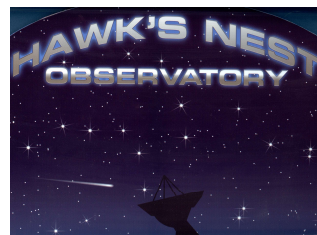


HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq



Date: May 18, 2020

Object: Jupiter – Io-B

Observer: Unattended

Start - Time UT:	0707	Planetary K-index:	1
Jupiter Altitude (deg):	19.7	Jupiter Azimuth (deg):	143.9
Jupiter CML:	85.42	Jupiter Io Phase:	083.08
Jupiter RA (hr/min):	19:57	Jupiter Dec (hr/min):	-20:55
Hour Angle (hr/min):	-02:26	Polarization	RCP
Sun Altitude (deg):	-24.2	Sun Azimuth (deg):	030.3
Sun RA (hr/min):	03:34	Sun Dec (hr/min):	19:14

End – Time UT:	0936		
Jupiter Altitude (deg):	28.4	Jupiter Azimuth (deg):	181.0
Jupiter CML:	175.5	Jupiter Io Phase	175.5
Hour Angle (hr/min):	00:04	Duration (min):	163
Sun Altitude (deg):	-04.1	Sun Azimuth (deg):	060.1
Max Frequency MHz	30	Min Frequency MHz	15
J/S Angular Separation	118.6	De:	-1.3

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 #1	TFD	RCP	-8.35 dB	#2 RCP	Port 2 +3dB	Twice daily
SDRPlay RSP2 #2	TFD	LCP	-7.59 dB	#1 LCP	Port 2 +3dB	Twice daily
JOVE II HNRAO #2	Jove dipoles	Linear	-3.66 dB	#3 Linear	Port 4 +3 dB	Offline

Radio JOVE dipoles phased @ 32 degrees for 2020-2021 season

Typinski AN-TFD-24-4 array phased @ 35 degrees for 2020-2021 season

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

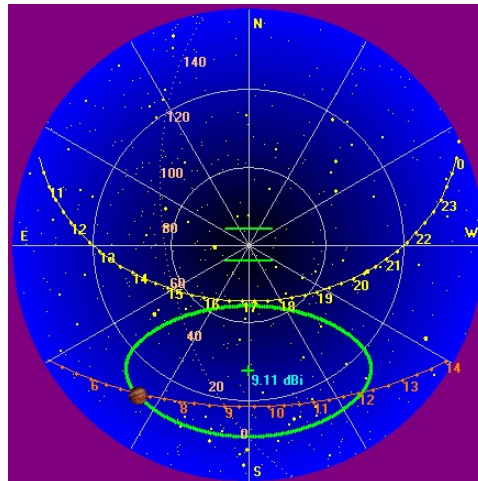
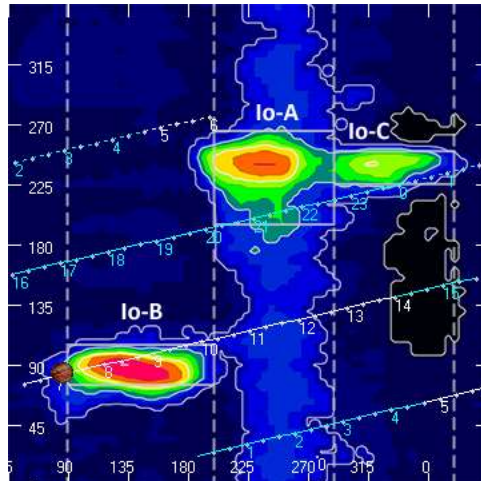
Radio Sky Spectrograph software version 2.9.30

Radio-SkyPipe software version 2.7.33 Radio-Jupiter Pro software version 3.8.2

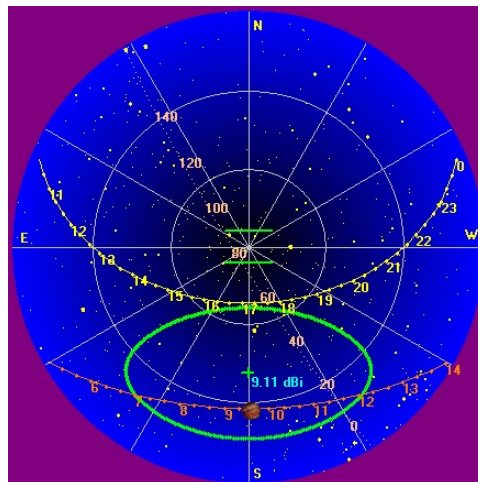
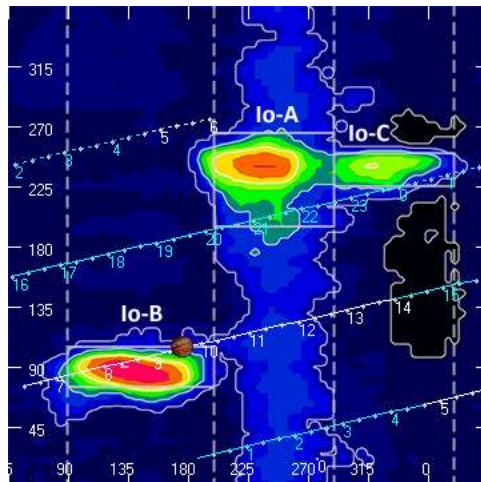
Network Time Server GpsNtp-Pi, Reeve Engineering

