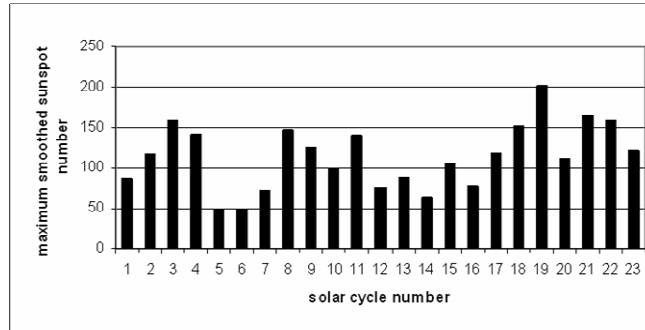


Grand Solar Minima

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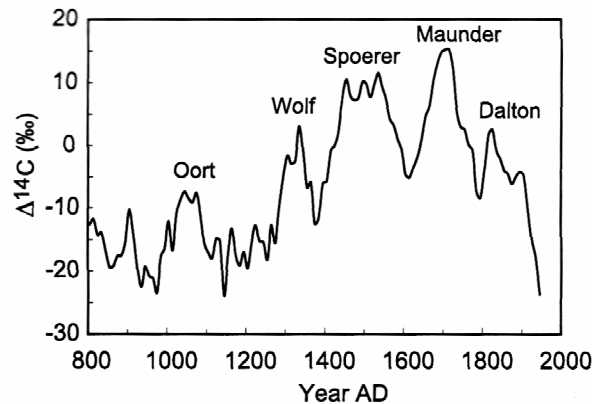
In the December 19 issue of QRZ DX (2007-50), the propagation attachment reported that no sunspots from the new Cycle 24 had occurred yet. The good news is on January 4, 2008 Active Region 981 rotated into view, and the first sunspot of Cycle 24 occurred (it was at high solar latitude and of the opposite magnetic polarity compared to Cycle 23 sunspots). While we wait for Cycle 24 to ramp up (it may take a while), let's review extended periods of low solar activity – also known as grand solar minima. The following plot of all twenty three solar cycles shows one such grand solar minimum.



It's the period including Cycles 5, 6, and 7 (from about 1798 to 1893) and is officially known as the Dalton Minimum. There's another extended period of low solar activity comprised of Cycles 12 through 16 (from about 1878 to 1933), but I'm not aware of any specific name for this period.

Have there been any extended periods of low solar activity prior to the Dalton Minimum? Yes. But since sunspot records aren't very good prior to the mid 1700s, we need a proxy to infer solar activity. That proxy is cosmogenic nuclides. The most common nuclides are carbon-14 in tree rings and beryllium-10 in ice cores. These nuclides are lowest when solar activity is intense and highest when solar activity is weak.

The following plot is from Miyahara, et al (*Variation of solar cyclicity during the Spörer Minimum*, **Journal of Geophysical Research**, Vol 111, A03103, March 2006). It plots the change in carbon-14.



There have been other extended periods of low solar activity – and on a somewhat regular basis. The one that we've most likely heard of is the Maunder Minimum from about 1645 to 1715. Of all the data on the plot, it appears to have been the period with the lowest solar activity (since the carbon-14 data is highest).

The data presented strongly suggest that we will again see an extended period of low solar activity. When will that start? I believe the consensus among scientists will be Cycle 25. Hopefully it won't be Cycle 24.