

HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq



Date: June 6, 2019

Object: Jupiter – Io-B

Observer: Unattended

Start - Time UT:	0700	Planetary K-index:	
Jupiter Altitude (deg):	24.2	Jupiter Azimuth (deg):	200.0
Jupiter CML:	83.91	Jupiter Io Phase:	068.85
Jupiter RA (hr/min):	17:17	Jupiter Dec (hr/min):	-22:29
Hour Angle (hr/min):	01:19	Polarization	RCP
Sun Altitude (deg):	-22.1	Sun Azimuth (deg):	026.9
Sun RA (hr/min):	04:48	Sun Dec (hr/min):	22:25

End – Time UT:	0917	De:	-2.7
Jupiter Altitude (deg):	09.3	Jupiter Azimuth (deg):	229.4
Jupiter CML:	166.74	Jupiter Io Phase	088.11
Hour Angle (hr/min):	03:37	Duration (min):	137
Sun Altitude (deg):	-05.1	Sun Azimuth (deg):	054.4
Max Frequency MHz	24	Min Frequency MHz	16

Data from Radio-Jupiter Pro 3.8.2

Observatory Configuration

Spectrograph Receiver	Antenna	Polarization	System Loss	Multicoupler	Multicoupler port	Calibrated
FSX-8S	TFD	RCP LCP	-8.35 dB -7.59 dB	#2 RCP #1 LCP	Port 1 +10dB Port 1 +10dB	Twice daily Twice daily
FSX-2	LWA	RCP/LCP manual select		N/A	N/A	N/A
SDRPlay RSP2	TFD	RCP	-8.35 dB	#2 RCP	Port 2 +3dB	Twice daily
SDRPlay RSP2	TFD	LCP	-7.59 dB	#1 LCP	Port 2 +3dB	Twice daily
JOVE I	TFD	RCP	-8.35 dB	#2 RCP	Port 3 +3 dB	04/20/2018
JOVE I	TFD	LCP	-7.59 dB	#1 LCP	Port 3 +3 dB	04/20/2018
JOVE II	Jove dipoles	Linear	-3.66 dB	#3 Linear	Port 4 +3 dB	4/19/2019
SDRPlay RSP1	Experimental*					

JOVE dipoles phased @ 32 degrees for 2018-2019 season

TFD array phased @ 35 degrees for 2018-2019 season

LWA antenna phased @ 35 degrees and orientation for observation: 45 degrees

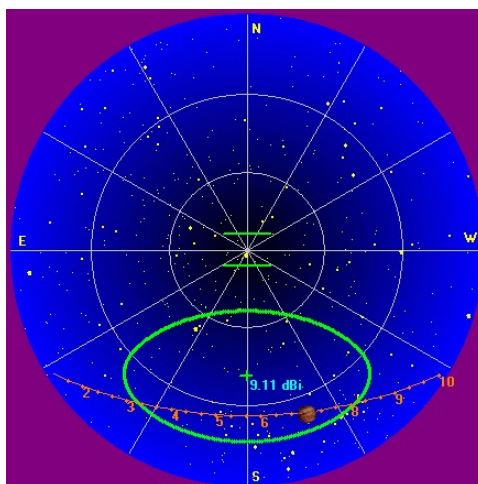
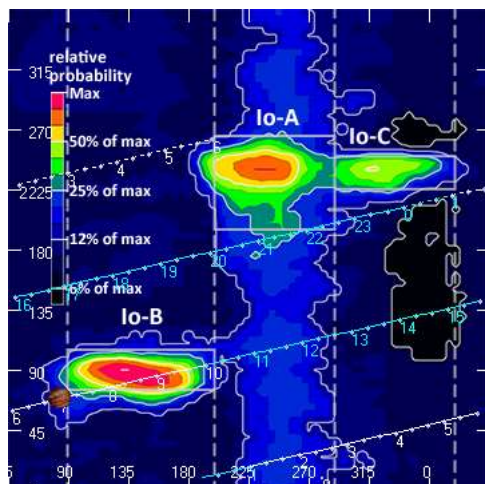
* Used for testing and evaluating antenna systems

Software Radio Sky Spectrograph 2.8.50

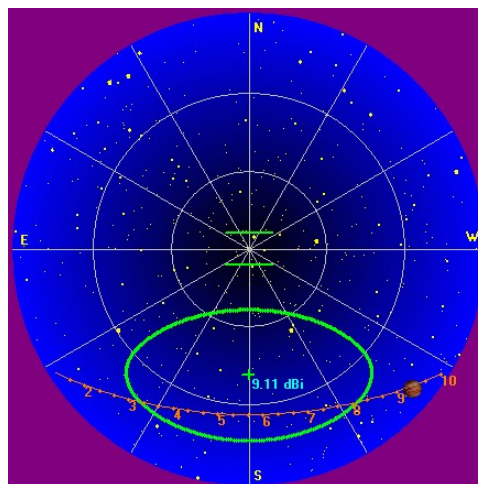
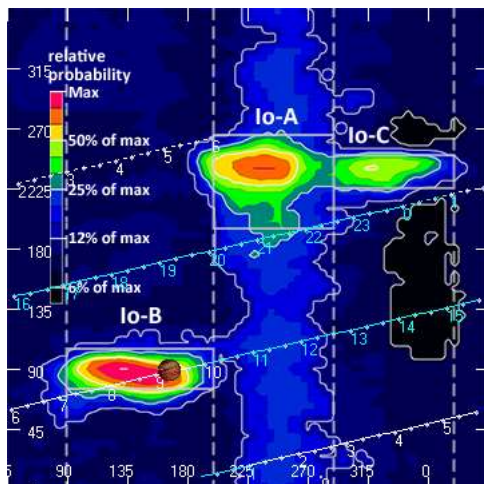
Red = Offline

All times are synced with a local GPS locked NTP server.

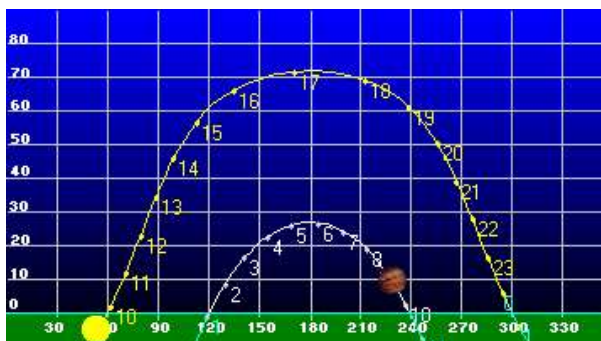
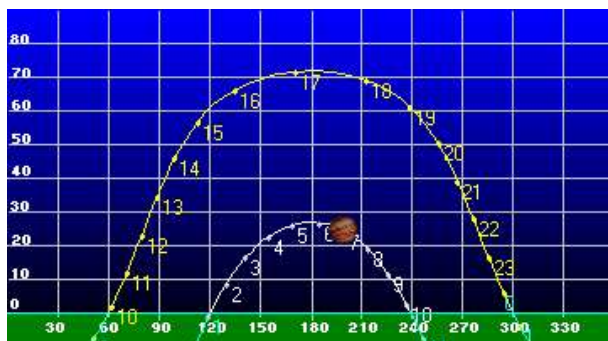
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Beginning of Pass



End of Pass



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MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360	38	RH	Late	
Io-C	(300-20)	(225-260)	36	RH&LH	Late	Also called "third source"
non-Io-C	300-360	0-360	32	RH&LH	Late	Voyager info

<https://www.radiosky.com/jupmodes.html>

Modulation Lanes Designations*	
L – Burst	S-Burst
L1 – No lanes	S1 – No lanes
L2 – Positive slope	S2 – Positive slope
L3 – Cross hatched	S3 – Cross hatched
L4 – Negative slope	S4 – Negative slope
*Modulation Lanes in the Dynamic Spectra of Jovian L-bursts, J.J. Riihimaa, Astron. & Astrophys. 4, 1970	

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Jupiter/Sun angular separation = 173.1 degrees

All observatory spectrographs and antennas functioning normally. No known issues. The Radio JOVE II / JOVE Dipole array was ineffective due to RFI. Background temperatures were registering at 600 kK. The emissions of this storm were too weak to be observed by the FSX-8S / TFD Array or the FSX-2 / LWA array.

