We hope you will look very carefully at these spectra in order to understand what we mean. Watching and analyzing those recorded files, we can see Doppler shifts of incoming signals as well as outgoing signals. Sometimes as a singular wave, other as a multiple events, as if more than one SCEB may be travelling around.

Of course we are not in any position to affirm that these perturbations are from SCEB for sure, rather than some other origin, though it is an interesting starting point to realize that what we have believed as a theoretical possibility was actually observed, correct in all the conditions hypothesized.

More observations and more recording sessions have to be set up in order to confirm or disprove my hypothesis and that, anyway, may be an important EMBLA2001 result. In this way we have a real VLF (and lower) path to follow. After the needed time spent to analyze the incoming data, we could establish if this way is a self-sustained hypothesis or not. At that point we'll have real data to propose. Moreover this kind of VLF/ELF perturbations in the way we have proposed are, at the time we are writing, never before been reported in the open literature to our knowledge.

SCEB (as not visible energy bags) may be, at this point, a common world atmospheric condition, not confined in the Hessdalen Valley only. But in that place (maybe in some more sites) SCEB may get the particular environment that drive them to break themselves. Such an environment may be formed by a mix of conditions able to broke SCEB: space particles, atmospheric particles, and Earth geological composition. (In Hessdalen Valley there are copper mines and water streams flowing in and out of the ground.) In addition there is manmade activity in the area and it has consequences in the ground and in the atmosphere. We should also consider not just the present manmade activity but also a past manmade activity may create condition for later SCEB breaks. But we have another item to look for: is there a gravimetric anomaly able to contribute to SCEB breaks in some way? Are any measurements done in the gravimetric field in the valley or in any other area in the world where similar phenomena appear? We should work this way, with data collected by satellite directly over the sites as well as from the ground. Moreover we should ask for data from the southern Atlantic area, a well known area affected by a strong and large gravimetric anomaly. Satellites could again supply important data. Also it should be helpful to have a way to talk with ship crews usually travelling along that area. They could give us important information. In order to understand if different atmospheric condition can give different results about SCEB, we confirm that it would be extremely useful have one receiving VLF /ELF Station flying on a balloon, working at about 400/500 meters high from the ground, able to collect low end radio waves data over the ground station area. This receiver would xperience a different electron averaged content per meter/square, compared to the ground Station. Probably we should set up at least two more portable stations to be established in the valley in the sites where, statistically, lights has been observed more often. I believe that one more portable VLF/ELF receiving station should be established in another valley (not so far from Hessdalen, say 5 km), in order to compare the two EM conditions, in the same time. We should see about the same ruffle emissions, both in the Hessdalen station as well as in the other valley receiving station, though the supposed change in the spectrogram may be shown in the site where SCEB has broken, where the standard noise condition has been changed, only. We should also reach an agreement to use satellite data, obtained directly over the Hessdalen Valley, again for comparing purpose. T.E.C. (Total Electron Content) data from GPS satellites research may

supply useful data, too. All these kinds of data may be transmitted from the Valley through the Internet, in order to give to the research community involved important and real-time data to analyze. This will lead to a step ahead in all the research fields, giving us the possibility to grow in every field (optical, radio, infrared) at the same time. There would be no need to be there personally every day, except for instrument maintenance purposes as well as for scientific update and local community contacts.

In summary, what really arises from the Hessdalen Valley investigations is the realization that our knowledge about our atmosphere and its connections with space particles and Earth ground is not complete. When it is complete, the Hessdalen Phenomena may be understood or, if you prefer, the Hessdalen Phenomena may give important clues to understand aforementioned connections.

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1) A. Cremonini: "Ricevitore VLF a correlazione per monitoraggio di fenomeni elettromagnetici in atmosfera" Università degli Studi di Bologna, Anno Accademico 1999/2000; Tesi di Laurea in Ingegneria Elettronica

2) E. Strand: "Project Hessdalen" at http://www.hessdalen.org

3) R. Helliwell, "Whistlers and Related Phenomena", Stanford University Press 1965.

4) B.G. Hauge: Project EMBLA, Proceeding of the "International Conference on Engineering Education"; 6-10 August Oslo, Norway;

5) M. Teodorani; Erling Strand; Bjorn Gitle Hauge: The EMBLA 2001 Optical Mission; http://www.itacomm.net/ph

Acknowledgements

There are some people I would like thank, deeply. They are the persons who had the patience to listen to me and give me friendship, precious advice, technical assistance and even the financial possibility to be in the wonderful Hessdalen Valley. Here are their names:

Massimo Teodorani for his help to let me be in the EMBLA project and his great scientific assistance during the time I was in the Valley and during the data analysis;

Renzo Cabassi and ICPH/CIPH (Italian Committee for Project Hessdalen or Comitato Italiano per il Progetto Hessdalen), for their friendship, assistance and financial support to let me be in Hessdalen;

Erling Strand, leader of Hessdalen Project, for all the information he gave me during my days in the valley and during data analysis. Moreover he gave me the use of one car, as well as the place to live with my family in Hessdalen;

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Ellin Brattas with her husband Birger and Bjiorne Lillevold with his wife Hallfrid, Hessdalen Valley residents, for giving us so much information about lights in the valley and how inhabitants feel about them, both now and in the past,

All the Norwegian people greeting us during our time in the Valley.

Report on Coordinated Observations 11/2001

By Bill Pine
Ontario, California

The purpose of the Coordinated Observation Program is to provide an opportunity for INSPIRE participants to gather data at convenient times for purposes of comparing the resulting signals and attempting to interpret them. Since there is no manmade source of VLF that is being studied here, the signals of interest are those of natural origin. As in most natural radio listening, we would like to hear something "interesting". Most of the time that would be whistlers, but other sounds such as tweeks, chorus, triggered emissions and even hiss are also interesting. Observing whistlers, however, remains the prize for faithful listening. The problem with whistlers is that they are not the most common natural radio signal. Since coordinated listening schedules are determined arbitrarily and in advance of the listening sessions, it is only a matter of luck if whistlers are available to be detected. The experience of the author is that whistlers are heard about once every four or five morning sessions. When they are present, you will probably hear a lot of them until the rotation of the earth carries the ducting magnetic field lines into an unfavorable alignment.

Conditions during November/2001 were mixed. Some observers were treated to an abundance of whistlers. This was especially true for those observers who listened earlier than just at the 8 AM and 9 AM times. When whistlers are present, it is more likely that they will be heard the closer to dawn that you observe. The following report includes sample spectrograms from contributing observers.

The following table summarizes the sessions monitored by observers.

Date	11/17					11/18					
Time	1300	1400	1500	1600	1700	1200	1300	1400	1500	1600	1700
Team											
S-1	C										
S-2	C	C									
S-4				P	P					P	P
I-1						M	M	M	M		
I-3	M	M	M	M			M	M	M		
I-4				P	P						P

Times indicated are UT times.
The letter in the box indicates the time zone of the observer:
E = EST = UT– 5, C = CST = UT – 6,
M = MST = UT – 7 and P = PST = UT – 8

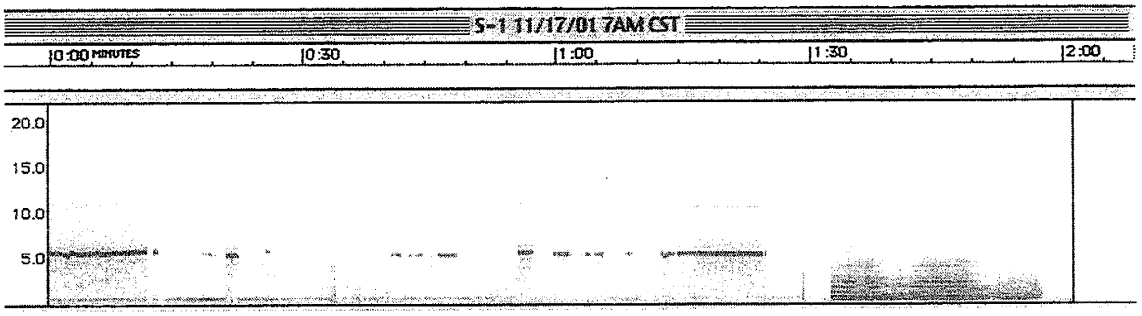
Observers:	Team S-1	Kathryn Robinson, O'Connor High School Helotes, TX	(CST)
	Team S-2	Mark Mueller, Brown Deer High School Brown Deer, WI	(CST)
	Team S-4	Bill Pine, Chaffey High School Ontario, CA	(PST)
	Team I-1	Shawn Korgan, Gilcrest, CO	(MST)
	Team I-3	Robert Bennett, Las Cruces, NM	(MST)
	Team I-4	Mitchell Lee, San Jose, CA	(PST)

For analysis purposes, a spectrogram was made of the first two minutes of each 12-minute hourly session. Additional spectrograms were made of any items of interest and of any segments requested by the observer. Time marks were placed on the tape every two minutes and a complete log was made of each session.

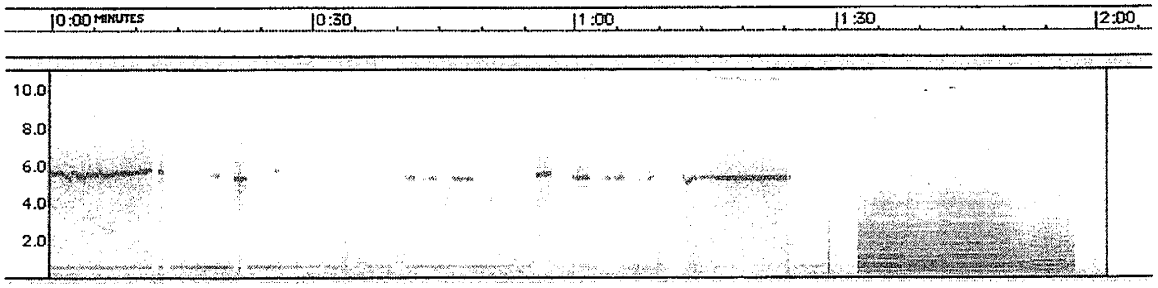
11/17/01 1300 UT 7 AM CST Team S-1 O'Connor High School, Helotes, Texas

Leading off the observations was the team from O'Connor High School in Helotes, TX. Physics teacher Kathryn Robinson was joined by Mark Bratton, Kelly Garrett, James Higdon, Kevin Lessard, Stacey McClister, Justin Warren and Karen Wood.

