Natural Radio

News, Comments and Letters About Natural Radio

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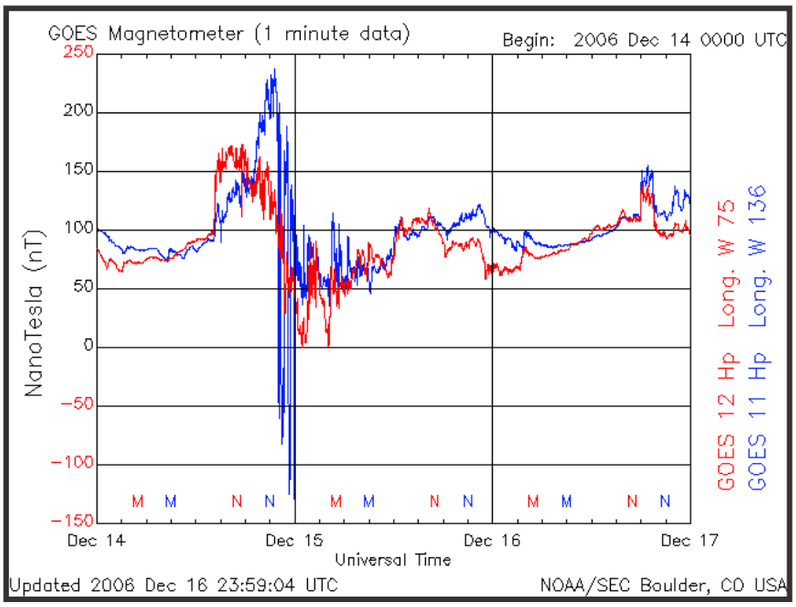
A pleasant surprise was the return of an active sunspot and an X3 flare that produced considerable geomagnetic activity.



The flare produced a CME that hit the earth on the evening of December 15. I began looking for auroral activity about 7 pm local time (0100 UTC) and was able to observe a bit of aurora low in the sky.

A couple of time there were upward green streamers and it looked like activity was going to really take off, but the lights faded each time, completely fading out by about 9 pm. Although the aurora was less then spectacular I did see 4 or 5 bright remnants of the Leonids meteor shower.

I went out about 9 AM on the morning of the 16 and was able to record some chorus, but nothing particularly remarkable.

Solar Max Predictions – Solar More and more of the prediction for the next Solar Cycle (Cycle 24) indicate that Solar Max will be very large. There was an article on December 21 at http://science.nasa.gov/headlines titled ***Scientists Predict Big Solar Cycle*** that talks about a new accurate method of predicting the next solar cycle.

It seems that there is a strong correlation between geomagnetic activity due to the solar wind and coronal holes and the intensity of the upcoming solar cycle. This geomagnetic activity tends to peak just ahead of solar minimum and the intensity of this peak tends to correlate well with the peak of the next solar cycle 6 or 7 years in the future.

This is explained in a more detailed paper by David H Hathaway and Robert M. Wilson at the NASA/National Space Science and Technology Center in Huntsville, AL, titled ***Geomagnetic Activity Indicates Large Amplitude for Sunspot Cycle 24***. (http://solarscience.msfc.nasa.gov/papers/hathadh/HathawayWilson2006-preprint.pdf)

The most widely used long-term geomagnetic index is the *aa* index. This index is produced from data gathered by two geomagnetic observatories at nearly antipodal positions on the earth's surface. The index is calculated from the weighted averages of

