

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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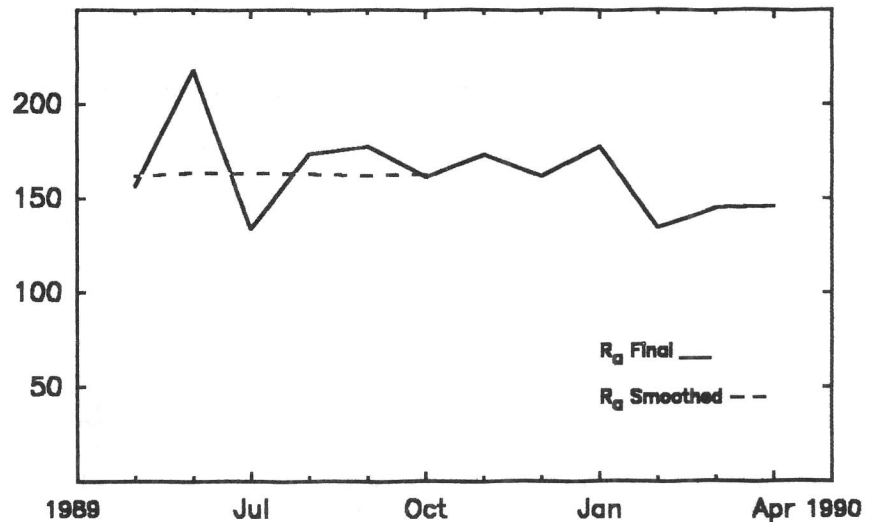
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## American Relative Sunspot Numbers for April

R <sub>a</sub> Final		
1) 107	11) 93	21) 209
2) 114	12) 93	22) 196
3) 118	13) 123	23) 189
4) 129	14) 152	24) 171
5) 131	15) 166	25) 155
6) 133	16) 184	26) 152
7) 132	17) 224	27) 128
8) 110	18) 218	28) 97
9) 98	19) 215	29) 99
10) 85	20) 215	30) 92

Mean = 144.3



One-hundredfour members of the international network of *American Sunspot Program* collaborators submitted reports for April. Solar activity was moderate and high during the first few days of the month. One X-class, and six M-level solar flares were recorded between the 1st and 5th. **SESC** Region 6007 (N23, L105, DAO on 5 April) produced the lone X-level flare on the 3rd, as well as M7.3 and M7.1 events on the 3rd and 4th. Region 5987 also contributed a strong flare (M4.1) from behind the western limb on the 1st.

Solar activity was moderate and low between the 6th and 12th. Three M-class solar flares were detected during the period. The strongest of these events was an optically un-correlated M3.2 flare which took place on the 12th. The geomagnetic field was at major to severe storm levels (K-indexes as high as 7) during portions of some days. The cause of these effects may have been two-fold: a response to the X1 flare which erupted on the 3rd for the early part of the period, and the disappearance of a long (48-degree) filament from the southeast quadrant between 5-6 April.

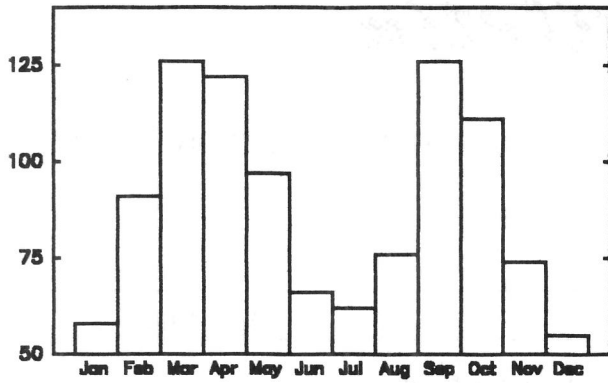
Activity increased to moderate and high between 13 and 19 April. The month's second and third X-level x-ray flares occurred during the period. Region 6022 (N31, L346, EKI on 15 April) produced the first of these events, a X1.4/2B on the 15th. On the next day, Region 6021 (S14, L341, FAI on 16 April) followed suit with a X2.2/2B tenflare which was accompanied by strong radio bursts. Region 6022 was the largest group on the disk during the week, attaining an area of 1070 millionths solar hemisphere (~3.2 billion km<sup>2</sup>) on the 17th. Relative sunspot numbers also increased dramatically during the period, as the more active longitudes of the Sun rotated into view.

