751		
279	7475		Oct. 20.1	516	.159	624	200.8	-15.5			232
			1916.0 (-1.^{y}6)							1916	
280	7624		Feb. 6.4	640	.153	928	200.9	-18.9			
281	7650		Mar. 7.9	524	.233	671	158.7	-17.4	761		238sc
282	7671		Mar. 26.2	558	.142	1086	277.4	+14.5			240
283	7681		Apr. 6.0	637	.148	1102	135.5	+10.4	763		
284†	7727		May 26.3	1109	.214	1748	190.6	-12.5	768		
285†	7738		June 2.0	661	.238	1028	102.4	+11.1	767		
286	7803		Aug. 18.2	679	.189	1125	160.6	+19.7	776		244sc
287	7848		Oct. 11.1	611	.193	868	168.5	+ 7.8			
			1917.0 (-0.^{y}6)							1917	
288	7926	516	Jan. 3.5	1396	.169	1775	136.3	+14.5	784		251sc
289	7929	517	Jan. 5.4	544	.173	642	111.7	+13.2	785		251sc
290†	7977	562	Feb. 9.5	2176	.146	3590	9.0	-16.0	788		
291	8049	621	Apr. 16.7	641	.154	872	216.3	+10.2	794		
292	8149	718	July 13.7	777	.152	1412	132.8	+18.0	806		
293†	8181	752	Aug. 10.2	2389	.136	3178	129.2	+16.2	806	Aug. 9.2, 13.6	

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1917 *(continued)*				°	°		1917	
294	8205	769	Aug. 18.8	573	.182	707	15.4	+ 7.9	815		255sc
295	8207	771	Aug. 18.9	671	.149	987	13.4	-23.2	816		255sc
296	8256	826	Sept.22.2	591	.152	941	280.5	-12.4	820		
297	8257	824	Sept.23.2	1406	.135	1687	267.4	+14.6	817		
298	8328	909	Nov. 29.0	684	.132	1197	107.0	-15.7	827		
299†	8354	930	Dec. 12.1	1047	.143	1557	293.4	+ 7.6	832		260sc
300	8374	953	Dec. 27.4	527	.144	761	92.4	+ 2.6	834		
301	8377	955	Dec. 30.3	574	.153	696	53.9	- 7.9	835		
			1918.0 (+0.^{y}4)							1918	
302	8387	966 970	Jan. 7.4	595	.176	662	307.6	+ 6.6	832		
303	8400	984	Jan. 20.7	1077	.097	1704	132.9	-15.4	836		
304	8412	993	Jan. 23.0	617	.123	1051	102.0	-16.4	840		
305	8433	1016	Feb. 17.6	730	.133	1008	125.4	+ 3.6	842		
306	8453	1036	Mar. 14.4	780	.149	1187	158.0	+18.4	845		
307	8479	1058	Apr. 5.9	669	.159	907	221.3	+13.3	848		264sc
308	8516	1100	May 9.5	552	.170	786	137.7	+17.4	851		
309	8631	1215	Aug. 16.6	933	.152	1189	266.1	+ 9.4	857	Aug. 15.7	
310	8651	1228	Aug. 26.7	653	.138	790	132.8	+16.3	861		
311†	8676	1250	Sept.14.8	631	.154	1109	241.1	-12.8	864		267
312	8687	1263	Sept.30.1	711	.144	1082	39.0	-11.0	867		
313	8709	1283	Oct. 17.7	635	.150	908	166.8	+16.1			268
314	8756	1316	Nov. 26.8	663	.134	1749	358.2	- 9.8	877		270, 271sc
315	8766	1327	Dec. 12.7	536	.153	623	148.7	-10.4	875		
316	8773	1332	Dec. 21.3	508	.159	859	34.7	- 9.3	880		273sc
317	8775	1334	Dec. 23.7	575	.162	857	3.2	- 7.7	877		273sc
			1919.0 (+1.^{y}4)							1919	
318	8794	1349	Jan. 10.5	584	.139	911	129.3	+ 9.9	882		
319	8833	1377	Feb. 14.5	982	.149	1375	28.4	+ 9.1	885		277
320	8850	1391	Mar. 10.2	748	.176	1214	75.8	+ 7.6	886		
321	8853	1394	Mar. 13.1	565	.163	665	38.4	+ 8.5	885		
322	8895	1433	May 9.1	765	.158	1173	5.0	+ 6.6	888		
323	8900	1438	May 19.2	1351	.161	1776	231.4	+14.2	889		
324	8928	1463	June 15.5	669	.176	844	231.1	+13.2	889		
325	8935	1469	June 18.5	1195	.146	1490	191.4	-16.9	891		
326	8966	1496	July 14.0	741	.165	1144	213.7	- 8.1	901		
327	8994	1520	Aug. 9.2	543	.186	627	226.9	- 6.8	901	Aug. 11.3	
328	9005	1530	Aug. 19.4	1099	.173	1503	92.1	+ 4.4	904		283sc
329	9007	1531	Aug. 19.2	764	.183	1145	94.5	- 2.8	907		283sc
330	9020	1543	Sept. 2.0	558	.170	1061	272.0	-15.3	908		
331†	9031	1556	Sept.14.8	526	.207	589	102.9	+ 1.6	904		284
332	9061	1590	Nov. 1.7	850	.159	1217	191.5	+12.5	910		
			1920.0 (+2.^{y}4)							1920	
333	9095	1626	Jan. 1.9	701	.190	1150	105.3	- 7.2	914		
334	9108	1636	Jan. 28.0	1526	.150	2037	120.7	- 6.9	914		
335†	9143	1661	Mar. 21.7	1966	.168	2690	134.4	- 4.9	918	Mar. 22.4	
336	9157	1669	Apr. 16.9	542	.199	764	148.0	- 6.3	918		292
337†	9227	1737	Sept. 2.8	1114	.162	1991	110.3	-14.1	927		295
338	9232	1742	Sept.10.7	528	.172	1138	7.1	+ 9.1	928		
339	9235	1744	Sept.28.6	532	.188	909	130.7	-11.4	927		297
340	9258	1767	Nov. 5.7	897	.172	1185	348.2	-10.1	931		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1921.0 ($+3^y.4$)				°	°		1921	
341	9284	1792	Jan. 9.9	537	.192	874	208.5	-14.2	934		
342	9315	1823	Mar. 27.4	530	.196	740	281.0	+ 9.4	938		
343†	9334	1842	May 14.7	1324	.179	1709	3.2	+ 0.5	941	May 13.6	
344	9401	1919	Nov. 24.8	623	.180	709	318.1	- 5.8	948		
			1922.0 ($+4^y.4$)							1922	
345	9420	1943	Feb. 8.4	564	.172	1478	42.5	+10.2	949		
346	9426	1949	Mar. 2.5	786	.218	1384	111.2	+ 8.4	951		
347	9429	1951?	Mar. 6.9	517	.139	749	53.4	+ 9.7	949		
348	9432	1953	Mar. 12.1	566	.138	866	345.5	- 5.1	950		304
349	9484	2005	Dec. 28.9	1116	.169	1438	91.6	+ 5.9			
			1924.0 ($-4^y.4$)							1924	
350	9537	2064	June 5.4	856	.136	1101	10.4	+31.2	958		314sc
351	9564	2095	Aug. 30.8	958	.167	1281	307.4	+21.5			
351*	9576	2109	Oct. 19.9	501	.160	572	5.4	+23.0			315
352	9584	2119	Nov. 21.5	723	.142	1387	296.2	+18.2	962		
353	9585	2121	Nov. 24.8	529	.144	778	253.1	+24.2			
			1925.0 ($-3^y.4$)							1925	
354	9637	2202	May 6.2	746	.160	883	271.6	+15.7	965		
355	9698	2273	Aug. 8.0	530	.140	939	111.3	+23.4	970		
356	9760	2343	Oct. 20.5	815	.146	970	220.6	-20.0			320
357	9779	2371	Nov. 13.6	765	.139	1358	262.5	-14.7			
358	9790	2382	Nov. 24.3	1458	.151	2071	121.3	+17.4	976		
359	9791	2384	Nov. 20.2	680	.140	1064	176.0	+23.1	977		
360	9805	2398	Dec. 10.4	684	.135	1052	269.4	-20.2			
361	9810	2403	Dec. 15.9	1053	.147	1476	196.9	+22.0	981		
362	9819	2411	Dec. 21.0	536	.183	675	130.4	+15.7	976		
363†	9825	2417	Dec. 25.4	1389	.167	2124	71.7	-20.5	984		322a
364†	9830	2422	Dec. 28.6	2587	.162	2934	30.0	+23.2	980		322a
			1926.0 ($-2^y.4$)							1926	
365	9857	2447	Jan. 22.4	964	.166	1210	63.6	-21.5	984	Jan. 26.7	324sc
366†	9861	2453	Jan. 24.5	3285	.159	3716	35.0	+20.8	980	Jan. 26.7	324sc
367	9874	2471	Feb. 14.5	1170	.154	1638	118.9	-18.8			
368	9878	2476	Feb. 17.7	551	.178	781	77.4	-12.6			
369	9880	2480	Feb. 19.1	518	.207	563	58.3	-20.5	984	Feb. 23.7	
370†	9885	2486	Mar. 4.0	1579	.132	1989	248.4	-27.6			325sc
371	9938	2545	May 5.9	872	.172	1212	138.5	-19.4	987		328sc
372	9943	2554	May 13.7	690	.161	987	35.3	-19.7	989		
373	9967	2578	June 9.8	614	.161	746	36.5	+ 8.6	991		
374	9977	2595	June 22.1	518	.166	898	234.1	+24.8			
375	9980	2598	June 29.8	1091	.184	1375	132.1	+21.6	993		
376	10006	2638	July 29.9	1290	.152	1702	93.5	-10.8	995		
377	10016	2653	Aug. 8.7	544	.142	788	323.6	-19.6	998		
378	10019	2656	Aug. 16.3	669	.152	944	224.2	-18.3			
379†	10041	2686	Sept.19.7	1881	.172	2142	129.4	+24.1	1001		331sc
380	10062	2711	Oct. 11.1	986	.153	1438	206.4	+17.7	1005	Oct. 13.8	
381	10064	2715	Oct. 9.1	552	.141	810	233.0	+14.1		Oct. 13.8	
382†	10065	2716	Oct. 13.8	527	.156	896	171.9	+16.6	1006	Oct. 13.8	
383	10118	2786	Dec. 16.0	875	.138	1439	58.4	+ 6.9			

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1927.0 ($-1^y.4$)				°	°		1927	
384	10133	2802	Jan. 1.2	576	.165	694	204.2	- 8.0	1013		
385	10138	2808	Jan. 8.6	866	.150	1218	107.5	-14.0	1014		333
386	10148	2822	Jan. 19.4	856	.144	1174	325.4	+25.0	1012		
387	10150	2823	Jan. 21.6	579	.143	860	296.3	-14.7	1015		
388	10173	2850	Feb. 9.8	613	.157	860	42.8	-14.6	1017		
389	10218	2902	Mar. 19.9	919	.129	1429	260.8	+32.5	1018		
390	10239	2925	Apr. 6.9	697	.154	915	24.4	+12.5			
391	10248	2934	Apr. 12.8	541	.190	718	306.7	-17.6			335*sc*
392	10287	2978	May 11.8	915	.179	1503	282.5	+16.9	1022		
393	10310	3007	June 8.1	1118	.145	1562	282.0	+16.8	1022		
394	10328	3031	June 30.9	568	.167	833	339.9	- 6.9	1025		
395	10335	3042	July 5.4	655	.157	813	280.4	+15.0	1022		
396	10359	3080	Aug. 14.3	792	.148	1469	113.1	-10.2	1028		
397	10366	3089	Aug. 28.7	642	.137	870	282.5	-16.2			337*sc*
398	10377	3099	Sept.14.4	746	.176	1231	61.6	-19.2	1029		
399	10379	3098	Sept.13.9	811	.160	1459	68.2	-11.1	1030		
400	10433	3170	Nov. 10.5	751	.137	1343	28.0	- 9.0			
401	10451	3188	Nov. 25.5	795	.140	1136	190.5	-16.0			
402	10461	3204	Dec. 8.8	568	.141	1429	16.0	-11.2	1035		339*sc*
			1928.0 ($-0^y.4$)							1928	
403	10477	3225	Jan. 3.8	506	.202	663	33.2	- 8.5	1035		
404	10497	3245	Jan. 22.6	1061	.130	1489	146.0	+15.4			
405†	10522	3271	Feb. 21.6	799	.156	1288	111.0	+ 5.6	1037		
406	10549	3298	Mar. 18.8	694	.157	875	124.7	+14.6	1043		
407	10550	3299	Mar. 19.9	537	.169	620	110.3	+ 8.4	1037		
408	10568	3317	Apr. 9.1	870	.167	1192	204.4	-15.8	1046		
409†	10600	3346	May 8.1	1077	.155	1474	180.6	-14.1	1049		341
410	10617	3366	June 2.9	575	.158	1156	199.2	-13.0	1046		
411	10644	3397	June 29.0	654	.174	785	214.5	-19.3	1050		
412	10649	3398	June 30.2	531	.147	1008	197.7	+18.1			
413	10658	3406	July 7.4	513	.160	861	102.6	-26.6	1055	July 7.9	
414	10662	3412	July 12.3	908	.189	1110	38.8	+ 8.0	1056		
415	10669	3418	July 17.5	970	.177	1404	329.2	-18.8			
416	10671	3419	July 19.8	671	.188	940	298.3	+ 9.4	1054		
417	10686	3433	July 31.8	690	.178	1091	140.4	+14.6	1057		
418	10709	3460?	Aug. 21.4	660	.161	1019	227.3	-11.6	1060		343*sc*
419†	10733	3490	Sept.12.7	1059	.155	1466	293.4	+14.7	1062		
420	10742	3497	Sept.24.4	1082	.172	1539	138.9	+16.0	1063		345*sc*
421	10744	3499	Sept.24.5	533	.176	882	137.4	-18.8			345*sc*
422†	10746	3501	Sept.27.4	1770	.150	2587	99.5	-15.3			345*sc*
423	10789	3542	Nov. 9.3	860	.151	1107	253.7	-15.4	1067		
424	10804	3563	Dec. 5.6	1210	.151	1844	266.8	+ 8.4	1070		348
			1929.0 ($+0^y.6$)							1929	
425	10841	3606	Jan. 17.4	791	.139	1294	63.4	+ 6.8	1073		
426	10861	3625	Feb. 11.9	668	.187	809	87.9	-10.6	1074		
427	10889	3646	Mar. 10.8	1084	.168	1244	92.4	- 9.7	1074	Mar. 11.6	350
428	10906	3667	Apr. 8.0	627	.195	811	80.6	- 9.5			
429	10915	3676	Apr. 18.0	531	.181	834	309.0	+ 4.4	1078		
430	10939	3700	May 28.4	637	.174	794	135.7	+13.6	1080		
431	10962	3726	June 24.1	705	.210	845	141.6	- 9.0	1082		
432	10986	3751	July 10.8	778	.192	1274	280.7	- 5.1	1085		351
433	10988	3754	July 17.1	501	.192	538	197.0	-15.9	1084		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1929 (continued)				°	°		1929	
434	11020	3799	Aug. 16.2	513	.177	749	158.8	- 7.2	1086		352a
435	11065	3849	Oct. 10.8	667	.163	1190	144.9	-19.6			
436	11068	3852	Oct. 13.4	764	.175	909	110.8	-10.5	1089		356sc
437	11075	3863	Oct. 31.1	921	.160	1200	237.4	+ 9.6	1090		357
438†	11081	3867	Nov. 3.7	1175	.166	2003	189.3	+14.8	1091		357
439	11082	3870	Nov. 9.6	777	.206	1164	111.4	-11.2	1089		
440	11097	3887	Nov. 27.9	744	.190	1005	231.0	+12.4	1095		
441	11100	3890	Nov. 30.4	1050	.210	1277	198.0	+16.3	1091		358
442	11104	3893	Dec. 1.6	679	.158	1223	182.3	+13.3			358
443	11105	3892	Dec. 1.6	544	.175	961	181.6	+17.8	1098		358
444	11119	3905	Dec. 12.7	932	.191	1244	36.2	- 6.0	1099		359
445†	11121	3907	Dec. 16.5	1456	.193	1685	346.1	+ 6.3	1100		359
446	11139	3925	Dec. 26.7	562	.144	1124	211.3	+10.6	1097		
447	11142	3929	Dec. 28.0	664	.178	834	194.5	+15.9	1091		
			1930.0 (+1.^{y}6)							1930	
448	11157	3943	Jan. 12.3	574	.185	701	352.3	+ 6.2	1100		
449	11200	3985	Mar. 7.0	557	.167	720	5.1	-16.0			362sc
450	11217	4001	Apr. 7.6	589	.165	726	308.1	+12.1			363
451	11309	4111	Oct. 10.8	875	.157	1506	7.0	+ 7.2			
452	11314	4117	Oct. 28.7	505	.178	645	131.4	- 6.2	1107		378sc, 379
453	11326	4132	Nov. 27.0	598	.172	822	105.0	- 8.6	1109		
			1931.0 (+2.^{y}6)							1931	
454	11346	4161	Jan. 12.6	536	.131	1232	211.0	+ 7.2	1110		
455†	11355	4175	Feb. 20.8	1143	.180	1882	55.5	+ 6.2	1111		385sc
456	11367	4185	Mar. 15.3	558	.181	1022	118.2	+ 4.0			386
457	11448	4294	Nov. 26.8	513	.224	787	329.9	+10.2	1117		
			1932.0 (+3.^{y}6)							1932	
458	11484	4337	Apr. 25.4	545	.213	844	145.3	+ 9.5	1121		
459	11525	4387	Dec. 12.9	513	.207	615	327.1	+10.0	1125		
			1933.0 (+4.^{y}6)							1933	
460	11537	4397	Feb. 7.3	1167	.174	1594	303.9	+13.3	1127		
			1934.0 (-3.^{y}4)							1934	
461	11573	4448	Apr. 21.8	725	.170	1169	277.6	-28.8	1129		
			1935.0 (-2.^{y}4)							1935	
462	11624	4507	Feb. 4.6	734	.177	1030	64.5	-16.6	1134		
463	11677	4567	June 29.9	891	.166	1142	306.3	-24.0			
464	11748	4660	Nov. 9.5	781	.156	1425	354.7	-28.8	1147		
465	11750	4662	Nov. 13.1	583	.178	866	307.0	+21.4			
466	11760	4675	Nov. 22.4	724	.157	1139	185.4	-15.1	1150		
467†	11764	4685	Dec. 2.2	1670	.172	2435	55.2	-25.5	1151		
468	11769	4691	Dec. 12.8	873	.175	1212	276.5	-23.1			
			1936.0 (-1.^{y}4)							1936	
469	11788	4716	Jan. 3.5	556	.180	828	350.1	-12.0	1152		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1936 *(continued)*				°	°		1936	
470	11790	4718	Jan. 8.0	763	.147	1098	290.6	+28.7	1153		
471	11795	4725	Jan. 19.9	1153	.159	1641	133.7	-32.0	1154		
472	11802	4732	Jan. 27.4	520	.187	984	34.9	+14.8			
473	11815	4751	Feb. 13.9	774	.217	1295	165.0	-27.3	1156		
474†	11876	4812	Apr. 8.0	580	.157	928	172.1	+20.2			
475	11948	4921	June 22.0	567	.166	1076	260.2	+20.5	1160		
476	11959	4942	June 26.4	553	.174	813	201.7	+18.5			
477	12016	5009	Aug. 30.8	603	.153	984	56.4	-25.6	1165*		
478	12060	5068	Oct. 6.2	672	.176	948	296.5	+19.3	1170		
479	12101	5116	Nov. 14.9	582	.184	923	133.2	- 7.2			
480	12108	5124	Nov. 22.5	692	.168	1243	32.5	-21.1	1177		
481	12109	5127	Nov. 29.3	957	.156	1425	302.8	+16.6	1178		435*sc*
482	12112	5131	Dec. 2.3	935	.147	1333	263.0	-14.8	1179		
483	12115	5135	Dec. 3.7	744	.156	1204	245.0	+16.4	1180		
			1937.0 ($-0^y.4$)							1937	
484	12178	5193	Jan. 16.9	514	.173	712	22.7	- 8.4	1186		
485	12188	5203	Jan. 24.2	854	.156	1538	286.6	-19.8			
486	12204	5215	Jan. 31.1	1734	.146	2364	196.3	-10.1	1189	Feb. 3.0	
487	12239	5254	Feb. 23.3	574	.131	925	250.6	+21.1	1188		
488	12254	5266	Mar. 2.1	793	.199	932	160.9	+ 8.4	1191		436*a*
489	12315	5337	Apr. 22.5	523	.172	735	203.0	- 9.2	1194	Apr. 26.7	439*sc*, 440*sc*
490	12319	5342	Apr. 23.2	1017	.146	1954	193.1	+25.1	1195	Apr. 26.7, 27.8	439*sc*, 440*sc*
491†	12320	5343	Apr. 24.7	1674	.174	2474	173.9	+19.5	1196	Apr. 26.7, 27.8	439*sc*, 440*sc*
492	12327	5348	Apr. 29.5	887	.183	1194	109.9	-20.5	1198	Apr. 26.7, 27.8	
493	12341	5362	May 15.6	585	.174	805	257.9	+18.4			
494	12349	5368	May 20.8	1220	.161	1484	189.2	-15.3	1199		
495	12362	5380	May 27.2	811	.170	1156	103.3	+11.0			442
496	12368	5386	June 4.8	863	.143	1130	349.5	+12.8			443
497	12380	5398	June 15.6	591	.186	717	208.0	+10.4	1202		
498	12385	5400	June 17.0	897	.197	1458	188.6	-14.4	1199		
499	12393	5409	June 21.0	549	.182	783	135.6	+12.2			444
500	12423	5441	July 9.1	970	.176	1272	256.1	+23.5	1205		
501	12441	5463	July 18.6	676	.135	972	130.5	+13.4	1207		446*sc*, 447
502	12449	5472	July 23.6	652	.153	871	64.0	-13.2			447
503†	12455	5477	July 28.8	2589	.159	3303	356.1	+31.5	1208		448*sc*
504†	12462	5489	Aug. 5.9	634	.144	1132	248.6	+24.0	1205		
505	12486	5505	Aug. 14.4	696	.171	1211	136.2	+11.7	1207		
506	12498	5522	Aug. 25.6	1046	.192	1191	348.0	+32.8	1208		
507	12521	5548	Sept. 9.6	644	.182	1037	150.0	+11.4	1213		450*sc*
508	12526	5552	Sept.11.0	719	.168	1735	131.5	+11.0			450*sc*
509†	12553	5578	Oct. 4.4	2661	.146	3340	182.3	+ 9.3	1216		452*sc*,453*sc*,454
510	12555	5581 } 5582 }	Oct. 7.0	668	.178	834	147.6	+10.6	1213		453*sc*, 454
511	12585	5609	Oct. 26.5	580	.153	1005	251.3	+11.1			
512	12602	5632	Nov. 14.0	616	.153	993	7.4	-14.7			
513	12634	5683	Dec. 15.3	640	.152	1074	314.0	-21.2			
514	12640	5688	Dec. 21.0	802	.131	1318	240.1	+26.2	1219		
			1938.0 ($+0^y.6$)							1938	
515	12666	5719	Jan. 11.4	731	.149	1564	317.1	+19.7			
516†	12673	5726	Jan. 18.4	2955	.176	3627	225.1	+17.1	1224	Jan. 16.9, 22.2	
517	12693	5756	Feb. 2.4	574	.171	690	27.8	+12.8	1225		457*sc*, 458*sc*
518	12703	5767	Feb. 10.1	850	.144	1292	286.1	-24.8	1226		459
519	12707	5771	Feb. 14.6	541	.139	644	226.8	+15.0	1224		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within -3d.0 to +5d.0 of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1938 *(continued)*				°	°		1938	
520	12734	5801	Mar. 10.2	586	.145	766	276.9	+22.5			
521	12757	5818	Mar. 26.9	1365	.185	1514	55.9	-14.6	1228		
522†	12777	5842	Apr. 14.2	1098	.171	1512	174.6	+26.6	1230	Apr. 16.2	463a
523	12778	5843	Apr. 16.3	625	.170	768	147.5	-23.9	1233	Apr. 16.2	463a
524	12781	5848	Apr. 21.3	690	.175	877	81.5	-10.2	1234		
525	12783	5853	Apr. 22.8	516	.186	716	62.0	-13.2	1228		
526	12808	5877	May 10.4	713	.171	1019	189.2	- 7.3	1236	May 11.7	465a
527	12821	5888	May 17.0	500	.176	704	101.0	-11.8	1237		465a
528†	12829	5898	May 23.8	1090	.188	1996	11.5	+ 8.0	1238		466sc
529	12851	5921	June 11.6	581	.188	815	123.3	+14.8	1239		468sc
530	12873	5939	June 22.5	669	.193	945	337.9	+ 6.1	1240		
531	12894	5970	July 7.2	697	.197	975	143.2	+13.8			469a, 470sc
532	12895	5973	July 10.7	1163	.181	1514	97.2	-12.9	1243		470sc, 471
533†	12902	5982	July 15.1	2122	.147	3379	39.8	-12.1	1244		471
534	12933	6016	July 29.4	525	.154	888	209.8	-21.2	1241		
535	12950	6037	Aug. 10.9	852	.166	1143	44.5	-14.9	1244		
536	12954	6042	Aug. 14.6	595	.150	955	356.3	-24.9			
537	12986	6093	Sept. 5.5	850	.171	1342	65.9	+11.4	1250		
538	13006	6111	Sept.25.5	584	.147	748	162.5	- 9.6			475sc, 476a
539†	13009	6116	Sept.27.8	666	.164	1432	132.1	-12.0	1249		475sc, 476a
540†	13024	6141	Oct. 11.9	2654	.133	3003	305.7	+17.0	1252		
541†	13064	6192	Nov. 10.8	1990	.174	2245	272.0	- 8.5	1257		
542	13072	6200	Nov. 15.7	594	.155	1754	207.1	-18.0	1258		
543†	13086	6213	Nov. 28.8	1482	.163	2302	35.1	+14.0	1262		479
544	13093	6221	Dec. 7.9	610	.193	856	274.4	-10.3	1257		
			1939.0 (+1.^{y}6)							1939	
545	13179	6313	Feb. 17.5	531	.196	739	51.5	-17.1	1267		
546	13235	6395	Apr. 16.0	685	.178	1164	14.2	+13.2	1277	Apr. 16.9	
547†	13245	6407	Apr. 26.4	671	.191	815	236.6	+29.1		Apr. 24.7	482sc
548†	13247	6406	Apr. 26.5	953	.176	1400	234.7	-15.7	1280	Apr. 24.7	482sc
549†	13259	6418	May 5.3	794	.179	996	118.0	+12.2			484sc
550	13348	6525	July 9.1	1344	.156	1905	341.1	- 4.3			
551	13350	6528	July 8.2	732	.180	1321	353.5	+ 6.4	1289		
552	13354	6535	July 17.8	628	.178	966	226.5	+16.8	1290		488, 489a, 490
553	13368	6553	Aug. 3.8	516	.190	582	0.8	+ 8.1	1289		
554	13371	6557	Aug. 7.3	793	.174	967	315.2	+13.8			491sc
555	13387	6576	Aug. 22.0	927	.162	1236	121.2	+12.8	1296	Aug. 22.0	
556†	13394	6585	Sept. 1.0	1751	.164	3054	348.2	-14.1	1297		492sc
557†	13405	6598	Sept.10.4	2504	.146	2993	224.1	-13.8	1298		
558	13427	6618	Sept.28.0	1717	.164	2256	351.6	-12.8	1297		
559	13456	6648	Oct. 26.0	1453	.159	2029	342.7	- 8.1	1301		
560	13475	6677	Nov. 18.8	771	.163	1302	28.6	-15.1			
			1940.0 (+2.^{y}6)							1940	
561†	13502	6725	Jan. 5.5	1689	.207	2860	120.2	+10.5	1306		496sc
562†	13518	6741?	Feb. 1.2	726	.183	1101	128.9	+ 9.9	1306		
563	13537	6758	Mar. 2.3	634	.181	973	91.9	- 5.3	1309		
564†	13555	6783	Mar. 26.3	1189	.166	1599	136.3	+12.1	1312	Mar. 24.6, 29.7	498a
565	13628	6874	June 22.7	525	.189	683	47.1	-10.2		June 25.1	
566	13629	6877	June 25.4	683	.165	967	12.3	-15.9		June 25.1	
567	13649	6902	July 7.6	746	.188	1234	210.2	+18.2	1320		
568	13653	6905	July 16.2	620	.152	869	95.8	+ 6.8	1317		503
569	13673	6930	Aug. 9.6	551	.189	813	133.4	-11.6	1321		505

