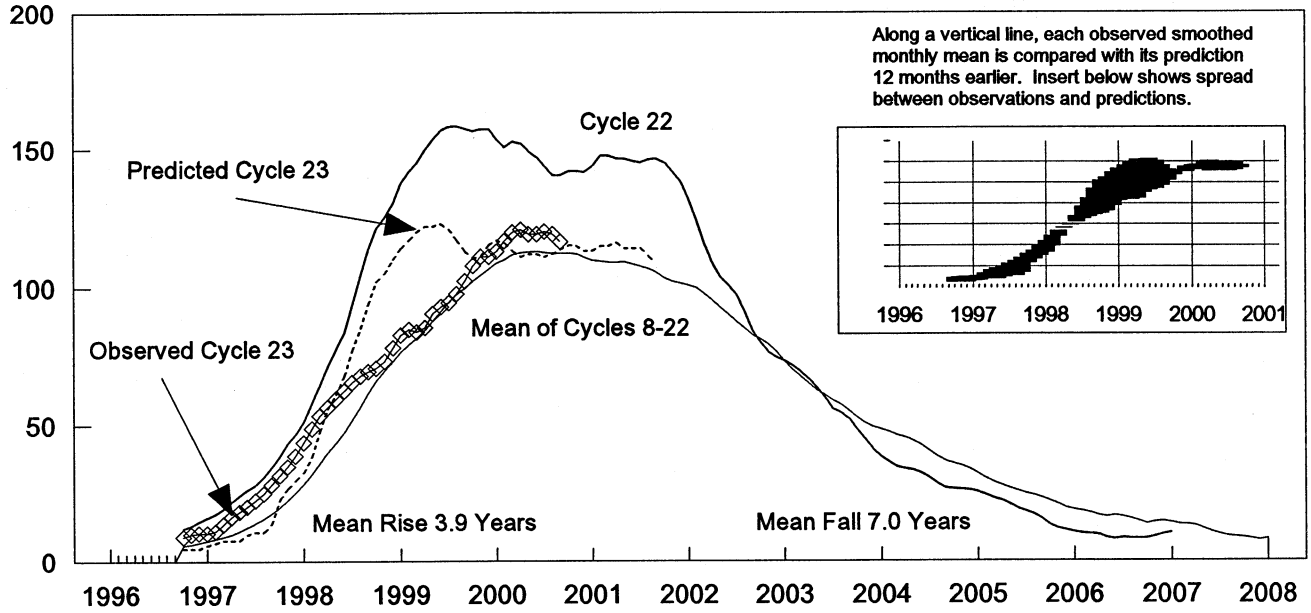
# Cycle 23 Smoothed Sunspot Numbers: Observed and Predicted




**Smoothed Sunspot Numbers (observed and Predicted) for Parts of Solar Cycles 22 and 23**

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Avg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1993 | 71 | 69 | 67 | 64 | 60 | 56 | 55 | 52 | 48 | 45 | 41 | 38 | 56 |
| 1994 | 37 | 35 | 34 | 34 | 33 | 31 | 29 | 27 | 27 | 27 | 26 | 26 | 31 |
| 1995 | 24 | 23 | 22 | 21 | 19 | 18 | 17 | 15 | 13 | 12 | 11 | 11 | 17 |
| 1996 | 10 | 10 | 10 | 9 | 8* | 9 | 8 | 8 | 8 | 9** | 10 | 10 | 8 |
| 1997 | 11 | 11 | 14 | 17 | 18 | 20 | 23 | 25 | 28 | 32 | 35 | 39 | 23 |
| 1998 | 44 | 49 | 53 | 57 | 59 | 63 | 65 | 68 | 69 | 71 | 73 | 78 | 62 |
| 1999 | 83 | 85 | 84 | 85 | 90 | 93 | 94 | 98 | 102 | 108 | 111 | 111 | 95 |
| 2000 | 113 | 117 | 120 | 121 | 119 | 119 | 120 | 119 | 116 | 116 | 115 | 114 | 117 |
| | | | | | | | | | | (5) | (11) | (14) | (3) |
| 2001 | 114 | 114 | 114 | 113 | 113 | 112 | 111 | 110 | 109 | 108 | 107 | 106 | 111 |
| | (16) | (18) | (20) | (23) | (26) | (26) | (25) | (26) | (28) | (29) | (28) | (28) | (24) |

Solar Cycle 22 | Solar Cycle 23 | Min, Max, and Predictions

*** May 1996 marks Cycle 22's mathematical minimum. ** October 1996 marks the consensus minimum NGDC is now using.**

**Observed and Predicted Numbers.** For the end of Cycle 22, and the rise and decline of Cycle 23, the table above lists observed smoothed sunspot numbers up to the one that includes the most recent monthly mean. We based these smoothed values on final monthly means through Sep 2000 and on provisional numbers thereafter. Table entries with numbers in parentheses below them denote predictions by the McNish-Lincoln method. (See page 9 in the Jul 1987 supplement to *Solar-Geophysical Data.*) Adding the number in parentheses to the predicted value generates the upper limit of the 90% confidence interval. Subtracting the number from the predicted value generates the lower limit. Consider, for example, the September 2001 prediction. There exists a 90% chance that in September 2001, the actual smoothed number will fall somewhere between 81 and 137.

**Points to Ponder.** The McNish-Lincoln prediction method generates useful estimates of smoothed, monthly mean sunspot numbers for no more than 12 months ahead. Beyond 12 months, the predictions regress toward the mean of all 15 cycles of observations used in the computation. Moreover, the method remains very sensitive to the date defining the onset of the current cycle, that is, to the date of the most recent sunspot minimum. The new cycle predictions tabulated above are based on the consensus minimum value of 8.8 that occurred in October 1996.

**Note: Please visit http://www.sec.noaa.gov for solar minimum and Cycle 23 discussions.**