Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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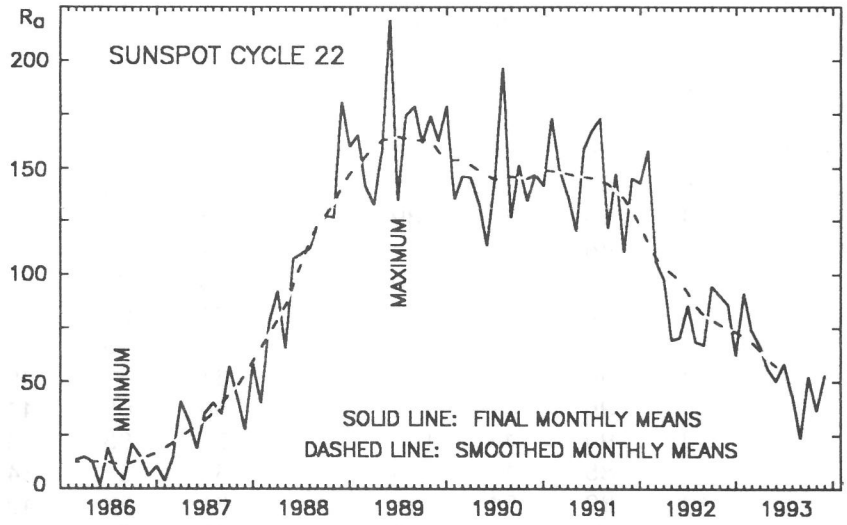
American Relative Sunspot Numbers for December

	R_a Final				
1)	70	11)	31	21)	37
2)	60	12)	21	22)	45
3)	62	13)	19	23)	56
4)	71	14)	21	24)	73
5)	62	15)	14	25)	90
6)	68	16)	22	26)	68
7)	66	17)	25	27)	72
8)	62	18)	32	28)	75
9)	48	19)	19	29)	79
10)	40	20)	30	30)	78
				31)	97

Mean: 52.0
Number of reports: 99



December Summary: December began with activity in the low and very low range; only class C and lesser intensity solar flares were recorded. A 17-degree-long filament disappeared from the Sun's Southern Hemisphere early on the 8th, and a prominence erupted on the northeast limb later that day. A 16-degree filament disappeared from the southwest quadrant on the 14th/15th.

A favorably positioned coronal hole spawned minor to severe geomagnetic storm conditions at high latitudes on the 1st and 2nd, a disturbance which began to subside late on the 3rd. The field then quieted, returned to disturbed levels for two days, and then became extremely quiet. The source of this second storm remains uncertain.

Solar activity continued to be low and very low until several hours after midday on the 22nd, when new spot-group - NOAA/USAF Region 7640 (N09, L205, FKI) - produced December's first class M flare (M1.4/1B). The Sun's Southern Hemisphere remained spotless from the 16th through the 23rd.

The geomagnetic field was mostly quiet with occasional periods of unsettled or active conditions during this period. Some high latitude stations experienced intervals of minor to major storm conditions during the third week of the month.

Flare activity centered in Region 7640 was the big story during the remainder of December. This highly prolific region produced numerous class C and lesser flares - no less than fifteen class C events on the 26th alone - along with a total of seven class M flares. The latter occurred as follows: the event described above; M1.3/1N and M1.1/1N flares on the 24th; a M1.5/SN on the 25th; a M1.5/1N on the 26th; a M1.9/SF on the 27th, and a M1.1/1N on the 28th. New Region 7645 (N11, L084, EKO) added an eighth class M flare (M1.6/1N) early on the 30th. This activity represents the highest monthly total of class M flares since June, and more than doubles the number recorded for any intervening month.

In spite of these eruptions, geomagnetic field conditions continued to be in the quiet or unsettled range. A brief interval of storm conditions did occur around midday on the 31st. According to SESC, its likely source is a Western Hemisphere coronal hole. The smoothed mean American Relative Sunspot Number for June, 1993, declined to 56.1.

The mean estimated American Relative Sunspot Number for 1-13 January is 75. The new year began with the eruption of the first major flare (M6.5/SN) to be recorded since June, 1993, in Region 7645. This impulsive event occurred late on the 2nd, accompanied by small radio bursts at discrete frequencies. On the 5th, Region 7647 (S16, L096, ESO) combined with fellow southern spot-group, Region 7646 (S08, L087, EKI), to spawn a long-duration M1.0/1N flare. A third class M flare (M1.3/1N) occurred in Region 7646 on the 7th. The geomagnetic field was mostly quiet to active, with occasional storm conditions at high latitudes.