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1940 (continued)				°	°		1940	
570	13677	6937	Aug. 11.2	563	.213	894	112.7	-12.6	1324		505
571	13678	6938	Aug. 12.6	708	.171	926	94.7	+ 5.9			
572	13679	6940	Aug. 16.8	637	.190	815	38.7	-12.4			
573	13683	6945	Aug. 20.7	589	.190	1098	346.5	+ 7.7	1325		
574	13692	6965?	Sept. 1.1	705	.193	971	195.9	- 5.4	1326		
575	13706	6982	Sept.19.7	531	.192	1052	311.2	-10.0	1327		
576	13721	7009	Oct. 13.0	716	.170	1151	2.9	+15.5			
577	13722	7011	Oct. 16.5	552	.197	671	317.6	- 8.9	1327		
			1941.0 (+3.^{y}6)							1941	
578	13904	7238	July 27.2	798	.162	1156	173.8	- 3.7	1345		
579†	13906	7241	July 31.1	558	.158	818	122.1	+12.4	1343		518*sc*
580	13909	7244	Aug. 6.1	665	.171	961	41.9	+10.2	1346		518*sc*
581†	13937	7281	Sept.16.9	1862	.148	3088	210.0	+11.6	1348	Sept.18.2	
582	13948	7297	Oct. 2.1	541	.198	639	9.2	+ 1.4	1350		
583†	13960	7315	Oct. 29.7	1169	.165	1432	5.5	+13.1			520*sc*
584	13972	7329	Nov. 28.3	560	.170	714	335.4	-18.8			521*a*
			1942.0 (+4.^{y}6)							1942	
585†	14015	7378	Feb. 28.8	1549	.191	2048	197.1	+ 7.0	1355	Mar. 1.3	523*a*
586	14030	7397	Mar. 27.9	669	.194	1179	200.0	+ 7.4	1355		
587	14040	7409	Apr. 9.4	662	.162	1195	34.1	- 7.5	1357		
588	14106	7508	Nov. 2.6	652	.156	943	176.3	-10.5	1363		
589	14116	7518	Nov. 27.9	548	.161	781	202.5	+ 7.9			
			1943.0 (+5.^{y}6)							1943	
590	14135	7550	Feb. 11.7	649	.180	953	284.4	+ 5.5	1366		
591†	14138	7555	Feb. 25.8	1004	.141	1892	98.2	+ 9.1	1367		
592†	14142	7559	Mar. 10.6	886	.176	1265	290.2	+ 4.3	1366		
593	14151	7573	Apr. 21.2	985	.171	1818	101.6	+ 9.3	1368		
594	14161	7589	July 13.5	550	.160	861	79.0	+14.1	1369		
595	14172	7611	Sept. 6.1	691	.210	1001	77.5	+14.2	1370		541
596	14175	7617	Oct. 3.1	575	.195	634	81.2	+15.4	1370		
			1944.0 (+6.^{y}6)							1944	
597	14238	7695	Dec. 14.5	650	.155	1010	56.3	-21.7		Dec. 15.8	
			1945.0 (-2.^{y}5)							1945	
598	14266	7732	Mar. 28.4	524	.172	798	127.6	-31.1	1375		560*a*
599	14267	7733	Apr. 1.3	721	.180	965	75.2	-21.3			561*sc*
600	14274	7741	May 1.6	724	.166	1142	35.2	-17.6			
601	14307	7791	July 15.2	522	.174	660	128.4	-19.2			
602	14324	7813	Aug. 13.5	500	.174	1051	101.5	+24.2			
603	14343	7848	Sept.23.6	714	.175	1140	278.1	-18.6	1378		
604	14347	7853	Oct. 4.0	622	.154	887	141.0	+23.4	1380		
605	14358	7864	Oct. 22.6	574	.167	722	256.0	-25.4	1381		564*sc*
			1946.0 (-1.^{y}5)							1946	
606	14408	7931	Jan. 14.0	650	.158	834	236.6	+28.6			
607	14410	7933	Jan. 17.5	831	.190	1175	190.0	+17.5	1388		
608	14414	7939	Jan. 26.9	774	.164	1206	66.6	-15.2	1389		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within -3d.0 to +5d.0 of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1946 *(continued)*				°	°		1946	
609†	14417	7943	Feb. 5.7	4779	.183	5202	297.2	+26.1	1390	Feb. 7.4	
610†	14451	7978	Mar. 6.7	1356	.136	1741	276.0	+28.0	1390		570*sc*
611	14468	8000	Mar. 17.5	541	.139	785	132.8	-16.4	1397		
612	14490	8015	Apr. 14.4	818	.167	928	125.9	-34.6	1396		571
613	14501	8026	Apr. 26.1	640	.158	970	330.8	+33.0		Apr. 23.3	
614†	14585	8129	July 26.9	3958	.111	4720	195.8	+22.2	1406	July 26.5	
615	14592	8135	Aug. 1.8	588	.170	723	118.2	-23.8	1407		
616	14593	8136	Aug. 2.3	796	.180	993	112.1	+10.1	1408		
617	14595	8137	Aug. 3.3	770	.158	1144	98.9	-27.8			
618	14600	8146	Aug. 10.5	723	.158	975	3.6	-19.8	1405		578*a*
619	14620	8163 (pt)	Aug. 24.2	667	.144	988	181.8	+23.2	1406		
620	14640	8191	Sept.15.7	661	.153	1001	245.5	+11.9			580*sc*, 581*a*
621	14643	8193	Sept.19.8	767	.110	1376	191.0	+20.2		Sept.21.7	581*a*
622†	14723	8288	Nov. 24.2	1070	.145	1802	47.8	+13.4	1427		
623†	14750	8319 (pt)	Dec. 17.0	1675	.138	2099	107.2	- 6.4	1430		
624	14754	8324	Dec. 20.4	550	.156	838	63.0	+12.6			
625	14757	8326	Dec. 21.6	699	.167	836	47.8	+10.6	1427		
626	14763	8333	Dec. 25.3	829	.151	1123	358.4	+24.6	1432		
			1947.0 (-0.^{y}5)							1947	
627	14781	8355	Jan. 13.3	605	.136	941	108.2	-10.7			
628	14784	8359	Jan. 19.4	508	.154	756	28.4	-15.7			
629	14790	8364	Jan. 20.7	521	.150	797	11.3	-12.5			584
630	14802	8377	Jan. 27.0	647	.133	919	287.1	-20.3	1436		584
631	14806	8382	Feb. 5.1	848	.157	1207	168.1	-15.6	1437		
632†	14813	8392	Feb. 11.3	2131	.137	2944	85.8	-21.1	1439		585*sc*
633	14822	8401	Feb. 17.2	560	.145	888	9.2	-17.5	1440		585*sc*
634	14831	8411	Feb. 22.7	682	.123	1385	296.3	-17.6	1436		
635	14838	8421 8423 } 8424	Feb. 28.4	697	.138	1157	221.9	+20.6	1441	Mar. 2.2	
636†	14851	8438	Mar. 10.2	3637	.160	4554	91.6	-23.1	1439		586
637	14855	8441	Mar. 10.6	1059	.130	1576	86.8	+13.5	1443		586, 587*sc*
638	14874	8466	Mar. 29.2	642	.157	766	201.7	-10.2	1442		588*sc*
639†	14886	8478	Apr. 7.2	5520	.133	6132	83.1	-24.4	1439		589*sc*
640	14892	8484	Apr. 3.3	969	.100	2025	134.5	-16.5	1446		
641	14933	8527	May 5.6	522	.142	786	67.9	-24.8	1439		
642	14937	8537	May 2.2	577	.168	884	113.2	- 3.6			
643	14938	8540	May 6.3	652	.161	789	58.5	+17.7	1450		
644	14945	8547	May 14.7	639	.169	810	307.9	+19.1	1452		
645	14957	8564	May 21.0	631	.147	1051	223.4	-28.5	1454		590*sc*
646†	14962	8568	May 23.2	992	.140	1736	195.1	+17.3			590*sc*
647	14965	8572	May 24.1	524	.166	796	183.5	-15.8			590*sc*
648	14968	8582	May 25.7	575	.160	740	161.6	-15.9			590*sc*
649	14970	8581	May 25.3	615	.133	1173	167.1	+21.0	1455		590*sc*
650	14995	8611	June 9.3	663	.127	1071	328.4	+23.0	1458		592
651	15059	8700	July 15.4	521	.173	654	210.9	-30.4	1463	July 17.7	
652†	15062	8706	July 17.8	836	.120	1459	179.1	+11.4	1464	July 17.7	
653	15063	8707	July 18.2	722	.211	966	174.5	+14.1	1464	July 17.7	
654	15069	8715	July 20.5	965	.116	1736	143.8	+12.8	1465	July 17.7	
655†	15089	8745	Aug. 3.9	1182	.124	1699	313.4	-17.5			
656	15094	8752	Aug. 7.2	1220	.129	1692	269.1	- 9.2	1470		
657†	15106	8767 (pt)	Aug. 12.8	726	.117	1359	195.1	+10.6			593*sc*
658	15111	8774	Aug. 16.1	524	.153	727	151.5	+15.0	1465		593*sc*
659	15174	8833	Sept.25.5	671	.183	1127	337.4	+17.5	1476	Sept.23.5	
660	15192	8859	Oct. 6.9	1098	.157	1587	187.9	+19.0	1478		598
661	15246	8925	Nov. 18.5	519	.145	765	345.8	-22.2	1484		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number Gr.	Group Number Mt.W.	U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P. Great Storm	Small Storm Ref.No.
			1947 *(continued)*				°	°		1947	
662	15292	8965 (pt)	Dec. 12.6	915	.142	1280	28.5	-12.7	1485		
663	15297	8971	Dec. 14.0	526	.150	1008	9.7	-17.4	1488		
664	15316	8994	Dec. 28.6	538	.165	756	177.9	-22.6	1491		
			1948.0 (+0.^{y}5)							1948	
665†	15387	9074	Feb. 16.3	870	.120	2245	243.2	+22.8	1498		
666	15399	9086	Mar. 3.0	832	.165	973	35.8	+16.0	1499		
667	15415	9101 (pt)	Mar. 15.6	619	.171	815	230.9	+24.4	1498		602*sc*
668	15439	9132	Apr. 3.8	613	.178	828	336.5	-16.6	1501		
669	15441	9130	Mar. 29.5	665	.126	1203	46.9	+21.3	1503		
670	15457	9148 (pt)	Apr. 15.3	525	.152	1134	185.5	-21.3	1506		
671	15463	9150	Apr. 17.2	939	.163	1233	159.8	+ 8.9	1507		603*a*
672	15485	9167	Apr. 26.1	1424	.147	1903	43.0	+23.3	1503		
673	15503	9190	May 10.1	960	.136	1358	218.0	- 7.9	1505		604*sc*, 605*sc*
674	15513	9197	May 11.3	511	.151	710	201.1	+17.3			604*sc*, 605*sc*
675†	15514	9199 (pt)	May 12.4	1195	.128	1661	187.2	-22.9	1506		605*sc*
676†	15521	9205	May 15.8	821	.161	1017	142.0	- 9.3	1513		605*sc*
677†	15542	9229	June 2.1	1405	.156	2371	273.2	+11.7	1516		
678	15578	9266 (pt)	June 25.7	1160	.097	1624	321.4	-13.9			
679	15587	9275	June 29.6	1334	.129	1513	269.2	+12.3	1516		
680	15619	9317	July 26.8	761	.162	933	269.6	+12.0	1516		
681	15638	9333 (pt)	Aug. 3.4	571	.147	981	168.7	- 9.2	1527	Aug. 8.0	
682	15646	9342	Aug. 8.9	790	.108	1151	95.8	-16.1		Aug. 8.0	
683	15695	9404 (pt)	Sept. 18.0	1254	.163	1533	286.3	- 9.6	1531		
684	15743	9456	Oct. 17.3	946	.098	1282	260.1	+12.7	1516	Oct. 17.9	608, 609*sc*
685	15763	9480	Oct. 27.6	581	.177	737	124.2	+ 5.5	1535		
686	15792	9514, 9527	Nov. 18.2	523	.149	898	199.0	- 9.2			
687†	15818	9547	Dec. 14.6	1377	.161	2434	211.8	- 9.6	1537		
688	15831	9568	Dec. 24.0	1592	.149	2513	87.0	-14.4	1540		
			1949.0 (+1.^{y}5)							1949	
689	15865	9603	Jan. 19.8	524	.170	701	94.7	-11.9	1540	Jan. 24.8	
690†	15871	9609	Jan. 22.9	2213	.146	2471	53.7	+22.9	1543	Jan. 24.8	
691	15891	9621, 9630	Feb. 4.9	548	.162	867	241.8	+ 4.8			
692†	15892	9622	Feb. 5.4	1586	.174	2248	236.4	- 9.6	1544		
693	15913	9646	Feb. 16.2	625	.157	1052	92.9	+14.1			
694	15914	9648	Feb. 16.8	699	.189	1410	85.8	-12.0	1547		611*sc*
695	15917	9654	Feb. 19.4	811	.170	1055	52.1	+21.3	1543		611*sc*
696	15920	9656	Feb. 21.0	745	.169	911	30.6	-16.9	1548		611*sc*
697	15932	9667	Feb. 28.8	619	.187	914	288.2	+ 6.8	1549		
698	15934	9670	Feb. 27.3	805	.140	1373	307.5	+12.5	1550		
699	15939	9676	Mar. 4.0	547	.124	998	246.1	+ 4.5			
700	15943	9682	Mar. 8.3	504	.165	773	188.8	+15.8	1551		
701	15961	9705	Mar. 18.8	683	.165	867	50.1	- 6.2	1555		612*sc*, 613*sc*
702	15962	9706	Mar. 19.4	1096	.141	1537	42.0	+22.4	1543		612*sc*, 613*sc*
703	16069	9836	May 31.6	652	.170	927	156.0	+ 3.8	1560		617*sc*, 618*sc*
704	16099	9875 (pt)	June 28.4	647	.185	749	146.9	- 6.8	1567		
705	16138	9917	July 22.7	572	.140	936	185.5	+13.4	1570		
706	16146	9925	July 30.6	972	.154	1525	80.8	-12.0	1571		620*sc*
707†	16148	9927 (pt)	Aug. 1.1	1328	.151	1564	61.9	-19.8	1568		620*sc*
708	16169	9949	Aug. 19.4	842	.133	1241	179.7	+14.1	1573		
709	16175	9955	Aug. 23.1	554	.188	654	130.2	+10.2	1574		
710†	16178	9960	Aug. 23.9	704	.143	1477	119.6	+15.4			
711†	16201	9987	Sept. 9.3	846	.169	1173	263.7	-13.4	1576		

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1949 *(continued)*				°	°		1949	
712	16210	10001	Sept.17.1	1311	.146	1726	161.2	-13.6	1577		
713	16230	10025	Oct. 6.1	565	.170	777	269.3	-14.4	1576		621a
714†	16232	10027 (pt)	Oct. 7.3	961	.155	1504	253.7	+ 7.8			621a
715	16279	10087	Nov. 8.5	737	.141	1233	189.6	-10.0	1582		
716†	16295	10103	Nov. 14.1	913	.133	1280	115.2	- 2.1			
717	16308	10119	Nov. 27.0	870	.172	1030	305.9	+18.1	1585		626
718	16354	10175	Dec. 27.0	512	.162	980	269.7	+10.5	1587		
			1950.0 (+2.^{y}5)							1950	
719	16386	10211	Jan. 27.2	560	.164	737	219.7	+20.0			627
720	16402	10229	Feb. 14.2	644	.143	1014	342.3	-17.2	1592		
721†	16410	10233 (pt)	Feb. 20.1	1853	.151	2856	264.2	+10.1	1593	Feb. 20.0	628sc
722	16435	10262 (pt)	Mar. 13.0	523	.208	613	349.1	-15.5	1599		
723	16460	10292	Apr. 4.3	506	.200	548	55.6	+27.0	1600		
724†	16467	10303	Apr. 13.6	1527	.140	2000	293.1	+13.4			
725	16469	10308	Apr. 19.5	508	.167	916	214.8	+14.1			
726	16474	10312	Apr. 25.6	658	.150	1085	133.4	-16.9	1605		
727	16475	10314	Apr. 27.3	1011	.172	1430	112.1	-12.0	1606		
728	16486	10324	May 3.4	615	.161	1119	30.6	+13.9	1603		631
729	16493	10332	May 12.4	511	.168	821	271.6	+ 6.1	1604		
730	16513	10350	May 26.3	924	.160	1160	88.0	+ 8.1	1607		632sc
731	16514	10351	May 22.9	542	.170	980	133.0	+17.3	1608		632sc
732	16531	10373 (pt)	June 14.5	913	.170	982	194.5	-18.1	1610		
733	16568	10412	July 20.2	503	.165	787	81.7	+12.0	1613		636sc
734	16570	10415	July 25.0	580	.190	677	18.3	-11.3	1614		636sc
735	16581	10434	Aug. 4.7	770	.142	1126	236.6	- 8.9			637a
736	16650	10530	Nov. 6.0	644	.149	985	85.1	+12.8	1621		
737	16651	10531 / 10532	Nov. 15.4	569	.156	848	320.2	+15.3	1622		
			1951.0 (+3.^{y}5)							1951	
738	16693	10582	Jan. 29.3	1068	.154	1591	54.1	+ 7.4	1624		
739	16711	10605	Feb. 24.9	694	.143	914	63.7	+10.4	1624		647sc
740	16722	10616	Mar. 23.0	914	.214	1044	79.9	+12.1	1626		
741†	16745	10639	Apr. 18.7	2064	.152	2553	87.5	+12.1	1626		650sc, 651
742	16750	10644	Apr. 24.7	578	.178	1538	8.5	-15.3	1627		
743†	16763	10662	May 16.0	3743	.158	4865	86.4	+13.0	1626		
744	16775	10673	May 22.2	786	.174	1153	5.4	+20.7			654sc
745	16781	10677	May 23.0	675	.147	1087	354.8	+17.0	1630		654sc
746	16782	10678	May 27.9	543	.192	629	289.3	-20.4	1629		654sc
747	16790	10687	June 11.4	661	.133	1151	97.3	+ 7.9			
748	16792	10690	June 12.0	893	.188	1354	88.9	+13.8	1626		
749†	16795	10692	June 18.4	2100	.144	2358	5.2	-12.2	1633		655sc
750	16799	10696	June 19.0	534	.152	1095	356.4	-10.3			655sc
751	16817	10715	July 14.0	667	.181	811	25.3	- 8.0	1634		
752	16818	10716	July 15.0	539	.141	866	12.0	- 9.8	1633		
753	16861	10775	Sept.15.0	542	.155	933	273.3	+ 6.9			659, 660sc
754	16882	10796	Oct. 14.2	596	.153	745	247.2	- 8.6	1638		662
755	16915	10835	Nov. 23.8	538	.134	887	72.0	+ 6.0	1640		
756	16927	10849 / 10855	Dec. 21.0	985	.127	1291	73.9	+ 8.8	1640		
			1952.0 (+4.^{y}5)							1952	
757	16954	10883	Feb. 18.6	562	.149	881	9.7	-11.4	1641		
758	17001	10957	June 29.2	555	.189	644	71.0	- 9.3	1644	June 29.8	

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

Ref. No.	Group Number		U.T. of Central Meridian Passage	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
	Gr.	Mt.W.								Great Storm	Small Storm Ref.No.
			1952 *(continued)*				°	°		1952	
759	17007	10972	July 15.1	765	.133	1212	220.1	- 2.5	1646		
760	17052	11054	Nov. 21.7	919	.178	1159	310.0	+ 5.4	1651		
			1953 ($+5^y.5$)							1953	
761			Apr. 27.1	735	.147	1062	33.6	+10.8			

THE GREATEST SUNSPOTS, 1874-1954.

The following list of the greatest sunspots has been abstracted from the preceding catalogue of spots of mean area 500 millionths of the Sun's hemisphere and upwards.

The spots are tabulated in order of size according to their mean area (corrected for foreshortening, and expressed in millionths of the Sun's hemisphere) during their respective disk passages.

The adjacent number in the first column indicates the order based on the measured *maximum* area of the spot group.

In this table, the interval (to 0.1 year) from the time of C.M.P. to sunspot maximum is given for each spot in the column following the time of C.M.P. The data tabulated in the other columns are the same as in the preceding catalogue.

The lower limit of size chosen for this list of great spots is 1500 millionths of the Sun's hemisphere for the mean daily area of the sunspot.

Order with respect to		Year	Group Number		U.T. of Central Meridian Passage	Interval from Sunspot Max.	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P.	
Mean Area	Max. Area		Gr.	Mt.W.									Great Storm	Small Storm Ref.No.
						y				°	°			
1	1	1947	14886	8478	Apr. 7.2	-0.2	5520	.133	6132	83.1	-24.4	1439		589*sc*
2	2	1946	14417	7943	Feb. 5.7	-1.4	4779	.183	5202	297.2	+26.1	1390	Feb. 7.4	
3	4	1946	14585	8129	July 26.9	-0.9	3958	.111	4720	195.8	+22.2	1406	July 26.5	
4	3	1951	16763	10662	May 16.0	+3.9	3743	.158	4865	86.4	+13.0	1626		
5	5	1947	14851	8438	Mar. 10.2	-0.3	3637	.160	4554	91.6	-23.1	1439		586
6	6	1926	9861	2453	Jan. 24.5	-2.3	3285	.159	3716	35.0	+20.8	980		324*sc*
7	7	1938	12673	5726	Jan. 18.4	+0.6	2955	.176	3627	225.1	+17.1	1224	Jan. 16.9, 22.2	
8	11	1905	5441		Feb. 4.2	-1.9	2801	.134	3339	329.5	-15.3	558		155*sc*
9	10	1937	12553	5578	Oct. 4.4	+0.4	2661	.146	3340	182.3	+ 9.3	1216		452*sc*,453*sc*,454
10	17	1938	13024	6141	Oct. 11.9	+1.4	2654	.133	3003	305.7	+17.0	1252		
11	16	1892	2421		Feb. 11.9	-2.0	2638	.172	3038	255.7	-28.2	275	Feb. 13.2	
12	12	1937	12455	5477	July 28.8	+0.2	2589	.159	3303	356.1	+31.5	1208		448*sc*
13	21	1925	9830	2422	Dec. 28.6	-2.4	2587	.162	2934	30.0	+23.2	980		322*a*
14	19	1939	13405	6598	Sept.10.4	+2.3	2504	.146	2993	224.1	-13.8	1298		
15	13	1917	8181	752	Aug. 10.2	0.0	2389	.136	3178	129.2	+16.2	806	Aug. 9.2, 13.6	

CATALOGUE OF THE GREATEST SUNSPOTS, 1874-1954

Order with respect to Mean Area	Order with respect to Max. Area	Year	Group Number Gr.	Group Number Mt.W.	U.T. of Central Meridian Passage	Interval from Sunspot Max.	Mean Area Whole Spots	Ratio Umbra/ Whole Spot	Max. Area Whole Spots	Longi-tude	Lati-tude	Recur-rent Series	Geomagnetic Storm within $-3^d.0$ to $+5^d.0$ of C.M.P. Great Storm	Small Storm Ref.No.
						y				°	°			
16	18	1905	5682		Oct. 20.2	-1.2	2336	.095	2995	161.9	+13.8	580		
17	24	1897	4497		Jan. 9.4	+2.9	2329	.161	2743	342.2	- 6.8	481		
18	35	1949	15871	9609	Jan. 22.9	+1.6	2213	.146	2471	53.7	+22.9	1543	Jan. 24.8	
19	8	1917	7977	562	Feb. 9.5	-0.5	2176	.146	3590	9.0	-16.0	788		
20	20	1947	14813	8392	Feb. 11.3	-0.4	2131	.137	2944	85.8	-21.1	1439		585sc
21	9	1938	12902	5982	July 15.1	+1.1	2122	.147	3379	39.8	-12.1	1244		471
22	41	1951	16795	10692	June 18.4	+4.0	2100	.144	2358	5.2	-12.2	1633		655sc
23	30	1951	16745	10639	Apr. 18.7	+3.8	2064	.152	2553	87.5	+12.1	1626		650sc, 651
24	44	1938	13064	6192	Nov. 10.8	+1.5	1990	.174	2245	272.0	- 8.5	1257		
25	25	1920	9143	1661	Mar. 21.7	+2.6	1966	.168	2690	134.4	- 4.9	918	Mar. 22.4	
26	34	1907	6205		June 19.7	+0.5	1965	.150	2472	65.6	-14.4	645		
27	36	1896	4428		Sept.16.7	+2.6	1954	.147	2458	55.0	+13.2			127sc, 128
28	38	1882	885		Nov. 18.8	-1.0	1928	.211	2425	121.0	+19.2	110	Nov. 17.4, 20.0	25*
29	46	1905	5589		July 16.8	-1.5	1911	.140	2164	342.3	+13.0	575		
30	49	1882	729		Apr. 19.1	-1.6	1892	.158	2123	64.7	-28.5	92	Apr. 17.0, 20.0	
31	47	1926	10041	2686	Sept.19.7	-1.7	1881	.172	2142	129.4	+24.1	1001		331sc
32	14	1941	13937	7281	Sept.16.9	+4.3	1862	.148	3088	210.0	+11.6	1348	Sept.18.2	
33	29	1907	6108		Feb. 12.4	+0.1	1860	.152	2555	306.2	-16.6	632	Feb. 9.6	
34	23	1950	16410	10233 (pt)	Feb. 20.1	+2.6	1853	.151	2856	264.2	+10.1	1593	Feb. 20.0	628sc
35	28	1905	5473		Mar. 8.0	-1.8	1845	.090	2572	270.9	+10.5	565		
36	48	1903	5093		Oct. 11.6	-3.2	1783	.108	2129	203.2	-21.3	525		150
37	27	1928	10746	3501	Sept.27.4	+0.3	1770	.150	2587	99.5	-15.3			345sc
38	15	1939	13394	6585	Sept. 1.0	+2.3	1751	.164	3054	348.2	-14.1	1297		492sc
39	40	1937	12204	5215	Jan. 31.1	-0.3	1734	.146	2364	196.3	-10.1	1189	Feb. 3.0	
40	42	1939	13427	6618	Sept.28.0	+2.3	1717	.164	2256	351.6	-12.8	1297		
41	39	1892	2581		July 10.2	-1.6	1691	.153	2387	83.4	+11.1	289	July 12.7	
42	22	1940	13502	6725	Jan. 5.5	+2.6	1689	.207	2860	120.2	+10.5	1306		496sc
43	50	1946	14750	8319 (pt)	Dec. 17.0	-0.5	1675	.138	2099	107.2	- 6.4	1430		
44	33	1937	12320	5343	Apr. 24.7	-0.1	1674	.174	2474	173.9	+19.5	1196	Apr. 26.7, 27.8	439sc, 440sc
45	37	1935	11764	4685	Dec. 2.2	-1.5	1670	.172	2435	55.2	-25.5	1151		
46	26	1893	3106		Aug. 7.4	-0.5	1640	.161	2621	292.6	-17.6	355		100sc
47	45	1898	4781		Sept. 9.2	+4.6	1636	.161	2235	239.1	-12.1	501	Sept. 9.5	
48	31	1948	15831	9568	Dec. 24.0	+1.5	1592	.149	2513	87.0	-14.4	1540		
49	43	1949	15892	9622	Feb. 5.4	+1.6	1586	.174	2248	236.4	- 9.6	1544		
50	53	1926	9885	2486	Mar. 4.0	-2.2	1579	.132	1989	248.4	-27.6			325sc
51	51	1942	14015	7378	Feb. 28.8	+4.8	1549	.191	2048	197.1	+ 7.0	1355	Mar. 1.3	523a
52	32	1894	3731		Oct. 8.1	+0.7	1542	.176	2511	60.2	-12.2			
53	53	1950	16467	10303	Apr. 13.6	+2.8	1527	.140	2000	293.1	+13.4			
54	52	1920	9108	1636	Jan. 28.0	+2.5	1526	.150	2037	120.7	- 6.9	914		
55	55	1908	6510		Aug. 31.2	+1.7	1519	.137	1919	35.2	+ 6.6	681		191

Notes on most of these great spot groups (of which six exceed 3000 millionths in mean area) are included in the notes that follow under the respective reference numbers given in the main catalogue.

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

NOTES

(All times are in U.T. Areas quoted are corrected for surface foreshortening and are expressed in millionths of the Sun's hemisphere).

Ref. No.

27. **1882** Apr. 19.1. The largest spot since the preceding cycle (maximum epoch 1870.6): a great complex spot in continual change including the formation of "bridges" across it. A great geomagnetic storm began one day after the central meridian passage of the spot.

28. **1882** May 17.3. Rapid disintegration after passing the central meridian.

38. **1882** Nov. 18.8. Brilliant reversals of the *Hα* and *Hβ* lines over this giant complex spot (denoting intense solar flares) were observed at Greenwich on Nov. 18, 20 and 21. *(Greenwich Spectroscopic and Heliographic Results*, 1882, p. 12-13). Multiple great geomagnetic storms occurred on Nov. 17-20.

48. **1883** July 25.9. Although Group 1080 has been identified as a return of Group 1058 (ref. No. 45), a vigorous resurgence of activity must have begun on the invisible hemisphere between the appearances of the two groups.

56. **1883** Dec. 26.8. A rapid decline of a group (area 1465 to 227 millionths in nine days).

61. **1884** Mar. 31.7. This group began near the central meridian and rose in area to 2246 millionths in six days before passing out of sight. The group returned as No. 63 and the remains were last seen on July 12.

100. **1892** Feb. 11.9. This great and active sunspot (the eleventh largest in this catalogue) was used by Hale at the Kenwood Observatory, Chicago, to obtain the first spectroheliograms in the K line of the solar spectrum. A great magnetic storm began 1.3 days after the central meridian passage of the spot.

