

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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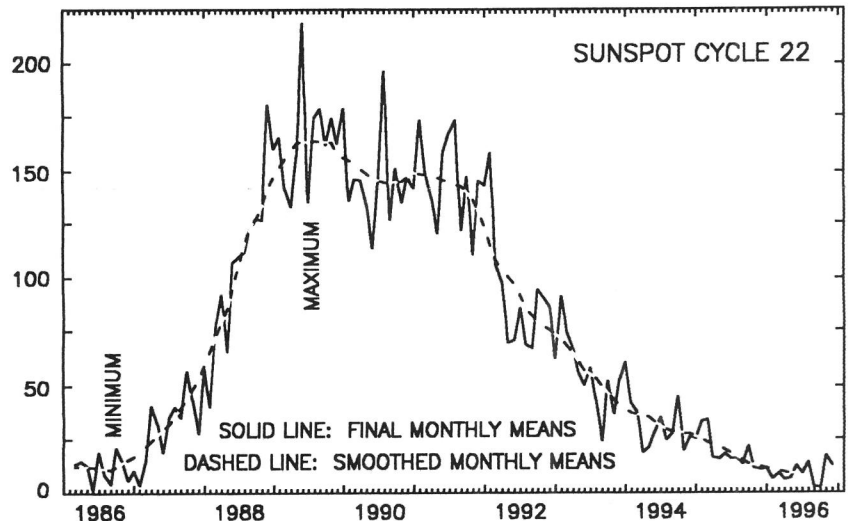
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## American Relative Sunspot Numbers for December

	R <sub>a</sub> Final				
1)	23	11)	23	21)	25
2)	11	12)	24	22)	20
3)	0	13)	26	23)	15
4)	0	14)	26	24)	8
5)	0	15)	25	25)	0
6)	0	16)	17	26)	0
7)	3	17)	24	27)	0
8)	15	18)	24	28)	0
9)	20	19)	17	29)	0
10)	15	20)	12	30)	0
			31)	0	
Mean: 12.0					
Number of reports: 90					



**December Summary:** Solar activity was low during the first three days of December as NOAA/USAF Region 7999 (S03, L171, EKI) continued to produce class-C flares while rotating around the Sun's western limb. The activity level dropped to very low during the next two days, and the visible hemisphere became spotless. The geomagnetic field was mostly in the quiet to unsettled range, while the >2 MeV electron fluence was normal.

Activity was mainly very low between the 6th and 12th. New cycle Region 8003 (S30, L354, CAO) emerged on the 7th and grew slowly during the period, while producing some lower-level flares. (See page two for more information on the next solar cycle.) The geomagnetic field was quiet to active; the latter conditions were attributed to coronal hole activity. The >2 MeV electron fluence was normal, rising a bit at week's end.

Very low activity continued to be the rule from the 13th through 19th, with the single exception of the 16th when an optically uncorrelated class-C2 flare was recorded, and the 19th when two long duration X-ray enhancements occurred. The second of these events (class-C intensity) was associated with spotless Region 8005 (S13, L234). A small filament also disappeared from the Sun's western hemisphere near the equator on the 19th. The geomagnetic field was quiet to unsettled.

With the exception of the 24th when an optically uncorrelated class C2.1 flare accompanied by a Type II radio burst occurred, solar activity was very low between the 20th and 26th. Other events of interest during the period included the eruption of a small filament near plage Region 8005 late on the 23rd. The geomagnetic field was mostly quiet, although minor storm levels were recorded during a brief interval early on the 23rd. The >2 MeV electron fluence -- moderate at the beginning of the week -- gradually declined to normal.

Little noteworthy activity occurred during the remainder of December. The Sun's visible hemisphere was spotless from the 25th on, and the geomagnetic field was quiet with a few periods of unsettled conditions. The smoothed monthly-mean American Relative Sunspot Number for June 1996 rose to a value of 8.3.

The estimated American Relative Sunspot Number for 1-14 January 1997 is 4.

[A Portion of the above information was obtained from Space Environment Center]

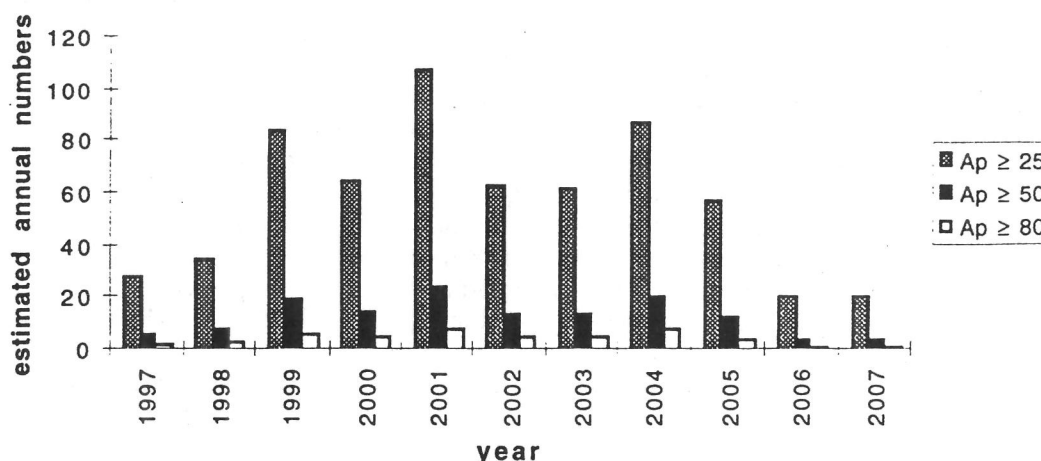
### A Preliminary Look at the Coming Solar Cycle (23)

Recently, a panel consisting of twelve scientists (including representatives from Australia, Germany, the United Kingdom and the United States) was convened in Boulder, Colorado, at the instigation of the *NOAA Space Environment Center*. The panel (the "Solar Cycle 23 Project") was recruited to access prediction techniques and arrive at a reasoned consensus on how the next solar cycle will develop. The following tables, diagram and conclusions represent a portion of their more interesting findings.

Technique	low end of range	maximum	high end of range
Even/Odd behavior	165	200	235
Precursor	140	160	180
Spectral	135	155	185
Recent Climatology	125	155	185
Neural Networks	110	140	170
Climatology (all)	75	115	155

Consensus prediction

Parameter	low end of range	maximum	high end of range
Smoothed Monthly Sunspot Number	130	160	190
Smoothed Monthly 10.7 cm Solar Flux	175	205	235



Precursor method estimates of geomagnetic activity during Cycle 23.

After examining a number of methodologies used for predicting solar and geomagnetic activity in Cycle 23, the panel found that a reasonable consensus is for a large solar cycle with a smoothed sunspot maximum of 160. This is comparable with the last two cycles, but is not expected to exceed Cycle 19, the largest cycle on record. While the month of Solar Cycle 22 minimum is yet to be determined, recent low levels of activity imply that minimum is at hand and will occur between May and December 1996. If so, Solar Cycle 23 will most likely peak in early 2000. Likewise, geomagnetic activity during the cycle is expected to be comparable to that experienced in recent cycles, resulting in annual average levels among the highest in the 128-year aa-index record of such activity. The probability for severe geomagnetic storms will be the greatest during an extended period lasting from 1999 through 2005.

**NOTE:** The monthly list of *Sudden Ionospheric Disturbances* will resume next issue.