

Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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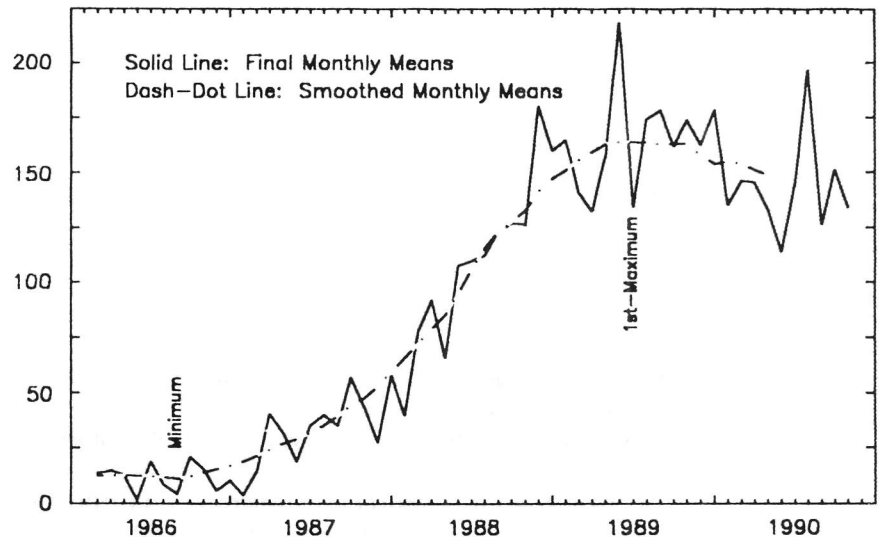
November 1990

American Relative Sunspot Numbers for November

R _a Final		
1) 77	11) 141	21) 120
2) 84	12) 143	22) 131
3) 117	13) 127	23) 130
4) 140	14) 142	24) 120
5) 169	15) 113	25) 114
6) 192	16) 98	26) 109
7) 197	17) 121	27) 106
8) 204	18) 102	28) 132
9) 200	19) 109	29) 152
10) 167	20) 109	30) 142

Mean: 133.6

Number of contributors: 100



Solar activity was mainly in the moderate and low range during November. The smoothed-mean American Relative Sunspot Number for May 1990 fell to 147.8. The continued decline of this index provides further evidence that the maximum for cycle twenty-two probably occurred during July 1989. Sunspot number activity during this solar cycle is shown in the diagram which appears above.

Four flares with x-ray intensities in the M-level classification occurred during the first ten days of the month; one in each of four spot groups. The strongest of these events was a M3.1/2B on the 6th in Space Environment Services Center (SESC) Region 6361 (N08, L130, Dao on 6 November). Other M-class events took place in Regions 6347 (S18, L214), 6350 (S25, L213) and 6355 (N17, L221). During the following week, Region 6361 spawned a M2.1/SF on the 11th and a M1.6/SN on the 13th. Region 6368 (N18, L028, Fki on 16 November), an extremely large spot group, produced a M1.2/1N on the 16th.

Activity continued to be moderate from the 17th to the 23rd. Nine flares with peak x-ray flux within the M-level category occurred during this interval. All of these events occurred in Region 6368, which by now had grown to be the second largest cluster to appear during cycle twenty-two (see page two). SESC (Boulder) measured its area as 3080 millionths solar hemisphere (approximately 9300 million km²) on the 18th. Although this region eventually developed some degree of magnetic complexity (beta-gamma-delta) and contributed many small and intermediate-level events, it failed to produce a major flare until the group began to decline as it approached the Sun's western limb.

Nine additional M-level flares occurred during the remainder of the month, bringing the total for November to twenty-five. A plurality of these events took place in Region 6368. Region 6368 spawned its most energetic flare, a M7.5/1N event on the 26th. The geomagnetic field experienced major storm conditions on the 27th, and both GOES spacecraft recorded magnetopause crossings at mid-day (UT). SESC cited the disappearance of several filaments on the 24th or multiple M-class flare eruptions as possible causes of this phenomenon.