A weak Io-B storm starting with RCP L-bursts but transitioning to predominantly all S-bursts. Most emissions were slightly above the GB as observed at this location. There were long periods of no activity during this storm.

At 0700:50 the first indications of emissions were L-bursts between 17 MHz and 20 MHz with L2 modulation lanes. The next significant emission group was at 0738 UT with a mix of Land S-bursts together with a brief N-event. The N-event appears to start at 0738:36 UT and end at 0739:11 UT centered around 18.5 MHz to 19 MHz. Weak S-bursts can be seen below this grouping between 16 MHz and 18 MHz.

The next observed emission starts at 0748 UT as a brief N-event at 23.5 MHz followed by a small group of S-bursts. The strength of this group is slightly above. This is followed by a longer N-event between 23.2 MHz at 0749 UT and 22.75 MHz at 0750 UT. It appears to be L-burst emission. Whether it's part of the same event or a new one, this N-event is followed by a group of horizontal emission groups from 0749 UT at 23 MHz and ends at approximately 0750 UT at 22.75 MHz.

One of the strongest groups of S-bursts were between 19 MHz and 20 MHz at 0820:50 UT. There were S2 modulation lanes present in this cluster. This was followed by another cluster at 0821:40 UT that were just slightly above the background noise.

At 8030:30 UT, another very weak group of S-bursts with S2 modulation lanes were observed and another weak cluster of S-bursts lasting 10 seconds were seen at 0831 UT.

More S-bursts slightly above the background noise were seen between 20 MHz and 21 MHz starting at 0839:10 UT and 0839:40 UT. At 0848:50 UT another cluster of S-bursts with S2 modulation lanes were observed. S-burst groups, slightly above the background continued throughout the remainder of the storm.

Both polarizations were reviewed and there did not appear to be any Io-D component to this storm.

The only things noteworthy were the N-events described above.

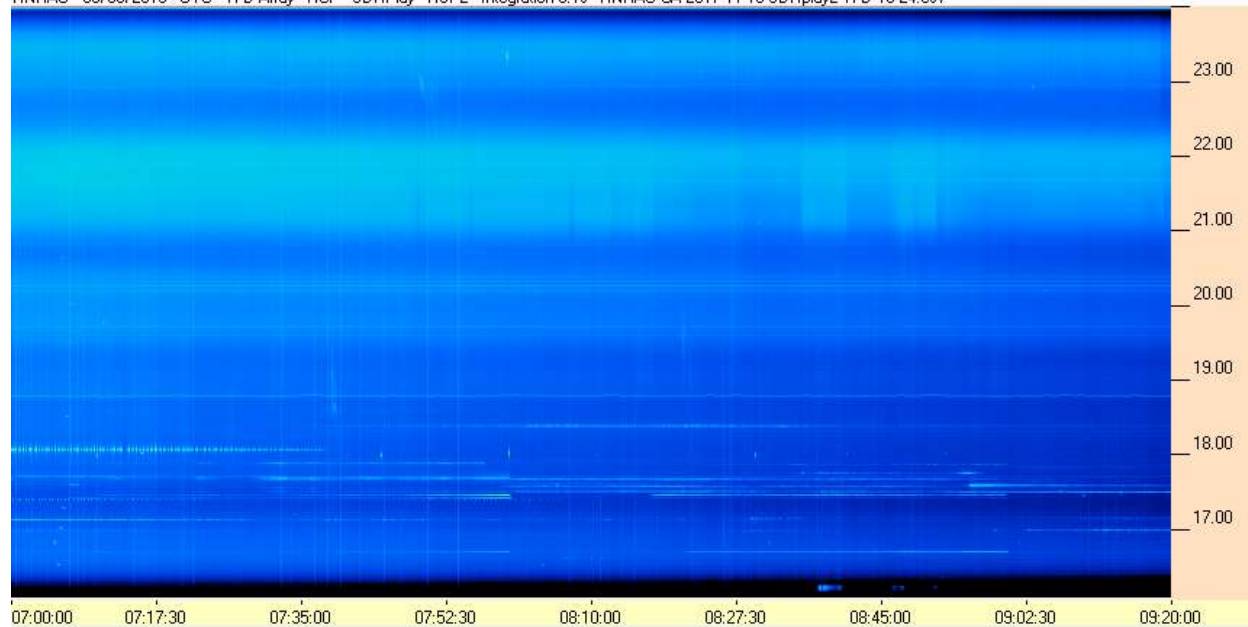
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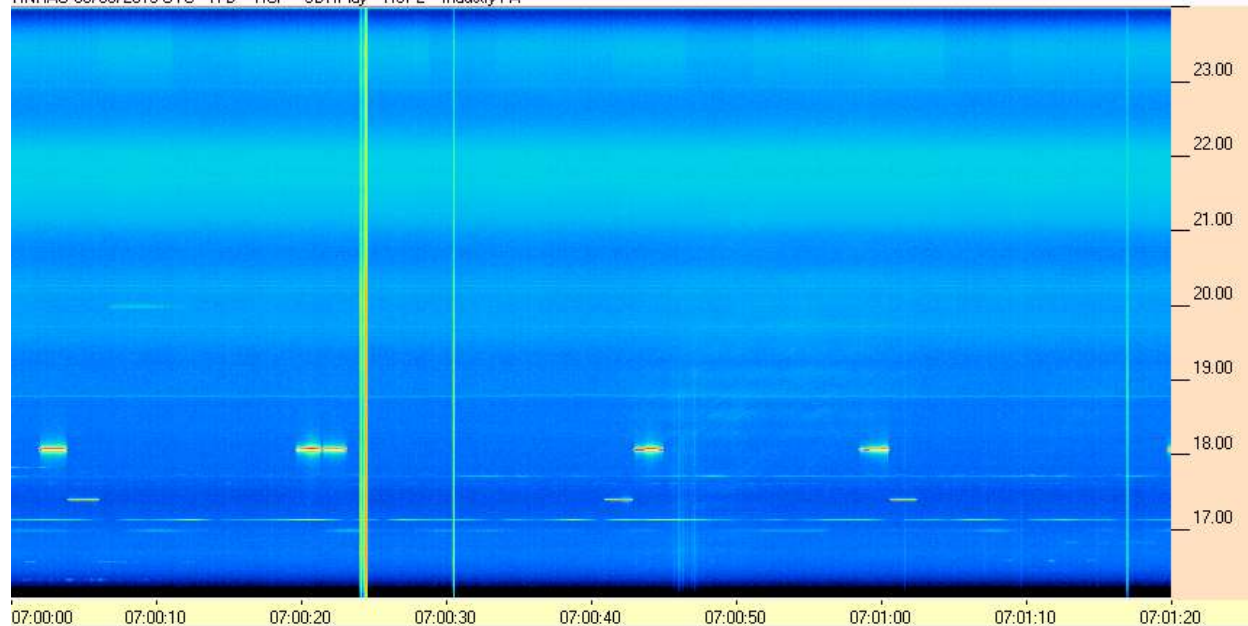


SDRPlay / TFD Array

HNRAO - 06/06/2019 - UTC - TFD Array - RCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv



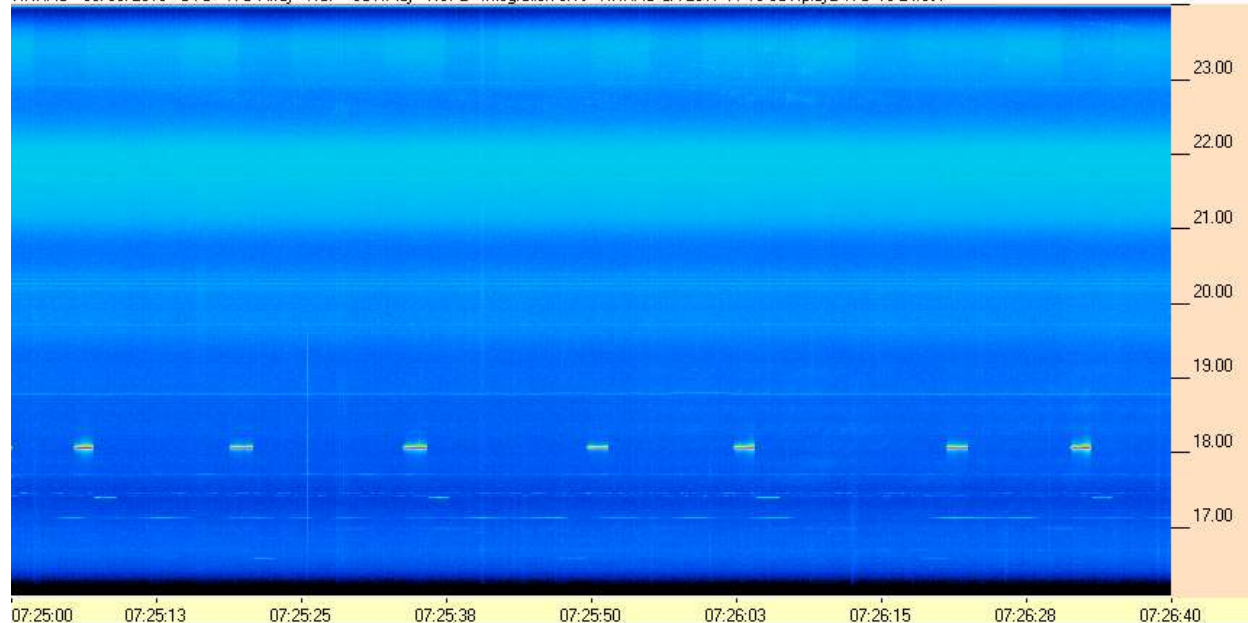
HNRAO 06/06/2019 UTC - TFD - RCP - SDRPlay - RSP2 - Industry PA



