

Spaced Spectrograph Observation of the 09 Dec 2016 Io-C Event

Dave Typinski, December 2016

Here is a visual comparison of the dynamic spectra of the Dec 9, 2016 Io-C event as recorded by a suite of spaced spectrographs comprised of four SUG stations. The stations are:

Station Details					
Station	Observer	Location	Array	Array Gain	Receiver
AJ4CO	Dave Typinski	High Springs, FL	8-element TFD	17 dBi	DPS
HNRAO	Jim Brown	Industry, PA	4-element TFD	14 dBi	FSX-8S
LGM	Wes Greenman	Alachua, FL	4-element TFD	14 dBi	FSX-1S
MTSU	Chuck Higgins	Murfreesboro, TN	4-element TFD	14 dBi	FSX-6S

The distances between these spaced spectrographs are:

Distance Between Stations (miles)				
	AJ4CO	HNRAO	LGM	MTSU
AJ4CO		759	10	469
HNRAO	759		760	464
LGM	10	760		476
MTSU	469	464	476	

Visual comparison of the dynamic spectra in the following two pages shows some interesting things.

1) The ionosphere is one harsh mistress. There are many differences in the dynamic spectra attributable to different ionospheric seeing conditions at each station.

2) MTSU has relocated the array and replaced the main feed line, but has not yet had a chance to re-configure the correction array. The correction array used in this analysis is an old one. As such, the background in the corrected MTSU spectrograms does not look smooth. The polarization subtraction spectra for MTSU are also not as good as they could be, for the same reason. This shows the importance of making a new correction array after any changes made to the antenna, feed line, or receiver. If an out-of-date correction array is used, the results are not as useful.

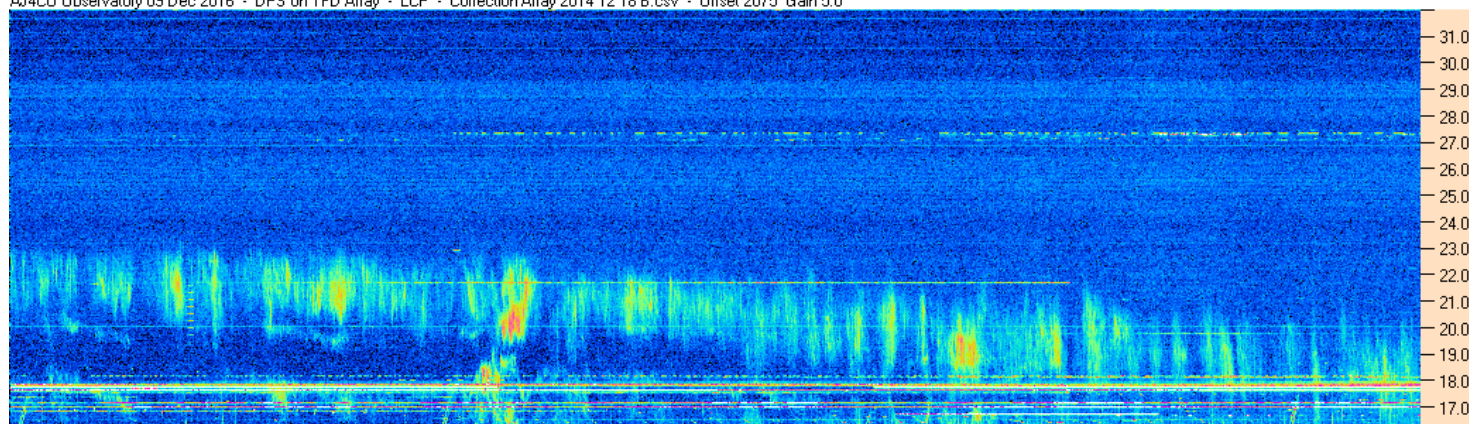
3) HNRAO was futzing with the antenna & receiver combinations during this observation, but there is a period long enough near the end to make a good comparison with the other stations.

4) It is important to optimize the color gain and color offset in RSS. With the color gains and offsets shown, the HNRAO and LGM spectra look like they are about 3 dB down compared to AJ4CO as one would expect. HNRAO is perhaps a tiny bit further down (another 1 dB?), possibly due to the lower transit elevation of Jupiter as seen from Pennsylvania – a combination of slightly less antenna response lower to the horizon and a little more ionospheric attenuation due to the slightly longer path length through the ionosphere. The MTSU spectra might look better if higher gains and offsets could be used; but, the lack of a more accurate correction array prevents this.

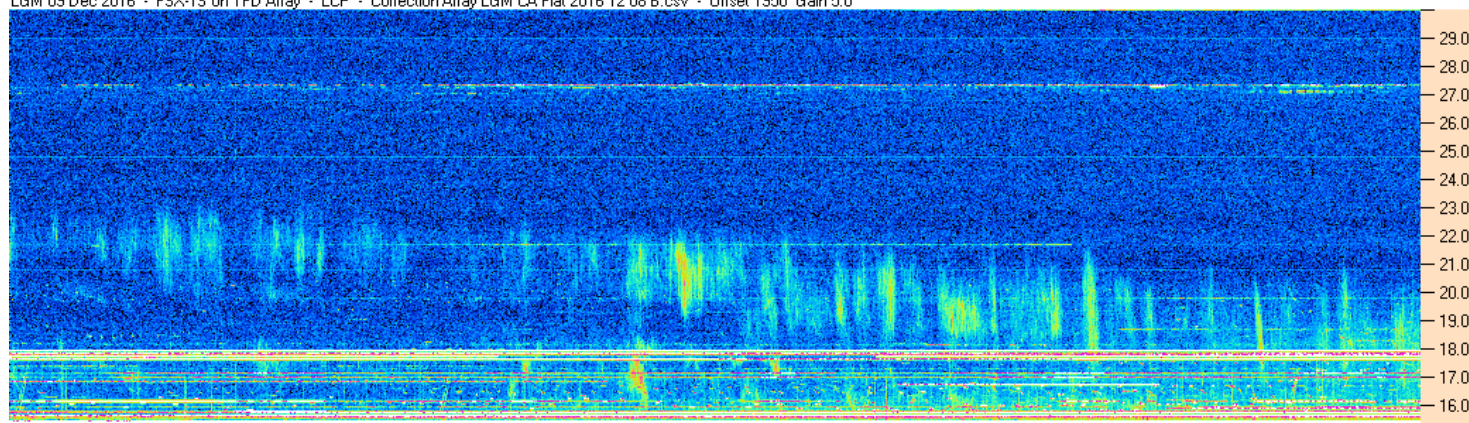
Pages 2 and 3 compare the stations' dynamic spectra. The remaining pages provide the full corrected spectra (LCP and RCP) for each station and the polarization subtraction spectra for each station.

Comparison of All Four Observatories' Dynamic Spectra – 1300 to 1340 UTC

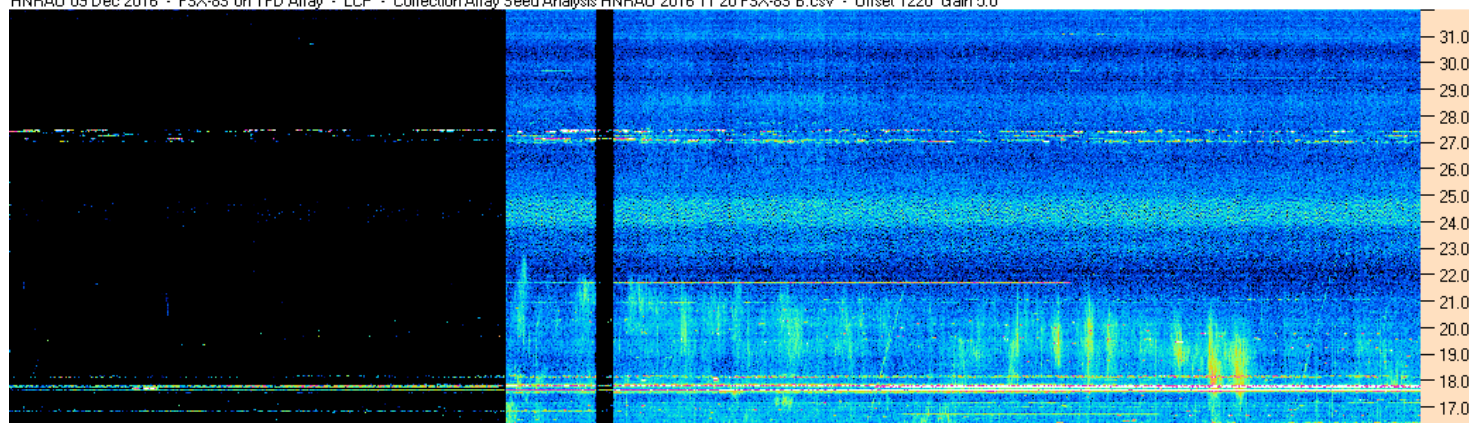
AJ4CO Observatory 09 Dec 2016 - DPS on TFD Array - LCP - Correction Array 2014 12 18 B.csv - Offset 2075 Gain 5.0



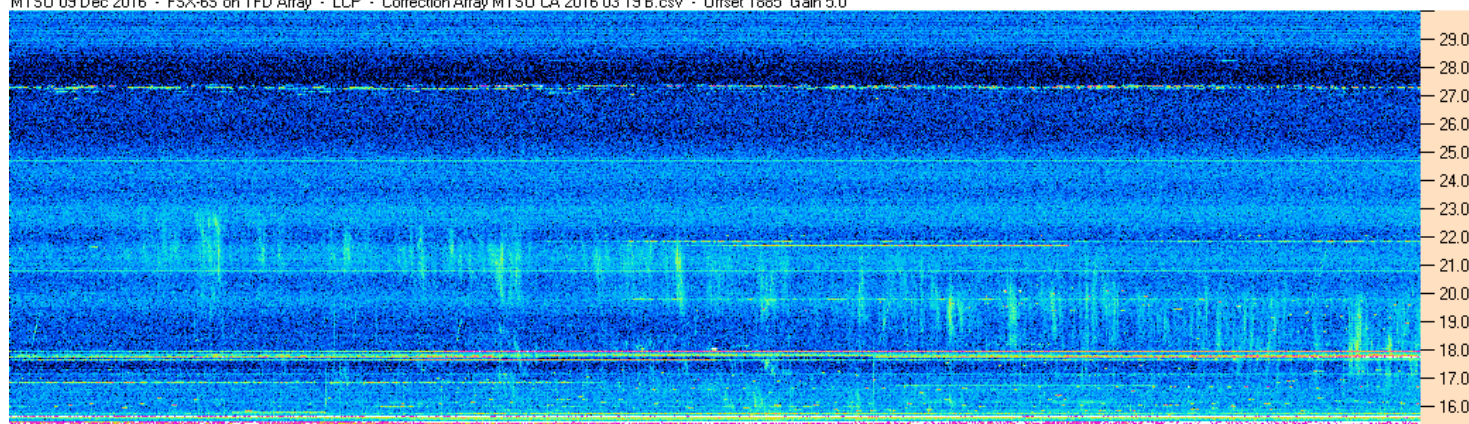
LGM 09 Dec 2016 - FSX-1S on TFD Array - LCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 1950 Gain 5.0



HNRAD 09 Dec 2016 - FSX-8S on TFD Array - LCP - Correction Array Seed Analysis HNRAD 2016 11 20 FSX-8S B.csv - Offset 1220 Gain 5.0



