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FEATURE

## What's Wrong with the Sun? (Nothing)

07.11.2008

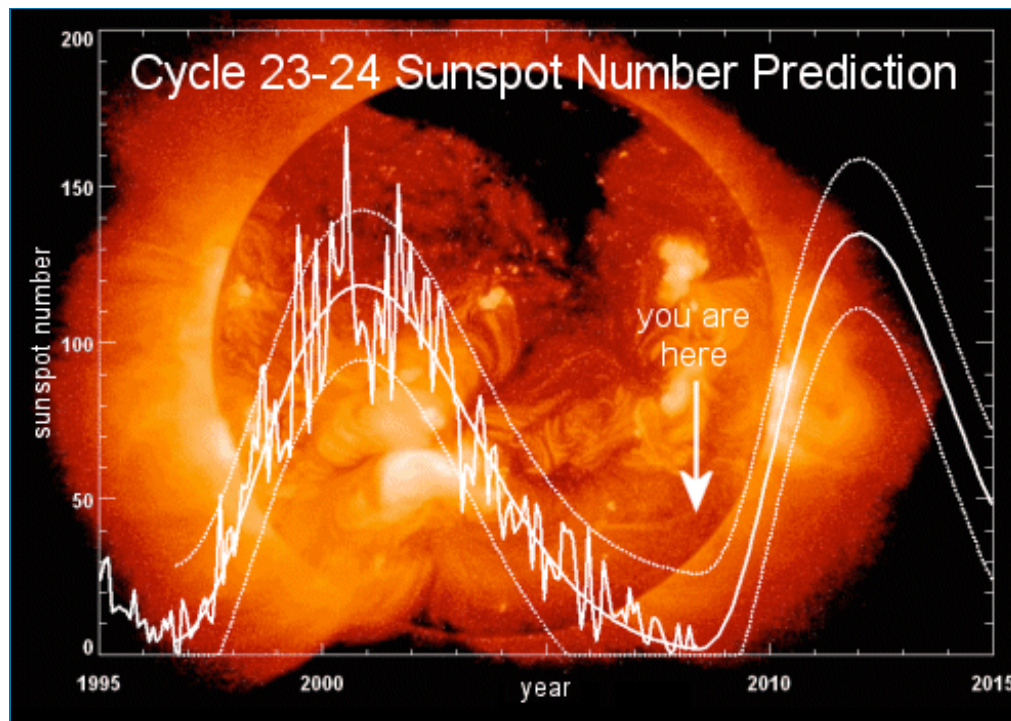
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**July 11, 2008:** Stop the presses! The sun is behaving normally.

So says NASA solar physicist David Hathaway. "There have been some reports lately that Solar Minimum is lasting longer than it should. That's not true. The ongoing lull in sunspot number is well within historic norms for the solar cycle."

This report, that there's nothing to report, is newsworthy because of a growing buzz in lay and academic circles that something is wrong with the sun. *Sun Goes Longer Than Normal Without Producing Sunspots* declared one recent press release. A careful look at the data, however, suggests otherwise.

But first, a status report: "The sun is now near the low point of its 11-year activity cycle," says Hathaway. "We call this 'Solar Minimum.' It is the period of quiet that separates one Solar Max from another."



**Above:** The solar cycle, 1995-2015. The "noisy" curve traces measured sunspot numbers; the smoothed curves are predictions. Credit: D. Hathaway/NASA/MSFC. [[more](#)]

During Solar Max, huge sunspots and intense solar flares are a daily occurrence. Auroras

appear in Florida. Radiation storms knock out satellites. Radio blackouts frustrate hams. The last such episode took place in the years around 2000-2001.

During Solar Minimum, the opposite occurs. Solar flares are almost non-existent while whole weeks go by without a single, tiny sunspot to break the monotony of the blank sun. This is what we are experiencing now.

Although minima are a normal aspect of the solar cycle, some observers are questioning the *length* of the ongoing minimum, now slogging through its 3rd year.