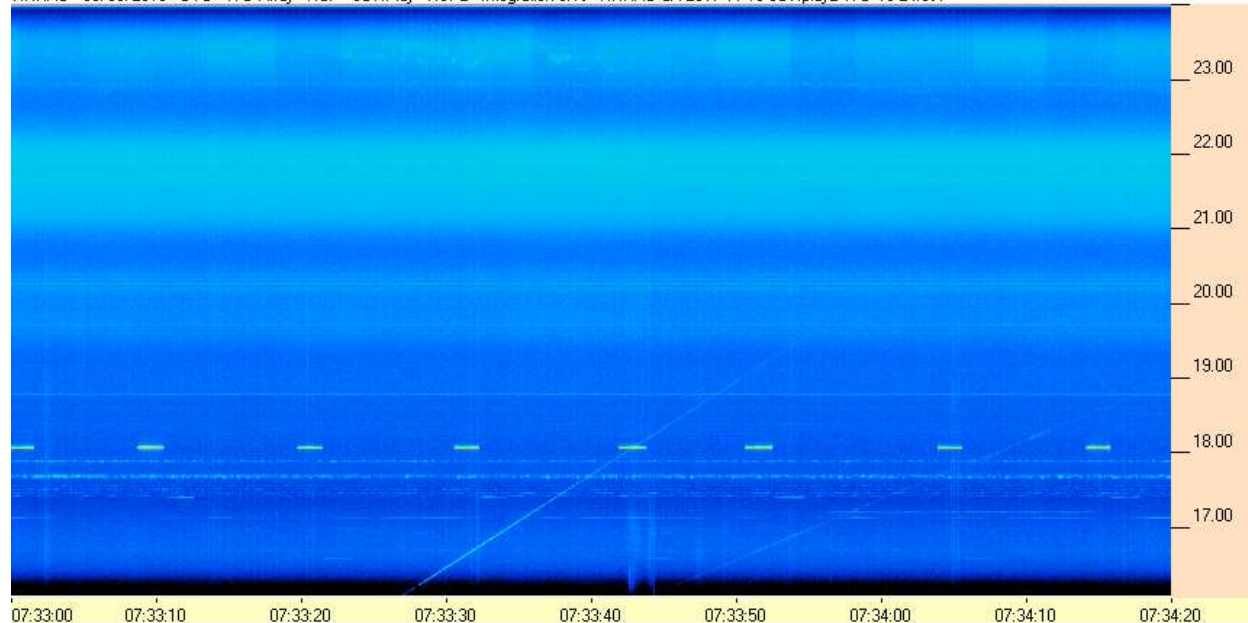
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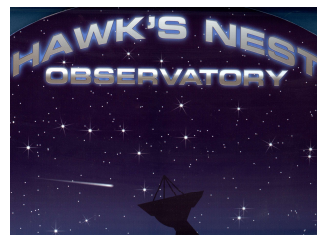
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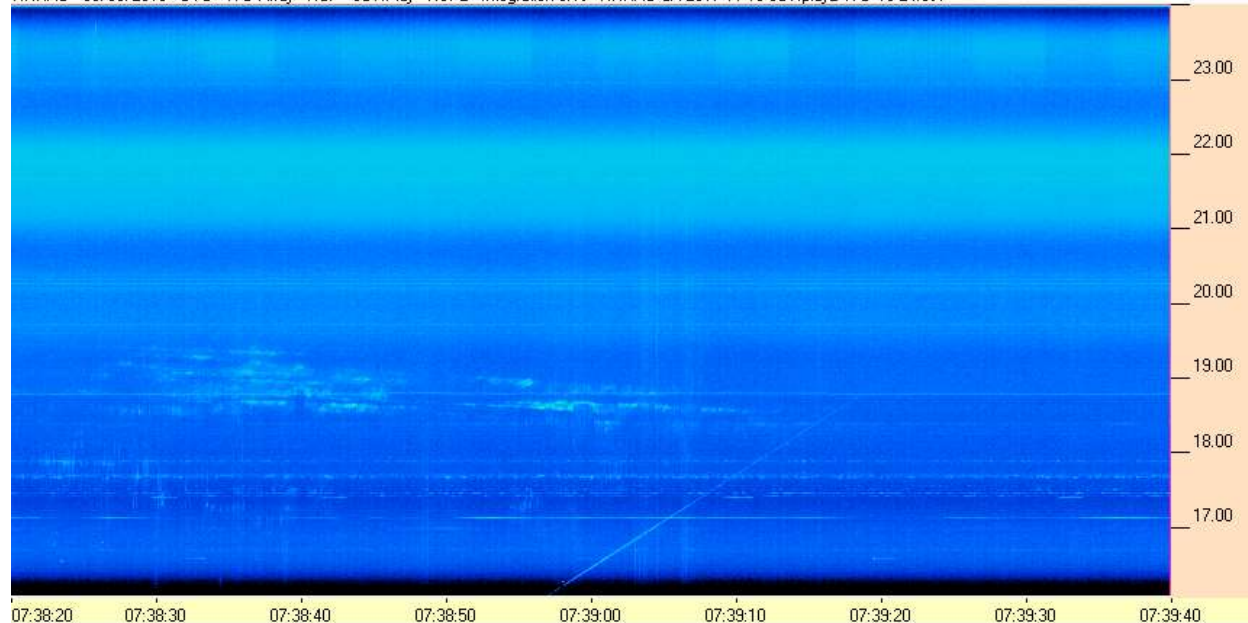
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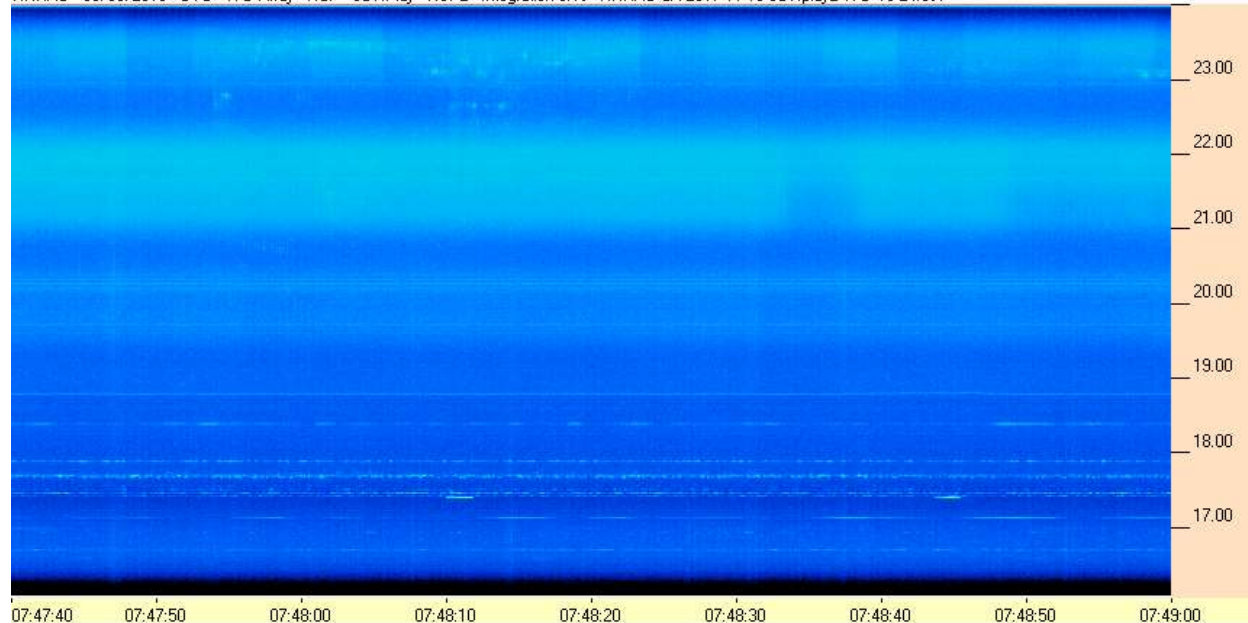
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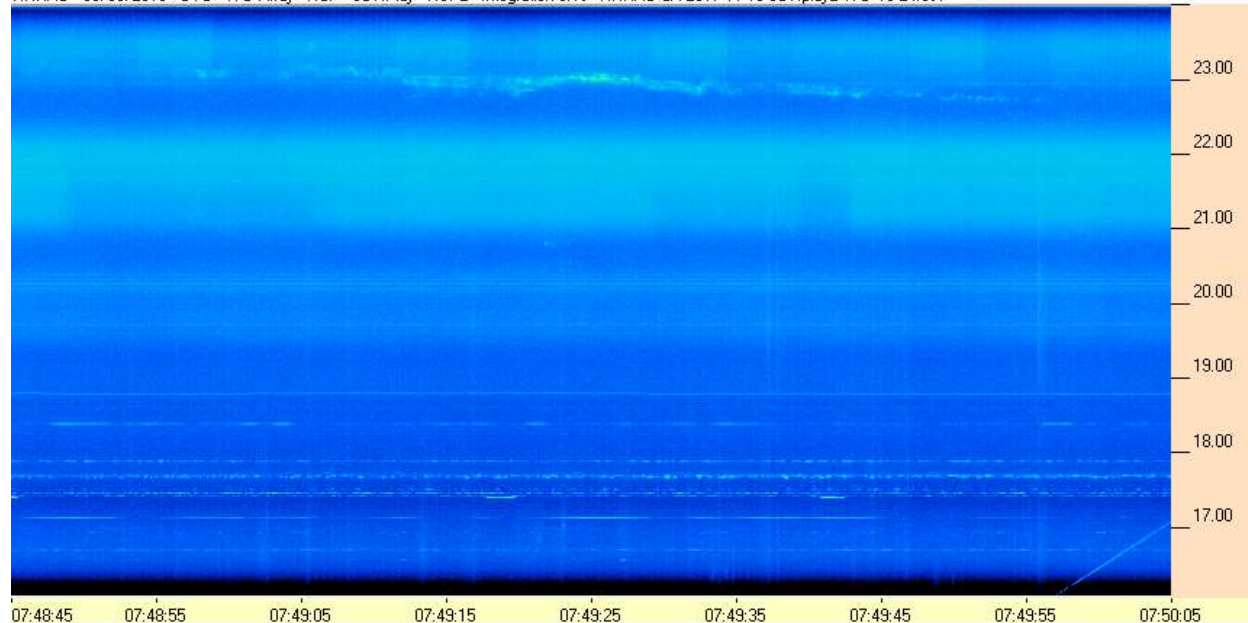
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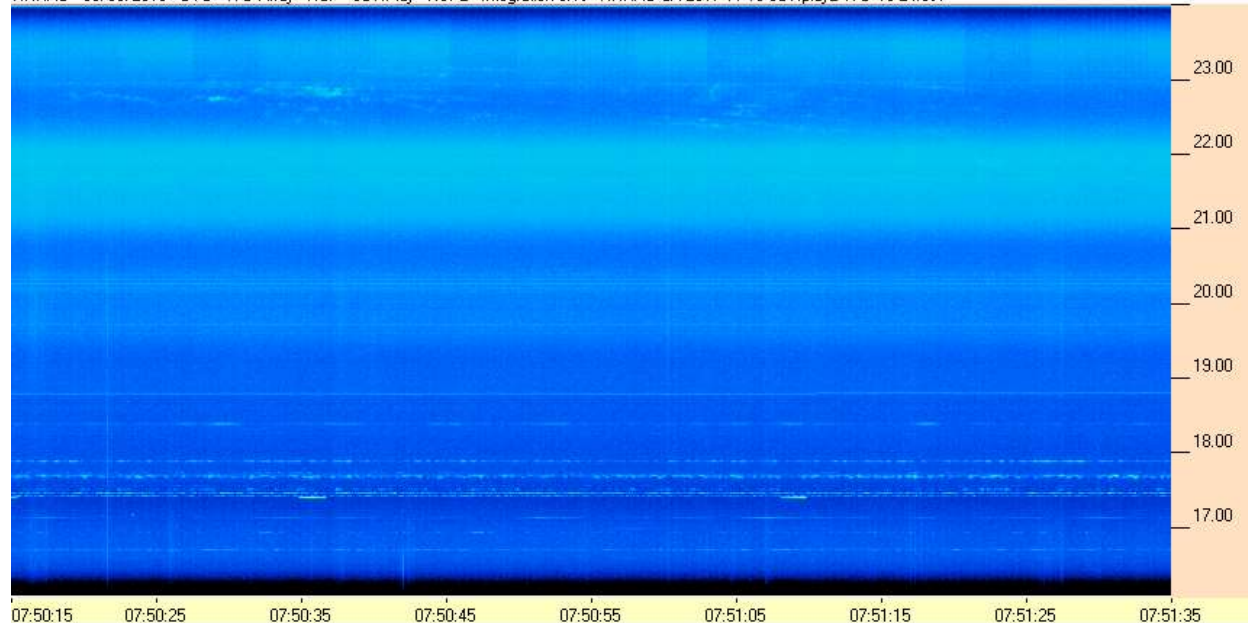