105. **1892** July 10.2. Although this big group has been associated with the great geomagnetic storm which began on July 12.7, it is more probable that a brilliant *Hα* reversal (solar flare) observed over Group 2583 (No. 106) on July 11 at $11^h.7$ (J. Townsend, *Astronomy and Astrophysics* **11**, 815, 1892) was the real precursor of this storm.

106. **1892** July 14.0. Extensive faculæ surrounding this spot suggest that it was much larger on the invisible hemisphere. Two periods of unusual chromospheric activity (representing solar flares) were observed:- (1) July 11^d, $11^h.7$. Brilliant reversals of *Hα* over the spot region (*Astronomy and Astrophysics* **11**, 815, 1892). A synchronous geomagnetic crochet was recorded at Greenwich ($\Delta H = -22\gamma$). A great magnetic storm, statistically associated with the previous spot because of its greater size, began 30 hours after this flare.

continued

Ref. No.

106. (2) July 15^d, 17^h. This notable flare was the first to be recorded on spectroheliograms (Hale, *Astrophysical Journal* **73**, 379, 1931). A great geomagnetic storm began 19½ hours later.

116. **1893** July 9.1. A bright "bridge" crossed the leader of this complex stream, and the division into two components was complete by July 11. The finer details of this "bridge" are shown in Plate XX of Jansen's *Atlas de Photographies Solaires* (Paris Observatory 1903).

118. **1893** Aug. 7.4. A giant group of exceptionally rapid growth, the measured maximum area of 2621 millionths being reached in five days.

144. **1894** Oct. 8.1. No trace of this big group (maximum area 2511 millionths) was left by the following rotation, unless it was the small ephemeral spot (Group 3782) seen on Nov. 3.

170. **1896** Sept. 16.7. A most unusual stream ("the caterpillar") composed of many irregularly formed spots extending in line for 25° of longitude. It had vanished by the next rotation. Other varieties of extended complex streams of spots are Nos. 334, 335, 409 and 467.

185. **1900** June 25.1. A spot of rapid initial growth near the west limb and having an abnormally large (measured) proportion of umbra. It is doubtful however, from a re-examination of the photographs, to what extent this feature is real.

187. **1903** Oct. 11.6. This complex spot, crossed by bright "bridges" before it divided into two, must have declined sharply on the invisible hemisphere, for the two fragments that returned averaged only 241 millionths. For general remarks on the curtailed life of big spots *see Observatory* **72**, 111, 1952.

196. **1905** Feb. 4.2. The occurrence of only a small geomagnetic storm near the time of C.M.P. of so large a spot group may be noted. Another small storm was however recorded on Mar. 2 when the diminished spot (as No. 198, Group 5471) was near the C.M., and again on Apr. 1, when the spot had decreased to a mean area of 378 units.

199. **1905** Mar. 8.0. The absence of a geomagnetic storm in association with this large group may be noted.

203. **1905** July 16.8. Another big group with no associated great geomagnetic storm. The leader spot had a broad "bridge" across it with subsidiary bridges.

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

NOTES - *continued*

Ref. No.

208. **1905** Oct. 20.2. The absence of geomagnetic activity during the disk passage of this giant complex spot is the third notable case in 1905. On Oct. 17, *H*α was brilliantly reversed on each side of the north umbra. Other active periods occurred on Oct. 20, 23 and 26. (*Kodaikanal Observatory Bulletin* No. VI, 1906 (June)).

216. **1906** May 15.8. A group of unusual development, as a ring of small spots enclosing a large area of the photosphere. *H*α was brilliantly reversed, and D_3 appeared dark over almost the whole group on May 13. (*Kodaikanal Observatory Bulletin* VIII, 1906 (Nov.)).

246. **1908** Aug. 13.4. A group of sudden initial development, the measured area rising from 57 to 531 units in less than 24 hours. The group returned as No. 248, and the last traces persisted until Oct. 29.

249. **1908** Sept. 10.0. Groups 6520 and 6522 have been combined because they appeared to be closely related. Spots in this general area appeared in five consecutive rotations. An extensive solar flare was recorded in *H*α at the Yerkes Observatory on Sept. 10 between $05^h.6$ and $09^h.8$, stretching across the equator and involving Group 6519 as well as Groups 6520 and 6522. The time lag between this flare at maximum and the onset of the great geomagnetic storm on the following day was about 26 hours. (Fox and Abetti, *Ap.J.*, **29**, 42, 1909).

257. **1909** May 13.7. Thirty-eight hours before the onset of the storm listed in association with this spot, an intense solar flare was recorded over the region (including a small group No. 6668) on Mount Wilson spectroheliograms. (Hale, *Ap.J.*, **73**, 390, 1931).

260. **1909** Sept. 23.8. Two intense solar flares occurred over this spot. (1) Sept. 24 at 10^h, recorded on spectroheliograms taken at South Kensington, London. (Lockyer, *M.N.*, **70**, 12, 1909). (2) Sept. 28 at $04^h.5$ recorded at Kodaikanal, South India, and synchronous there with a strong geomagnetic "crochet". (Michie Smith, *M.N.*, **70**, 23, 1909). Evershed (*Kodaikanal Observatory Bulletin* No. 22, 1910) drew attention to his observation of a marked Zeeman effect, denoting the presence of a strong temporary magnetic field at the time of the flare. A violent geomagnetic storm followed the first flare after 25 hours, and a small storm followed the second flare (60° W of the C.M.) after 51 hours.

276. **1915** July 25.2. Maximum area (1509 millionths) was apparently attained in four days.

277. **1915** Aug. 4.4. No trace of this group (which rose in area to 1901 millionths) was left by the following rotation.

Ref. No.

278. **1915** Sept. 26.8. This is probably the group in which solar "bombs" (described by Ellerman in *Ap.J.*, **46**, 298, 1917) were observed; they were repeated in Group 7475 (No. 279).

284. **1916** May 26.3. The peak area (1748 millionths) was reached within a week.

285. **1916** June 2.0. During its return as Group 7756 (mean area 197 millionths) a brilliant flare was recorded on June 29 09^h.

290. **1917** Feb. 9.5. A giant stream rising to 3000 millionths within a week of its origin near the east limb. Solar flares of large magnitude were recorded on *H*α spectroheliograms taken at the Mount Wilson Observatory on Feb. 7^d $16^h.0$ and 8^d $15^h.7$ when the centre of the group was 24° E and 11° E respectively of the C.M. (Hale, *Ap.J.*, **73**, 394, 1931), but no geomagnetic disturbance of "great" or small storm intensity followed the flares after an interval of a day or two.

293. **1917** Aug. 10.2. This giant complex spot of crab-like appearance had a multi-polar magnetic field ranging from γ to βγ of the Mount Wilson classification (Hale, Ellerman, Nicholson and Joy, *Ap.J.*, **69**, 153, 1919). The spot must have disintegrated rapidly after its disk passage, for on its return disk passage as Group 8231 the mean area was only 82 units. Two notable solar flares were recorded over the group on Mount Wilson spectroheliograms on Aug. 8 at $14^h.4$ and Aug. 9 at $14^h.6$, besides a number of minor ones (Hale, *Ap.J.*, **73**, 395, 1931).

299. **1917** Dec. 12.1. This big stream of normal type originated on the C.M. and grew rapidly to an area of 1557 millionths by the fifth day. Returning as No. 302, traces of the group lasted until 1918 Mar. 29, giving a total duration of 108 days.

311. **1918** Sept. 14.8. A group with many changes and later with its axis highly inclined to the solar equator.

331. **1919** Sept. 14.8. This big regular spot just north of the solar equator and another regular spot (return of No. 329) just south of it made a distinctive pair with their penumbræ barely separated by the equator. Their unipolar magnetic fields were of opposite polarity to one another as well as the direction of the vortical *H*α structure around the spots. (*Magnetic Observations of Sunspots* 1917-1924, Pt. I (Mount Wilson Observatory 1938) p. 51 and Plate 3b).

335. **1920** Mar. 21.7. A complex stream (βγ) of unusual length. It represented a vigorous revival of spot activity which began on 1919 Dec. 30 and included another long and complex stream (No. 334, Group 9108).

continued

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

NOTES - *continued*

Ref. No.

335. The last trace of spots in this general area did not disappear until May 15.

337. **1920** Sept. 2.8. Development of a complex stream. The leader split into two components which became widely separated in longitude.

343. **1921** May 14.7. A big complex spot (γ), unique for its size on the solar equator and of great observational interest because of the distribution of magnetic polarities (*Magnetic Observations of Sunspots* 1917-1924 (Mount Wilson 1938) Part II p. 541-3). The spot divided into two, resulting in a βγ group, remnants of which lasted for two months. The geomagnetic storm associated with this spot was a very great one of long duration. Apart from the storm itself, four "sudden-commencements" were recorded (Newton *M.N. Geophys. Supp.* 5, 178, 1948).

363. **1925** Dec. 25.4. The maximum area (2124 millionths) of this large stream was reached on the ninth day. The following component, a regular spot, persisted from 1925 Dec. 20 until after 1926 Mar. 24 and was probably represented by small spots until Apr. 20. For other long-lived regular spots (length of life probably >170 days) *see* notes to Nos. 438, 561 and 623.

364. **1925** Dec. 28.6. This great complex spot or group (βγ) showed no signs of a decline in area during its disk passage. But a comparison of position between it and its even greater successor (as Group 9861) points to a collapse in area of the former when on the invisible hemisphere and a contemporary outburst of a new spot formation preceding the original position.

366. **1926** Jan. 24.5. Until the advent of the five giant spots of the last cycle (1944.2 to 1954), this was the biggest spot in the Greenwich records. Its relatively high latitude (21° N), like those of three of the four giants which have exceeded it in size, may be noted. This giant sunspot was the first subject for detailed examination by G. E. Hale with his spectrohelioscope. Two brilliant and extensive solar flares were observed respectively on Jan. 24 at $19^h.7$ and at 20^h on the following day, the former being the more extensive (Hale, *Ap.J.*, **73**, 396, 1931). A great geomagnetic storm followed 48 hours after the first flare. The giant spot returned as a mere fragment (Group 9881, mean area 390 millionths). But the chromosphere over the spot was inherently active, and a very intense and extensive flare was recorded on Kodaikanal spectroheliograms on Feb. 22, thirty-seven hours before the onset of a great geomagnetic storm (Royds, *M.N.*, **86**, 381, 1926).

370. **1926** Mar. 4.0. No trace of this big group was left by the next rotation.

Ref. No.

379. **1926** Sept. 19.7. A very large stream (βγ) showing unusual changes, especially in the leader spot which became elongated before dividing into two. The follower, a regular spot, moved 7° backwards during the disk passage.

382. **1926** Oct. 13.8. This group, over which a brilliant and extensive flare was recorded by the Meudon Observatory on Oct. 13 (*L'Astronomie* 40, 489, 1926) continued the history of a region which had produced spots since July 19. A great geomagnetic storm followed the solar flare by 17 hours (reckoned to a preliminary *sc*) and by about 39 hours (to the onset of the active part of the storm).

405. **1928** Feb. 21.6. This group and No. 407 formed part of a sequence of sunspot activity that continued in the same place for longer than four months.

409. **1928** May 8.1. An unusually long and active stream (19° in length at its greatest extension) with its axis inclined 15° to the solar equator.

419. **1928** Sept. 12.7. A complex stream (βγ) of unusual later growth, remnants of which lasted to the third return on the solar disk. A faint solar "bomb" (? low-level flare) was observed at Mount Wilson on Sept. 11, and a solar flare was recorded on Sept. 14 on spectroheliograms taken by Evershed in this country.

422. **1928** Sept. 27.4. The decline of this giant complex group (the "camel" spot) was so rapid that no trace of it was left by the following rotation.

438. **1929** Nov. 3.7. This big bi-polar group was first recorded 45° east of the C.M. and reached an area of 2003 millionths before passing out of sight. The group contained a very large regular spot, as leader, and this returned (ref. No. 441) with a mean area of 1050 millionths - an abnormally large area for a regular spot. In the next rotation, when the spot showed signs of disintegration, its mean area was still as large as 664 millionths (ref. No. 447), and remnants lasted until 1930 Jan. 28.

445. **1929** Dec. 16.5. Another case, like No. 438, of a bi-polar group with a regular spot of unusual size which lasted for two months. Its final position was nearly 7° behind its first recorded position on 1929 Dec. 10, 10° having been included for normal drift.

455. **1931** Feb. 20.8. Rapid transformation of small inactive spots into a big group, the area rising from 161 to 1828 millionths in four days.

467. **1935** Dec. 2.2. A great complex stream seen from near its origin to its full development (area 2435

continued

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

NOTES - *continued*

Ref. No.

467. millionths). A semi-opaque structure covered the preceding part of the following spot on Dec. 2 and 3. There was also an apparent clockwise rotation of this spot.

474. **1936** Apr. 8.0. A brilliant and extensive flare was recorded over this group (βγ) on Apr. 8 at $16^h.8$. *Quarterly Bulletin on Solar Activity (I.A.U.) et seq.*

491. **1937** Apr. 24.7. From a small measured area on Apr. 19 of 43 millionths, a giant group developed to nearly 2500 millionths by Apr. 27. The group was flare-active, 32 flares being collectively observed during its disk passage. (I.A.U., *loc. cit.*).

503. **1937** July 28.8. The largest group in latitudes >30° ever recorded at Greenwich. A number of solar flares (28) were recorded during its disk passage, when the group passed through its maximum development.

504. **1937** Aug. 5.9. A flare of magnitude 3+ occurred over this group (βγ) on July 31 at $16^h.7$ at a position 67° E of C.M.

509. **1937** Oct. 4.4. A great complex spot (γ) presenting its full development during disk passage. Its subsequent decline must have been rapid, for on its return only small spots were left in an extensive area of faculae. The great spot was exceptionally active in flares, no fewer than 59 being observed as it crossed the disk. One of these on Sept. 30 at $10^h.2$ (52° E of C.M.) and another on Oct. 7 at $02^h.4$ (41° W) were especially noteworthy. The non-occurrence of a great geomagnetic storm during the disk passage of this active sunspot may be noted, although two small sc storms were probably related to this very active solar region.

516. **1938** Jan. 18.4. A great complex (γ) spot - seventh in order of size, 1874-1954 - attaining its greatest area (3627 millionths) about three days after C.M.P. Two outstanding solar flares were recorded:- (1) Jan. 20 at $18^h.3$ and (2) Jan. 24 at $02^h.9$ (maximum). A great geomagnetic storm followed 29 hours after the first flare. Although the second flare occurred 82° W of the C.M., it seems very probable that a violent geomagnetic storm (with a great auroral display), beginning nearly 32 hours later was directly related to it. A number of other flares of lesser magnitude were recorded in association with this great sunspot.

522. **1938** Apr. 14.2. A complex stream (βγ) with its axis considerably inclined to the solar equator. Two flares of magnitude 3+ occurred respectively on Apr. 13 at $09^h.5$ and Apr. 15 at $08^h.5$. A violent geomagnetic storm began on Apr. 16 at $05^h.8$.

Ref. No.

528. **1938** May 23.8. The origin of this active stream (β) was recorded at 21° E of C.M. Its full development probably occurred soon after its disappearance round the west limb. A remnant of the stream lasted till after Aug. 17.

533. **1938** July 15.1. A great composite spot (βγ), ninth in order of maximum size in the Greenwich records. No. 535 in the catalogue is a return of it.

539. **1938** Sept. 27.8. An intense flare over this group (βγ) was recorded on Sept. 23 at $16^h.9$ at a position 60° E of C.M. The region generally was flare-active, a total of 27 flares having been recorded (I.A.U. data).

540. **1938** Oct. 11.9. A pair of big complex spots reaching maximum area (3003 millionths) on the central meridian. The collapse of the group must have been sudden, since the mean area on the return of the group was only 42 millionths, and it died out on Nov. 11.

541. **1938** Nov. 10.8. This complex, changing group (βφ) was flare-active. A maximum field strength of 4000 gauss was recorded at Mount Wilson.

543. **1938** Nov. 28.8. This stream (βγ) of vigorous development was exceptionally active in solar flares. No geomagnetic storm was, however, associated with the group.

547. **1939** Apr. 26.4. A brilliant extensive flare occurred with this spot at a position 59° E of C.M. on Apr. 21 at $16^h.5$.

548. **1939** Apr. 26.5. Spots continued in this area for longer than six months and included the giant group, No. 557.

549. **1939** May 5.3. A flare of magnitude 3+ was recorded over this group (βγ) on May 4 at $09^h.5$.

556. **1939** Sept. 1.0. This flare-active group reached its greatest area (3054 millionths) just before passing round the west limb. Fresh spot formation probably began on the invisible hemisphere to produce for its return appearance so large a group as Group 13427 (No. 558). A solar flare of some importance occurred on Sept. 1 at $07^h.3$.

557. **1939** Sept. 10.4. Like a number of other giant spots, this great complex group (βγ) decreased rapidly and returned with a mean area one-tenth that of its former disk passage. Although no outstanding case was recorded, 45 solar flares were collectively observed during this first disk passage (I.A.U. data). The non-association of this group with a geomagnetic storm deserves comment.

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

NOTES - *continued*

Ref. No.

561. **1940** Jan. 5.5. A giant stream of normal type seen from its origin 55° E of the C.M. Its maximum area of 2860 millionths was reached on the sixth day. The leader spot, itself exceeding 1200 millionths, can be traced intact from Jan. 2 to Apr. 2 and the probable remnants of it to Apr. 22, *i.e.* for 112 days. *See* also Nos. 363 and 438.

562. **1940** Feb. 1.2. This was the return of the big leader spot of the preceding group. Group 13519 (mean area 472 millionths) representing the follower spot, 16° behind, might be included to make an aggregrate mean area of 1198 units.

564. **1940** Mar. 26.3. A complex spot (γ). Numerous solar flares occurred and, in particular, a very intense one on Mar. 23 at $11^h.6$ (max.). A violent geomagnetic storm followed 26.6 hours after the maximum of this flare.

579. **1941** July 31.1. A return of an unusual group (Gr. 13886) with a mean area of 490 units but showing fresh development before passing out of view. This earlier spot was associated with two major flares on July 3 at $16^h.4$ (max.) and July 8 at $14^h.7$ (*P.A.S.P.* **53**, Plate XXIII, 1941).

581. **1941** Sept. 16.9. A great complex group (βγ) undergoing changes. An intense flare of magnitude 3+ (one of the 35 collectively observed during the group's disk passage) was observed on Sept. 17 at $08^h.6$, 9° W of the C.M. A great geomagnetic storm began 20½ hours later.

583. **1941** Oct. 29.7. No trace of this big group remained by the next rotation.

585. **1942** Feb. 28.8. A big complex spot (γ) noteworthy in connexion with the first observation of solar radiation on metre wavelengths. Two notable flares occurred (1) on Feb. 21 at $13^h.8$ (max.) at the Sun's east limb over the spot area (d'Azambuja, *L'Astronomie*, June 1942). A strong synchronous geomagnetic crochet ($\Delta H = -40\gamma$) was recorded at Abinger. (2) on Feb. 28 at $12^h.7$ when the spot was near the C.M. Another large synchronous crochet was recorded ($\Delta H = -69\gamma$). A small geomagnetic storm, that very probably resulted from the elevated flare at the Sun's limb, occurred on Feb. 23, 47.7 hours after flare maximum. Not unexpectedly, a great geomagnetic storm followed the second flare, the time interval being 19½ hours. A third flare, short-lived but of great brilliance, was recorded again in *H*α on Mar. 3, from which rose a high-speed prominence seen as a moving dark filament across the solar disk to the west limb (*Observatory* **64**, 215, 1942).

591. **1943** Feb. 25.8. A group of considerable size, only one year before sunspot minimum. The leader spot rose in *continued*

Ref. No.

591. area to 1324 millionths by Feb. 28, but it disappeared as a dot 29 days later.

592. **1943** Mar. 10.6. This has been rightly ascribed as a return of No. 590, but it is clear that a new phase of development must have begun on the invisible hemisphere between the two disk passages. The history of the region extended over five solar rotations, from Feb. 9 to June 3.

609. **1946** Feb. 5.7. This immense group (βf of the Mount Wilson classification) is the second largest group in this catalogue. Many solar flares were recorded, including one of outstanding magnitude on Feb. 6 at $16^h.8$ (max.), an *H*α spectroheliogram of which is reproduced in *P.A.S.P.*, **58**, 87, 1946. A great geomagnetic storm followed 17.5 hours after flare maximum. After a lapse of four years, which included a sunspot minimum, solar radiation detectable on metre wavelengths was again recognised, and bursts of "solar noise" were associated with individual flares (Appleton and Hey, *Phil. Mag.*, **37**, 73, 1946).

610. **1946** Mar. 6.7. A return of the great spot of Feb. (No. 609). On Mar. 5, a geomagnetic crochet of unusual range for Greenwich ($\Delta H = -81\gamma$) began at $11^h\ 25^m$, reached its maximum in 2 minutes and ended at $12^h\ 25^m$. Nearly synchronous with this crochet, there was a sudden, intense burst of solar "noise" on 4.1 metres (Hey, Parsons and Phillips *M.N.*, **108**, 359, 1948). A complete fade-out on long-distance, short-wave radio channels extended in this country from $11^h\ 30^m$ to $12^h\ 07^m$ (Cable and Wireless Limited). At the time, no spectrohelioscopes appear to have been in operation owing to cloudy weather, but at Geneva, M. Martheray reported the observation of a flare in *integrated* light (like the classical case of Carrington and Hodgson) at $11^h\ 24^m$ for three minutes. No geomagnetic storm followed later.

614. **1946** July 26.9. The third in order of size of the great spots in the Greenwich record. A solar flare of outstanding brilliance and extent occurred on July 25 with its maximum intensity at $16^h.5$. (Ellison, *M.N.*, **106**, 500, 1946: *P.A.S.P.*, **58**, 317, Plate XXI, 1946). A great geomagnetic storm began 26.3 hours later. Other notes on flares associated with this giant sunspot are given by Dodson and Hedeman, *Ap.J.*, **110**, 242, 1949.

622. **1946** Nov. 24.2. This βγ group began near the east limb, and the maximum area of 1802 millionths was reached on the seventh day. The leader spot lasted to the fourth disk passage.

623. **1946** Dec. 17.0. The continuity of the leader spot of this big bi-polar group (βγ) is probable for a period of not less than 114 days.

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

NOTES - *continued*

Ref. No.

632. **1947** Feb. 11.3. See note to No. 639.

636. **1947** Mar. 10.2. See note to No. 639.

639. **1947** Apr. 7.2. By far the biggest spot group in the Greenwich records and probably the largest in the whole history of sunspot observations. In the preceding rotation it was represented by Group 14851 (No. 636) which was itself the fifth largest group in this catalogue and this group in turn was preceded by Group 14813 (No. 632) the mean area of which exceeded 2000 millionths. The recorded history of this series of great spots extended from Feb. 5 to May 11. From the run of the daily areas, it seems that surges of spot renewal must have started on the invisible hemisphere between the disk passages of Groups 14813 and 14851 and between those of Groups 14851 and 14886 when the greatest area was reached. After this, the group must have collapsed, for it returned with a mean area (made up of two widely separated groups) of only 661 millionths. It is noteworthy that no *great* geomagnetic disturbance was associated with any of the three disk passages of these giant spots. No flare of outstanding intensity appears to have been observed, but 48 flares were collectively observed. (I.A.U. data).

646. **1947** May 23.2. This complex group (βγ) was flare-active, 36 flares being collectively observed.

652. **1947** July 17.8. A complex spot (γ) reaching maximum area past the C.M. It was flare-active (28 flares).

655. **1947** Aug. 3.9. The rapid decline of this group (βγ) had set in near the west limb. No trace of it remained in the following rotation. The group was abnormally flare-active (50 flares). Characteristics of some of these flares are described by Dodson and Hedeman, *Ap.J.*, **110**, 242, 1949.

657. **1947** Aug. 12.8. This changing, complex group (γ) was abnormally flare-active (53 flares), though no flare of outstanding intensity was recorded.

665. **1948** Feb. 16.3. The first signs of this bi-polar group (β) were near the central meridian. A spectacular development took place between Feb. 19 and 20, when the measured area rose from 581 to 2067 millionths.

675. **1948** May 12.4. This big regular spot with penumbral appendages had its origin in Group 15457 (No. 670) which itself reached a maximum area of 1134 millionths.

676. **1948** May 15.8. On May 21 a flare of magnitude 3+ with its maximum at $11^h.4$ was observed visually in *Hα* over this group at a position 70° W of the C.M. A synchronous phase-anomaly on very long radio waves (16 kc/s. = 18.7 kms.) began at $11^h\ 17^m$ (Bracewell and

continued

Ref. No.

676. Straker, *M.N.*, **109**, 31, 1949), and an intense burst of solar "noise" was recorded at $11^h\ 22^m$.

677. **1948** June 2.1. A continuous series of spots (including Nos. 679, 680 and 684) appeared in this region until Nov. 11, *i.e.* for 5½ months.

687. **1948** Dec. 14.6. This giant stream (βp) may have had a larger maximum area than 2434 millionths on the invisible hemisphere. The occurrence of a flare on Dec. 9 at $11^h.9$ was indicated by a geomagnetic crochet, a large "sudden phase-anomaly" on very long radio wave-lengths and an intense burst of solar radiation recorded on metre wave-lengths. *(Septième Rapport de la Commision pour l'Étude des Relations entre les Phénomènes Solaires et Terrestres* (1951), p. 123, Note 18).

690. **1949** Jan. 22.9. A solar flare of magnitude 3+ was recorded on Jan. 23 at 02^h when this giant group was on the central meridian. A great storm, accompanied by a brilliant auroral display, began 40 hours later.

692 **1949** Feb. 5.4. Two notable solar flares, among numerous minor ones, were associated with this active group (βp):- (1) Feb. 1 at $12^h.6$ (max.), 51° E of C.M., (2) Feb. 11 at $11^h.2$ (max.), 80° W of C.M. (*Observatory*, **69**, 74, 1949, and Ellison, *Publications Royal Observatory, Edinburgh*, Vol. 1, No. 4, p. 55, 1950).

707. **1949** Aug. 1.1. A flare of magnitude 3+ was recorded on Aug. 5 at 55° W of C.M. over this complex group (βγ) at $08^h.1$ (max.). (*Observatory*, **69**, 235, 1949). There were numerous other flares during the disk passage of the group. One of these of visual magnitude 2 on July 31 at $14^h\ 20^m$ to $16^h\ 00^m$ being associated with an enormous burst of solar radiation observed on a wave-length of 10.7 cm. = 2800 Mc/s. (Dodson, Hedeman and Covington, *Ap.J.*, **119**, 545, 1954).

710. **1949** Aug. 23.9. With this group (βγ), there was at first only slight growth for a few days, then a sudden development between the fifth and sixth days, the measured area rising from 509 to 1458 millionths. The spots did not survive to the next rotation.

711. **1949** Sept. 9.3. Numerous flares (46 collectively observed by international co-operation) occurred over this group, the most important being on Sept. 13 at $13^h.2$ at 63° W of C.M.

714. **1949** Oct. 7.3. A big, flare-active, complex spot (γ) - soon declining after a brief maximum of 1504 millionths. No trace of it was left by the following rotation.

716. **1949** Nov. 14.1. The growth of this equatorial spot was rapid, an area of 1254 millionths being reached on the

continued

CATALOGUE OF SUNSPOTS >500 MILLIONTHS OF THE SUN'S HEMISPHERE, 1874-1954

NOTES - *continued*

Ref. No.

716. third day. The spot did not return. A solar flare of magnitude 3+ occurred on Nov. 19 at $10^h.5$ (max.) at a position 70° W of C.M. (Elisson, *Observatory*, **70**, 77, 1950 and *Pub. R.O. Edinburgh, loc. cit.*, p. 61).

721. **1950** Feb. 20.1. A major flare was recorded over this complex group (βγ) on Feb. 17 at $01^h.6$ (max.). Another intense flare occurred on Feb. 21 at $23^h.7$.

724. **1950** Apr. 13.6. A big complex group (γ) that did not survive to the following rotation. A high maximum field strength of 4200 gauss was recorded at Mount Wilson.

741. **1951** Apr. 18.7. A giant complex group (γ) with numerous flares but none of outstanding intensity. The group must have developed considerably on the invisible hemisphere, its first appearance being represented by Group 16722 (No. 740). A still greater development is represented by Group 16763 (No. 743).

Ref. No.

743. **1951** May 16.0. A giant complex group (γ), the fourth largest in this catalogue. Numerous flares were recorded but none of outstanding importance, although one of them on May 18 (*Observatory*, **71**, 170, 1951) lasting from $10^h\ 20^m$ - $14^h\ 15^m$ was associated with an intense burst of solar radiation recorded on a wavelength of 10.7 cm. (*loc. cit.*, No. 707, *Ap.J.*). An increase in area had taken place on the invisible hemisphere since the preceding disk passage. (*See* Group 16745). The subsequent history of this area is represented by Group 16792 (No. 748), and the last trace was seen on July 14.

