

Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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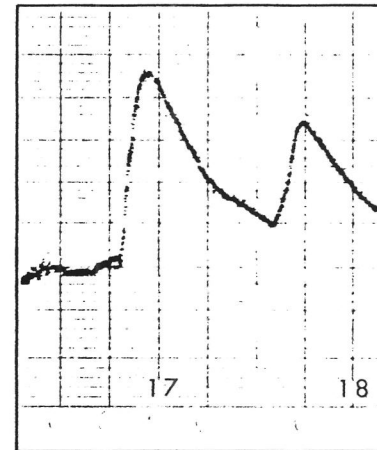
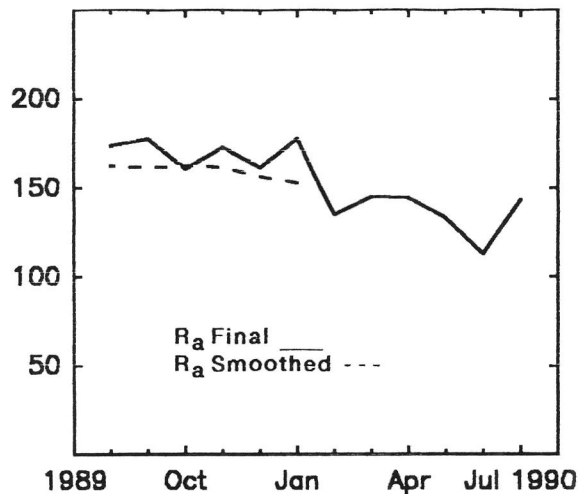
July 1990

American Relative Sunspot Numbers for July

R _a Final		
1) 261	11) 107	21) 127
2) 242	12) 104	22) 144
3) 240	13) 106	23) 174
4) 209	14) 107	24) 201
5) 184	15) 96	25) 199
6) 169	16) 90	26) 190
7) 158	17) 76	27) 173
8) 132	18) 55	28) 154
9) 104	19) 60	29) 139
10) 94	20) 84	30) 118
31) 141		

Mean: 143.2

Number of contributors: 102



Solar activity ranged from low to high during the first five days of July; several solar flares attained M-level intensity during the period. The more interesting of these was a pair which occurred in opposite hemispheres on the 4th, and reached maximum less than one hour apart. The first, a M7.6/2B, was associated with SESC Region 6138 (N22, L024, DKO on 4 July). As this event declined, a M4.8/2B flare erupted in Region 6131 (S21, L074, EAI on 4 July). These events combined to produce spectacular *sudden ionospheric disturbances* (above right) which took place at almost the same moment as the optical flares.

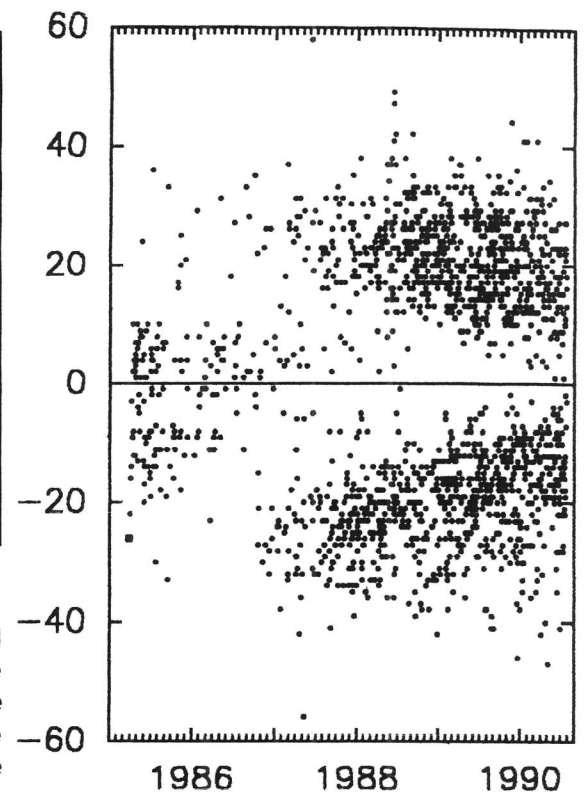
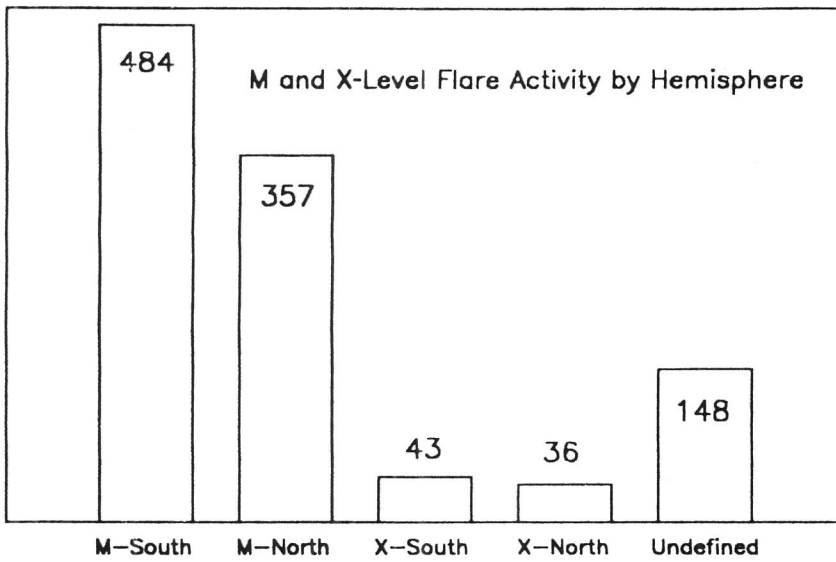
Activity was moderate and low between the 6th and 12th. Four M-level flares were recorded during the interval. The most energetic was a M2.2/2N from Region 6133 (N17, L046, DK1 on 6 July) early on the 6th. Relative sunspot numbers and other activity indices declined from the peak which was experienced at the end of June and early part of July, resulting in generally low activity levels that continued through the third week of the month. Two brief periods in the moderate range which were associated with M-class flares took place. One of these was an optically uncorrelated M3.1 event which probably occurred in Region 6138 as the group rounded the western limb on the 13th.