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

HNRAO Observing Log
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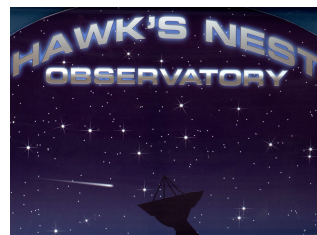
Beginning of Pass



End of Pass



HNRAO Observing Log
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EN90sq



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	

An Io-B storm consisting mainly of positive drift RCP L-bursts with L-2 modulation lanes. S-bursts were observed at times. All three RCP spectrographs recorded data. The Radio JOVE telescope was offline. RFI was present in all spectrographs, however, the broad bright horizontal band in the FSX-2/LWA spectrograph was caused by a heat pump.

First indications of emission were between 0707 UT and 0708 UT with L-bursts, between 16 MHz and 19 MHz, and L-2 modulation lanes. These emissions were one or two dB above GB. There were only faint indications of emissions until 0734 UT, when stronger L-bursts were observed between 21 MHz and 23 MHz. At 0737 UT, much stronger emissions between 20 MHz and 24 MHz were observed.

At 0814 UT, an excellent example of broad band L-2 modulation lanes were observed. These can be seen spanning 7 MHz, from 17 MHz to 24 MHz.

Between 0833 UT and 0837 UT S-burst emissions. These were seen to be between 17 MHz and 24 MHz.

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Starting at 0838 UT, the stronger emissions from this storm appear. These were a mix of L-bursts and S-bursts. These emissions were possibly 6 – 9 dB above GB. The stronger of these emissions were between 16 MHz and 19 MHz. S-bursts were seen between 22 MHz and 24 MHz.

Between 0839:45 UT and 0840 UT were emissions that were the strongest seen during this Jupiter season. These were observed to be between 16 MHz and 19 MHz. Again, these were 6-9 dB (or more) above GB.

There was a continuation of the L-burst and S-burst mix of emissions, with another strong cluster between 0842:20 UT and 0840:45 UT. These strong bursts were between 16 MHz and 19 MHz.

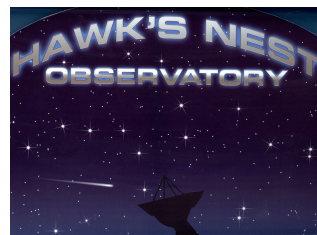
There is another good example of broad band modulation lanes between 0847 UT and 0848:30 UT, where the modulation lanes can be seen from 16 MHz to 22 MHz.

The last strong emissions grouping was at 0907:45 UT. Where there were indications of emissions, there were two to three dB above GB.

This was, without question, the some of the strongest, if not the strongest, emissions observed in the past year. Well defined L-2 modulation lanes, L-burst and S-burst mix and interplanetary scintillation were all present.

