Geophysical Research Abstracts
Vol. 13, EGU2011-6113-2, 2011
EGU General Assembly 2011

Properties of solar activity derived from cosmogenic radionuclides

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Understanding the Sun's magnetic activity is important, among other reasons, because of its impact on the Earth's environment. The sunspot record since 1610 shows cycles of magnetic activity with an irregular distribution of amplitudes and with a periodicity around 11 years; they are modulated on longer timescales and were interrupted by the Maunder minimum in the 17th century.

During the past several cycles the average activity was very high. This raises the question whether the present period of high solar activity is likely to terminate soon or even to be followed by another (Maunder-like) grand minimum.

Using cosmogenic radionuclides such as 10Be in ice cores, changes in the open magnetic field of the Sun can be traced back many thousand of years providing unprecedented information about the history of solar activity. The record of solar activity derived from 10Be can provide a number of constrains for solar dynamo models as well as helping answer questions related to solar activity.
A detailed statistical analysis of the cosmogenic record allows us to demonstrate that the recent period of high solar activity is indeed coming to an end. Frequency analysis of the solar modulation potential reveals the presence of significant periodicities, namely around 2200 years (Hallstatt), 980 y (Eddy), 208 y (de Vries) and 90 y (Gleissberg.)

Using these results, the main properties of the solar activity for the past 10,000 years will be discussed.