Solar activity remained low until late on the 25th, when Region 6174 (S12, L080, HSX on 25 July) spawned a M2.3/2N flare. This long-duration solar flare combined with a disappearing filament to produce a satellite proton event on the 26th, and major geomagnetic storm conditions on 28-29 July. Region 6162 (N10, L144, FKI on 26 July), the largest group on the visible hemisphere during July, generated a M3.3/1B flare on the 26th. This cluster grew to encompass an area of 900 millionths solar hemisphere (~2.7 billion km²) on the 25th, and was the most complex spot group on the disk during the latter half of July. However its rate of major flare production was low.

Activity was low with a single excursion into the moderate range during the rest of the month. One strong flare was recorded; a M4.4/2B which occurred in Region 6180 (N18, L035, CAO on 30 July) on the 30th. A total of thirteen flares attained M-level intensity during July, compared with twenty-one for June. Although relative sunspot numbers were fairly high during the beginning and fourth week of July, the smoothed monthly-mean for January 1990 (152.7) declined by two and one-half percent, the second largest percentage-drop for any month of cycle 22. The solar 10.7 radio flux and x-ray background levels were 176 and B9.4 respectively, as July ended.

The estimated American sunspot number for 1-14 August is 151. Activity has generally been in the low and moderate range during this period. Thus far only five solar flares have reached M-level intensity, although one of these, an M7.9/2B event on the 10th, was the strongest to erupt since the optically uncorrelated X1.4 flare that occurred on 26 May.

A portion of this information was obtained from: SESC PRE, Numbers 774-79 (1990).



In the June issue of the Solar Bulletin we outlined the developmental differences between the Sun's hemispheres for cycle 22 as they are described by the relative sunspot number, pointing out that the Northern Hemisphere has been the more active member during the cycle's rise. On the other hand, when this activity is measured by the occurrence of strong x-ray solar flares, a different picture emerges.

The bar-graph shows the hemispherical locations of M and X-level events which have been recorded by the GOES satellites between sunspot minimum (September 1986) and July 1990, according to data obtained from SGD through 1989, and the PRE thereafter. Those data represented by the final bar were unlisted as to hemisphere in the publications, and consist of 4 X-class, and 144 M-level events. The butterfly-diagram to the right shows the positions of emerging spot-groups from April 1985 when the first spots of cycle 22 appeared, through July 1990.

References: Preliminary Report and Forecast of Solar Geophysical Data, Numbers 744-779.
Solar-Geophysical Data, Part II, Numbers 511-549.

Sudden Ionospheric Disturbances Recorded During June 1990
 Records were received from A1,9,19,40,50,52,61,62,63,64,65,66,67,68,69.

Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	D
1	0638	2+	4	9	1420	2+	5	13	1836	1-	4	26	0556	1	4
2	0642	2+	5	9	1650	2+	5	13	2009	1-	4	26	1758	2	5
2	1406	1-	4	9	2011	2	5	13	2240	1+	4	26	1936	2+	5
3	0606	2	5	9	2301	2	4	14	1149	1	4	27	1434	1-	4
3	0755	1	5	10	0725	2	5	14	1223	1+	4	27	1545	1	5
3	1636	1+	4	10	0900	1	5	14	1845	2	5	27	1632	1-	4
5	0830	1	4	10	0921	2+	5	15	0658	2+	5	27	1653	1+	5
5	1702	1-	4	10	1340	1+	4	15	0835	2+	5	27	2113	1+	5
6	1439	1	5	10	1445	2+	5	15	1517	1	4	28	1134	1+	4
6	1643	2	5	10	1505	2+	5	16	0943	2+	4	28	1405	2+	5
6	1837	2	5	10	1624	2+	5	16	1634	1+	5	28	1721	2+	5
6	2032	2+	5	10	1827	2	4	17	1530	1-	4	28	1915	1+	4
7	0600	1	5	10	2148	2+	5	19	1600	1+	4	28	1947	2	5
7	0625	3	5	10	2223	3	5	20	0645	1-	4	28	2033	2+	5
7	0755	2	5	11	0558	1-	4	20	0735	1-	4	28	2317	1	5
7	1129	1-	4	11	0945	2+	5	20	1656	1	4	29	0556	1	4
7	1445	1+	5	11	1855	2	5	22	0702	2+	4	29	1316	2+	5
7	1606	1-	4	11	1945	1+	5	22	2056	1-	4	29	1510	2+	5
7	1717	1-	4	12	0533	3	5	23	1104	1-	4	29	1604	2	5
7	1754	1-	5	12	1319	2+	5	23	1800	1	4	29	1646	1+	5
7	1915	3+	5	12	1541	1-	4	23	2050	1	4	29	1923	1+	4
8	1159	1+	5	12	1701	2+	5	24	0523	3+	4	29	2233	2	5
8	1340	1	4	12	2115	3+	4	24	1630	1+	4	30	1630	2+	5
8	1530	2+	5	13	1419	2	5	25	0702	1-	4	30	1814	2	5
8	2123	1	4	13	1626	1	5	26	0325	2	4	30	1947	2	5

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