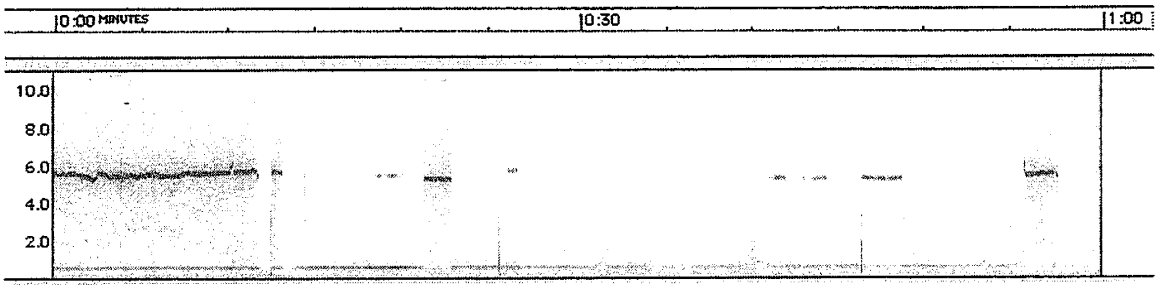
The O'Connor team experienced some intermittent problems with oscillation on the receiver, but sferics were clearly audible and powerline hum was very low.



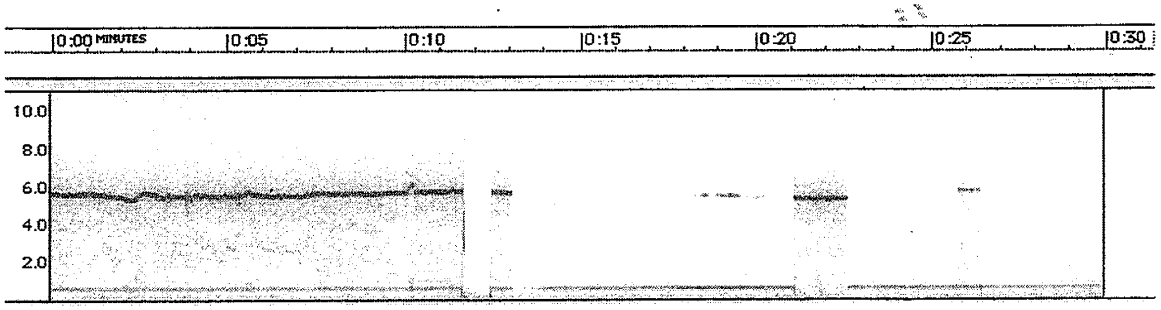
A spectrogram of the first 2 minutes. The receiver oscillation appears as a horizontal line above 5 kHz. The signal in the last 30 seconds is a "motorboat" sound of unknown, but probably manmade, origin.



The first 2 minutes using a frequency range of 0-11 kHz.

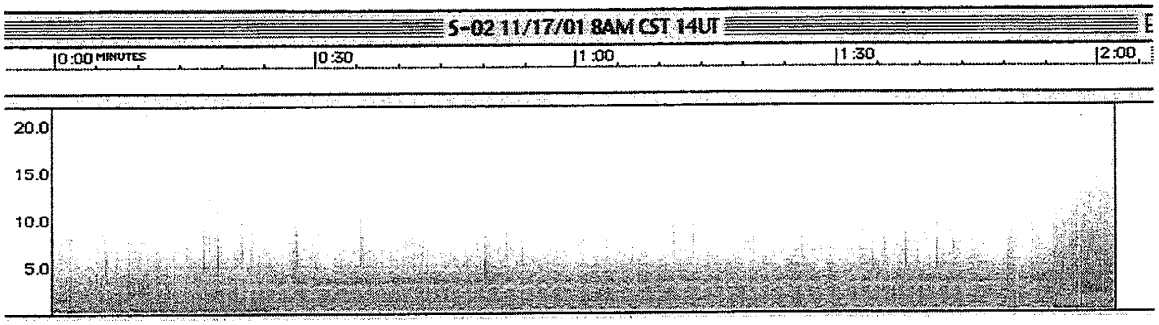


The first minute.

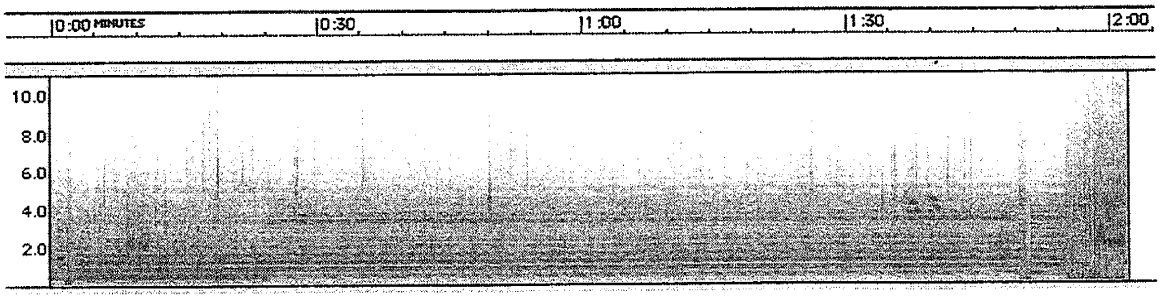


The first 30 seconds.

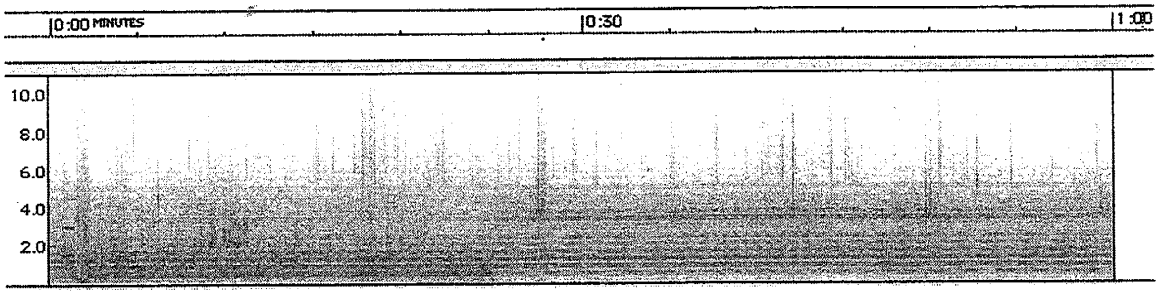
11/17/01 1400 UT 8 AM CST Team S-2 Brown Deer High School, Brown Deer, WI



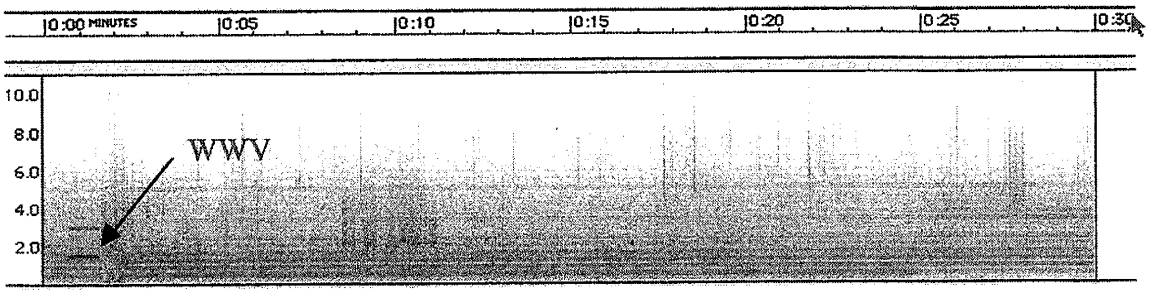
Mark Mueller observed from Brown Deer High School at 7 AM and 8 AM local. Above is the first 2 minutes at 8 AM. Lots of manmade hum at this site. Sferics are easily heard above the hum. Sferics can be seen on the spectrogram extending above the hum to above 10 kHz. Sferics were more dense at 7 AM.



0-11 kHz frequency range.



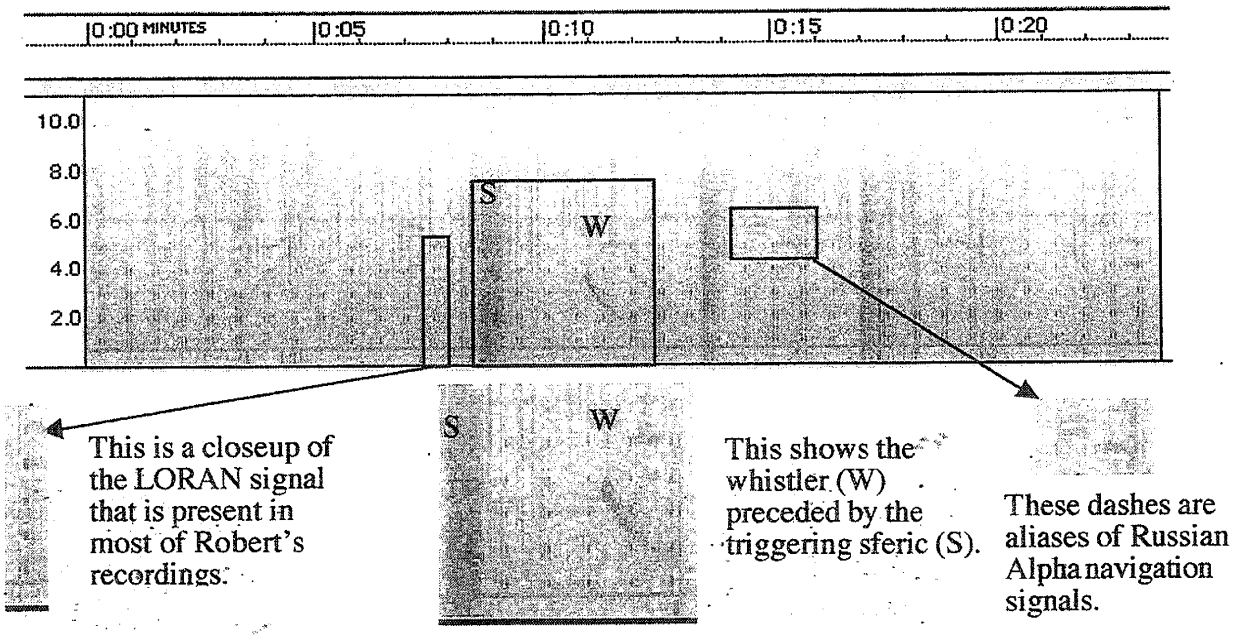
First minute.



