

Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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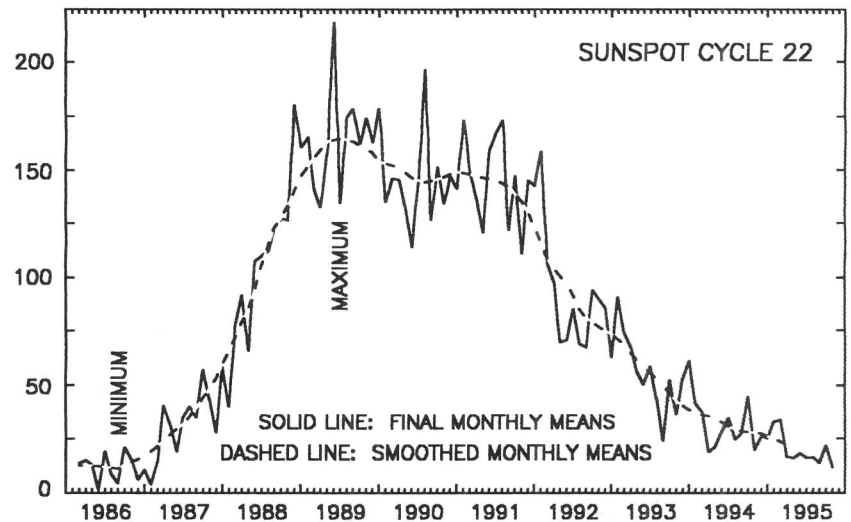
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American Relative Sunspot Numbers for November

		R _a Final			
1)	0	11)	10	21)	10
2)	7	12)	10	22)	10
3)	0	13)	10	23)	8
4)	8	14)	10	24)	0
5)	0	15)	24	25)	0
6)	9	16)	30	26)	0
7)	9	17)	37	27)	6
8)	11	18)	26	28)	10
9)	11	19)	11	29)	12
10)	15	20)	11	30)	14

Mean: 10.6
Number of reports: 94



November Summary: Solar activity was very low during the first eight days of November. The geomagnetic field varied between quiet and minor storm levels (major at high latitudes), and the daily > 2 MeV electron fluence was mostly in the moderate-to-high range.

With the sole exception of the 10th when a optically-uncorrelated class C2 flare pushed activity into the low range, solar activity continued to be very low during the following seven days. Noteworthy events were limited to a 14-degree filament which disappeared from the Sun's SE quadrant on the 15th. The > 2 MeV electron fluence was moderate for several days prior to mid-month, and normal thereafter. The geomagnetic field was quiet to unsettled.

The first sunspot group to appear in the Sun's Northern Hemisphere since October 30th -- NOAA/USAF Region 7926 (N07, L010, CAO) -- was observed beginning on November 16th. Region 7926 (reverse polarity for Cycle 22 with some mixed polarities), produced a C8/SF late on the 16th with material ejected outward to at least 0.18 solar radii. This complex, and a small bipole that emerged later in the month and eventually grew into a type-D group, were the only spotted regions to appear in the Northern Hemisphere during November.

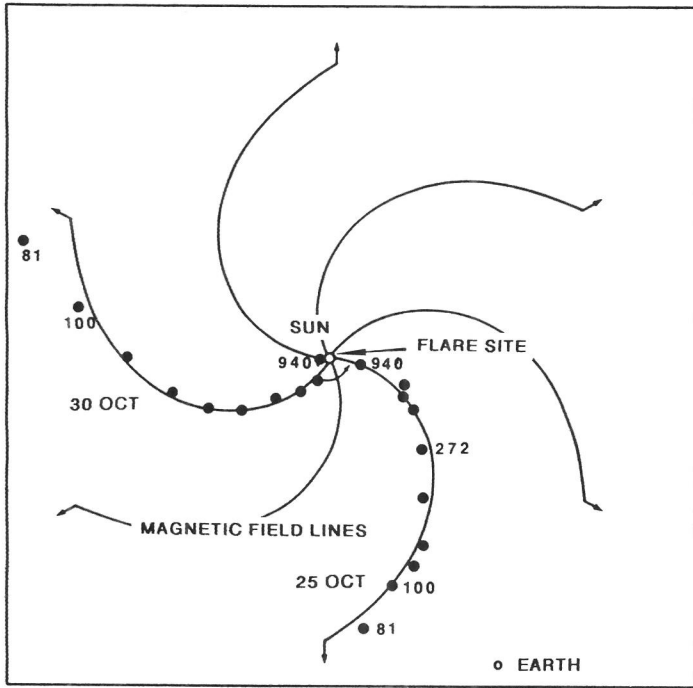
Activity continued at a very low level between the 17th and 23rd. Brief periods of minor storm conditions occurred at the beginning of the interval, but otherwise the geomagnetic field was mainly in the quiet to unsettled disturbance range. The daily > 2 MeV electron fluence was normal.

