

# Natural Radio

*News, Comments and Letters About Natural Radio*

**January 2009**

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I am writing this several days before Christmas deep in all the chaos that goes along with the season. We will definitely be having a White Christmas in Northern Illinois as there are about 8 inches of snow on the ground with another 8 to 10 on the way. The current temperature is on the negative side of the scale.

But by the time you read this, we will be well on our way into 2009 and so I extend my best wishes to all of you and your families for a happy New Year. We probably have some more tough times ahead, but that can bring us back to the basic values of families and community and realize that our strength and happiness flows from those relationships more than whether the market went up or down. This is not to ignore that there is real suffering and loss out there, but people do come together in times of need to aid those that are hurting worst in these times.

It is tempting for writers to make predictions at this time of year, but I don't like being wrong so I'll point you to some stories that I think will have some impact on the Natural Radio community in 2009, so watch them and see what happens. They will definitely affect our understanding of Space Weather, and just might correlate to Natural Radio activity.

## *Stories to Watch in 2009 –*

**1. Sunspot Cycle 24.** Cycle 24 is probably the most watched and written about cycle since we have been studying sunspots. There has been much speculation about it in the scientific community and outright panic and fear-mongering in the popular press. I am looking at a blank Sun (via the web) as I write this, but there has been some slight glimmers of activity in the past few months, and scientists are still predicting an active cycle. (See item #3 below.) This should be the year that we begin to see a significant upswing in activity. Bets anyone?

**2. Magnetic Portals.** The Themis mission, which deployed a constellation of five identical satellites, was launched on February 17, 2007. According to NASA, "NASA's Time History of Events and Macroscale Interactions during Substorms (THEMIS) aims to resolve one of the oldest mysteries in space physics, namely to determine what physical process in near-Earth space initiates the violent eruptions of the aurora that occur during substorms in the Earth's magnetosphere."

In October of 2008, it was announced that periodically in the magnetosphere, magnetic portals open, linking Earth to the sun 93 million miles away. Large amounts of high-energy particles may flow through the opening before it closes. This phenomenon is called a flux transfer event or "FTE", and happens on the "dayside" of the Earth when

the Earth's and Sun's fields briefly merge or "reconnect," approximately every eight minutes. The portal looks like a magnetic cylinder about as wide as Earth.

**3. Cracks in the Magnetosphere.** Another Themis discovery announced in the past few weeks showed a large rift in the dayside magnetosphere that allowed massive amounts of solar wind to pour in. These cracks are more than four times wider than the earth and 7 diameters long. Even more amazing was that the reconnection that caused it happened with a northward Interplanetary Magnetic Field (IMF) which will cause a major rethinking of how the Earth and Sun interact.

These northward IMFs don't trigger geomagnetic storms but they load the magnetosphere up with plasma and prime it for a storm that can result when the CME hits.

CMEs in even numbered Solar Cycles, as is the current Cycle 24, tend to have a leading edge with northward magnetization. (This is related to the fact that the Sun's magnetic polarity flips with every Sunspot Cycle.) This kind of CME should rip open the magnetosphere and load it with plasma just before the storm gets underway – a perfect sequence for a massive storm event. Cycle 24 could be very interesting.

**4. The Earth Breathes in Sync With the Sun.** Another interesting discovery this year is that the Earth's outer atmosphere breathes in and out on a regular cycle of 9, 7 or 5 days. The outer atmosphere of the Earth expands as it is heated by the Solar Wind and contracts as the Solar Wind lessens.

Increases in the Solar Wind are often caused by coronal holes which tend to be evenly spaced across the sun. If there were three coronal holes, and since the Sun rotates approximately once every 27 days, we would have a stream from a Coronal Hole sweeping across Earth every 9 days. More coronal holes would cause a more frequent fluctuation. It would be interesting to see if any of these cycles could be related to whistlers or propagation.

**5. Science Returns with the New U.S. Administration.** After 8 years of an administration that was hostile or at best apathetic to science, it looks like the Obama administration is going to return science to its proper role in policy making.

The appointments of Jane Lubchenco as head of NOAA and Steven Chu as Secretary of Energy are a step in the right direction. Hopefully, this will avoid the debacle of several years ago when NOAA funding was severely cut back and the Space Weather Prediction Center was almost shut down. A replacement for the current FCC Chairman is not expected until next year.

But, there are still Congressional hurdles and with the economy in its current state, priorities change. Nevertheless, I am hopeful this will herald resurgence in R&D, more emphasis on science education and an effort to encourage science careers for our young people. It will be interesting to watch this new administration as the next four years unfold.