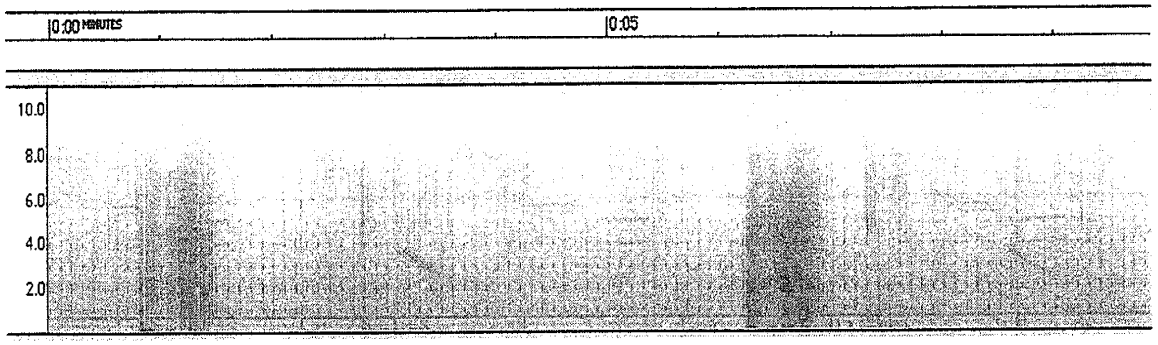
First 30 seconds. Note the WWV tones just after the start.

11/17/01 1500 UT 6 AM MST Team I-03 Robert Bennett, Las Cruces, NM

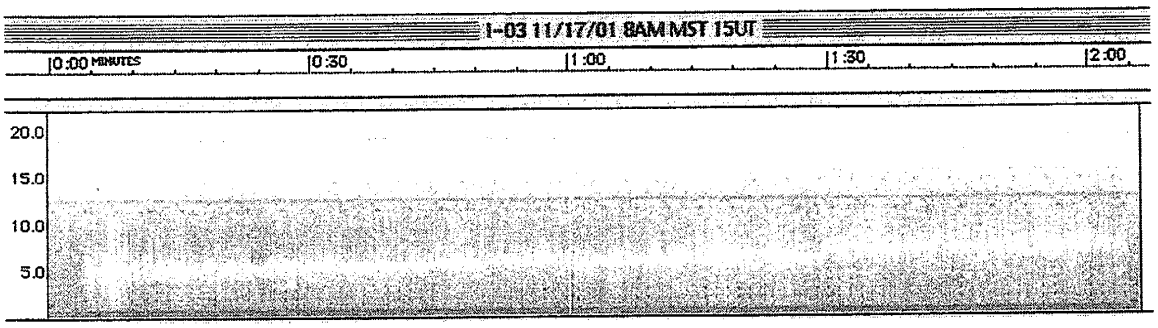
The 17th was a nice day for outdoor monitoring. There were rain showers in the area the previous day and the desert was damp but not wet enough to make the dirt roads impassable. I arrived on site at 0500 MT and there was ground fog all over, no wind and temperature about 30 degrees F. I setup and got ready to monitor by 0530 using a 6-foot whip antenna. When I tested my setup, I was hearing whistlers so I started recording. The first tape (side A) starts at 0540 MT and ends at 0609 MT. I would have recorded continuously until 0630, however I didn't have enough blank tapes. During the 30-minute period of the recording, I detected many whistlers, several whistler echo and some instances of strong static bursts (lightning) triggering a whistler. This is the first time I have recorded a whistler, its lightning trigger and the whistler echo. I recorded over 20 strong whistlers during this interval.



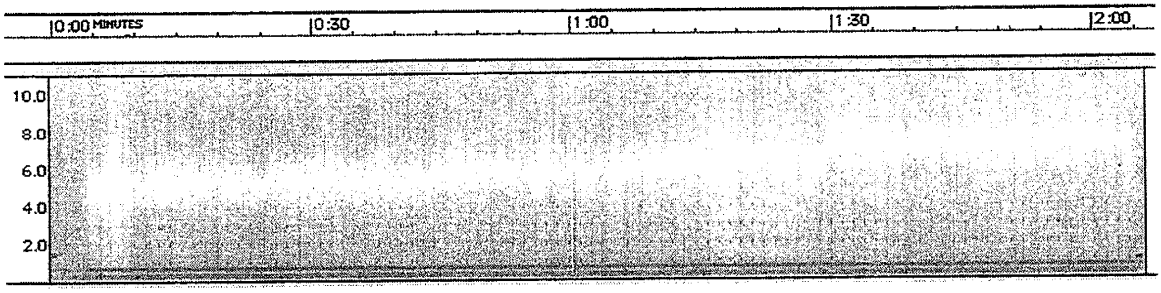
This whistler was recorded at 1241 UT. The sferic precedes the whistler by about 2 seconds.



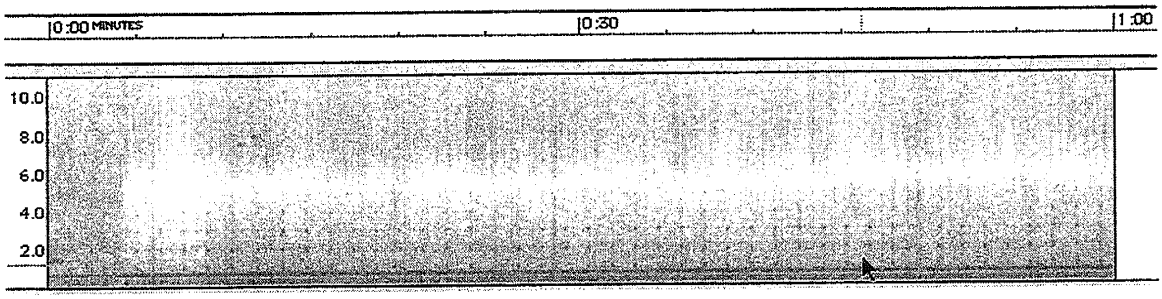
Two more whistlers each preceded by a strong sferic. Most whistlers recorded this morning were 2-hop whistlers originating with "local" lightning and bouncing off the ionosphere in the Southern Hemisphere and returning to be heard as a whistler.



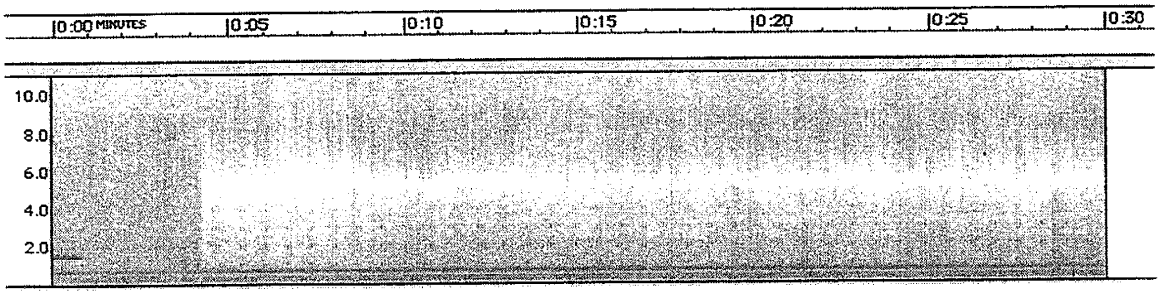
. In this spectrogram, Alpha dashes are visible as are a couple of horizontal lines at about 13 kHz and 19 kHz.



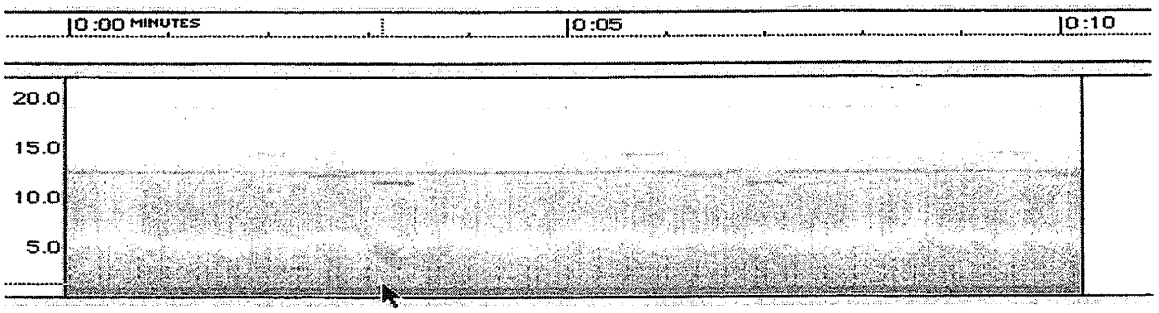
0-11 kHz.