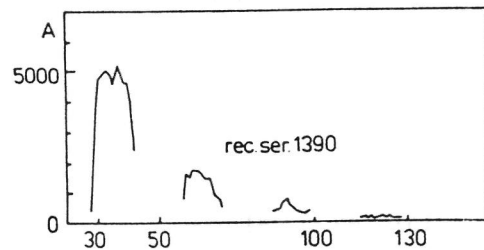
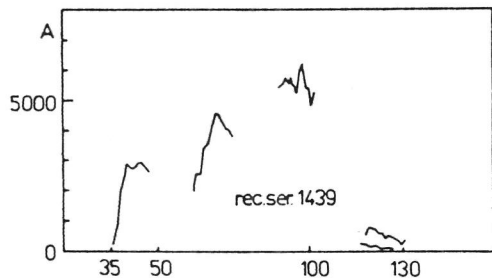
The estimated mean American Relative Sunspot Number for 1-16 December is 176. Activity has been moderate and high throughout early December. Twenty-six solar flares have attained M-level intensity, and five of these events had peak x-ray energy emissions which exceeded M5.0.

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

The Largest Sunspot Groups

During November, a large sunspot group, **SESC** Region 6368, dominated the Sun's visible hemisphere. The area of this cluster, ~ 3080 millionths solar hemisphere (msh), makes it the second largest group of cycle twenty-two. Region 5395 attained a maximum area of nearly 3600 msh during its transit in March 1989. An area of 3080 msh would rank Region 6368 as the seventeenth largest group of the modern record (Taylor, 1989).

According to the *Catalogue of Larger Sunspots* (Spencer Jones, 1955) and Kopecky (1984), the largest recorded group reached a maximum size nearly twice that of the November region when it encompassed an area of 6132 msh (~ 18,400 million km²) during early April, 1947. The second largest group of the historical record was observed in 1946; it reached a maximum area of 5202 msh on 7 February. The growth of both of these recurrent spot groups is depicted below in diagrams which originally appeared in Kopecky's analysis. Note that the larger group (left) separated into two groups during its fourth transit.



- Editor -

Kopecky, M. 1984, *Solar Physics*, **93**, 181-87.

Spencer Jones, H. 1955, *Sunspot and Geomagnetic-Storm Data Derived from Greenwich Observations 1874-1954*, Her Majesty's Stationary Office.

Taylor, P.O. 1989, *Journal of the American Association of Variable Star Observers*, **18**, 1, 65-69.

Sudden Ionospheric Disturbances Recorded During October 1990

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

Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	D
1	0830	1	5	8	1430	1-	4	15	1917	2	5	21	0557	2	5
1	1321	1-	4	8	1501	1-	5	16	0352	1+	4	21	0722	1	5
1	2117	1+	4	8	1656	2	5	16	1627	1-	5	21	0800	2+	4
2	1334	2	5	9	0900	3	5	16	1728	2+	5	21	0956	2+	5
3	1633	1-	4	9	1349	2	4	16	1800	1-	4	21	1501	1-	5
3	1651	2+	5	9	1600	2+	5	16	2126	1-	4	21	1646	2+	5
3	1809	2+	5	9	1752	1+	4	17	0652	1+	4	21	1847	1	5
3	2045	2	5	9	1915	2+	5	17	1326	1	5	22	1354	1	4
4	0725	1	4	10	1802	2+	5	17	1427	1-	5	22	2000	2	5
4	0946	1-	4	10	2029	2	5	17	1448	1	4	23	1620	2+	5
4	1210	1	4	11	0740	2	5	17	1651	2+	5	23	2130	1+	5
4	1613	1+	4	11	1440	1+	5	17	1854	1-	4	24	1640	1	5
4	1716	2	4	12	1806	1-	4	17	2038	2	5	24	1955	2	5
5	0631	1	4	12	2110	1-	4	18	1529	2	5	24	2200	1	5
5	1115	1-	4	13	1504	2	5	18	2215	2+	5	24	2359	1-	5
6	1720	2+	5	13	1830	2+	5	19	1402	1-	4	25	0902	1+	5
6	1843	2+	5	13	1944	2+	5	19	1722	2+	5	25	1110	2+	5
7	1254	1+	5	14	0726	2+	5	20	0456	2+	5	25	1611	1-	5
7	1510	2	5	14	2000	1-	4	20	0908	2	4	26	1655	1-	5
7	1629	2	5	15	1415	1+	5	20	1528	1	5	26	2015	1-	5
7	2148	2	5	15	1618	1-	4	20	1628	2+	5	27	2137	1-	5
7	2300	2	5	15	1655	1+	5	20	1803	3	5	29	1256	1-	5
8	0705	2+	5	15	1847	1	5	21	0321	2+	5	30	1933	2+	5
8	0905	2	4												

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