

Natural Radio

News, Comments and Letters About Natural Radio

September 2002

Copyright © 2002 by Mark S. Karney

It's hard to believe that summer is winding down already and that the quieter listening conditions of fall are almost upon us. The thought of quiet conditions makes winter almost tolerable. Almost. I shipped my youngest son, Kevin, off to the University of Missouri this week, so Natalie and I are now empty nesters which I hope will leave more time for Natural Radio activities.

The almost continuous thunderstorm activity this summer in the Midwest has made listening next to impossible. I had hoped to do some listening on our vacation to Emerald Isle in North Carolina, which is one of the barrier islands at the southern end of the outer banks. In my mind I had envisioned power lines many miles away with just some small distribution lines powering the vacation homes on the narrow island. Ha! Shows how little I know about power distribution. After we crossed the bridge to the island, the first thing I saw was the 350Kv power lines that traversed the length of the island and passed about 200 ft. from our oceanfront condo. I didn't even bother to take the receiver out of the car.

Natural Radio wasn't far from my mind, though and sitting on the third floor deck, cool drink in hand, watching the constant motion of the waves and the twice daily ebb and flow of the tides got me to thinking of the complexity of motion of the plasma fluid in the magnetosphere. I was puzzled why low tide occurred when the moon was overhead and tried to find a book on tides, but none were available. However, tide tables are published in the newspapers that list the times of the high and low tides – and I discovered these times vary considerably with your position along the coast. I later found out after doing some internet research when I returned home, that the tide tables are determined mostly by observation – the behavior of tides are too complex to build an accurate model. Although the moon is the major player in tides, the gravity of the sun is important and even Jupiter plays a minor role.

Our plasma ocean in the magnetosphere is tugged by the moon just as the oceans are, although I understand that it is a much smaller factor than the solar wind and the other forces. No wonder we can't predict the occurrence of whistlers!

Only Sferics? As Natural Radio listeners most of our efforts are concentrated on hearing whistlers and the various VLF emissions like chorus. Sferics are sometimes interesting when the sferic that causes a whistler can be heard, but for the most part, they are just noise that threatens our hearing and covers up the real interesting signals. But there may be a wealth of information in the sferics, as a little research indicates.

An article, *Measurement of charge transfer in sprite-producing lightning using ELF radio atmospherics* by S.A. Cummer and U. S. Inan in the July, 1997, issue of

Geophysical Research Letters published by the American Geophysical Union, described a method for measuring the current transferred in sprite-producing lightning by measuring the ELF sferic. Low-light level observations were made of thunderstorms from Yucca Ridge, Colorado, while the sferics were observed on a single loop antenna at Stanford. A computer model was developed to determine the charge transfer of the lightning stroke from the measured sferic. Of course the logical extension of this research is to use the sferics as a proxy detector of sprites. This was the subject of another paper in the April 1999 issue of the same publication. It would be interesting to look at the sferics that produce whistlers and see if there is any correlation between them and sprite producing sferics.

In doing some research on electrophonics related to Meteors, I found another paper by Colin Price and Moshe Blum at Tel Aviv University titled *ELF/VLF Radiation produced by the 1999 Leonid Meteors*. The authors made measurements of LF electromagnetic waves in the Negev Desert in Israel during the Leonids meteor storm on November 18, 1999. (leonid.arc.nasa.gov/MS025.pdf) They were able to correlate sferic-like signals with the incoming meteors. The spectrum of the meteor pulses differed from lightning produced pulses in several ways. First, the pulses from the meteors were weaker than distant sferics. Secondly, the pulses were longer than lightning produced sferics – a lightning pulse was typically on the order of a millisecond, while the meteor induced pulses could last up to 10 ms. Finally, the spectrum of distant lightning shows a peak at around 5 or 6 kHz., while the meteor spectra showed a minimum in this range. The meteor pulses had peaks in the ELF range (300 – 1500 Hz.) with an additional weaker maximum in the 2 kHz. range. The Leonids are coming again in November; it might be a great opportunity for those of you with experimentation and discovery in your blood.

The last interesting tidbit I found was an internet article about a study done in Italy that discovered sferic-like signals associated with seismic activity. Unfortunately I lost my bookmark for the web page and even though I spent many hours searching the web, I was unable to find it again. If anyone has any information on this research, I would appreciate hearing about it.

So when whistlers seem non-existent, and the endless static crashes rattle your brains, it might be worth spending some effort analyzing some of those seemingly mundane atmospheric. Fire up Spectrogram or your audio editing program and check out the waveforms of some of those atmospheric -- especially some of the weaker ones recorded during the winter. You'll never know what you might find.

Fall Equinox Coordinated Listening The fall equinox is upon us and the weekends for coordinated listening are Sept. 21 & 22 with Sept. 28 & 29 being an alternate if conditions are bad on the first weekend. The downward side of the solar cycle just after the peak is the usual time for maximum geomagnetic activity and that's where we are. There has been a lot of solar activity the past couple of weeks with an X3 flare yesterday, so with a little luck, September should produce some good activity.

I would like to encourage those of you who don't get out to listen very often to take advantage of this opportunity to hear some whistlers or chorus while the weather is

still nice. Please write up your experiences and send them in. People like reading about what others are doing, and your experiences may encourage others to get out and hear the wonders of the Natural Radio signals that have moved across our planet for billions of years. The LWCA and the Lowdown are member supported, and without your written contributions, this publication will continue to shrink.

For new listeners here are some tips to increase your chances of hearing some Natural Radio Signals:

1. Find a location well away from power lines. You need to be at least a couple of miles from any high voltage transmission lines and a quarter mile or more from any distribution lines.
2. Find an open location away from trees or other obstructions.
3. The best times for whistlers are between midnight and dawn, with a peak near sunrise. For chorus, the best listening times are the few hours after sunrise.
4. Make sure you have spare batteries, bug repellent, a flashlight and a thermos of hot coffee and whatever other items you need to be comfortable.
5. If there is lightning in the area, get away from your antenna and get to a safe location. Get permission before entering private property.

As usual, listen at least for the six minutes of each hour starting as early before local sunrise as you are able. Logging information, is in the March, 2001 issue of *The Lowdown*. Write or E-Mail me if you don't have that issue and I'll send you a copy of the logging instructions.

I will be publicizing these dates on the VLF_Group list also. Take this opportunity to venture out in the early fall weather and maybe hear some great Natural Radio.

Scanning The Net I have taken over the VLF_Group mailing list from founder Shawn Korgan. This list deals mostly with Natural Radio activity. If you wish to join, simply send a blank e-mail to (VLF_Group-subscribe@yahoogroups.com) from the e-mail account you wish to have subscribed to the VLF group.

For alerts on Space Weather sign up for one of the lists managed by NOAA's Space Environment Center. Visit the following web address to sign up for free automatic e-mail alerts: <http://sec.noaa.gov/ListServer.html>. If more advanced alerts by fax or pager are necessary you can register to receive them at the following web address: <http://sec.noaa.gov/alerts/register.html>.

Bill Taylor passed along the location of a database that might be useful to Natural Radio experimenters. The location is <http://www.magnet.oma.be/sevem/index.html>. The SEVEM database system provides a user-friendly access to information about all the missions/satellites in the terrestrial magnetosphere, which have been equipped with radio antennae and/or fluxgate magnetometers.