Solar activity gradually declined after the 20th. Four flares were recorded which attained M-level intensity, but all were at the lower end of the scale. The solar 10.7 centimeter radio flux and x-ray background dropped to lows of 133 and B3.4 respectively, on the 30th. However, a total of twenty-one M-level and three X-class flares were recorded during April, so that overall activity was up from March levels. Consequently, the smoothed-mean for October 1989 increased from the September value of 161.7 to 162.5.

The status of this spot cycle continues to be in doubt. If mean relative sunspot numbers increase substantially during May and the following month or so, the corresponding smoothed-mean could exceed the July/August level. Otherwise, it is possible that the maximum for cycle twenty-two will have occurred at that time, marking the shortest rise to maximum of the modern record (~2.83 years).

The estimated mean American sunspot number for 1-14 May is 118, with activity in the moderate range at the end of the period. Several X-class and a number of M-level flare events have already occurred during May.

Reference: **SESC PRF**, Numbers 761-66 (1990).



It is well known that aurorae are most apt to appear around the Spring and Fall equinox when the Earth is in a position which is most likely to intercept the Sun's highly directional emissions. When the major magnetic storms (as defined by the Ap\* index) that occurred between 1932 and 1989 are grouped by month, the result is the strong correlation shown in the diagram to the left.

### Sudden Ionospheric Disturbances Recorded During March 1990

Records were received from A1,3,9,19,46,50,52,59,61,62,63,64,65,66,67,68.

Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def
1	0346	1	5	12	1855	1+	5	20	0548	1-	1	24	1945	1-	5
1	0410	2+	5	13	0700	1	2	20	0933	1-	1	25	0425	2+	3
1	0540	2+	5	13	0720	2	2	20	0948	1-	1	25	0651	1+	1
1	0740	2	3	13	2000	1+	5	20	1444	1+	5	25	0914	2+	5
1	0835	2	4	13	2148	1+	5	20	1525	2+	5	25	1401	1-	5
1	0915	2	5	14	1635	2+	5	20	1702	2+	5	25	1616	2	5
1	1503	1	5	15	1356	1	5	20	2016	1+	5	25	1800	2	5
2	0840	2+	4	15	2128	1	5	20	2030	2	5	25	1950	2	5
3	0805	2+	2	16	0641	2	2	21	0840	2+	2	26	1317	2	5
3	1000	1	2	16	0725	2+	4	21	1835	1-	5	26	1601	2	5
3	1307	2	5	16	0845	2+	3	21	1902	1-	5	27	0421	1+	2
3	1640	2+	5	16	1346	1-	5	21	2030	2+	5	27	0745	3	2
3	2025	2+	5	16	1506	2	5	22	0429	2	2	27	1346	1-	5
6	0812	1+	1	16	1635	2	5	22	0548	2+	1	27	1418	2	5
6	1413	1	5	16	1738	2	5	22	0710	2+	3	27	1530	1+	5
6	1527	1	5	16	1844	2	5	22	0745	2	2	27	1553	2	5
6	1718	1+	5	17	1501	1+	5	22	1029	1-	3	27	2014	2	5
6	1805	1+	5	17	1610	1+	5	22	1602	2+	5	28	0601	1	2
6	1837	2	5	17	1716	2	5	22	1845	2	5	28	0705	2	2
7	0822U	1	1	18	0410	1-	1	22	1915	2+	5	28	0745	3	5
7	1947	1	5	18	0443	1+	2	23	0610	1-	2	28	1603	2+	5
8	0736	1+	3	18	0525	2+	1	23	0626	1+	5	28	1836	2	5
8	1702	2+	5	18	0840	2	2	23	0744	2+	2	28	2045	2	5
8	1855	1-	5	18	1401	2	5	23	1254	1	5	29	0835	2+	3
9	1643	1	5	18	1844	1-	5	23	1636	1+	5	29	1000	2	2
10	0705	2	2	19	0510U	2	1	24	0512	2+	5	29	1432	1-	5
10	1416	1-	5	19	0541	1	1	24	0615	2	2	30	0225	2	4
10	1501	2	5	19	1231	1-	5	24	0646	2	2	30	0734	2	5
11	0403	2+	3	19	1320	1+	5	24	1022	2	2	30	1927	2+	5
12	0900	2	2	19	1353	2+	5	24	1548	2	5	31	0926	2	3
12	1415	1	5	19	1716	2	5								

U = undefined.

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