

ROYAL OBSERVATORY, GREENWICH.

DETERMINATION OF THE SOLAR ROTATION
FROM LONG-LIVED SPOTS

AND

CHARACTERISTIC MOVEMENTS
OF SUNSPOTS

DERIVED FROM THE GREENWICH SUNSPOT MEASURES
FOR THE FOUR SOLAR CYCLES, 1878-1923.

DETERMINATION OF THE SOLAR ROTATION FROM LONG-LIVED SPOTS.

The measurement of Sun Spots at Greenwich has been carried on for four complete cycles. The present seems a fitting opportunity for a rediscussion of these measures for determination of the Solar Rotation. For this purpose the most valuable material is given by the spots which have been seen in two or more consecutive rotations of the sun. Instead of using spot-groups, *i.e.*, the mean of a number of allied spots, long-lived single spots have been chosen. Such spots are usually leaders of groups of spots and of regular form which makes them very suitable for measurement.

The measures of these spots have been extracted, with the help of the *Catalogue of Recurrent Groups of Spots*,* from the *Daily Results* since 1878, and collected in the form in which they have been published in the *Ledgers* since 1916. The method of reduction is very simple; the mean position of the spot for the days when visible at its first appearance (excluding days when the spot is more than 75° from the central meridian) is compared with the corresponding mean position after its re-appearance. If the change of longitude be x° in the interval of y days, then the angular movement of the spot is x°/y per mean solar day relative to a meridian on the Sun having a sidereal rotation of period 25.38 days or a daily movement of $14^\circ.18$, this being the datum adopted in the *Nautical Almanac* for the computation of the longitude of the central meridian as seen from the Earth. Thus the sidereal angular motion of the spot per mean solar day is $14^\circ.18 + x^\circ/y$.

In the following table, the first four columns give the numbers of the groups containing the spot during its two successive appearances on the Sun's disc, together with a letter by which it can be easily identified amongst the measures of the components of the group. *l* indicates that it is the leading spot of the group; *f*, the follower; *p*, the principal component; *g*, the sole component of the group. Where a distinctive letter, such as *a*, *b*, or *c*, has been given in the *Daily Results* or the *Ledgers*, it is also given in columns *two* and *four*. The *sixth* and *seventh* columns give the mean longitude respectively in the first and second rotations derived from the measures collected from the *Daily Results* from 1878–1915 or appearing in the *Ledgers* from 1916 to 1923. The mean date, given in the *eighth* and *ninth* columns, is expressed in days and decimal of a day, reckoning from midnight at the commencement of the year. Columns *ten* and *eleven* give the differences of longitude and interval in days.

* Appendix to Greenwich Photo-Heliographic Results, 1907 and in subsequent volumes up to 1915.

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x .	y .	x/y .	Diurnal Motion.
1st Rotation.		2nd Rotation.			1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°			°		°	°
Year 1878—1879. No suitable spots.												
Year 1880.												
321	g	327	p	+25.3	89.04	84.32	127.9	152.4	-4.72	24.5	-19	13.99
342	l	351	g	+11.1	325.25	327.30	219.3	245.9	+2.05	26.6	+08	14.26
343	g	354	p	+24.7	235.12	230.41	225.9	252.4	-4.71	26.5	-18	14.00
348	l	359	p	+22.4	190.98	190.03	232.8	256.0	-0.95	23.2	-04	14.14
397	l	403	g	+20.6	256.09	250.00	333.3	360.8	-6.09	27.5	-22	13.96
Year 1881.												
408	l	419	g	+16.5	354.02	354.02	18.3	41.8	0.00	23.5	.00	14.18
410D	l	424	g	-19.0	239.16	240.14	26.2	50.8	+0.98	24.6	+04	14.22
433	l	451	g	+21.3	342.14	335.62	71.9	97.4	-6.52	25.5	-25	13.93
436	l	453	g	-15.1	270.58	271.14	76.4	102.8	+0.56	26.4	+02	14.20
453	g	471	p	-14.2	271.14	270.36	102.8	126.4	-0.78	23.6	-03	14.15
461	l	474	g	+6.8	152.93	167.15	112.3	133.8	+14.22	21.5	+66	14.84
526	g	549	p	+27.8	307.22	293.17	208.8	237.4	-14.05	28.6	-49	13.69
552	p	574	g	+14.6	266.20	263.47	240.3	265.9	-2.73	25.6	-11	14.07
553	l	575	g	+20.6	263.77	257.26	241.3	267.9	-6.51	26.6	-24	13.94
561	l	577	g	-25.0	180.02	173.08	245.8	271.0	-6.94	25.2	-27	13.91
566	l	582	g	+12.5	102.90	102.48	253.4	275.4	-0.42	22.0	-02	14.16
586	p	598	g	+14.2	39.18	41.45	283.8	310.8	+2.27	27.0	+08	14.26
589	g	603	p	+16.4	289.10	286.81	291.9	319.9	-2.29	28.0	-08	14.10
594	p	605	p	+21.8	248.23	251.20	297.3	318.9	+2.97	21.6	+14	14.32
603	p	625	g	+16.6	286.81	282.00	319.9	345.9	-4.81	26.0	-18	14.00
606	l	628	g	+16.9	237.00	238.34	323.7	350.4	+1.34	26.7	+05	14.23
Year 1882.												
642	l	658	p	+16.2	12.03	18.78	6.3	29.7	+6.75	23.4	+29	14.47
653	g	677	l	-17.9	97.75	104.52	23.3	47.0	+6.77	23.7	+28	14.46
664	l	687	f	-13.8	291.40	293.27	39.9	63.3	+1.87	23.4	+08	14.26
672	l	699	l	-18.5	137.69	135.20	47.9	72.4	-2.49	24.5	-10	14.08
691	g	718	g	+0.3	221.78	224.63	68.8	95.9	+2.85	27.1	+11	14.29
693	l	713	g	+24.4	270.20	267.14	68.4	90.9	-3.06	22.5	-13	14.05
702	l	732	g	-22.2	75.72	72.40	79.9	105.5	-3.32	25.6	-13	14.05
705	p	735	g	-10.4	3.01	6.77	85.3	112.4	+3.76	27.1	+14	14.32
722	g	749	p	+20.8	160.78	155.36	100.9	126.9	-5.42	26.0	-21	13.97
744	g	767	g	+22.1	176.78	168.32	126.9	154.4	-8.46	27.5	-31	13.87
785	l	806	p	+10.0	198.72	199.34	181.4	203.4	+0.62	22.0	+03	14.21
797	l	812	g	+14.8	293.25	296.74	199.9	225.9	+3.49	26.0	+13	14.31
808	l	821	g	-11.5	127.55	128.69	214.9	239.4	+1.14	24.5	+04	14.22
838	l	856	g	+11.8	201.67	203.19	260.7	288.3	+1.52	27.6	+05	14.23
846	g	868	g	-22.0	50.18	43.26	271.9	299.9	-6.92	28.0	-25	13.93
868	g	890	g	-22.6	43.26	36.12	299.9	328.4	-7.14	28.5	-25	13.93
870	l	895	g	+15.9	334.31	330.78	305.9	331.4	-3.53	25.5	-14	14.04
885	g	908	l	+18.9	120.97	119.33	321.8	344.8	-1.64	23.0	-07	14.11

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		α .	y .	α/y .	Diurnal Motion.
1st Rotation.		2nd Rotation.			1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
Year 1883												
927	g	946	g	-18.6	213.87	211.04	4.7	29.8	- 2.83	25.1	- .11	14.07
987	l	1011	l	+13.1	135.56	142.41	92.4	116.4	+ 6.85	24.0	+ .28	14.46
999	l	1027	g	-22.1	307.61	300.90	106.8	134.8	- 6.71	28.0	- .24	13.94
1000	p	1026	g	-15.7	303.70	303.15	106.8	130.9	- 0.55	24.1	- .02	14.16
1071	p	1094	p	-10.3	176.04	178.02	196.6	224.9	+ 1.98	28.3	+ .07	14.25
1109	g	1126	g	-18.8	253.95	249.48	246.9	274.4	- 4.47	27.5	- .16	14.02
1114	g	1133	g	-22.1	132.79	128.78	255.9	283.4	- 4.01	27.5	- .15	14.03
1133	g	1169	g	-22.8	128.78	118.66	283.4	311.4	-10.12	28.0	- .36	13.82
1144	g	1173	l	- 9.5	35.18	36.80	290.9	317.9	+ 1.62	27.0	+ .06	14.24
1173	l	1198	p	- 9.6	36.80	34.65	317.9	345.4	- 2.15	27.5	- .08	14.10
1177	p	1206	p	-15.0	332.45	331.16	322.9	347.4	- 1.29	24.5	- .05	14.13
1216	l	1255	g	- 8.4	206.04	208.21	358.3	386.8	+ 2.17	28.5	+ .07	14.25
1217	p	1256	g	+ 1.5	199.58	203.36	358.3	386.8	+ 3.78	28.5	+ .13	14.31
Year 1884.												
1267	p.a	1303	l.a	-25.4	27.66	19.61	35.8	63.9	- 8.05	28.1	- .28	13.90
1284	p	1320	g	- 9.5	207.39	208.31	48.9	76.4	+ 0.92	27.5	+ .03	14.21
1288	l	1323	g	+13.4	178.68	188.52	51.3	78.4	+ 9.84	27.1	+ .36	14.54
1324	p.a	1358	p.a	+ 7.8	180.37	182.59	78.9	104.8	+ 2.22	25.9	+ .09	14.27
1330	l.a	1360	g	- 8.9	122.49	129.32	82.9	108.9	+ 6.83	26.0	+ .26	14.44
1371	l.a	1393	g	- 9.5	26.95	28.88	116.9	144.3	+ 1.93	27.4	+ .07	14.25
1381	p.a	1409	l.a	- 7.1	153.17	152.32	134.8	162.3	- 0.85	27.5	- .03	14.15
1388	p.a	1410	g	- 2.3	74.87	79.73	140.8	164.8	+ 4.86	24.0	+ .20	14.38
1393	g	1414	g	- 8.8	28.88	31.55	144.3	170.9	+ 2.67	26.6	+ .10	14.28
1409	l.a	1425	g	- 6.9	152.32	151.25	162.3	188.9	- 1.07	26.6	- .04	14.14
1438	l.a	1455	p.a	- 3.1	317.05	323.44	206.9	230.9	+ 6.39	24.0	+ .26	14.44
1480	l.a	1501	l.a	+14.2	21.04	19.15	256.9	281.4	- 1.89	24.5	- .08	14.10
1480	f.b	1501	f.b	+14.2	10.88	10.50	257.4	277.4	- 0.38	20.0	- .02	14.16
1495	g	1518	g	-13.9	133.93	132.64	272.4	297.9	- 1.29	25.5	- .05	14.13
1532	l.a	1548	g	- 7.1	302.74	307.10	317.3	339.3	+ 4.36	22.0	+ .20	14.38
1546	l.a	1563	p.a	+ 2.4	353.19	355.88	339.8	364.7	+ 2.69	24.9	+ .11	14.29
Year 1885.												
1632	l.a	1647	p.a	-16.3	243.54	243.08	93.4	116.9	- 0.46	23.5	- .02	14.16
1706	p.a	1720	p.b	+ 9.7	244.31	245.72	169.8	198.5	+ 1.41	28.7	+ .05	14.23
1718	p.a	1737	p.a	- 9.6	292.79	297.54	195.0	221.9	+ 4.75	26.9	+ .18	14.36
1728	p.a	1748	g	-12.7	175.00	173.17	203.5	230.9	- 1.83	27.4	- .06	14.12
1738	l.a	1759	p.a	-11.9	289.34	293.34	222.4	249.4	+ 4.00	27.0	+ .15	14.33
1756	l	1767	g	- 3.2	24.34	28.47	245.4	269.4	+ 4.13	24.0	+ .17	14.35
1773	l.a	1788	p.a	-15.5	263.10	260.51	278.8	306.2	- 2.59	27.4	- .09	14.09
Year 1886.												
1828	l.a	1835	p.a	- 9.9	32.53	35.31	15.4	40.3	+ 2.78	24.9	+ .11	14.29
1835	p.a	1852	p.a	- 9.0	35.31	35.70	40.3	67.4	+ 0.39	27.1	+ .01	14.19
1853	l.a	1864	p.a	- 5.3	23.47	26.75	68.4	96.4	+ 3.28	28.0	+ .12	14.30
1856	l.a	1869	g	+ 4.7	199.85	201.68	82.4	109.9	+ 1.83	27.5	+ .06	14.24
1860	l.a	1874	p.a	-17.5	119.37	117.65	90.4	115.9	- 1.72	25.5	- .07	14.11

