

Natural Radio

News, Comments and Letters About Natural Radio

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After a few months of craziness at work, things slowed down and I was able to take a couple of days off as I recovered from a nasty cold. I spent some of the time working on my *Natural Radio Lab* website and finally finished the conversion from the obsolete Mambo Content Management System to the more user friendly WordPress. The thought is there will be more time to write and upload content as I won't be spending time trying to figure out the hacks necessary to make a post look acceptable. We'll see.

I'm running 3 or 4 other WordPress sites now and the program is a real pleasure to work with. It can be a little complex creating the look you want for the site, but once that is done, adding content and updates is extremely simple. And the price is right – WordPress is freeware. Although originally designed to be blogging software, WordPress works extremely well for static pages, and the number of plug-ins and themes lets you implement almost any kind of functionality and instantly create many different looks without needing a lot of design ability.

The updated site went live this weekend and I have checked all of the pages and links and everything seems to be working properly. There should be some new content by the time you read this. Visit the site at: naturalradiolab.com.

Chorus Like You've Never Heard It – One of the major challenges to listening to Natural Radio signals is man-made noise. The noise from power mains is ubiquitous. The 50 or 60 Hz. fundamental signal and harmonics that pass through our desired frequency band along with noise from mechanical devices and electrical devices such as CFL ballasts, switching power supplies and the like, can make hearing all but the strongest signals very difficult.

Filtering is sub-optimal, and the best strategy is to get away from the noise and closer to the signal. Putting a Natural Radio receiver in space is the ultimate way to do this, and that is just what has been done with the successful launch of the Radiation Belt Storm Probes (RBSP).

Back in 1955 Dr. James Van Allen from the University of Iowa and several other American scientists developed proposals to launch of a scientific satellite as part of the research program conducted during the International Geophysical Year (IGY) of 1957-1958. On January 31, 1958, Van Allen's Explorer spacecraft was launched on a Redstone rocket and returned enormously important scientific data about the radiation belts circling the Earth. These belts were later named the Van Allen belts in his honor.

Run the clock ahead 54 years, and scientists again at the University of Iowa are involved in another probe to the Van Allen belts, the Radiation Belt Storm Probes (RBSP) which were launched from Cape Canaveral Air Force Station in the pre-dawn hours of Aug. 30, 2012. After a successful launch, the probes were released from the upper stage of the Centaur rocket one at a time, and sent off into their different orbits, beginning the two-year mission to study Earth's radiation belts.

NASA's RBSP was designed to help us understand the sun's influence on Earth and near-Earth space by studying the Earth's radiation belts on various scales of space and time.

The two RBSP spacecraft have nearly identical eccentric orbits and identical instrumentation. The orbits cover the entire radiation belt region and the two spacecraft lap each other several times over the course of the mission. With a spaced pair of satellites, RBSP can discriminate between spatial and temporal effects, and compare the effects of various proposed mechanisms for charged particle acceleration and loss.

If you'd like to know more about the instrumentation and details of the mission visit the mission website at: http://www.nasa.gov/mission_pages/rbsp/mission/index.html. I'll post links to the site as well as audio samples on the naturalradiolab.com website.

There are a variety of instruments aboard the pair of satellites, but one of the more interesting ones is the Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS) with Craig Kletzing at the University of Iowa being the principal investigator.

EMFISIS monitors magnetic fields and plasma waves with three coils of wire, or solenoids, oriented as if they were the 90-degree angles at the corner of a cube.

Experiments in the past have only been able to monitor such waves in a single direction, but EMFISIS will measure E and H field components in all three directions as it also incorporates the electric field information gathered by the booms on the Electric Field and Wave Suite (EFW) instrument.

Currently, it is thought that the plasma waves that produce chorus make provide the force that accelerates "killer electrons" in the outer Van Allen belt. These energetic electrons can damage satellites and pose a hazard to astronauts. The measurements made by the RBSP satellites over their two year mission should answer many of the uncertainties that we now have as to the flow of particles in and out of the Van Allen belts.

So far, the craft has performed flawlessly and although it is still in the 60-day commissioning period before beginning its prime mission, it is sending back interesting and useful data.

Released this week were recordings of chorus and whistlers from inside the radiation belts. These recordings have amazing clarity and of course are free of terrestrial power mains interference. Also, and this is a first for a recording within the radiation belt, the recordings have 16-bit sampling for CD quality sound.

Prof. Don Gurnett of the University of Iowa is well known for his recordings of Space Sounds, and now there will be a whole new series of sounds to add to his collection. You can find samples of the RBSP recordings and many other Natural Radio recordings made from earth and space on the University of Iowa Site at:

<http://www-pw.physics.uiowa.edu/space-audio/>

Live VLF Natural Radio – Since we've been discussing online Natural Radio recordings, you might want to check out this site. Paul Nicholson and several collaborators built this site that consists of a collection of live natural radio streams of the VLF band as well as a variety of data from those streams. There are some stereo streams also, with two separated sites feeding the stream. This was a major undertaking and a great accomplishment.

<http://abelian.org/vlf/>