

Natural Radio

News, Comments and Letters About Natural Radio

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The weather in January and February was way too nasty for Natural Radio listening so I decided to do a few technology upgrades at the office. I spent way too many non-billable hours this month switching from a traditional phone system to a VOIP system with integrated data and cellular service. We now have a T1 line that is super fast and digital phones that can do just about everything.

The upgrade has been long overdue as our aging phone system was on it's last leg and probably wouldn't be serviceable if it ever quit. As usual, setup wasn't as smooth as it could have been, the phones and Internet connection worked right away, but it took about a week to get the cellular, email and websites working properly.

I am hoping the new technology pays for itself in increased efficiency. There was an immediate decrease in spam emails from about 200 per day to less than 50. That alone made it worth the effort. If you haven't looked into the new VOIP technology you may want to check it out. The phones plug right into the Ethernet network. Since each phone has its own IP address, I can unplug my phone from the office and plug it in to my network at home, and my office phone will ring there. My phone numbers, fax numbers and email addresses are the same as they have been.

I am looking at the opportunities this better service will provide for Natural Radio activities. More on this in the future.

THEMIS & Substorms – NASA's Themis mission was successfully launched on Saturday, February 17 from Cape Canaveral. The THEMIS mission, named after the Greek goddess of justice, wisdom and good counsel, uses 5 satellites with identical instrumentation that were deployed from a single launch vehicle. These 5 spacecraft have carefully chosen orbits whose apogees line up every 4 days over an array of geomagnetic observatories and whole-sky cameras in the Northern US and Canada.

Substorms are not well understood, and THEMIS will answer some fundamental questions about the nature of substorms. The primary objectives of the mission are to

1. Establish when and where substorms begin.
2. Determine how the individual components of the substorm interact.
3. Determine how substorms power the aurora, and
4. Identify how local current disruption mechanisms couple to the more global substorm phenomena.

After the primary mission is complete in the Spring of 2008, THEMIS will study the radiation belts and then move on to study how the solar wind interacts with the magnetosphere on the day side of the earth.

If you've ever observed the aurora, you may have seen the auroral band continue to brighten as it moves toward the South. Then, within a few minutes, the band of light break into many bands of light some of which will move back overhead and to the North, flashing rapidly and turning multiple colors – not unlike a fluorescent tube at the end of its life. This is a visual display of the beginning phases of an auroral substorm. I was fortunate to witness this kind of event in the early morning hours of November 8, 2004, after a large Earthward directed CME. (See the December, 2004 issue of *The Lowdown*.)

The interaction happens like this. The solar wind distorts the Earth's magnetic field. It is compressed on the day side and stretched far out into space on the night side forming what is called the geotail. Energy from the sun couples into the geotail, especially after earthward directed Coronal Mass Ejections. Occasionally this energy is released explosively in a substorm, in a similar manner to the violent release of energy during earthquakes.

Currently there are two competing theories of what triggers a substorm. We know that three events happen in a substorm -- Current disruption, Auroral eruption, which we can see, and magnetic reconnection. These events happen in quick succession and in a very thin plane so that there has been no conclusive evidence as whether the current disruption or magnetic reconnection is the triggering event. THEMIS will solve the controversy and give us more information on the workings of the magnetosphere and the sun-Earth connection.

Substorms are precursors to a full-scale geomagnetic storm, all of its propagation and communication disrupting events, along with the associated possible damage to satellites and the power grid.

One Natural Radio event from substorms is the Substorm Chorus Event or SCE. This is a VLF emission which may be observed after the onset of the substorm expansion phase. It is comprised of a band of VLF chorus emissions with rising upper and lower cutoff frequencies. The theory is that Electrons are injected into the nightside magnetosphere during the expansion phase of a substorm. These generate whistler-mode waves near the geomagnetic equator which propagate down the field lines and through the ionosphere to be heard on the ground.

The NASA public information site with the full explanations is at http://ds9.ssl.berkeley.edu/themis/mission_mystery.html

Get Ready For Spring Equinox Listening – The Spring Equinox is just a few weeks away. The Equinoxes are typically time of increased Natural Radio phenomenon, and after a long winter it's a good time to head out to your favorite quiet site and shake off the winter blues.

Now is the time to install fresh batteries, check the operation of your equipment and make sure that your listening and recording kit are in order and that all the accessories and cables are still there. (It's amazing how patchcords and adapters can disappear.)