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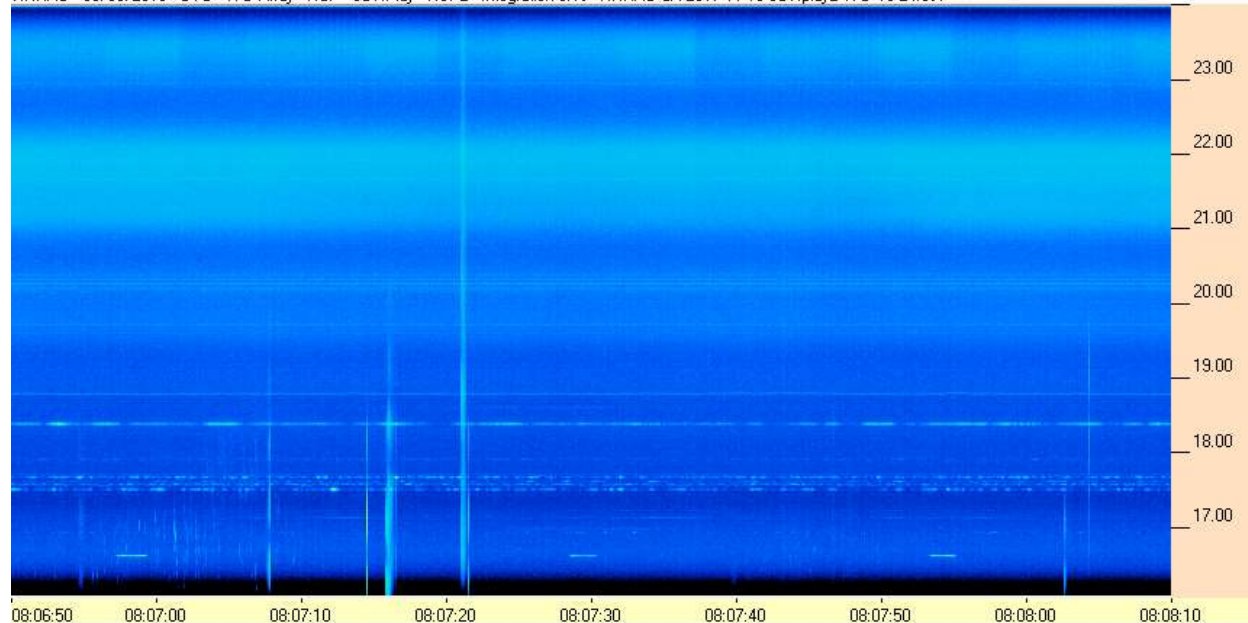
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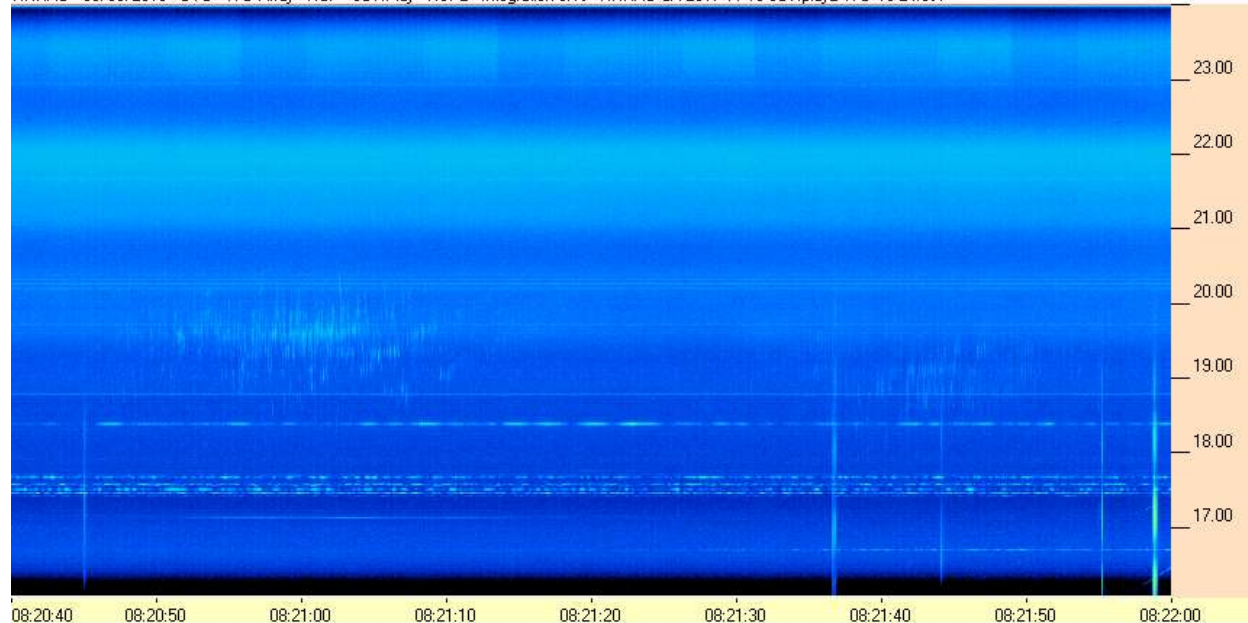
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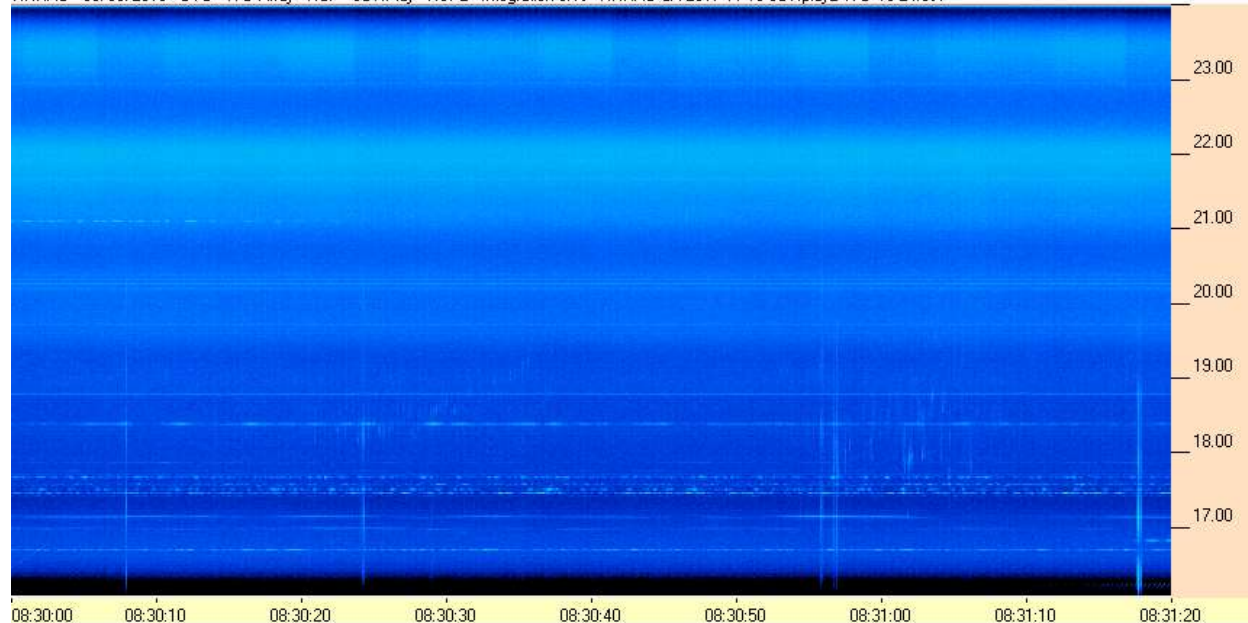
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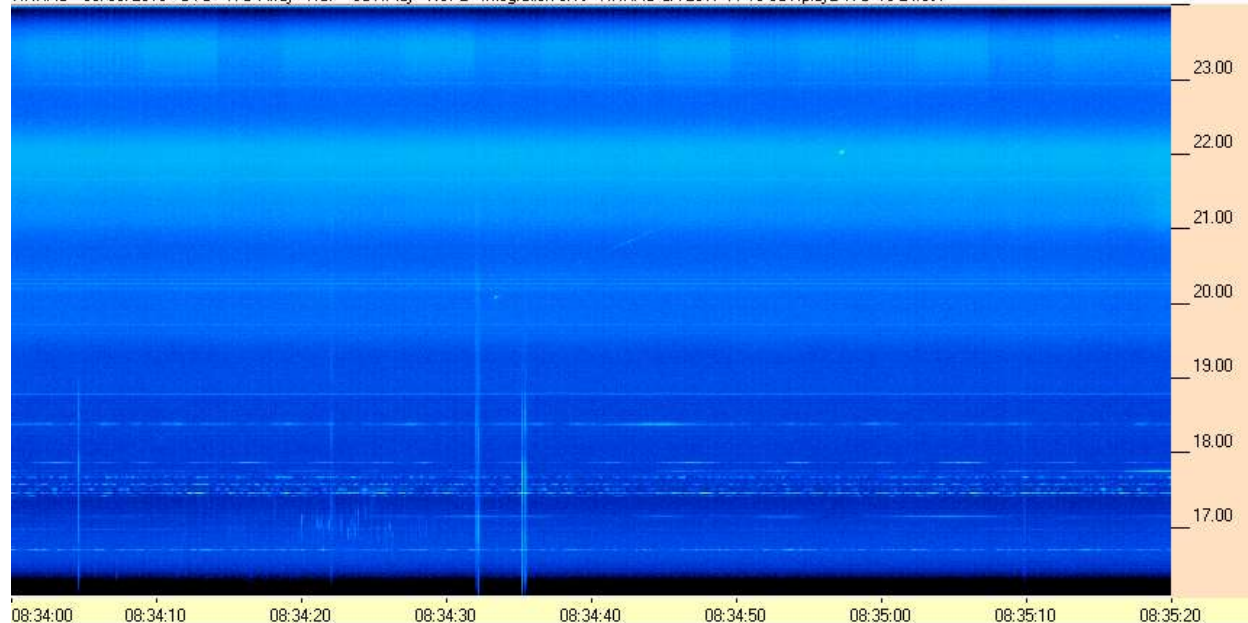
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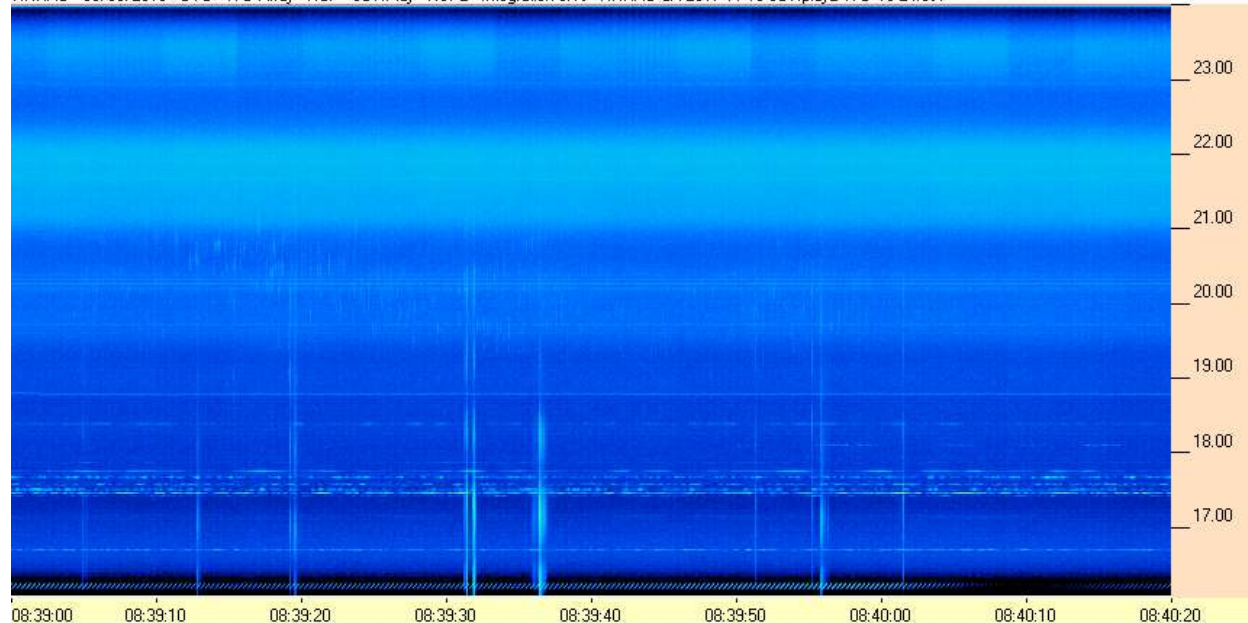
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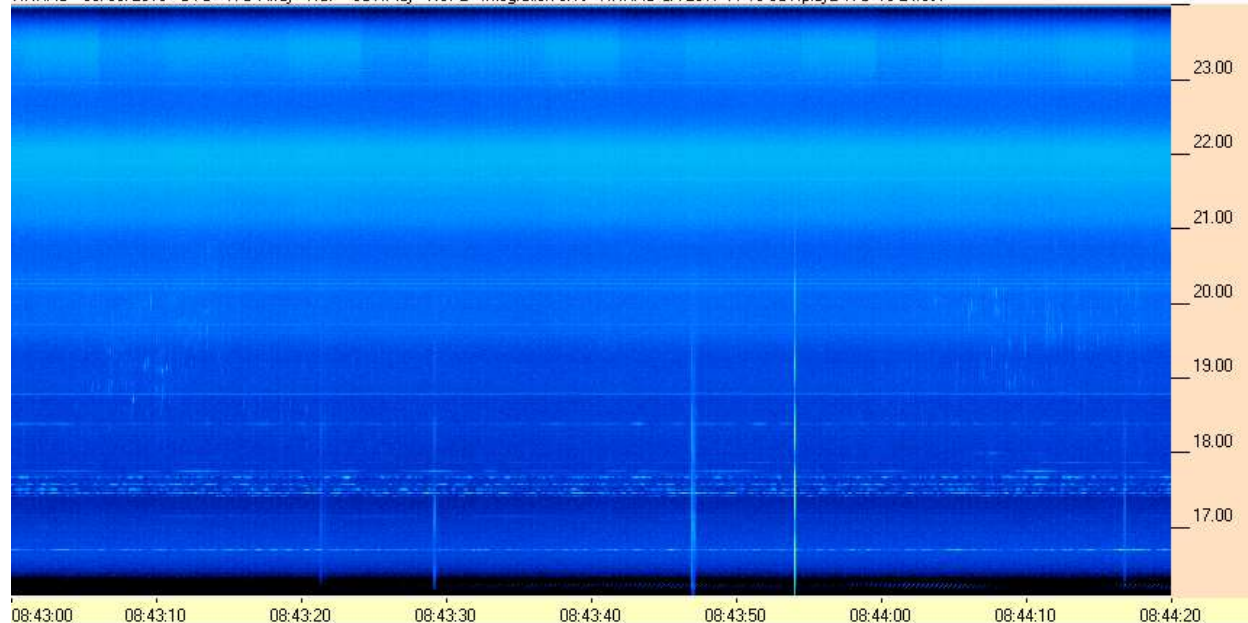