The final week of November saw a continuation of the now-familiar trend of very low daily activity levels. The geomagnetic field was mostly quiet with the exception of a brief period of major storm conditions (severe at some high-latitude sites) around midday on the 27th, and scattered minor storming thereafter. The former disturbance is attributed to a recurrent coronal hole. The > 2 MeV electron fluence was normal for most of the period, then rose slightly on the 29th. The smoothed mean American Relative Sunspot Number for May 1995 is 19.8.

The mean estimated American Relative Sunspot Number for 1-14 December is 12. Solar activity was very low during the first two weeks of December. A weak solar flare with faint parallel ribbons on the 2nd may have been accompanied by material ejection. Otherwise, noteworthy events were limited to a 13-degree filament which disappeared from the Sun's NW hemisphere early on the 4th, and a second which erupted on the 9th/10th in the Southern Hemisphere just east of the central meridian. The geomagnetic field was mostly quiet or unsettled, with a short-lived disturbance on the 1st and 2nd -- possibly due to solar transient -- and a few brief periods of minor storm conditions on the 4th. The > 2 MeV electron fluence was normal.

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

Ulysses Verifies the Shape of the Solar Interplanetary Magnetic field



After a journey of more than 3 million, million kilometers, the Ulysses spacecraft has now completed the first observational flight over the Sun's polar regions. This extraordinarily successful mission has provided astronomers and other researchers with a vast store of information about the forces and phenomena at work in previously unexplored high-latitude regions. One of the more intriguing findings came from a clever radio-based experiment designed to obtain information about the shape of the solar interplanetary magnetic field.

Energetic solar phenomena such as solar flares inject huge numbers of highly energetic, high-temperature, electrons into the interplanetary medium. As they propagate outward, these particles follow the Sun's extended magnetic field structure, interacting with the slower solar wind plasma and generating radio emissions along the way. Since these emissions are in part based on solar wind density -- which falls as distance from the Sun increases -- the signals vary in frequency from several hundred MHz near the Sun to about 50 kHz near the orbit of the Earth. The radio manifestation of such interactions can be observed as a moving Type III radio burst.

The instrumentation carried aboard Ulysses includes a sensitive 76-channel radio receiver coupled to both dipole and monopole antennas; a configuration which allows frequencies

between 1 and 940 kHz to be observed. Furthermore, the experiment was designed to determine the direction of arrival of the radiation from modulation measurements. Thus, observations permit tracking of the bursts through interplanetary space. The speed of the exciter electrons -- typically between 0.1 and 0.3 the speed of light -- causes the radio emission to occur at progressively later times. It takes about 20 minutes for the particles to travel from Sun to Earth.

The shape of the solar interplanetary magnetic field has long been thought to be in the form of an 'Archimedean Spiral' (see diagram), a distinctive pattern of field lines that results from the rotation of the Sun. For an observer on the Earth, the solar coronal plasma appears to expand outward radially, while the field lines form spirals with footprints anchored to the Sun itself. Deviations from the precise spiral path result primarily from kinks spawned by variations in solar wind speed.

As Ulysses passed over the Sun's southern polar regions on October 25th, 1994, a medium-intensity, but long-duration solar flare accompanied by material ejection and radio emission erupted in NOAA/USAF Region 7792, a rather unspectacular sunspot group in the Southern Hemisphere.

Because the entire radio emission trajectory which resulted from this activity was visible to the high-flying Ulysses spacecraft, the entire path of radio bright spots (diagram numbers indicate frequency in kiloHertz) could be measured in less than one-hour. A second series of radio burst observations, this time without an obvious source, was undertaken five days later. Thus, each of these unique observational runs provided near instantaneous views of the spiral form of the interplanetary field. Michael Boschat, Nova Scotia, Canada, supplied the NASA illustration from which the diagram was prepared.

[Reference: Reiner, Fainberg and Stone, 1995, *Science*, Volume 270, 20 October 1995.]

Sudden Ionospheric Disturbances (SES) Recorded During October 1995

Records were received from A5,9,40,50,61,62,63,65,68,69,70,71,72,73,74,75,76,77,78,80,81,82,83,84,85

Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	Def	Day	Max	Imp	De
10	1641	1-	5	12	1414	1	5	13	1520	1+	5	14	1927	1	5
11	0606	1	5	12	1722	2	5	13	2215	1-	5	15	1215	1-	5
11	0844	1-	5	12	1828	1-	4	14	0924	1-	5	17	1723	1-	5
11	1334	1-	5	13	0100	1-	5	14	0953	1	5	19	2028	1-	4
11	1943	2	5	13	0921	1-	5	14	1235	1-	5	20	0600	2+	4
12	0604	2	5	13	1301	1-	5	14	1407	1+	5	21	1523	1	5
								14	1725	1-	5	24	1320	2	5

Analysts: J. Ellerbe; S. Hansen; M. Hayden; P. King; A. Landry; R. Papp; G. Rosenberg; A. Stokes; M. Taylor; P. Taylor; L. Witkowski
 Frequencies recorded (kHz): 16.8; 18.3; 19.6; 20.3; 21.4; 23.4; 24.0; 24.8; 30.6; 48.5; 51.6.