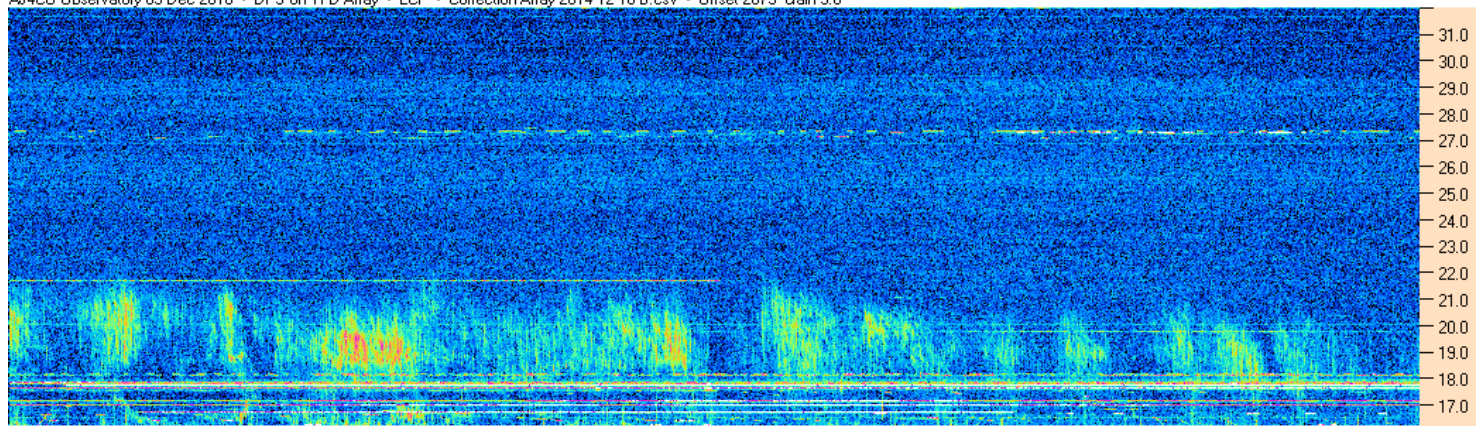
MTSU 09 Dec 2016 - FSX-6S on TFD Array - LCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 1885 Gain 5.0



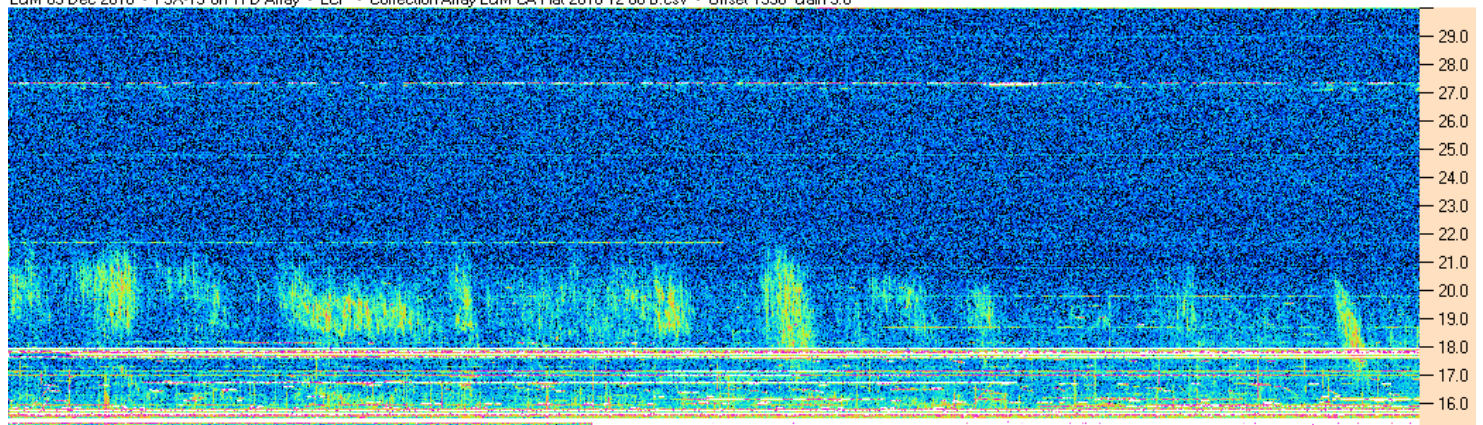
13:00:00 13:04:00 13:08:00 13:12:00 13:16:00 13:20:00 13:24:00 13:28:00 13:32:00 13:36:00 13:40:00

Comparison of All Four Observatories' Dynamic Spectra – 1324 to 1336 UTC

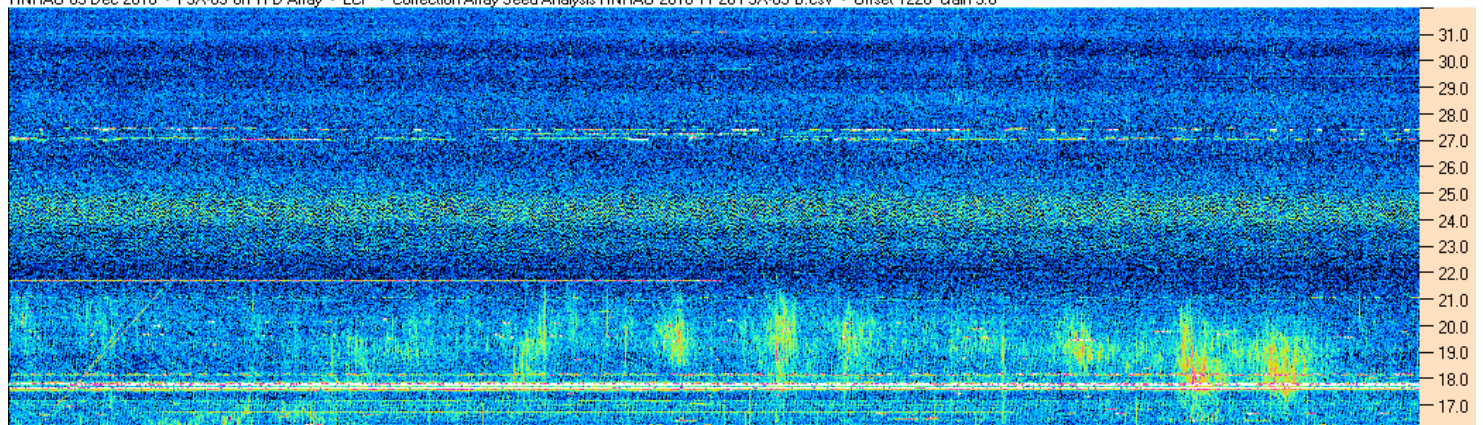
AJ4C0 Observatory 09 Dec 2016 - DPS on TFD Array - LCP - Correction Array 2014 12 18 B.csv - Offset 2075 Gain 5.0



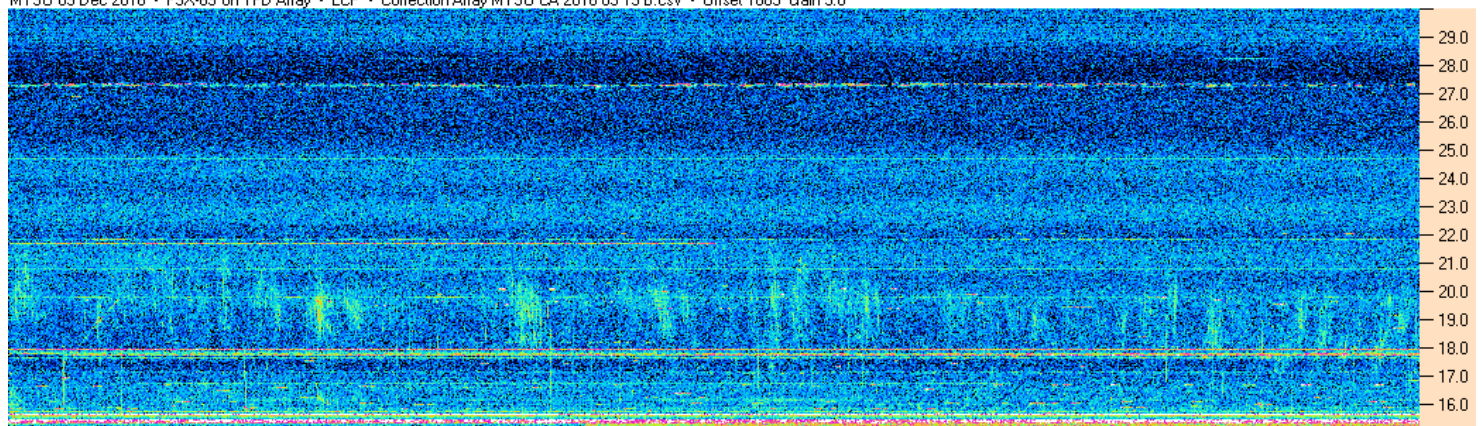
LGM 09 Dec 2016 - FSX-1S on TFD Array - LCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 1950 Gain 5.0



HNRAD 09 Dec 2016 - FSX-8S on TFD Array - LCP - Correction Array Seed Analysis HNRAD 2016 11 20 FSX-8S B.csv - Offset 1220 Gain 5.0



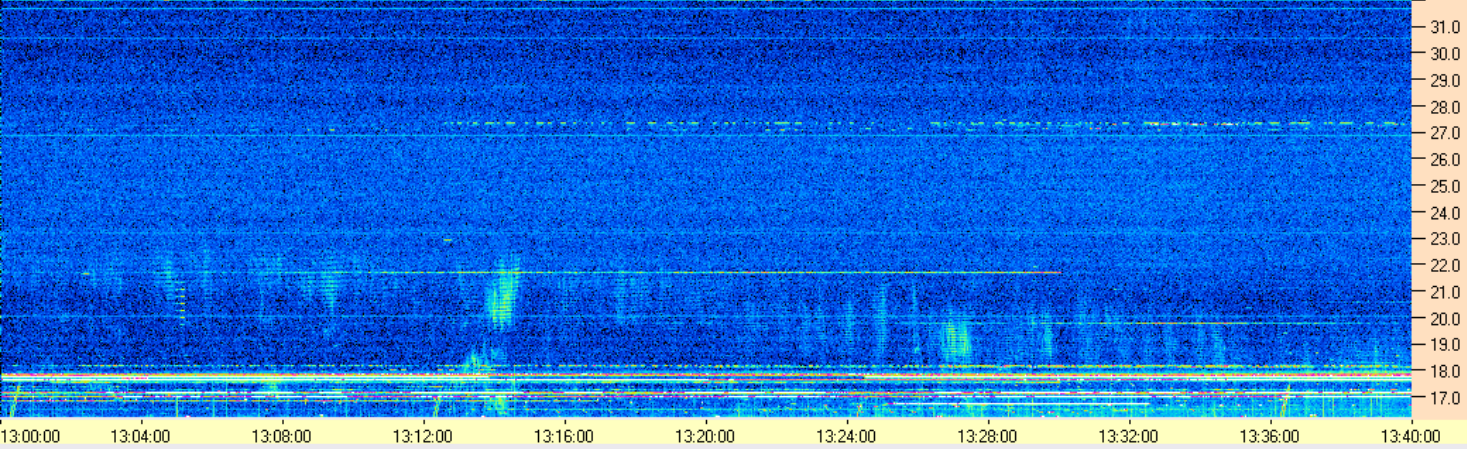
MTSU 09 Dec 2016 - FSX-6S on TFD Array - LCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 1885 Gain 5.0