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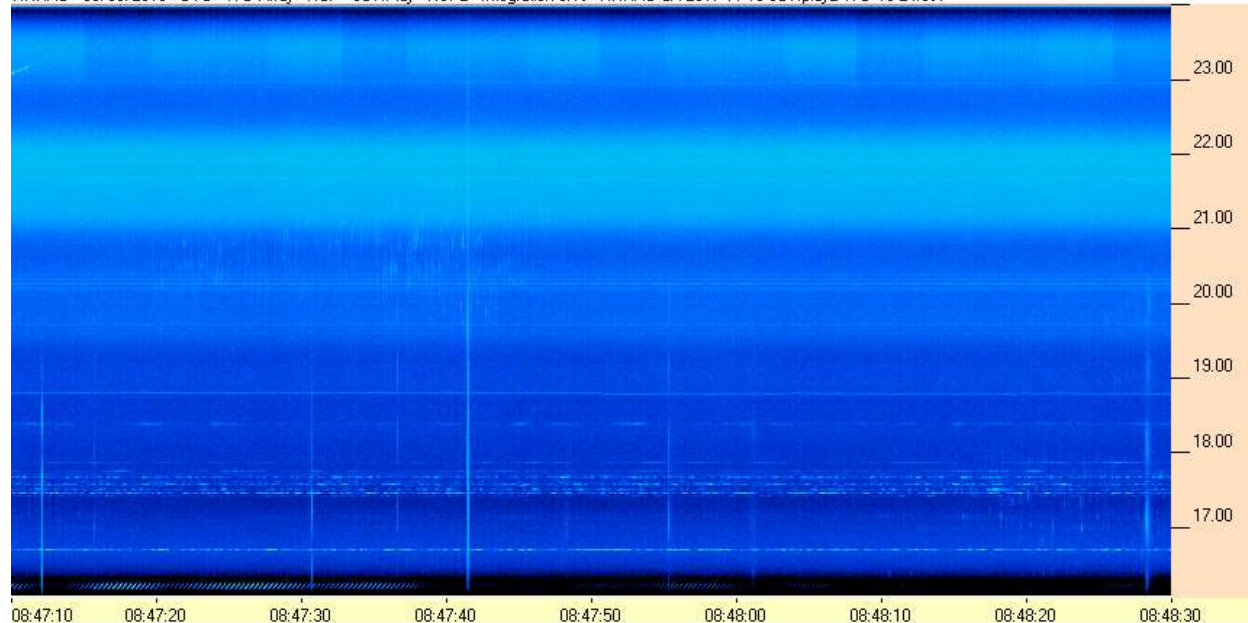
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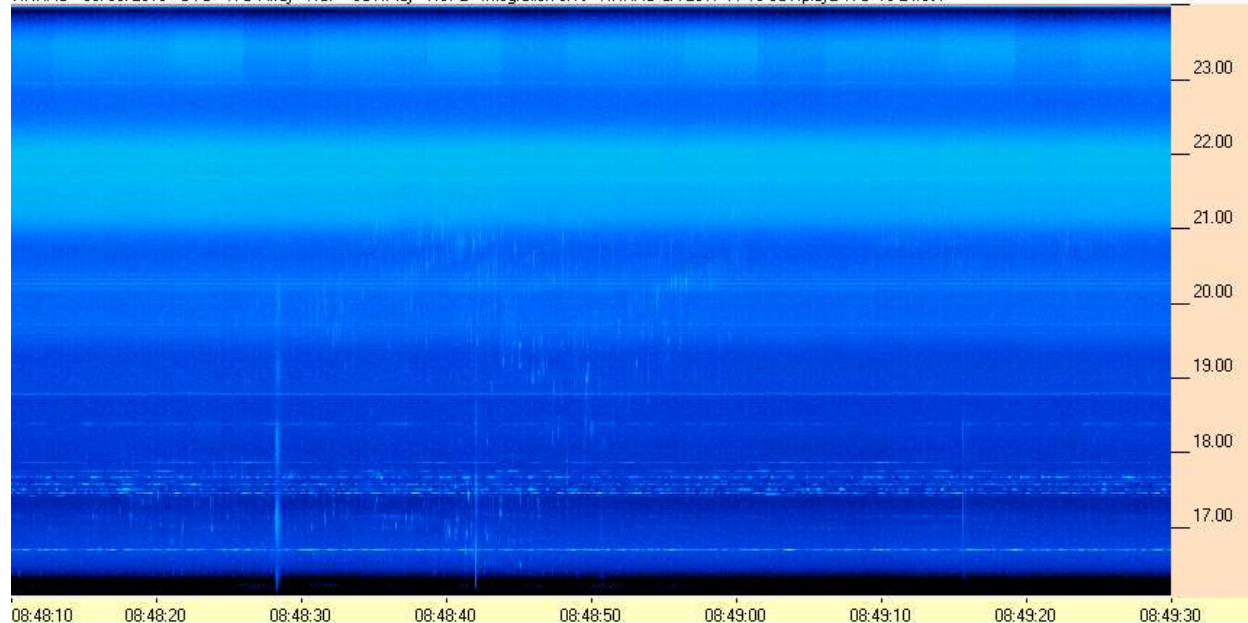
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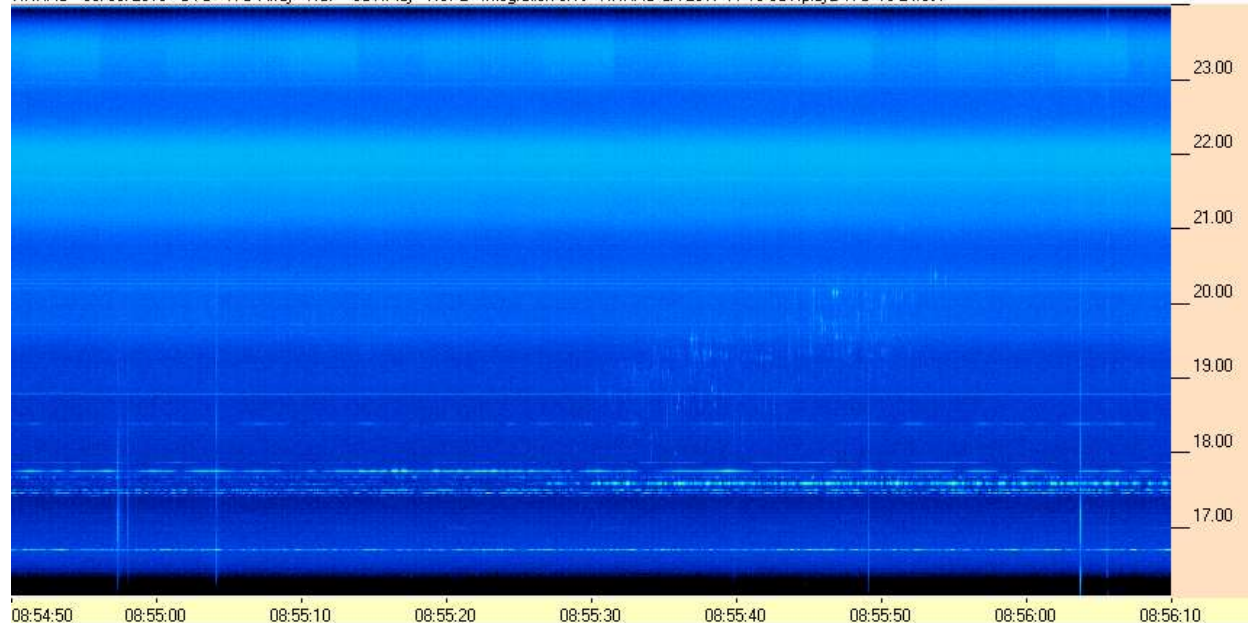
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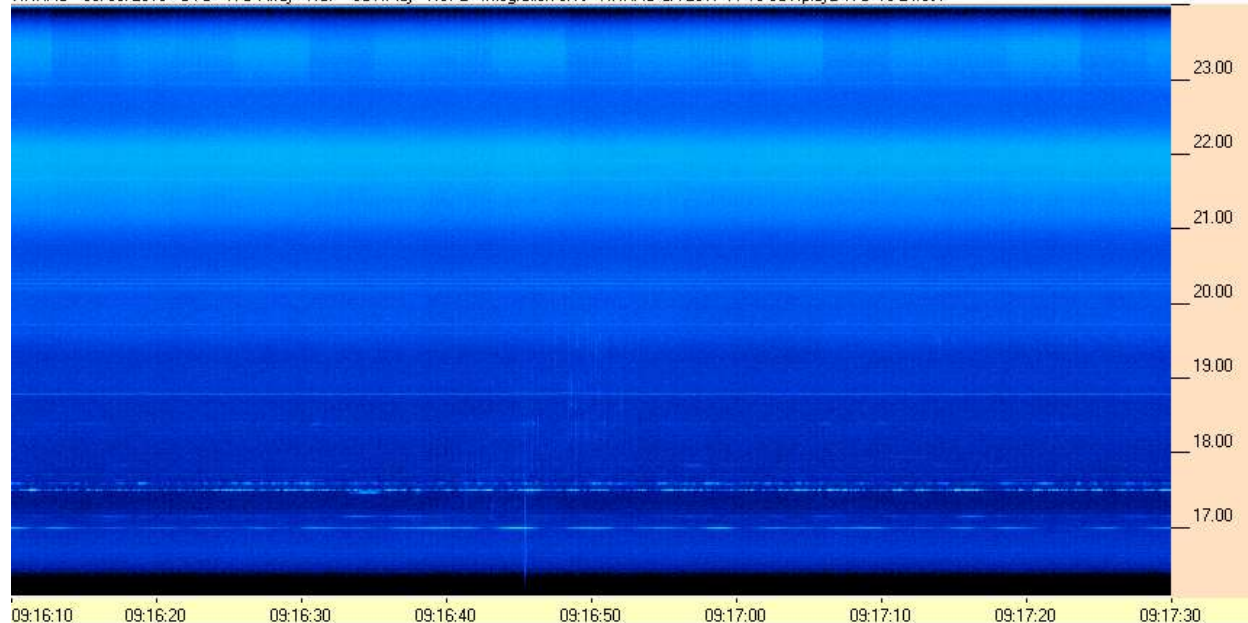
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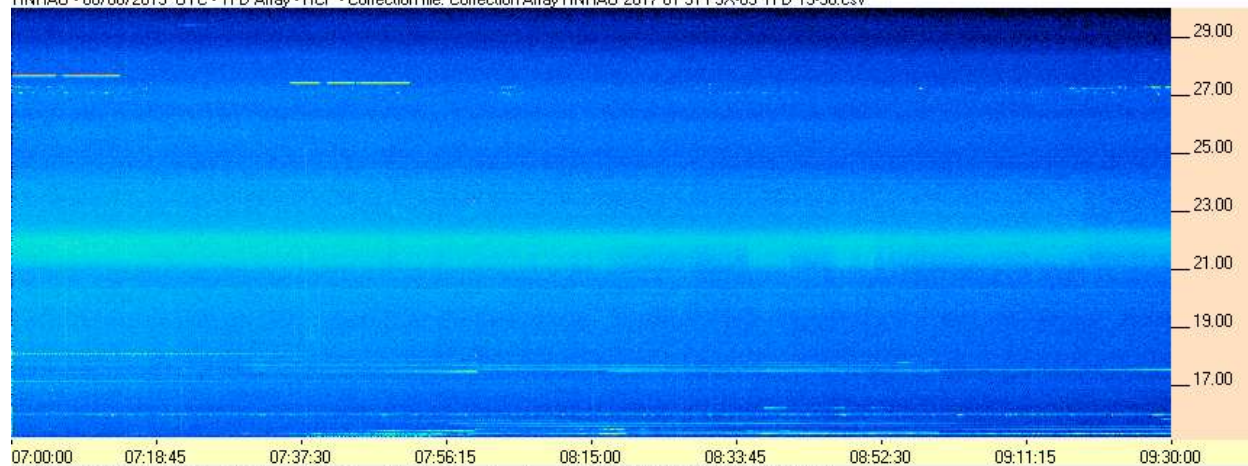


