



The Phase of the Solar Cycle as a Harbinger of Solar Activity

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In 2009, as Solar Cycle 23 wound down and as an apparently delayed onset of Solar Cycle 24 approached, B.J.I. Bromage (SOHO 33 Workshop, 2009) pointed out that the solar cycle had a variable period that averaged to 11.1 years over the very long term, but that there was a shorter term variation in the phase of solar cycle so that solar minimum occurred earlier and earlier until, in one fell swoop, it returned to the phase expected from the average period and the original phase. It accomplished this with one extra long solar cycle. A very striking example of this behavior occurred in 1798, immediately before the Dalton minimum, which did not recover for two full solar cycles. The solar cycle phase then remained fairly constant until 1987, when it developed a close-to-three-year phase lead over the long-term trend, similar to the phase lead just prior to the onset of the Dalton minimum. If there is linkage between solar activity and the phase lead of the current cycle ahead of the long-term average, then our best estimate is that in the 21st century, we will repeat the behavior of the Dalton minimum at the beginning of the 19th century.