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		<i>x</i> .	<i>y</i> .	<i>x/y</i> .	Diurnal Motion.
1st Rotation.		2nd Rotation.			1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°	Year 1886.— <i>contd.</i>		°		°	°
1864	<i>p.a</i>	1876	<i>g</i>	− 6.0	26.75	32.30	96.4	122.4	+ 5.55	26.0	+ .21	14.39
1878	<i>l.a</i>	1884	<i>g</i>	−10.9	72.88	74.25	122.4	146.4	+ 1.37	24.0	+ .05	14.23
1884	<i>g</i>	1897	<i>g</i>	−11.1	74.25	74.06	146.4	173.4	− 0.19	27.0	− .01	14.17
1891	<i>l.a</i>	1901	<i>p.a</i>	−14.9	304.61	301.99	157.9	183.4	− 2.62	25.5	− .10	14.08
1901	<i>p.a</i>	1910	<i>p.a</i>	−14.2	301.99	300.50	183.4	211.4	− 1.49	28.0	− .05	14.13
1906	<i>l.a</i>	1915	<i>p.a</i>	− 9.0	76.06	78.90	201.8	226.9	+ 2.84	25.1	+ .11	14.29
							Year 1887.					
1987	<i>p.a</i>	1992	<i>p.a</i>	− 7.8	94.93	97.18	161.9	188.4	+ 2.25	26.5	+ .08	14.26
1991	<i>p.a</i>	1996	<i>p.a</i>	−12.4	179.29	182.34	182.4	206.4	+ 3.05	24.0	+ .13	14.31
1992	<i>p.a</i>	1998	<i>g</i>	− 7.4	97.18	97.53	188.4	215.4	+ 1.35	27.0	+ .01	14.19
							Year 1888. No suitable spots.					
							Year 1889.					
2085	<i>l.a</i>	2086	<i>g</i>	+ 5.8	312.67	315.14	73.4	95.4	+ 2.47	22.0	+ .11	14.29
2090	<i>l.a</i>	2092	<i>p.a</i>	− 6.8	31.13	36.29	172.4	198.9	+ 5.16	26.5	+ .19	14.37
2092	<i>p.a</i>	2099	<i>g</i>	− 8.1	36.29	36.91	198.9	225.9	+ 0.62	27.0	+ .02	14.20
2097	<i>l.a</i>	2100	<i>g</i>	−19.8	164.72	160.38	218.9	243.9	− 4.34	25.0	− .17	14.01
							Year 1890.					
2159	<i>l.a</i>	2165	<i>l.a</i>	+20.4	311.40	310.10	331.9	353.9	− 1.30	22.0	− .06	14.12
							Year 1891.					
2183	<i>l.a</i>	2193	<i>g</i>	+19.6	280.31	284.54	51.4	77.9	+ 4.23	26.5	+ .16	14.34
2204	<i>l.a</i>	2220	<i>g</i>	−19.5	137.30	135.48	115.9	143.4	− 1.82	27.5	− .06	14.12
2247	<i>l.a</i>	2266	<i>p.a</i>	−21.9	37.39	29.62	178.9	202.9	− 7.77	24.0	− .32	13.86
2294	<i>l.a</i>	2311	<i>p.a</i>	+26.2	178.03	170.43	248.9	276.9	− 7.60	28.0	− .27	13.91
2299	<i>p.a</i>	2318	<i>p.a</i>	+14.4	51.69	53.66	258.9	285.9	+ 1.97	27.0	+ .07	14.25
2349	<i>l.a</i>	2364	<i>g</i>	−19.7	265.44	267.67	324.4	351.9	+ 2.23	27.5	+ .08	14.26
							Year 1892.					
2376	<i>l.a</i>	2411	<i>p.a</i>	+21.6	39.88	45.56	3.4	28.4	+ 5.68	25.0	+ .22	14.40
2405	<i>p.a</i>	2431	<i>p.a</i>	+19.0	148.77	144.39	22.9	50.9	− 4.38	28.0	− .15	14.03
2448	<i>p.a</i>	2481	<i>p.a</i>	+10.5	105.95	106.73	80.9	107.9	+ 0.78	27.0	+ .03	14.21
2481	<i>p.a</i>	2512	<i>p.a</i>	+10.8	106.73	107.83	107.9	132.4	+ 1.10	24.5	+ .04	14.22
2492	<i>p.a</i>	2528	<i>g</i>	−17.6	313.77	313.11	119.9	144.9	− 0.66	25.0	− .03	14.15
2507	<i>p.a</i>	2545	<i>p.a</i>	+18.6	166.89	163.13	130.9	155.9	− 3.76	25.0	− .15	14.03
2530	<i>l.a</i>	2562	<i>l.a</i>	+11.1	2.46	359.94	144.9	167.9	− 2.52	23.0	− .11	14.07
2550	<i>p.a</i>	2581	<i>l.a</i>	+10.4	85.27	89.60	163.4	191.4	+ 4.33	28.0	+ .15	14.33
2560	<i>f.a</i>	2583	<i>p.a</i>	−31.3	46.98	32.96	168.4	194.9	−14.02	26.5	− .53	13.65
2580	<i>l.a</i>	2612	<i>g</i>	−22.4	98.51	91.18	189.9	217.9	− 7.33	28.0	− .26	13.92

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x .	y .	x/y .	Diurnal Motion.
1st Rotation.	2nd Rotation.				1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°			°		°	°
Year 1892. <i>contd.</i> —												
2581	l.a	2611	p.d	+11.4	89.60	93.18	191.4	218.4	+ 3.58	27.0	+ .13	14.31
2583	p.a	2615	p.a	-30.8	32.96	16.58	194.9	222.9	-16.38	28.0	- .58	13.60
2586	l.a	2623	g	- 8.2	302.04	303.22	201.9	228.9	+ 1.18	27.0	+ .04	14.22
2598	l.a	2636	p.a	+12.7	176.14	173.73	211.4	238.9	- 2.41	27.5	- .09	14.09
2611	p.d	2643	p.a	+10.6	93.18	93.14	218.4	244.9	- 0.04	26.5	.00	14.18
2612	g	2644	p.a	-22.4	91.18	81.88	217.9	245.9	- 9.30	28.0	- .33	13.85
2643	p.a	2675	p.a	+10.4	93.14	91.53	244.9	272.4	- 1.61	27.5	- .06	14.12
2726	l.a	2760	p.a	+ 7.5	290.76	291.45	310.4	338.9	+ 0.69	28.5	+ .02	14.20
2730	l.a	2759	g	+19.8	296.36	292.94	313.4	337.9	- 3.42	24.5	- .14	14.04
2749	p.a	2787	l.a	-15.6	6.69	7.41	333.4	360.9	+ 0.72	27.5	+ .02	14.20
2773	l.a	2794	g	-11.6	264.32	271.59	342.4	365.9	+ 7.27	23.5	+ .31	14.49
Year 1893.												
2853	l.a	2889	p.a	+14.8	303.98	304.26	53.9	80.4	+ 0.28	26.5	+ .01	14.19
2881	l.a	2914	l.a	- 7.9	42.64	50.08	73.9	100.4	+ 7.44	26.5	+ .28	14.46
2893	p.a	2930	p.a	+24.1	274.96	268.53	83.9	109.9	- 6.43	26.0	- .25	13.93
2906	p.a	2939	p.a	-14.3	182.29	190.02	90.9	116.9	+ 7.73	26.0	+ .30	14.48
2919	l.a	2956	l.a	-27.7	57.71	50.43	101.4	128.4	- 7.28	27.0	- .27	13.91
2923	l.a	2964	p.a	-13.7	331.87	331.04	106.9	132.9	- 0.83	26.0	- .03	14.15
2951	p.a	2992	l.a	-20.1	93.77	91.05	124.9	151.9	- 2.72	27.0	- .10	14.08
2993	l.a	3034	l.a	-20.0	79.68	77.36	152.9	177.4	- 2.32	24.5	- .09	14.09
3005	p.a	3047	g	-12.2	321.73	322.38	161.9	188.9	+ 0.65	27.0	+ .02	14.20
3015	l.c	3054	l.a	-20.2	288.43	284.03	168.9	191.9	- 4.40	23.0	- .19	13.99
3020	f.c	3071	p.a	+17.3	220.32	217.30	172.4	196.9	- 3.02	24.5	- .12	14.06
3054	l.a	3110	g	-21.4	284.03	278.00	191.9	215.9	- 6.03	24.0	- .25	13.93
3059	l.a	3098	p.a	+10.9	318.30	322.53	190.9	216.4	+ 4.23	25.5	+ .17	14.35
3067	l.a	3112	p.a	+16.9	251.63	245.24	194.4	220.9	- 6.39	26.5	- .24	13.94
3078	p.a	3185	l.a	-20.2	108.63	103.07	204.9	232.4	- 5.56	27.5	- .20	13.98
3106	l.a	3156	p.a	-19.1	296.39	292.08	218.9	245.9	- 4.31	27.0	- .16	14.02
3107	l.a	3155	p.a	+14.0	301.51	301.85	219.9	244.9	+ 0.34	25.0	+ .01	14.19
3154	l.a	3202	p.a	-11.1	307.04	305.59	244.9	271.9	- 1.45	27.0	- .05	14.13
3155	p.a	3203	p.a	+13.5	301.85	300.65	244.9	272.4	- 1.20	27.5	- .04	14.14
3173	l.a	3216	g	- 8.1	170.54	176.17	254.9	281.9	+ 5.63	27.0	+ .21	14.39
3203	p.a	3250	p.a	+13.4	300.65	298.28	272.4	299.9	- 2.37	27.5	- .08	14.10
3206	l.c	3246	l.a	+ 9.1	326.12	335.01	273.4	294.9	+ 8.89	21.5	+ .41	14.59
3227	p.a	3266	g	+23.0	85.73	80.60	288.9	311.9	- 5.13	23.0	- .22	13.96
3287	l.a	3304	g	+19.0	334.58	334.94	325.9	350.9	+ 0.36	25.0	+ .01	14.19
3305	g	3352	g	- 1.4	330.12	335.93	351.9	378.9	+ 5.81	27.0	+ .21	14.39
3318	l.a	3367	p.a	- 3.0	225.00	234.05	358.9	387.4	+ 9.05	28.5	+ .32	14.50
3323	l.a	3370	g	-10.2	197.08	201.61	361.9	386.4	+ 4.53	24.5	+ .18	14.36
3325	p.a	3372	l.a	- 7.2	168.72	173.82	364.4	391.9	+ 5.10	27.5	+ .18	14.36
Year 1894.												
3356	l.a	3396	l.a	+11.5	309.73	309.60	15.9	42.9	- 0.13	27.0	.00	14.18
3360	l.a	3401	g	-14.8	268.03	267.56	18.9	46.9	- 0.47	28.0	- .02	14.16
3371	l.a	3402	p.a	+16.2	264.52	265.40	22.4	46.9	+ 0.88	24.5	+ .03	14.21
3402	p.a	3443	g	+16.9	265.40	263.98	46.9	73.4	- 1.42	26.5	- .05	14.13
3414	l.a	3442	p.a	- 4.4	262.03	270.63	50.9	73.9	+ 8.60	23.0	+ .37	14.55
3413	p.a	3449	p.a	-25.8	152.24	143.30	54.9	79.9	- 8.94	25.0	- .36	13.82
3460	l.a	3492	p.a	+10.9	54.75	54.94	90.4	116.9	+ 0.19	26.5	+ .01	14.19

