

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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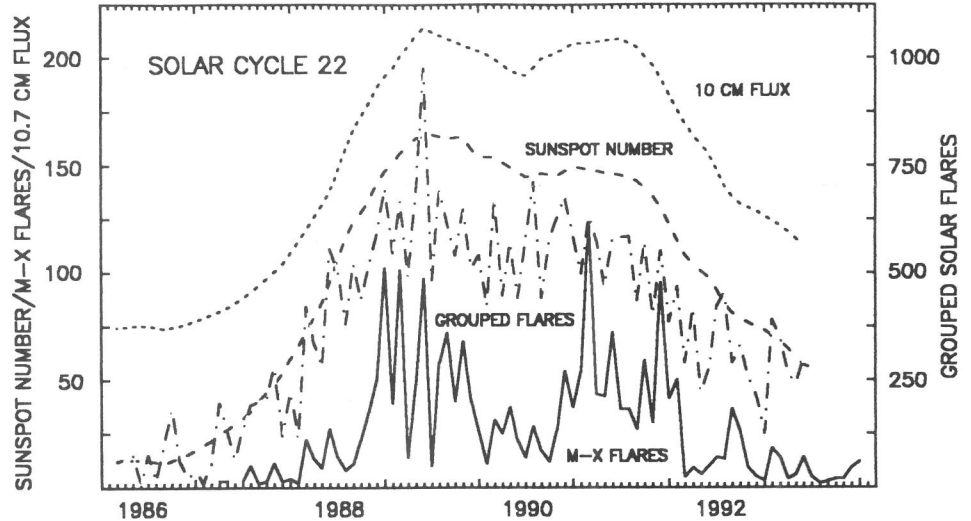
Volume 50 Number 1

January 1994

## American Relative Sunspot Numbers for January

		R <sub>a</sub> Final			
1)	89	11)	41	21)	54
2)	79	12)	43	22)	66
3)	91	13)	45	23)	72
4)	101	14)	38	24)	74
5)	104	15)	36	25)	74
6)	98	16)	32	26)	68
7)	94	17)	26	27)	53
8)	80	18)	30	28)	49
9)	67	19)	31	29)	54
10)	51	20)	37	30)	42
				31)	33

Mean: 59.7  
Number of reports: 99



**January Summary:** The new year began with the eruption of the first major flare (M6.5/SN) to be recorded since June 1993, in NOAA/USAF Region 7645 (N12, L082, FKI). 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 Hemisphere 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 recorded at high latitudes.

In contrast to the first week of January, solar activity during the second week was predominately low. A coronal mass ejection occurred near the Sun's NE limb late on the 12th, possibly associated with the eventual return of the active area near old Region 7640, which spawned seven class M flares during its transit of the Sun's visible hemisphere during the latter portion of December. Some geomagnetic storm conditions were recorded at high-latitudes during the second half of the period. These disturbances were probably related to coronal hole activity.

Week three began with activity in the low range, but escalated to high after Region 7654 (N09, L208, DK1) produced January's second major flare (M6.1/1N) late on the 16th. This event contained a Y-shaped ribbon characteristic and tenflare, along with a Type II sweep which spread outward at a velocity estimated to be near 400 kilometers per second. Several hours later, Region 7654 followed with an impressive class C9 flare.

According to Big Bear Observatory, at the time of these eruptions Region 7654 contained a strong delta magnetic configuration and was located close to the site of old Region 7640. A filament disappeared from the Sun's Southern Hemisphere near mid-disk on the 21st. The geomagnetic field continued to be unsettled to active, with scattered storming recorded at some middle and high latitude stations. A portion of this activity may have been coronal hole related.

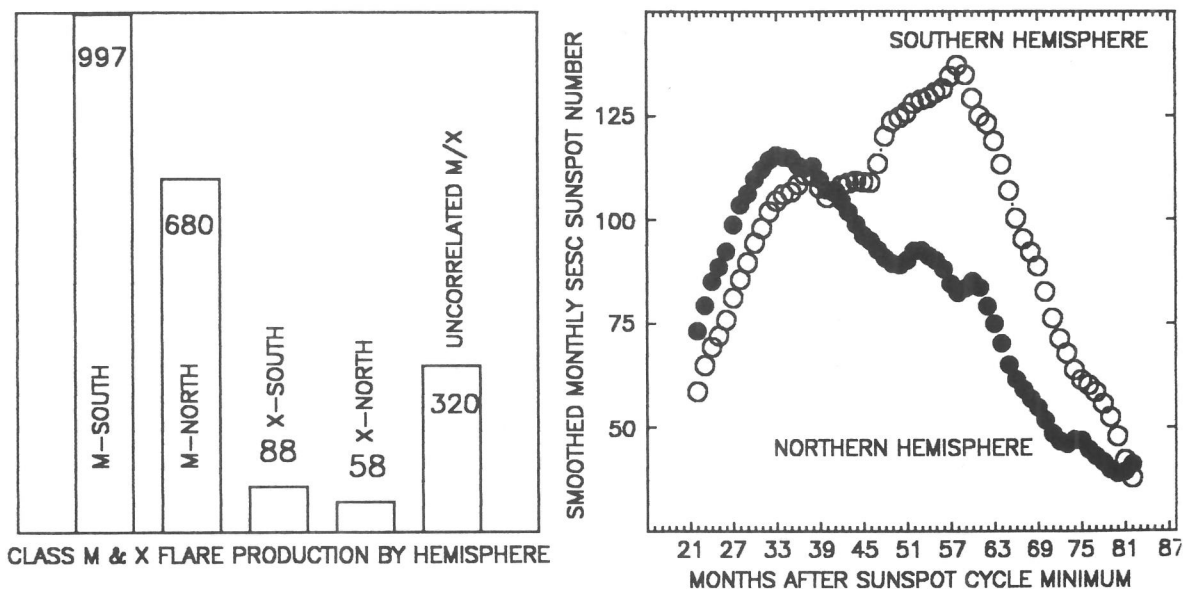
Region 7654 spawned five additional class M X-ray events before rotating off the visible hemisphere on the 28th. These consisted of a long-duration M1.6/1N flare on the 25th; a long-duration M1.5/1B on the 26th; an M2.7/1B on the 27th, and a M1.8/SF on the 28th, with secondary class M1.1 X-ray peak nearly two hours later. Other interesting occurrences during the fourth week of the month included the disappearance of a section of the large filament located near mid-disk, on the 28th. Moderate to high fluxes of high energy (> 2 MeV) electrons were observed during mid-January, but this phenomenon - which persisted for several days - was not related to eruptive events (flares, disappearing filaments, etc.) on the Sun. Rather, it is possible that the anomalies reported at geosynchronous altitudes (including failure of the Canadian 'Anik' satellites) were caused by deep-dielectric charging indirectly associated with a coronal hole.

