

Natural Radio

News, Comments and Letters About Natural Radio

January 2001

Copyright © 2001 by Mark S. Karney

Christmas is over and the real Millennium approaches rapidly, fortunately with almost no hype after last years doom and gloom predictions. Morning temperatures here in Illinois that have been hovering around zero or less have not been very conducive to Natural Radio listening. This is a good time to regroup and make plans for spring listening and get the equipment in shape.

Late November, however, provided some interesting listening. The large solar flares and subsequent coronal mass ejections that hit around November 28th provided some of the most interesting listening of the year. I discovered a new quiet site, only about 5 minutes away from home, and went there on my way to work on November 28th. I heard probably the loudest chorus I have ever heard with all kinds of strange sounds. There were only one or two very faint whistlers in the time I recorded, but since my site is in a forest preserve that opens and hour after sunrise, that probably has something to do with it. Mike Mideke and Shawn Korgan were also listening around that time and heard the same effects (See correspondence.)

More Coordinated Listening Shawn Korgan sent in the following request:

What if we had a listening session each month? Would the first Saturday and Sunday of each month work for most? And for the time, how does starting a few hours before local sunrise sound? A few hours before sunrise to shortly after sunrise is a terrific time to hear VLF activity, maybe even the best time of all!

I would participate in every Sunday session if we were to start a listening program like this. I believe that many would find it fun listening each month and comparing any major results we hear in common.

Better yet, we could make up a simple yearly schedule that would allow for even greater listening possibilities. One day on the sun is equal to 27 days on earth. The activity affecting VLF conditions rotates around on the sun once every 27 days. The best schedule would be to listen the first Saturday and Sunday of one month and then the next month to listen on a Saturday and Sunday near the middle of the month and then back again to the first Saturday and Sunday for the next month. This would help give us coverage for solar activity and possibilities for the best listening opportunities should we happen to miss the best conditions on any given month because the activity on the sun is not facing the earth during one month's listening session. Again, any thoughts are welcome.

From my standpoint, it's absolutely no problem to schedule coordinated listening sessions – I print it in the column and add it to the calendar on the LWCA website. I do have several thoughts on the issue, though. One possibility might be to coordinate with The Inspire Project who also sponsors coordinated listening. Another possibility might be to establish listening times and procedures for use during periods of high geomagnetic activity. Shawn, Mike and I all happened to be listening at almost the same time on November 28th and all caught the interesting chorus activity of that day. This type of serendipity might be repeated more often if there were given monitoring times when the Kp index goes above 5, for example. Also we might want to schedule the beginning time around sunrise on the East

Coast (which I know makes you guys on the West Coast have to get up really early), so that we have the best chance of being coordinated across the country for whistlers.

I would be interested in hearing your comments on this. And of course we'll be doing our usual coordinated monitoring around the Spring equinox.

Mir Coming Down In February - End of INTMINS Russia will use an unmanned cargo spacecraft to safely drop the aging Mir into the Pacific in February, bringing an end to the INTMINS experiment. (INTMINS, like the NASA SEPAC experiment tried to produce triggered VLF emissions by firing a pulsed electron gun out into space.) Officials say it will be aimed into the Pacific Ocean, 900 to 1,200 miles east of Australia on Feb. 27-28.

Russian Aerospace Agency chief Yuri Koptev said that a 20-hour loss of radio contact with Mir this week was a final warning that time was up. Koptev said the incident highlighted the wear and tear on the station. "Russia mustn't allow such risks because of its obligations before the international community, and this is why the president and the government have decided to discard Mir in February," Koptev said.

Receiver Front-End Design Scott Fusare (N2BJW), completed his excellent article discussing some of his ideas for receiver front-end design. It appears elsewhere in this issue so don't miss it.

Your Much Appreciated Correspondence

• **Michael Mideke, WB6EER , Benson, AZ (mideke@theriver.com)** Just a quick mag-storm report. Yesterday, 11/26 I went out at dawn to a hummy site partway up Soza Mesa and heard nothing of interest. Today, I went back, heard weak chorus on the WR-3, set up RS-6 with whip on a short mast and found a whistler storm in progress at 1315. After it got light enough to see the jeep trail I went five miles further from the power lines and recorded until the event had pretty well faded away at 1630. This was a fairly typical whistler storm, punctuated by bits of barking chorus and riser bursts. There were a few sharp, fast whistlers which sometimes seemed to be triggering bits of chorus. Don't know if they were part of the "storm" or not - no spectrogram work yet. At its peak levels I'd rate the whistler storm "signal" as moderately strong. Other than the above mentioned whistlers, no whistler activity was observed. As usual, I'm eager to hear whether anyone else heard and recorded this event. I expect to be out again tomorrow.

This morning (28 Nov.) I returned to my "overlook" site and recorded approximately from 1305 to 1510 UT. Whistlers and chorus seemed to be running in parallel, not interacting. The whistlers were mostly quite long 2-hop type proceeding from strong spheric clusters. The whistlers ranged from weak to moderately strong. The chorus was fading in and out, never very strong. Chirps, risers, mutters, barks - quite a variety of effects. As the morning progressed both whistlers and chorus grew weaker and the activity density seemed to decline, though that may have been only because of the slow fadeout trimming away the weaker events.