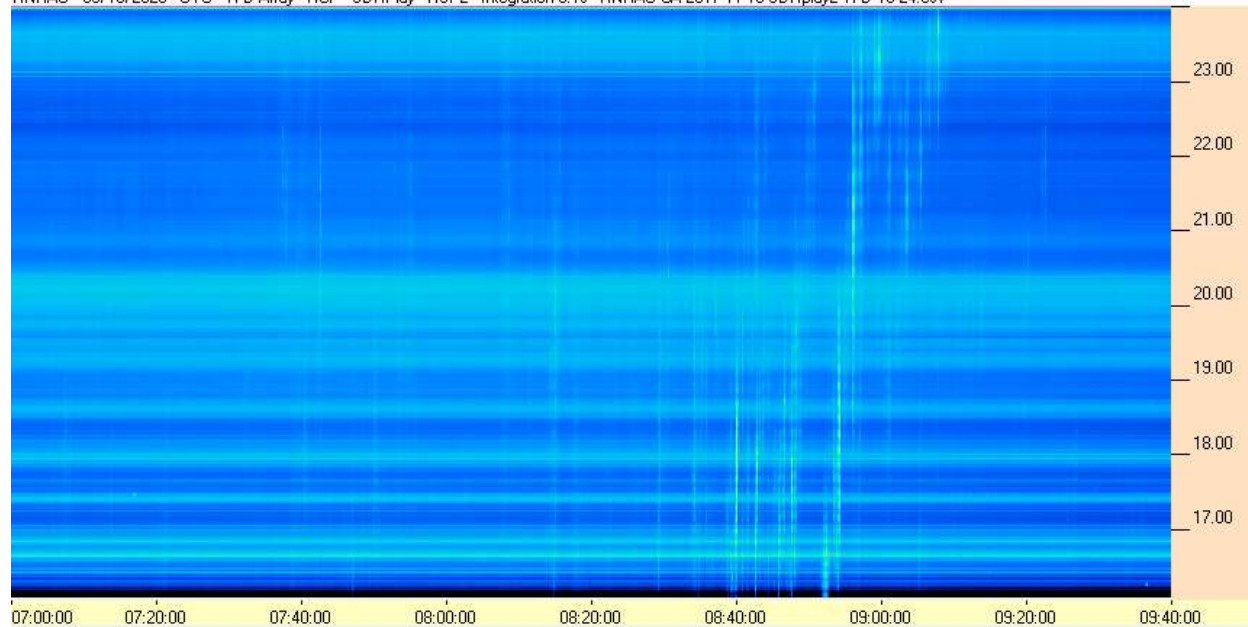
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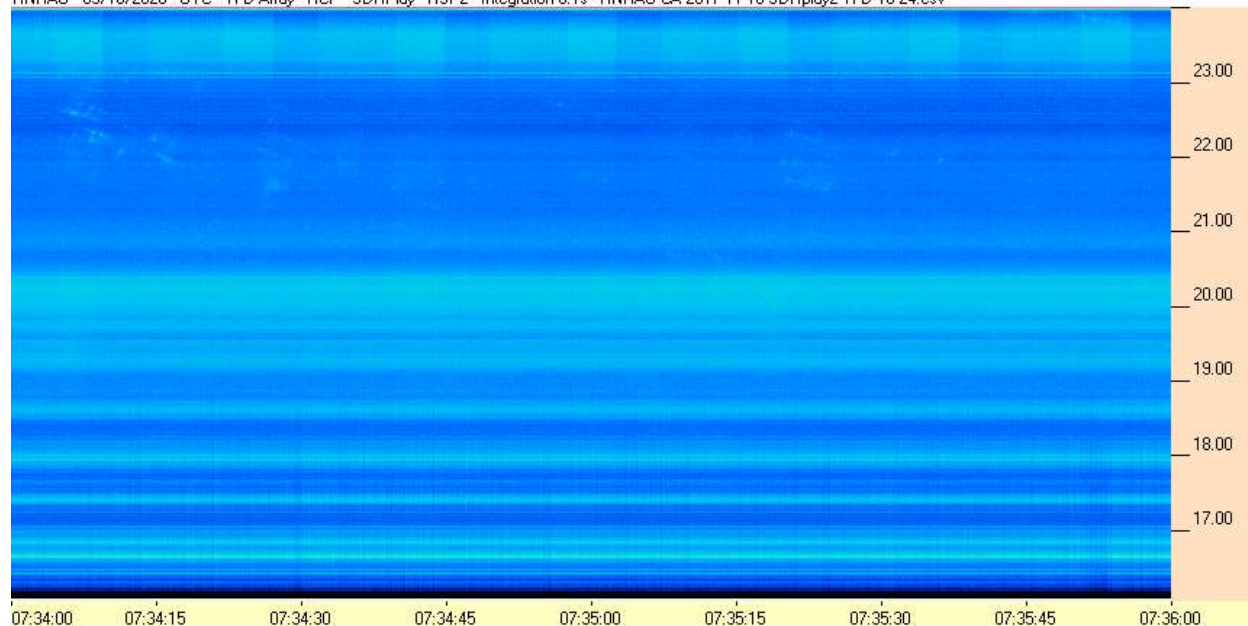