Arrow points to whistler at 15:00:47 UT

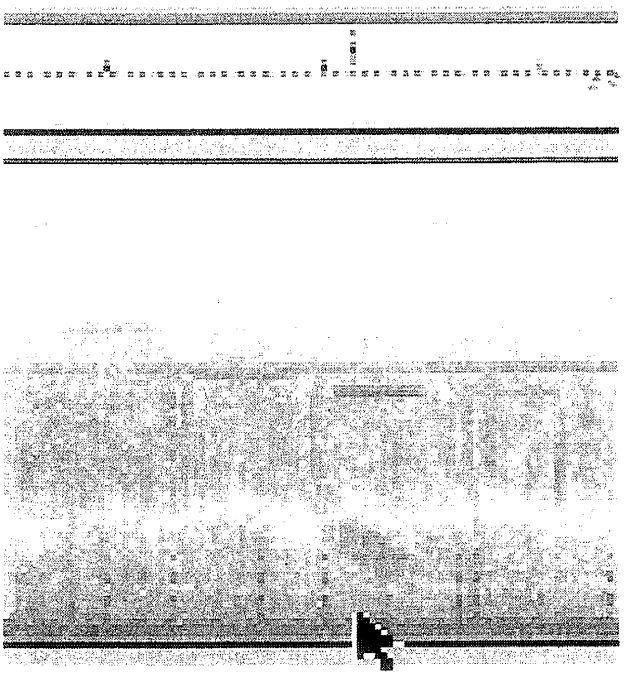


First 30 seconds. The 1500 UT WWV tone is the dash at the beginning.



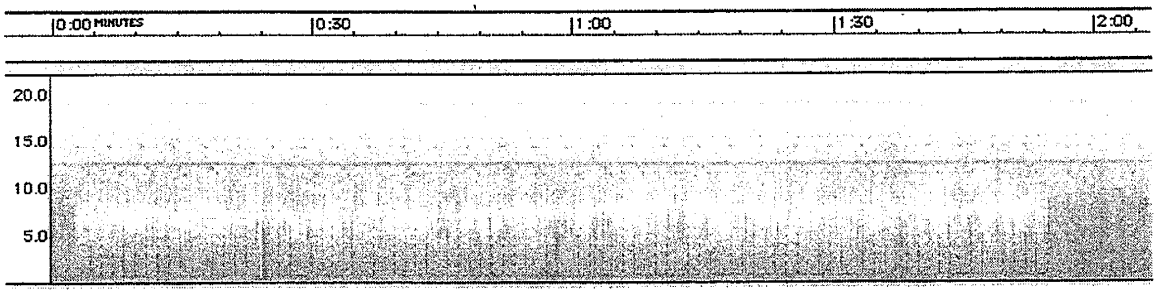
The whistler at 15:00:47 UT. In this 0-22 kHz view, Alpha signals are prominent as are a couple of carriers at 13 kHz and 19 kHz.

A closeup of the Alpha navigation signals. These signals consist of a three-tone sequence repeating every 4 seconds.

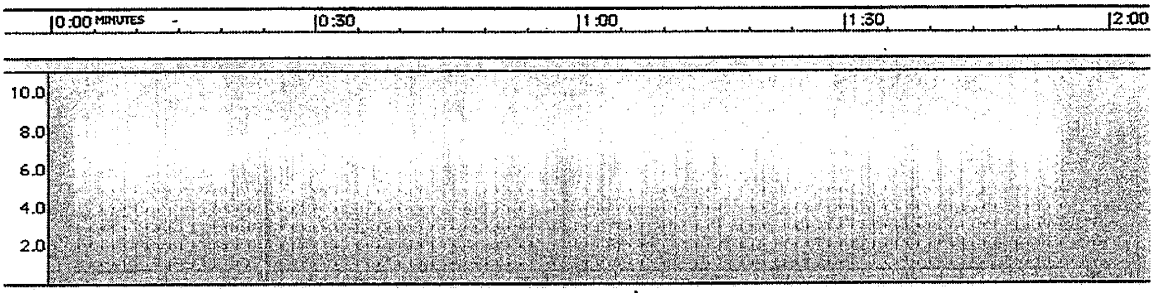


Enlargement of the whistler also showing one set of Alpha signals.

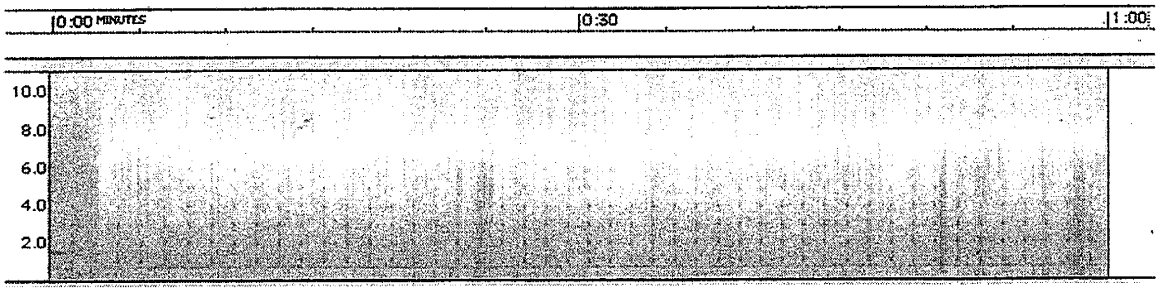
11/17/01 1600 UT 7 AM MST Team I-03 Robert Bennett, Las Cruces, NM



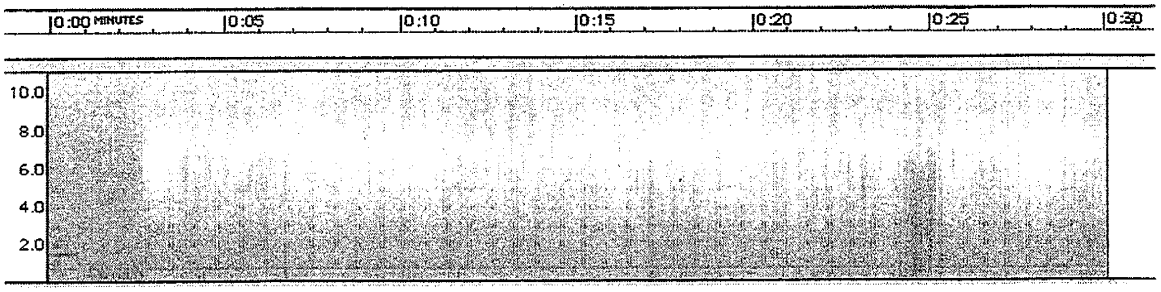
By 9 AM local time, the whistlers have stopped, but dense sferics continue.



0-11 kHz frequency range.



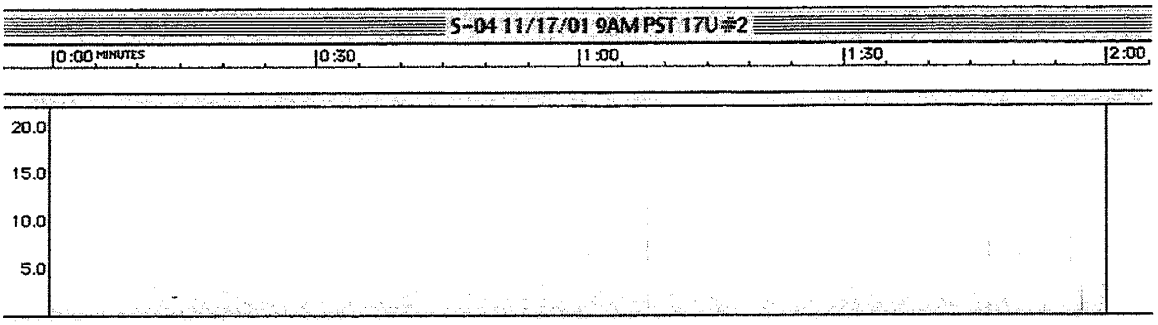
First minute. LORAN signals are easily visible – and the "clacking" sound is prominent!



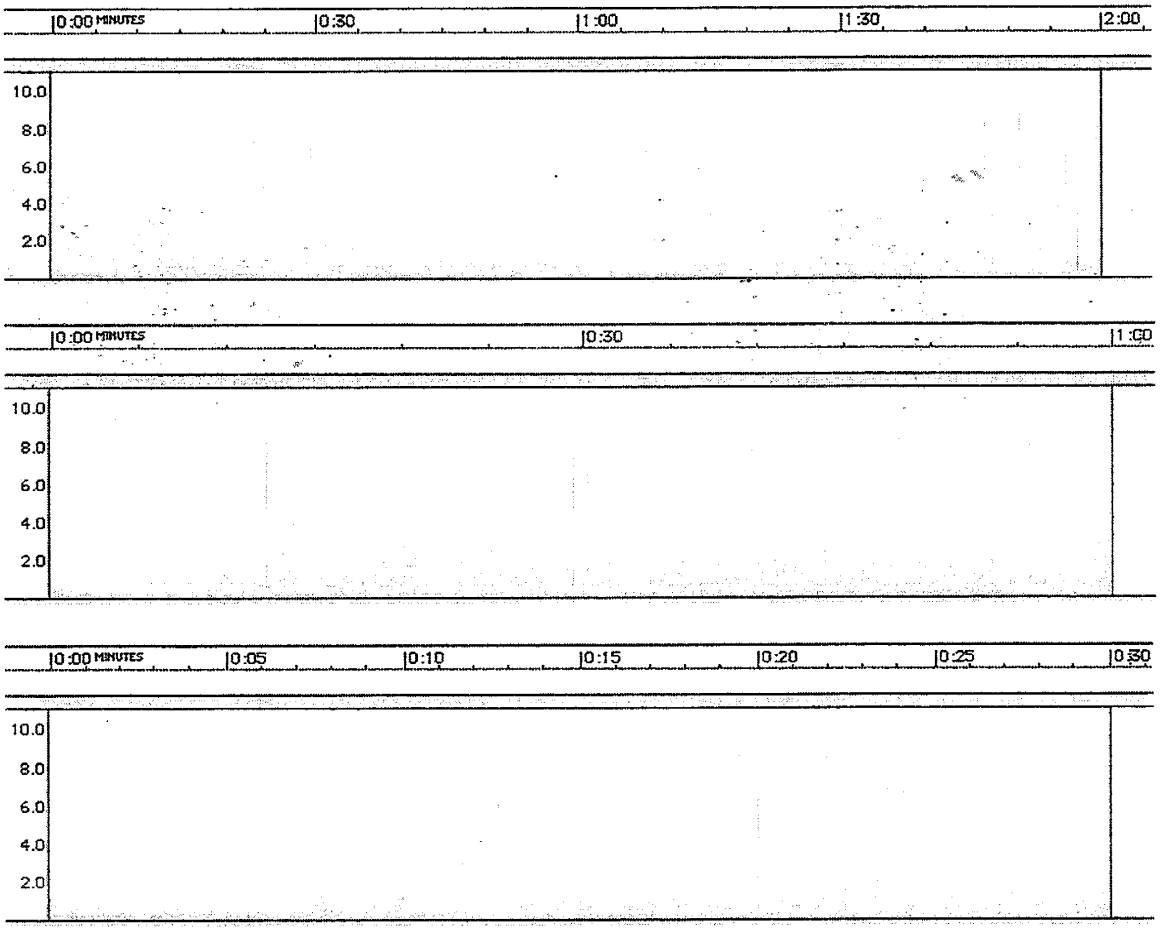
First 30 seconds. .