I just spent three full days in the vicinity of Magdalena NM, much of the time cruising Forest Service roads in search of hum-free zones. Definitely a good map of all the power lines would be a great help. My thought, if I can come up with a map, is to black out a 5 mile

corridor on either side of each line, then see if any openings remain. Then, if openings exist, see if anything resembling a road runs through any of the openings. Actually I finally found a really good area in the San Mateo Mts., SE of the VLA. The nearest AC is on the SE VLA track and that is a buried line and should have minimal effect from 5 miles. Two miles north of that are a couple of mid-level distribution lines. Ten miles west there's a 2 phase line running off to a ranch somewhere and 10 miles east another 3 phase line. Both would be in the null of a N/S loop. There is a buried telephone line running through the area and it is a source of low level AC hum, particularly around the little modules that stick up out of the ground every mile or so. Given the potential of that line for eventual monitoring and control functions, I think I can live with it. Road access to that point is all-weather. It is possible to go further - much further, but not so easily or with snow on the ground.

I've been in contact with Dave Finley, N1IRZ, the public information person at the VLA. He says no coordinated monitoring has been done to see if there is an actual correlation between whistler activity and discrepancies in 320 MHz calibration target headings. Still haven't got my hands on the paper relating the research that was done.

Having stumbled into a house-and-cat sitting offer I can't refuse, it looks like I'll be heading back up to Magdalena next week for a more extended stay. Hopefully I'll be prepared to do some loop experiments, along with getting to know more people, tracking down that VLA research, etc.

•**Shawn Korgan, Gilcrest, Colorado (korgans@mymailstation.com)** In response to the question put forth by Dave Laida, I would say, the smaller the wire gauge (larger conductor) the better the VLF antenna. The reason for this is that a larger conductor will create less noise because the resistance will naturally be lower in a larger conductor. I would recommend at least a 16 gauge conductor of no less than 200 feet in length. I generally use insulated wire to keep moisture from corroding the metal wire (either bare or insulated wire works fine in the experiments I have performed).

In tests this past summer, a 1000 foot antenna was no better than a 250 foot antenna on my receiver. As a general rule of thumb, I use the shortest length of wire needed to overcome the receiver's internal noise level. On my receiver, this is just over 100 feet in length. I have also found that on long-wire antennas, it helps to run a counterpoise wire. A couple hundred feet of wire running in the opposite direction (laying on the ground) and hooked to the receiver's ground, works great as a counterpoise and helps to pull in the VLF signals.

In late November, the earth was hit with five major flares. I was out during many of the nights following, listening for interesting VLF activity. During the night of November 29th, I was fortunate enough to see the aurora borealis here in Colorado for the first time. Not only did I get a chance to see it, I was able to listen to the aurora with my vlf receiver while I watched it light up the sky.

On November 28th, I heard low frequency whipping sounds in the background mixed in later with chorus and a lot of risers (almost what might be termed a riser shower) at one point. Along with this activity, there were very high pitched chirps and whistling sounds for several hours.

On the night of November 30th, I heard some low pitched emissions that I have never heard examples of before from anyone. These low pitched emissions occurred around the time when either dawn chorus or a whistler shower might normally have been heard (around sunrise). Maybe the best way to describe these sounds is the sound of wind blowing across

the tops of open Coke bottles or the low frequency part of several police sirens echoing miles off in the distance.

On December 1st, I heard a collage of activity. At one point, there were up to three or possibly four whistling emissions all rising and falling in frequency simultaneously mixed in with a lot of chirping, whistlers and chorus.

Today (December 15th), I captured for hours the Russian ALPHA signal stronger than I have ever heard it before. Spectrographs show that I was hearing all the tones from two of the Russian ALPHA transmitters (nine different tones every 3.6 seconds). Vlf activity was lacking while the Russian ALPHA transmissions were booming in loud and clear. The strength of the ALPHA signals may help us to determine the strength of VLF activity? When I saw the aurora on Nov. 29th, I was also able to receive up to twenty different stations announcing the time from all over the world on the 5 MHz time frequency. As soon as the aurora disappeared, so did all the other stations other than the usual Ft. Collins and Hawaii stations.

I have been busy with receiver design and testing. I hope everyone gets a chance to hear great vlf activity between now and the next copy of the LOWDOWN. Remember, one solar day equals twenty seven earth days. If five major flares occur within a few days, there is a high probability great activity may occur again twenty seven days later.

Natural Radio Log

Month Day	Time UTC	What Heard (whistlers/hour where applicable)	ID - Grid Sq.
11/26	1315-1630	Whistler storm	MM-DM42
11/28	1305-1510	Whistlers & Chorus	MM-DM42
11/28	1500-1520	Loud Chorus, risers, chirps etc.	MK-EN52
11/28	--	Chorus, chirps & risers	SK-DM79
11/29	--	Aurora & auroral sounds	SK-DM79
11/30	--	Low pitched emissions	SK-DM79
12/01	--	Chirping, whistlers & chorus	SK-DM79

MM - Michael Mideke, Benson, WB6EER , Benson, AZ Equipment - RS-6 receiver with active whip on 25 ft. mast, Marantz PMD 430 cassette recorder, and Sony DAT recorder.

MK - Mark Karney, N9JWF, Barrington, IL. Equipment - WR-3, LF Engineering loop, homebrew receiver with 60" whip and -24db/octave hi-pass active filter, 350 Hz. cutoff.

SK - Shawn Korgan, Gilcrest, CO. Equipment - Homemade e-field receiver I refer to as the SK-1 with 500 feet of antenna wire.