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x .	y .	x/y .	Diurnal Motion.
1st Rotation.		2nd Rotation.			1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°			°		°	°
Year 1894.—contd.												
3465	p.a	3495	g	+15.1	21.81	19.68	91.9	118.4	-2.13	26.5	-0.08	14.10
3533	p.a	3581	p.a	+12.8	357.05	359.54	148.9	175.9	+2.49	27.0	+0.09	14.27
3537	p.a	3585	p.a	+15.7	314.54	315.87	151.9	178.9	+1.33	27.0	+0.05	14.23
3546	l.a	3583	p.a	-1.0	343.60	348.34	152.9	175.9	+4.74	23.0	+0.20	14.38
3575	l.a	3624	l.a+b	-13.3	77.21	76.71	169.9	196.9	-0.50	27.0	-0.02	14.16
3581	p.a	3637	l.a	+13.1	359.54	359.57	175.9	202.9	+0.03	27.0	.00	14.18
3599	l.a	3652	l.a	+11.9	188.78	192.48	188.9	213.9	+3.70	25.0	+0.15	14.33
3604	f.c	3654	p.a	-19.3	167.43	162.40	189.9	214.9	-5.03	25.0	-0.20	13.98
3640	l.a	3674	p.a	-7.2	329.83	336.38	205.9	230.9	+6.55	25.0	+0.26	14.44
3642	p.a	3679	g	+18.2	300.98	297.94	206.9	232.9	-3.04	26.0	-0.11	14.07
3702	g	3734	p.a	+17.1	42.00	41.02	253.9	281.9	-0.98	28.0	-0.04	14.14
3732	p.a	3776	g	+12.7	56.43	54.43	280.9	306.9	-2.00	26.0	-0.08	14.10
3817	l.a	3836	p.a	-14.0	34.18	31.75	338.4	362.9	-2.43	24.5	-0.10	14.08
Year 1895.												
3847	p.a	3883	p.a	-18.3	307.52	301.00	5.4	31.9	-6.52	26.5	-0.24	13.94
3884	l.a	3916	p.a	+13.8	304.95	308.79	32.9	59.9	+3.84	27.0	+0.14	14.32
3916	p.a	3955	g	+12.8	308.79	307.40	59.9	84.4	-1.39	24.5	-0.06	14.12
3933	p.a	3964	g	+13.0	183.63	184.01	69.9	95.9	+0.38	26.0	+0.01	14.19
3968	p.a	4005	l.a	-13.6	134.53	141.38	100.9	127.9	+6.85	27.0	+0.25	14.43
3989	l.a	4024	p.a	+23.0	303.57	299.61	114.9	142.9	-3.96	28.0	-0.14	14.04
3996	l.a	4025	g	-12.8	297.60	298.44	118.4	141.9	+0.84	23.5	+0.03	14.21
4028	l.a	4061	p.a	-23.9	275.42	273.39	144.9	170.9	-2.03	26.0	-0.08	14.10
4049	p.a	4077	p.a	-18.2	82.06	76.85	158.9	186.4	-5.21	27.5	-0.19	13.99
4084	l.a	4112	p.a	-6.4	1.61	3.12	192.9	219.4	+1.51	26.5	+0.05	14.23
4107	l.a	4133	p.a	-8.7	79.28	79.33	214.9	240.9	+0.05	26.0	.00	14.18
4110	l.a	4139	p.a	+10.8	27.53	27.70	219.4	244.9	+0.17	25.5	+0.01	14.19
4139	p.a	4180	p.a	+11.2	27.70	26.12	244.9	272.4	-1.58	27.5	-0.06	14.12
4208	l.a	4229	p.a	+19.0	360.15	359.95	302.4	327.4	-0.20	25.0	-0.01	14.17
4210	l.a	4230	p.a	+9.5	328.06	331.31	305.9	328.9	+3.25	23.0	+0.14	14.32
4211	l.a	4231	p.b	+11.6	292.96	297.06	306.9	333.4	+4.10	26.5	+0.15	14.33
4234	l.a	4256	l.a	-13.4	304.78	305.52	336.9	360.9	+0.74	24.0	+0.03	14.21
4255	l.a	4277	p.a	-10.5	322.18	323.69	358.9	386.4	+1.51	27.5	+0.05	14.23
4256	l.a	4278	p.a	-13.8	305.52	303.97	360.9	387.9	-1.55	27.0	-0.06	14.12
Year 1896.												
4305	l.a	4320	p.a	-15.9	156.02	160.07	64.4	85.4	+4.05	21.0	+0.19	14.37
4369	l.a	4386	p.a	-15.1	219.87	216.72	165.4	191.4	-3.15	26.0	-0.12	14.06
4395	p.a	4407	p.a	-20.4	124.04	120.63	199.9	228.4	-3.41	28.5	-0.12	14.06
4416	l.a	4435	l.a	-11.2	297.02	301.78	243.4	267.9	+4.76	24.5	+0.19	14.37
4435	l.a	4446	p.a	-11.1	301.78	304.05	267.9	292.9	+2.27	25.0	+0.09	14.27
4456	p.a	4473	p.a	-16.0	76.38	77.74	312.9	336.4	+1.36	23.5	+0.06	14.24
Year 1897.												
4505	l.a	4526	g	+6.4	204.06	212.09	22.4	45.9	+8.03	23.5	+0.34	14.52
4517	l.a	4532	p.a	-1.1	27.01	35.26	34.9	58.9	+8.25	24.0	+0.34	14.52
4518	l.a	4535	p.a	-6.2	347.98	347.81	34.9	62.9	-0.17	28.0	-0.01	14.17
4523	l.a	4531	l.a	+13.2	40.90	45.84	34.9	58.4	+4.94	23.5	+0.21	14.39

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		α .	y .	α/y .	Diurnal Motion.
1st Rotation.		2nd Rotation.			1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°			°		°	°
Year 1897—contd.												
4526	g	4541	f.c	+ 6.1	212.09	216.05	45.9	72.4	+ 3.96	26.5	+ .15	14.33
4532	p.a	4549	p.a	— 1.3	35.26	41.24	58.9	85.4	+ 5.98	26.5	+ .22	14.40
4560	l.c	4573	p.a	+ 2.9	225.92	232.96	100.4	125.9	+ 7.04	25.5	+ .27	14.45
4579	p.a	4588	p.a	— 8.9	270.13	271.36	150.4	177.4	+ 1.23	27.0	+ .04	14.22
4588	p.a	4599	g	— 9.0	271.36	271.77	177.4	200.4	+ 0.41	23.0	+ .02	14.20
4605	l.a	4615	p.a	— 5.4	69.56	70.91	219.9	246.9	+ 1.35	27.0	+ .05	14.23
4615	p.a	4634	p.a	— 5.9	70.91	73.03	246.9	273.9	+ 2.12	27.0	+ .08	14.26
4663	p.a	4674	p.a	+ 9.8	210.83	209.10	345.9	372.9	— 1.73	27.0	— .06	14.12
Year 1898.												
4687	g	4704	p.a	— 7.5	100.77	104.12	43.9	70.9	+ 3.35	27.0	+ .12	14.30
4765	p.a	4778	g	+ 11.1	333.88	341.41	216.9	243.4	+ 7.53	26.5	+ .28	14.46
4781	l.a	4791	p.a	— 12.4	240.94	240.75	250.9	278.4	— 0.19	27.5	— .01	14.17
Year 1899.												
4848	p.a	4855	p.a	— 12.8	61.40	61.18	90.9	117.9	— 0.22	27.0	— .01	14.17
4855	p.a	4857	p.a	— 12.6	61.18	61.14	117.9	144.9	— 0.04	27.0	.00	14.18
Year 1900.												
4915	l.a	4917	p.a	— 11.3	290.84	292.14	66.3	90.4	+ 1.30	24.1	+ .05	14.23
Year 1901.												
4953	l.a	4955	p.a	+ 9.3	165.72	168.66	145.4	171.3	+ 2.94	25.9	+ .11	14.29
Year 1902. No suitable spots.												
Year 1903.												
5088	l.a	5095	g	+ 13.9	92.72	92.15	269.0	291.8	— 0.57	22.8	— .03	14.15
5091	l.a	5099	p.a	+ 13.9	244.70	248.54	280.9	305.4	+ 3.84	24.5	+ .16	14.34
5100	l.a	5116	l.a	+ 16.9	236.52	233.58	308.9	335.7	— 2.94	26.8	— .11	14.07
5100	f.b	5116	f.b	+ 16.6	227.12	227.53	309.3	336.2	+ 0.41	26.9	+ .02	14.20
5104	l.a	5120	g	— 26.8	165.68	154.79	317.3	339.3	— 10.89	22.0	— .49	13.69
5129	p.a	5146	p.a	+ 18.9	86.96	83.94	346.8	374.9	— 3.02	28.1	— .11	14.07
Year 1904.												
5183	p.a	5204	g	+ 8.1	237.11	244.82	79.9	105.5	+ 7.71	25.6	+ .30	14.48
5195	g	5210	l.a	+ 13.6	105.42	111.27	89.9	117.9	+ 5.85	28.0	+ .21	14.39
5269	l.a	5291	g	— 18.6	60.31	58.56	203.5	227.5	— 1.75	24.0	— .07	14.11
5317	l.a	5329	p.a	— 23.1	326.88	320.27	267.7	290.4	— 6.61	22.7	— .29	13.89

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x.	y.	x/y.	Diurnal Motion.
1st Rotation.		2nd Rotation.			1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
Year 1904—contd.												
5322	l.a	5351	p.a	-16.2	56.63	59.87	286.7	311.3	+ 3.24	24.6	+ .13	14.31
5366	p.a	5396	p.a	+28.8	246.30	239.92	329.2	349.4	- 6.38	20.2	- .31	13.87
5390	p.a	5420	p.a	+17.6	268.46	263.30	350.3	376.9	- 5.16	26.6	- .19	13.99
Year 1905.												
5441	p.a	5471	p.a	-16.2	329.49	330.75	33.9	61.3	+ 1.26	27.4	+ .05	14.23
5524	l.a	5542	p.b	+11.1	162.11	167.28	131.4	155.8	+ 5.17	24.4	+ .21	14.39
5529	l.a	5550	p.a	-15.2	67.23	69.86	136.8	162.8	+ 2.63	26.0	+ .10	14.28
5529	f.c	5553	p.a	-14.9	53.80	52.42	136.8	164.4	- 1.38	27.6	- .05	14.13
5589	l.a	5620	p.a	+12.6	343.62	346.62	197.1	223.9	+ 3.00	26.8	+ .11	14.29
5597	l.a	5622	l.a	+14.6	323.72	323.89	202.0	225.9	+ 0.17	23.9	+ .01	14.19
5622	l.a	5653	p.a	+13.5	323.89	325.77	225.9	250.9	+ 1.88	25.0	+ .07	14.25
5628	l.a	5655	p.a	+ 3.2	273.68	286.28	231.9	254.9	+12.60	23.0	+ .55	14.73
5680	l.a	5703	p.a	+13.2	236.25	238.70	286.4	313.8	+ 2.45	27.4	+ .09	14.27
5713	p.a	5745	l.a	-17.6	157.37	158.36	319.8	343.3	+ 0.99	23.5	+ .04	14.22
5747	l.a	5775	l.a	+ 8.0	99.09	104.78	351.4	378.9	+ 5.69	27.5	+ .20	14.38
5766	l.a	5788	g	- 8.1	281.78	286.93	364.8	391.8	+ 5.15	27.0	+ .19	14.37
Year 1906.												
5775	l.a	5798	p.a	+ 8.5	104.78	107.02	13.9	40.4	+ 2.24	26.5	+ .08	14.26
5785	l.a	5802	p.a	-10.9	335.38	339.01	24.3	50.3	+ 3.63	26.0	+ .14	14.32
5790	l.a	5803	l.a	+14.1	303.51	309.04	27.9	52.9	+ 5.53	25.0	+ .22	14.40
5817	l.a	5843	p.a	+19.3	106.95	106.21	70.7	95.4	- 0.74	24.7	- .03	14.15
5871	l.a	5889	p.a	+11.9	133.93	135.40	147.4	175.0	+ 1.47	27.6	+ .05	14.23
5886	l.a	5898	p.a	+20.9	7.22	6.62	160.5	184.5	- 0.60	24.0	- .03	14.15
5894	p.a	5928	p.a	+10.4	45.09	48.20	182.5	206.6	+ 3.11	24.1	+ .13	14.31
5898	p.a	5931	p.a	+21.5	6.62	1.25	184.5	211.9	- 5.37	27.4	- .19	13.99
5912	p.a	5935	p.a	+18.2	201.55	199.93	197.0	224.0	- 1.62	27.0	- .06	14.12
5931	p.a	5946	p.a	+22.4	1.25	353.78	211.9	240.4	- 7.47	28.5	- .26	13.92
5933	l.a	5944	p.a	-16.2	24.87	23.90	213.2	238.0	- 0.97	24.8	- .04	14.14
6004	l.a	6034	p.a	-11.4	60.75	63.19	316.8	341.9	+ 2.44	25.1	+ .10	14.28
Year 1907.												
6059	l.a	6098	p.a	+ 7.7	109.47	113.15	2.8	29.8	+ 3.68	27.0	+ .13	14.31
6075	p.a	6103	l.a	-13.2	329.72	337.20	13.3	40.4	+ 7.48	27.1	+ .28	14.46
6088	l.a	6112	g	-16.2	232.38	233.94	21.3	43.4	+ 1.56	22.1	+ .07	14.25
6090	p.a	6115	p.a	+ 5.0	174.10	176.73	24.8	49.3	+ 2.63	24.5	+ .11	14.29
6099	l.a	6123	p.a	+22.6	83.59	77.25	32.3	59.3	- 6.34	27.0	- .23	13.95
6103	l.a	6136	l.a	-13.5	337.20	339.29	40.4	66.4	+ 2.09	26.0	+ .08	14.26
6134	p.a	6156	g	+12.4	356.75	355.69	65.9	92.4	- 1.06	26.5	- .04	14.14
6140	p.a	6161	g	-17.1	309.25	303.50	69.4	96.9	- 5.75	27.5	- .21	13.97
6172	l.a	6189	g	+ 7.4	77.53	82.27	114.4	139.5	+ 4.74	25.1	+ .19	14.37
6205	l.a	6215	p.a	-17.8	68.20	63.71	170.0	196.9	- 4.49	26.9	- .17	14.01
6215	p.a	6233	p.a	-19.0	63.71	56.48	196.9	224.9	- 7.23	28.0	- .26	13.92
6236	l.a	6255	p.a	-23.3	337.43	325.10	230.9	259.0	-12.33	28.1	- .44	13.74
6243	l.a	6267	p.a	-16.8	134.33	134.83	248.0	272.9	+ 0.50	24.9	+ .02	14.20
6247	p.a	6273	p.a	- 7.1	37.25	36.46	253.5	278.3	- 0.79	24.8	- .03	14.15
6256	p.a	6280	p.a	+ 7.4	308.72	310.71	260.0	287.4	+ 1.99	27.4	+ .07	14.25

