Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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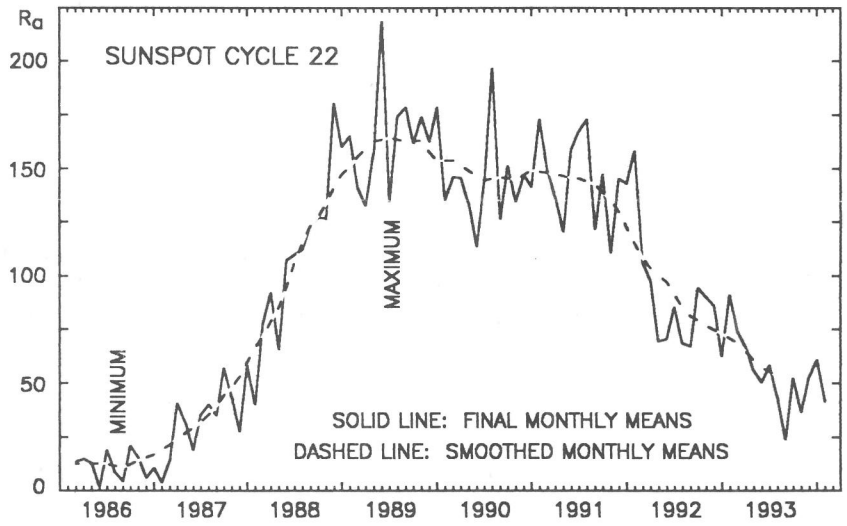
American Relative Sunspot Numbers for February

	R_a Final				
1)	33	11)	32	21)	17
2)	40	12)	39	22)	40
3)	43	13)	49	23)	41
4)	48	14)	44	24)	40
5)	47	15)	36	25)	37
6)	44	16)	41	26)	37
7)	49	17)	45	27)	46
8)	54	18)	43	28)	47
9)	48	19)	33		
10)	38	20)	21		

Mean: 40.4
Number of reports: 98



February Summary: Activity was low and very low during the first four days of February. A 17-degree filament departed the Sun's SW quadrant early on the 1st (see below). The geomagnetic field continued to be quiet to active; minor to major disturbance levels associated with a small coronal hole were recorded at high-latitude sites.

Solar activity in the low and very low range persisted between the 5th and 11th, but interest was centered on the geomagnetic field. A major disturbance began on the 6th with mid-latitudes at major storm levels and severe conditions at higher latitudes. A small (5%) Forbush decrease began on the 6th, and the GOES-6 spacecraft underwent two magnetopause crossings during the day. (The Forbush decrease returned to normal by late on the 7th.) Note that this disturbance was not directly linked to the return of the coronal hole which is suspected of involvement in the anomalous satellite charging events during January. Rather, the source is thought to be the filament which disappeared from the Sun on the 1st.

The mid-January coronal hole system did return at about this same time however, and is responsible for an additional bout of major to severe storm conditions later in the period. Levels of enhanced electrons (>2 MeV) similar to January's high-energy flow accompanied the reappearance of this system.

Low activity continued to be the rule from the 12th through 18th. The elevated level of enhanced electrons which began at the end of the first week of February continued, but declined briefly at the end of the period as the coronal hole rotated behind the Sun. During the week, Space Environment Services Center called attention to the uncharacteristically-long interval of daily mid-latitude A-indices (Fredricksburg) which exceeded a value of 20. Since 1957, similar-length strings have been recorded only twice: in late March 1984 during the decline of cycle 21, and in early June 1991. The February run of such values is the longest during this 37-year period. The coronal hole system described above is believed to be responsible for this activity.

February's first class M flare (M4.0/3B) erupted in NOAA/USAF Region 7671 (N11 L189, DAO) early on the 20th. In combination with the coincidental disappearance of a large nearby filament, this event significantly influenced the terrestrial environment for several days. A satellite proton event (>10 Mev) began within two hours of the flare, and reached a peak (10,000 p.f.u.) on the 21st - a few minutes after the arrival of the unusually fast-moving shock and plasma cloud from the flare/CME. This was the first proton event to be recorded since March 1993. Other phenomena associated with these events included a severe geomagnetic storm, multiple satellite magnetopause crossings, a (5%) Forbush decrease, and a total HF communications blackout along transpolar paths. As might be expected, numerous reports of auroral activity during the evening of 21/22 February were received from stations as low as latitude 41 degrees (Toledo, Ohio). Conditions abated during the latter portion of the 22nd, and returned to normal during the 23rd.