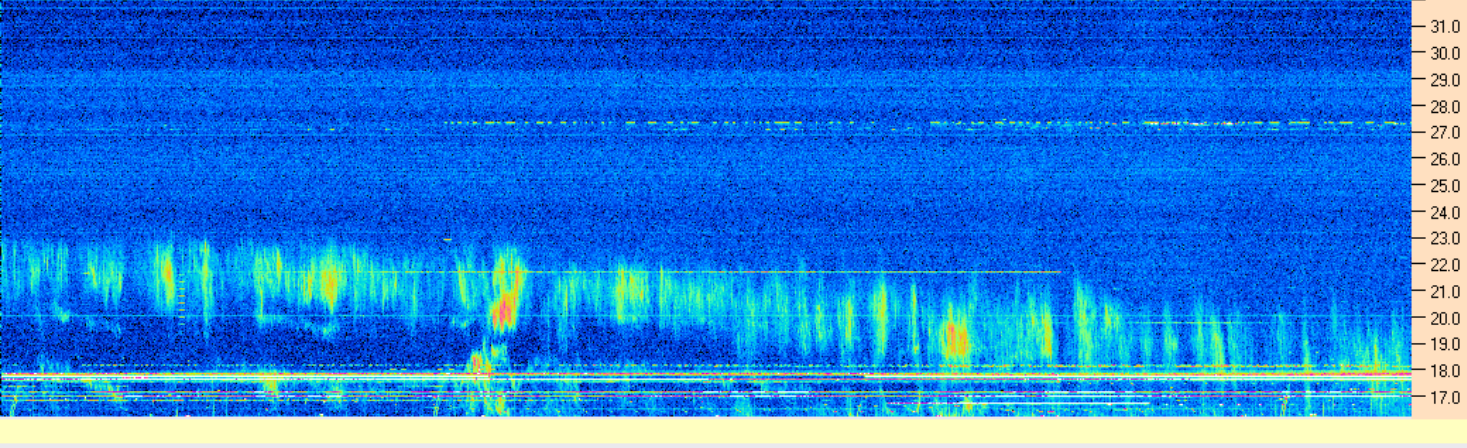
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AJ4CO Data – 1300 to 1340 UTC

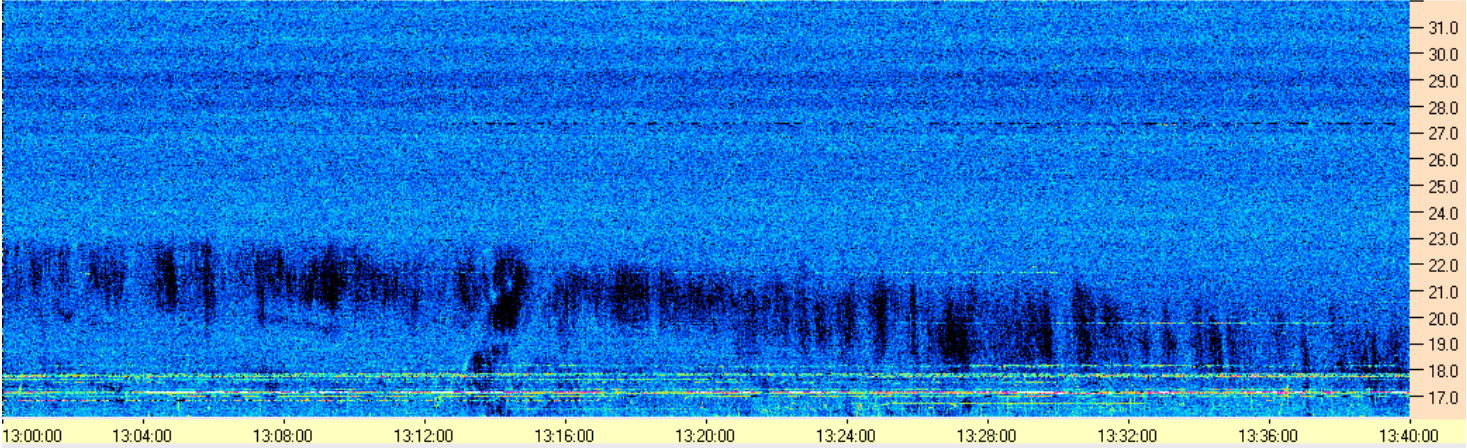
AJ4CO Observatory 09 Dec 2016 - DPS on TFD Array - RCP - Correction Array 2014 12 18 B.csv - Offset 2075 Gain 5.0



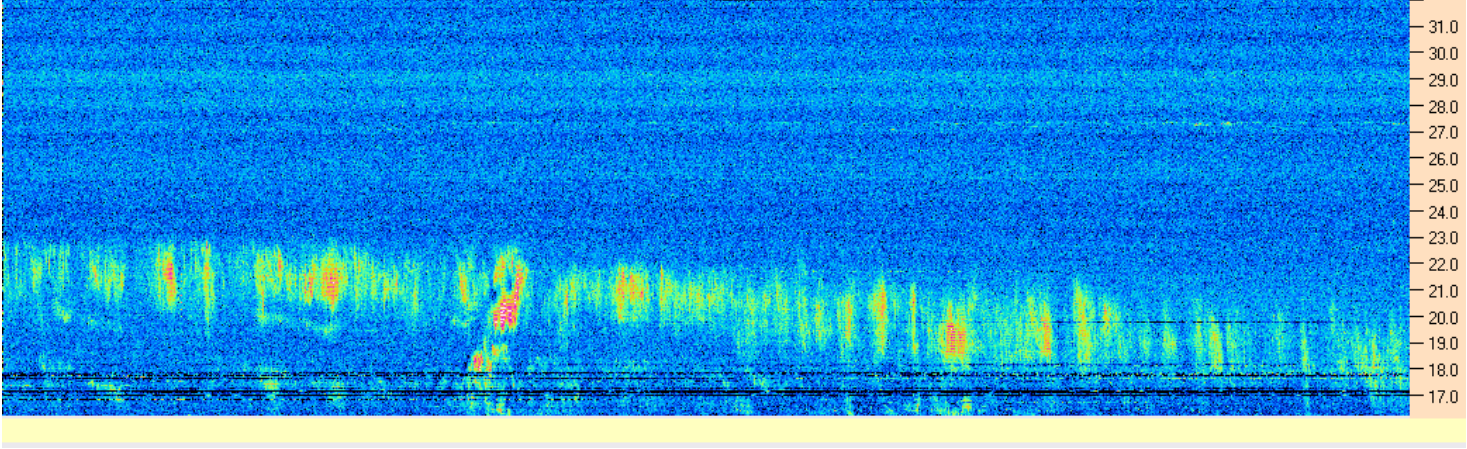
AJ4CO Observatory 09 Dec 2016 - DPS on TFD Array - LCP - Correction Array 2014 12 18 B.csv - Offset 2075 Gain 5.0



AJ4CO Observatory 09 Dec 2016 - DPS on TFD Array - RCP-LCP - Correction Array 2014 12 18 B.csv - Offset 50 Gain 2.0

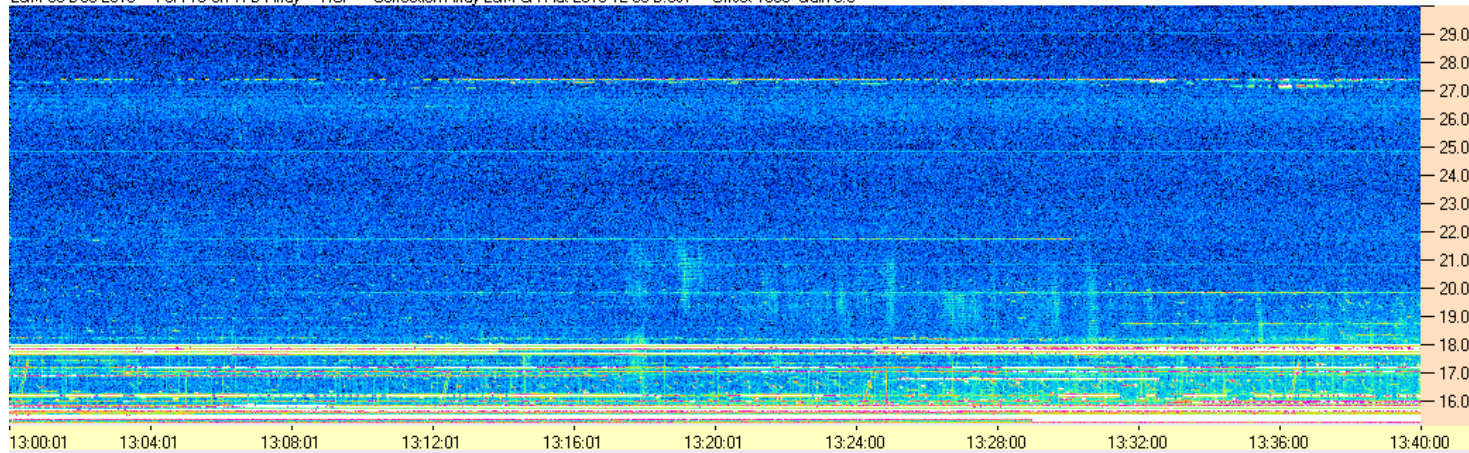


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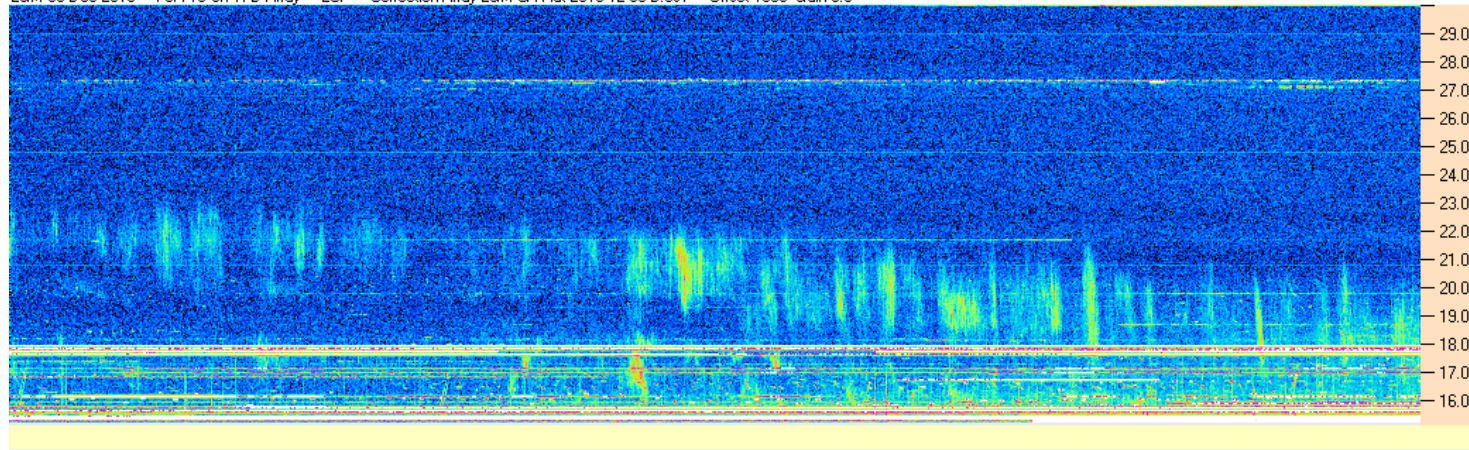