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x .	y .	x/y .	Diurnal Motion.
1st Rotation.	2nd Rotation.				1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°	Year 1907—contd.		°		°	°
6276	p.a	6293	p.a	-21.1	351.15	352.48	285.9	310.3	+ 1.33	24.4	+ .05	14.23
6296	l.a	6316	l.a	-13.9	338.87	341.35	312.8	339.9	+ 2.48	27.1	+ .09	14.27
6300	l.a	6318	p.a	+12.1	270.15	277.20	318.8	344.4	+ 7.05	25.6	+ .27	14.45
6318	p.a	6335	g	+13.1	277.20	276.43	344.4	370.4	- 0.77	26.0	- .03	14.15
6323	l.a	6344	g	-15.9	220.11	226.35	350.8	376.4	+ 6.24	25.6	+ .24	14.42
6324	l.a	6349	l.a	- 4.5	143.43	147.64	354.8	381.4	+ 4.21	26.6	+ .16	14.34
							Year 1908.					
6390	g	6416	g	- 9.0	180.81	184.39	96.4	123.4	+ 3.58	27.0	+ .13	14.31
6393	g	6420	p.a	-15.1	161.85	162.32	98.9	124.8	+ 0.47	25.9	+ .02	14.20
6420	p.a	6440	g	-15.0	162.32	158.46	124.8	152.4	- 3.86	27.6	- .14	14.04
6436	l.a	6453	g	+10.9	331.52	333.34	139.4	165.9	+ 1.82	26.5	+ .07	14.25
6441	p.a	6464	p.a	- 3.0	144.56	154.06	152.9	179.9	+ 9.50	27.0	+ .35	14.53
6465	p.a	6489	g	-16.4	130.64	127.16	181.8	208.9	- 3.48	27.1	- .13	14.05
6494	l.a	6517	p.a	- 6.4	354.04	354.91	221.3	245.9	+ 0.87	24.6	+ .03	14.21
6499	l.a	6519	p.a	- 5.5	274.38	279.67	228.8	251.9	+ 5.29	23.1	+ .23	14.41
6517	p.a	6535	p.a	- 6.5	354.91	357.15	245.9	271.9	+ 2.24	26.0	+ .08	14.26
6519	p.a	6539	p.a	- 5.4	279.67	278.77	251.9	278.9	- 0.90	27.0	- .03	14.15
6520	g	6540	p.a	+12.2	268.24	271.61	253.4	280.0	+ 3.37	26.6	+ .13	14.31
6540	p.a	6558	g	+12.4	271.61	271.71	280.0	306.4	+ 0.10	26.4	. 00	14.18
6577	p.a	6592	p.a	+11.6	168.05	166.50	342.8	369.7	- 1.55	26.9	- .06	14.12
6589	l.a	6602	g	- 3.0	322.42	326.70	361.2	384.9	+ 4.28	23.7	+ .18	14.36
							Year 1909.					
6592	p.a	6609	p.a	+10.0	166.50	167.18	3.7	30.9	+ 0.68	27.2	+ .02	14.20
6602	g	6618	g	- 3.0	326.70	331.98	18.9	44.9	+ 5.28	26.0	+ .20	14.38
6604	p.a	6621	p.a	+ 8.2	296.89	298.53	21.3	47.9	+ 1.64	26.6	+ .06	14.24
6610	p.a	6628	p.a	-16.8	152.64	150.83	31.7	58.7	- 1.81	27.0	- .07	14.11
6676	l.a	6686	p.a	- 1.6	341.98	347.21	157.8	180.8	+ 5.23	23.0	+ .23	14.41
6695	l.a	6711	p.a	+ 6.6	40.85	42.53	204.5	230.8	+ 1.68	26.3	+ .06	14.24
6722	l.a	6733	p.a	-12.6	158.62	168.60	251.3	276.8	+ 9.98	25.5	+ .39	14.57
6723	l.a	6734	p.a	- 1.1	163.10	167.08	252.6	276.8	+ 3.98	24.2	+ .16	14.34
6733	p.a	6754	a	-13.3	168.60	167.82	276.8	302.9	- 0.78	26.2	- .03	14.15
6734	p.a	6753	g	+ 0.4	167.08	169.73	276.8	303.9	+ 2.65	27.1	+ .10	14.28
6746	p.a	6765	g.a	- 4.9	311.83	310.67	293.3	320.3	- 1.16	27.0	- .04	14.14
6756	l.a	6778	g.a	- 4.9	94.51	97.79	309.8	333.9	+ 3.28	24.1	+ .13	14.31
6771	l.a	6786	g.a	-13.4	182.65	184.13	329.8	356.8	+ 1.48	27.0	+ .05	14.23
6772	p.a	6787	g.a	-12.7	167.24	172.30	330.9	357.9	+ 5.06	27.0	+ .19	14.37
6774	l.a	6788	p.a	+14.7	171.99	170.32	332.3	357.9	- 1.67	25.6	- .06	14.12
6793	p.a	6809	p.a	-15.7	84.22	82.08	364.3	391.8	- 2.14	27.5	- .08	14.10
							Year 1910.					
6796	l.a	6811	g	+ 5.4	58.98	65.95	1.7	28.3	+ 6.97	26.6	+ .26	14.44
6813	l.a	6826	b	-15.3	187.97	187.22	46.9	72.8	- 0.75	25.9	- .03	14.15
6813	f.b	6826	c	-11.7	184.11	188.19	46.9	73.9	+ 4.08	27.0	+ .15	14.33
6817	l.a	6827	p.a	- 7.3	107.21	115.23	55.4	77.9	+ 8.02	22.5	+ .36	14.54
6823	l.a	6828	g.a	+15.9	3.39	3.41	62.4	87.4	+ 0.02	25.0	. 00	14.18
6849	l.a	6859	p.a	-10.5	51.35	54.75	138.4	162.0	+ 3.40	23.6	+ .14	14.32
6874	p.a	6880	p.a	-15.6	48.39	47.18	220.5	248.0	- 1.21	27.5	- .04	14.14

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x.	y.	x/y.	Diurnal Motion.
1st Rotation.		2nd Rotation.			1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°			°		°	
Year 1911.												
6937	l.a	6942	g	- 1.8	195.23	202.86	90.9	116.9	+ 7.63	26.0	+ .29	14.47
6944	g.a	6950	g.a	- 6.2	189.45	193.38	117.9	140.8	+ 3.93	22.9	+ .17	14.35
Years 1912 and 1913. No suitable Spots.												
Year 1914.												
7060	p.a	7068	g.a	+18.4	68.01	65.21	230.9	258.5	- 2.80	27.6	- .10	14.08
7102	l.a	7122	g	-22.8	115.90	109.44	336.4	363.9	- 6.46	27.5	- .24	13.94
Year 1915.												
7169	p.a	7204	p.a	+23.4	239.27	234.49	42.4	69.4	- 4.78	27.0	- .18	14.00
7223	p.a	7255	l.a	+19.9	299.89	295.52	93.9	121.4	- 4.37	27.5	- .16	14.02
7255	l.a	7285	g.a	+20.2	295.52	289.00	121.4	149.4	- 6.52	28.0	- .23	13.95
7266	l.a	7282	p.a	+21.7	317.02	312.35	123.4	147.4	- 4.67	24.0	- .19	13.99
7304	l.a	7341	p.a	+17.6	6.02	10.32	174.4	197.4	+ 4.30	23.0	+ .19	14.37
7315	l.a	7343	g.a	+19.5	347.58	350.06	174.9	198.9	+ 2.48	24.0	+ .10	14.28
7341	p.a	7384	g.a	+18.0	10.32	9.08	197.4	224.9	- 1.24	27.5	- .05	14.13
7406	l.a	7445	g.a	+22.2	189.53	184.93	239.4	263.9	- 4.60	24.5	- .19	13.99
7418	g.a	7450	g.a	-16.3	77.16	81.54	246.9	273.4	+ 4.38	26.5	+ .17	14.35
7564	p.a	7595	g	+10.3	173.40	175.30	352.4	375.9	+ 1.90	23.5	+ .08	14.26
Year 1916.												
7595	g	7622	g	+10.8	175.30	174.60	10.9	38.4	- 0.70	27.5	- .03	14.15
7618	l.a	7646	g	-13.1	239.01	241.79	34.9	59.9	+ 2.78	25.0	+ .11	14.29
7683	l.a	7701	l.a	+20.1	231.20	233.81	93.4	111.9	+ 2.61	18.5	+ .14	14.32
7683	f.b	7701	f.b	+20.6	227.40	224.36	93.4	113.4	- 3.04	20.0	- .15	14.03
7708	g	7733	g	+10.4	107.29	108.73	125.4	152.4	+ 1.44	27.0	+ .05	14.23
7733	g	7756*	g	+10.2	108.73	111.40	152.4	175.4	+ 2.67	23.0	+ .12	14.30
7737	l.a	7751	l.a	+12.8	128.40	128.64	155.3	178.4	+ 0.24	23.1	+ .01	14.19
7737	f.b	7751	f.b	+14.0	122.77	124.92	155.3	177.9	+ 2.15	22.6	+ .10	14.28
7740	l.a	7767	l.a	+ 6.8	297.91	302.18	164.9	189.9	+ 4.27	25.0	+ .17	14.35
7746	l.a	7769	g	+13.4	273.90	277.33	170.4	193.9	+ 3.43	23.5	+ .15	14.33
7748	l.a	7771	g	+17.1	180.92	180.05	176.4	201.4	- 0.87	25.0	- .03	14.15
7769	g	7789	g	+12.9	277.33	275.26	193.9	221.4	- 2.07	27.5	- .07	14.11
7772	l.a	7796	g	+ 8.8	164.01	168.69	204.4	229.4	+ 4.68	25.0	+ .19	14.37
7820	l.a	7852	g	+24.5	134.38	131.27	259.4	286.9	- 3.11	27.5	- .11	14.07
7831	f.b	7845	g	+18.4	148.60	145.38	262.4	285.9	- 3.22	23.5	- .14	14.04
7833	l.a	7853	g	+26.2	112.44	113.22	264.4	288.4	+ 0.78	24.0	+ .03	14.21
7845	g	7870	f.b	+17.5	145.38	147.25	285.9	313.4	+ 1.87	27.5	+ .07	14.25
7853	g	7876	l.a	+24.8	112.26	107.87	288.4	315.9	- 4.39	27.5	- .16	14.02
7865	f.b	7891	l.a	-21.2	260.28	259.69	307.9	330.4	- 0.59	22.5	- .03	14.15
7895	l.a	7918	g	-21.8	215.97	215.17	339.4	362.4	- 0.80	23.0	- .03	14.15
7899	l.a	7920	g	+ 7.8	181.37	187.55	341.4	364.4	+ 6.18	23.0	+ .27	14.45