SDRPlay RSP2/RCP – TFD Array

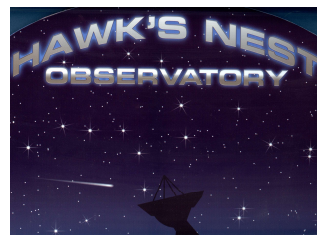
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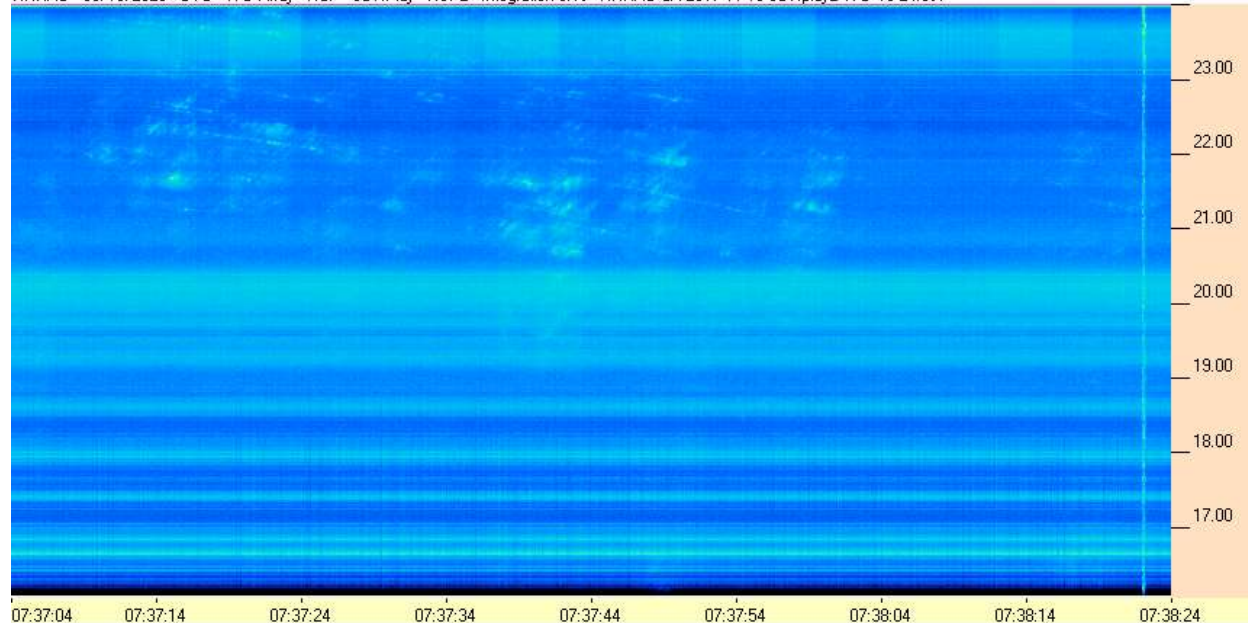
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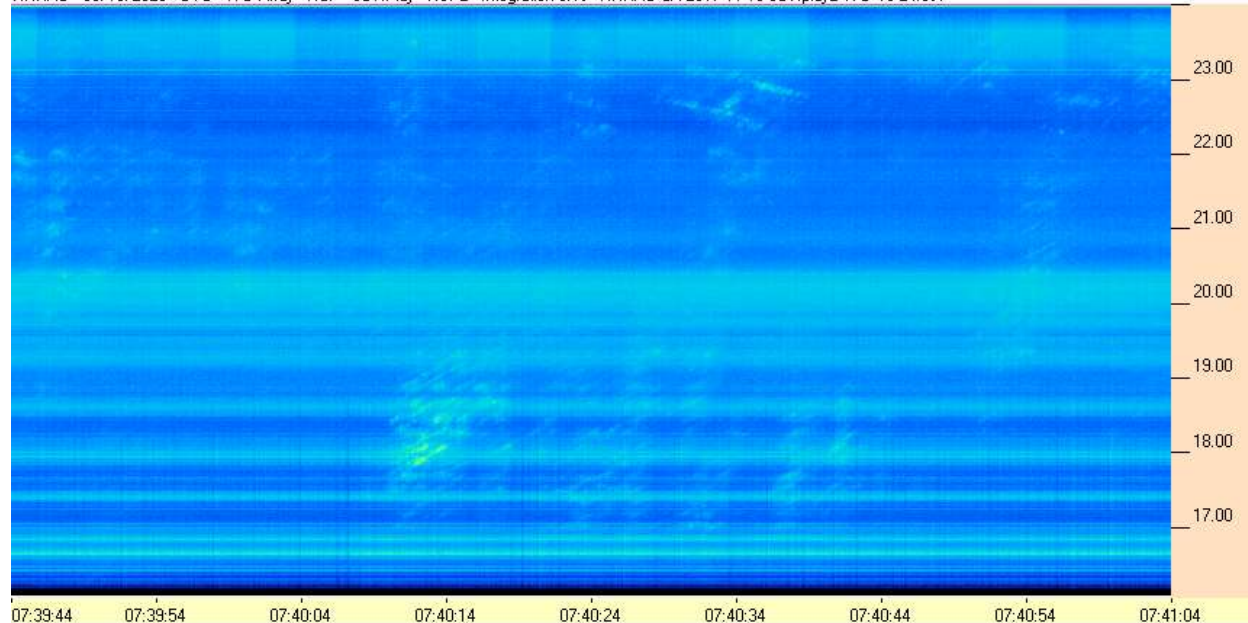
