

Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

Peter O. Taylor, editor
P O Box 5685
Athens, GA 30604-5685 USA



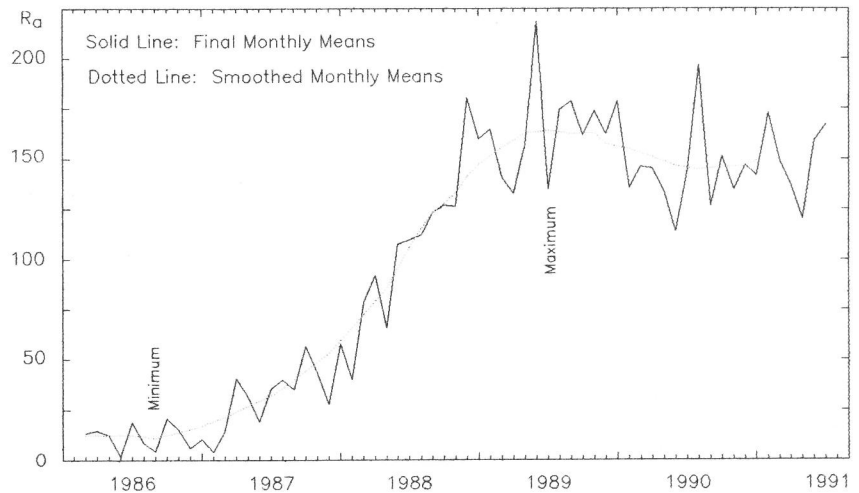
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July 1991

American Relative Sunspot Numbers for July

R _a Final		
1) 192	11) 140	21) 157
2) 200	12) 136	22) 162
3) 230	13) 138	23) 192
4) 226	14) 128	24) 208
5) 207	15) 114	25) 200
6) 200	16) 98	26) 196
7) 206	17) 87	27) 182
8) 188	18) 85	28) 186
9) 163	19) 115	29) 187
10) 153	20) 124	30) 189
		31) 166

Mean: 166.3
Number of reports: 99



July began with activity at a high level, as a long-duration M5.8/1N flare occurred on the 1st in NOAA Region 6703 (N28, L241, FAO on 4 July). A second instance of high activity took place on the 5th as this group spawned an additional major flare with an intensity of M5.4/2B. Region 6703 is the return of old Region 6659, which spawned five huge X-level flares (X12+) during its June disk transit. The satellite altitude proton event which began in late June as a result of an earlier major flare in Region 6703, peaked on July 2nd and ended on the 4th; its associated PCA ended late on the 2nd.

Activity was mainly moderate between the 6th and 15th. Two major flares were recorded, both in Region 6703. The first and more powerful event, a X1.9/4B, occurred on the 7th. It was followed by a satellite level proton event which reached a maximum of 2300 p.f.u. on the 8th, and severe geomagnetic storm conditions at some stations. Region 6703 had dissolved into an area of spotless plage when it produced its final major flare on the 11th; a long-duration M7.3/3B Tenflare accompanied by a bright loop prominence system near the Sun's western limb. The latter system was reminiscent of the phenomena associated with the group's final X12+ flare during its previous rotation, which also took place near west limb. Storm conditions ensued, and on the 13th GOES-7 crossed the magnetopause on two occasions.

It is interesting to note that Region 6703 marked the fourth appearance of this spot complex (Region 6580 in April, 6619 in May and 6659 in June). Moreover, these groups were located in almost the identical position of the largest group of this cycle, the highly active Region 5395 (March, 1989). According to P.S. McIntosh of the NOAA Space Environment Laboratory, Region 6659 was similar in structure and evolution to Region 5395 and provided the largest X-ray Region Index on record, exceeding the previous high (Region 5395) by about 50%.