11/17/01 1700 UT 9 AM MST Team S-04 Chaffey High School, Ontario, CA

On the 17th, Bill Pine, Physics teacher, was joined by Lorena Flores, Zujeith Hernandez, Elizabeth Mercado, and Josh Miller. Conditions were quiet with sferics predominating.

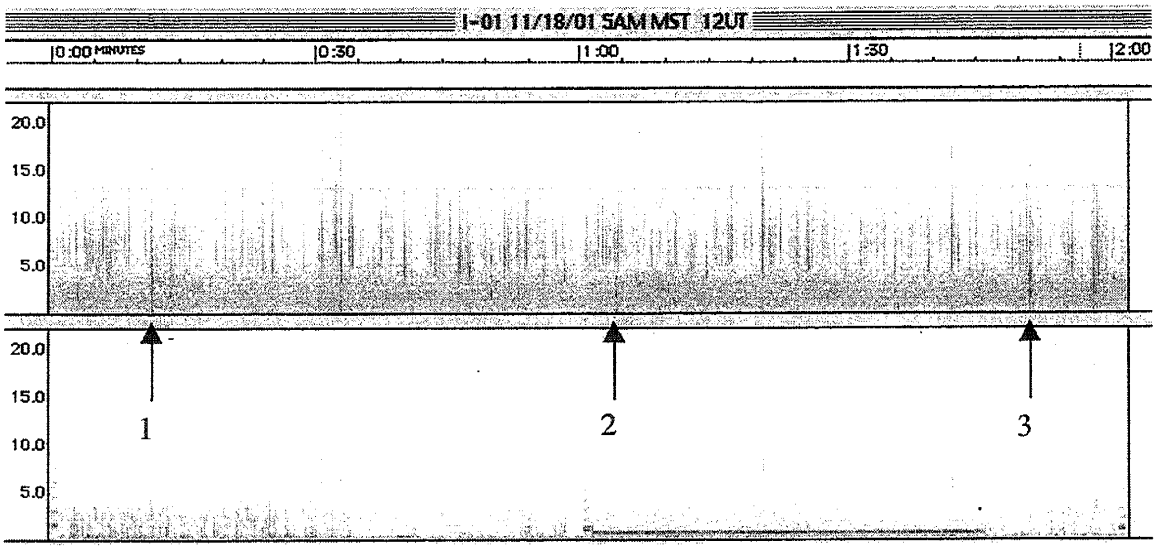


Receiver #2 Zujeith Hernandez

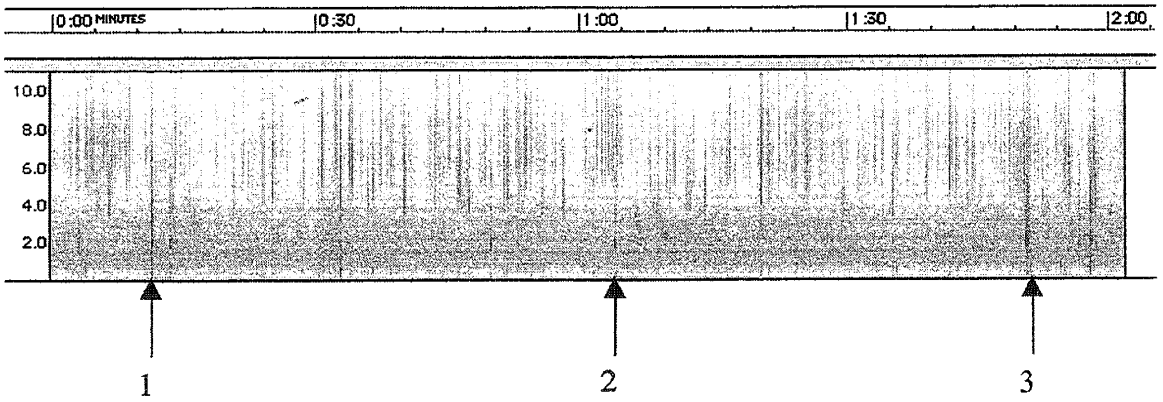


11/18/01 1200 UT 5 AM MST Team I-01 Shawn Korgan, Gilcrest, CO

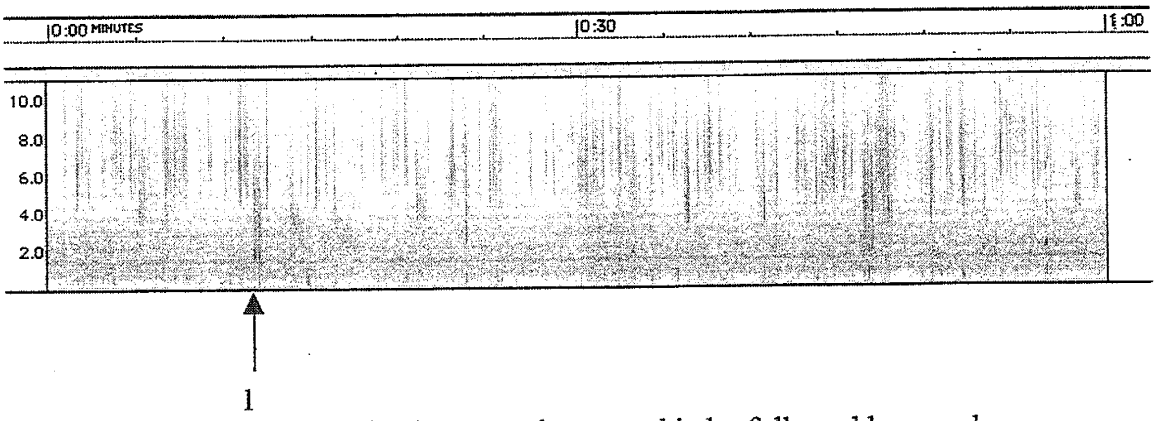
Shawn Korgan was up early at his prairie observing site.



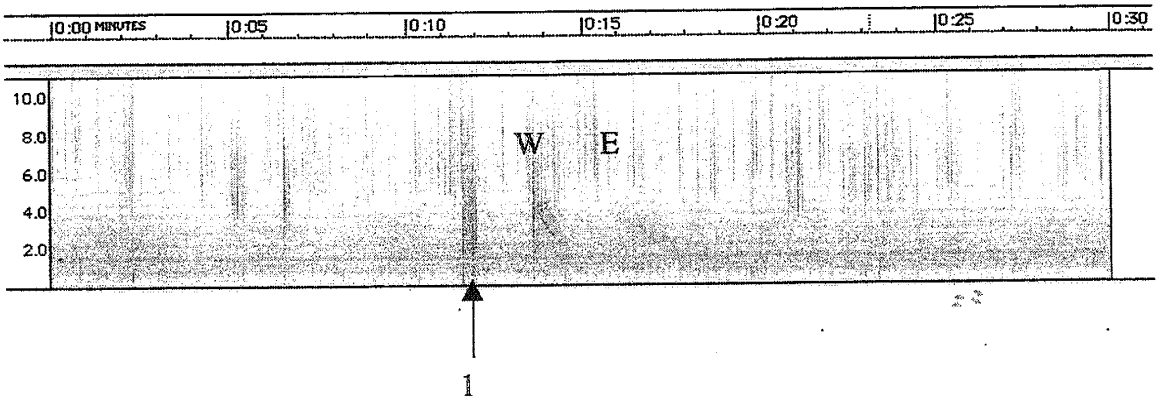
Data on top track, WWV on bottom track. 1, 2 and 3 point to strong sferics followed by strong whistlers and echoes. The whistlers may be 2-hop originating in the Northern Hemisphere. The echoes would be 4-hop.



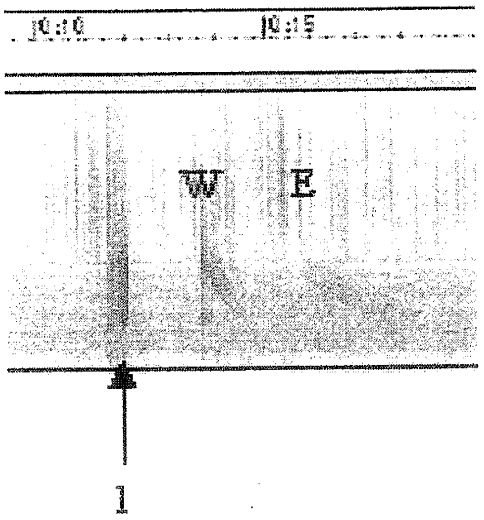
0-11 kHz frequency range. Whistlers and echoes are visible following the sferics.