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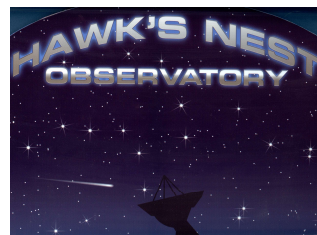
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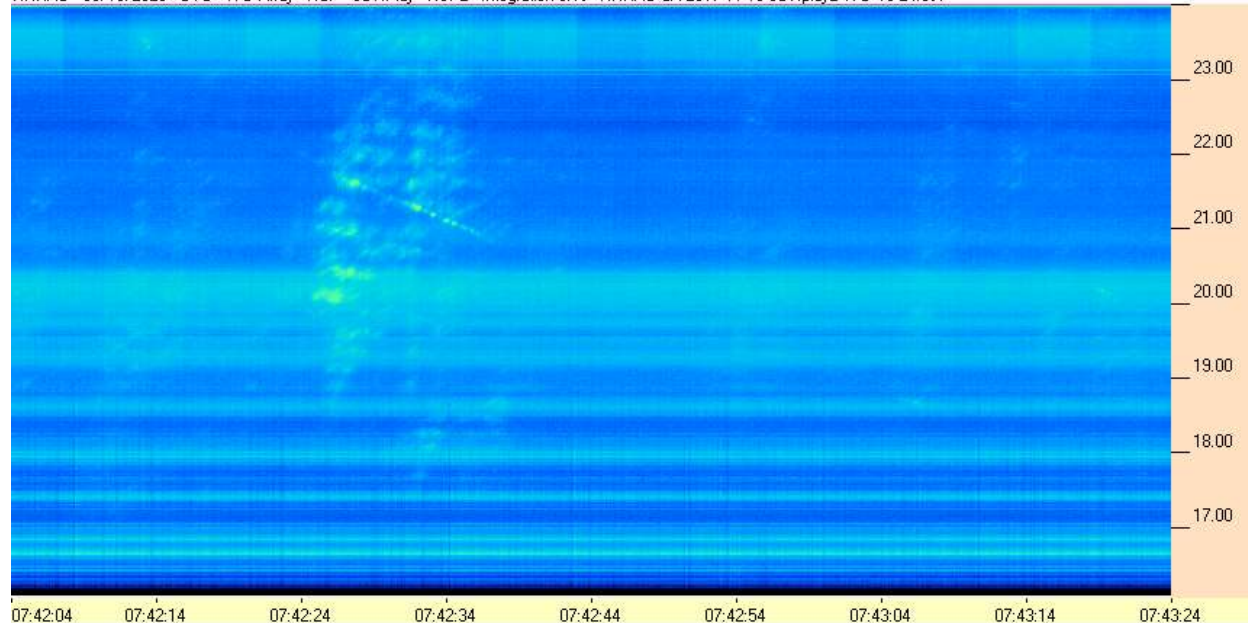
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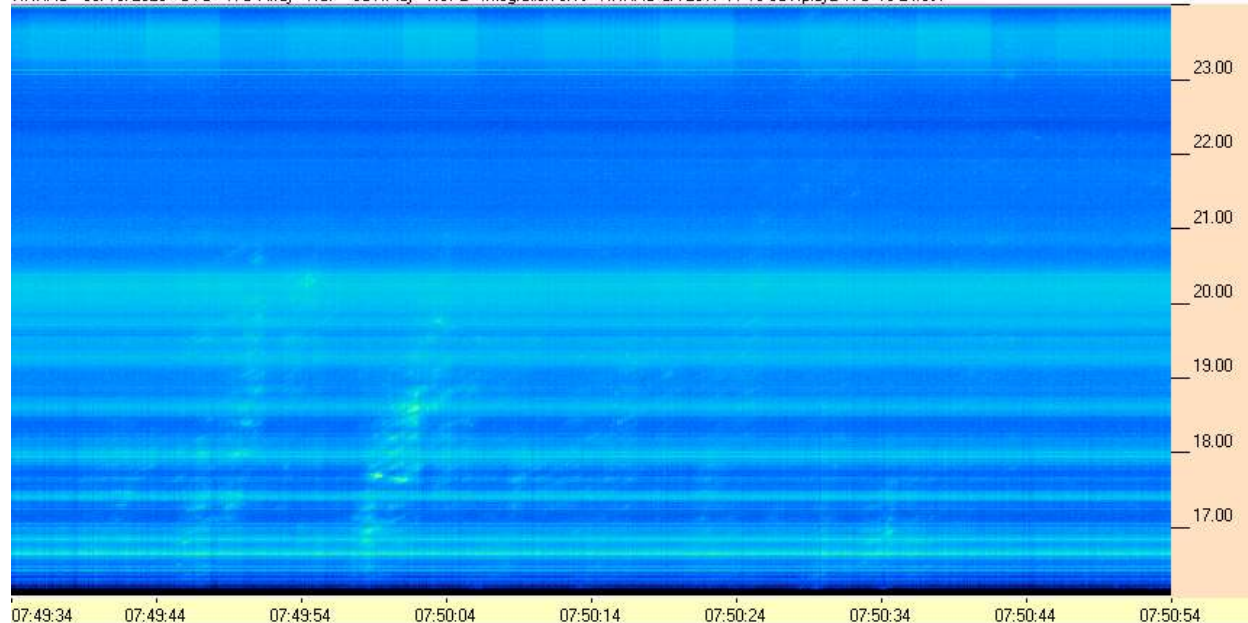