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x .	y .	x/y .	Diurnal Motion.
1st Rotation.	2nd Rotation.				1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°	Year 1917.		°		°	°
7949	l.a	7980	g	+19.6	347.40	344.02	16.9	40.4	-3.38	23.5	-1.14	14.04
7977	l.a	8008	l.a	-14.8	15.27	15.76	39.9	66.4	+0.49	26.5	+0.02	14.20
7977	f.b	8008	f.b	-17.9	4.66	3.68	40.4	66.9	-0.98	26.5	-0.04	14.14
8002	l.a	8038	g	+24.1	67.93	67.16	62.9	87.9	-0.77	25.0	-0.03	14.15
8009	l.a	8037	g	+23.5	95.52	89.70	63.9	84.4	-5.82	20.5	-0.28	13.90
8024	l	8046	g	-9.8	232.94	236.73	78.9	103.4	+3.79	24.5	+0.15	14.33
8047	l.a	8073	g	+18.4	250.34	247.35	105.4	130.4	-2.99	25.0	-0.12	14.06
8049	l.a	8076	g	+9.8	219.17	224.88	105.9	132.4	+5.71	26.5	+0.22	14.40
8076	g	8104	g	+9.8	224.88	228.02	132.4	159.4	+3.14	27.0	+0.12	14.30
8089	l.a	8125	g	-24.6	24.78	16.25	147.4	175.4	-8.53	28.0	-0.30	13.88
8104	g	8140	g	+10.8	228.02	230.16	159.4	186.4	+2.14	27.0	+0.08	14.26
8125	g	8163	g	-23.6	16.25	10.09	175.4	203.4	-6.16	28.0	-0.22	13.96
8189	l.a	8221	g	+0.3	204.75	212.30	218.9	242.4	+7.55	23.5	+0.32	14.50
8199	l.a	8239	g	-16.8	72.13	68.97	225.4	251.9	-3.16	26.5	-0.12	14.06
8215	l.a	8260	g	-17.0	264.96	262.35	238.4	265.4	-2.61	27.0	-0.10	14.08
8256	l.a	8289	g	-12.8	284.28	286.83	264.4	290.9	+2.55	26.5	+0.10	14.28
8257	l.a	8290	g	+13.6	270.32	271.99	264.9	292.4	+1.67	27.5	+0.06	14.24
8289	g	8315	g	-10.9	286.83	287.83	290.9	318.4	+1.00	27.5	+0.04	14.22
8307	l.a	8334	g	+6.4	59.48	65.78	311.4	334.4	+6.30	23.0	+0.27	14.45
8317	l.a	8348	g	+7.7	303.02	306.43	319.9	344.4	+3.41	24.5	+0.14	14.32
8328	l.a	8370	g	-13.6	111.14	115.44	332.9	358.4	+4.30	25.5	+0.17	14.35
8337	l.a	8366	g	-6.3	123.23	129.80	333.9	357.4	+6.57	23.5	+0.28	14.46
8353	l.a	8389	g	+6.3	262.33	267.64	348.4	373.4	+5.31	25.0	+0.21	14.39
8354	l.a	8387	f.b	+6.7	298.68	306.35	347.9	371.4	+7.67	23.5	+0.33	14.51
8366	g	8401	p.a	-6.5	129.80	133.97	357.4	384.4	+4.17	27.0	+0.15	14.33
8369	l.a	8402	l.a	+16.3	129.29	127.69	359.4	385.4	-1.60	26.0	-0.06	14.12
8369	f.b	8402	f.b	+18.5	120.98	117.13	360.4	382.9	-3.85	22.5	-0.17	14.01
8377	l.a	8409	g	-8.1	55.98	59.84	363.4	390.4	+3.86	27.0	+0.14	14.32
Year 1918.												
8387	f.b	8419	g	+7.4	306.35	308.08	6.4	33.9	+1.73	27.5	+0.06	14.24
8419	g	8444	g	+7.3	308.08	307.23	33.9	60.9	-0.85	27.0	-0.03	14.15
8433	l.a	8456	g	+2.9	130.48	136.68	47.4	71.4	+6.20	24.0	+0.26	14.44
8462	l.a	8483	g	+6.9	181.72	185.93	72.9	97.9	+4.21	25.0	+0.17	14.35
8473	g	8500	g	-5.0	321.48	326.11	87.4	114.4	+4.63	27.0	+0.17	14.35
8478	l.a	8501	p.a	-22.1	292.00	287.49	93.4	115.4	-4.51	22.0	-0.20	13.98
8479	l.a	8508	g	+14.6	223.75	226.60	94.9	118.4	+2.85	23.5	+0.12	14.30
8484	l.a	8507	g	+27.3	250.78	242.18	96.9	119.9	-8.60	23.0	-0.37	13.81
8516	l.a	8549	g	+17.3	139.42	136.61	128.4	155.9	-2.81	27.5	-0.10	14.08
8549	g	8573	g	+16.9	136.61	131.69	155.9	183.4	-4.92	27.5	-0.18	14.00
8582	l.a	8615	g	+10.8	83.86	86.01	187.4	213.9	+2.15	26.5	+0.08	14.26
8597	l.a	8623	g	-9.7	354.03	360.13	198.4	217.9	+6.10	19.5	+0.31	14.49
8612	l.a	8651	g	+16.6	132.30	132.86	211.9	237.9	+0.56	26.0	+0.02	14.20
8615	g	8657	g	+10.5	86.01	86.50	213.9	238.9	+0.49	25.0	+0.02	14.20
8619	l.a	8660	g	-20.4	30.06	25.95	217.9	242.9	-4.11	25.0	-0.16	14.02
8631	l.a	8669	g	+10.5	272.37	271.71	227.4	252.9	-0.66	25.5	-0.03	14.15
8631	f.b	8670	g	+9.1	260.00	263.03	224.4	250.9	+3.03	26.5	+0.11	14.29
8651	g	8680	g	+15.8	132.86	130.43	237.9	264.9	-2.43	27.0	-0.09	14.09
8683	l.a	8715	g	+7.4	124.52	127.65	266.9	291.9	+3.13	25.0	+0.12	14.30
8691	l.a	8717	g	+10.8	104.93	109.89	271.4	293.9	+4.96	22.5	+0.22	14.40
8703	l.a	8727	g	+0.7	298.58	304.63	282.9	306.4	+6.05	23.5	+0.26	14.44

(19318)

D 23

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x.	y.	x/y.	Diurnal Motion.
1st Rotation.		2nd Rotation.			1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
Year 1918—contd.												
8738	l.a	8766	g	-10.5	143.56	148.66	322.4	345.9	+ 5.10	23.5	+ .22	14.40
8766	g	8791	g	- 9.8	148.66	150.62	345.9	371.9	+ 1.96	26.0	+ .08	14.26
8773	l.a	8798	g	- 8.2	36.92	42.97	355.4	380.9	+ 6.05	25.5	+ .24	14.42
8774	g	8801	g	-21.2	6.83	1.60	356.4	379.9	- 5.23	23.5	- .22	13.96
Year 1919.												
8815	l.a	8834	g	- 5.8	290.84	301.22	27.4	50.9	+10.38	23.5	+ .44	14.62
8834	g	8858	g	- 5.9	301.22	303.95	50.9	77.9	+ 2.73	27.0	+ .10	14.28
8839	g	8861	g	+13.2	204.35	204.01	58.4	83.4	- 0.34	25.0	- .01	14.17
8850	l.a	8871	g	+ 6.5	79.22	84.85	68.9	94.9	+ 5.63	26.0	+ .22	14.40
8862	l.a	8884	g	-19.4	182.51	181.43	87.4	114.9	- 1.08	27.5	- .04	14.14
8871	g	8889	g	+ 6.3	84.85	87.37	94.9	121.9	+ 2.52	27.0	+ .09	14.27
8884	g	8903	g	-19.6	181.43	174.90	114.9	140.4	- 6.53	25.5	- .26	13.92
8889	g	8909	g	+ 8.3	87.37	89.21	121.9	148.9	+ 1.84	27.0	+ .07	14.25
8895	l.a	8917	g	+ 6.9	6.56	10.54	127.9	154.9	+ 3.98	27.0	+ .15	14.33
8902	l.a	8932	g	- 7.9	209.91	220.10	140.9	165.4	+10.19	24.5	+ .41	14.59
8917	g	8958	g	+ 8.0	10.54	13.42	154.9	179.9	+ 2.88	25.0	+ .11	14.29
8922	l.a	8952	g	+ 4.6	54.77	61.76	156.4	177.9	+ 6.99	21.5	+ .33	14.51
8948	l.a	8973	g	-13.3	113.80	114.41	177.9	200.9	+ 0.61	23.0	+ .03	14.21
8955	l.a	8971	g	+ 7.4	122.06	126.59	177.4	200.4	+ 4.53	23.0	+ .20	14.38
8966	l.a	8994	g	- 6.3	219.40	226.87	194.9	219.9	+ 7.47	25.0	+ .30	14.48
8966	f.b	8996	g	- 9.6	210.24	212.67	195.9	220.9	+ 2.43	25.0	+ .10	14.28
8973	g	9002	g	-14.1	114.41	114.13	200.9	228.9	- 0.28	28.0	- .01	14.17
8994	g	9021	g	- 6.7	226.87	230.51	219.9	245.9	+ 3.64	26.0	+ .14	14.32
9005	l.a	9031	g	+ 2.7	96.14	103.02	230.4	256.9	+ 6.88	26.5	+ .26	14.44
9007	l.a	9030	g	- 2.1	98.05	105.41	230.4	256.4	+ 7.36	26.0	+ .28	14.46
9031	g	9047	g	+ 1.9	103.02	106.32	256.9	283.9	+ 3.30	27.0	+ .12	14.30
9040	g	9056	g	-11.6	273.41	275.80	271.4	297.9	+ 2.39	26.5	+ .09	14.27
9043	l.a	9059	g	-15.0	223.15	222.71	275.4	302.4	- 0.44	27.0	- .02	14.16
9047	g	9065	g	+ 3.0	106.32	106.89	283.9	311.4	+ 0.57	27.5	+ .02	14.20
9064	l.a	9075	g	-15.0	145.37	142.97	308.9	335.4	- 2.40	26.5	- .09	14.09
9065	g	9077	g	+ 3.4	106.89	108.91	311.4	336.4	+ 2.02	25.0	+ .08	14.26
Year 1920.												
9108	l.a	9127	g	- 5.9	125.96	132.00	26.4	51.4	+ 6.04	25.0	+ .24	14.42
9143	l.a	9157	g	- 6.1	144.19	147.99	81.9	106.9	+ 3.80	25.0	+ .15	14.33
9144	g	9158	g	- 5.2	117.50	121.54	81.9	106.4	+ 4.04	24.5	+ .16	14.34
9157	g	9174	g	- 5.9	147.99	151.16	106.9	131.9	+ 3.17	25.0	+ .13	14.31
9189	l	9204	g	+13.9	218.81	222.90	156.4	182.9	+ 4.09	26.5	+ .15	14.33
9204	g	9215	g	+13.5	222.90	224.55	182.9	209.4	+ 1.65	26.5	+ .06	14.24
9207	l.a	9216	g	-14.5	196.75	196.38	184.9	211.9	- 0.37	27.0	- .01	14.17
9213	g	9225	g	+11.6	299.30	303.39	204.4	229.4	+ 4.09	25.0	+ .16	14.34
9251	l	9263	g	+17.7	153.66	149.13	299.4	324.9	- 4.53	25.5	- .18	14.00
9258	l.a	9270	g	- 9.2	351.41	357.04	309.9	336.4	+ 5.63	26.5	+ .21	14.39
Year 1921.												
9284	l.a	9294	g	-15.1	211.54	213.38	12.4	35.9	+ 1.84	23.5	+ .08	14.26
9315	l.a	9329	g	+ 9.4	282.31	285.22	85.4	112.4	+ 2.91	27.0	+ .11	14.29
9334	l.a	9345	g	+ 0.9	7.06	15.35	134.9	159.9	+ 8.29	25.0	+ .33	14.51

DETERMINATION OF SOLAR ROTATION FROM LONG-LIVED SPOTS FROM 1878-1923.