749. **1951** June 18.4. A great composite spot (γ). Although steady in area during this disk passage, the spot returned (as Group 16818, No. 752) with a mean area reduced to 539 millionths. It is noteworthy that this is the third giant group of 1951, *i.e.* nearly four years after sunspot maximum. None of these three groups was associated with a great geomagnetic storm.

ROYAL GREENWICH OBSERVATORY

Catalogues of Geomagnetic Storms

1874-1954

(I) Great Storms

(II) Small Storms

Appendices

(1) Great Storms 1840-1874

(2) Comparative Sunspot and Geomagnetic (Sq. range) Curves, 1841-1950

GREENWICH SUNSPOT AND GEOMAGNETIC-STORM DATA, 1874-1954

Blank page retained for pagination

CATALOGUES OF GEOMAGNETIC STORMS

1874-1954

CATALOGUE I - GREAT STORMS

CATALOGUE II - SMALL STORMS

RECORDED AT GREENWICH AND (SINCE 1925) AT ABINGER.

The following two catalogues supersede those given more than twenty-five years ago in *Greenwich Photoheliographic Results* 1927 pp. C 127-139 together with the provisional annual additions which have been published in *The Observatory*.

The opportunity has been taken to present the data, which have been checked throughout and revised where necessary, in an improved form. The new presentation includes (a) additional information about storm-onset when it is characterized by a "sudden-commencement": (b) the tabulation of the sunspot of largest mean area within -3.0 to +5.0 days (i.e. 40° east to 66° west) of the Sun's central meridian at storm-onset, thus including an interval of one day for a statistical travel-time of solar particles from Sun to Earth. In the 1927 catalogues, the corresponding limits were from -4.0 to +4.0 days: (c) the addition of a column giving the longitude of the Sun's central meridian when the storm began, thus enabling 27-day recurrence tendencies to be traced in the storm data: (d) Notes on special features shown by individual storms have been added, including outstanding auroral displays and any records of special antecedent solar activity.

As in previous tabulations, the lower limit of range for a great storm at Greenwich or Abinger has been adopted as 60′ in D or 300γ in H or in Z. For small storms, the lower limit for inclusion is 30′ in D or 150γ in H or in Z. The same limits apply to the period 1916 to 1924 inclusive when the north component of the Earth's magnetic field was recorded instead of the horizontal component.

The following explanatory notes are added:-

(1) The first column of each catalogue gives a sequence reference number, 1 to 112 for the great storms and 1 to 697 for the small storms. The addition of a † in Catalogue I indicates that a note on the storm has been given following the catalogue. In Catalogue II, the numeration of the storms up to 1925 is the same as that of the 1927 catalogue. The three small storms inserted during the revision have therefore been given the appropriate number with asterisk according to their date of occurrence.

(2) The storms are grouped according to the year. The interval from the beginning of the year to the epoch of the maximum of the current cycle is given in brackets to 0Y1. The adopted epochs of maximum are those published by the Federal Observatory, Zurich, viz. 1870.6, 1883.9, 1894.1, 1907.0, 1917.6, 1928.4, 1937.4 and 1947.5.

(3) The time of storm-onset is given in column 2. (When the time given in cols. 3, 5 and 6 is between 22.8^h and 24.0^h, the day of the onset of the storm will be one calendar day earlier than that given in col. 2). For the end of the storm, if it occurs on the following day or later, the date alone is given because the termination of the storm is usually much less definite than the onset. Columns 3, 5 and 6 give the onset time of the storm according to its behaviour as (a) "sudden-commencement" (SC), (b) abrupt but not a SC, (c) indefinite. In the case of a SC, the range in H is also given in col. 4. When the range appears as a fraction, it is to be understood that there is a small preliminary impulse in the opposite sense to the main impulse which is positive except in the cases of inverted SCs, the ranges of which are printed in italics, (*see M.N. Geophys. Supp.* 5, 164, 1948).

Regarding the accuracy obtainable in timing sudden-commencements, from 1874-1913, it seems permissible to give the time only to 0.1^h. From 1914, when new magnetographs were installed, the time to the nearest minute may be given, and from 1938 when the La Cour "quick-run" magnetograph was installed the time has been given to 0.1^m whenever the sharpness of the trace justified this.

(4) The ranges of the storms given in columns 7, 8 and 9 are given to the nearest minute of arc in D and to the nearest 5 gamma in H and Z. The measured lower limits of 300γ for the great storms and 150γ for the small storms were, however, adhered to before rounding off the measured ranges to the nearest 5γ. For the great storm ranges, especially in the earlier records, the 5γ unit probably overestimates the attainable accuracy.

(5) Particulars of the associated sunspots given in columns 10, 11 and 12 have been abstracted from the *Greenwich Photohleiographic Results* either from the *Ledgers* or (after 1915) from the *General Catalogue*. Prior to 1916, the published mean area of a group during its disk passage has been corrected where necessary, so as to exclude days (as has been the practice since 1916) on which the spot was 80° or more in longitude from the central meridian or, otherwise, not wholly in view.

Column 13, headed $\varphi - B_0$, gives the heliographic distance from the centre of the Sun's disk of the spot (or group of spots) at its central meridian passage, φ being the mean latitude of the spot, and B_0 the heliographic latitude of the centre of the disk.

The following is a list of instances in which a considerably larger sunspot was situated outside the adopted limits of -3.0 to +5.0 days from C.M. at the time of storm-onset.

CATALOGUE I

Ref. No.	Date	Area of Sunspot listed	Larger Sunspot outside adopted limits		Ref. No.	Date	Area of Sunspot listed	Larger Sunspot outside adopted limits	
			Area	From C.M. days				Area	From C.M. days
29	1894 Feb. 28.6	208	1277	+6.0	82	1940 Mar. 31.4	275	1189	+5.1
46	1915 June 17.1	268	767	-3.8	110	1951 Oct. 28.5	68	325	-3.4
71	1938 Jan. 25.5	168	2955	+7.1					

CATALOGUE II

Ref. No.	Date	Area of Sunspot listed	Larger Sunspot outside adopted limits		Ref. No.	Date	Area of Sunspot listed	Larger Sunspot outside adopted limits	
			Area	From C.M. Days				Area	From C.M. Days
95	1893 Feb. 4.8	91	1011	+5.5	451	1937 Sept. 30.6	177	2661	-3.8
162	1905 Aug. 2.0	28	701	-5.0	460	1938 Mar. 5.5	30	586	-4.7
205	1909 Sept. 30.2	19	619	+6.4	522	1942 Feb. 23.6	180	1549	-5.2
243	1916 May 21.0	67	1109	-5.3	532	1943 Feb. 17.2	0	649	+5.5
252	1917 Feb. 15.6	182	2176	+6.1	536	1943 July 9.3	8	550	-4.2
296	1920 Sept. 22.1	0	532	-6.5	540	1943 Sept. 2.7	0	691	-3.4
298	1921 May 19.8	10	1324	+5.1	543	1943 Oct. 8.4	0	575	+5.3
321	1925 Nov. 8.8	125	765	-4.8	559	1945 Mar. 14.0	0	451	+5.1
422	1935 Sept. 10.7	0	384	+5.1	681	1952 Nov. 26.8	11	919	+5.1

The small number of cases in Catalogue I in which a significantly larger sunspot was beyond the adopted limits at the time of storm-onset illustrates the statistical relationship between the greater magnetic storms and the larger sunspots.

The following are the chief amendments that have been made during the present revision and extension of earlier published data:-

CATALOGUE I

Ref. No. 18. 1892 Mar. 6. In the 1927 catalogue, a small sunspot (Group 2441) of mean area 11 millionths had been omitted. With the present adopted limits (-3.0 to +5.0 days) that spot is now replaced by Group 2439 of mean area 48 units.

No. 24. 1892 July 16. Range in D corrected from 89′ to 78′.

No. 66. 1937 Feb. 3. This storm has been inserted and that of Apr. 25 (*Observatory* list for 1937) transferred to Catalogue II.

No. 80. 1940 Mar. 24. Range in H corrected from 1000γ to 1370γ and the Z range corrected from 800γ to 1000γ.

CATALOGUE II

No. 25*. 1882 Nov. 21.6. This storm has been inserted.

No. 104. 1894 Jan. 3.7. The range in D has been corrected from 37′ to 57′ and the H range from 152γ to >345γ. However, the storm has been retained in Catalogue II, because the range in Z is far below that of great-storm level.

No. 229*. 1914 Oct. 28.1. This storm has been inserted.

No. 243*. 1916 July 1.0. This storm has been inserted.

No. 317. 1925 Sept. 1.7. The D and H ranges have been revised as also for Nos. 318 and 319.

No. 328. 1926 May 3.9. From this storm to the end of 1927, the present list supersedes that given in the 1927 catalogue.

Storm Commencements. In the re-examination of magnetograms, the following small storms (Catalogue II) were found to be preceded by "sudden-commencements" (SCs) that had been omitted from the 1927 catalogue but which appear sufficiently distinctive to warrant inclusion here:-

Nos. 58, 173, 201, 231, 238, 243*, 271, 283 and 327.

The onset of No. 21 has been revised from *SC* to *i* (indefinite), the SC on July 31 at 14.3^h having occurred during the revised period of the storm.

The following storm-onsets were changed from *SC* to *a* (abrupt):-

Nos. 10, 11, 98, 117, 145, 146, 156, 162, 164, 183, 198, 202, 204, 229, 252 and 322.

All times throughout the two Catalogues and in the notes to Catalogue I are expressed in Universal Time (U.T.). Areas of associated sunspots are corrected for foreshortening and expressed in millionths of the Sun's hemisphere.

CATALOGUE I. - GREAT GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.	ΔH	a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	φ $-B_0$	
		h	γ	h	h	′	γ	γ					°
	1874.0 (+3.^{y}4)									1874			
1	Oct. 3.6- 4	13.9	53			57	>235	325	127	Oct. 4.6	984	-19	57
	1880.0 (-3.^{y}9)									1880			
2	Aug. 12.5-14			11.7		66	>300	385	343	Aug. 13.9	302	+18	253
	1881.0 (-2.^{y}9)									1881			
3	Jan. 30.8			19.7		75	330	365	412	Jan. 30.0	418	- 7	155
4	Sept. 12.5-13				12	65	335	345	566	Sept. 9.9	519	+ 6	66
	1882.0 (-1.^{y}9)									1882			
5†	Apr. 17.0	23.5	9/162			>59	>455	>1040	729	Apr. 19.1	1892	-23	93
6	Apr. 20.2	03.6	23/109			>68	>300	>340	729	Apr. 19.1	1892	-23	51
7	June 24.5	12.4	13/52			50	325	235	780	June 19.6	217	+20	266
8	Aug. 4.7- 5	15.8	30/127			36	335	260	808	Aug. 1.6	350	-18	82
9†	Nov. 17.4-18	10.2	>180			115	>565	>1060	885	Nov. 18.8	1928	+17	139
	Nov. 20.0				00	85	>1090	>1040	885	Nov. 18.8	1928	+17	105
	1883.0 (-0.^{y}9)									1883			
10	Apr. 3.4- 5			09.0		58	190	315	987	Apr. 3.4	543	+20	135
11	Sept. 16.1-17	02.7	9/93			52	345	>240	1114	Sept. 13.9	974	-29	104
	1884.0 (+0.^{y}1)									1884			
12	July 2.8- 4	19.3	11/167			41	330	295	1419	July 2.1	434	-16	228
	1885.0 (+1.^{y}1)									1885			
13†	Mar. 15.4-16			10.7		54	170	370	1622	Mar. 16.2	244	+12	96
14	May 25.6-26	13.7	30/113			31	360	125	1672	May 24.3	531	+15	237
	1886.0 (+2.^{y}1)									1886			
15	Mar. 30.3-31			08.3		73	>335	285	1860	Mar. 30.8	487	-10	122
	1891.0 (-3.^{y}1)									1891			
16	May 13.3-16			08.3		52	340	>330	2211	May 10.7	235	-22	280
	1892.0 (-2.^{y}1)									1892			
17	Feb. 13.2-14	05.5	9/64			>73	>540	>635	2421	Feb. 11.9	2638	-22	238
18	Mar. 6.4- 7			09.7		49	>290	325	2439	Mar. 1.7	48	-12	306
19	Mar. 11.9-13	22.5	144			74	295	375	2440	Mar. 10.6	423	-21	233
20	Apr. 25.6-27				14	58	390	395	2486	Apr. 23.8	575	+15	4
21	May 18.4-19	08.4	61			75	300	480	2515	May 16.8	705	-12	63
22	June 27.2	05.0	20			36	305	>315	2567	June 25.0	337	+ 9	256
23†	July 12.7-14	17.8	10/268			34	520	285	2581	July 10.2	1691	+ 7	50
24†	July 16.5-17			12.6		78	590	370	2583	July 14.0	832	-36	360
25	Aug. 12.5-13			12.6		75	540	405	2615	Aug. 11.5	277	-37	3
	1893.0 (-1.^{y}1)									1893			
26	Aug. 18.0	00.2	12			34	250	>350	3131	Aug. 20.5	220	-19	153

CATALOGUE I. - GREAT GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T.				RANGES			Group No.	C.M.P.	Area	$\varphi - B_0$	
		S.C.		a	i	D	H	Z					
	1894.0 ($-0.^y1$)	h m	ΔH γ	h	h	′	γ	γ		1894			°
27	Feb. 22.9-24	22.5	32			52	>260	390	3412	Feb. 22.6	1277	-25	182
28	Feb. 25.3-26	07.8	*47/122*			74	400	>270	3412	Feb. 22.6	1277	-25	150
29†	Feb.28.6-Mar.1	15.2	78/226			49	340	>230	3413	Feb. 25.2	208	-19	107
30	Mar. 30.7-31				17	57	325	470	3464	Apr. 2.5	977	+28	71
31	July 20.2-21	06.0	43			63	690	>520	3624	July 17.1	588	-17	36
32	Aug. 20.1	02.9	134			66	>445	>530	3668	Aug. 17.1	1336	0	347
33	Sept.14.0-15	01.2	52			40	300	430	3701	Sept.12.4	430	-22	18
34	Nov. 13.6-14	14.1	3/54			50	350	500	3793	Nov. 10.5	147	-25	300
	1898.0 ($+3.^y9$)									1898			
35	Mar. 15.0-16	00.8	6/47			83	>345	>520	4702	Mar. 11.6	981	- 6	74
36	Sept. 9.5			12.0		57	>365	480	4781	Sept. 9.2	1636	-19	235
	1900.0 ($+5.^y9$)									1900			
37	May 5.1	03.1	26			30	210	370	4924	May 2.6	137	- 2	204
	1903.0 ($-4.^y0$)									1903			
38†	Oct.31.2-Nov.1	06.0	68			119	1175	1440	5098	Oct. 31.7	493	-23	304
39	Dec. 13.5-14			12.5		60	>135	>355	5129	Dec. 14.0	310	+21	94
	1907.0 ($0.^y0$)									1907			
40	Feb. 9.6-10	14.2	20/96			95	>225	>460	6108	Feb. 12.4	1860	-10	343
	1908.0 ($+1.^y0$)									1908			
41	Sept.11.9-12	21.8	133			84	>355	>445	6520} 6522}	Sept.10.0	743	+ 6	241
42†	Sept.29.1-30	01.4	11/82			>65	400	380	6533	Sept.26.7	417	+ 2	14
	1909.0 ($+2.^y0$)									1909			
43†	Jan. 3.5- 4				12	71	>120	150	6591	Jan. 3.2	656	+12	183
44	May 14.2-15	05.0	75			50	430	>355	6669	May 13.7	669	-14	260
45†	Sept.25.4			08.4		193	1710	>1080	6728	Sept.23.8	619	-12	285
	1915.0 ($-2.^y6$)									1915			
46	June 17.1-18	01 52	34			71	>375	>295	7299	June 18.5	268	0	53
	1917.0 ($-0.^y6$)									1917			
47	Aug. 9.2-10	04 11	7/74			55	315	225	8181	Aug. 10.2	2389	+10	142
48	Aug. 13.6-15	14 24	*42*			40	380	335	8181	Aug. 10.2	2389	+10	84
	1918.0 ($+0.^y4$)									1918			
49	Aug. 15.7-16	15 51	14/142			30	370	155	8631	Aug. 16.6	933	+ 3	278
	1919.0 ($+1.^y4$)									1919			
50	Aug. 11.3-12			06 56		58	>360	>720	8994	Aug. 9.2	543	-13	198

CATALOGUE I. - GREAT GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.	ONSET U.T. a	ONSET U.T. i	RANGES D	RANGES H	RANGES Z		Group No.	C.M.P.	Area	$\varphi - B_0$	
	1920.0 (+2.y4)	h m	ΔH γ	h m	h	′	γ	γ		1920			°
51	Mar. 4.5- 5	11 36	5/43			64	240	280	9133	Feb. 29.0	267	- 3	360
52†	Mar. 22.4-23	09 11	*24*			86	730	>490	9143	Mar. 21.7	1966	+ 2	125
	1921.0 (+3.y4)									1921			
53†	May 13.6-17	13 10	13/178			110	>740	>460	9334	May 14.7	1324	+ 3	18
	1926.0 (-2.y4)									1926			
54†	Jan. 26.7-27			16 20		60	>420	>205	9861	Jan. 24.5	3285	+26	8
55†	Feb. 23.7-25			16 30		60	305	>205	9880	Feb. 19.1	518	-13	358
56	Apr. 14.6-15	14 03	9/78			70	455	>205	9917	Apr. 12.2	139	+18	61
57†	Oct. 13.8-16	19 26	39			112	>430	>600	10062	Oct. 11.1	986	+12	171
	1927.0 (-1.y4)									1927			
58	July 21.9-22	21 04	98			59	310	335	10342	July 19.1	185	-18	62
59	Aug. 20.3-21	06 36	*14/39*			43	320	205	10362	Aug. 21.0	221	+ 4	33
60	Oct. 12.4	10 25	*10/70*			56	350	240	10406	Oct. 10.6	334	-18	52
	1928.0 (-0.y4)									1928			
61	May 27.5-29				13	35	335	210	10613	May 27.8	108	+14	283
62	July 7.9- 8				22	84	>540	470	10658	July 7.4	513	-31	96
	1929.0 (+0.y6)									1929			
63	Feb. 27.3-28	07 34	21/38			74	370	240	10879	Feb. 27.8	183	+13	245
64	Mar. 11.6-13	13 55	47/140			47	305	290	10889	Mar. 10.8	1084	- 2	82
	1932.0 (+3.y6)									1932			
65	May 29.5-30				11	38	340	265	11491	May 26.4	314	+ 5	56
	1937.0 (-0.y4)									1937			
66	Feb. 3.0			23 02		42	305	145	12204	Jan. 31.1	1734	- 4	158
67	Apr. 26.7-27	17 54	52			44	400	275	12320	Apr. 24.7	1674	+24	147
68	Apr. 27.8-28				19	42	>310	260	12320	Apr. 24.7	1674	+24	133
	1938.0 (+0.y6)									1938			
69	Jan. 16.9-17	22 35	171			46	370	290	12673	Jan. 18.4	2955	+22	245
70	Jan. 22.2-23			05 30		57	725	240	12673	Jan. 18.4	2955	+22	175
71†	Jan. 25.5-26	11 48	10/43			126	1055	570	12682	Jan. 26.5	168	+26	132
72†	Apr. 16.2	05 49	32/111			307	1375	500	12777	Apr. 14.2	1098	+32	148
73†	May 11.7-13	15 54	39/109			79	960	420	12808	May 10.4	713	- 4	171
	1939.0 (+1.y6)									1939			
74	Feb. 24.7-25	17 08	29			65	295	330	13189	Feb. 26.8	189	+36	317
75†	Apr. 16.9-17	21 27.4	43			53	350	310	13235	Apr. 16.0	685	+19	2
76	Apr. 24.7-26	17 36.6	162			46	555	170	13247	Apr. 26.5	953	-11	259
77	Aug. 16.5-17				11	34	345	185	13379	Aug. 16.0	453	-25	193
78	Aug. 22.0-23	00 40	81			47	300	360	13387	Aug. 22.0	927	+ 6	120
79	Oct. 13.1-15	02 05.0	78			52	315	250	13446	Oct. 12.0	456	-12	153

CATALOGUE I. - GREAT GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		ONSET U.T. a	ONSET U.T. i	RANGES D	RANGES H	RANGES Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1940.0 (+2.^{y}6)	h m	ΔH γ	h m	h	′	γ	γ		1940			°
80†	Mar. 24.6-26			13 48		131	1370	1000	13555	Mar. 26.3	1189	+19	158
81†	Mar. 29.7-31	16 03	134			70	640	550	13555	Mar. 26.3	1189	+19	91
82†	Mar.31.4-Apr.1	09 41.3	108			56	620	245	13568	Apr. 2.2	275	- 6	69
83	June 25.1-26	02 53.8	32			52	470	250	13629	June 25.4	683	-18	16
	1941.0 (+3.^{y}6)									1941			
84†	Mar. 1.2- 2	03 57.5	45			186	1650	1310	13814	Feb. 27.3	416	+22	329
85†	July 4.2- 5	03 42.2	44			78	945	745	13886	July 3.9	490	+10	118
86†	Sept.18.2-20				05	123	1250	1115	13937	Sept.16.9	1862	+ 5	193
	1942.0 (+4.^{y}6)									1942			
87†	Mar. 1.3- 2			07 29		86	510	175	14015	Feb. 28.8	1549	+14	190
	1943.0 (+5.^{y}6)									1943			
88	Aug.28.5-Sept.1	12 52.5	187			48	320	260	14170	Aug. 25.8	27	-21	191
	1944.0 (+6.^{y}6)									1944			
89†	Apr. 1.8- 3				19	38	380	105	-	-	-	-	207
90	Dec. 15.8-17	18 52.8	27			69	265	415	14238	Dec. 14.5	650	-21	39
	1946.0 (-1.^{y}5)									1946			
91†	Feb. 7.4- 8	10 19.3	*42/110*			78	525	375	14417	Feb. 5.7	4779	+33	275
92	Mar. 23.7-27				17	88	420	615	14461	Mar. 20.8	260	-13	52
93†	Mar. 28.3-29	06 35.6	*64/162*			162	1660	920	14471	Mar. 27.0	492	+28	351
94	Apr. 23.3-25				07	91	580	570	14501	Apr. 26.1	640	+38	8
95†	July 26.8-27	18 46.5	320			76	925	615	14585	July 26.9	3958	+17	198
96†	Sept.21.7-24	17 13.5	5/113			136	925	450	14643	Sept.19.8	767	+13	165
	1947.0 (-0.^{y}5)									1947			
97	Mar. 2.2- 4	03 59.8	33			60	480	345	14838	Feb. 28.4	697	+28	198
98	Apr. 17.5-18	12 25.8	22/52			67	375	345	14905	Apr. 19.8	226	-14	307
99	July 17.7-19	17 48.5	208			40	510	135	15069	July 20.5	965	+ 8	180
100	Aug. 22.4-25	09 10.8	*91/174*			54	465	145	15116	Aug. 18.9	192	+12	69
101	Sept.23.5-25	12 29.4	21/91			67	310	340	15174	Sept.25.5	671	+11	4
	1948.0 (+0.^{y}5)									1948			
102	Aug. 8.0- 9	23 00	9/82			47	345	270	15646	Aug. 8.9	790	-22	108
	Aug. 9.5-11				13	36	275	165	15646	Aug. 8.9	790	-22	88
103	Oct. 17.9-19	22 10.5	82			59	435	290	15743	Oct. 17.3	946	+ 7	251
	1949.0 (+1.^{y}5)									1949			
104†	Jan. 24.8-25	18 27.6	93			71	430	315	15871	Jan. 22.9	2213	+28	29
	Jan. 25.6-26				15	83	595	490	15871	Jan. 22.9	2213	+28	18
105†	May 12.3			06 40		76	705	535	16042	May 11.5	359	-13	51
106	Oct. 15.3-17	08 07.9	*82/201*			46	345	210	16250	Oct. 17.2	405	+ 9	148

CATALOGUE I. - GREAT GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM							LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.	a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1950.0 (+2.^{y}5)	h m	ΔH γ	h	′	γ	γ		1950			°
107†	Feb. 20.0-22	23 40.4	30		120	425	360	16410	Feb. 20.1	1853	+17	266
108	Aug. 18.7-20	15 38.9	22		61	305	460	16592	Aug. 21.2	412	-17	52
	1951.0 (+3.^{y}5)								1951			
109	Sept.25.5-26			13	101	455	395	16869	Sept.22.6	378	+ 8	135
110	Oct. 28.5	11 53.1	45/90		84	545	420	16891	Oct. 25.6	68	+ 4	59
	1952.0 (+4.^{y}5)								1952			
111	Apr. 21.5-22	11 49.9	27		60	340	195	16968	Apr. 18.6	438	- 4	260
112	June 29.8-30	19 32	40		29	320	205	17001	June 29.2	555	-12	63

THE GREATEST STORMS

Of the above 112 great storms, the following tabulated in order of date were of outstanding magnitude.

Date of Storm	RANGES D	H	Z	Area of Associated Sunspot	Interval from Sunspot Maximum
	′	γ	γ		y
1882 Nov. 17.4, 20.0	115	>1090	>1060	1928	-1.0
1903 Oct. 31.2	119	1175	1440	493	-3.2
1909 Sept.25.4	193	1710	>1080	619	+2.7
1921 May 13.6	110	≫740	≫460	1324	+3.8
1938 Jan. 25.5	126	1055	570	168†	+0.7
1938 Apr. 16.2	307	1375	500	1098	+0.9
1940 Mar. 24.6	131	1370	1000	1189	+2.8
1941 Mar. 1.2	186	1650	1310	416	+3.8
1941 Sept.18.2	123	1250	1115	1862	+4.3
1946 Mar. 28.3	162	1660	920	492	-1.3
1946 Sept.21.7	136	925	450	767	-0.8

† See note to this storm (No. 71).

For storms of outstanding range during the period 1840 to 1874, see the following dates in the last table of this section (p. 102):- 1841 Sept. 24, 1847 Sept. 24 and Oct. 23, 1848 Nov. 17, 1859 Sept. 2 and 1872 Feb. 4.

CATALOGUE I. - GREAT GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

NOTES

Ref. No.

5. **1882** Apr. 17.0. This storm, with its notable range in Z of more than 1040γ was the first and more active of a pair of storms, the second following on Apr. 20. A brilliant display of the Aurora Australis was seen from New Zealand on Apr. 17, the culmination of the display being about 7 p.m., or $07\frac{1}{2}^h$ U.T. (*Symons' Meteorological Magazine* **17**, 72, 1882). At about the same time (U.T.), or perhaps half-an-hour earlier, the climax of a display of the Aurora Polaris was recorded in Illinois (E. L. Larkin, *ibid.* p. 104). At Greenwich, where it was daylight, the Z trace had reached a very low minimum at $06^h.1$ and was passing to a high maximum value at about 13^h, the overall range exceeding 1000γ. Another spectacular display of the Aurora Australis was recorded in New Zealand on Apr. 20, with its maximum near 08^h U.T., but the large distinctive movements of the Z trace at Greenwich on Apr. 17 are not repeated.

9. **1882** Nov. 17.4, Nov. 20.0. A complex storm that might have been catalogued as two separate disturbances barely separated from one another and presumably related to intense chromospheric activity over the giant sunspot (see note to No. 38 in the catalogue of large sunspots). During the auroral display associated with the storm, a moving streak of auroral light was observed at Greenwich on the evening of Nov. 17 (Maunder, *Observatory* **6**, 192, 1883).

13. **1885** Mar. 15.4. The associated sunspot was small, but a fairly extensive area of faculæ surrounded it and the neighbouring group (No. 1624), thus suggesting a large group when the region was on the Sun's invisible hemisphere.

23. **1892** July 12.7. A brilliant reversal of *Hα* (solar flare), 32° east of the Sun's central meridian, was observed over Group 2583 on July 11 at $11^h.7$. (*Astronomy and Astrophysics* **11**, 815, 1892). A synchronous geomagnetic "crochet" (ΔH = -30γ) was recorded on the Greenwich magnetograms. The time-interval between the flare and the storm-onset was 30 hours. A larger spot group, No. 2581, was nearer the central meridian and is accordingly listed in the catalogue.

24. **1892** July 16.5. An extensive solar flare was recorded $19\frac{1}{2}$ hours before storm-onset on K spectroheliograms - the first flare to be thus recorded (Hale, *Ap.J.*, **73**, 384, 1931). The associated spot (Group 2583) was then 22° west of the Sun's central meridian.

29. **1894** Feb. 28.6. A much larger sunspot (Group 3412) of mean area 1277 millionths was 80° W of the central meridian.

Ref. No.

38. **1903** Oct. 31.2. The chromosphere over the associated sunspot (mean area 493 millionths) was active, brilliant reversals of *Hα* being recorded by A. Fowler on Oct. 31 and less brilliant ones on Oct. 29 and 30 (*Nature* **69**, 6, 1903). Evidence of the occurrence of an intense flare 28 hours before the onset of the storm is provided by the record of a strong "crochet" on the Zo-Sé magnetograms (M. Burgaud, *Observatoire de Zi-Ka-Wei*, XI, 1951). The storm itself, the most notable since the dual storm of 1882 Nov., was of great intensity from 12^h to 21^h and ended abruptly after 25 hours duration. Auroral displays were recorded from England, Hungary and New York, the telegraphic services being seriously dislocated (Maunder, *Knowledge* **26**, 277, 1903).