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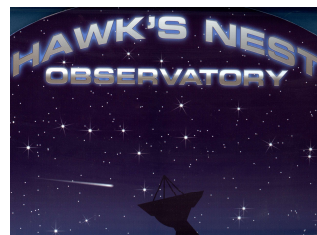
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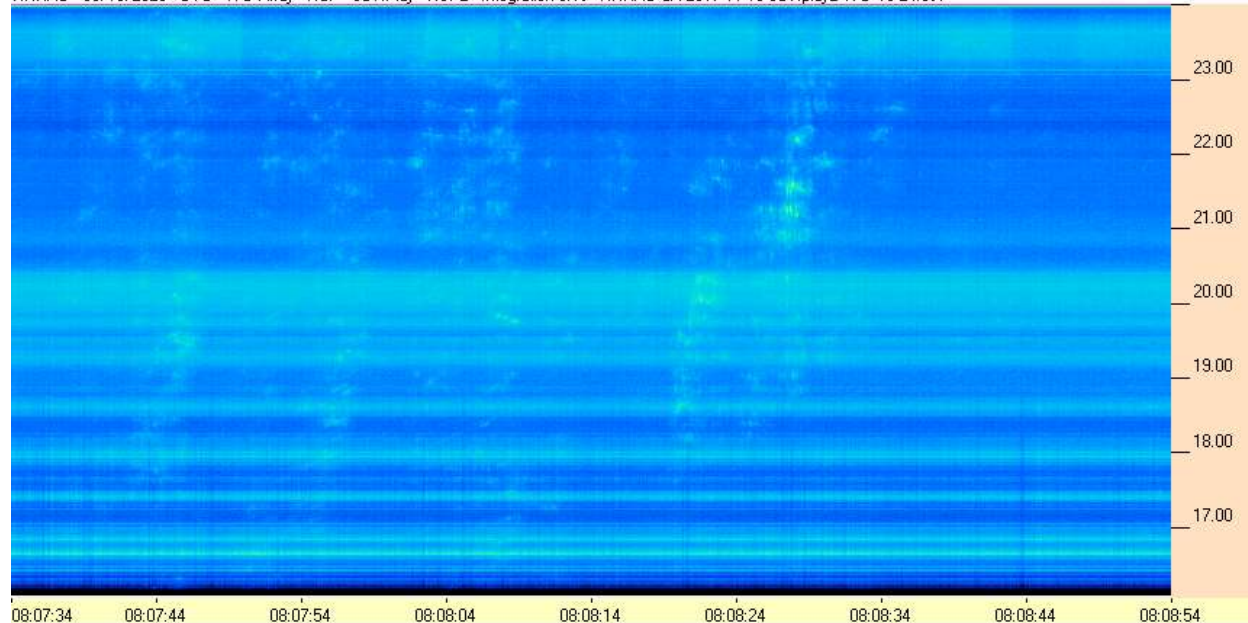
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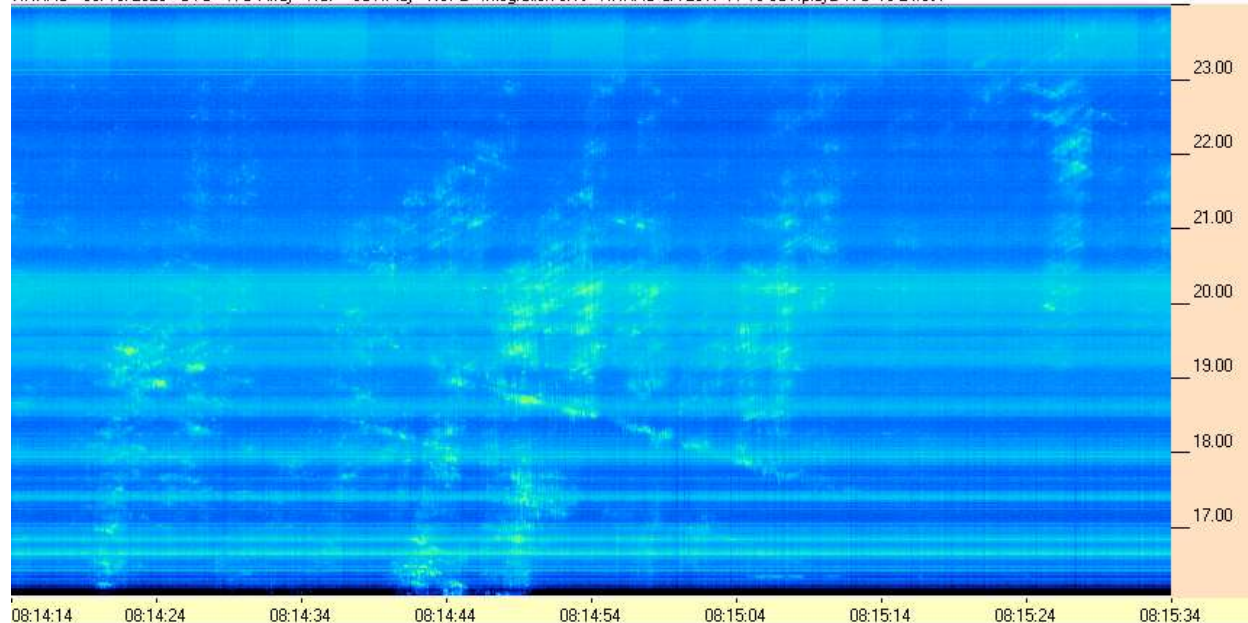
