Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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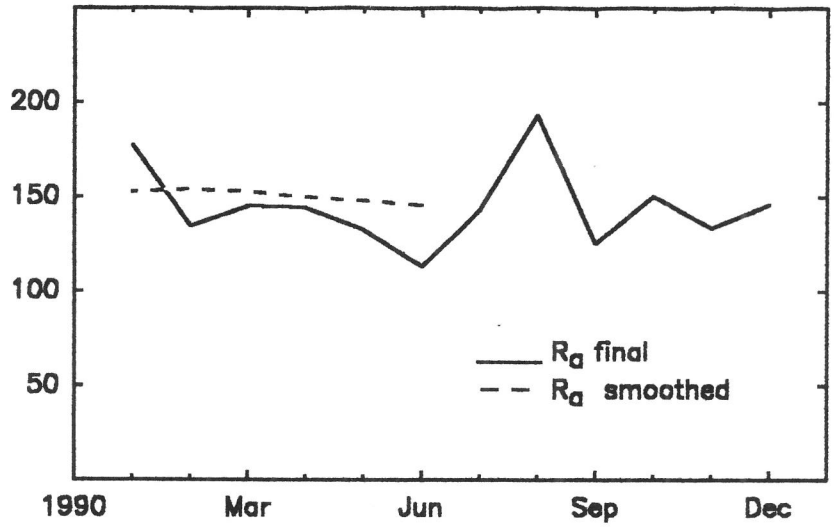
American Relative Sunspot Numbers for December

	R_a Final	
1) 137	11) 170	21) 110
2) 174	12) 144	22) 106
3) 184	13) 139	23) 97
4) 196	14) 106	24) 105
5) 195	15) 102	25) 106
6) 202	16) 121	26) 116
7) 216	17) 123	27) 122
8) 229	18) 124	28) 129
9) 206	19) 150	29) 126
10) 198	20) 129	30) 120
		31) 142

Mean: 145.9
Number of contributors: 98



Solar activity was low and moderate during the first week of December. Six solar flares reached M-level x-ray intensity. A majority of these events occurred in Space Environment Services Center (SESC) Region 6397 (N10, L144, Eki on 7 December) which also produced the strongest flare of the period, a M6.6/1F on the 4th. This event was associated with a 310 s.f.u. Tenflare. (SESC defines a 'Tenflare' as a solar flare which yields a 10 centimeter radio noise burst that exceeds 100% of the pre-event 10 centimeter flux value.) Sunspot activity was robust during the first week of December, with as many as eighteen separate clusters present on the disk on some days.

The following week saw activity climb into the moderate and high range. Nineteen M-class solar flares were detected during the interval. Four of these events were major flares. Two were associated with Region 6398 (N15, L166 Dao on 10 December); a M5.8/2B on the 10th and a M8.9/SF on the 12th. Region 6402 (S11, L179, Cao on 11 December) spawned a M6.5/SB on the 11th, and Region 6399 (N20, L165, Dao on 12 December), a M5.1/SF on the 12th.

Activity was moderate during week three. Thirteen solar flares reached M-level intensity. These events were primarily associated with Regions 6412 (N17, L020, Fki on 16 December) and 6415 (N13, L034, Dki on 20 December). Region 6412, a moderately complex spot group, grew to encompass 1450 millionths solar hemisphere on the 17th. This cluster is the return of old Region 6368 which produced fourteen M-class flares during its disk transit. As few as four groups were present on the visible hemisphere during the period, but the large number of individual spots within this complex kept the daily spot number fairly high.

During the fourth week of December, activity was moderate and high. Nine M-class, and three X-level solar flares were recorded during the period. The latter events occurred in Regions 6412 and 6420 (S26, L246, Dao on 26 December). Region 6420 was separated into two groups shortly after rounding the Sun's eastern limb; thereafter, the leading portion was numbered 6423. Region 6412 produced a X1.0/2B on the 23rd and a X1.8/1B as the cluster rotated over the western limb on the 24th. Region 6420 followed with a X1.9/2B Tenflare on the 26th. These two spot groups were also responsible for all of the week's M-class events with the single exception of a M4.3/1N in Region 6215 on the 22nd.

Three additional M-level flares occurred during the remainder of the month, bringing the total for December to fifty, the highest number to be recorded since November 1989. These (final three) events took place on the 30th in Region 6424 (S11, L254, Eai on 30 December). In spite of the increase in the number of strong solar flares, the smoothed-mean American Relative Sunspot Number continued to fall, declining to a value of 145.5 for June 1990. A consensus of opinion now indicates that the spot-maximum of solar cycle twenty-two occurred during July 1989.