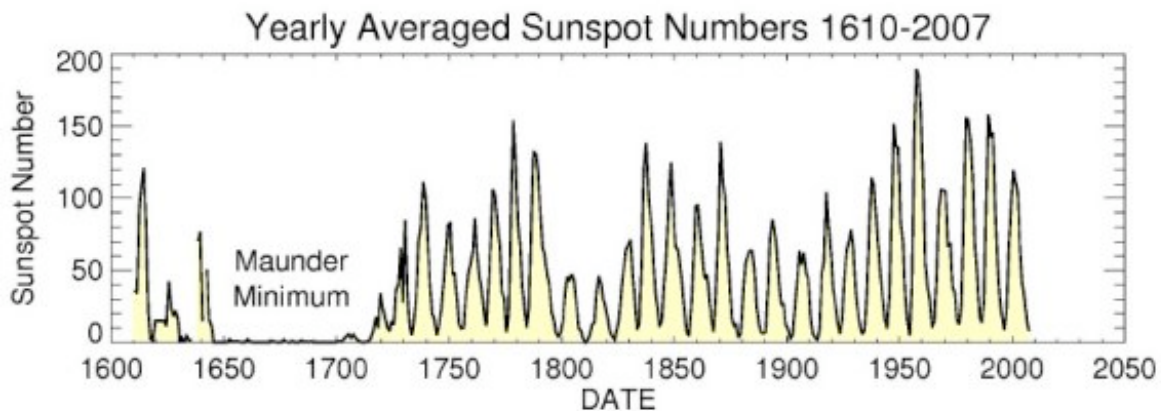
"It does seem like it's taking a long time," allows Hathaway, "but I think we're just forgetting how long a solar minimum can last." In the early 20th century there were periods of quiet lasting almost twice as long as the current spell. (See the [end notes](#) for an example.) Most researchers weren't even born then.



Hathaway has studied international sunspot counts stretching all the way back to 1749 and he offers these statistics: "The average period of a solar cycle is 131 months with a standard deviation of 14 months. Decaying solar cycle 23 (the one we are experiencing now) has so far lasted 142 months--well within the first standard deviation and thus not at all abnormal. The last available 13-month smoothed sunspot number was 5.70. This is bigger than 12 of the last 23 solar minimum values."

In summary, "the current minimum is not abnormally low or long."

The longest minimum on record, the Maunder Minimum of 1645-1715, lasted an incredible 70 years. Sunspots were rarely observed and the solar cycle seemed to have broken down completely. The period of quiet coincided with the Little Ice Age, a series of extraordinarily bitter winters in Earth's northern hemisphere. Many researchers are convinced that low solar activity, acting in concert with increased volcanism and possible changes in ocean current patterns, played a role in that 17th century cooling.



For reasons no one understands, the sunspot cycle revived itself in the early 18th century and has carried on since with the familiar 11-year period. Because solar physicists do not understand what triggered the Maunder Minimum or exactly how it influenced Earth's climate, they are always on the look-out for signs that it might be happening again.

The quiet of 2008 is not the second coming of the Maunder Minimum, believes Hathaway. "We have already observed a few sunspots from the next solar cycle," he says. (See [Solar Cycle 24 Begins](#).) "This suggests the solar cycle is progressing normally."

What's next? Hathaway anticipates more spotless days<sup>1</sup>, maybe even hundreds, followed by a return to Solar Max conditions in the years around 2012.

Stay tuned to Science@NASA for updates.