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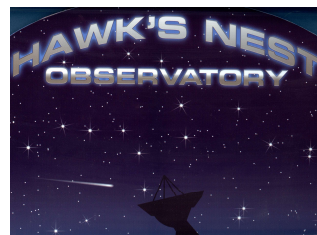
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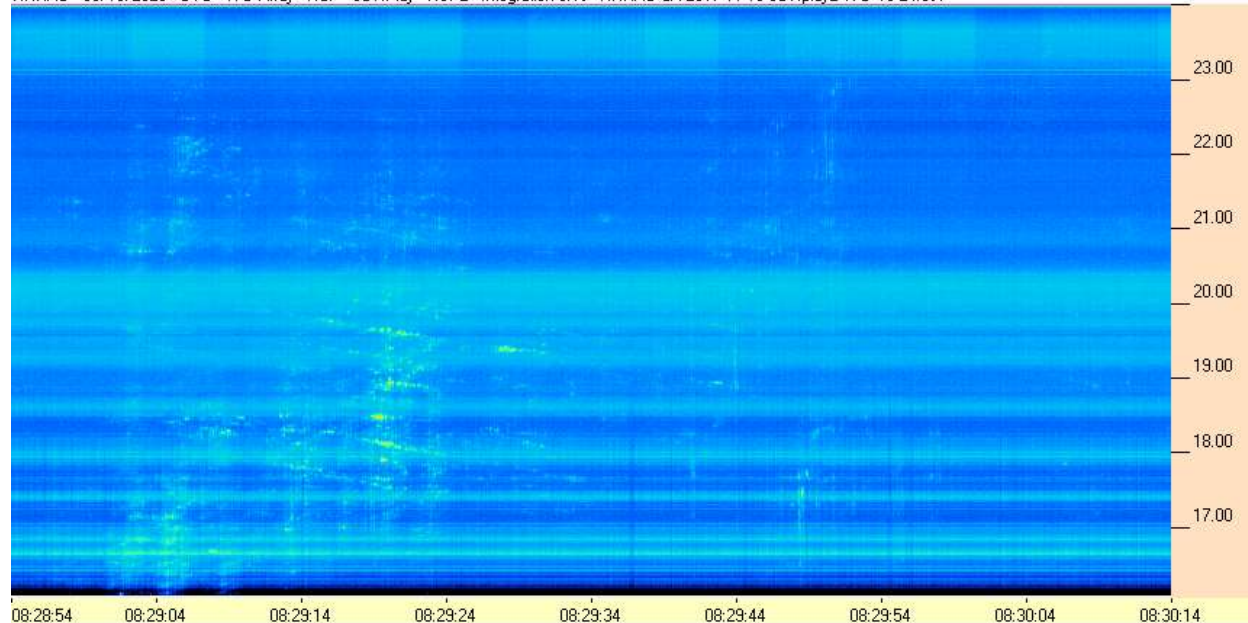
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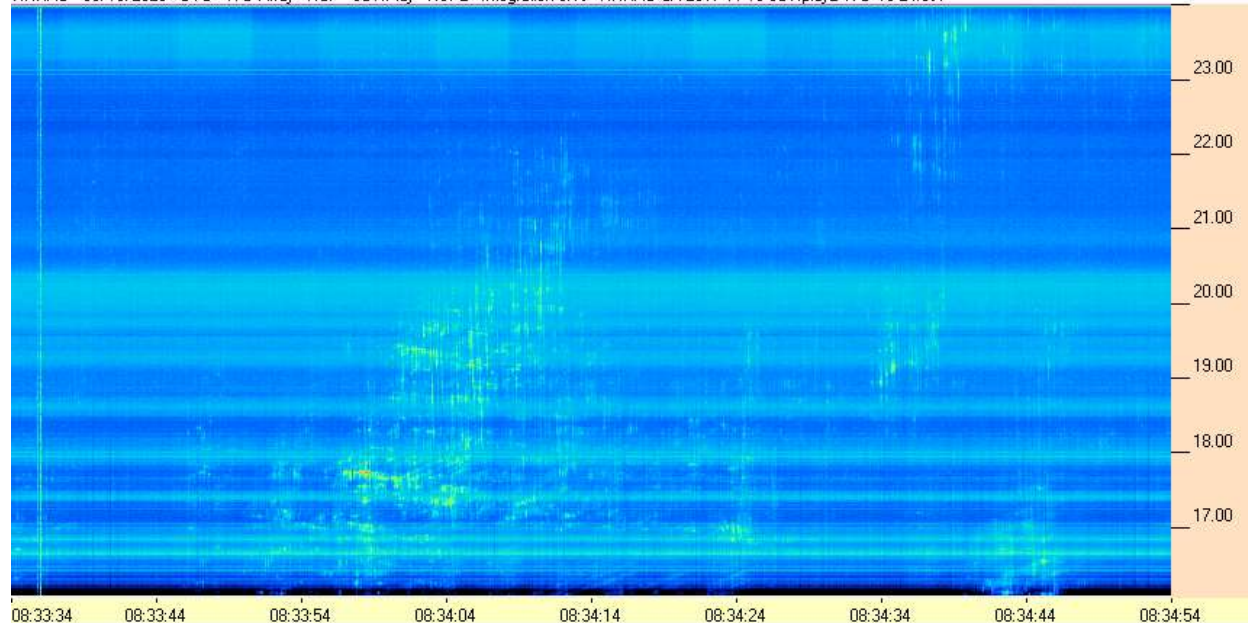