LGM Data – 1300 to 1340 UTC

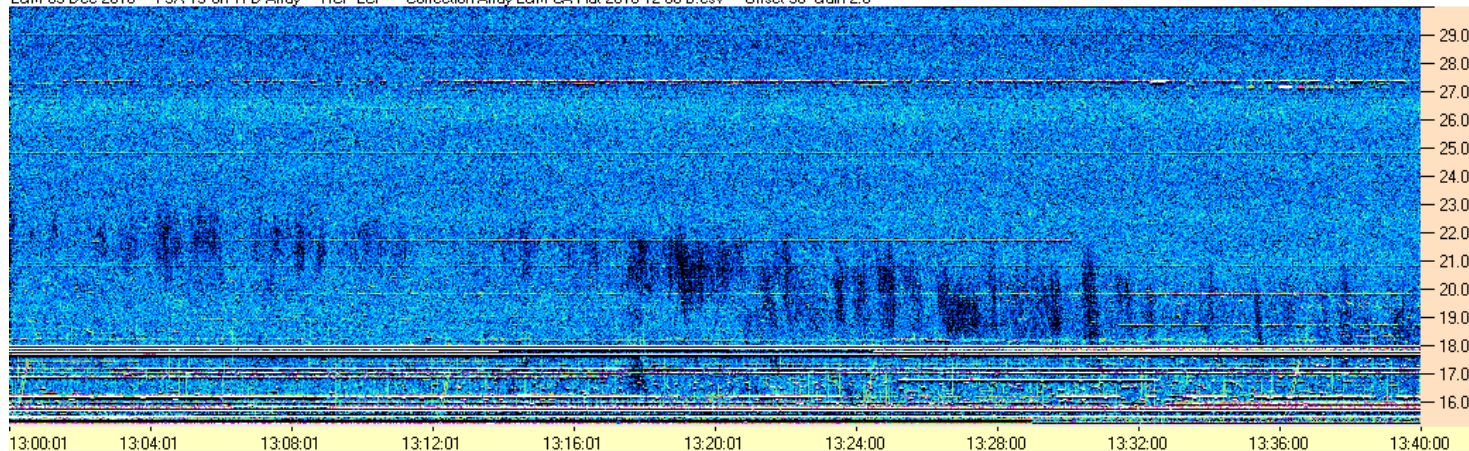
LGM 09 Dec 2016 - FSX-1S on TFD Array - RCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 1950 Gain 5.0



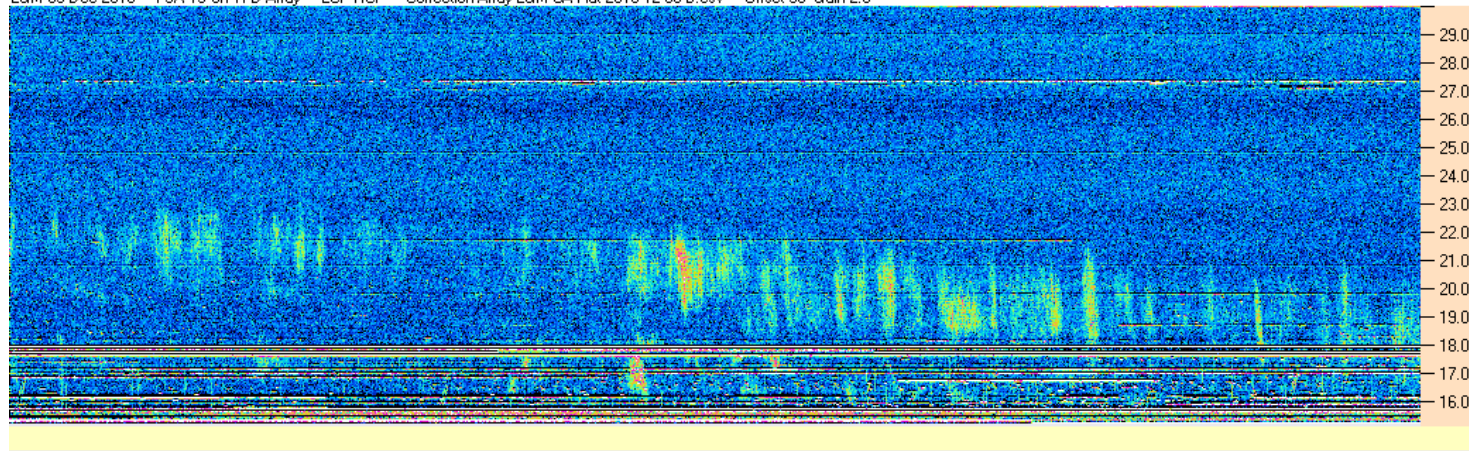
LGM 09 Dec 2016 - FSX-1S on TFD Array - LCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 1950 Gain 5.0



LGM 09 Dec 2016 - FSX-1S on TFD Array - RCP-LCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 50 Gain 2.0

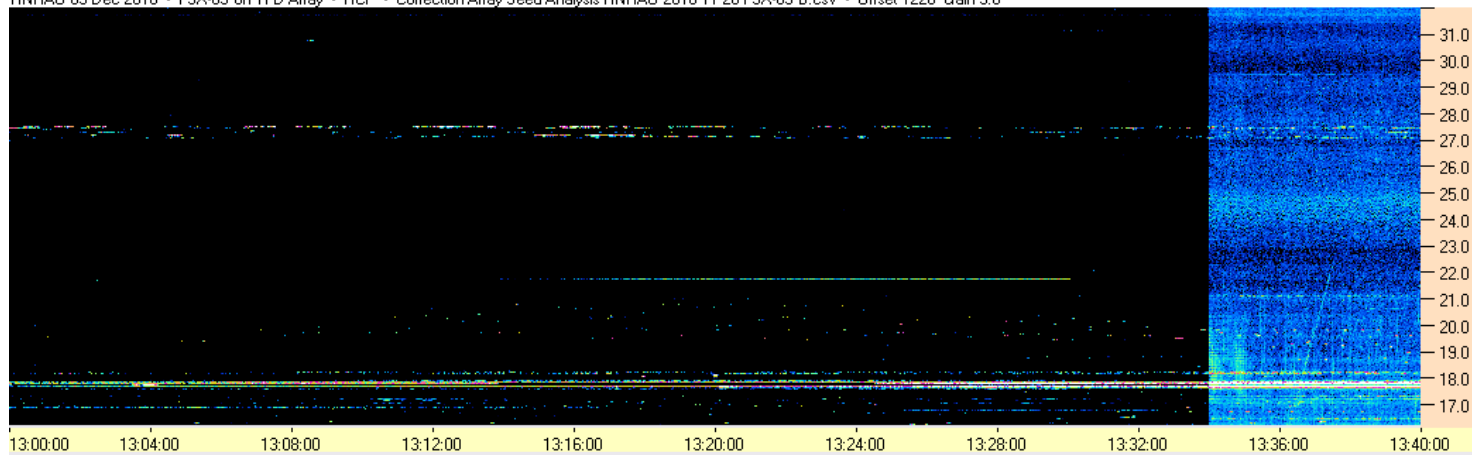


LGM 09 Dec 2016 - FSX-1S on TFD Array - LCP-RCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 50 Gain 2.0

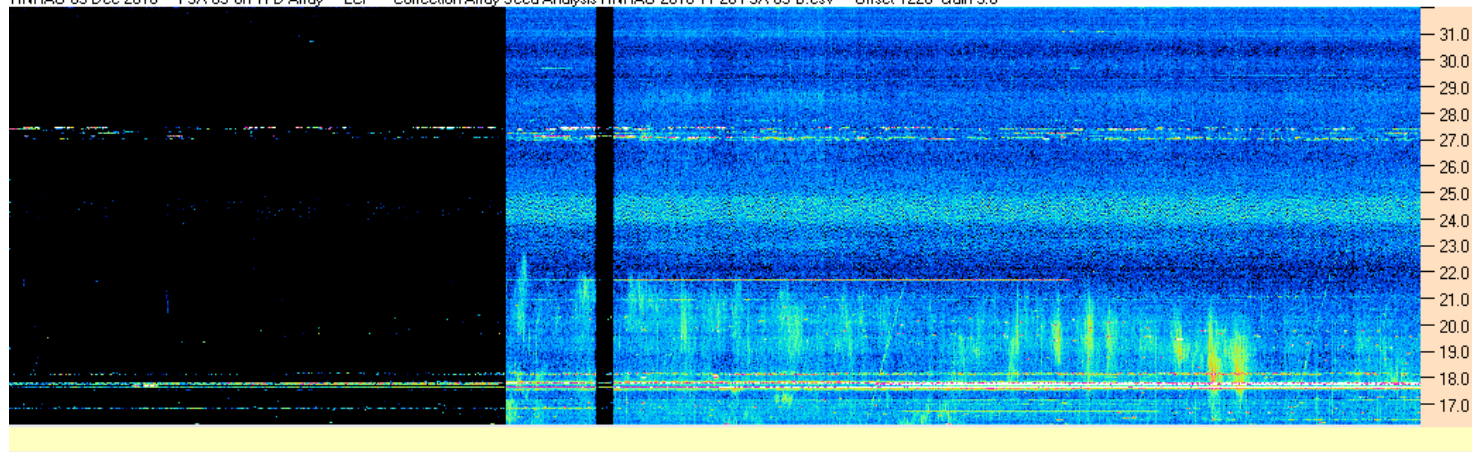


HNRAO Data – 1300 to 1340 UTC

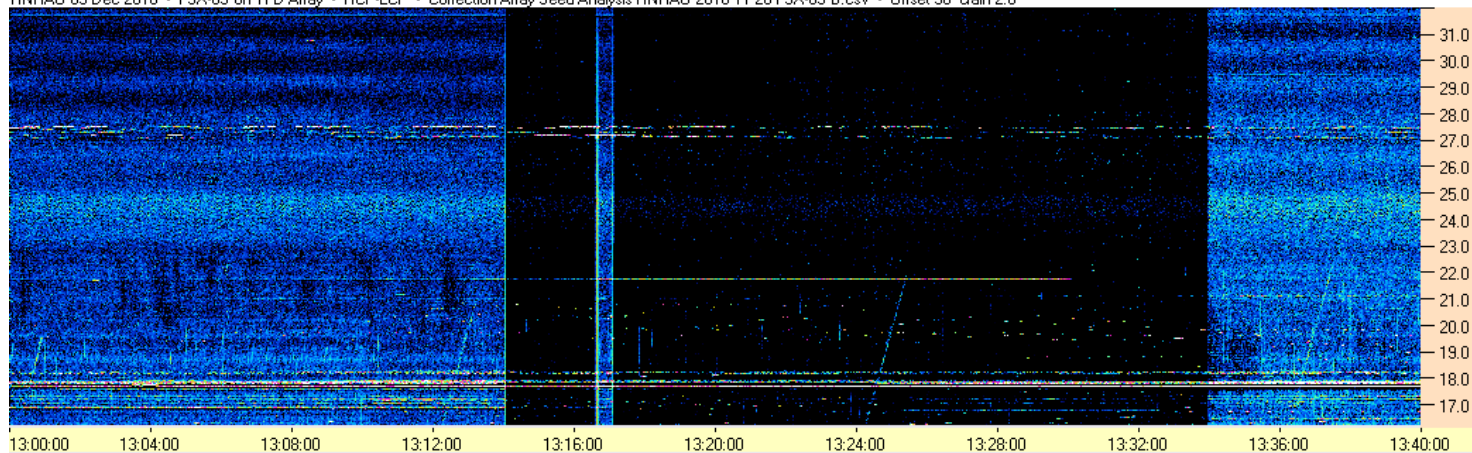
HNRAO 09 Dec 2016 - FSX-8S on TFD Array - RCP - Correction Array Seed Analysis HNRAO 2016 11 20 FSX-8S B.csv - Offset 1220 Gain 5.0