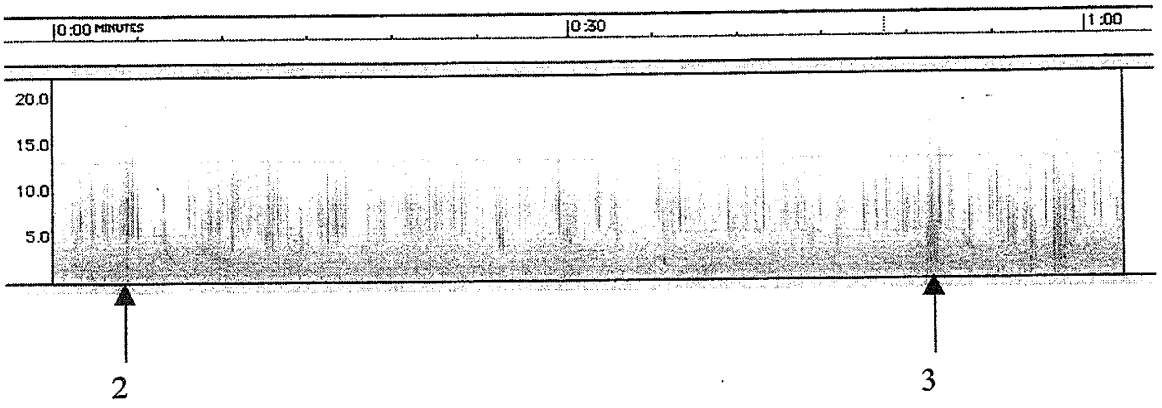
First minute showing sferic #1 that gave rise to a whistler followed by an echo.



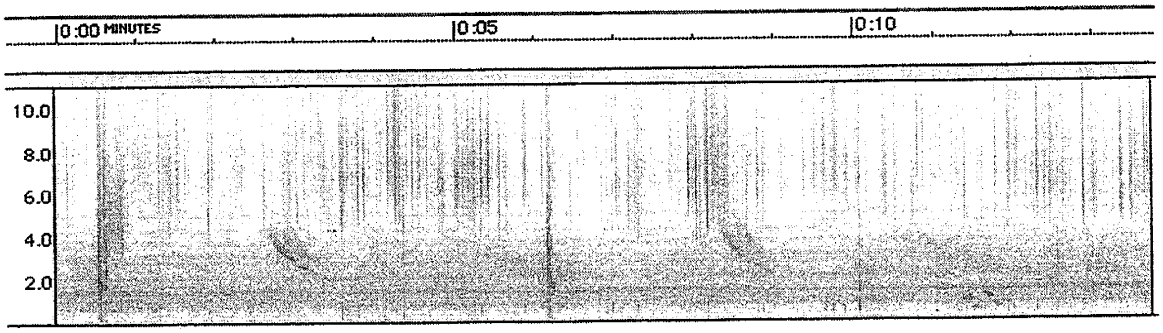
The first 30 seconds showing sferic #1 followed by the whistler (W) and echo (E).



Enlargement of the sferic, whistler and echo.

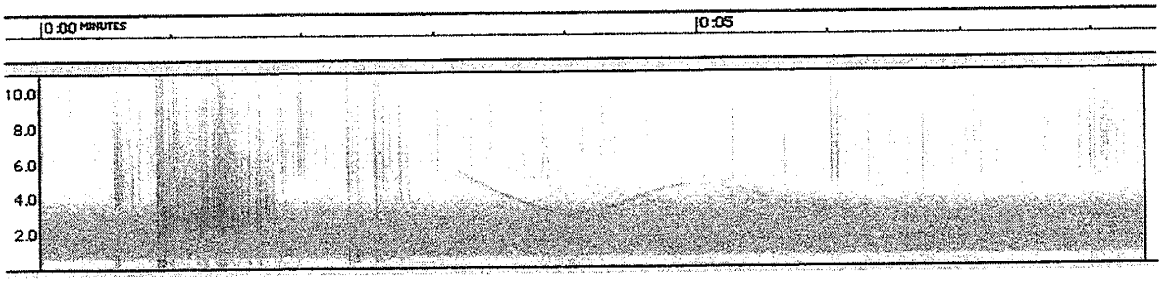


This is the second minute with sferics 2 and 3 indicated.



This shows two tweeks logged at 12:03:31 and 12:03:36. Note the whistlers follow after identical time intervals.

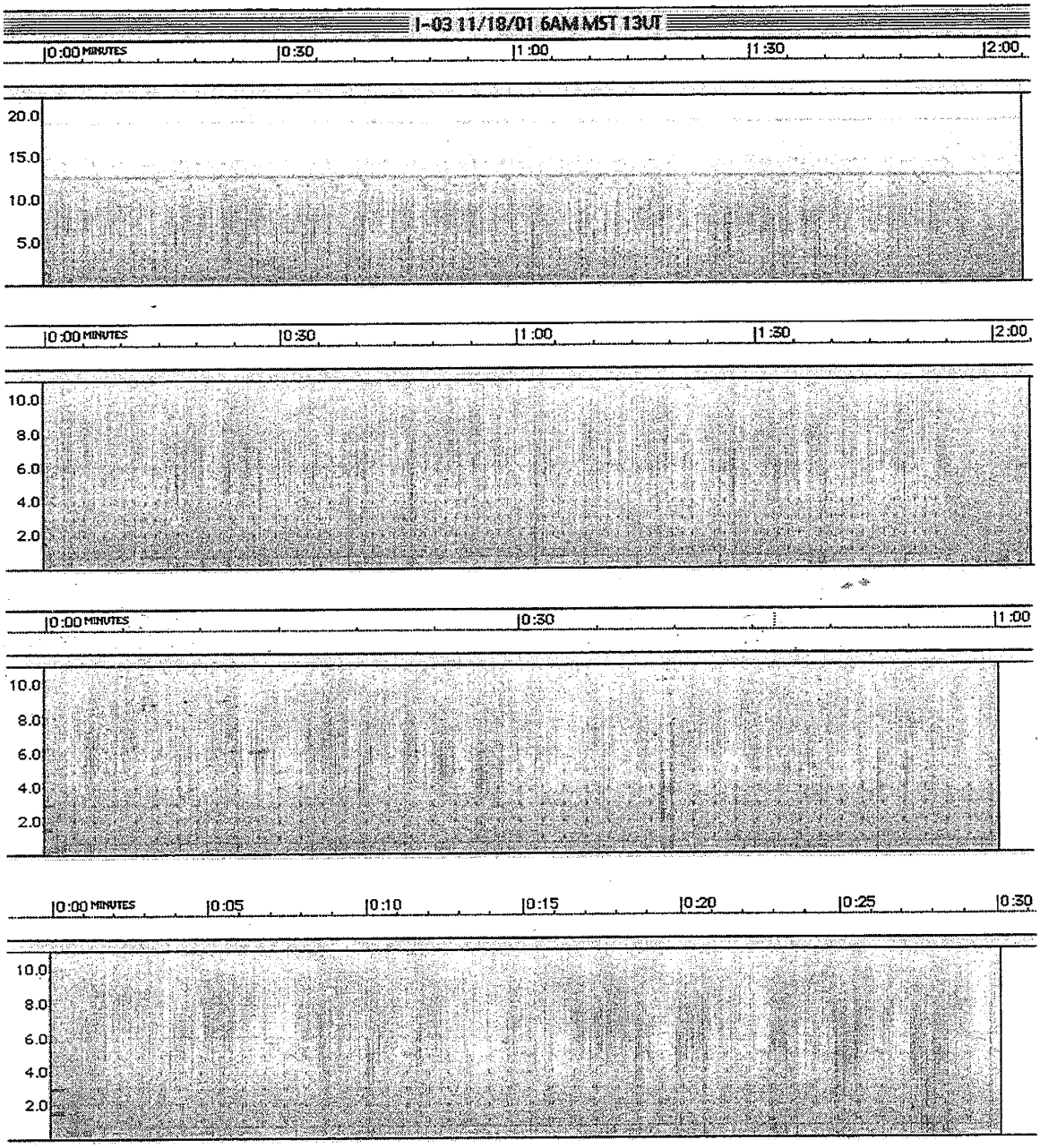
Later on the 18th, Shawn logged a strange sound. The spectrogram is also strange!.



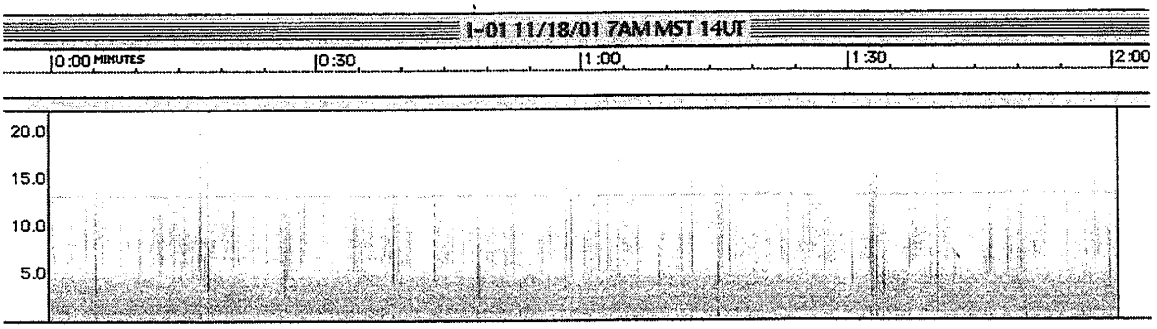
Shawn's guess is that this is a whistler blended with a riser with an echo of the whistler crossing the riser. Notice the combination extends over 2.5 seconds.