Region 7654 - at the time a day past west limb transit - is the suspected source of the final class M flares to be recorded during January, a pair of M2.4 events which occurred on the 29th. The geomagnetic field was mostly quiet to active, with some brief intervals of storm conditions. The smoothed mean American Relative Sunspot Number for July 1993, declined to 54.6.

The mean estimated American Relative Sunspot Number for 1-15 February is 44. No class M or greater intensity solar flares have been recorded during this interval. The coronal hole system referred to in the **January Summary** has again affected the terrestrial environment. Details in the next Solar Bulletin.

[A portion of the above information was obtained from SELDADS]

### Solar Activity by Hemisphere During Cycle 22



**Note:** For the first time since February 1990, the most recent smoothed monthly-mean sunspot number (July 1993) for the Sun's Northern Hemisphere exceeded that for the south (right-hand diagram).

### Sudden Ionospheric Disturbances (SES) Recorded During December, 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	1204	1-	5	8	1218	1-	5	23	1145	1-	5	26	1243	1-	5
1	1230	1-	5	8	1941	1-	5	23	1447	1+	5	26	1130	1-	5
1	2131	1-	5	10	2304	1-	5	23	1624	1+	5	26	1340	1	5
2	1559	1-	5	12	1836	1-	5	23	2030	1-	5	26	1505	1+	5
2	2243	2	5	13	1126	1	5	23	2302	1+	5	26	1546	1+	5
3	1140	1-	5	13	1158	1-	5	24	1000	2	5	26	1707	1-	5
3	2246	1	5	14	1100	1-	5	24	1345	1	5	26	1800	1	5
4	0115	1-	5	14	1209	1-	5	24	1415	1-	5	26	1904	1	5
4	0327	1-	5	14	1532	1-	5	24	1455	2+	5	26	1935	1-	5
4	1433	1-	5	14	1918	1-	5	24	1634	1-	5	27	0955	1	5
4	1739	1-	5	15	0655	1-	5	24	1731	1+	5	27	1845	2	5
5	1030	1+	5	17	2026	1	4	24	1812	2+	5	28	0654	1-	5
5	1542	1	5	19	0737	1-	5	24	2117	1-	5	28	0903	1+	5
5	1644	1	5	19	2251	1-	5	25	0108	1-	5	28	1315	1-	5
5	2210	2	5	20	0721	2	5	25	0330	1-	5	28	1658	1+	5
6	1037	1-	5	20	0843	1	5	25	0828	2	4	29	0748	1-	5
6	1230	1-	5	21	0030	1+	5	25	0911	1-	5	29	1538	2+	5
6	1719	2	5	21	0801	1-	5	25	1231	1-	5	30	0919	1	5
6	1742	1+	5	21	1301	1-	5	25	1243	1-	5	30	1200	1-	5
6	2045	1+	5	22	0939	1-	5	25	1414	1-	5	30	1323	1-	5
6	2245	1+	5	22	1114	1	5	25	1451	1-	5	30	1535	2	5
7	0214	1-	5	22	1616	1-	5	25	1711	1	5	30	1610	2+	5
7	0829	1+	5	22	1648	1-	5	25	1751	1+	5	30	1710	2	5
7	1202	1	5	22	1724	1	5	25	2122	1-	5	30	1916	1	5
7	1720	1	5	23	0012	1-	5	26	0200	1-	5	30	2121	1-	5
7	1951	1-	5	23	0906	1-	5	26	0848	1-	5	31	1443	1-	5

**Analysts:** J. Ellerbe; S. Hansen; M. Hayden; J. Knight; A. Landry; R. Papp; C. Ranft; A. Stokes; M. Taylor; P. Taylor; L. Witkowski  
 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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