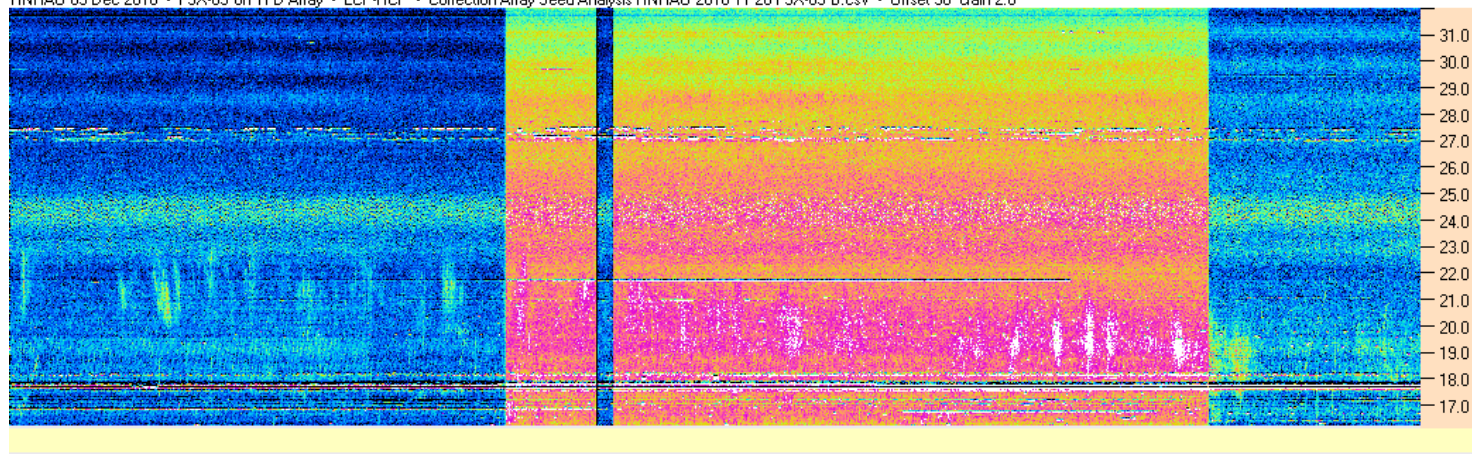
HNRAO 09 Dec 2016 - FSX-8S on TFD Array - LCP - Correction Array Seed Analysis HNRAO 2016 11 20 FSX-8S B.csv - Offset 1220 Gain 5.0



HNRAO 09 Dec 2016 - FSX-8S on TFD Array - RCP-LCP - Correction Array Seed Analysis HNRAO 2016 11 20 FSX-8S B.csv - Offset 50 Gain 2.0

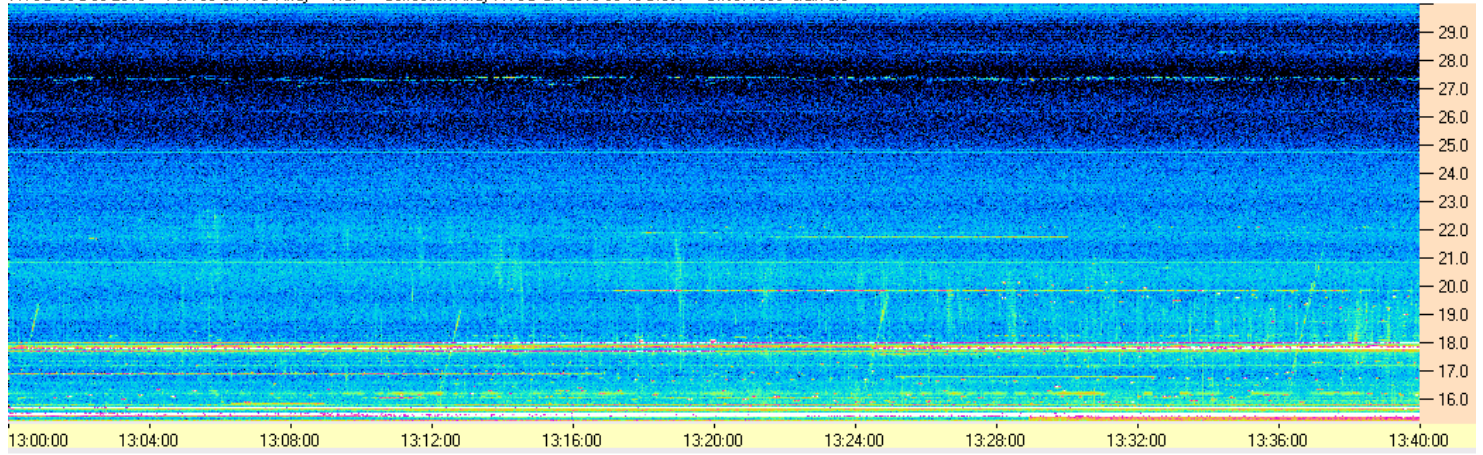


HNRAO 09 Dec 2016 - FSX-8S on TFD Array - LCP-RCP - Correction Array Seed Analysis HNRAO 2016 11 20 FSX-8S B.csv - Offset 50 Gain 2.0

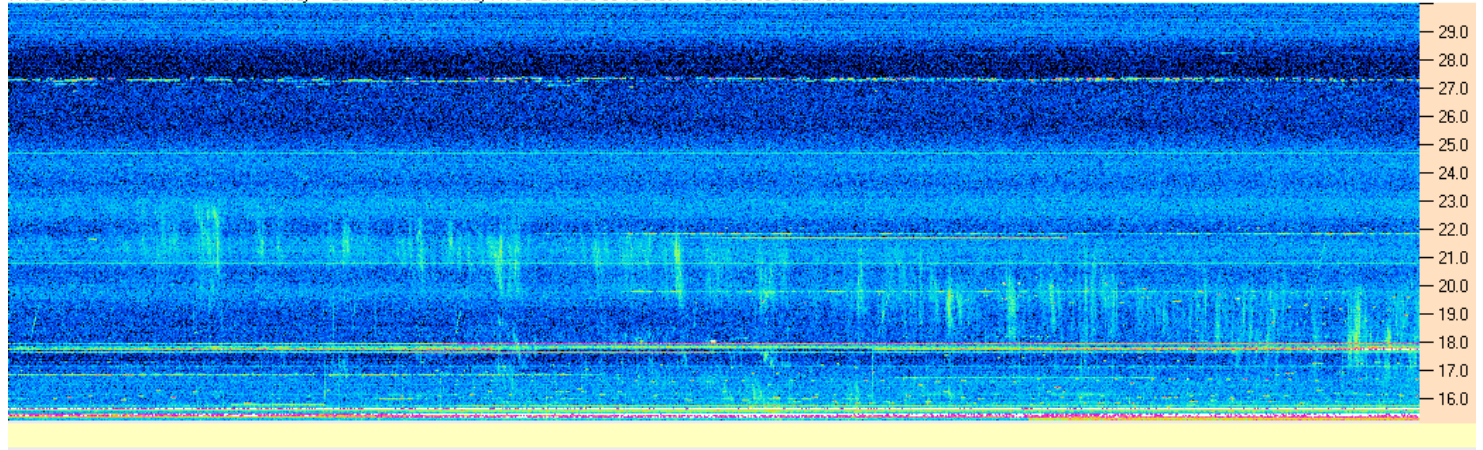


MTSU Data – 1300 to 1340 UTC

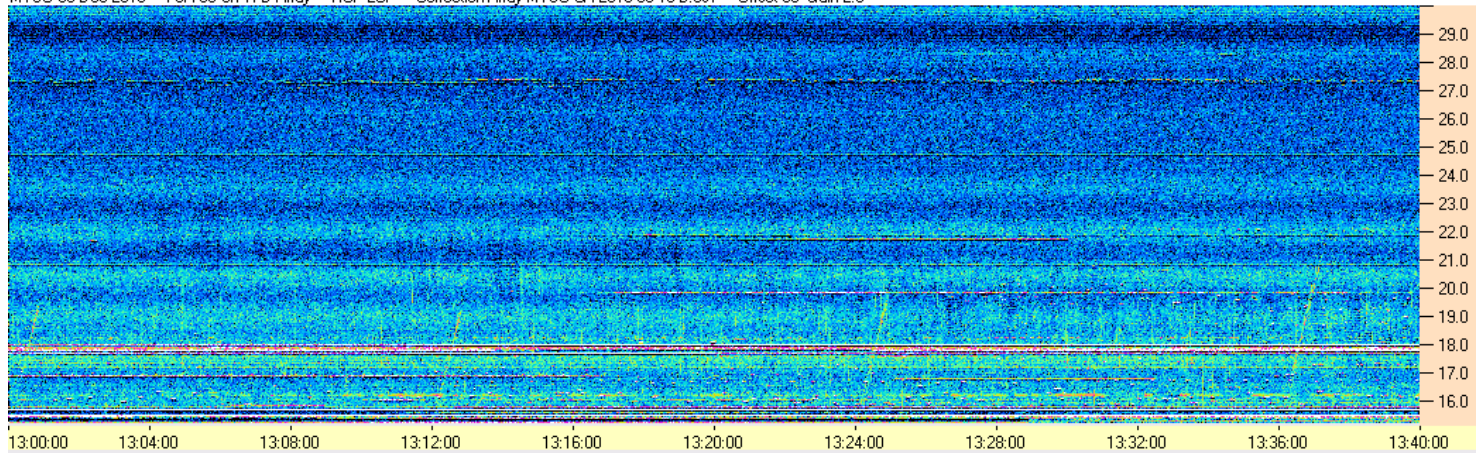
MTSU 09 Dec 2016 - FSX-6S on TFD Array - RCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 1885 Gain 5.0



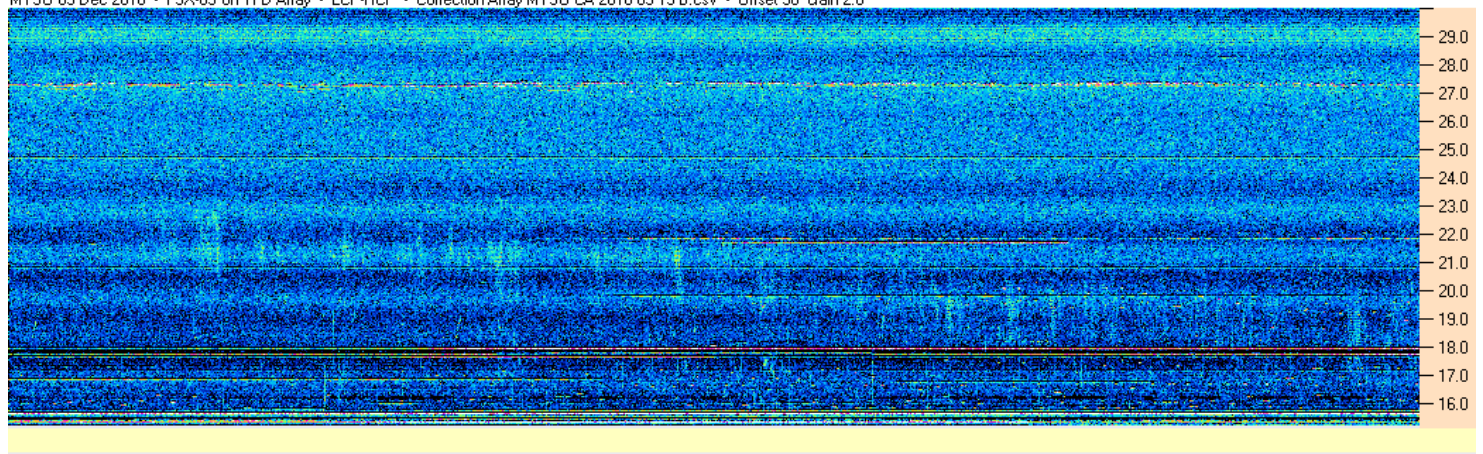
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MTSU 09 Dec 2016 - FSX-6S on TFD Array - RCP-LCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 50 Gain 2.0