Solar activity was moderate and high between the 16th and 24th. Four major flares were recorded, all at the lower end of the X classification. These events included a X1.1/2B Tenflare on the 17th in Region 6729 (S22, L067, DAI on 17 July) and a X1.0/1N from behind the Sun's east limb on the 18th which was attributed to Region 6734, the probable return of old Region 6694. Material from this event was observed out to 0.54 solar radii. On the 20th, Region 6734 (N08, L356, DKO on 20 July) produced a second class X Tenflare (X1.0/2B), and yielded a third (X1.0/2B) on the 22nd. Boulder recorded a sudden impulse on the 18th, presumably caused by the arrival of the shock from the class X flare in Region 6729. The geomagnetic field experienced some storm conditions during this interval. These were ascribed to both flare and coronal hole effects.

Although sunspot numbers were quite high, the Sun was relatively quiet from the 25th through the 29th. Then on the 30th, activity increased to high as Region 6734 spawned its final major flare of July, a M7.2/1N Tenflare. One day later, the month's strongest X-ray flare, a X2.3/2B Tenflare, occurred in Region 6749 (S17, L278, DAI on 31 July). The smoothed-mean American Relative Sunspot Number for January increased to a value of 148.1.

[A portion of this information was obtained from the SELDADS data base.]

SPAN: SELVAX::ptaylor FAX: [USA] 404-353-2336 INTERNET: ptaylor%SELVAX.span@east.gsfc.nasa.gov

Sudden Ionospheric Disturbances (SES) Recorded During June 1991

Records were received from A1,3,9,19,40,50,52,59,61,62,63,64,65,66,67,68,69,70,71,72,73.

Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def
1	0404	2+	4	7	0059	3+	5	12	1830	1-	5	18	1944	2	4
1	0612	1-	5	7	0616	2+	5	12	1943	1	5	18	2243	2	5
1	0645	3	4	7	0710	2	5	12	2018	1-	5	18	2326	2	5
1	1150	1+	5	7	0815	2	5	12	2118	1+	5	19	1045	1	5
1	1210	1-	5	7	1232	2+	5	12	2348	1+	5	19	1239	1-	5
1	1319	2	5	7	1300	1-	5	13	0328	1+	4	19	1730	2	5
1	1427	1	5	7	1418	1+	5	13	0519	1-	5	19	1805	1	5
1	1445	1-	5	7	2218	1+	5	13	0534	2+	5	19	1830	2	5
1	1508	3	5	8	0205	1	5	13	0631	2+	4	20	0506	1+	5
2	0035	2+	5	8	0604	1-	4	13	0830	1+	4	20	1130	2	5
2	0624	2	5	8	1325	2	5	13	0851	2	5	20	1425	1+	4
2	0745	2+	5	8	1539	1+	5	13	0929	1	5	20	1746	2	5
2	1047	1+	5	8	1641	1	5	13	0946	2+	5	21	0512	2	4
2	1154	1	5	8	1703	1+	5	13	1106	1-	4	21	0541	2	4
2	1315	1+	5	8	1857	2+	5	13	1118	1-	5	21	0836	2	5
2	1415	3+	5	8	2106	1-	5	13	1415	2	5	21	1228	1+	5
2	1504	2+	5	8	2121	1+	5	13	1716	1	5	21	2307	2	5
2	2030	2+	5	9	0139	2	5	13	1800	2+	5	22	0007	1-	5
2	2205	1-	4	9	0552	2+	5	13	2013	1-	5	22	0747	2	5
2	2210	1	4	9	0847	1-	5	13	2028	1-	5	22	0826	2	5
3	0024	1	5	9	0952	2+	5	13	2045	1+	5	22	1153	1	5
3	0203	1+	5	9	1058	1-	5	13	2145	1+	5	22	1312	2	5
3	1014	1	4	9	1315	2+	5	13	2206	2	5	22	1754	1	4
3	1346	2	4	9	1528	2	5	13	2321	1-	5	22	2304	2+	4
3	1530	1	4	9	1628	1	4	13	2332	1+	5	23	0911	1	4
3	1558	2+	4	9	1723	1-	4	14	0001	1-	5	23	1516	2+	5
3	1636	1-	5	9	1815	2	5	14	0020	2+	5	23	1621	2	5
3	1903	1+	5	9	2004	2+	5	14	0139	2+	5	23	1713	1-	4
3	2058	2	5	9	2214	1-	5	14	0421	2	5	23	1830	1-	4
3	2306	1-	5	9	2248	2	5	14	0500	1	5	23	1858	2+	5
4	0108	1+	5	10	0029	2	5	14	0527	2+	5	23	2002	1	5
4	0200	2	5	10	0229	1	5	14	0628	2+	5	23	2018	3	5
4	0249	1	5	10	0900	1	5	14	0725	1+	4	23	2214	1	4
4	0344	2	5	10	0916	1-	5	14	0948	1+	5	23	2342	1+	4
4	1130	1-	4	10	0930	1-	5	14	1058	2+	5	24	0901	1	4
4	1327	1-	5	10	1102	1+	5	14	1345	2	5	24	1623	2	4
4	1358	2	5	10	1131	1+	5	14	1515	1	4	24	1828	1	4
4	1618	1-	5	10	1228	2	5	14	1820	1	4	24	1859	2	5
4	1645	1	5	10	1301	1	5	14	1915	2	5	25	0035	1+	5
4	1914	1	5	10	1338	1-	5	14	2122	1-	5	25	0904	2+	5
4	1947	1-	4	10	1356	2+	5	14	2233	2	5	25	1615	2	5
4	2006	1-	5	10	1536	1	5	14	2331	1+	5	25	1701	1-	4
4	2014	2+	5	10	1635	1	5	15	0034	1	5	26	0153	2	5
4	2229	1	5	10	1657	2+	5	15	0410	2+	4	26	1645	1-	5
4	2245	1-	5	10	1732	1+	4	15	0545	2+	5	26	1900	2+	4
4	2353	1-	5	10	2128	1+	5	15	0828	3+	5	26	2013	1	5
5	0003	2+	5	10	2204	1-	5	15	1328	1	5	27	1355	2+	5
5	0200	1+	5	10	2220	1-	5	15	1513	2	5	27	1644	1+	5
5	0246	2+	4	10	2230	1+	5	15	1853	1	5	27	2009	1-	5
5	0545	3+	5	11	0134	2	5	15	2004	1+	5	27	2034	1	5
5	0830	1-	5	11	0405	1-	4	15	2058	2	5	27	2150	1-	4
5	0901	1-	5	11	0428	2+	4	16	0002	1-	5	28	0540	3+	5
5	1149	1+	5	11	1028	1+	5	16	0537	1+	5	28	0809	2	5
5	1559	2	5	11	1115	1-	5	16	1228	1+	4	28	1048	1+	5
5	1745	2+	5	11	1158	2	5	16	1646	2+	5	28	1445	1+	5
5	1851	2+	5	11	1325	1	4	16	1746	1	5	29	1014	1-	4
5	2117	2	5	11	1356	1+	5	16	1822	1+	5	29	1251	1-	5
5	2331	2	5	11	1729	2	5	16	2056	1-	5	29	1544	2	5
6	0107	3+	5	11	2039	3+	5	16	2213	2	5	29	1629	2+	4
6	0440	2	4	11	2332	2	5	17	0114	1	5	30	0301	2+	5
6	0508	1	4	12	0709	2	5	17	0139	2	5	30	0502	1-	4
6	0708	2	5	12	0916	1	5	17	0602	1-	4	30	0609	1+	4
6	0758	2	5	12	0944	1-	5	17	0814	1-	5	30	0730	1-	4
6	1351	1	5	12	1015	1	5	17	0829	2	5	30	1213	2	5
6	1428	1-	5	12	1047	1+	5	17	1231	2	5	30	1342	2+	5
6	1651	1-	5	12	1130	1	5	17	1956	2	5	30	1538	2+	5
6	1701	1+	5	12	1236	1+	4	18	1000	2	5	30	1852	2	5
6	1735	2	5	12	1605	1+	5	18	1112	1+	5	30	2244	2+	5
6	1952	1-	5	12	1709	2	5	18	1415	1	5	30	2313	2	4
6	2245	2	5	12	1758	1+	5	18	1805	1	5				