42. **1908** Sept. 29.1. The spot associated with this storm had an area of only 417 millionths, but significantly it was the return of a big group (No. 6510) with a mean area of 1519 millionths.

43. **1909** Jan. 3.5. Although the storm had an indefinite onset a SC occurred at $18^h.6$ (ΔH = +50γ).

46. **1909** Sept. 25.4. This notable storm subsided rapidly after about ten hours of great intensity. The abrupt impulse listed as occurring at $08^h.4$ was evidently followed by a typical large SC at $11^h\ 42^m$, lost on the Greenwich traces in the violent onset-movements. The SC clearly appears on the Alibag magnetograms with a range of +100γ in H. The Aurora Australis was recorded from Australia and the Cape (Journ. B.A.A. **20**, 40 and 97, 1909). An intense solar flare occurred 25 hours before storm-onset (22.3 hours if the obscured SC be taken) over the northern sunspot (Group 6728). See W. J. S. Lockyer, *M.N.* **70**, 12, 1909. A geomagnetic crochet (ΔH = -40γ), synchronous with the flare (Sept. 24, 10^h - $12^h.5$), was recorded at Greenwich.

52. **1920** Mar. 22.4. The great auroral display associated with this storm was covered by collective observations from Australia, Europe and North America from Mar. 22^d 13^h to Mar. 23^d 05^h. During this period the Z value at Greenwich decreased from a high positive range (off the sheet) at about 17^h to a low minimum value at about 03^h, representing a range >490γ (W. Housman, *Mem. B.A.A.* **29** IV, 1931; J. P. Henderson, *Journ. R.A.S. Canada* **14**, 127, 1920; G. Hartnell, *Terrestrial Magnetism* **25**, 59, 1920).

53. **1921** May 13.6. The great auroral display associated with this complex storm was widely observed. It was seen from as near to the equator as Samoa and was also visible at Watheroo in bright moonlight. In the United

continued

CATALOGUE I. - GREAT GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

NOTES - *continued*

Ref. No.

53. States the display was described as "almost unique for native Californians". (*Terr. Mag.* **26**, 98 and 118, 1921: *Mem. B.A.A.*, *loc. cit.*).

54. **1926** Jan. 26.7. This storm was preceded by two notable solar flares recorded over the great sunspot on Jan. 24^d $19^h.7$ and Jan. 25^d 20^h, giving time-intervals of 48 hours and 24 hours respectively. (G. E. Hale, *Ap.J.* **73**, 396, 1931).

55. **1926** Feb. 23.7. This storm was undoubtedly associated with a spot that was the return, with greatly diminished area, of the giant spot associated with storm No. 54. An extensive flare, consisting of brilliant filaments, was recorded at Kodaikanal on Feb. 22 at $02^h.3$ lasting for more than seven hours (T. Royds, *M.N.* **86**, 381, 1926). On account of its rather larger size Group 9880 has been tabulated, according to the procedure herein adopted.

57. **1926** Oct. 13.8. A SC ($\Delta H = +39\gamma$) occurred on Oct. 13 at 19^h 26^m but the storm did not develop until Oct. 14.7. An intense solar flare was recorded on Oct. 13 at $13^h.2$ over Group 10065 which had a mean area of 527 millionths and was thus smaller than the associated group listed in the catalogue.

71. **1938** Jan. 25.5. The associated auroral display was the greatest seen from the south of England for many years, and it was also visible as far south as Italy, Madeira, and Bermuda. The Aurora Australis was recorded at sea in latitude $34^\circ.9$ S. The display as witnessed from Sussex is described in detail by Capt. Barlow (*Quarterly Journ. R. Met. Soc.* **64**, 215, 1938). Red auroral emission over the North Sea was measured by Störmer to a height of 600 kms. (*Nature* **141**, 955, 1938). This geomagnetic storm apparently had its origin in a solar flare which occurred 33 hours earlier at the extreme position of 82° west of the Sun's central meridian over Group 12673. The statistical limits of distance from the C.M. require Gr. 12682 of mean area 168 millionths to be tabulated in the catalogue against this storm.

72. **1938** Apr. 16.2. The listed ranges of this intense, short-lived storm occurred between $05^h.8$ and 08^h. The storm was completely over by 16^h.

73. **1938** May 11.7. The most noticeable features of this fairly intense storm of rather short duration were (1) a high positive peak in H at $17^h.9$ matched by a lesser positive peak in Z, (2) a deep dip in H at $23^h.7$, a similar negative dip in Z at $23^h.8$, and a synchronous eastwards peak in D. The pattern of the traces suggests an aurora going southwards over Greenwich.

Ref. No.

75. **1939** Apr. 16.9. A second and larger SC ($\Delta H = -4/+113\gamma$) occurred at 01^h $56^m.5$.

80. **1940** Mar. 24.6. The most active period of this storm lasted from 16^h on Mar. 24 to 05^h on Mar. 25, though H remained agitated for some hours afterwards. H reached its highest value at $16^h.7$, and low values occurred at $21^h.3$ and $0^h.6$ (Mar. 25). Maximum Z was reached in a series of four peaks between $16^h.2$ and $18^h.2$ and minima occurred at $21^h.3$ and $0^h.5$. The moon was full on Mar. 23, $19^h.5$, so that the conditions for observing an auroral display were unfavourable. At Alibag the storm was the severest for 70 years (*Terr. Mag.* **45**, 352, 1940). A major solar flare (magnitude 3+) was recorded on Mar. 23 at $11^h.3$ 37° east of the C.M. over the big sunspot listed (time-interval = 26.6 hours). A crochet synchronous with the flare had the large range in H of -64γ.

81., 82. **1940** Mar. 29.7, 31.4. The first of this pair of storms (like the preceding storm on Mar. 24) was associated with a large sunspot (Group 13555), active in solar flares. One of these, of magnitude 3, occurred 47.6 hours before storm-onset on Mar. 29. Another flare, of comparable magnitude, was recorded on Mar. 30 at 55° W of the C.M. and 32.1 hours before the onset of the storm on Mar. 31. Because of the statistical limits of position imposed in the tabulation, Group 13568 and not Group 13555 (the probable source of disturbance) had to be listed in the catalogue for storm No. 82.

84. **1941** Mar. 1.2. This very intense storm was accompanied by an "unusual display of dark red aurora", as recorded from Scotland (*Meteorological Magazine*, 1941 in MS.). The intense part of the storm occurred between 14^h and 19^h, after which the storm quickly subsided. Although no direct observation of an intense antecedent flare appears to have been recorded, a geomagnetic crochet was recorded at Abinger on Feb. 28 with onset at 09^h $28^m.9$, rising rapidly in 1.1 mins. to a maximum and ending at 10^h 0^m, the range in H being -28γ. This gives an effective time-interval from this undoubted U-V flare-effect to the storm-onset of 18½ hours. (See No. 13 List A, pp. 202-208, *M.N. Geophys. Supp.* **5**, 1948).

85. **1941** July 4.2. A distinctive SC (as tabulated) occurred 25 hours before the violent period of this storm began, with a probable second SC on July 5 at 04^h $59^m.7$. An intense solar flare, lasting 5½ hours, over the active spot Group No. 13886, was observed 36.4 hours before this second SC. A notable feature of the storm-traces was the swing in H at 12^h on July 5 from negative values to a high positive peak at $12^h.8$, with

continued

CATALOGUE I. - GREAT GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

NOTES - *continued*

Ref. No.

85. secondary positive peaks at $14^h.7$ and $15^h.5$. Z reached a high positive peak at $12^h.6$ and a slightly higher one at $14^h.7$. The storm ended abruptly soon after 23^h on July 5.

86. **1941** Sept. 18.2. This intense storm was accompanied by an auroral display in the eastern United States, unparalleled for many years. The display was seen as far south as Florida (McNish, *Terr. Mag.* **46**, 461, 1941). An intense solar flare occurred 20 hours before the onset of the storm at a position 9° W of the C.M. over the big sunspot listed (*Observatory* **64**, 161, 1941). A synchronous crochet ($\Delta H = -29\gamma$) was registered at Abinger.

87. **1942** Mar. 1.3. This storm, with relatively small range in Z, was associated with giant pulsations superimposed on the storm-traces from $14\frac{1}{2}^h$ to 17^h on Mar. 1. Their period was about 4 minutes and their amplitude in H about 80γ. The solar antecedent of the storm appears well-established - an extensive flare over the sunspot on the central meridian and a strong synchronous crochet ($\Delta H = -69\gamma$) giving an effective travel-time of $19\frac{1}{2}$ hours for solar particles from Sun to Earth. During the disk-passage of the associated sunspot, solar radio emission at metre wavelengths (solar noise) was first recorded. (Appleton and Hey, *Phil. Mag.* **37**, 73, 1946).

89. **1944** Apr. 1.8. The Sun was spotless from Mar. 31 to Apr. 6. The spot group previous to this period (No. 14191) crossed the C.M. on Mar. 25.1. This storm, with indefinite onset appears to be a member of a long-continued 27-day sequence (solar M-region storm).

91. **1946** Feb. 7.4. A brilliant and extensive solar flare, with its maximum 17.5 hours before storm-onset, occurred 19° W of the C.M. over the great sunspot. (See note to No. 609 in sunspot catalogue).

93. **1946** Mar. 28.3. A remarkable feature of this storm was the very large positive excursion of H from about $12\frac{1}{2}^h$ to $15\frac{1}{2}^h$ with its highest peak at $13^h.5$. The Z trace showed large rapid movements with an extreme negative value at $13^h.2$. The D trace was also violently disturbed over this period. A display of the Aurora Australis was observed from Watheroo (lat. 30°.S) from $11^h\ 35^m$ to $14^h\ 15^m$ (U.T.). At $13^h\ 30^m$ "very bright rays appeared to originate from the arch and converged to a point 10° north of the zenith". (W. Parkinson, *continued*

Ref. No.

93. *Terr. Mag.* **51**, 298, 1946). Although the associated sunspot listed showed no distinctive features, a solar flare of magnitude 3, lasting for more than three hours, was observed in its vicinity about 25 hours before storm-commencement.

95. **1946** July 26.8. The solar antecedent of this storm was a great flare - one of the most brilliant and extensive ever recorded (see note to No. 614 in the sunspot catalogue). The time-interval between flare-maximum and storm-onset was 26.3 hours. The storm subsided abruptly soon after 10^h on July 27, *i.e.* duration about $15\frac{1}{2}$ hours. Because of the high intensity of the flare, it is surprising that no geomagnetic crochet appears on the Abinger traces at $16^h\ 27^m$ on July 25 (flare-maximum). Weak disturbance was present, but the movements were quite insufficient to obscure even a small crochet. A definite crochet, however, appears on the San Juan magnetogram reproductions published by the U.S. Coast and Geodetic Survey, Washington. On the magnetograms from Cheltenham and Tucson crochets, if present, are not distinctively shown.

96. **1946** Sept. 21.7. Following the SC listed, quiet conditions prevailed for eleven hours, followed by moderate disturbance for about six hours. Then intense disturbance began which lasted from 10^h to 17^h on Sept. 22. Although no specific flare can be definitely assigned as the probable precursor of this storm, the associated sunspot was complex (βγ) and definitely active in flares.

104. **1949** Jan. 24.8, 25.6. This storm was associated with a great auroral display seen at its best in Scotland, the sky being generally cloudy in southern England. (J. Paton, *Observatory* **69**, 119, 1949; see also W. Jackson, *ibid.* p. 76 and *Nature* **163**, 774, 1949, for Canadian reports). A solar flare of major magnitude was observed over the big sunspot 40 hours before the geomagnetic storm began.

105. **1949** May 12.3. A major solar flare occurred 10° E of the C.M. on May 10 and $34\frac{1}{2}$ hours before this storm began.

107. **1950** Feb. 20.0. A flare of magnitude 3+ occurred over the associated giant sunspot 70.1 hours before the tabulated onset-time of the storm. An interval of more than 15 hours elapsed between the SC and the main disturbance of the traces.

The above catalogue of great storms includes several pairs of storms (extending in three cases to triplets) with their onset-times only a few days apart. In addition to these dual or multiple storms, there are a few other storms, given under one reference number, suggesting from their double peaks of activity two separate but overlapping disturbances. The occurrences of the greatest solar flares show a similar non-random distribution (*Observatory* **70**, 233, 1950). The reference numbers of such storms are given below together with the interval in days between their respective onset-times. Earlier examples are noted in the list of great storms, 1840 to 1874, given in the last section of this volume.

Nos. 5, 6 (3.2); 9 (2.6); 18, 19 (5.5); 23, 24 (3.8); 27, 28, 29 (2.4, 3.3); 47, 48 (4.4); 67, 68 (1.1); 69, 70, 71 (5.3, 3.3); 77, 78 (5.5); 80, 81, 82 (5.1, 1.7); 92, 93 (4.6); 102 (1.5); 104 (0.8).

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1875.0 (+4.^{y}4)	h	ΔH γ	h	h	′	γ	γ		1875			°
1	Feb. 26.5-27	11.5	41			51	180	270	145	Feb. 24.5	648	+25	295
2	May 6.6- 7	15.0	68			30	140	150	157	May 2.3	639	+13	103
	1876.0 (+5.^{y}4)									1876			
3	Feb. 19.2-20	03.8	33			50	220	190	196	Feb. 16.7	587	- 6	253
4	Mar. 25.0-26	00.4	15			36	95	165	204	Mar. 25.1	352	+21	155
5	Nov. 10.8-11				20	32	70	105	..	..	0	..	345
6	Dec. 10.0-11	00.7	21			32	100	65	..	..	0	..	320
	1877.0 (+6.^{y}4)									1877			
7	Jan. 6.6- 7	14.4	33			34	150	75	..	..	0	..	317
8	May 28.8-29	18.5	36			39	175	205	..	..	0	..	242
	1878.0 (+7.^{y}4)									1878			
9	Jan. 24.0	00.6	27			30	105	60	266	Jan. 22.6	115	+13	310
10	May 14.3-15			06.2		26	160	130	..	..	0	..	295
11	June 3.3- 4			07.5		43	175	195	272	May 31.8	198	+ 9	30
	1880.0 (-3.^{y}9)									1880			
12	Mar. 17.5-18				12	34	130	115	316	Mar. 19.0	53	-10	45
13	Aug. 18.6-20	13.8	19/80			27	165	200	348	Aug. 17.4	533	+16	173
14	Sept.15.0-17				01	28	160	195	357	Sept.11.3	699	-24	170
15	Oct. 25.4-28				09	31	70	95	382A	Oct. 25.4	283	-26	357
16	Nov. 2.9- 4				22	32	115	180	384	Oct. 29.6	114	+11	246
	1881.0 (-2.^{y}9)									1881			
17	Nov. 8.5-10				11	34	145	150	598	Nov. 8.0	101	+11	34
	1882.0 (-1.^{y}9)									1882			
18	Jan. 19.7-20				16	36	120	140	650	Jan. 17.8	131	+21	163
19	Feb. 1.5- 3				13	40	140	160	658	Jan. 30.7	272	+22	354
20	Feb. 20.2				05	42	175	105	672	Feb. 18.1	244	-12	108
21	July30.7-Aug.1				17	36	190	165	808	Aug. 1.6	350	-18	149
22	Sept.11.9-13	22.7	47			22	215	No trace	833	Sept. 7.6	218	0	297
23	Oct. 2.4- 3	09.7	50			59	250	No trace	846	Sept.30.6	984	-28	26
24	Oct. 5.8- 6				18	34	225	195	848	Oct. 1.7	485	-29	342
25	Nov. 12.0-15	23.3	52			54	220	260	876	Nov. 10.0	774	-22	211
25*	Nov. 21.6-22				15	42	195	130	885	Nov. 18.8	1928	+17	83
26	Dec. 20.6-22				14	34	175	125	913	Dec. 20.0	100	+12	62
	1883.0 (-0.^{y}9)									1883			
27	Feb. 1.2- 4			05.7		35	155	95	941	Jan. 28.1	114	-21	220
28	Feb. 24.6-25	13.7	16/61			64	280	230	971	Feb. 26.7	93	- 5	273
29	Feb.27.6-Mar.3				15	33	120	140	971	Feb. 26.7	93	- 5	233
30	Mar. 26.8-30				20	32	130	145	981	Mar. 22.1	460	- 1	234
31	Apr. 24.7-26				17	40	230	115	1008	Apr. 27.7	134	+12	211
32	May 20.7-23				17	28	175	135	1028	May 16.0	228	+13	228
33	July 8.2-12				06	39	200	75	1066	July 9.5	495	-27	308

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1883 *continued*	h	ΔH γ	h	h	′	γ	γ		1883			°
34	Oct. 5.5- 6				11	41	235	140	1130	Oct. 7.8	199	-13	206
35	Oct. 16.7-17	16.1	8/59			31	125	110	1144	Oct. 18.6	1161	-15	60
36	Nov. 1.7- 3				17	38	180	140	1156	Oct. 31.5	422	-14	209
37	← Nov. 22.1-23	01.5	38			34	155	170	1181	Nov. 19.7	624	+16	300
	1884.0 (+0.^{y}1)									1884			
38	Feb. 23.6-24			14.3		32	115	75	1284	Feb. 19.1	330	- 3	149
39	Feb.29.7-Mar.3	17.2	43			30	140	115	1301	Mar. 2.7	451	+18	68
40	Apr. 24.4-25			10.2		31	140	100	1363	Apr. 20.5	283	- 5	66
41	Oct. 1.9- 3	21.8	7/104			31	195	165	1497	Sept.30.3	283	-20	104
42	Nov. 2.5- 4				13	44	225	230	1526	Nov. 2.3	131	+ 6	48
	1885.0 (+1.^{y}1)									1885			
43	Jan. 22.6				15	40	140	105	1573	Jan. 18.8	545	- 1	58
44	May 10.3			06.2		25	165	65	1661	May 7.2	284	+18	80
45	May 13.3-14			07.9		41	245	155	1662	May 9.4	130	+ 7	40
46	June 24.9-26	22.5	3/68			31	220	190	1706	June 21.5	1541	+ 9	195
	1886.0 (+2.^{y}1)									1886			
47	Mar. 19.8-20				18	33	180	65	1857	Mar. 16.0	24	- 6	262
48	Apr. 11.6-21	15.5	*12/30*			32	160	140	1864	Apr. 6.6	259	+ 1	320
49	May 8.8-15				18	44	210	190	1880	May 8.1	763	+12	322
50	June29.7-July3				16	30	175	110	..	..	0	..	354
51	July 27.6-28				14	47	245	270	1908	July 26.7	96	- 9	345
52	Sept. 7.6-15				15	25	190	110	1920	Sept. 4.7	201	+ 5	150
53	Oct. 6.5-11				12	42	140	145	1930	Oct. 5.2	72	-22	129
54	Nov. 2.6- 6				15	35	140	110	..	..	0	..	131
55	Nov.29.6-Dec.3				14	36	105	80	..	..	0	..	135
	1887.0 (+3.^{y}1)									1887			
56	Sept.25.7-28				16	47	170	210	..	..	0	..	134
57	Nov. 21.4-22				09	36	170	70	..	..	0	..	106
	1888.0 (+4.^{y}1)									1888			
58	Jan. 13.0	23.8	11			44	175	95	2030	Jan. 11.8	24	- 9	132
59	Jan. 23.5-24				13	37	130	135	2031	Jan. 23.0	53	- 4	354
60	Apr. 11.1-14				03	34	145	105	..	..	0	..	39
61	May 20.4-21	09.6	17			29	170	160	2052	May 17.8	448	- 6	240
62	June 3.0- 6			01.2		31	115	145	..	..	0	..	60
63	Oct.30.8-Nov.1	19.7	6/36			41	125	35	..	..	0	..	240
	1889.0 (+5.^{y}1)									1889			
64	Mar. 17.8-18				19	35	115	65	..	..	0	..	222
65	July 17.2	04.8	5/41			24	270	60	2092	July 18.8	321	-13	57
66	Sept. 8.8-11				19	23	150	75	..	..	0	..	69
67	Oct. 5.7- 8				16	31	95	70	..	..	0	..	73
68	Nov. 1.2- 3				06	24	175	165	..	..	0	..	83
69	Nov. 26.6-29				14	38	140	60	..	..	0	..	109

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1890.0 ($-4^y.1$)	h	ΔH γ	h	h	′	γ	γ		1890			°
70	Nov. 7.9- 8				21	34	140	100	..	..	0	..	218
	1891.0 ($-3^y.1$)									1891			
71	Feb. 11.8-15				19	26	160	120	2179	Feb. 11.8	216	+22	35
72	Mar. 2.1- 6	01.8	28			36	170	180	2186	Feb. 25.9	74	+32	154
73	Mar.31.6-Apr.2	13.9	20			27	160	150	2197	Apr. 1.1	19	-18	125
74	Apr. 7.6- 9	15.3	11/45			38	140	110	2195	Apr. 4.4	237	+26	33
75	Apr. 12.4-13				10	34	180	130	2198	Apr. 10.8	51	-10	329
76	Sept. 8.7-12				17	36	145	175	2294	Sept. 7.0	391	+18	154
77	Sept.27.8-29				19	34	140	90	2306	Sept.30.5	269	+17	262
78	Oct. 8.5	12.7	17/29			30	85	40	2315	Oct. 8.1	549	-21	121
79	Oct. 23.8-26				19	29	165	75	2325	Oct. 19.7	228	+11	280
80	Nov. 19.9-22				22	41	140	90	2349	Nov. 21.5	705	-21	282
81	Dec. 7.0			23.0		24	165	175	2357	Dec. 2.5	44	+22	57
	1892.0 ($-2^y.1$)									1892			
82	Jan. 4.8- 6	18.8	13			45	205	145	2376	Jan. 4.6	434	+25	37
83	Feb. 20.8-21	19.1	8/77			30	130	85	2429	Feb. 19.4	404	+23	139
84	Feb. 26.0-27				23	32	125	75	2434	Feb. 25.5	186	+32	70
85	Feb.29.9-Mar.5				22	41	250	180	2434	Feb. 25.5	186	+32	19
86	Mar. 24.8-26				20	28	155	120	2454	Mar. 27.2	478	+34	63
87	Apr.30.9-May 3				22	45	180	230	2492	Apr. 29.3	295	-14	294
88	May 19.6	15.3	36/91			14	155	50	2515	May 16.8	705	-12	46
89	June 2.6- 3				14	41	290	195	2534	May 30.1	1141	-18	222
90	July 26.0-29	00.3	6/43			30	190	175	2596	July 22.5	63	-26	235
91	Aug. 3.6- 5	13.9	29			26	195	150	2611	Aug. 5.7	682	+ 4	121
92	Oct. 17.5-20				13	32	160	95	2705	Oct. 20.4	74	-27	211
93	Nov. 4.1- 5	02.5	9/40			47	200	230	2716	Nov. 1.2	691	-32	340
94	Dec. 4.8- 6	20.3	8/67			38	280	>295	2757	Dec. 3.7	291	+17	295
	1893.0 ($-1^y.1$)									1893			
95	Feb. 4.8- 5				19	38	180	150	2831	Feb. 1.2	91	+31	199
96	Apr. 26.7	16.3	18/193			29	245	60	2931	Apr. 23.1	386	+26	212
97	June 9.5-11	12.9	25/77			24	180	70	3005	June 11.8	248	-13	352
98	June 18.3-20			06.8		22	195	100	3015	June 14.4	408	-21	235
99	July 15.9-16				21	47	215	175	3067	July 14.4	396	+13	230
100	Aug. 6.2- 8	03.9	40			27	280	160	3106	Aug. 7.4	1640	-24	309
101	Sept.26.5-27				11	30	160	105	3206	Sept.28.7	598	+ 1	351
102	Sept.29.6-30	13.9	15/38			33	165	80	3206	Sept.28.7	598	+ 1	311
103	Nov. 1.6- 3				14	42	165	175	3254	Oct. 28.5	235	-12	235
	1894.0 ($-0^y.1$)									1894			
104	Jan. 3.7- 4				16	57	>345	85	3325	Dec. 31.3	339	- 4	124
105	Jan. 11.8-12	19.8	38			27	185	40	3345	Jan. 9.2	222	-10	16
106	Feb. 20.8-21	20.3	7/74			38	235	155	3412	Feb. 22.6	1277	-25	210
107	Apr. 17.5-18				12	43	175	190	3485	Apr. 18.5	187	-10	195
108	May 13.5-17				13	25	190	95	3518	May 15.8	1085	-13	212
109	June 8.9-11	22.6	5/36			31	240	235	3559	June 11.6	401	-18	222
110	July 1.9- 3	21.1	63			38	155	45	3590	June 28.4	155	-15	278
111	Sept.18.6-23				14	27	145	180	3720	Sept.18.8	136	-15	318
112	Oct. 16.1-20				02	32	100	80	3738	Oct. 11.2	342	+ 4	316

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1895.0 (+0.^{y}9)	h	ΔH γ	h	h	′	γ	γ		1895			°
113	Feb. 9.6-10				15	36	160	130	3892	Feb. 8.4	434	+20	220
114	Mar. 8.6-10				15	32	100	70	3932	Mar. 11.5	146	+27	225
115	Mar. 13.5-18				13	36	180	135	3934	Mar. 12.5	227	+19	159
116	Apr. 10.6-14				15	30	175	140	3970	Apr. 7.4	156	+11	149
117	May 10.3			07.1		29	160	65	4005	May 8.5	263	-10	117
118	Oct. 12.5-17				13	36	190	130	4195	Oct. 12.2	23	-23	225
119	Nov. 9.5-13				12	41	185	155	4212	Nov. 5.6	47	-15	215
120	Dec. 7.3- 9	07.0	24			33	130	75	4235	Dec. 2.7	105	+ 2	208
	1896.0 (+1.^{y}9)									1896			
121	Jan. 2.9- 8				22	38	155	70	4262	Jan. 2.2	199	+15	219
122	Jan.29.8-Feb.5				20	30	150	95	4285	Jan. 29.7	656	- 9	224
123	Feb. 28.5				13	44	215	120	4295	Feb. 23.7	699	+23	193
124	May 2.5- 4				13	46	230	315	4348	Apr. 30.6	104	- 7	69
125	May 17.6-18				15	26	160	145	..	..	0	..	231
126	Aug. 1.5- 3				13	24	190	75	4405	Aug. 1.5	72	-14	305
127	Sept.17.8-18	18.4	6/50			35	250	130	4428	Sept.16.7	1954	+ 6	41
128	Sept.20.1				02	39	165	80	4428	Sept.16.7	1954	+ 6	10
129	Oct. 8.5-13				12	36	200	165	..	..	0	..	127
130	Nov. 5.8- 9				19	36	165	110	4456	Nov. 8.7	710	-19	114
131	Dec. 3.7- 5				16	50	125	110	4472	Dec. 4.8	238	+ 9	106
	1897.0 (+2.^{y}9)									1897			
132	Jan. 1.8- 3				19	40	160	190	4491	Jan. 4.4	133	- 9	83
133	Apr. 1.8- 2				18	27	185	105	4554	Apr. 3.2	134	+10	338
134	Apr. 19.7-21	17.8	6/42			32	175	175	4567	Apr. 16.3	146	+11	100
135	Apr. 23.3-25	06.4	16/26			29	185	95	..	..	0	..	53
136	Dec. 10.9-11				21	46	140	140	4665	Dec. 13.4	903	+13	234
137	Dec. 20.5-21				12	48	235	170	4670	Dec. 21.0	43	+ 5	107
	1898.0 (+3.^{y}9)									1898			
138	Oct. 25.7-26				16	32	110	60	4801	Oct. 28.7	645	+10	345
	1899.0 (+4.^{y}9)									1899			
139	Feb. 11.9-13				22	44	165	120	..	..	0	..	346
140	Mar. 21.7-22				16	32	145	100	4845	Mar. 21.0	445	- 2	209
141	May 15.0-16	00.6	23			30	105	65	4856	May 17.5	21	- 6	211
142	June 29.8-30	19.2	30			37	170	130	4863	June 29.3	450	+ 3	325
143	Oct. 23.6-24				14	35	95	55	..	..	0	..	236
	1900.0 (+5.^{y}9)									1900			
144	Mar. 12.9-14				22	28	170	230	..	..	0	..	187
	1901.0 (+6.^{y}9)									1901			
145	May 10.3			08.1		32	130	55	..	..	0	..	358
	1902.0 (-5.^{y}0)									1902			
146	Apr. 10.4-11			09.5		28	180	40	..	..	0	..	256
147	Aug. 21.6-22				15	32	90	60	..	..	0	..	294