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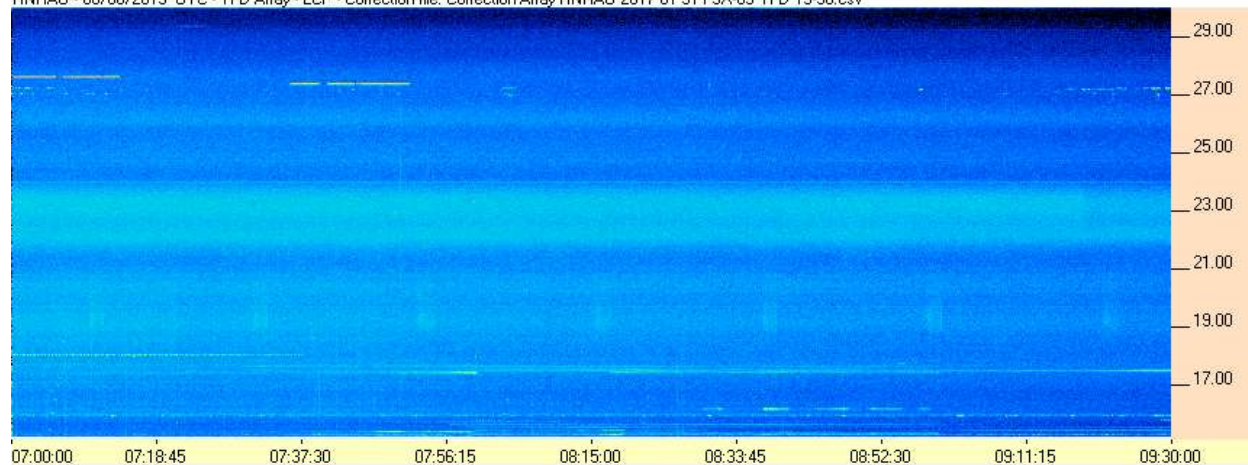