[A portion of this information was obtained from **SELDADS**]

American Relative Sunspot Numbers for 1993

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	52	25	80	70	28	99	63	42	32	70	21	70
2	50	43	81	64	24	98	61	38	31	85	19	60
3	50	67	84	85	42	97	70	34	23	86	18	62
4	59	89	102	67	61	83	73	33	25	88	20	71
5	71	117	114	79	64	76	71	26	20	80	32	62
6	84	127	101	92	65	84	54	34	14	70	34	68
7	83	125	98	82	67	66	42	43	11	52	31	66
8	98	127	102	91	79	56	45	40	16	65	27	62
9	96	124	95	90	93	49	38	60	15	60	22	48
10	97	110	82	78	105	47	33	65	2	46	24	40
11	90	95	79	63	106	36	34	66	0	61	19	31
12	105	94	76	36	99	18	38	60	0	45	15	21
13	99	89	66	20	77	14	52	62	7	29	22	19
14	73	83	54	15	50	10	62	45	10	30	27	21
15	56	75	58	14	39	10	68	30	14	50	27	14
16	65	84	58	26	31	11	64	23	25	45	33	22
17	64	65	57	39	28	16	65	28	22	38	36	25
18	66	86	65	54	17	11	82	31	25	35	35	32
19	61	87	73	70	20	15	77	27	17	47	40	19
20	51	86	70	96	30	21	69	23	15	59	43	30
21	44	95	86	98	22	28	66	35	14	64	55	37
22	34	100	70	96	12	31	62	45	7	60	54	45
23	33	96	61	104	14	50	65	44	21	56	54	56
24	43	90	48	106	28	50	65	55	26	47	53	73
25	51	85	44	88	41	57	51	54	45	42	40	90
26	40	82	54	57	51	61	58	49	50	43	42	68
27	41	85	58	62	62	69	67	52	47	30	43	72
28	44	91	54	52	78	76	53	53	52	28	54	75
29	37		52	43	86	77	46	50	53	25	57	79
30	35		60	34	90	70	41	41	53	26	71	78
31	40		67		92		45	36		26		97
Mean:	61.7	90.1	72.5	65.7	54.9	49.5	57.4	42.7	23.1	51.2	35.6	52.0

Yearly Mean: 54.5

Sudden Ionospheric Disturbances (SES) Recorded During November 1993

Records were received from A9,40,50,59,61,62,63,65,66,67,68,69,70,71,72,73,74,75,76,77,78,80,81

Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def
1	1122	1	5	12	1800	1	5	14	1701	1	5	23	0816	1-	5
1	1237	1-	5	12	1945	1-	5	14	1825	1-	5	24	0945	1	5
1	1555	1	5	12	2000	1-	5	14	2131	1-	5	24	1317	1-	5
4	1145	1-	5	12	2038	1-	5	15	1709	1+	5	24	1854	1	5
4	1229	1-	5	12	2047	1-	5	15	2330	1	5	24	2345	1+	5
4	2126	1+	5	12	2201	1-	5	16	0930	1-	5	25	1905	1+	5
8	2200	1+	5	12	2301	1-	5	18	1331	1-	5	25	2026	1+	5
10	1540	1	5	13	0017	1-	5	18	1700	1	5	26	1122	1+	5
10	2136	1-	5	13	0105	1-	5	18	1953	3	4	26	1210	1-	5
11	1127	2+	5	13	0237	1-	5	19	0739	2+	5	26	1605	1	5
11	1455	1-	5	13	0416	1-	5	19	2000	3	5	26	1711	1+	5
11	1702	1	5	13	0754	1-	5	20	0030	1+	5	29	0729	1-	5
11	1732	1	5	13	0931	1+	5	20	2005	2	5	29	1012	1	5
11	1916	1-	5	13	1008	1	5	22	0310	1	5	29	1515	1-	5
12	0030	1	5	13	1034	1+	5	22	0955	1-	5	29	1735	1+	5
12	0221	1-	5	13	1532	2+	5	22	1450	1-	5	29	1910	1-	5
12	0837	1	5	13	1742	1	5	22	2326	2	5	29	2315	1	5
12	1610	2+	5												

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Frequencies recorded (kHz): 16.8; 18.3; 19.6; 21.4; 23.4; 24.0; 24.8; 28.5; 30.6; 48.5; 51.6; 73.6; 77.15

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