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1903.0 ($-4^y.0$)	h	ΔH γ	h	h	′	γ	γ		1903			°
148	Apr. 6.0	23.4	6/51			26	190	120	5017	Apr. 8.7	413	-14	177
149	Apr. 9.0				23	18	150	25	5017	Apr. 8.7	413	-14	137
150	Oct. 12.4-14				10	40	185	175	5093	Oct. 11.6	1783	-27	193
151	Dec.30.1-Jan.1	03.3	48			37	85	100	5141	Dec. 30.2	14	+16	235
	1904.0 ($-3^y.0$)									1904			
152	June 15.7-16			16.4		32	215	155	5250	June 11.3	184	+19	171
153	Oct. 21.6-22				14	31	150	100	5331	Oct. 20.3	116	-28	281
	1905.0 ($-2^y.0$)									1905			
154	Jan. 5.7- 6				16	32	125	60	5416	Jan. 8.3	77	-14	358
155	Feb. 3.1- 4	01.8	32			47	250	85	5441	Feb. 4.2	2801	- 9	343
156	Mar. 2.6- 3			13.4		29	200	100	5471	Mar. 3.5	989	-10	342
157	Apr. 1.0- 6	01.2	86			38	245	85	5489	Mar. 31.2	378	- 9	314
158	June 9.6				14	11	165	40	5542	June 5.6	310	+11	114
159	June 22.5-23				12	17	155	50	5559	June 20.4	64	-25	304
160	July 5.9- 9	21.6	38			26	155	115	5577	July 7.9	154	-16	126
161	July 23.4-24	08.7	9/21			14	160	60	5597	July 18.5	558	+ 9	254
162	Aug. 2.0- 4			00.6		20	155	75	5609	July 31.8	28	-12	127
163	Aug.28.6-Sept.1				14	21	150	65	5638	Aug. 30.2	181	+ 9	136
164	Nov. 12.3-13			08.1		46	220	140	5706	Nov. 13.3	709	+ 3	217
165	Nov. 15.6-17	15.2	32			60	280	175	5706	Nov. 13.3	709	+ 3	173
	1906.0 ($-1^y.0$)									1906			
166	Feb. 24.5-26				12	49	140	135	5803	Feb. 22.7	234	+20	284
167	May 15.2				06	20	150	85	5869	May 15.8	589	+17	313
168	June 1.8- 4	20.0	27			18	155	75	5871	May 28.9	544	+13	80
169	July 11.5-12				13	30	220	80	5908	July 10.4	124	+15	274
170	July 29.8-31	20.0	9/62			16	175	45	5933	July 30.4	934	-21	32
171	Aug. 7.6- 8			13.5		22	175	85	..	..	..0	..	276
172	Sept.22.5-23			12.6		32	210	165	5968	Sept.17.6	378	+ 1	30
173	Dec. 21.9-23	21.5	45			44	150	120	6046	Dec. 18.6	848	-15	278
	1907.0 ($0^y.0$)									1907			
174	Jan. 14.8-15	19.6	44			36	210	40	6076	Jan. 14.8	561	- 9	323
175	Feb. 7.3- 9	08.1	7/21			28	150	85	6103	Feb. 10.1	636	- 7	13
176	Mar. 10.2-11	05.0	44			31	95	100	6140	Mar. 11.5	572	- 9	325
177	Mar. 11.7-12	17.3	10/24			38	110	125	6140	Mar. 11.5	572	- 9	308
178	Mar. 21.6-22	13.4	11/45			33	165	105	6150	Mar. 19.6	133	+16	176
179	Apr. 15.9-16				22	17	150	60	6168	Apr. 13.0	263	- 4	202
180	May 18.6-20	14.0	7/>53			25	170	100	6187	May 15.1	72	- 9	130
181	July 10.6-11	14.4	40			27	200	105	6211	July 7.2	379	0	149
182	Sept.10.1-13	01.8	18			38	125	105	6252	Sept.12.2	312	-14	55
183	Nov. 21.4			10.7		32	115	125	6308	Nov. 19.8	118	-12	182
	1908.0 ($+1^y.0$)									1908			
184	Mar. 1.5- 5				12	34	135	90	6372	Feb. 26.4	102	- 7	290
185	Mar.26.5-Apr.1				12	46	>170	190	..	..	0	..	320
186	May 25.8-26				18	27	205	130	6439	May 27.1	12	-21	244
187	July 15.6-17				14	26	170	65	6480	July 13.6	117	-19	291

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1908 *continued*	h	ΔH γ	h	h	′	γ	γ		1908			°
188	Aug. 9.0	00.1	31			28	215	105	6490	Aug. 4.7	1053	-21	329
189	Aug. 12.6-14	15.3	103			25	170	70	6494	Aug. 7.6	512	-13	281
190	Aug. 19.0	00.3	44			26	155	145	6503	Aug. 19.9	205	-22	197
191	Sept. 5.0- 6				00	34	255	175	6510	Aug. 31.2	1519	- 1	332
192	Sept. 9.5-11				11	23	175	75	6520 6522	Sept.10.0	743	+ 6	273
193	Oct. 12.5-14				13	34	105	120	6547	Oct. 13.4	26	+ 1	197
194	Oct.31.3-Nov.1	06.4	13			27	175	45	6558	Nov. 3.2	54	+ 9	309
195	Nov. 7.8-11				20	32	140	145	6561	Nov. 8.9	108	+10	210
196	Nov. 17.0-18	01.0	22			36	150	200	6569	Nov. 19.1	352	+ 8	89
197	Dec. 4.3- 6				08	32	145	90	6575	Dec. 6.4	132	-13	221
	1909.0 (+2.^{y}0)									1909			
198	Jan. 1.5- 2			11.2		30	150	175	6591	Jan. 3.2	656	+12	210
199	Jan.29.5-Feb.1				13	44	240	155	6607	Jan. 29.4	518	- 3	201
200	Mar. 19.5				12	46	185	295	6641	Mar. 16.2	55	- 6	276
201	Mar. 27.8-29	18.3	*15/65*			37	195	185	6642	Mar. 24.6	704	+18	166
202	May 18.2-19			05.1		31	255	195	6669	May 13.7	669	-14	206
203	Aug.28.7-Sept.1	17.2	6/35			26	155	80	6717	Aug. 23.7	12	-19	292
204	Sept.21.5-22			11.2		30	140	120	6728	Sept.23.8	619	-12	337
205	Sept.30.2	04.0	8			31	265	195	6732	Sept.30.8	19	- 3	222
206	Oct. 18.7-19				17	41	175	195	6746	Oct. 20.7	125	-11	338
207	Oct. 23.0	00.0	27			25	135	230	6746	Oct. 20.7	125	-11	281
208	Oct. 24.4-25				10	34	125	70	6746	Oct. 20.7	125	-11	263
209	Nov.30.1-Dec.2				02	31	205	75	6774	Nov. 27.8	767	+12	139
	1910.0 (+3.^{y}0)									1910			
210	Mar. 27.8-29				18	51	295	270	6828	Mar. 29.7	108	+22	28
211	Mar.30.8-Apr.2				19	28	165	135	6828	Mar. 29.7	108	+22	349
212	June 20.0-22			00.9		38	275	80	..	..	0	..	355
213	Aug. 21.5-22				13	24	210	145	..	..	0	..	249
214	Aug. 28.6-30				14	24	165	100	..	..	0	..	155
215	Sept.29.3			08.0		46	175	100	6886	Sept.26.9	284	-13	96
216	Oct. 5.8- 6			18.3		32	130	80	6894	Oct. 3.1	717	-21	10
217	Oct. 19.3-22	07.3	13			32	85	50	6897	Oct. 21.8	509	+ 1	192
218	Oct. 25.5-28				12	30	155	110	6897	Oct. 21.8	509	+ 1	111
219	Dec. 28.5-30				12	35	100	55	..	..	0	..	347
	1911.0 (+4.^{y}0)									1911			
220	Jan. 24.5-27				12	37	140	75	..	..	0	..	352
221	Feb. 21.5-24				11	35	205	95	..	..	0	..	344
222	Mar. 20.0-29	00.8	18			34	130	90	..	..	0	..	354
223	Apr. 8.8- 9				20	38	160	115	6940	Apr. 9.3	142	- 2	93
224	May 14.7-16				17	18	150	95	..	..	0	..	338
225	Oct. 10.7-11				17	47	135	130	..	..	0	..	168
	1912.0 (+5.^{y}0)									1912			
226	Aug. 5.7- 6				17	19	175	90	..	..	0	..	170
227	Sept.17.6-18				14	44	160	65	6999	Sept.15.3	108	-16	322
228	Oct. 14.7-16				16	32	115	55	..	..	0	..	325

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1914.0 ($-3^y.6$)	h m	ΔH γ	h	h	′	γ	γ		1914			°
229	Apr. 6.3- 7			08.0		32	145	120	7030	Apr. 5.4	425	+35	60
229*	Oct. 28.1-29				02	32	150	90	7085	Oct. 28.6	76	+18	233
	1915.0 ($-2^y.6$)									1915			
230	Sept. 22.5-30				13	32	150	130	7445	Sept. 24.0	46	+14	205
231	Oct. 14.6-16	13 50	4/18			34	120	135	7467	Oct. 13.6	326	+ 3	273
232	Oct. 22.5-26				12	48	160	140	7475	Oct. 20.1	516	-21	169
233	Oct. 31.8-Nov. 1				20	36	150	85	7488	Oct. 30.1	240	+16	47
234	Nov. 5.6- 6	14 37	18			46	235	120	7492	Nov. 2.4	131	-25	343
235	Nov. 15.8-22				19	38	125	110	7516	Nov. 18.9	98	+24	209
236	Dec. 6.5- 7				12	48	205	115	7550	Dec. 8.0	46	+20	296
	1916.0 ($-1^y.6$)									1916			
237	Jan. 10.6-13				15	37	200	50	7595	Jan. 12.0	236	+15	194
238	Mar. 8.0-10	00 41	19			39	185	255	7650	Mar. 7.9	524	-10	158
239	Mar. 16.8-21				20	31	165	125	7664	Mar. 14.4	47	+43	42
240	Mar. 29.2-Apr. 1				04	31	135	105	7671	Mar. 26.2	558	+21	238
241	Apr. 25.2-27				04	28	170	170	7702	Apr. 26.6	308	-22	242
242	Apr. 27.5-29	13 09	22/51			28	185	150	7702	Apr. 26.6	308	-22	211
243	May 21.0-25	23 01	24			34	155	115	7721	May 18.9	67	+27	260
243*	July 1.0	23 20	70			23	175	105	7751	June 27.3	254	+10	78
244	Aug. 22.8-24	18 28	72			42	230	No trace	7803	Aug. 18.2	679	+13	100
245	Aug. 26.8-27	19 42	10/84			29	240	260	..	..	0	..	47
246	Sept. 2.9- 5				21	31	170	85	7812	Sept. 5.0	83	-21	313
247	Sept. 30.3-Oct. 2				08	33	170	95	7840	Sept. 28.8	13	-22	311
248	Oct. 5.5-14				13	49	190	225	7844	Oct. 3.9	72	-28	243
249	Nov. 3.4- 9				10	36	155	60	7864	Nov. 3.4	112	+11	222
250	Nov. 11.8-13				18	20	150	30	7871	Nov. 8.7	250	+ 6	111
	1917.0 ($-0^y.6$)									1917			
251	Jan. 4.2- 5	05 03	22			45	170	250	7926	Jan. 3.5	1396	+18	127
252	Feb. 15.6-16			13.4		38	135	160	7990	Feb. 17.0	182	-11	289
253	June 23.0-25				01	33	145	95	8124	June 23.4	425	+11	46
254	July 31.4-Aug. 1				09	28	155	170	8171	July 28.6	373	-20	259
255	Aug. 20.4-23	08 24	20			46	235	280	8207	Aug. 18.9	671	-30	354
256	Aug. 25.8-26				19	30	160	110	8215	Aug. 27.1	493	-24	282
257	Sept. 5.3	06 08	39/77			33	165	75	8228	Sept. 4.8	312	-22	144
258	Sept. 29.5-Oct. 6				12	31	125	80	8270	Oct. 1.1	363	-24	184
259	Oct. 28.4-Nov. 1				10	30	165	80	8296	Oct. 25.1	276	-26	163
260	Dec. 16.3-17	08 17	4/12			59	175	260	8354	Dec. 12.1	1047	+ 8	239
	1918.0 ($+0^y.4$)									1918			
261	Jan. 29.5-Feb. 1				13	45	170	105	8421	Jan. 26.9	122	-13	16
262	Feb. 9.8-15				19	36	190	95	8428	Feb. 12.7	101	- 2	228
263	Mar. 7.9- 9	21 08	5/72			45	180	230	8446	Mar. 4.2	73	- 5	244
264	Apr. 10.9-12	20 55	51			28	135	165	8479	Apr. 5.9	669	+20	156
265	May 16.8-21				19	41	185	200	8528	May 17.5	128	-20	41
266	June 9.7-12				17	24	180	155	8558	June 5.2	197	+14	85
267	Sept. 16.0-23				00	37	190	145	8676	Sept. 14.8	631	-20	225
268	Oct. 15.5-20				11	34	175	220	8709	Oct. 17.7	635	+10	196
269	Nov. 10.5-17				12	38	130	90	8732	Nov. 6.9	90	+ 5	213

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS -3d.0 TO +5d.0				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1918 *continued*	h m	ΔH γ	h	h	′	γ	γ		1918			°
270	Nov. 24.5				11	30	85	35	8756	Nov. 26.8	663	-11	28
271	Nov. 29.6-Dec. 1	13 21	14			37	175	95	8756	Nov. 26.8	663	-11	321
272	Dec. 7.8-11				18	44	170	165	8765	Dec. 4.2	179	-16	213
273	Dec. 25.2-26	03 50	11			43	180	210	8775	Dec. 23.7	575	- 6	343
	1919.0 (+1.y4)									1919			
274	Jan. 3.8- 7	18 12	9/27			38	155	125	8783	Dec. 31.1	82	- 8	217
275	Jan. 16.5-23				13	32	150	75	8798	Jan. 17.0	205	- 3	51
276	Jan. 31.4-Feb. 5	10 42	20			38	105	45	8817	Jan. 29.3	120	+30	214
277	Feb. 13.5-16				13	32	160	60	8833	Feb. 14.5	982	+16	42
278	Feb. 21.0-24				00	36	165	90	8834	Feb. 21.1	148	+ 2	303
279	Feb. 27.8-Mar. 6				20	31	150	120	8842	Mar. 2.7	235	+14	213
280	Mar. 19.8-23				18	37	180	135	8855	Mar. 16.2	444	+24	310
281	Mar. 27.5-31				12	34	130	95	8862	Mar. 29.5	451	-13	208
282	May 2.0- 3	22 55	8/67			44	275	185	8890	May 3.3	377	-15	99
283	Aug. 18.9-20	20 54	3/19			22	190	80	9005	Aug. 19.4	1099	- 2	100
284	Sept. 18.9-21				21	38	175	210	9031	Sept. 14.8	526	- 6	50
285	Oct. 1.7- 3	16 10	5/62			36	225	190	9041	Oct. 1.9	292	- 2	240
286	Oct. 4.2- 6	04 29	17			42	210	245	9041	Oct. 1.9	292	- 2	207
287	Oct. 28.2-29				06	31	125	120	9059	Oct. 30.3	138	-19	250
288	Nov. 16.5-18				12	31	95	35	9068	Nov. 18.2	29	+ 2	356
289	Dec. 14.2-16				06	33	215	75	9083	Dec. 15.1	223	+ 5	351
	1920.0 (+2.y4)									1920			
290	Feb. 16.5-18				11	39	160	60	9119	Feb. 13.9	258	+11	224
291	Feb. 24.5-25				13	30	150	180	9128	Feb. 22.4	147	+24	119
292	Apr. 15.0-16				00	33	130	140	9157	Apr. 16.9	542	- 1	173
293	May 13.0-16	00 21	29			20	155	80	9178	May 9.3	199	+18	163
294	June 9.6-11				15	21	185	105	9189	June 5.1	361	+14	158
295	Sept. 3.2- 5				05	25	195	100	9227	Sept. 2.8	1114	-21	106
296	Sept. 22.1-23	02 15	22			36	125	85	..	..	0	..	216
297	Sept. 28.5-29				12	46	190	140	9235	Sept. 28.6	532	-18	132
	1921.0 (+3.y4)									1921			
298	May 19.8-21	20 03	5/84			53	230	75	9338	May 16.0	10	- 6	296
299	Sept. 2.1				02	28	155	105	9385	Aug. 28.7	51	-17	343
300	Oct. 7.8- 9				19	28	190	80	..	..	0	..	231
301	Nov. 16.3-18				07	34	130	70	9399	Nov. 18.3	457	+ 5	70
	1922.0 (+4.y4)									1922			
302	Jan. 8.7-10				16	36	160	No trace	9412	Jan. 10.2	33	+11	87
303	Jan. 24.5-26				13	32	165	100	..	..	0	..	239
304	Mar. 12.5-14				13	30	160	85	9432	Mar. 12.1	566	+ 2	340
305	Apr. 8.5-10				11	22	160	70	9447	Apr. 6.6	97	+16	344
306	Sept. 7.3- 9				07	29	155	90	..	..	0	..	136
307	Sept. 14.0-15				00	38	195	155	..	..	0	..	48
308	Oct. 4.8- 9				19	28	180	160	9470	Sept. 30.1	17	-15	133
309	Oct. 30.8-Nov. 3				20	34	160	70	..	..	0	..	150

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS -3d.0 TO +5d.0				Long. of C.M.
	Date	ONSET U.T. S.C.	ΔH	a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	φ-B0	
	1923.0 (+5.y4)	h m	γ	h m	h	′	γ	γ		1923			°
310	Mar. 24.5-27				13	48	230	145	9492	Mar. 21.2	27	+14	44
311	Sept. 26.1-28				03	36	155	150	..	..	0	..	111
312	Oct. 14.9-18				21	36	180	160	9513	Oct. 14.8	78	- 2	223
	1924.0 (-4.y4)									1924			
313	Jan. 29.2-30			05.5		41	135	215	..	..	0	..	262
314	June 9.6-11	14 13	22			35	170	190	9537	June 5.4	856	+31	315
315	Oct. 23.0-25				00	24	155	80	9576	Oct. 19.9	501	+17	325
	1925.0 (-3.y4)									1925			
316	June 22.7-25				(16)	31	165	115	9673	June 20.1	43	-31	4
317	Sept. 1.7- 2	17 45	40			39	205	90	9708	Aug. 28.9	240	+16	144
318	Sept. 21.1	02 15	4/60			18	180	55	9741	Sept. 23.2	331	-20	248
319	Oct. 8.8-12				19	35	210	55	9748	Oct. 4.4	116	+10	15
320	Oct. 23.4-24				10	36	170	140	9760	Oct. 20.5	815	-25	182
321	Nov. 8.8-11				20	31	95	90	9772	Nov. 3.9	125	+10	326
322	Dec. 27.6-29			14 48		29	155	85	9830	Dec. 28.6	2587	+26	43
	1926.0 (-2.y4)									1926			
323	Jan. 12.0			23 00		27	185	65	9842	Jan. 13.3	229	+29	200
324	Jan. 22.6-23	15 35	5/40			33	175	160	9861	Jan. 24.5	3285	+26	60
325	Mar. 5.4- 6	10 04	..			53	230	>150	9885	Mar. 4.0	1579	-20	230
326	Mar. 9.5-12				12	46	170	160	9891	Mar. 10.0	342	+28	175
327	Mar. 17.9-23	21 06	3/29			30	130	115	9899	Mar. 18.6	401	-12	65
328	May 3.9-13	21 15	55			31	170	125	9938	May 5.9	872	-16	165
329	June 1.5- 2			11 09		41	310	>105	9964	June 4.3	242	-15	146
330	Sept. 14.4-17			08 45		35	215	190	10040	Sept. 16.3	251	+12	199
331	Sept. 18.6-22	14 17	28			53	300	275	041	Sept. 19.7	1881	+17	144
332	Oct. 24.3-25			06.4		31	155	115	072	Oct. 22.4	169	-21	35
	1927.0 (-1.y4)									1927			
333	Jan. 7.3- 8				08	36	140	90	10138	Jan. 8.6	866	-10	124
334	Mar. 26.0-28				01	28	160	90	224	Mar. 21.8	119	- 5	181
335	Apr. 14.0-15	23 50	8/88			30	255	165	248	Apr. 12.8	541	-12	290
336	May 3.2- 5				04	34	240	145	275	May 2.0	240	-15	37
337	Aug. 29.0-Sept. 1	00 03	48			25	175	90	366	Aug. 28.7	642	-23	278
338	Oct. 22.3-24	06 41	10/101			48	300	115	423	Oct. 20.5	344	-10	282
339	Dec. 13.5-14	12 40	16			31	155	80	461	Dec. 8.8	568	-10	313
	1928.0 (-0.y4)									1928			
340	Mar. 11.3-14				08	34	160	90	10540	Mar. 7.7	411	+13	224
341	May 10.5-17				12	30	195	110	600	May 8.1	1077	-11	149
342	June 22.2-25				04	22	240	70	637	June 23.0	300	+ 8	304
343	Aug. 25.9-27	22 38	26			30	>185	115	709	Aug. 21.4	660	-19	168
344	Sept. 18.7-19	15 44	18/62			32	180	75	739	Sept. 17.3	225	-18	214
345	Sept. 24.7-26	16 25	14/75			27	155	70	746	Sept. 27.4	1770	-22	135
346	Oct. 18.3	07 27	55			53	260	235	762	Oct. 13.7	478	+ 2	182
347	Oct. 24.7-25	17 53	6/33			34	240	155	769	Oct. 21.7	311	+11	99
348	Dec. 5.7- 9				17	35	110	70	804	Dec. 5.6	1210	+ 8	266

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS -3d.0 TO +5d.0				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	φ-B0	
	1929.0 (+0.y6)	h m	ΔH γ	h m	h	′	γ	γ		1929			°
349	Feb. 17.0-18				23	36	225	145	10866	Feb. 13.0	186	+ 2	20
350	Mar. 15.6-16				14	31	120	215	889	Mar. 10.8	1084	- 3	30
351	July 10.5				11	21	290	100	986	July 10.8	778	- 9	285
352	Aug. 14.5-15			12 29		23	225	135	11020	Aug. 16.2	513	-14	183
353	Sept. 7.0	23 38	41			26	155	75	041	Sept. 4.5	280	-11	231
354	Sept.21.9-22				21	21	170	100	054	Sept.22.6	176	-28	34
355	Oct. 7.4- 9				10	31	215	70	061	Oct. 4.8	484	+ 5	190
356	Oct. 16.5-17	11 14	*6/15*			47	190	110	068	Oct. 13.4	764	-16	70
357	Nov. 2.8- 3				20	37	205	115	081	Nov. 3.7	1175	+11	203
358	Dec. 3.8- 4				19	40	145	110	100	Nov. 30.4	1050	+16	153
359	Dec. 16.5				12	35	205	100	121	Dec. 16.5	1456	+ 8	343
	1930.0 (+1.y6)									1930			
360	Jan. 4.6- 7				14	33	140	80	11151	Dec. 31.7	49	+15	94
361	Feb. 12.9-16				21	51	190	130	187	Feb. 8.6	338	-12	297
362	Mar. 11.6-16	14 40	31			36	210	120	200	Mar. 7.0	557	- 9	305
363	Apr. 6.6-12				14	34	235	130	217	Apr. 7.6	589	+ 6	322
364	Apr. 19.8-23				18	39	215	115	227	Apr. 22.5	28	+33	148
365	May 5.0-10				00	38	225	140	234	May 7.3	492	+20	307
366	May 16.6-22				14	34	230	130	235	May 12.4	85	+ 5	155
367	May 30.6-June 2				15	30	235	170	242	May 29.2	60	+13	328
368	June 12.0-14	00 44	25			24	200	95	257	June 12.3	179	+13	164
369	June 16.2-18				04	32	265	95	257	June 12.3	179	+12	109
370	July 9.6-13	14 52	18/95			28	200	160	266	July 6.2	287	0	159
371	July 24.9-26				21	31	185	70	272	July 27.5	43	- 2	317
372	Aug. 5.7-13				16	32	255	125	278	Aug. 5.7	9	-15	160
373	Aug. 14.7-15				17	>33	>170	75	280	Aug. 12.2	349	-13	41
374	Sept. 3.5- 4				13	39	170	125	292	Sept. 4.1	270	- 2	141
	Sept. 5.5- 7				11	25	170	65					113
375	Sept.18.4-19				09	46	200	125	302	Sept.19.2	50	-17	303
376	Sept.28.7-30				17	42	205	140	306	Oct. 1.0	176	0	167
377	Oct. 17.6				14	52	185	195	310	Oct. 15.4	118	+ 6	278
378	Oct. 25.7-28	16 10	*49*			32	190	130	314	Oct. 28.7	505	-11	171
379	Oct. 28.7-30				17	28	185	60	314	Oct. 28.7	505	-11	131
380	Nov. 14.7-15				17	20	180	95	..	..	0	..	267
381	Nov. 23.8-26				18	33	190	115	323	Nov. 19.5	381	+ 2	148
382	Dec. 3.0- 4	01 08	3/28			46	225	270	329	Nov. 29.0	80	+14	26
383	Dec. 20.6-21				15	34	120	65	338	Dec. 23.4	40	+11	154
	1931.0 (+2.y6)									1931			
384	Feb. 13.5-15				13	32	140	60	11351	Feb. 8.5	234	+15	151
385	Feb. 24.2-27	04 14	14			35	140	120	355	Feb. 20.8	1143	+13	10
386	Mar. 12.7-15				17	31	110	45	367	Mar. 15.3	558	+11	153
387	May 7.0- 8				01	18	160	80	392	May 7.7	56	+ 3	143
388	June 1.6- 3	15 30	74/40			20	160	75	..	..	0	..	164
389	Oct. 12.7-13				16	23	195	110	..	..	0	..	205
390	Oct. 29.5-30				11	49	260	215	..	..	0	..	343
	1932.0 (+3.y6)									1932			
391	Jan. 27.6-28				15	22	165	60	11464	Jan. 27.3	101	- 8	236
392	Feb. 2.8- 4	20 22	11			30	160	65	467	Feb. 1.4	138	+19	154
393	Mar. 10.6-11				15	34	145	95	..	..	0	..	30

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1932 *continued*	h m	^H/Y	h m	h	′	γ	γ		1932			°
394	Mar. 18.0				00	36	115	65	..	..	0	..	292
395	Mar. 27.7-31	17 48	6/19			29	175	90	11479	Mar. 30.3	74	- 3	164
396	Apr. 6.7- 8				16	24	160	65	..	..	0	..	32
397	July 5.5- 7				13	16	170	45	502	July 6.6	154	-12	285
398	Aug. 27.6-29				14	33	205	75	509	Aug. 25.3	50	-13	303
399	Oct. 20.5-21				11	35	100	90	516	Oct. 20.3	24	+ 2	311
	1933.0 ($+4^y.6$)									1933			
400	Feb. 19.5-20				11	31	120	60	..	..	0	..	144
401	Feb. 21.6-24				14	28	185	95	..	..	0	..	117
402	Mar. 18.1-19				02	32	175	70	..	..	0	..	153
403	Mar. 19.6-24				15	34	160	80	..	..	0	..	134
404	Apr. 21.7-23				17	23	170	45	11545	Apr. 20.0	28	+15	57
405	Apr.30.7-May2	16 27	26/84			41	215	215	546	Apr. 27.6	7	+11	298
406	Aug. 5.5- 6				11	42	135	90	..	..	0	..	97
407	Sept. 8.9-10	21 23	31			21	265	100	556	Sept. 5.4	70	-17	3
408	Sept.13.5-14				13	45	170	80	..	..	0	..	302
409	Nov. 5.7- 8				17	30	160	65	..	..	0	..	320
	1934.0 ($-3^y.4$)									1934			
410	Mar. 4.7- 7				17	34	160	70	..	..	0	..	192
411	May 11.8-13	20 08	28			30	120	60	..	..	0	..	14
412	July 30.1-Aug.1	03 20	3/54			30	165	70	11586	July 28.0	5	-30	44
413	Sept.24.8-25				19	38	200	120	..	..	0	..	15
414	Dec. 3.9- 4				22	27	175	110	..	..	0	..	171
415	Dec. 29.5-31				13	34	160	100	611	Dec. 28.7	109	-27	193
	1935.0 ($-2^y.4$)									1935			
416	Mar. 14.2-16				06	39	120	105	11637	Mar. 15.2	132	+ 7	290
417	Apr. 10.4-13				09	29	205	85	647	Apr. 9.4	45	+29	291
418	May 1.5- 2	12 47	37			37	130	60	..	..	0	..	12
419	June 7.5-11				12	34	205	95	667	June 10.3	175	-31	243
420	June 11.6-12	13 12	31			13	155	50	667	June 10.3	175	-32	189
421	July 24.9-25	20 35	75			18	175	75	686	July 22.0	334	+23	335
422	Sept.10.7-12				17	33	180	90	..	..	0	..	64
423	Sept.23.5-25	12 40	6/26			31	185	90	714	Sept.21.7	296	+12	255
424	Oct. 20.5-22				11	39	135	70	734	Oct. 20.9	429	+17	258
425	Oct. 24.3-25			06 40		30	130	90	734	Oct. 20.9	429	+17	208
	1936.0 ($-1^y.4$)									1936			
426	Apr. 17.6-23				14	35	170	120	11883	Apr. 15.5	160	-23	45
427	May 10.5-12				12	23	195	85	909	May 7.7	57	+15	102
428	May 15.8-20				20	24	150	70	912	May 17.3	494	-25	32
429	June 8.5- 9				12	26	185	75	938	June 4.0	385	-24	79
430	June 18.4-20			09 44		25	>235	185	945	June 15.4	36	+22	306
431	July 2.2				04	32	145	100	965	June 29.8	164	+11	125
432	July 10.2-11				04	27	195	80	969	July 6.1	47	-30	19
433	July 29.2-30				06	24	155	85	985	July 31.6	251	+20	128
434	Oct. 16.6-17			15 00		33	130	50	12063	Oct. 11.7	359	-19	159
435	Nov. 29.0	23 39	90			40	175	105	109	Nov. 29.3	957	+16	307