FSX-8S / TFD Array

HNRAO - 06/06/2019 UTC - TFD Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv



HNRAO - 06/06/2019 UTC - TFD Array - LCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv

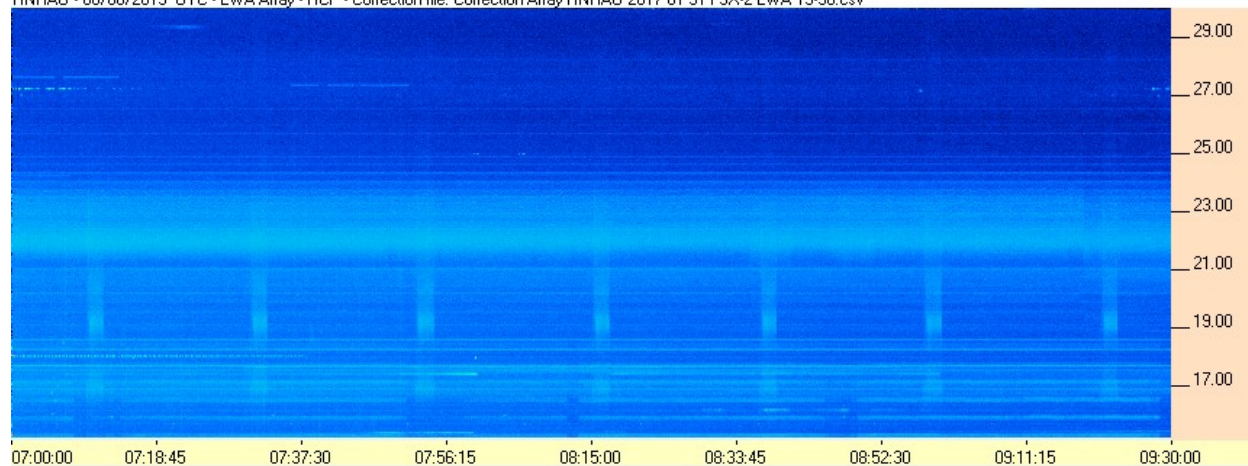


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FSX-2 / LWA Array

HNRAO - 06/06/2019 UTC - LWA Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-2 LWA 15-30.csv



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JOVE II / JOVE Dipole Array