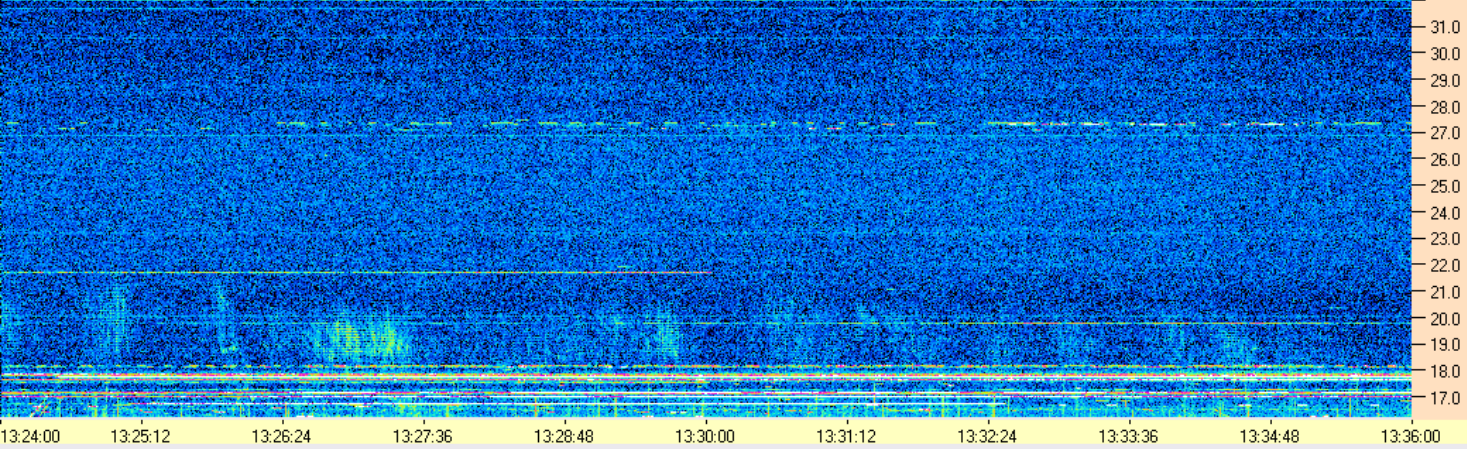


MTSU 09 Dec 2016 - FSX-6S on TFD Array - LCP-RCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 50 Gain 2.0

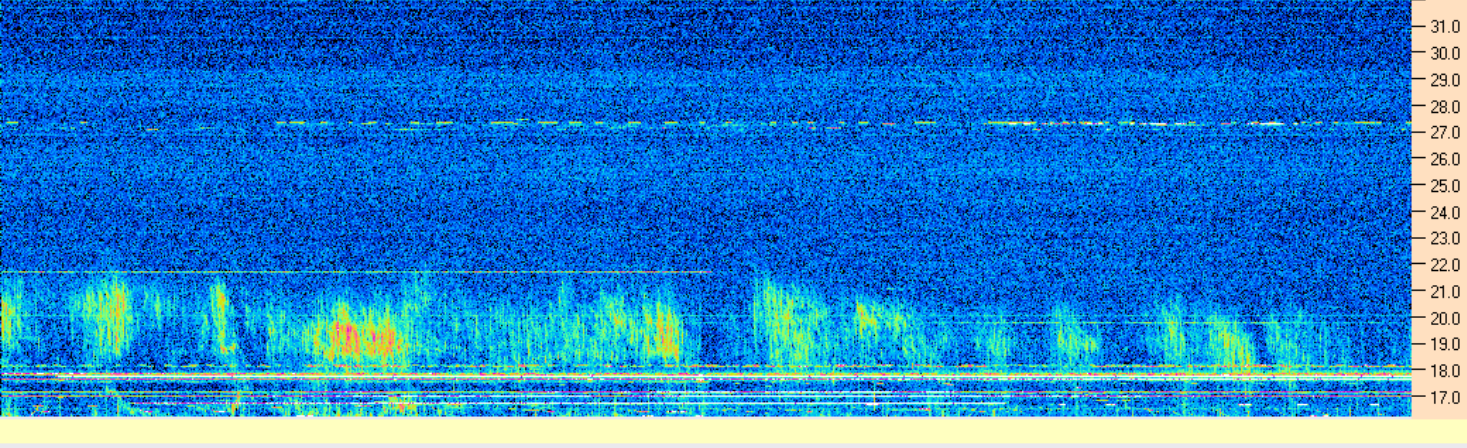


AJ4CO Data – 1324 to 1336 UTC

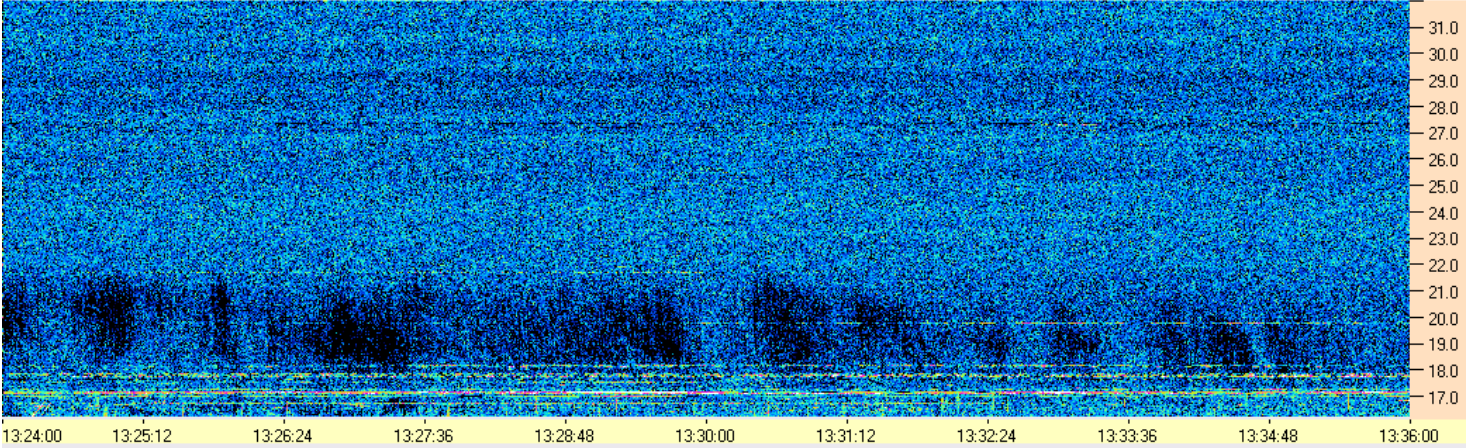
AJ4CO Observatory 09 Dec 2016 - DPS on TFD Array - RCP - Correction Array 2014 12 18 B.csv - Offset 2075 Gain 5.0



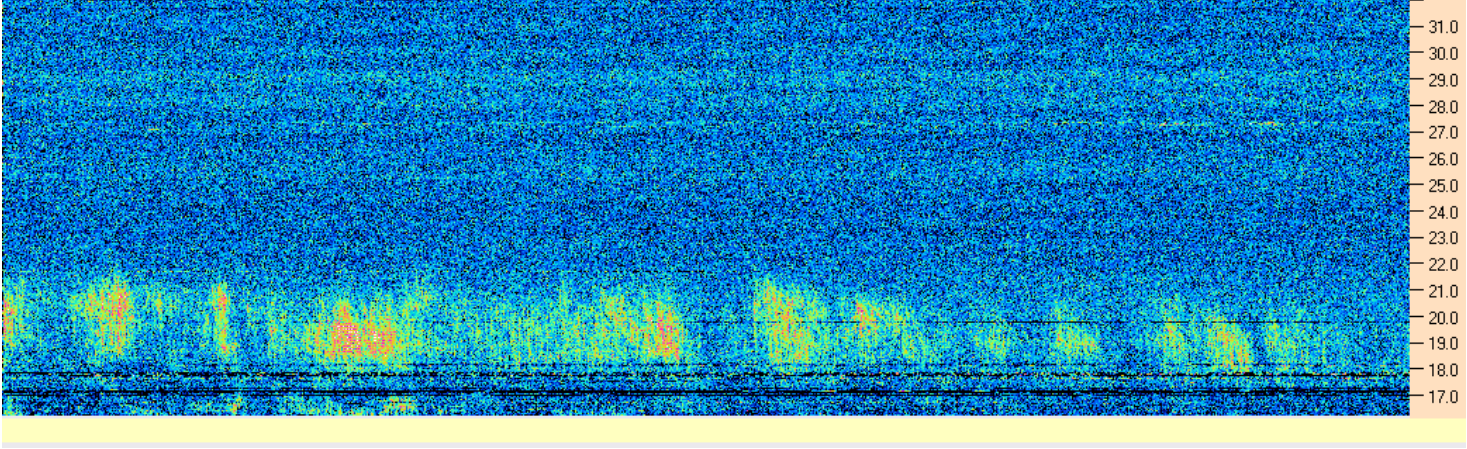
AJ4CO Observatory 09 Dec 2016 - DPS on TFD Array - LCP - Correction Array 2014 12 18 B.csv - Offset 2075 Gain 5.0



AJ4CO Observatory 09 Dec 2016 - DPS on TFD Array - RCP-LCP - Correction Array 2014 12 18 B.csv - Offset 50 Gain 2.0

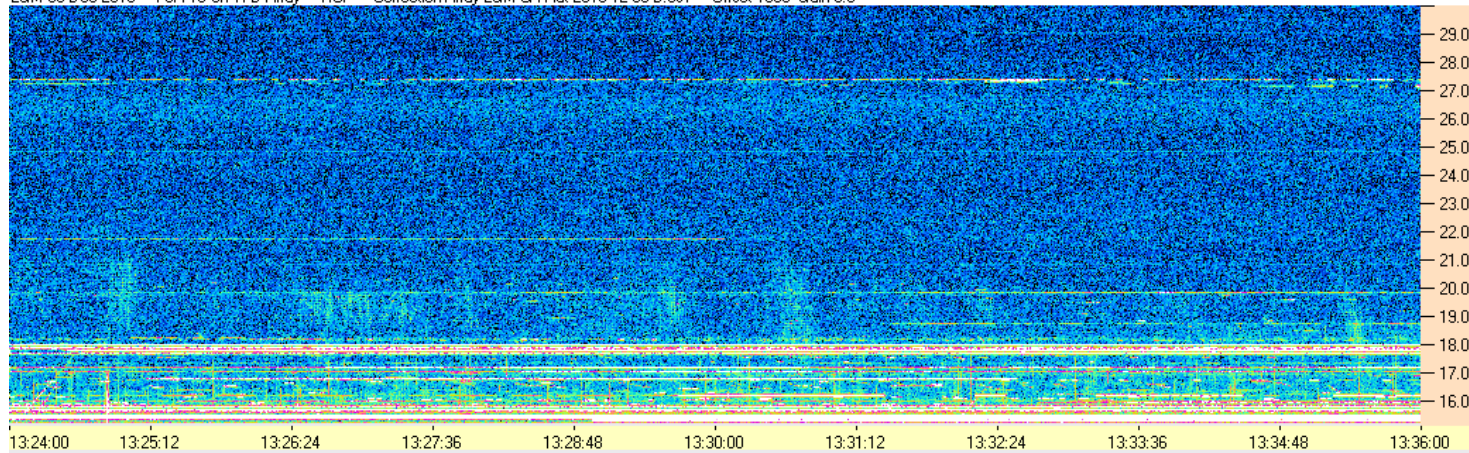


AJ4CO Observatory 09 Dec 2016 - DPS on TFD Array - LCP-RCP - Correction Array 2014 12 18 B.csv - Offset 50 Gain 2.0

