

Natural Radio

News, Comments and Letters About Natural Radio

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Since the magnetosphere has been so quiet, I spent part of last evening listening to other forms of natural emissions. I took my ultrasonic bat detector outside after spotting several bats in the fading hours of daylight.

Besides the bats, however, I was detecting another ultrasonic signal which I thought might have been bats hanging in the trees in “ultrasonic idle” mode, but it seemed a little too constant. The sound was still there this morning, so I know it wasn’t bats.

My bat detector is a simple one, it amplifies the ultrasonic signal and clips it into a series of pulses and then uses a digital frequency divider chip to bring it down into the audible range. Because of this method, it doesn’t provide any amplitude information -- only frequency information. Thus, locating the source of the sound isn’t easy, but it appears to be power-line related. I know the interference is coming in acoustically because if I put my hand about a foot in front of the sensor the noise goes away. So, maybe this ultrasonic detector might be useful in detecting power line corona and arcing that causes VLF and wideband interference. More experimentation is in order.

Unfortunately, it appears that we need a lot more bats to control this summer’s mosquito population. Maybe, one could build an ultrasonic device to attract bats and thus reduce the mosquitoes in a given area. It probably would be cheaper than one of those propane powered CO₂ devices.

Earthquake-ULF Link Strengthens – A few months ago, Dr. Fritz Raab, W1FR, sent me an article from the December, 2005, *IEEE Spectrum* concerning new detection methods of Earthquakes. The article was written by Tom Bleier, CEO of QuakeFinder in Palo Alto, CA; and Friedemann Freund, a senior researcher at NASA Ames Research Center in Mountain View, CA., and indicated that recent measurements have established an even closer link between ULF emissions, Infrared emissions and earthquakes

While the mechanism for the generation of low frequency radio signals and infrared emissions is not known, there is a possible theory. The deformation of the rock destabilizes its atoms, thus freeing electrons from their atomic bonds and creating positively charged electron deficiencies, or holes. One of the authors, Freund, demonstrated at NASA Ames Research Center, that the breaking of oxygen-oxygen bonds when rocks were crushed would produce holes. The holes propagate upward to the earth’s surface, while the electrons moved down into the hot mantle of the earth. The movement of charge was measured at 300 meters per second in the lab. And of course the moving charge is a flow of electric current that produces magnetic fluctuations. The currents generated are massive.

Since the fluctuations are slow, the frequencies are low and the wavelengths thus long, which allow propagation through the earth and detection at the surface.

These waves produce electronically detected ELF and ULF magnetic field changes, ionospheric changes, infrared luminescence, and air-conductivity changes. These changes are being monitored on the ground and from space. Earthquake precursors are now being seen as infrared hot-spots from IR sensors in satellites. ELF and ULF noise increases are being measured and ground-based sensors are noting an increase in air conductivity before an earthquake.

While the links have been established, a better scientific understanding of the underlying processes is needed and the technology and extent of the monitoring needs to be improved before public officials and others are fully confident in the data. Some of the problems that need to be solved are separating the signals from man-made and other natural noises, developing a better ground network to better locate signal sources as space based observations of ULF and VLF waves don't provide a very accurate location of the source, and just more experience with the observations to know exactly how they correlate with earthquakes.

There is a related NASA article that talks about the space based monitoring at http://science.nasa.gov/headlines/y2003/11aug_earthquakes.htm. Read about the California Magnetometer network, the world's largest ULF network at <http://www.quakefinder.com/>.

Microbes Ride the Plasma? – All those fields in the earth's outer reaches may be transporting more than subatomic particles and Whistlers. You probably remember the news splash when formations that looked like microbes were discovered in a meteorite from the red planet. Whether they were microbes or not was never proven conclusively, but it was determined that microbial existence in a meteorite was plausible.

Well, another method of transport has been discovered, one that would allow microbes to travel between planets and even beyond the solar system. An engineer at the US Federal Aviation Administration, Tom Dehel, was working on how geomagnetic fields can disrupt the function of the satellites used for GPS navigation when he came to this conclusion. Dehel presented his research findings in Beijing, China at the meeting of the international Committee on Space Research (COSPAR).

According to the *New Scientist* magazine:

“Dehel calculated the effect of electric fields at various levels in the atmosphere on a bacterium that was carrying an electric charge. He showed that such bacteria could easily be ejected from the Earth's gravitational field by the same kind of electromagnetic fields that generate auroras. And these fields occur every day, unlike the extraordinarily large surface impacts needed to eject interplanetary meteorites.”

The upward force of the electric field would counteract gravity and allow the microbes to be suspended in the upper atmosphere for years where they could grow and

reproduce and possibly evolve to survive in the environment of high UV energy and near vacuum.

This is not a new idea; it was first suggested in 1908 by chemist Svante Arrhenius. Now with current measurements, it has been shown that the fields are sufficient to create the conditions that could send microbes floating of into interplanetary space and on their way to a new home.

Scientists have already shown that some bacterial spores can survive in the extreme conditions of space, and then be revived. Thus, Dehel believes, this method of the spreading of life through interplanetary and possibly intergalactic space is possible and should be studied further. Read about it in the *New Scientist* at <http://www.newscientistspace.com/article/dn9601>

Renato's New Natural Radio Book – Congratulations to Renato Romero on the publication of his book, *NATURE RADIO, Reception and Study of Natural Origin Radio Signals*. Unfortunately for those of us in the English speaking world, the book is published in Italian only. Renato is going to ask the publisher to produce a translated version. If you read Italian, information is on his website at <http://www.vlf.it>.

Your Much Appreciated Correspondence

•Dave Laida, Delta Lake, NY. (laida@nystec.com) - Whistler Wire Antenna

After more than 10 years of building high-impedance E-field active antennas with vertical whips I finally constructed a horizontal wire active antenna for natural radio listening. The 100 ft. long antenna is insulated stranded AWG #26 strung about 4.5 ft above ground level and supported every 20 ft by wooden stakes. Orientation N-S or E-W has made no difference with this short a length.

The preamp is a single stage 2N5484 JFET in common source configuration. The gain on purpose is quite modest and hence linearity is excellent—no unwanted intermodulation products from strong VLF and LF stations. The audio output is connected to the high impedance MIC input on a Radio Shack 32-2040 amplified speaker; signal amplitude is loud enough at half volume setting. The circuit is earth grounded and I observed that a grounded counterpoise wire strung in the opposite direction from the antenna added no benefit. The 100 ft. antenna is terminated with a 2.2 M Ω resistance (as compared to 50 M Ω + for typical E-field whip receivers) hence the circuit is electrostatic insensitive; the prototype board actually has no metallic shielding. All signals including power line interference are coming off the antenna lead exclusively. I use no low pass filters, which corrupt the natural signal with amplitude and phase distortions, since there is absolutely no LORAN-C demodulation or broadcast station interference with the wire antenna at the low elevation. My vertical whip receivers easily demodulate LORAN-C with antennas more than 18 inches long.

The wire antenna is operating in a rural housing development in central New York State that has buried power lines to the houses and above ground power lines about 3/8 mile away. Not hearing incessant LORAN-C rep rate and the fidelity improvement of transient signals through a wideband preamp are really appreciated.