A class M2.8 flare without optical correlation occurred on the 27th, and several filaments disappeared during the last week of February. In spite of these events and those of recent weeks, solar activity remained centered in the low range.

However, it is evident that the Sun - and solar cycle 22 - continues to spawn interesting and exciting phenomena; some with potentially potent terrestrial implications. The Final Smoothed-Mean American Relative Sunspot Number for August 1993 is 52.5.

The mean estimated American Relative Sunspot Number for 1-14 March is 52. The recurrent coronal hole system discussed above returned at the end of the first week of March. A relatively long period of disturbed geomagnetic field conditions ensued, and daily >2 MeV electron fluence was elevated into the E+09 range for a number of days. No class M or greater intensity solar flares were recorded during the first half of March.

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

Offer to Reduce Solar Disk Drawings

We have received the following generous offer from Dr L.M. Dougherty, retired long-term Director of the British Astronomical Society - Solar Section:

'Would any AAVSO Solar Division observers like to have their solar disk drawings reduced on our *Graphics Tablet*[1]? These reductions would include the heliographic coordinates for each sunspot group. In addition, if a series of drawings extending over several months is submitted, a standard deviation can be derived. This information - in the form of a computer printout - would be available within 4-6 weeks, and the drawings returned. The BAA *Graphics Tablet* is standardized to a projected solar image diameter of 6-inches, but other diameters can be accommodated with some notice.' Interested parties should contact Dr Dougherty directly (Dog Hill Farm, Barkisland, West Yorkshire HX4 0ES, England).

1. Dougherty, L.M., et al. 1986, J. Br. Astron. Assoc., **96**, 2, p88.

Sudden Ionospheric Disturbances (SES) Recorded During January 1994

Records were received from A9,40,50,59,61,62,63,65,66,67,68,69,70,71,72,73,74,75,76,77,78,80,81,82

Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	De
1	1227	1-	5	7	0040	1-	5	19	0828	1-	5	26	2120	1-	5
1	1259	1-	5	7	0943	1+	5	19	1145	1+	5	27	1350	1	5
1	1557	2	5	7	1131	2	5	19	1345	1-	5	27	1422	1	5
1	1743	2+	5	7	1236	1	5	19	2346	2	5	27	1500	1	5
2	0831	1	5	7	1823	2	5	24	1313	1-	5	27	1609	1-	5
2	1407	1-	5	8	2243	1	5	24	2109	1+	5	27	1631	1	5
2	1511	1-	5	9	1541	1	5	25	1356	1-	5	27	2004	1-	5
2	1952	2	5	9	1626	1+	5	25	1423	1-	5	27	2106	1-	5
4	0745	1+	5	9	2255	2+	5	25	1447	1-	5	27	2143	1-	5
5	0652	2+	5	10	0335	1+	5	25	1604	1-	5	28	0900	1-	5
5	1025	1-	5	12	1411	1	5	25	1643	1	5	28	0916	1-	5
5	1316	1-	5	13	0339	1-	5	25	1814	1-	5	28	1131	1	5
5	1410	1	5	13	1823	1-	5	25	1832	2+	5	28	1549	1+	5
5	1453	1-	5	14	1611	1	5	25	2044	1-	5	28	1625	1-	5
5	1532	1-	5	15	0818	1	5	25	2158	1	5	28	1632	1+	5
5	1547	1	5	15	1435	1-	5	26	1012	1-	5	28	1826	1-	5
5	1633	1-	5	15	1613	1-	5	26	1140	1	5	28	1835	1-	5
5	1801	1-	5	15	1809	1-	5	26	1349	2	5	28	1851	1	5
5	1822	1-	5	16	2321	2	5	26	1607	1-	5	28	1948	1-	5
5	1845	1-	5	17	0039	1-	5	26	1621	1	5	29	0736	1-	5
5	1947	1-	5	17	0722	1+	5	26	1632	1-	5	29	0830	1	5
6	0758	1	5	17	0916	1-	5	26	1643	1-	5	29	0905	2	5
6	1010	1	5	17	1901	1-	5	26	1651	1-	5	29	1113	1-	5
6	1238	1	5	18	1109	1-	5	26	1721	1-	5	29	1129	2	5
6	1432	1	5	19	0620	1-	5	26	1853	1-	5	29	1305	2	5
6	1701	1-	5	19	0631	1-	5	26	2025	1-	5	29	1510	2+	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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