Group Number and Spot.				Mean Latitude.	Mean Longitude.		Mean Date.		x .	y .	x/y .	Diurnal Motion.
1st Rotation.	2nd Rotation.				1st Rotation.	2nd Rotation.	1st Rotation.	2nd Rotation.				
				°	°	°			°		°	°
Year 1921—contd.												
9345	g	9360	f.b	+ 0.8	15.35	20.01	159.9	186.9	+ 4.66	27.0	+ .17	14.35
9384	l.a	9393	g	+ 11.5	113.27	116.90	239.4	284.9	+ 3.63	45.5	+ .08	14.26
9396	l.a	9399	g	+ 7.7	41.07	43.48	298.4	321.4	+ 2.41	23.0	+ .10	14.28
9397	l.a	9400	g	+ 3.9	330.43	332.49	300.4	326.4	+ 2.06	26.0	+ .08	14.26
9401	l.a	9407	g	— 5.6	319.00	324.81	327.9	354.9	+ 5.81	27.0	+ .22	14.40
9407	g	9415	g	— 5.7	324.81	329.46	354.9	381.4	+ 4.65	26.5	+ .18	14.36
9415	g	9421	g	— 5.2	329.46	335.35	381.4	408.4	+ 5.89	27.0	+ .22	14.40
Year 1922.												
9426	l.a'	9439	g	+ 7.8	117.10	122.56	63.4	86.9	+ 5.46	23.5	+ .23	14.41
9426	f.b	9441	g	+ 8.7	105.90	103.29	61.9	86.9	— 2.61	25.0	— .10	14.08
9451	l.a	9452	g	+ 8.0	18.75	22.57	123.9	147.4	+ 3.82	23.5	+ .16	14.34
9465	l.a	9472	g	— 11.8	343.08	344.20	237.9	283.9	+ 1.12	46.0	+ .02	14.20
9477	g	9483	g	— 5.6	0.62	3.89	314.4	338.4	+ 3.27	24.0	+ .13	14.31
9482	l.a	9486	g	— 3.7	50.93	55.50	337.4	363.9	+ 4.57	26.5	+ .17	14.35
Year 1923.												
9511	g	9514	g	— 16.9	58.80	57.59	272.4	298.9	— 1.21	26.5	— .05	14.13

The mean diurnal motions are collected in the following table for each of the four cycles with their respective latitudes in 5° zones from the equator to $\pm 30^\circ$. Cycle I includes the years 1878–1888; Cycle II, 1889–1899; Cycle III, 1900–1913; Cycle IV, 1914–1923. The mean latitude is indicated by (ϕ), the sidereal diurnal motion by (ξ), and the number of spots by (n).

Cycle I.	II.	III.	IV.	Mean.	Observed Minus Computed.
$0^\circ-5^\circ \begin{cases} \phi & 2^\circ.5 \\ \xi & 14^\circ.34 \\ n & 7 \end{cases}$	$\begin{cases} \phi & 2^\circ.2 \\ \xi & 14^\circ.46 \\ n & 7 \end{cases}$	$\begin{cases} \phi & 3^\circ.0 \\ \xi & 14^\circ.38 \\ n & 12 \end{cases}$	$\begin{cases} \phi & 2^\circ.6 \\ \xi & 14^\circ.38 \\ n & 14 \end{cases}$	$\begin{cases} \phi & 2^\circ.6 \\ \xi & 14^\circ.38 \\ n & 40 \end{cases}$	$+^\circ.01$
$5^\circ-10^\circ \begin{cases} \phi & 8^\circ.3 \\ \xi & 14^\circ.28 \\ n & 22 \end{cases}$	$\begin{cases} \phi & 7^\circ.5 \\ \xi & 14^\circ.30 \\ n & 22 \end{cases}$	$\begin{cases} \phi & 7^\circ.4 \\ \xi & 14^\circ.31 \\ n & 20 \end{cases}$	$\begin{cases} \phi & 7^\circ.4 \\ \xi & 14^\circ.36 \\ n & 47 \end{cases}$	$\begin{cases} \phi & 7^\circ.6 \\ \xi & 14^\circ.33 \\ n & 111 \end{cases}$	$^\circ.00$
$10^\circ-15^\circ \begin{cases} \phi & 12^\circ.8 \\ \xi & 14^\circ.23 \\ n & 23 \end{cases}$	$\begin{cases} \phi & 12^\circ.3 \\ \xi & 14^\circ.23 \\ n & 47 \end{cases}$	$\begin{cases} \phi & 12^\circ.8 \\ \xi & 14^\circ.27 \\ n & 34 \end{cases}$	$\begin{cases} \phi & 12^\circ.4 \\ \xi & 14^\circ.25 \\ n & 32 \end{cases}$	$\begin{cases} \phi & 12^\circ.5 \\ \xi & 14^\circ.25 \\ n & 136 \end{cases}$	$^\circ.00$
$15^\circ-20^\circ \begin{cases} \phi & 17^\circ.0 \\ \xi & 14^\circ.16 \\ n & 18 \end{cases}$	$\begin{cases} \phi & 17^\circ.9 \\ \xi & 14^\circ.12 \\ n & 27 \end{cases}$	$\begin{cases} \phi & 16^\circ.9 \\ \xi & 14^\circ.15 \\ n & 24 \end{cases}$	$\begin{cases} \phi & 17^\circ.6 \\ \xi & 14^\circ.12 \\ n & 26 \end{cases}$	$\begin{cases} \phi & 17^\circ.4 \\ \xi & 14^\circ.13 \\ n & 95 \end{cases}$	$-^\circ.01$
$20^\circ-25^\circ \begin{cases} \phi & 22^\circ.2 \\ \xi & 14^\circ.00 \\ n & 15 \end{cases}$	$\begin{cases} \phi & 21^\circ.8 \\ \xi & 14^\circ.02 \\ n & 14 \end{cases}$	$\begin{cases} \phi & 22^\circ.1 \\ \xi & 13^\circ.99 \\ n & 7 \end{cases}$	$\begin{cases} \phi & 22^\circ.4 \\ \xi & 14^\circ.03 \\ n & 18 \end{cases}$	$\begin{cases} \phi & 22^\circ.2 \\ \xi & 14^\circ.01 \\ n & 54 \end{cases}$	$+^\circ.01$
$25^\circ-30^\circ \begin{cases} \phi & 25^\circ.9 \\ \xi & 13^\circ.87 \\ n & 4 \end{cases}$	$\begin{cases} \phi & 28^\circ.4 \\ \xi & 13^\circ.78 \\ n & 5 \end{cases}$	$\begin{cases} \phi & 27^\circ.8 \\ \xi & 13^\circ.78 \\ n & 2 \end{cases}$	$\begin{cases} \phi & 26^\circ.8 \\ \xi & 14^\circ.01 \\ n & 2 \end{cases}$	$\begin{cases} \phi & 27^\circ.3 \\ \xi & 13^\circ.85 \\ n & 13 \end{cases}$	$+^\circ.02$

The value of the sidereal angular daily motion found from the collected data is expressed by

$$\xi = 14^\circ.37 - 2^\circ.60 \sin^2 \phi.$$

The discordances from this formula are given in the last column of the preceding table. The mean deviation of a single spot is $\pm 0^\circ.08$, and is the same in all latitudes. The observations have been classified according to the hemisphere in which the spots occur.

For the Northern hemisphere

$$\xi = 14^\circ.36 - 2^\circ.34 \sin^2 \phi \text{ from 223 spots.}$$

For the Southern hemisphere

$$\xi = 14^{\circ} \cdot 38 - 2 \cdot 82 \sin^2 \phi \text{ from 226 spots.}$$

These results point to no measurable difference between the two hemispheres from the equator to $\pm 30^{\circ}$. Their degree of accordance may be used as a means of determining the probable error of the formula obtained for the daily sidereal motion—

$$14^{\circ} \cdot 37 \pm 0^{\circ} \cdot 01 - (2^{\circ} \cdot 60 \pm 0^{\circ} \cdot 24) \sin^2 \phi.$$

A summary of these results, with a comparison with other determinations of the Solar Rotation, is given in *Monthly Notices* of the R.A.S. for April, 1925, pp. 548–552.

CHARACTERISTIC MOVEMENTS OF SUN SPOTS.

It has been shown above that the average daily motion of Sun Spots in latitude ϕ is given by the formula $\xi = 14^{\circ} \cdot 37 - 2^{\circ} \cdot 60 \sin^2 \phi$. It is known that the motion of spots in longitude is not uniform, and particularly that the “leader” spot immediately after formation tends to move forward in longitude. In order to obtain more definitive information on this characteristic movement, the longitudes of suitable spots used in the previous discussion have been tabulated for each day onwards from the day of their formation.

The longitudes for each day were taken from the annual volumes, where they are given corresponding to an assumed rotation of the sun $\xi = 14^{\circ} \cdot 18$ constant for all latitudes. These were corrected to correspond with a mean rotation $\xi = 14^{\circ} \cdot 37 - 2^{\circ} \cdot 60 \sin^2 \phi$, appropriate to the latitude. By taking out the means the displacement in longitude of a spot for each day of its existence was obtained.

There are of necessity gaps of about 14 days' duration when the spots were on the invisible hemisphere, and days for which there were less than seven observations have been omitted from the tables.

A division of the material has been made between (a) Recurrent Spots which were seen to disappear at their first return, (b) Spots which passed off the disc after their first return but did not come round again, and (c) Spots which returned a second time. The length of life in these three classes is approximately 30, 45 and 60 days respectively. The displacements of spots for each day from their mean positions are given for these three groups separately in Tables I, II and III.

GREENWICH PHOTO-HELIOGRAPHIC RESULTS, 1924.

TABLE I.
(a) 30-Day "Leader" Spots.Displacement of Spots in longitude (unit= 0.1°).