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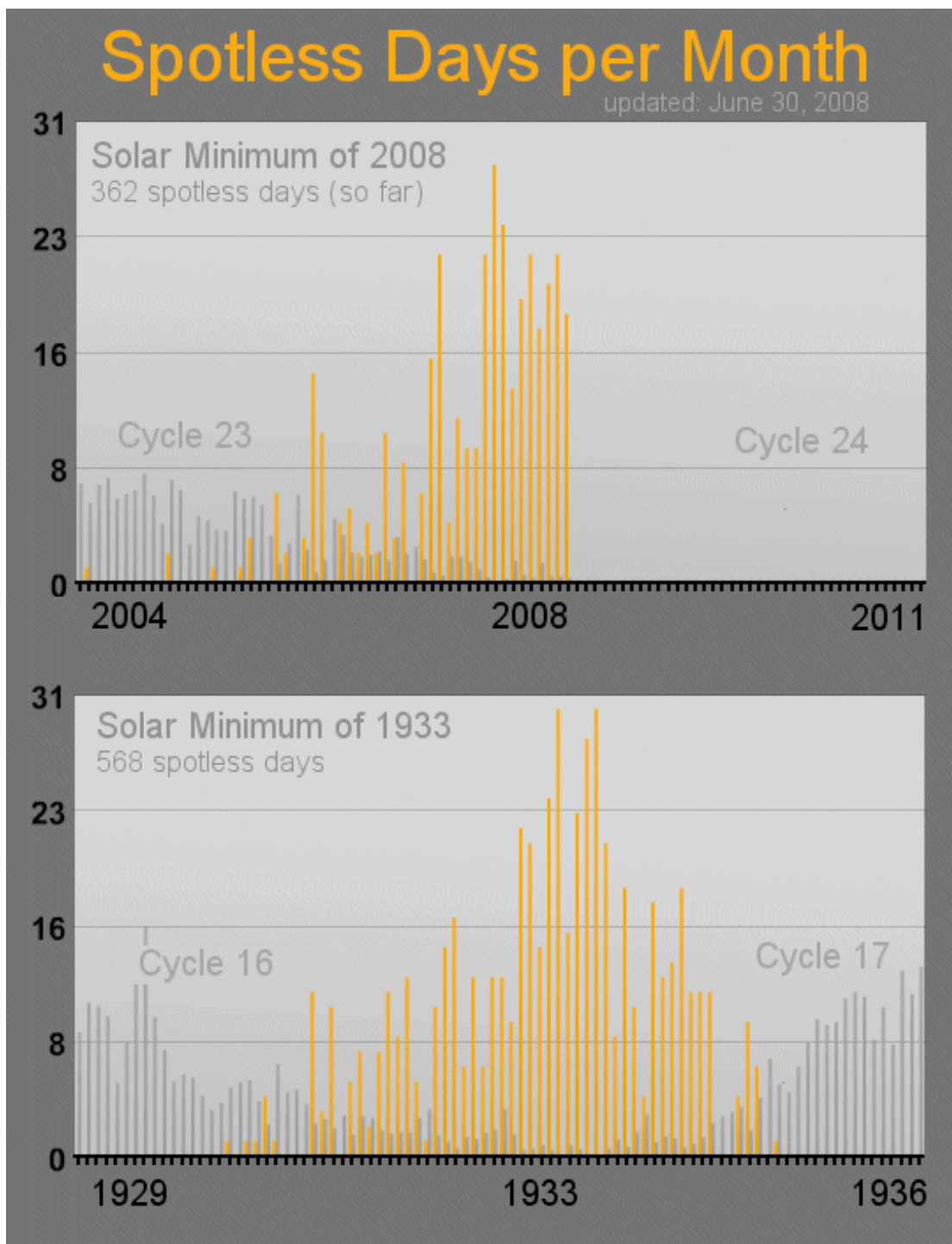
Author: [Dr. Tony Phillips](#) | Credit: [Science@NASA](#)

### more information: Spotless Days

<sup>1</sup>Another way to examine the length and depth of a solar minimum is by counting spotless days. A "spotless day" is a day with no sunspots. Spotless days never happen during Solar Max but they are the "meat and potatoes" of solar minima.

Adding up every daily blank sun for the past three years, we find that the current solar minimum has had 362 spotless days (as of June 30, 2008). Compare that value to the total spotless days of the previous ten solar minima: 309, 273, 272, 227, 446, 269, 568, 534, ~1019 and ~931. The current count of 362 spotless days is not even close to the longest.

The plot below compares the Solar Minimum of 2008 to a longer one in 1933:



Orange bars represent the number of spotless days per month. The ongoing solar minimum needs to accumulate another 206 spotless days before it matches the duration of the 1933 minimum, which is considered unremarkable by solar historians.

What does a spotless day look like? The Solar and Heliospheric Observatory (SOHO) recorded this blank sun on July 1, 2008:



[Click here](#) for a Solar Max comparison.

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Curator: [Bryan Walls](#)  
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