The estimated mean American Relative Sunspot Number for 1-15 January is 126. Activity has ranged from low to moderate throughout early January. Seven solar flares have attained M-level intensity, but none have been classed as major events.

Daily American Relative Sunspot Numbers for 1990

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day
174	177	169	107	68	94	261	149	125	120	77	137	1
151	164	169	114	55	90	242	151	124	130	84	174	2
160	140	155	118	58	84	240	142	135	146	117	184	3
169	120	113	129	84	85	209	131	141	147	140	196	4
140	90	105	131	77	81	184	125	119	130	169	195	5
133	77	98	133	106	100	169	116	114	136	192	202	6
131	91	116	132	125	100	158	121	107	150	197	216	7
135	109	91	110	135	116	132	125	104	155	204	229	8
117	110	90	98	138	103	104	145	112	156	200	206	9
134	79	85	85	128	112	94	161	118	173	167	198	10
161	80	87	93	127	131	107	162	113	199	141	170	11
169	82	89	93	142	130	104	175	127	190	143	144	12
165	100	90	123	141	124	106	182	139	207	127	139	13
133	91	89	152	137	121	107	210	164	208	142	106	14
159	90	108	166	152	105	96	218	158	221	113	102	15
147	65	125	184	168	109	90	226	162	193	98	121	16
183	47	136	224	177	104	76	262	144	190	121	123	17
179	88	165	218	181	90	55	273	138	185	102	124	18
201	123	203	215	190	80	60	277	143	173	109	150	19
233	139	228	215	183	74	84	280	142	152	109	129	20
222	158	230	209	197	69	127	262	138	141	120	110	21
196	181	210	196	179	76	144	249	133	143	131	106	22
218	220	234	189	156	73	174	266	113	137	130	97	23
235	269	234	171	151	86	201	275	101	132	120	105	24
225	236	215	155	147	102	199	241	97	130	114	106	25
220	220	193	152	131	121	190	217	98	111	109	116	26
203	217	161	128	137	151	173	194	95	110	106	122	27
209	205	135	97	118	202	154	163	119	107	132	129	28
213		132	99	113	225	139	172	127	108	152	126	29
192		130	92	100	245	118	177	118	89	142	120	30
198		109		106		141	152		84		142	31
177.6	134.6	145.0	144.3	132.5	112.8	143.2	193.5	125.6	150.1	133.6	145.9	Mean

Yearly Mean: 145.1

Sudden Ionospheric Disturbances Recorded During November 1990

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

(The following is a list of the more definite SIDs for November. A complete list of 159 events is available on request.)

Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	De
4	1740	2+	5	13	1131	2+	5	18	1636	1-	5	24	1815	1-	5
5	1303	1-	5	14	1729	1+	5	18	1808	2+	5	24	1832	1+	5
5	1455	1	5	15	0919	1	5	18	1953	1	5	24	2001	1+	5
5	1555	1+	5	15	1123	1	5	19	0931	1	5	25	0816	1+	5
5	1730	1-	5	15	1515	2	5	19	0951	2	5	25	1017	2+	5
6	1011	1+	5	15	2120	1	5	19	1113	1-	5	25	1712	2+	5
6	1759	1	5	16	0819	1-	5	19	1338	2+	5	25	1900	2+	5
6	1903	1	5	16	1317	1-	5	20	1722	1	5	26	0940	2	5
6	2047	2	5	16	1810	1	5	20	1748	1+	5	26	1450	1	5
7	1306	1	5	16	1937	1	5	20	1826	1	5	26	1654	2	5
7	1755	2	5	17	0542	1+	5	20	1848	2	5	26	2041	1-	5
7	1852	1	5	17	0702	2	5	21	0504	1	5	27	0519	2	5
7	2008	1	5	17	0909	1	5	21	0534	2+	5	27	1558	1+	5
8	0829	1-	5	17	1314	1	5	21	0630	2+	5	27	1828	2	5
8	0908	1+	5	17	1448	1	5	21	1728	2	5	27	1905	1	5
8	1514	2+	5	17	1601	1-	5	21	1843	1	5	27	1946	1+	5
8	1959	1	5	17	1736	2	5	21	1918	1+	5	28	0626	2+	5
11	0443	2+	5	17	1844	2	5	22	0826	1+	5	28	1412	2	5
11	1431	1	5	17	1942	2	5	22	1422	2	5	28	1950	1+	5
12	1436	1	5	18	0021	1	5	23	0907	2	5	29	0953	1+	5
12	1645	1-	5	18	0852	1-	5	23	1636	1	5	29	1341	2+	5
12	1901	1-	5	18	1442	1	5	23	2100	1+	5	30	0552	1+	5
12	1919	1+	5	18	1527	1	5	24	1421	2+	5	30	1758	1	5

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