Group Numbers.	Lat.	1	2	3	4	5	6	7	8	9	10	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
433, 51	..	+21.3	-9	-1	+15	+10	+20	+20	+31	+37	..	..	..	..	..	+8	0	+3	-6	-12	-14	-15	-15	-20	-22	-28
552, 74	..	+14.6	+13	+12	+2	+22	+14	+30	+22	..	+22	..	..	..	..	..	..	..	-9	-10	-7	-12	-18	-19	-20	-27
566, 82	..	+12.5	-10	-4	+8	+7	+18	+15	+8	+9	+9	..	..	..	..	..	..	..	-12	-11	-10	..	..	..	..	..
594, 605	..	+21.8	-20	-28	-27	-34	-31	-34	-43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
693, 712	..	+24.4	-32	-26	-20	-7	+4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
785, 806	..	+10.0	-19	-4	+6	+17	+10	+16	+11	..	+20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1438, 55	..	-3.1	-30	-23	-8	-3	..	..	..	..	..	+13	+9	+8	+8	+3	+3	+8	+6	+6	+6	+1	-12	..	..	..
1532, 48	..	-7.1	-19	-15	-11	-5	0	+4	+5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1632, 47	..	-16.3	-17	-6	+1	+5	+21	..	..	..	..	+1	-2	-2	-5	-1	0	0	0	+1	+3	+4	+2	-4	..	..
1756, 67	..	-3.2	..	-2	+5	+2	+2	-2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1906, 15	..	-9.0	-23	-6	+4	+8	+10	+11	+9	+6	-2	-1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2085, 86	..	+5.8	-2	+13	+14	..	..	..	..	..	..	+4	0	-1	-1	-4	-5	-7	-14	-18	..	..	..	..	..	..
2159, 65	..	+20.4	-38	-22	-8	+7	+10	+8	+5	+8	+7	+3	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2247, 66	..	-21.9	-19	-15	+6	+17	+26	+28	+30	+23	+22	+25	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2530, 62	..	+11.1	+27	+32	+31	+27	+20	+19	+17	+12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2730, 59	..	+19.8	-18	-12	+2	+13	+16	+7	+25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2773, 94	..	-11.6	-81	-76	-67	-42	-25	-3	+17	+22	+29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3067, 112	..	+16.9	+37	+17	+35	+32	+42	+41	+27	+26	+18	+9	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3206, 46	..	+9.1	-53	-50	-41	-27	-22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3287, 304	..	+19.0	-60	-36	-30	-16	-20	-5	+2	+9	+15	+17	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3414, 42	..	-4.4	-44	-52	-33	-8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3546, 83	..	-1.0	-32	-14	-4	+7	+8	+19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3640, 74	..	-7.2	-45	-36	-28	-21	-14	-4	+1	0	+8	+2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3817, 36	..	-14.0	+2	+7	+16	+20	+21	+25	+23	+20	+11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3996, 4025	..	-12.8	-7	-3	+2	+12	+12	+5	+4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4028, 61	..	-23.9	-62	-33	-19	-17	-11	-11	-11	-10	-11	-11	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4107, 33	..	-8.7	-26	+10	+16	+27	+30	+35	+32	+26	+22	+14	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4210, 30	..	+9.5	-15	-8	+4	+8	+1	-4	-6	-2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4305, 20	..	-15.9	-44	-38	-24	-9	-4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5104, 20	..	-26.8	+18	+23	+25	+27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5317, 29	..	-23.1	+2	+9	+12	+28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5366, 96	..	+28.8	-18	-12	-6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5894, 928	..	+10.4	-13	-8	0	+7	+1	-4	-4	0	+1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6088, 112	..	-16.2	-43	-35	-28	-16	-6	+2	+9	+7	+13	+16	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6243, 67	..	-16.8	-21	-14	-10	-6	+2	0	-5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6247, 73	..	-7.1	+7	+15	+24	+28	+25	+21	+16	+16	+11	+12	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6276, 93	..	-21.1	-39	-28	-24	-24	-25	-27	-18	-23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6323, 44	..	-15.9	-70	-45	-42	-39	-31	-32	-22	-30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6817, 27	..	-7.3	-38	-32	-29	-31	-25	-21	-17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6823, 28	..	+15.9	-12	-6	+3	+3	+2	+1	+1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7406, 45	..	+22.2	-15	-1	+4	+8	+11	+9	+6	+1	-4	-4	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7618, 46	..	-13.1	-20	-9	-5	-4	-6	-7	-6	-3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7748, 71	..	+17.1	-16	-7	0	+8	+6	+2	+3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7949, 80	..	+19.6	+4	+7	+8	+6	+5	+3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8002, 38	..	+24.1	-49	-37	-34	-31	-35	-24	-11	-6	-2	-4	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8009, 37	..	+23.5	-2	+6	+11	+12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8024, 46	..	-9.8	-15	-5	-2	-3	-4	-6	-7	-4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8189, 221	..	+0.3	-33	-25	-19	-13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8307, 34	..	+6.4	-43	-29	-18	-9	+4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8353, 89	..	+6.3	-45	-40	-21	-1	+7	+11	+10	+11	+9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8462, 83	..	+6.9	-17	-3	+4	+2	+2	-2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8478, 501	..	-22.1	-1	+4	+11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8484, 507	..	+27.3	-11	+5	+11	+6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8597, 623	..	-9.7	-24	-25	-28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8683, 715	..	+7.4	-20	-3	+5	+14	+15	+14	+9	+2	-1	-3	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8703, 27	..	+0.7	-29	-13	-5	-7	-3	-3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8773, 98	..	-8.2	-53	-21	-14	-15	-15	-2	-7	-2	-2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8902, 32	..	-7.9	-80	-58	-40	-39	-32	-26	-20	-13	-6	-1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8955, 71	..	+7.4	-18	-10	+1	0	-11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9451, 52	..	+8.0	+2	-2	-3	-3	-2	-6	-7	-1	-1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Days on which Photographs are

TABLE II.

(b) 45-Day "Leader" Spots.

day of formation (day 1) and successive days.

Group Numbers.	Lat.	1	2	3	4	5	6	7	8	9	10	11	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
348, 59 ..	+22.4	-47	-44	-21	-13	+2	-7																									
408, 19 ..	+16.5	-29	-17	+6	+17	+7																										
410D, 24	-19.0	-63	-41	-28	-20	-3	+13	+2																								
553, 75 ..	+20.6	+14	+18	+22	+24	+17	..	+16	..	+19																						
606, 28 ..	+16.9	..	-51	-19	-15	-7	-5	-5	-5	0	-5	+2																				
642, 58 ..	+16.2	-63	-53	-48																												
664, 87 ..	-13.8	-25	..	-6	+10																											
808, 21 ..	-11.5	+4	+11	+8	+2																											
999, 1027	-22.1	+3	+14	+19	..	+13	+15	+13	+7	+4	0	+6																				
1288, 323 ..	+13.4	-101	..	-79	..	-59	-47	-40	-35	-31	-17	-13																				
1480, 501 ..	+14.2	+7	+19	+24	..	+24	+22																									
1546, 63 ..	+2.4	+2	+10	+16	+12	+12	+11	+10	+19																							
1738, 59 ..	-11.9	..	-17	-14	-11	-11	-9	-5	-7	-5	-9	-5																				
1860, 74 ..	-17.5	-32	-13	-05	+7	+9	+14	+11	+18	+17																						
2097, 100 ..	-19.8	-13	+14	+19	+20	+12	+10	+11	+07																							
2183, 93 ..	+19.6	-72	-63	-44	-39	-33	-32	-31	-23	-22																						
2726, 60 ..	+7.5	+7	+10	+21	+22	+17	+22	+24	+19	+7	+22	+15																				
3015, 54 ..	-20.2	+12	+22	+18	+14																											
3059, 98 ..	+10.9	-33	-23	-13	-3	-4	-4	-2	-2																							
3106, 56 ..	-19.1	+3	+7	+11	+22	+23	+24	+9	-3	+16	-4																					
3460, 92 ..	+10.9	-39	-19	+7	+20	+22	+33	+33	+20	+18	+16	+15																				
4084, 112 ..	-6.4	+14	+19	+17	+15	+14	+17	+17	+14	+16	+11																					
4523, 31 ..	+13.2	-46	-28	..	-14	-17																										
4560, 73 ..	+2.9	-47	-37	-24	-11	0	0	+4	0	-3																						
4915, 17 ..	-11.3	+1	+7	+8	+6	+5																										
5088, 95 ..	+13.9	+9	+11	+17	+8																											
5524, 42 ..	+11.1	-26	-28	-17	-11	-11	-14	-18																								
5628, 55 ..	+3.2	-88	-73	-59	-46	-36	-31																									
5790, 803 ..	+14.1	-67	-39	-34	-30	-22	-11	-7	-10																							
5817, 43 ..	+19.3	-23	-19	-14	-7	-3	+6																									
5933, 44 ..	-16.2	+9	+8	+1	+1	+2	-3																									
6099, 123 ..	+22.6	+1	+1	-2	-1	-7	+14	+15	+13	+14	+5																					
6390, 416 ..	-9.0	-18	-15	-7	-10	0	+3	+7	+7	+10	+12	+5																				
6676, 86 ..	-1.6	-22	-12	-2	-1	+2	0																									
6746, 65 ..	-4.9	+20	+30	+29	+31	+33	+31	+30	+28	+29	+32	+26																				
6774, 88 ..	+14.7	+3	+21	+24	+21	+18	+14	+6	+6	+2																						
6937, 42 ..	-1.8	-76	-60	-41	-19	-5	+12	+26	+27																							
7266, 82 ..	+21.7	-17	+1	+7	+15	+20																										
7737, 51 ..	+12.8	-13	+8	+34																												
7772, 96 ..	+8.8	-46	-19	-1	+2	+3	-1	-1																								
7895, 918 ..	-21.8	-26	-24	-22																												
7899, 920 ..	+7.8	-40	-22	-7																												
7977, 8008	-14.8	-33	+1	+16	+19	+17	+18	-1	-9	-5	-7																					
8047, 73 ..	+18.4	+13	+14	+12	+11	+8	0	-1																								
8256, 89 ..	-12.8	-45	-20	-8	-1	+2	+4	+8	+10	+13	+12																					
8317, 48 ..	+7.7	-21	-6	-1	+6	+13	+10																									
8328, 70 ..	-13.6	-21	-17	-15	-18	-16	-19	-17																								
8369, 402 ..	+16.3	+4	-11	+3	+11	+14	+15	+10																								
8691, 717 ..	+10.8	-35	-20	-10																												
8922, 52 ..	+4.6	-36	-23	-18																												
9007, 30 ..	-2.1	-54	-34	-16	-8	-6	-8	-11	-6	-3	+3	+4																				
9064, 75 ..	-15.0	+1	+13	+16	+15	+19	+21	+17	+18	+16	+13																					
9258, 70 ..	-9.2	-37	-25	-21	-18	-15	-12	-11	-6	-1	+1	+5																				
9284, 94 ..	-15.1	-28	-10	-8	-9	-5																										
9384, 88 ..	+10.5	-22	+5																													
9396, 99 ..	+7.7	+2	+2	+17																												
9397, 400 ..	+3.9	+24	+25	+26	+22	+19	+14	+10	+10	+5	+1	-8																				
9426, 39 ..	+7.8	-23	-17	-16	-12	-8	-15																									
9465, 69 ..	-11.8	+10	+9	+8	+4																											
9511, 14 ..	-16.9	-7	-6	-7	-4	+11	+13	+5	+7	+4	+2	+2																				

not available are indicated by ..

(19318)

D 24

TABLE III.

(c) 60-Day "Leader" Spots.

Displacement of Spots in longitude (unit= $0^{\circ}1$)

Group Numbers.	Latitude	1	2	3	4	5	6	7	8	9	21	22	23	24	25	26	27	28
436.53.71 ..	14.9	-53	-30	-15	-7	+6	+13	+20	+17	+23							+1	+4
1828.35.52 ..	9.3	+7	+19	+23	+20	+16		-2						+6	+8	+6	+10	+11
1878.84.97 ..	11.2	+1	+18	+25	+27	+18					+18	+12	+10	+8	+10	+7	+9	
1891.1901.10 ..	14.3	+4	+27	+42	+43	+40	+40	+38	+36					+10	+10	+10	+1	
2560.83.2615 ..	31.0	-6	+1	+16	+20	+12	+20	+24	+23	+23					+15	+13	-4	
3371.3402.43 ..	16.6	-22	-11	-4	+1	-6						+4	-1	+1	+1	+1	+7	+10
4234.56.78 ..	13.7	+3	+9	+21	+26						+4	+14	+11	+13	+14	+15	+10	+12
4416.35.46 ..	11.1	-35	-24	-16	-15	-11	-12	-11	-15	-11				+12	+8	+5	+6	+8
4505.26.41 ..	6.1	-57	-48	-36	-18	-12					+7	+9	+4	+3	+4	+5	+8	+12
4517.32.49 ..	1.4	-64	-54	-35	-25		-20	-14	-14					+5	0	+3	+2	+3
5597.5622.53 ..	13.9	-1	+2	+6	+6						-14	-7	-5	-6	-4	-4	-4	-2
5785.5802.20* ..	10.9	-37	-24	-16	+1	+4	+9	+5	+2	-9					+17	+15	+11	+10
6193.6420.40 ..	15.0	-32	+2	+13	+17	+19	+22	+26	+25	+26					+25	+18	+19	
6494.6517.35 ..	6.4	-21	-9	-10	+2	+4	+2	+5	+3	+2				+15	+13	+13	+10	+11
6499.6519.39 ..	5.4	+1	+7	+21	+10	+17	+4				+29	+33	+31	+28	+28	+26	+24	+23
6589.6602.18 ..	3.0	-17	-3	+1	+2	-4					-4	-5	-2	-4	-1	-1	0	0
6722.33.54 ..	12.9	-82	-75	-57	-49	-54	-49	-43	-38	-27					+27	+28	+33	+34
6723.34.53 ..	1.3	+2	+11	+25	+22						+13	+9	+12	+13	+12	+12	+12	+11
7304.41.84 ..	17.6	-59	-49	-45	-38	-32					+9	+10	+10	+9	+9	+10	+8	+7
7564.95.622 ..	10.5	+4	+16	+24	+23	+22					+23	+19	+21	+20	+20	+16	+13	+8
7746.69.89 ..	12.6	-15	-5		+6	+14					+25	+25	+25	+23	+20	+18	+18	+16
7833.53.76 ..	25.0	-86	-76	-62	-54	-54					+16	+13	+9	+10	+10	+5	+1	-4
8089.8125.63 ..	23.9	+2	+14	+19	+18	+16	+13	+8	+10	+12								
8337.86.8401 ..	6.5	-42	-36	-18	-3						+11	+5	+6	+3	+4	0	+3	+3
8612.51.80 ..	16.1	-47	-40	-19	-3	+12	+20	+22	+26	+26					+20	+17	+13	
8738.66.61 ..	10.0	-32	-17	-8	-11	-15					+14	+13	+11	+6	+10	+7	+7	+6
8815.34.58 ..	6.0	-92	-58	-39	-28	-20					+17	+22	+19	+14	+18	+17	+18	+17
8948.73.9002 ..	13.8	+6	+12	+15	+10	+6	+2				+14	+15	+12	+11	+6	+7	+11	+11
8966.94.9021 ..	6.4	-82	-51	-29	-18	-9	-4	+1	-1					+16	+18	+16	+14	+13
9143.57.74 ..	5.8	-2	+11	+10	+7	+6	+2	+4	-2					+8	+4	+10	+8	+4
9334.45.60 ..	0.9	-27	-27	-26	-27	-29	-24	-18	-21					+8	+14	+14	+14	+12

TABLE III.