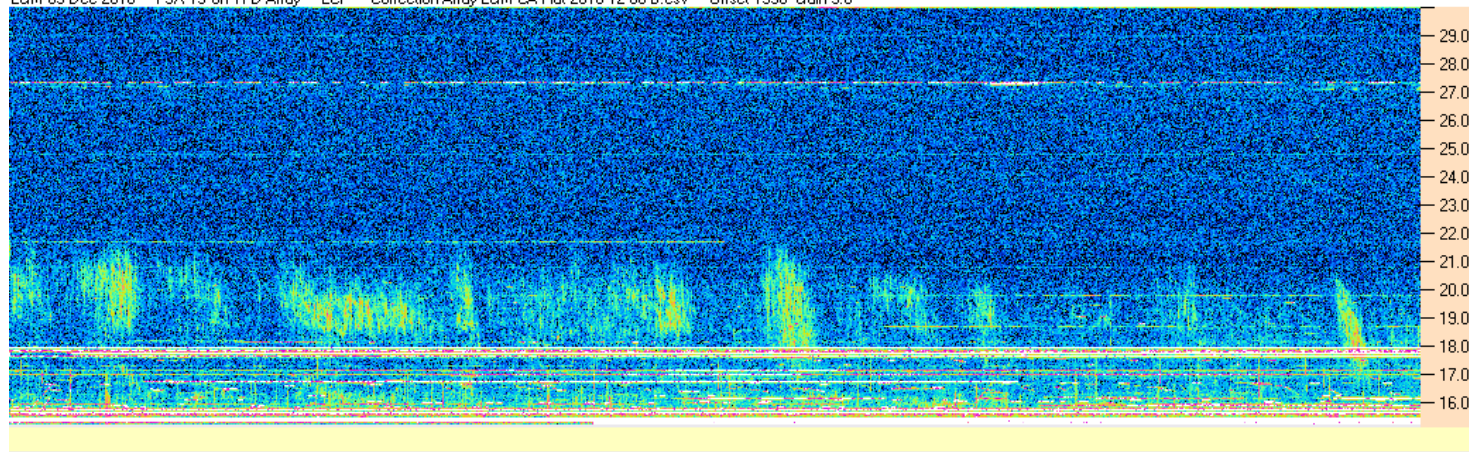


LGM Data – 1324 to 1336 UTC

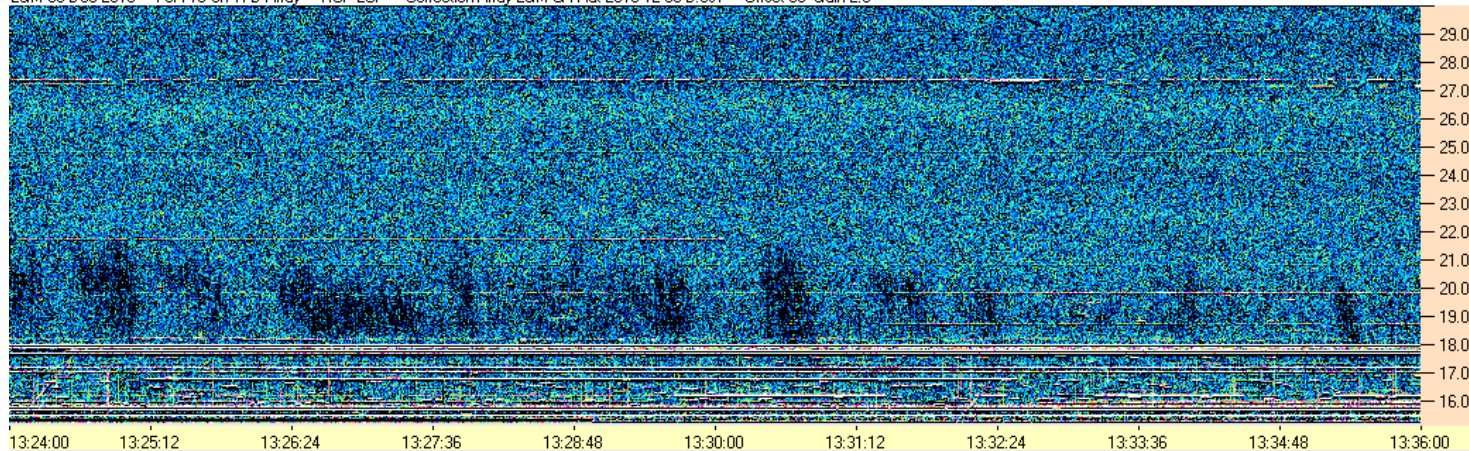
LGM 09 Dec 2016 - FSX-1S on TFD Array - RCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 1950 Gain 5.0



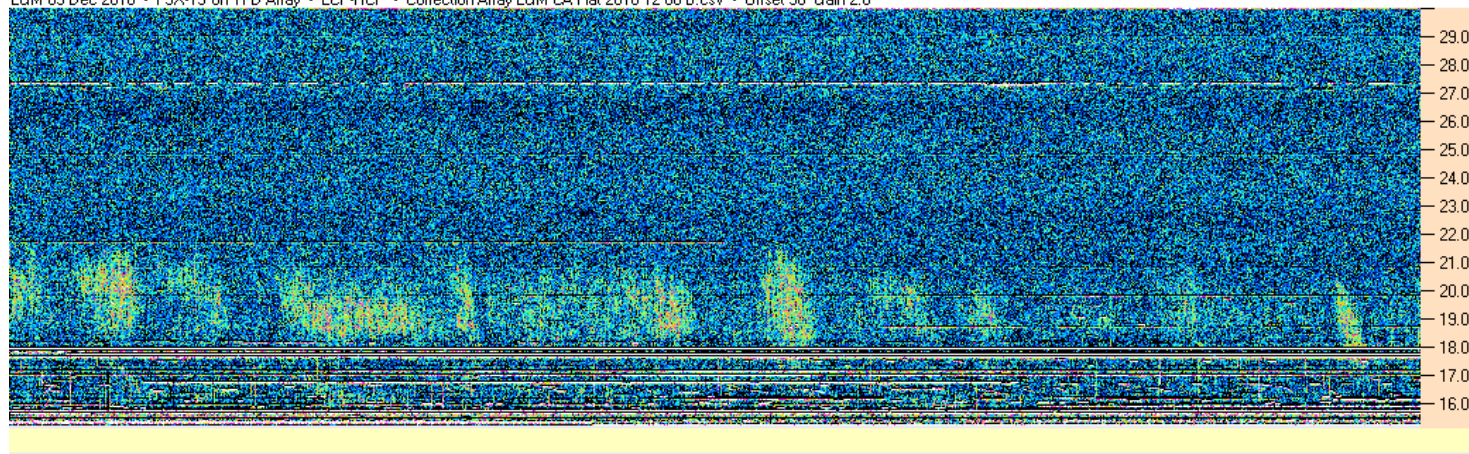
LGM 09 Dec 2016 - FSX-1S on TFD Array - LCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 1950 Gain 5.0



LGM 09 Dec 2016 - FSX-1S on TFD Array - RCP-LCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 50 Gain 2.0

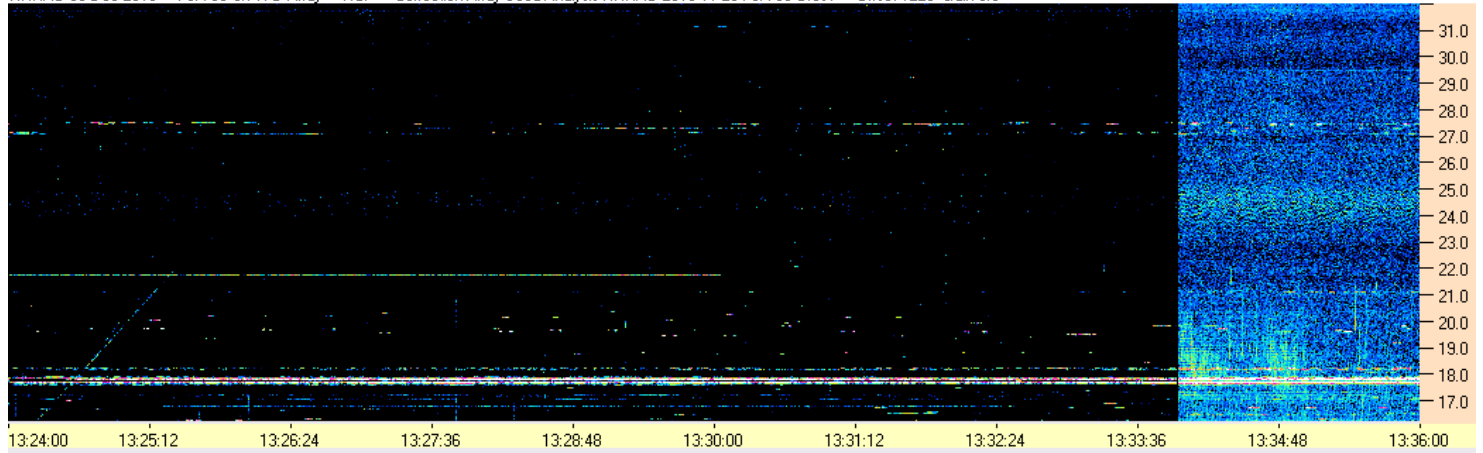


LGM 09 Dec 2016 - FSX-1S on TFD Array - LCP-RCP - Correction Array LGM CA Flat 2016 12 08 B.csv - Offset 50 Gain 2.0

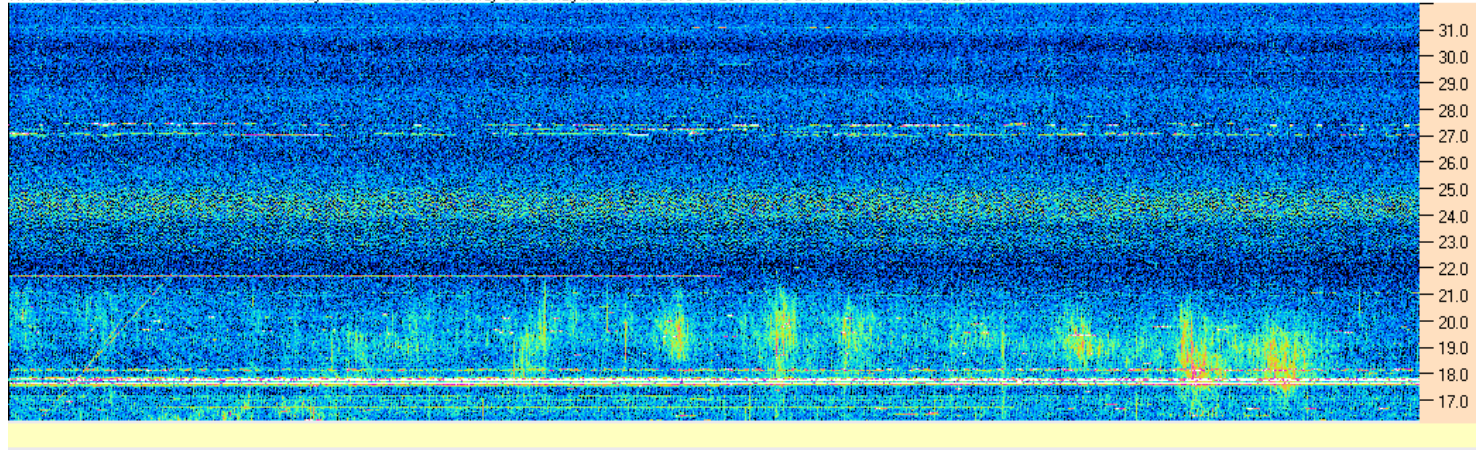


HNRAO Data – 1324 to 1336 UTC

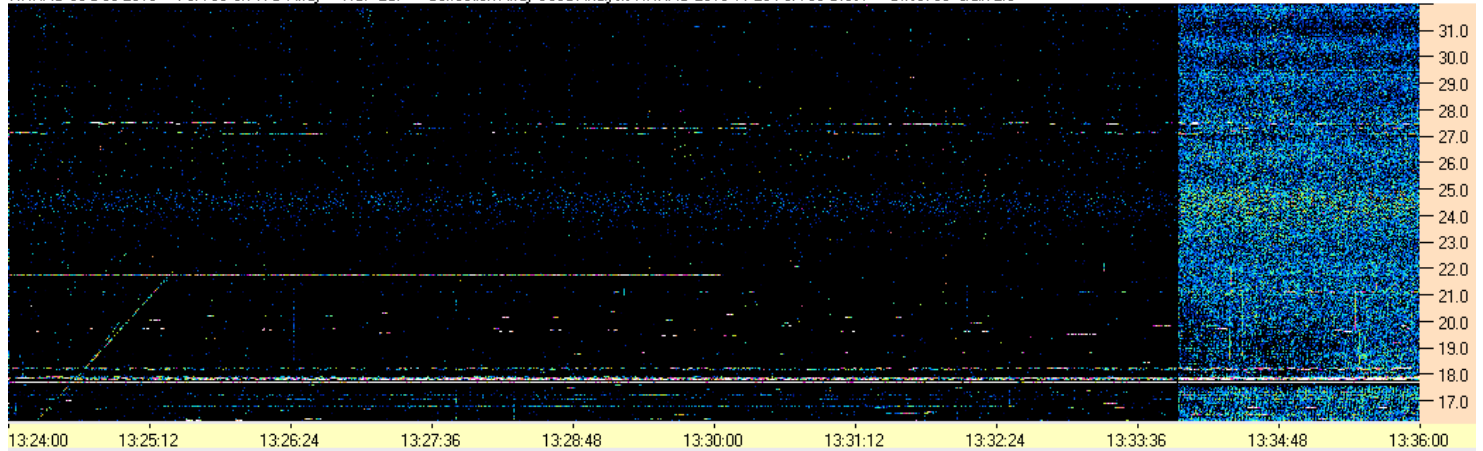
HNRAO 09 Dec 2016 - FSX-8S on TFD Array - RCP - Correction Array Seed Analysis HNRAO 2016 11 20 FSX-8S B.csv - Offset 1220 Gain 5.0