11/18/01 1300 UT 6 AM CST Team I-03 Robert Bennett, Las Cruces, NM

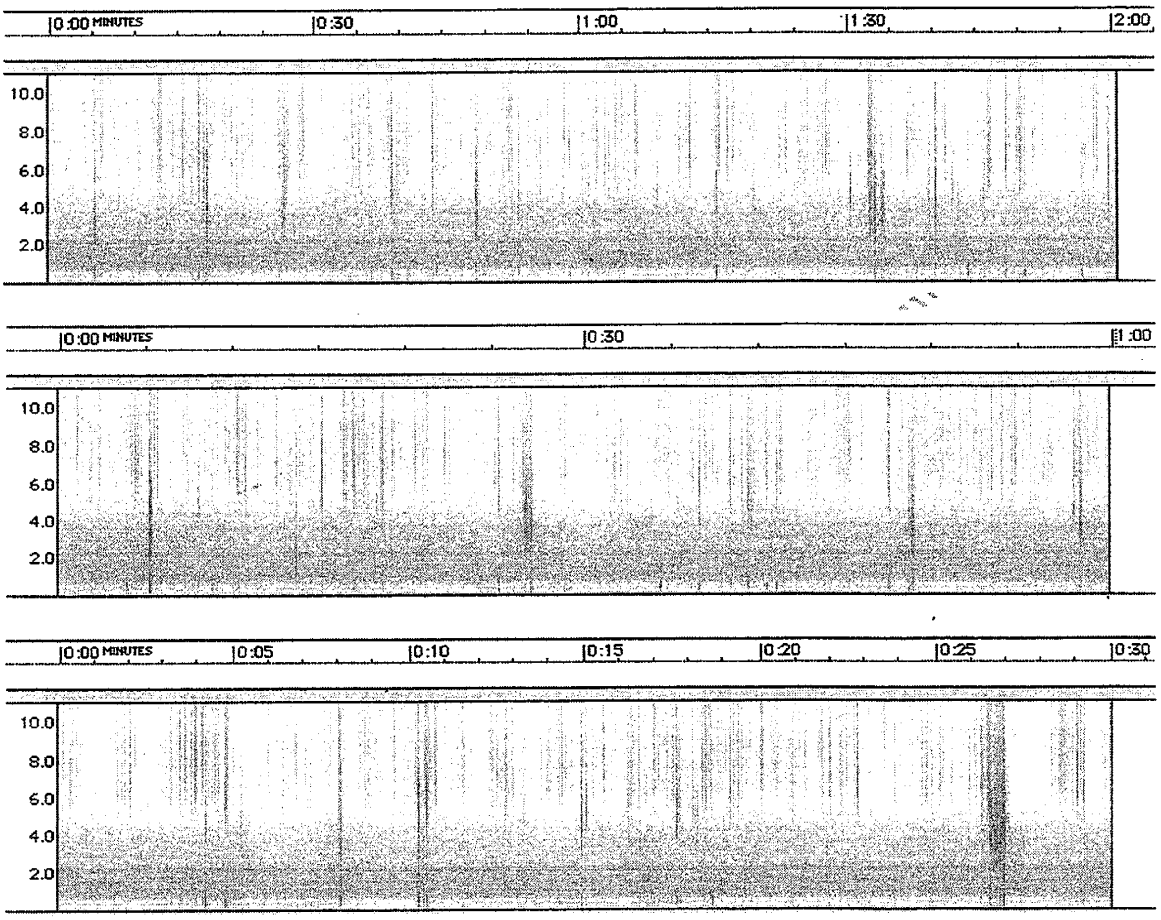
Strong, dense sferics were the rule on the 18th in New Mexico.



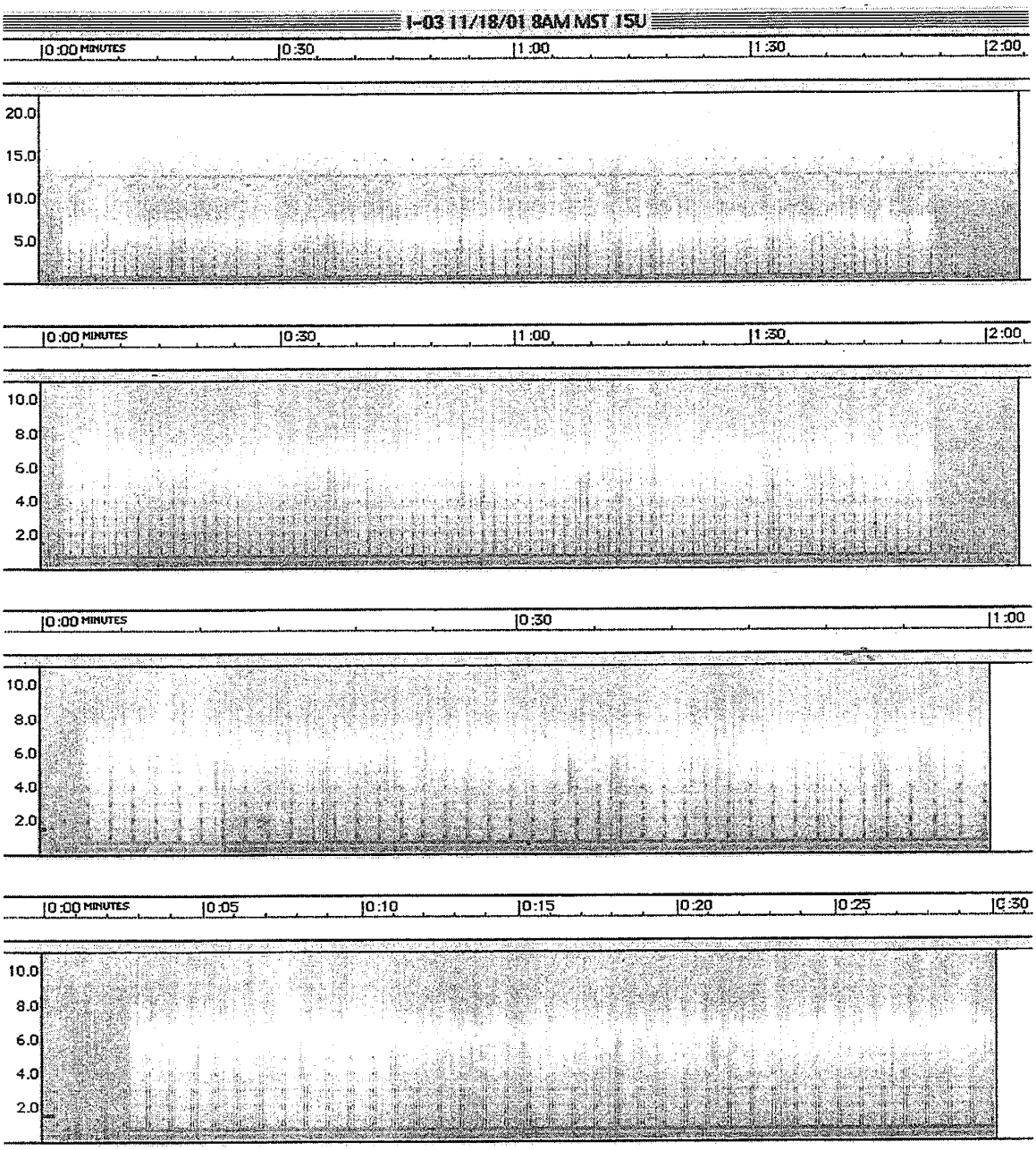
11/18/01 1400 UT 7 AM MST Team I-01 Shawn Korgan, Gilcrest, CO



The band below 5 kHz is hiss, which sounds like white noise with varying loudness..

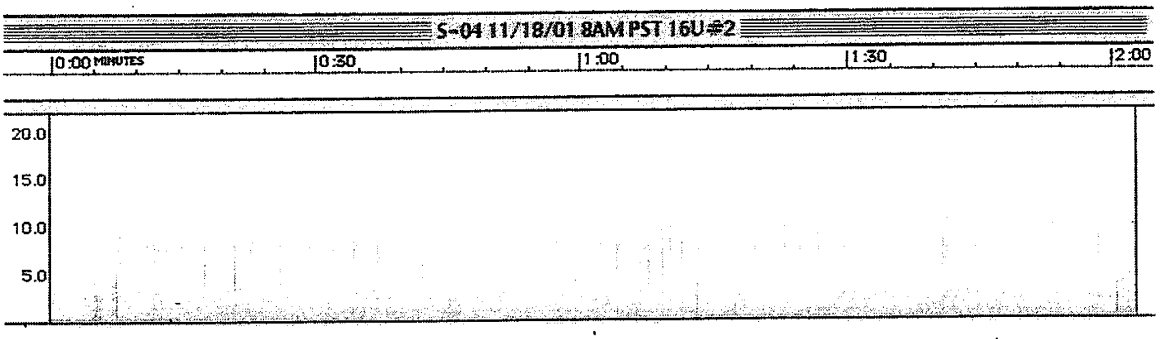


11/18/01 1500 UT 8 AM CST Team I-03 Robert Bennett, Las Cruces, NM

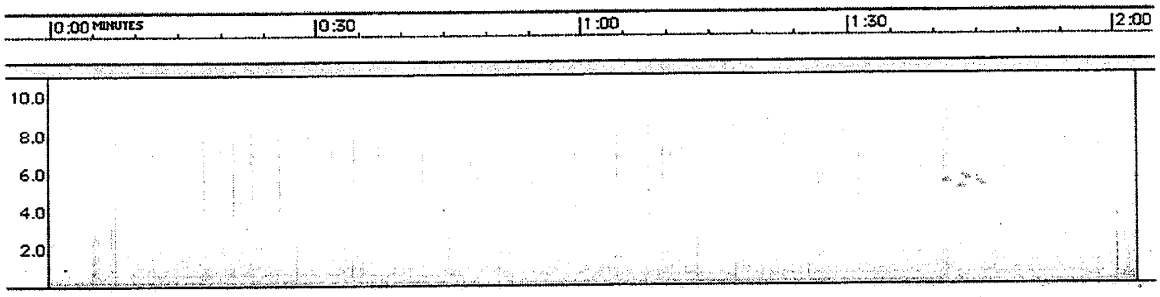


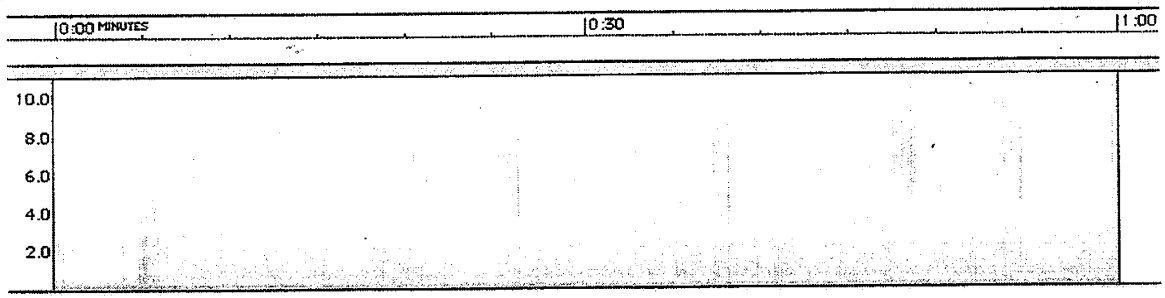
11/18/01 1600 UT 8 AM PST Team S-4 Chaffey High School, Ontario, CA