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1937.0 (-0.y4)	h m	ΔH γ	h m	h	′	γ	γ		1937			°
436	Mar. 5.2- 6			07 27		36	105	45	12254	Mar. 2.1	793	+16	120
437	Mar. 22.2-23				06	22	160	50	283	Mar. 20.5	87	-19	256
438	Mar.31.1-Apr.1	03 18	5/31			30	150	120	289	Mar. 29.5	453	+16	139
439	Apr. 24.5-25	12 00	16/61			47	280	150	320	Apr. 24.7	1674	+24	176
440	Apr. 25.7-26	15 46	113			32	320	125	320	Apr. 24.7	1674	+24	161
441	May 4.7- 5	17 53	37			29	205	160	330	May 5.0	246	+22	41
442	May 27.4-29				09	25	170	125	362	May 27.2	811	+12	100
443	June 4.6- 7			14.5		30	195	145	368	June 4.8	863	+13	353
444	June 22.4-23				10	20	170	70	393	June 21.0	549	+10	116
445	June 27.1-28			02.7		27	230	70	402	June 27.1	459	-13	55
446	July 19.5-21	12 53	55			23	190	65	441	July 18.6	676	+ 9	119
447	July 21.8-23				18	18	180	90	441	July 18.6	676	+ 9	88
	July 23.6-27				14	30	160	105					64
448	Aug. 1.9- 2	21 50	4/26			25	155	140	455	July 28.8	2589	+26	301
449	Aug. 22.1-23	03 07	3/40			34	>300	120	500	Aug. 24.0	226	-16	34
450	Sept.10.7-11	17 51	39			30	155	95	526	Sept.11.0	719	+ 4	137
451	Sept.30.6-Oct.2	13 45	31/85			28	180	115	546	Sept.29.2	177	+10	233
452	Oct. 3.5- 5	11 16	32			43	205	130	553	Oct. 4.4	2661	+ 3	194
453	Oct. 7.2- 8	05 21	35			29	150	140	553	Oct. 4.4	2661	+ 3	146
454	Oct. 9.3-13				07	37	225	105	553	Oct. 4.4	2661	+ 3	118
455	Oct. 23.3-24				08	36	140	120	578	Oct. 21.4	142	-32	293
456	Nov.29.5-Dec.1			11.1		28	150	85	619	Nov. 24.9	111	+ 8	163
	1938.0 (+0.y6)									1938			
457	Jan. 31.8	19 21	62			36	155	40	12693	Feb. 2.4	574	+19	49
458	Feb. 6.1- 7	03 10	31			30	150	100	693	Feb. 2.4	574	+19	339
459	Feb. 8.6-10				15	34	185	155	703	Feb. 10.1	850	-18	306
460	Mar. 5.5- 6				13	35	110	125	732	Mar. 6.8	30	-11	338
461	Mar. 21.9-23				22	37	245	100	754	Mar. 22.3	250	- 1	122
462	Mar. 23.8-24				19	35	215	125	754	Mar. 22.3	250	- 1	97
463	Apr. 13.5-15			11.7		32	180	85	777	Apr. 14.2	1098	+32	184
464	May 4.5				13	18	180	90	794	May 3.1	397	-25	267
465	May 14.4-15			9.8		31	125	105	821	May 17.0	500	- 9	136
466	May 28.3-30	07 22	9/27			26	170	125	829	May 23.8	1090	+10	312
467	June 7.9- 8	22 02	92			17	195	65	844	June 6.3	268	- 6	172
468	June 12.7-13	17 54	5/93			22	180	80	851	June 11.6	581	+14	108
469	July 4.5- 5			12.0		23	180	75	894	July 7.2	697	+10	178
470	July 9.8-11	19 51	49			20	180	75	895	July 10.7	1163	-17	109
471	July 15.2-16				06	32	235	160	902	July 15.1	2122	-16	38
472	Aug. 3.9- 5	21 33	4/138			32	305	140	934	July 30.1	382	-12	137
473	Aug. 22.6-23	13 53	26/146			24	265	75	975	Aug. 23.6	255	-24	250
474	Sept.13.8-16	18 37	75			55	280	255	999	Sept.16.6	232	0	317
475	Sept.27.9-28	22 01	102			33	285	175	13009	Sept.27.8	666	-19	131
476	Sept.30.5-Oct.1			12.3		28	200	120	009	Sept.27.8	666	-19	96
477	Oct. 7.4- 8			10.0		51	220	250	022	Oct. 5.5	271	+ 5	6
478	Oct. 23.2-28				06	30	185	85	038	Oct. 25.7	246	+20	157
479	Dec. 2.6- 4				15	36	110	105	086	Nov. 28.8	1482	+13	344
	1939.0 (+1.y6)									1939			
480	Feb. 5.8- 7	19 50.5	4/40			26	160	95	13171	Feb. 3.3	366	- 3	206
481	Mar. 27.8-30				18	40	220	155	211	Mar. 23.2	280	+21	267
482	Apr. 23.7-24	17 36.6	162			37	295	215	247	Apr. 26.5	953	-11	272
483	May 1.5- 3	11 35.8	85			36	170	155	247	Apr. 26.5	953	-11	169

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1939 *continued*	h m	γ	h m	h	′	γ	γ		1939			°
484	May 5.9- 9	20 43.9	146			26	285	140	13259	May 5.3	794	+16	111
485	June 13.7-14				16	32	270	120	316	June 14.4	271	+23	317
486	July 3.0- 4	00 38.3	33			32	215	110	341	June 29.8	268	-16	58
487	July 4.6- 5	14 07.9	79			28	275	210	341	June 29.8	268	-16	41
488	July 16.5-17				13	20	215	65	354	July 17.8	628	+12	243
489	July 19.9-20			22.0		26	200	105	354	July 17.8	628	+12	198
490	July 21.4-22				10	26	245	75	354	July 17.8	628	+12	178
491	Aug. 12.1-13	01 39.6	54			28	305	165	371	Aug. 7.3	793	+ 8	251
492	Sept. 2.9- 4	21 42.5	81			26	190	65	394	Sept. 1.0	1751	-21	323
493	Sept. 17.2-18				04	39	135	145	410	Sept. 12.3	164	-24	134
494	Oct. 3.4- 4				09	37	120	200	429	Oct. 1.0	491	+ 8	281
495	Dec. 6.8- 8			20.3		33	140	110	483	Dec. 7.4	87	- 9	151
	1940.0 (+2.^{y}6)									1940			
496	Jan. 3.6- 4	14 39.7	35			43	140	165	13502	Jan. 5.5	1689	+14	145
497	Jan. 18.6				14	45	215	165	508	Jan. 16.7	181	- 4	308
498	Mar. 23.3-24			06.3		31	165	105	555	Mar. 26.3	1189	+19	176
499	Apr. 2.8- 3			19.0		43	260	200	568	Apr. 2.2	275	- 6	37
500	Apr. 25.1-26	02 04.2	5/44			54	215	185	582	Apr. 21.9	251	+16	95
501	May 23.7-25	17 53.5	125			31	355	120	600	May 19.8	309	+17	84
502	June 14.3-15			08 00		26	195	95	619	June 12.7	367	- 8	159
503	July 13.3-14				08	25	175	110	653	July 16.2	620	+ 2	135
504	Aug. 2.8- 3	18 52.0	43			19	180	90	670	Aug. 4.0	433	+13	224
505	Aug. 9.3-10				08	23	175	90	677	Aug. 11.2	563	-19	138
506	Sept. 26.7-27	17 03.7	90			50	230	140	711	Sept. 27.6	409	-10	218
507	Oct. 6.9- 9				21	40	185	170	716	Oct. 6.0	116	+ 7	84
508	Nov. 12.3-13				08	34	140	95	743	Nov. 12.3	316	+ 4	324
509	Nov. 25.3-26				08	39	165	90	752	Nov. 23.4	143	-11	152
510	Dec. 19.9-24				21	34	170	100	770	Dec. 15.7	256	+12	188
	1941.0 (+3.^{y}6)									1941			
511	Jan. 17.5-19				12	32	180	90	13791	Jan. 13.8	86	+16	171
512	Mar. 4.0- 5				00	31	170	70	814	Feb. 27.3	416	+22	292
513	Mar. 13.8-14				18	32	205	125	826	Mar. 12.5	186	+20	165
514	Mar. 19.5-22				12	38	190	85	827	Mar. 19.6	202	+17	88
515	Mar. 28.0-30				00	45	170	115	834	Mar. 29.0	92	+14	336
	Mar. 30.7-31			16.6		52	290	185					300
516	Apr. 24.3-25				08	32	145	115	847	Apr. 24.6	458	- 1	336
517	July 6.5- 7				11	21	210	210	886	July 3.9	490	+10	87
518	Aug. 4.1- 5	01 28.2	81			42	205	245	909	Aug. 6.1	665	+ 4	69
519	Aug. 26.6-28				14	35	180	130	922	Aug. 26.8	369	+ 4	131
520	Oct. 31.2-Nov. 1	03 41.6	44			43	205	185	960	Oct. 29.7	1169	+ 9	346
521	Dec. 1.2- 2			06.0		34	220	230	972	Nov. 28.3	560	-20	297
	1942.0 (+4.^{y}6)									1942			
522	Feb. 23.6-24	13 29	40			42	140	135	14014	Feb. 24.6	180	+13	265
523	Mar. 5.2- 6			04.2		33	170	125	015	Feb. 28.8	1549	+14	139
524	Apr. 3.8- 4			19.3		44	220	130	033	Apr. 4.3	72	+15	109
525	Sept. 11.7-12				16	23	230	90	092	Sept. 9.4	12	-13	141
526	Sept. 17.4-19				10	24	180	75	094	Sept. 19.0	99	-22	66
527	Oct. 2.5- 4				11	38	210	135	097	Sept. 27.4	75	-12	228
528	Oct. 11.8-16				20	32	160	70	100	Oct. 14.0	28	-17	104

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1942 *continued*	h m	ΔH γ	h	h	′	γ	γ		1942			°
529	Oct. 28.5-30				12	50	215	195	14104	Oct. 28.4	76	-11	244
530	Nov. 23.8-26				20	32	180	110	115	Nov. 24.2	44	-10	257
	1943.0 (+5.^{y}6)									1943			
531	Jan. 20.7-21				(16)	44	205	85	14128	Jan. 23.7	44	- 3	214
532	Feb. 17.2-18				04	24	190	45	..	..	0	..	212
533	Mar. 29.6-30				(15)	36	195	60	146	Mar. 25.3	212	+15	40
534	May 17.6-19				15	20	210	70	156	May 13.5	337	-38	112
535	July 4.4- 7				10	26	210	70	..	..	0	..	200
536	July 9.3-10				(07)	18	220	80	161*	July 7.6	8	+ 5	135
537	Aug. 8.4- 9				09	37	260	205	164	Aug. 9.4	133	+19	97
538	Aug. 12.9-14				21	33	190	70	164	Aug. 9.4	133	+19	37
539	Aug. 19.3-21				07	26	180	90	166	Aug. 14.7	108	-11	313
540	Sept. 2.7- 5				(17)	18	180	90	..	..	0	..	122
541	Sept. 8.7-10				17	27	180	90	172	Sept. 6.1	691	+ 7	43
542	Sept. 26.5-27				12	26	185	70	..	..	0	..	168
	Sept. 27.8-Oct. 4				18	39	220	120					151
543	Oct. 8.4-10				(10)	32	165	60	..	..	0	..	11
544	Oct. 24.4-27				09	37	165	110	..	..	0	..	160
	Oct. 27.7-Nov. 1				16	35	185	100	177	Oct. 30.6	245	+10	117
545	Nov. 6.7- 7			16.3		42	170	75	..	..	0	..	343
546	Nov. 19.1-22				03	32	240	70	..	..	0	..	173
	Nov. 23.4-27				10	39	170	105					125
547	Dec. 16.3-22				08	47	180	70	183	Dec. 12.4	144	+ 8	183
	1944.0 (+6.^{y}6)									1944			
548	Jan. 11.9-18				22	38	170	70	..	..	0	..	193
549	Feb. 7.4-11				09	36	190	90	..	..	0	..	204
550	Feb. 13.8-14				20	33	165	85	..	..	0	..	119
551	Mar. 26.1-28			02.0		30	215	105	14191	Mar. 25.1	287	-17	295
552	Apr. 15.6-16				14	32	150	100	..	..	0	..	25
553	Aug. 2.5- 3				12	24	165	130	..	..	0	..	24
554	Sept. 30.5-Oct. 1				13	37	165	70	219	Sept. 29.6	236	+15	324
555	Oct. 14.6-15				15	38	175	100	..	..	0	..	139
556	Dec. 27.5-28				13	34	165	120	245	Dec. 27.1	126	+28	245
	1945.0 (-2.^{y}5)									1945			
557	Jan. 15.2-16				(05)	24	150	90	14253	Jan. 16.9	104	+26	358
558	Mar. 12.4-13				09	40	150	85	263	Mar. 8.9	451	- 7	338
559	Mar. 14.0-16	23 46.7	39			34	195	115	..	..	0	..	317
560	Mar. 26.0-27				00	29	160	80	266	Mar. 28.4	524	- 6	159
	Mar. 27.9-28			20.6		21	170	60					134
561	Apr. 1.2- 2	04 59.0	59			27	150	65	267	Apr. 1.3	721	-15	77
562	Aug. 28.1				02	30	185	115	..	..	0	..	268
563	Sept. 16.0-19				23	27	155	125	..	..	0	..	19
564	Oct. 23.0-25	23 40.7	18			38	165	105	358	Oct. 22.6	574	-31	250
565	Oct. 27.8-28				20	34	140	85	367	Oct. 27.0	319	+23	187
566	Nov. 8.7-10				17	35	130	60	369	Nov. 6.5	68	-25	30
567	Dec. 13.5-14	12 39.4	5/36			44	195	130	392	Dec. 13.4	80	-16	291
568	Dec. 19.8-21	18 10.8	46			24	160	50	399	Dec. 22.6	168	+23	208

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1946.0 ($-1^y.5$)	h m	ΔH	h	h	′	γ	γ		1946			°
569	Jan. 3.3- 4				08	42	245	195	14401	Dec. 30.5	232	-14	17
570	Mar. 10.1-11	01 51.6	34			42	145	95	451	Mar. 6.7	1356	+35	231
571	Apr. 14.5-15				11	31	150	115	490	Apr. 14.4	818	-29	124
572	May 6.9- 7	22 27.5	4/124			34	250	90	506	May 4.3	491	-19	188
	May 8.3-11			06.9		28	210	120					170
573	May 20.9-25				21	22	195	115	523	May 22.9	200	+17	3
574	June 7.3- 9			07.6		26	185	130	537	June 7.6	142	-26	133
575	June 18.6-19				15	21	170	85	551	June 14.6	271	-21	343
576	June 27.7-29	17 28.9	8/50			29	185	115	556	June 26.4	206	-23	225
577	July 18.6-19	14 14.7	69			29	170	95	578	July 18.3	391	-10	306
578	Aug. 14.8			19.0		30	215	70	600	Aug. 10.5	723	-26	306
579	Aug. 30.9-31	22 39.6	64			35	175	140	623	Aug. 28.6	436	+ 2	94
580	Sept. 16.6-17	13 47.6	23/51			35	160	125	640	Sept. 15.7	661	+ 5	233
581	Sept. 17.0-19			23.9		44	280	295	643	Sept. 19.8	767	+13	228
582	Sept. 27.2-Oct. 1				06	41	310	230	648	Sept. 23.4	425	+15	93
583	Oct. 26.8-27				20	39	200	125	689	Oct. 27.9	427	-12	63
	1947.0 ($-0^y.5$)									1947			
584	Jan. 24.2-26				06	29	195	140	14802	Jan. 27.0	647	-15	325
585	Feb. 16.1-17	02 58.2	20			35	180	140	813	Feb. 11.3	2131	-14	23
586	Mar. 8.3- 9				08	59	270	210	851	Mar. 10.2	3637	-16	117
587	Mar. 15.4	08 41.3	28/83			31	155	150	855	Mar. 10.6	1059	+21	24
588	Mar. 27.2-29	04 28.4	18			33	130	160	874	Mar. 29.2	642	- 4	228
589	Apr. 8.9- 9	21 48.4	27/52			18	210	70	886	Apr. 7.2	5520	-18	60
590	May 22.9-24	22 43.3	7/69			30	120	55	962	May 23.2	992	+19	199
	May 24.3	06 45	110/133			38	330	80					180
591	June 5.3- 6	07 25.7	62/80			28	190	60	986	June 3.5	236	-21	22
592	June 13.7-16	17 49.1	7/82			33	225	150	995	June 9.3	663	+23	270
593	Aug. 15.4-16	09 50.7	4/16			40	315	205	15106	Aug. 12.8	726	+ 4	161
	Aug. 16.5-21				11	28	180	155					146
594	Sept. 3.0- 4	23 25.8	3/60			46	230	165	130	Aug. 31.0	372	+14	275
595	Sept. 7.5				11	30	150	85	147	Sept. 6.1	344	+ 3	216
596	Sept. 12.9-15				21	38	160	130	155	Sept. 11.2	220	-22	144
	Sept. 15.6-20			14.9		35	145	120	166	Sept. 16.9	221	+ 9	109
597	Sept. 30.8-Oct. 3	18 08.6	9/60			37	185	180	187	Oct. 2.6	360	-16	268
598	Oct. 9.5-16				12	36	225	140	192	Oct. 6.9	1098	+13	153
599	Nov. 9.4-13			09.0		42	205	145	245	Nov. 11.3	350	+ 6	106
	1948.0 ($+0^y.5$)									1948			
600	Jan. 3.6				15	44	145	60	15319	Dec. 31.0	246	-11	98
601	Mar. 11.9-15			21.7		35	140	100	412	Mar. 14.6	321	+31	279
602	Mar. 15.1-16	03 35.1	45			39	290	265	415	Mar. 15.6	619	+32	237
603	Apr. 21.0			22.8		22	160	100	463	Apr. 17.2	939	+14	110
604	May 9.3	07 24	*57/111*			27	200	80	503	May 10.1	960	- 5	228
605	May 15.0-17	23 23	26			34	170	130	514	May 12.4	1195	-20	153
606	May 21.2-22				06	26	175	135	529	May 24.0	302	+24	71
607	Aug. 19.8-20	19 38	8/74			34	150	65	655	Aug. 18.6	275	+ 8	311
608	Oct. 14.5-15				12	32	175	125	743	Oct. 17.3	946	+ 7	297
609	Oct. 21.5-24	11 19.8	8/48			41	165	85	743	Oct. 17.3	946	+ 7	204
610	Nov. 1.8- 3				19	39	170	125	775	Oct. 31.3	200	+33	55

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS -3.0 TO +5.0				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1949.0 (+1.^{y}5)	h m	$\frac{\Delta H}{\gamma}$	h	h	′	γ	γ		1949			°
611	Feb. 21.6-23	15 16.5	23/83			36	130	85	15917	Feb. 19.4	811	+28	22
612	Mar. 16.6-17	15 33.8	22/70			44	270	140	962	Mar. 19.4	1096	+29	79
613	Mar. 21.9-23	21 27.3	70			38	240	180	962	Mar. 19.4	1096	+29	10
614	Apr. 7.8- 8	19 23.2	10/44			44	285	170	998	Apr. 4.5	328	-18	147
615	Apr. 12.6-14	15 21.6	10/82			26	170	70	16002	Apr. 11.7	242	- 3	83
616	May 3.8- 4	18 14.8	59			31	160	100	037	May 5.6	394	+10	163
617	May 30.5-June 1	12 30.7	7/52			29	215	80	069	May 31.6	652	+ 4	170
618	June 3.9- 6	21 53.6	44			36	230	195	069	May 31.6	652	+ 4	112
619	June 12.5-13				11	31	185	105	081	June 8.6	111	+16	358
620	Aug. 3.1- 5	02 05.1	5/60			42	190	145	148	Aug. 1.1	1328	-26	35
621	Oct. 7.5- 8			11.7		37	135	160	232	Oct. 7.3	961	+ 1	251
622	Oct. 13.8-15	20 11.2	78			50	215	165	245	Oct. 13.4	317	+14	167
623	Oct. 27.4-28				10	43	130	80	262	Oct. 28.6	265	+ 8	349
624	Nov. 1.4- 3				10	50	175	165	271	Nov. 4.1	329	+21	283
625	Nov. 19.2-21				06	30	175	100	291	Nov. 16.3	405	+ 7	48
626	Nov.29.0-Dec.1				23	26	155	90	308	Nov. 27.0	870	+17	279
	1950.0 (+2.^{y}5)									1950			
627	Jan. 24.6-25				14	42	170	135	16386	Jan. 27.2	560	+26	254
628	Feb. 23.4-24	10 43.2	3/30			46	155	125	410	Feb. 20.1	1853	+17	221
629	Mar. 19.2	05 45.1	41			28	245	175	443	Mar. 18.5	437	+19	268
630	Mar.31.3-Apr.7				08	33	160	140	457	Apr. 2.2	233	+ 4	108
631	May 2.5- 5				13	25	170	90	486	May 3.4	615	+18	43
632	May 27.5-29	12 05.3	*15/46*			38	205	175	513	May 26.3	924	+ 9	72
633	June 6.0			00.3		22	180	80	520	June 1.6	302	+ 6	306
634	June 23.8-25	18 02.3	88			25	215	80	542	June 25.2	373	+ 7	71
635	June 29.5-July 1				12	36	195	160	542	June 25.2	373	+ 7	355
636	July 24.1-25	01 51	2/32			34	160	120	570	July 25.0	580	-17	30
637	Aug. 7.5- 8			10.9		39	240	165	581	Aug. 4.7	770	-15	199
	Aug. 8.9-12				22	33	210	85					181
638	Sept. 3.1-11				03	37	215	170	604	Sept. 3.5	176	+ 7	208
639	Sept.23.5-25				12	29	190	90	616	Sept.21.4	260	+11	299
640	Sept.30.7-Oct.6	17 46.5	7/30			46	280	135	620	Sept.27.3	83	+21	204
641	Oct.28.0-Nov.1				01	55	240	195	640	Oct. 26.9	30	+34	203
642	Nov. 24.7-30				17	31	215	115	..	..	0	..	198
643	Dec. 12.2-14	05 26.4	23			31	150	70	667	Dec. 9.8	296	+20	328
644	Dec. 22.6-24				14	40	150	115	..	..	0	..	191
	1951.0 (+3.^{y}5)									1951			
645	Jan. 21.6-23				15	42	125	75	16685	Jan. 17.8	122	+20	156
646	Feb. 21.8-25				18	36	195	90	707	Feb. 17.6	151	+19	105
647	Feb.27.0-Mar.1	00 27.6	67			39	160	100	711	Feb. 24.9	694	+18	36
648	Mar. 13.5-15				13	39	185	150	718	Mar. 12.2	184	+20	205
649	Apr. 2.5- 5				12	31	140	120	735	Apr. 4.9	54	-13	301
650	Apr. 18.3-19	06 52.5	19			37	255	105	745	Apr. 18.7	2064	+17	93
651	Apr. 20.5-23				12	37	150	125	745	Apr. 18.7	2064	+17	64
652	May 1.0- 3				00	53	230	140	752	Apr. 26.5	390	+22	285
653	May 9.7-10				17	19	300	95	761	May 12.0	18	-13	170
654	May 25.8-26	18 47.7	32			38	160	105	775	May 22.2	786	+23	317
655	June 17.7-18	17 01.9	80			34	220	190	795	June 18.4	2100	-14	14
656	July 1.9- 2	22 26.9	66			37	215	230	803	June 27.3	136	+ 9	186
657	July 31.5-Aug.2				12	22	180	160	831	July 29.6	118	- 9	154
658	Sept.11.5-14				11	31	155	110	857	Sept. 9.7	370	-10	319

CATALOGUE II. - SMALL GEOMAGNETIC STORMS RECORDED AT GREENWICH - ABINGER, 1874-1954

Ref. No.	GEOMAGNETIC STORM								LARGEST GROUP OF SUNSPOTS $-3^d.0$ TO $+5^d.0$				Long. of C.M.
	Date	ONSET U.T. S.C.		a	i	RANGES D	H	Z	Group No.	C.M.P.	Area	$\varphi - B_0$	
	1951 *continued*	h m	γ	h	h	′	γ	γ		1951			°
659	Sept. 16.3-18				(08)	37	250	160	16861	Sept. 15.0	542	0	256
660	Sept. 19.5-25	11 54.4	28			54	270	220	861	Sept. 15.0	542	0	214
661	Oct. 7.4-11				09	36	185	135	879	Oct. 6.7	215	-11	338
662	Oct. 16.8-20				(18)	35	275	130	882	Oct. 14.2	596	-15	214
663	Nov. 13.3-16				08	37	155	125	899	Nov. 9.9	337	-17	211
664	Dec. 27.9-28	21 37.0	2/45			30	200	70	931	Dec. 27.3	10	+19	343
	1952.0 (+4.^{y}5)									1952			
665	Jan. 12.6-16				(14)	24	155	75	16941	Jan. 15.1	496	+10	136
666	Jan. 29.6-30	15 27.3	3/15			45	155	70	946	Jan. 28.6	144	-16	273
667	Feb. 6.4- 9				10	41	155	80	950	Feb. 7.8	56	-17	170
	Feb. 10.7-14				16	37	190	80					113
668	Feb. 23.9-25	21 26.5	5/39			52	160	150	955	Feb. 19.3	71	+26	299
669	Mar. 3.5-12				(12)	41	255	245	..	..	0	..	186
670	Mar. 21.5-26				12	38	155	120	..	..	0	..	309
671	Mar. 30.5-Apr. 10				13	48	230	160	961	Mar. 26.6	147	- 1	190
672	Apr. 29.6-May 7				14	40	220	195	972	Apr. 27.1	87	+19	153
673	May 26.3-31				(08)	40	185	185	983	May 28.0	254	- 3	160
674	July 5.0- 6				00	23	185	95	17003	July 1.5	180	-12	354
675	Sept. 7.7-10				17	25	185	100	036	Sept. 10.4	38	-15	219
676	Sept. 25.8-26				20	38	110	50	040	Sept. 27.3	246	- 4	340
677	Sept. 28.6-30				14	37	150	145	040	Sept. 27.3	246	- 4	303
678	Oct. 3.7- 6				17	43	165	125	042	Oct. 5.1	14	-16	236
679	Oct. 25.7-26				17	21	160	115	047	Oct. 25.4	405	- 3	305
680	Oct. 29.5-Nov. 1			13.0		35	135	100	047	Oct. 25.4	405	- 3	255
681	Nov. 26.8-28				19	39	140	60	053	Nov. 27.5	11	-14	242
682	Dec. 1.7- 4				17	27	160	60	..	..	0	..	178
	1953.0 (+5.^{y}5)									1953			
683	Jan. 5.2- 6	05 46.4	14			23	165	75	17062	Jan. 3.1	81	+16	83
684	Jan. 25.5-30				11	34	150	70	..	..	0	..	176
685	Feb. 22.6-28				(14)	32	140	90	..	..	0	..	166
686	Mar. 1.8- 4				20	39	155	160	..	..	0	..	71
687	Mar. 22.0-26				(00)	39	175	90	075	Mar. 24.5	68	- 8	165
688	Apr. 16.0				01	29	195	85	..	..	0	..	195
689	May 15.5-17				12	42	180	160	..	..	0	..	165
690	Aug. 23.0-31	00 24	24			34	205	115	1337*b*	Aug. 18.0	15	- 1	289
691	Sept. 3.7- 5				17	41	195	135	..	..	0	..	134
692	Sept. 18.8-24				18	47	175	210	17114	Sept. 21.0	73	0	295
693	Oct. 15.4-20	08 45.7	7			46	200	190	118	Oct. 11.7	182	-14	304
694	Nov. 12.5-21				(12)	37	170	65	..	..	0	..	293
	1954.0 (+6.^{y}5)									1954			
695	Feb. 21.6-23				14	31	120	80	..	..	0	..	42
696	Mar. 22.8-24				19	34	150	75	..	..	0	..	17
697	Apr. 11.7-12				17	41	175	140	..	..	0	..	114

APPENDIX (1)

GREAT GEOMAGNETIC STORMS RECORDED AT THE ROYAL OBSERVATORY, GREENWICH 1840–1874

The following catalogue of 54 great geomagnetic storms has been compiled from the Greenwich magnetic records from 1840 to 1874, thereby extending backwards by thirty-five years the preceding Catalogue I, 1874–1954. The same lower limits for the range of the elements were adopted as heretofore, viz. 60′ in D or 300γ in H or Z.

For the first seven years, before the introduction of the photographic record, the storm ranges have been abstracted from a table in the "Greenwich Magnetical and Meteorological Observations" headed *Extraordinary Observations*. The values therein tabulated were derived from observations made at short intervals of time, down to 1 minute or less, when appreciable disturbance was recognized to be present from the routine observations, made at two-hourly intervals throughout the day and night.