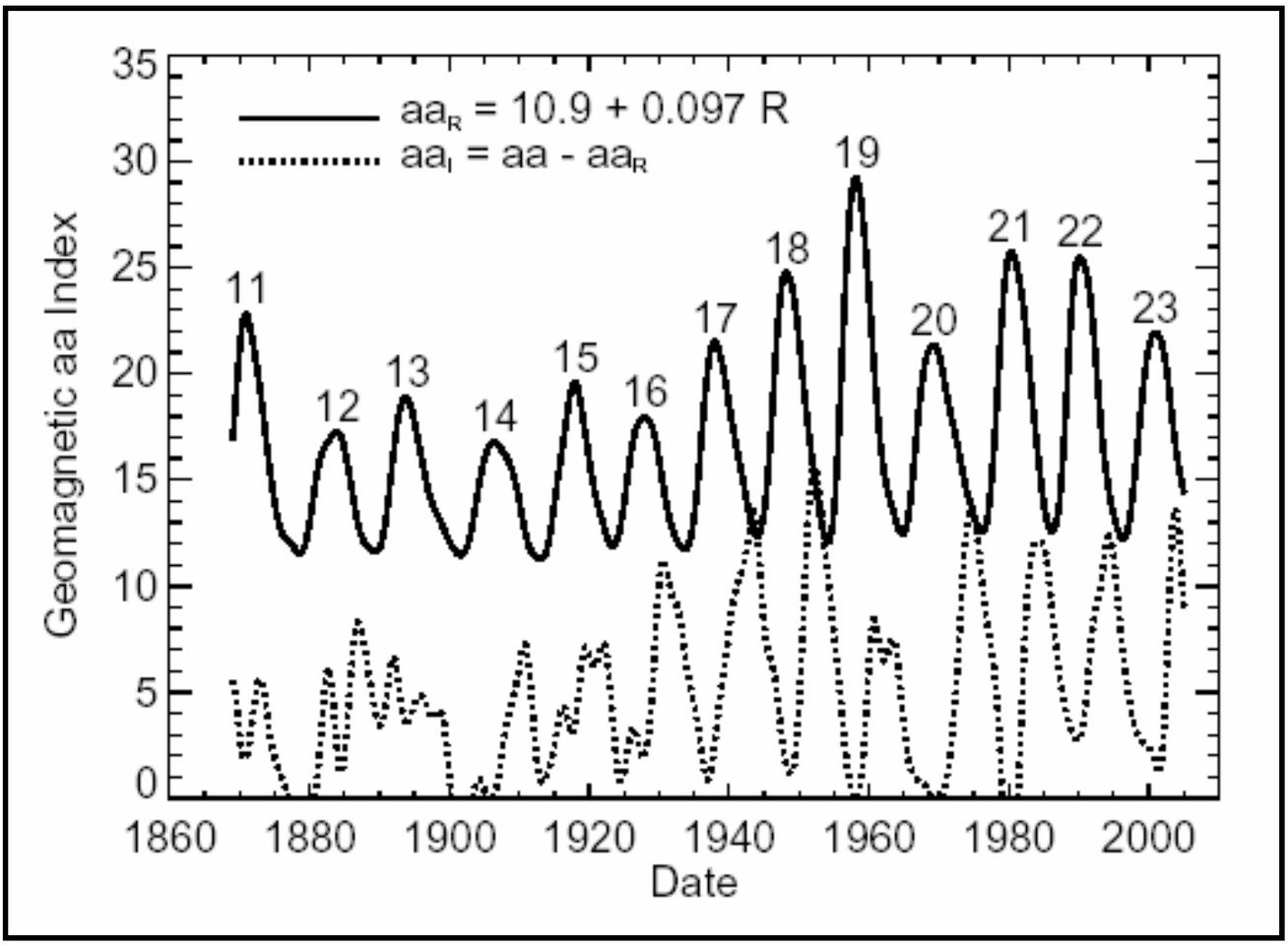
the amplitude of the magnetic field variations from the two observatories over three hour intervals.

Measurements of this index go back to 1868 and much work has been done recently to reconstruct these earlier measurements so that they correlate with the method of measurement in use today.

The **aa** index consists of two components:

> **aa_R** - the part of the magnetic field variation that is due to sunspot activity such as flares, filament eruptions and coronal mass ejections.
>
> **aa_I** - the part of the magnetic field variation that included non-sunspot related activity such as interplanetary shocks from high-speed solar wind streams due to coronal holes.

Scientists can calculate the **aa_R** component as it is proportional to the sunspot number. It is then subtracted from the measured **aa** index and the **aa_I** component is calculated. The chart below, taken from the aforementioned research paper, shows the two components plotted on the same axes.



As you can see by looking at the chart, the peak in **aa_I** activity occurs just before the solar minimum (since the **aa_R** component is proportional to sunspot number). You will also notice that the **aa_I** peaks end to correlate very well to the peak of the next sunspot cycle, making a prediction of 6 or 7 years ahead possible.