(c) 60-Day "Leader" Spots.

on day of formation (day 1) and successive days.

29	30	31	32	33	34	35	48	49	50	51	52	53	54	55	56	57	58	59	60	61
+4	+8	+6	+2	+2	+6	+6														
+15	+12	+14	+16	+7	+13															
+8	+8	+7	+8																	
+1	0	-3	-9	-7	-9	-9														
+5	+7	+4	+6	+10	+8	+10														
+6	+7	+6	+4	+13																
+9	+10	+13	+13																	
+7	+9	+11	+9	+10	+8	+5														
+12	+13	+15	+10	+6	+3	0														
+3	+3	+6	+11	+7	+13															
-1	-2	-4	-3																	
+9	+4	0	+1	-1	+3	+4														
+15	+14	+17	+16	+13	+11	+10														
+8	+7	+6	+6	+3	+2	-1														
+21	+15	+16	+20																	
+3	+3																			
+33	+31	+32	+31	+34	+33	+36														
+13	+7	+5	+8																	
+7	+15																			
+4	0	+2	+3																	
+16	+14	+14	+12																	
-9	-21	-19	-15	-25																
-5	-6	-11	-9	-6	-5	-3														
+2	+6	+2																		
+15	+12	+9	+12	+11	+9	+4														
+5	+4	+5	+11																	
+16	+22	+20	+21																	
0	-10	-15	-3																	
+10	+10	+9	+7	+7	+8	+8														
+5	+2	-2	-4	-6	-5	-2														
+13	+10	+10	+8	+8	+12	+7														

TABLE IV.

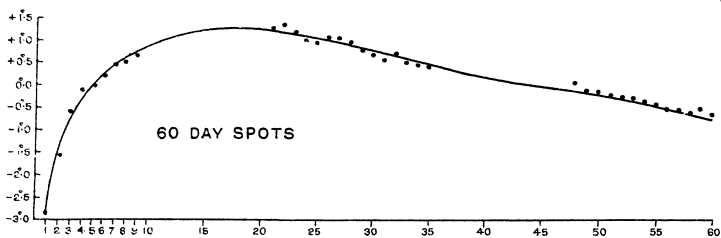
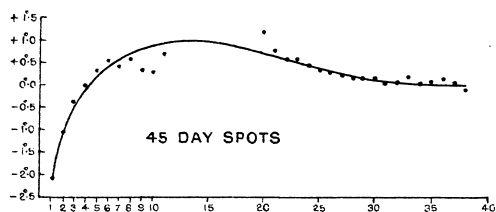
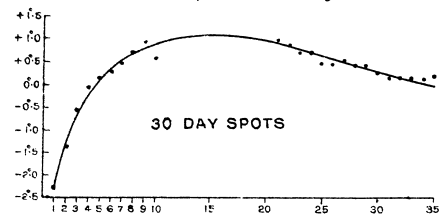
Mean Displacements in Longitude and Areas of "Leader" Spots.

(a) 30-day "Leader" Spots.				(b) 45-day "Leader" Spots.				(c) 60-day "Leader" Spots.			
Day.	Displacement.	Area.	Number of Spots.	Day.	Displacement.	Area.	Number of Spots.	Day.	Displacement.	Area.	Number of Spots.
	°				°				°		
1	-2.30	106	59	1	-2.18	128	58	1	-2.84	119	30
2	-1.36	167	60	2	-1.03	242	58	2	-1.57	230	30
3	-0.60	219	60	3	-0.39	306	58	3	-0.58	308	30
4	-0.04	243	56	4	0.00	340	49	4	-0.11	345	30
5	+0.19	268	49	5	+0.32	373	47	5	-0.01	385	26
6	+0.27	285	43	6	+0.54	409	41	6	+0.23	415	16
7	+0.46	301	38	7	+0.42	436	34	7	+0.43	428	15
8	+0.71	283	29	8	+0.58	450	28	8	+0.51	485	14
9	+0.94	297	23	9	+0.33	458	23	9	+0.79	550	9
10	+0.58	280	14	10	+0.28	452	18				
				11	+0.71	394	14				
				20	+1.22	239	13				
21	+0.95	189	16	21	+0.79	281	20	21	+1.28	356	14
22	+0.86	163	22	22	+0.60	290	23	22	+1.34	367	16
23	+0.71	154	27	23	+0.63	271	28	23	+1.19	349	17
24	+0.72	142	34	24	+0.46	247	34	24	+1.01	351	23
25	+0.48	131	42	25	+0.37	263	39	25	+0.94	342	26
26	+0.47	119	50	26	+0.28	253	42	26	+1.05	337	29
27	+0.51	104	54	27	+0.23	246	51	27	+1.04	328	30
28	+0.42	99	54	28	+0.18	238	58	28	+0.93	316	30
29	+0.41	88	51	29	+0.18	231	58	29	+0.81	303	30
30	+0.27	79	45	30	+0.18	216	58	30	+0.69	296	30
31	+0.19	72	43	31	+0.09	208	54	31	+0.56	296	29
32	+0.19	56	33	32	+0.09	165	46	32	+0.65	278	28
33	+0.19	41	26	33	+0.23	177	40	33	+0.49	276	17
34	+0.13	11	21	34	+0.03	157	36	34	+0.48	259	15
35	+0.22	17	12	35	+0.10	144	30	35	+0.43	267	13
				36	+0.16	131	24				
				37	+0.06	99	20				
				38	-0.10	107	15				
								48	+0.08	175	10
								49	-0.11	158	15
								50	-0.17	144	17
								51	-0.24	134	22
								52	-0.29	130	24
								53	-0.30	118	27
								54	-0.38	112	30
								55	-0.46	111	29
								56	-0.56	89	27
								57	-0.56	81	28
								58	-0.63	85	26
								59	-0.55	57	21
								60	-0.66	43	13
								61	-0.98	11	7

"LEADER" SPOTS (30, 45, AND 60 DAYS AVERAGE DURATION) MEAN DISPLACEMENTS IN LONGITUDE AND AREAS.

MEAN DISPLACEMENTS IN LONGITUDE.

*Abscissæ - Days from formation of Spots.
Ordinates - Displacements in longitude.*



MEAN AREAS.

*Abscissæ - Days from formation of Spots.
Ordinates - Areas, corrected for foreshortening
in millionths of Sun's visible hemisphere.*

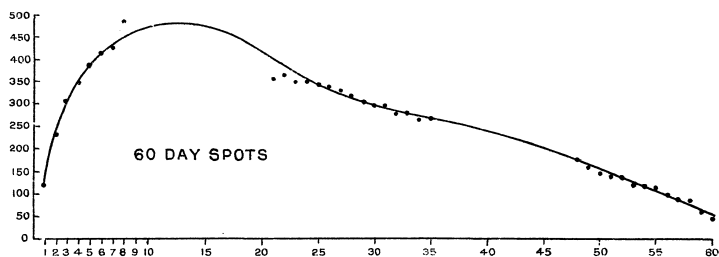
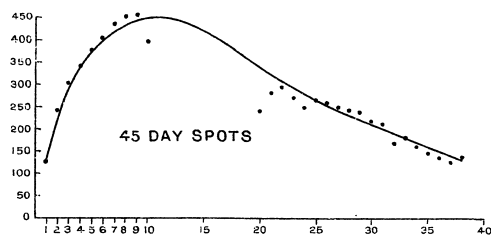
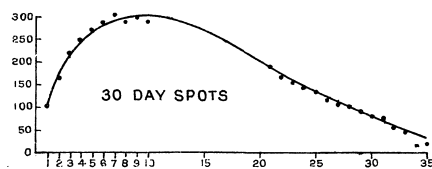


Table IV gives the mean displacements derived from the preceding tables. The means of those days on which the greatest number of spots were together visible were used as fiducial points from which mean positions for other days were derived. For example: in Table III, Class (c), 30 spots were seen on days 1, 2, 3, 4; 27, 28, 29, 30; 54. The means of these 30 spots were taken, and gave the relative positions as tabulated in Table IV. But on the 8th day only 14 spots were seen. The difference between the mean position of these 14 spots and the same 14 on the 4th day was $+0^{\circ}.62$; this was applied to $-0^{\circ}.11$ of 4th day and gave $+0^{\circ}.51$ for the 8th day. Similarly, for the 21st day, 14 spots were seen which occur on the 29th day, the difference of the mean position being $+0^{\circ}.47$. Applying this to the value $+0^{\circ}.81$ already found, $+1^{\circ}.28$ was obtained, as the mean displacement for the 21st day. Actually, values found in this more accurate but slightly complicated manner differ very little from those obtained by taking the simple means of the columns in Tables I, II and III.

The corresponding mean areas, corrected for foreshortening and expressed in millionths of the Sun's visible hemisphere, are also given in the tables for comparison with the displacements in longitude, but it was thought unnecessary to give the separate observations.

The average diurnal movement of the spots in longitude is derived from the curves as follows:—

TABLE V.
Diurnal Movement in Longitude of "Leader Spots."

Day.	(a) 30-day Spots.	(b) 45-day Spots.	(c) 60-day Spots.
1—3	$+0^{\circ}.85$	$+0^{\circ}.85$	$+1^{\circ}.10$
3—5	$+0^{\circ}.40$	$+0^{\circ}.30$	$+0^{\circ}.35$
5—7	$+0^{\circ}.20$	$+0^{\circ}.20$	$+0^{\circ}.20$
7—9	$+0^{\circ}.15$	$+0^{\circ}.10$	$+0^{\circ}.15$
9—21	$0^{\circ}.00$	$0^{\circ}.00$	$+0^{\circ}.04$
21—36	$-0^{\circ}.06$	$-0^{\circ}.04$	$-0^{\circ}.05$
48—61	..	..	$-0^{\circ}.05$

Thus in the first two days of its life the leader spot of a group appears to be moving rapidly forward in longitude at the rate of about $1^{\circ}.0$ per day. In the next two days the rate has diminished to about $0^{\circ}.4$ per day, and it continues to diminish until about the 15th day, when the spot is moving with the mean velocity corresponding to its latitude. By about the 20th day it is moving slowly backwards at a rate of about $0^{\circ}.05$ per day. Corresponding changes take place in the size of the spots, which increase rapidly at the start, reach a maximum at about the 10th day, and then slowly decline. It may be noticed that the area is a maximum at nearly the same time both for spots which last 60 days, and for those of half that duration.

A summary of these results is also given in *M.N.R.A.S.*, April, 1925, pp. 553–560.

(19318)

D 25