Photographic recording of the trace-movements was begun at Greenwich in the autumn of 1847, and thereafter these magnetograms of H, D and Z were the basis of examination, but in a number of cases eye observations extended the range of one or other element beyond the extent of the photographic sheet.

In these early records, the ranges in Z (in particular) are subject to some uncertainty owing to large corrections for temperature and also, in the case of Z, to instability of the instrument. The ranges given under Z are therefore to be regarded, in most cases, as giving the order of magnitude of notable ranges. In the majority of cases, the maximum and minimum values were within an hour or two of each other. Ranges of less than 500γ in Z are sometimes listed in cases when either the D or H ranges were somewhat below great-storm level.

The range in D is tabulated to the nearest minute of arc, though this degree of accuracy was not obtainable. (The range to 0°.1 would probably underestimate the degree of accuracy). The range in H is given to the nearest 25γ. Ranges passing beyond the recording sheet are indicated by >. Cases for which the trace-movements suggest ranges that have passed far beyond the recording sheets are indicated by a double sign ≫.

In compiling this list of great storms, full use was made of a list of magnetic disturbances, recorded at Greenwich from 1848 to 1881, that had been published by E. W. Maunder (*Monthly Notices*, **65**, 540-548, 1905). For the present tabulation, however, the original magnetograms were re-examined and the ranges remeasured, all times being expressed in U.T.

The data of associated sunspots were derived from the examination of sunspot records from 1840 onwards, as follows:-

(a) Schwabe's original sunspot drawings covering the period up to 1853 (in the possession of the Royal Astronomical Society).

(b) Carrington's drawings reproduced in his "Observations of the Spots on the Sun" (1863) covering the period 1853 November to 1861 March.

(c) Kew data and Ely photographs, 1862-1873.

The purpose of this examination of solar records was to pick out any spot of significant area (500 millionths of the Sun's hemisphere and upwards) that was within 3 days before and 5 days after its central meridian passage at storm onset. Measures of area made at Kew both on the Schwabe and Carrington drawings and on the Kew photographs are to be found in

(1) *Researches on Solar Physics* 2nd series by W. de la Rue, Balfour Stewart and B. Loewy (1866).

(2) *Phil. Trans.* **159**, 1, 1868: **160**, 389, 1870.

The data given in columns 8 and 9 are to be taken as giving the approximate time of central meridian passage and the order of size respectively. In no case was the Sun entirely free from spots at the time of any of the storms listed.

The following epochs of sunspot maximum have been adopted from the Zurich publications in order to derive the time interval in years given in column 4.

1837.2, 1848.1, 1860.1, 1870.6

The notes include references to notable auroral displays, extending southwards over this country and to southern Europe generally. Records of aurorae that appeared useful for a comparison with the Greenwich magnetograms were the basis of the selection, which otherwise does not aim at completeness.

SUPPLEMENT TO CATALOGUE I: LIST OF GREAT STORMS RECORDED AT GREENWICH 1840-1874

Ref. No.	Date of Storm	Time of Onset	Interval from Sunspot Maximum	RANGES D	RANGES H	Notable Z Range	Approx. C.M.P. and Area of Notable Sunspots	Remarks and Reference to Notes
		U.T.	yrs.	′	γ	γ	U.T.	
1	1840 Dec. 19 - 21	22	+3.8	54	350			Note 1.
2	1841 Sept. 24 - 26	22	+4.5	≫91	950	1300		Note 2.
3	1841 Nov. 18 - 20	18	+4.7	72	200			
4	1842 July 2 - 4	04	+5.3	97	400		July 1 1500	
5	1846 Sept. 21 - 22	18	-1.4	62	250			
6	1847 Mar. 19 - 20	12	-0.9	72	500			
7	1847 Sept. 24 - 25	12	-0.4	127	1100	≫500	Sept. 19 3000	Note 7.
8	1847 Oct. 23 - 25	09	-0.3	106	1900	740	Oct. 23 2700	Great aurora: full Moon. Note 8.
9	1847 Dec. 17 - 18	14	-0.1	60	>225		Dec. 16 1000	Great aurora. Note 9.
	1847 Dec. 20 - 21	02	-0.1	90	675			
10	1848 Feb. 21	08	0.0	66	575		Feb. 20 ~1000	Great aurora.
11	1848 Nov. 17 - 18	10	+0.8	109	>550	>750	Nov. 15 900	Great aurora. Note 11.
12	1851 Sept. 6 - 7	13	+3.6	79	450			
13	1851 Sept. 29 - 30	15	+3.6	≫73	>350		Sept. 27 500	Note 13.
14	1851 Dec. 6 - 7	19	+3.8	52	325			
15	1852 Feb. 15 - 16	09.2	+4.0	63	>350		Feb. 16 900	Notable group of storms. Note 16.
16	1852 Feb. 18 - 19	02.0	+4.0	48	450		" "	
17	Feb. 19 - 20	12	+4.0	≫89	>500	650	" "	
18	1852 Feb. 21	11	+4.0	64	200		" "	
19	1852 Nov. 11 - 14	19	+4.8	73	150			
20	1853 July 12 - 13	13	+5.4	66	275			Note 20.
21	1854 Mar. 15 - 16	19	+6.1	66	200		Mar. 10 700	Note 21.
22	1857 May 7 - 8	14	-2.8	70	>325		May 5 700	Note 22.
23	1857 Dec. 16 - 17	13	-2.1	60	450			Note 23.
24	1858 Apr. 9 - 11	00	-1.8	>48	>475			Note 24.
25	1859 Aug. 28 - 29	07.5	-0.4	73	275		Aug. 31 2300	Dual storms and great aurorae. The Carrington & Hodgson solar flare on Sept. 1.
26	1859 Sept. 2 - 5	04.7	-0.4	≫92	≫625	1500	" "	
27	1859 Oct. 13	01.5	-0.3	62	>500	1000		Great aurora. Note 27.
28	1860 Aug. 8 - 11	13	+0.5	49	450		Aug. 8 2000	Dual storm: Note 28.
	1860 Aug. 12 - 13	04	+0.5	44	600		" "	
29	1860 Sept. 6 - 7	20	+0.6	56	425		Sept. 4 1300	
30	1862 July 5	17	+2.4	35	350			
31	1862 Aug. 4 - 5	05	+2.5	55	350		Aug. 1 500	Note 31.
32	1862 Oct. 3 - 6	19	+2.7	>73	425		Oct. 1 600	
33	1865 Aug. 2 - 5	18	+5.5	78	500	525	(July 30) 1000	Note 33.
34	1866 Feb. 21 - 22	04.5	+6.0	>65	>400	>850	Feb. 18 1700	Note 34.
35	1868 Sept. 30	18	-1.9	61	200			
36	1869 Feb. 3 - 4	23	-1.5	52	250	350	Jan. 30 500	
37	1869 Apr. 15 - 16	11	-1.3	94	>400	650	Apr. 14 >750	Note 37.
38	1869 May 13 - 14	14	-1.2	92	>700	600		Great aurora. Note 38.

SUPPLEMENT TO CATALOGUE I: LIST OF GREAT STORMS RECORDED AT GREENWICH 1840-1874

Ref. No.	Date of Storm	Time of Onset	Interval from Sunspot Maximum	RANGES D	RANGES H	RANGES Notable Z Range	Approx. C.M.P. and Area of Notable Sunspots	Remarks and References to Notes
		U.T.	yrs.	′	γ	γ	U.T.	
39	1870 Feb. 1 - 2	11	-0.5	70	>200	300		Aurora seen at Greenwich. Note 39.
40	1870 Apr. 5 - 6	06	-0.3	50	>325	350	Apr. 5 1000	Great aurora. Note 40.
41	1870 May 20	11	-0.2	44	475	550		A spotted disk.
42	1870 Aug. 20 - 21	23.3	0.0	54	300	300		
43	1870 Sept. 24 - 26	03	+0.1	92	>575	≫700	Sept. 21 1700	Aurora. Note 43.
44	1870 Oct. 24 - 25	10.4	+0.2	88	400	450		Duplex storm and great aurora.
	1870 Oct. 25	12	+0.2	>59	1150	775		Note 44.
45	1871 Feb. 11 - 13	23.2	+0.5	74	>225	350		
46	1871 Apr. 9 - 10	16.7	+0.7	51	500	675	Apr. 12 750	Notable aurora. Note 46.
47	1871 June 18	00	+0.9	45	>400	325		
48	1871 Aug. 24 - 25	20	+1.0	63	300		Aug. 20 1250	
49	1871 Nov. 1 - 2	18	+1.2	65	225			Note 49.
50	1871 Nov. 9 - 11	10.1	+1.3	62	375			
51	1872 Feb. 4 - 5	14	+1.5	125	800	>950		Great aurora. Note 51.
52	1872 July 7 - 8	17.0	+1.9	41	525		July 5 750	
53	1872 Aug. 3 - 4	11	+2.0	44	325			Note 53.
54	1872 Oct. 14 - 16	22.3	+2.2	81	600	425	Oct. 15 500	Dual storms. Note 54.
55	1872 Oct. 17 - 18	00	+2.2	79	>425	500	" "	
56	1874 Feb. 4 - 5	14.5	+3.5	126	800	>300		Note 56.

NOTES

Year	Ref. No.	
1840	1	The onset times of storms Nos. 1-7 are somewhat uncertain in the absence of magnetograms.
1841	2	A large range in Z occurred on Sept. 24 from 15.2^h to 15.6^h. Large changes in H and D were also recorded about the same time.
1847	7	Besides the giant sunspot listed, there was another spot with central meridian passage on Sept. 24 and with area exceeding 1000 millionths of the Sun's hemisphere.
1847	8	This great complex storm was associated with a brilliant aurora seen at Greenwich and elsewhere in full moonlight on the night of Oct. 24 (*Greenwich Magnetical and Meteorological Observations*, 1847, p. 222-9). At Cambridge at 22^h, a corona was recorded 21° south of the zenith (azimuth 19° E of S). Greenwich observers recorded a corona from 21^h50^m to 22^h10^m U.T. a few degrees south of the zenith. A display of the Aurora Australis was reported from Hobarton (Hobart, Tasmania).
1847	9	This complex storm appears to fall into two parts, the more severe period beginning on Dec. 20 at 02^h and ending abruptly at 21^h. Auroral displays were observed in southern Europe.
1848	11	The large range in Z (probably exceeding 750γ) occurred on Nov. 17 at 21.7^h. The auroral display as seen from Greenwich, Northampton and Stonyhurst is described in the *Greenwich Observations*, 1848, p. lxvi. The auroral display was seen southwards to the Mediterranean area and eastwards to Odessa. (See note to No. 51).
1851	13	The magnetic traces showed great agitation from Sept. 29 18^h to 12^h on the following day when the storm ended abruptly. This storm was followed by a considerable disturbance with onset on Oct. 1 at 20.5^h, but with recorded ranges below "great" storm level.
1852	16	This very active storm, (clearly separated from that on Feb. 15-16) appears from the magnetograms to fall into two sections, the greatest ranges occurring in the second half. Great agitation of the traces occurred, however, on Feb. 18 from 06^h to 18^h. A sudden-commencement (SC) on Feb. 18 at 02.0^h had a range in H of +50γ. Disturbance flared up again on Feb. 21 at 11^h at storm No. 18.
1853	20	Two sunspots near the central meridian represent the return of a giant spot with area of the order of 2000 millionths of the Sun's hemisphere.

SUPPLEMENT TO CATALOGUE I: LIST OF GREAT STORMS RECORDED AT GREENWICH 1840-1874

NOTES *continued*

Year	Ref. No.	
1854	21	The associated sunspot group (Carrington No. 25) developed rapidly from small spots, recorded on Mar. 9, into "a fine double group" with a maximum area of 700 millionths of the Sun's hemisphere on Mar. 13.
1857	22	The associated sunspot (Carrington No. 146) was a large growing spot developing multiple umbræ. It lasted to a third disk passage.
1857	23	No associated sunspot of unusual size has been listed, but it is worth noting that a complex spot (Carrington No. 210), which was recorded on Dec. 19 with an area of about 450 millionths, would have crossed the central meridian on Dec. 14.
1858	24	No associated sunspot is listed on account of size. It is significant, however, that a small group with central meridian passage on Apr. 11 was possibly the return of a giant group (Carrington No. 244).
1859	25	This storm is the first of a pair of violent storms associated with brilliant auroral displays seen from many parts of the world which were, according to E. Loomis, "unsurpassed by any similar phenomena on record" (*American Journal of Science and Arts* **32**, 319, 1861). This first storm began with an inverted SC on Aug. 28 at 07.5^h its range being especially big in D (30′). Disturbance was greatest from Aug. 28 21^h till 10^h on the following day, the storm ending rather abruptly ten hours later. It was, therefore, on a relatively undisturbed trace that the large geomagnetic crochet ($\Delta H = -110\gamma$), synchronous with the classical solar flare observed by Carrington and Hodgson, occurred at 11.3^h on Sept. 1. The second and even more intense storm began suddenly 17½ hours after the solar flare had been observed.
1859	26	The intense solar flare - for as such the observations by Carrington and Hodgson (*Monthly Notices, R.A.S.*, **20**, 13, 1859) may now be interpreted - occurred in a giant sunspot (Carrington No. 520) which crossed the central meridian on Aug. 31, the spot centre passing 12° north of the centre of the disk. The storm began with a SC at 04.7^h on Sept. 2. Violent agitation of the traces occurred till about 16^h and considerable agitation till the early hours of Sept. 4. The greatest ranges in D and H were recorded between 04^h and 09^h on Sept. 2. At 06^h Z, which was then at a negative value, swung through a measured range exceeding 1000γ (and perhaps reaching 1500γ) to a high positive value at which it remained for about an hour.
1859	27	This storm barely lasted for 24 hours, ending abruptly at midnight. The Z trace was much disturbed from 15^h to 19^h and included an extreme range from positive to negative values of the order of 1000γ. An auroral display was recorded in Europe as far south as the Mediterranean. There is a gap in the solar observations *continued*
1859	27	from Oct. 9 to 20. A spot measuring over 1000 millionths on Oct. 20 (Carrington No. 555) would have been near the east limb on Oct. 13.
1860	28	Disturbance preceded this dual storm from 04^h on Aug. 7. A burst of activity occurred around 0^h on Aug. 11. A great elongated and complex spot (Carrington No. 785) appears related to this dual storm. The spot returned (No. 809), still of considerable size, and another storm (No. 29) began 29 days after the first.
1862	31	The largest spot on the Sun's disk had an area of 1600 millionths on Aug. 3, but had crossed the central meridian on July 29. Another spot <500 millionths crossed the central meridian on Aug. 1.
1865	33	The area given for the sunspot is for Aug. 3. The spot was not seen before Aug. 1.
1866	34	This storm ceased abruptly at 19^h on Feb. 22. The large complex sunspot crossing the central meridian on Feb. 18 was Kew No. 735 in latitude 17° N, having a mean area of about 1700 millionths and a maximum area of 2100 millionths on Feb. 21.
1869	37	The sunspot associated with this storm was observed to be very active spectroscopically on Apr. 21 at 07^h and 14^h, suggesting the occurrence of brilliant solar flares (see list of great flares *Monthly Notices R.A.S.* **103**, 246, 1943).
1869	38	The traces were in agitation during this intense, short-lived storm until about 02^h on May 14. The disturbed pattern of the traces at $19\frac{1}{2}^h$ on May 13 was similar to that noted in the case of storm No. 51 (*q.v.*). A great aurora was extensively observed over Europe.
1870	39	The storm ended abruptly at 06^h on Feb. 2. An associated aurora having its maximum at about 19^h15^m was seen from Greenwich (*Proc. British Met. Soc.*, **5**, 68, 1870).
1870	40	The tabulated ranges in D and H occurred between 14^h and $18\frac{1}{2}^h$. Although the storm ranges were not large, the associated aurora was widely recorded over Europe. As seen from London the display was quite a notable one (T. Paulin; *Symons's Meteorological Magazine*, **5**, 64, 1870). At the time of the storm, the Sun presented a very spotted disk. Although there was no spot of great size near the central meridian, a very large group was near the east limb.
1870	43	There were two large spot groups that could be associated with this storm, the first as listed, and a second (area about 1200 millionths) which crossed the central meridian on Sept. 25. The latter was active spectroscopically, especially on Sept. 28 at 21^h when activity, corresponding to a solar flare, was recorded 46° W of C.M.

SUPPLEMENT TO CATALOGUE I: LIST OF GREAT STORMS RECORDED AT GREENWICH 1840-1874

NOTES *continued*

Year	Ref. No.	
1870	44	This great storm appears to fall into two parts, the maximum phase of each being associated with brilliant auroral displays recorded from the southern parts of Great Britain. The aurora was recorded at Cairo and eastwards to Baghdad. A brilliant display of the Aurora Australis was recorded from Natal (lat. 28½° S) (*Proc. British Met. Soc.* 5, 281, 1870). On Oct. 24 at about 20^h and on Oct. 25 at 18^h, the auroral displays culminated in the formation of a corona, seen from England a few degrees south-east of the zenith (*Symons's Met. Mag.* 5, 156, 1870). On Oct. 25 at about 20^h the H trace showed a remarkable swing of 1150γ from a positive to a negative value, the Z trace showing a sudden transition from positive to negative values. On the previous evening at 18^h, when a corona was also reported just south of the zenith, the same pattern of trace movements occurred but not to so marked an extent. The two auroræ were also characterised by their deep red colour. At the time of this dual storm the central region of the Sun's disk was spotted, but no spot was large.
1871	46	On Apr. 9 at 22.7^h Z decreased within a few minutes by 450γ, recovery being reached by 23.1^h. At nearly the same time H, already subnormal, decreased by a further 250γ to a minimum at 23.0^h. These trace movements correspond approximately in time with the formation of a corona which was 30° south of the zenith as observed from Scarborough between 22^h and 23^h (*Symons's Met. Mag.* 6, 42 (with sketch), 1871). From Mattishall, Norfolk, the time of the corona near the zenith was given as 22^h20^m to 23^h. No corona appears to have been observed from London, but at 23^h "the sky, with the exception of a small portion of the south horizon, was completely covered with pale streamers passing from West to East." (*loc. cit.* p. 43).
1871	49	The storm is notable for the agitation of the traces (especially H) rather than for the range of the *continued*
1871	49	elements. An aurora observed on Nov. 10 is described in *Quarterly Journal of the Meteorological Society*, 1, 39, 1871. On Nov. 10 at 21.3^h, the Z trace began falling to a low minimum value reached at 21.8^h.
1872	51	A violent storm of relatively short duration (22 hours) and associated with a brilliant auroral display, extensively observed from Europe and as far south as Bombay and Lahore, Suez and Athens. When first seen at about 18^h from the south of England, red auroral patches were in the *southern* part of the sky, and it seems significant that at this time Z at Greenwich had passed from positive to negative values. The display reached a maximum between 18^h55^m and 19^h00^m when a corona was observed from near Barnstaple (N. Devon) 28° south of the zenith and 20° east of south in azimuth (*Symons's Met. Mag.*, 7, 1, 1872). At this time, Z and H dropped suddenly to their lowest values, D having shown a sharp westerly peak at 18^h20^m. The three traces generally were greatly agitated from 17^h to 23^h. Similar trace patterns occurred during storms nos. 11, 27 and 38.
1872	53	Although there was no sunspot of sufficient size to justify an association with this storm, the interval of 27 days since the previous storm suggests that the same disturbed solar region was operative.
1872	54	Two storms separated from each other by about four hours of comparative quiet. On Oct. 14 at 23.5^h, H changed from a large positive to a large negative value. The Z trace shows a sharp depression by midnight. The second storm ended abruptly on Oct. 18 at 23^h.
1874	56	The storm was short-lived with violent agitation of the D and H traces till $22\frac{1}{2}^h$ on Feb. 4. The H trace showed a marked negative peak at 19.0^h and Z a negative peak at 19.8^h. An auroral display was seen from the south of England (*Symons's Met. Mag.*, 9, 9 and 22, 1874).

For the sunspot associated with storm No. 40, the date of central meridian passage and the approximate area have been obtained (there being a gap in the Ely photographs) from the series of observations made by G. Spörer and published under the title "Beobachtungen der Sonnenflecken" in *Astronomischen Gesellschaft*, No. 13 (1878).

C.B.H. 25839 - Wt. 3450 - Dd. 258-1000-3/55

APPENDIX (2)

COMPARATIVE SUNSPOT AND GEOMAGNETIC (S_q RANGE) CURVES 1841-1950

The accompanying diagram shows the variation in sunspot numbers and in the ranges of the diurnal inequalities in the Earth's magnetic elements as recorded at Greenwich and Abinger.

Upper Curve, R - Sunspot Numbers
Middle Curve, D - Declination (in minutes of arc)
Lower Curve, H - Horizontal Component (in gamma units)

The *Philosophical Transactions* (**171**, 541, 1880) contains the original paper by W. Ellis showing the relation between the Wolf sunspot numbers and the ranges in the mean diurnal inequalities of the magnetic elements observed at the Royal Observatory, Greenwich, over the period 1841-1877.

The investigation was extended at the Royal Observatory and published in the *Monthly Notices of the Royal Astronomical Society* **63**, 462, to cover the period 1873-1902.

The present diagram has been prepared at the Royal Greenwich Observatory by Mr. A. Edwards to cover the whole of the period 1841-1950.

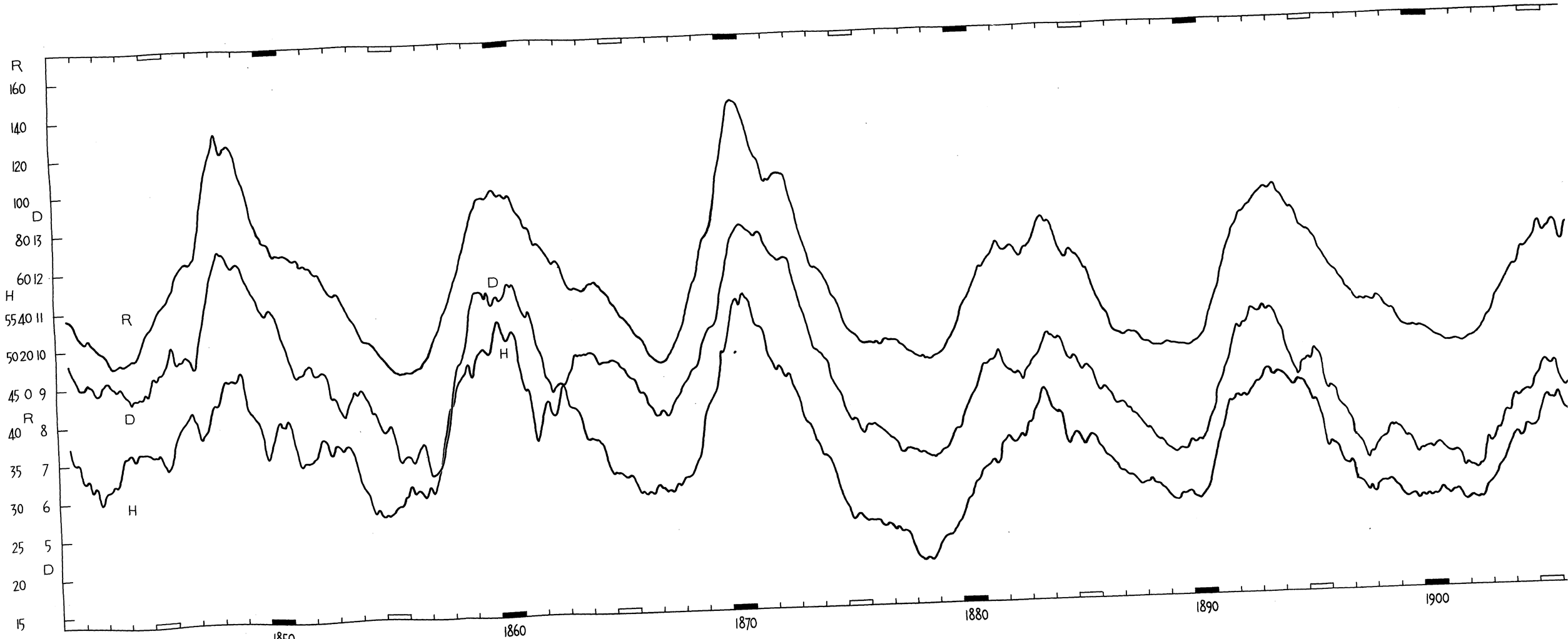
In his original work Ellis used days from amongst which were excluded those he considered disturbed. The present diagram has been prepared using the International Quiet Days and an attempt has been made to establish a correction, applicable to the figures given by Ellis to reduce them to the same system. The difference between the ranges given by "All" and "Quiet" days was found to vary, but it appeared to be practically neglible in both D and H about 1877. Ellis's figures for the period 1841-1877 have therefore been left unchanged.

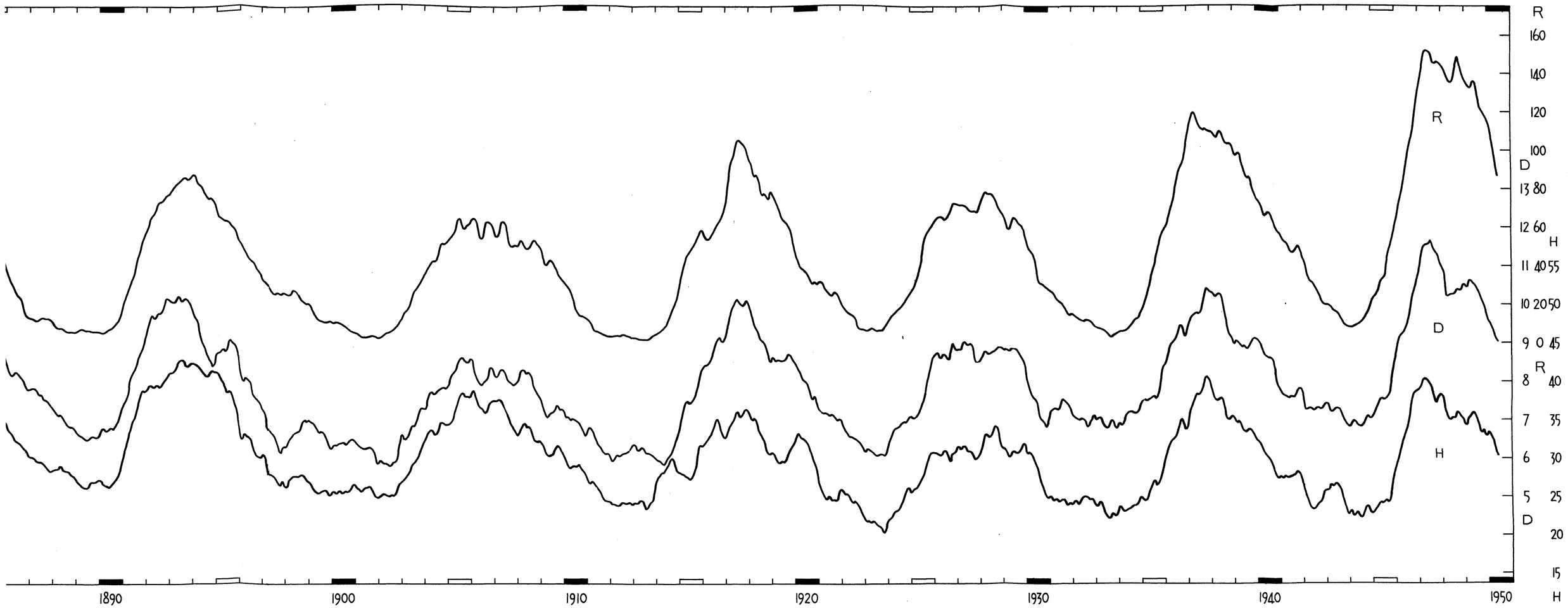
During the period 1912-1924 the North Component, X, was recorded at Greenwich. A statistical correction has been determined and applied to convert the mean ranges in X to H ranges.

From 1926 the magnetic curves are derived from the Abinger magnetic data.

The data used in the construction of the magnetic curves are the ranges in the monthly mean diurnal inequalities. To remove the seasonal variation and to smooth the values, means of groups of 13 successive values, of which the two end values have been assigned half weight, have been plotted.

The sunspot numbers, which have been smoothed in a comparable manner, have been taken from Table 2 appearing on p. 145 of the *Astronomische Mitteilungen, No. 145*, published by the Federal Observatory, Zurich.


R
160
140
120
100
D
80 13
60 12
H
55 40 11
50 20 10
45 0 9
R
40 8
35 7
30 6
25 5
D
20
15
R
D
H
D
H
1850
1860
1870
1880
1890
1900


R
160
140
120
100
D
13 80
12 60
H
11 40 55
10 20 50
9 0 45
R
8 40
7 35
6 30
5 25
D
20
15
H
R
D
H
1890
1900
1910
1920
1930
1940
1950

QC
836
.G7
c.3
TRANCI

Greenwich, England. Royal Observatory.
Sunspot and geomagnetic-storm data, derived from Greenwich observations, 1874-1954.

ROYAL GREENWICH OBSERVATORY

SUNSPOT AND GEOMAGNETIC-STORM DATA

DERIVED FROM GREENWICH OBSERVATIONS

1874-1954

LONDON:
HER MAJESTY'S STATIONERY OFFICE
1955

QC
836
.G7
c.3