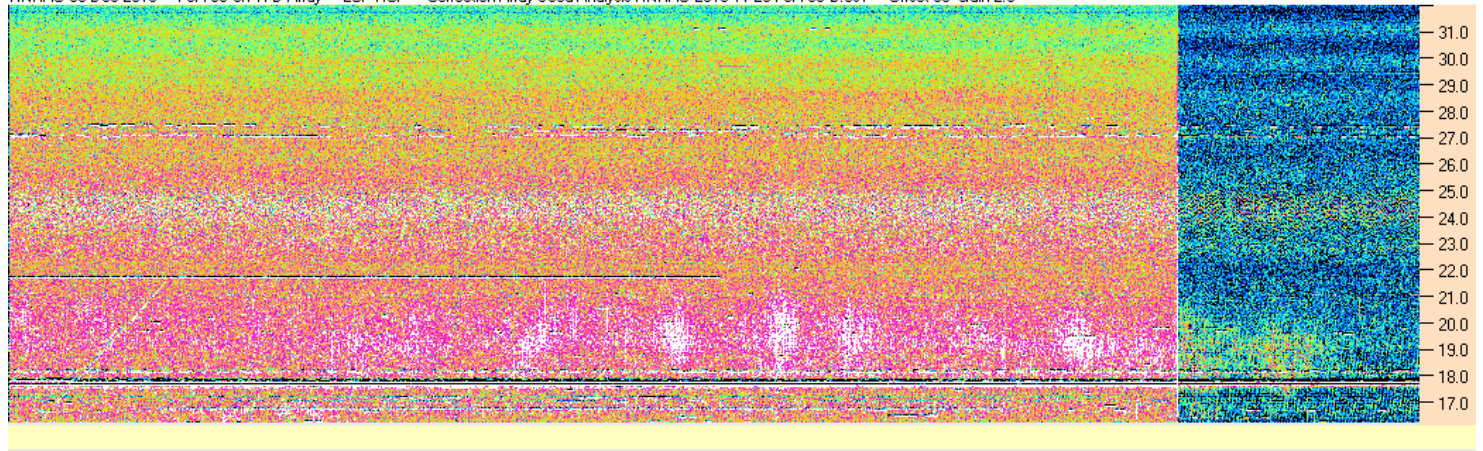
HNRAO 09 Dec 2016 - FSX-8S on TFD Array - LCP - Correction Array Seed Analysis HNRAO 2016 11 20 FSX-8S B.csv - Offset 1220 Gain 5.0



HNRAO 09 Dec 2016 - FSX-8S on TFD Array - RCP-LCP - Correction Array Seed Analysis HNRAO 2016 11 20 FSX-8S B.csv - Offset 50 Gain 2.0

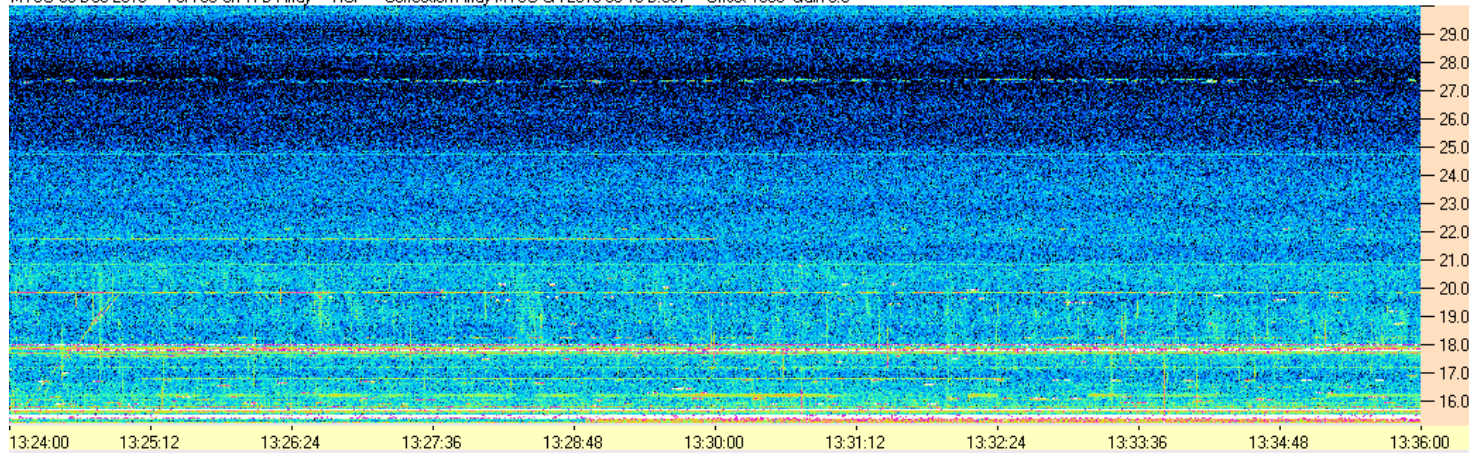


HNRAO 09 Dec 2016 - FSX-8S on TFD Array - LCP-RCP - Correction Array Seed Analysis HNRAO 2016 11 20 FSX-8S B.csv - Offset 50 Gain 2.0

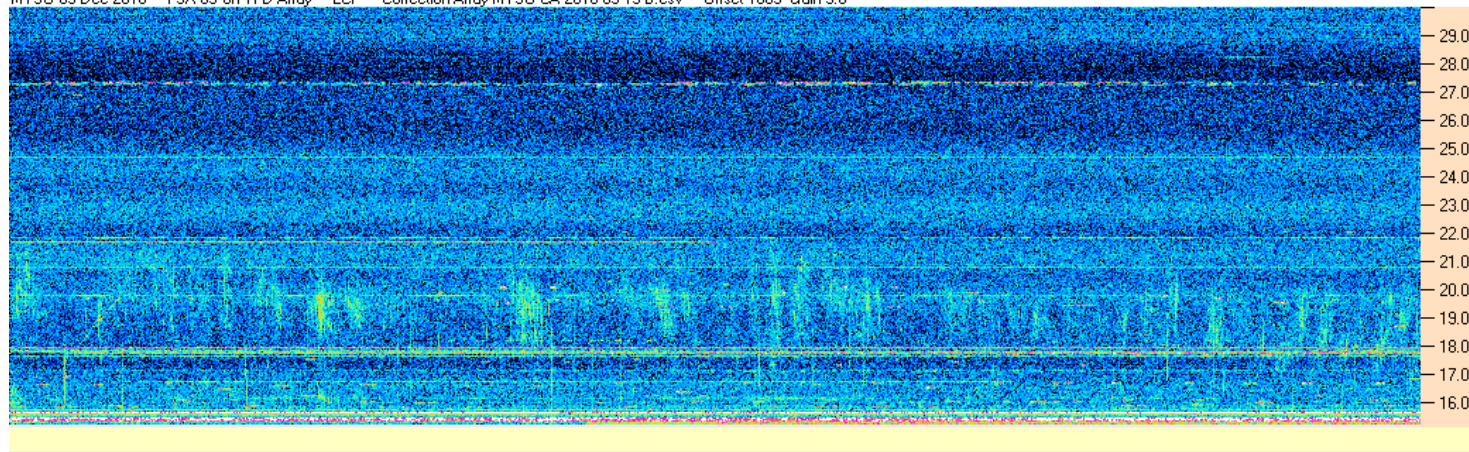


MTSU Data – 1324 to 1336 UTC

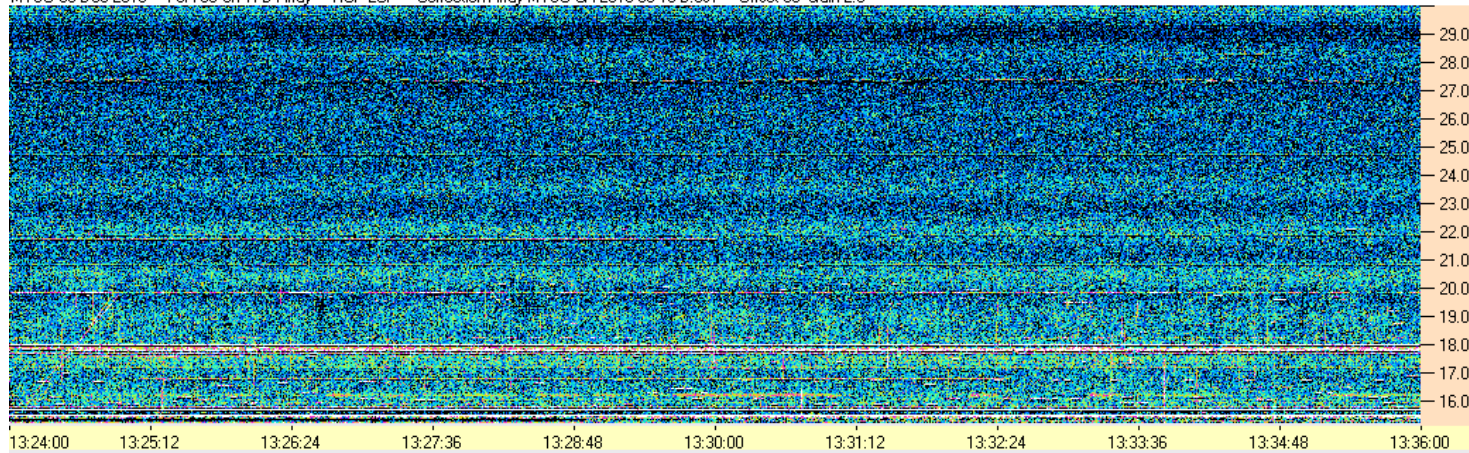
MTSU 09 Dec 2016 - FSX-6S on TFD Array - RCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 1885 Gain 5.0



MTSU 09 Dec 2016 - FSX-6S on TFD Array - LCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 1885 Gain 5.0



MTSU 09 Dec 2016 - FSX-6S on TFD Array - RCP-LCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 50 Gain 2.0



MTSU 09 Dec 2016 - FSX-6S on TFD Array - LCP-RCP - Correction Array MTSU CA 2016 03 19 B.csv - Offset 50 Gain 2.0