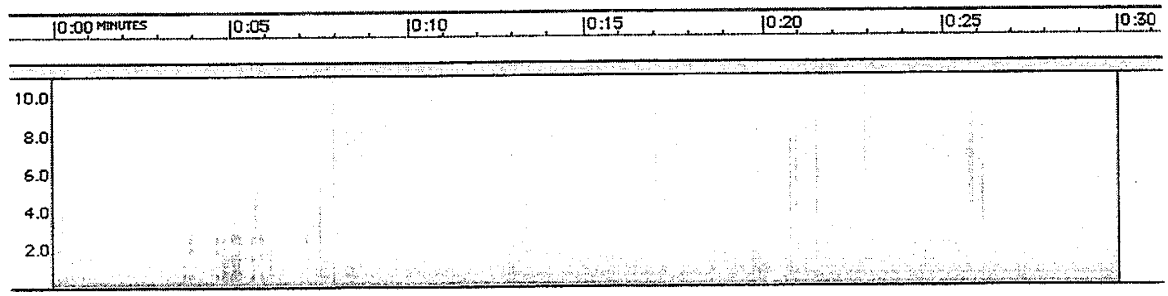
Chaffey observers on November 18 included Anna Choe, Lorena Flores, Daisy Medina, Elizabeth Mercado, and Shelley Su.



Conditions were again quiet with medium density sferics.

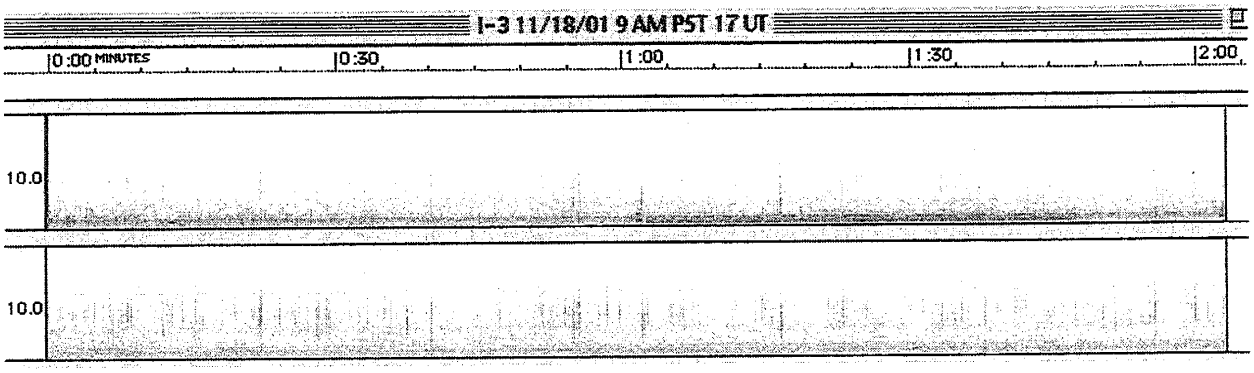




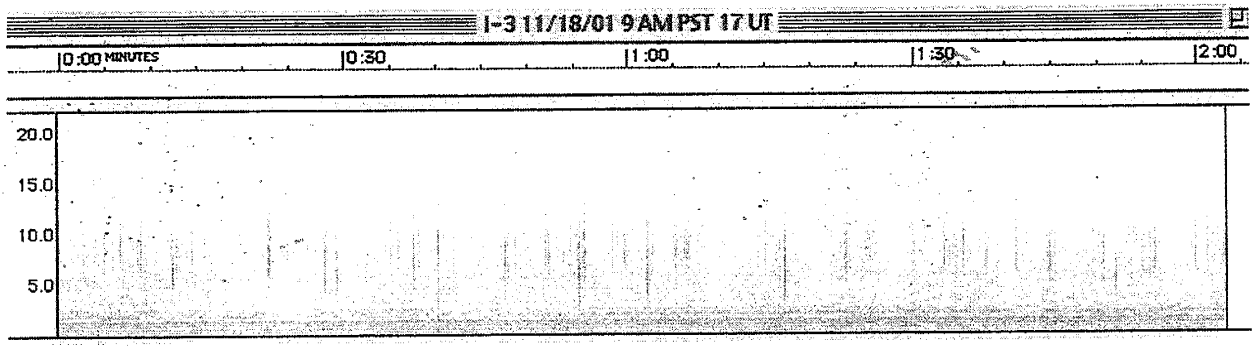


11/18/01 1700 UT 9 AM PST Team I-4 Mitchell Lee, San Jose, CA

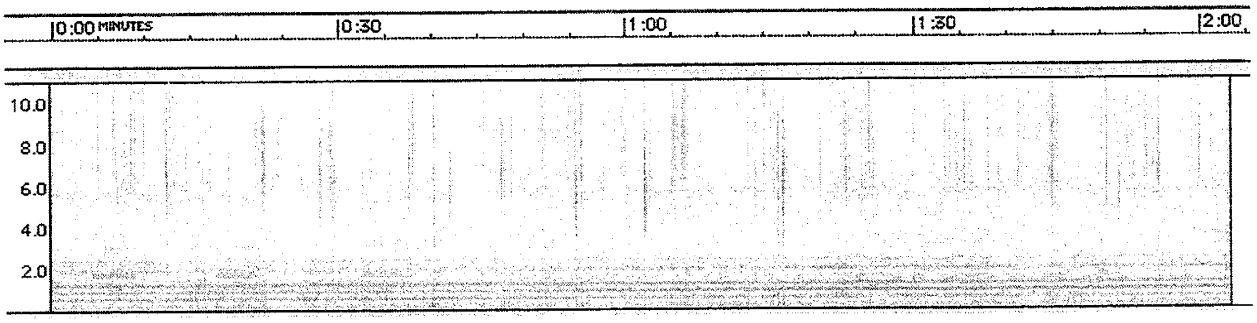
New observer, Mitchell Lee of San Jose, California, was observing from Onion Valley in the High Sierras. Conditions in Northern California were very similar to those recorded in Southern California. Mitchell logged occasional tweeks and a couple of whistlers. No whistlers were detected in Southern California.



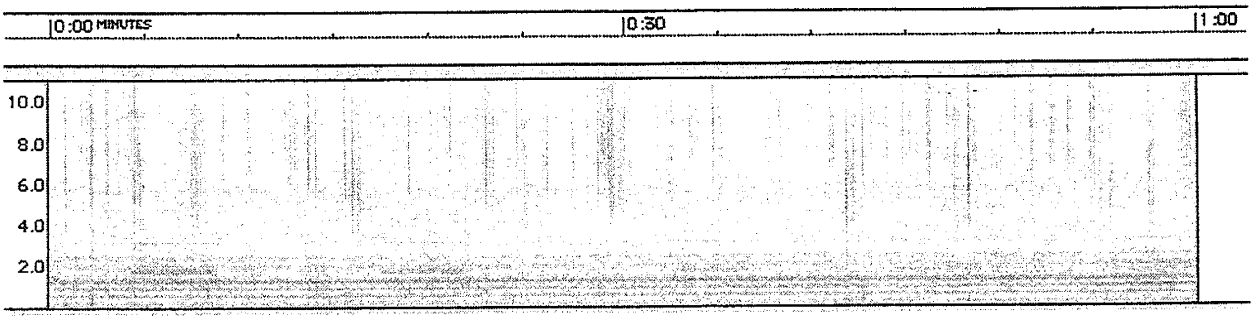
WWV is on the top channel, natural radio on the bottom channel.



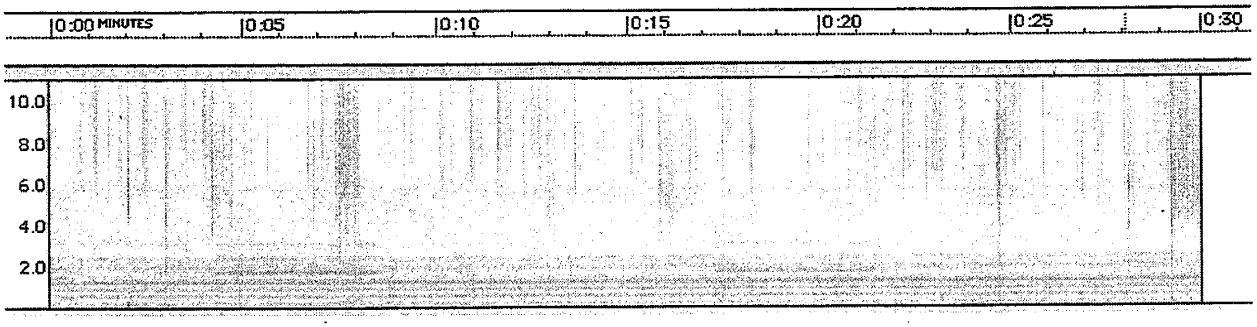
This is the data channel using a 0-22 kHz frequency range and showing the first two minutes.



The first two minutes using a 0-11 kHz frequency range. Horizontal bands below 2 kHz show a low level of 60 Hz hum and harmonics. The sferics are easily the predominate signal on the tape.



The first minute.



The first 30 seconds.

The conclusion of the 1700 UT observations marked the end of the November 2001 Coordinated Observing schedule.