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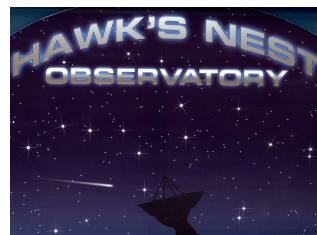
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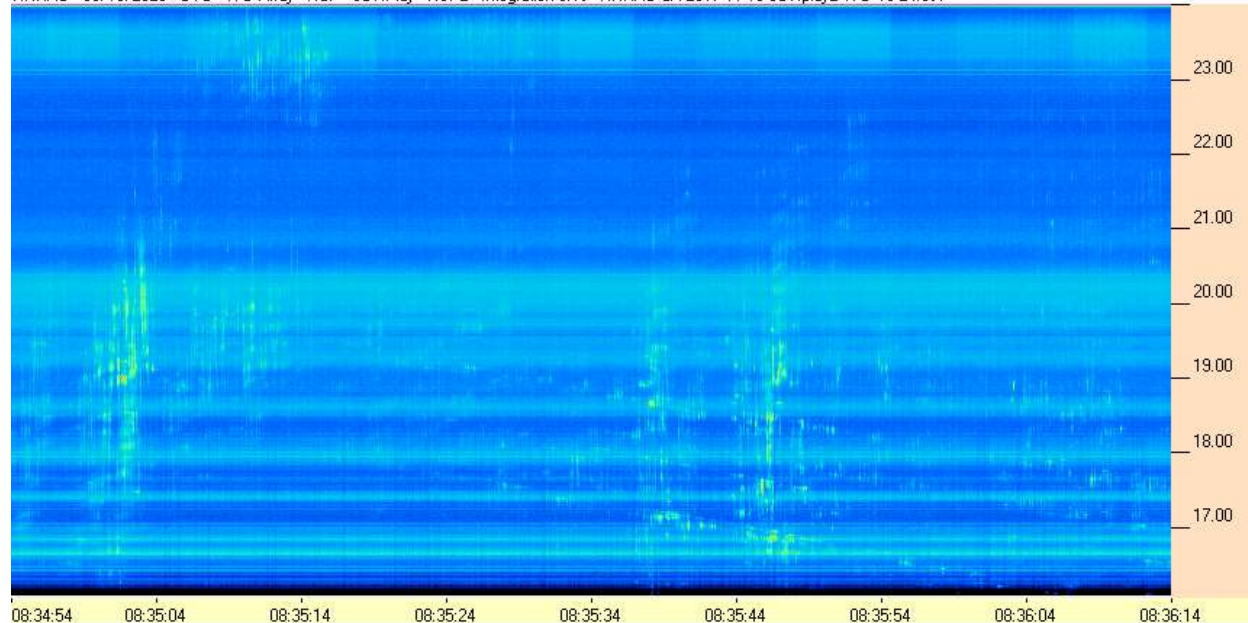
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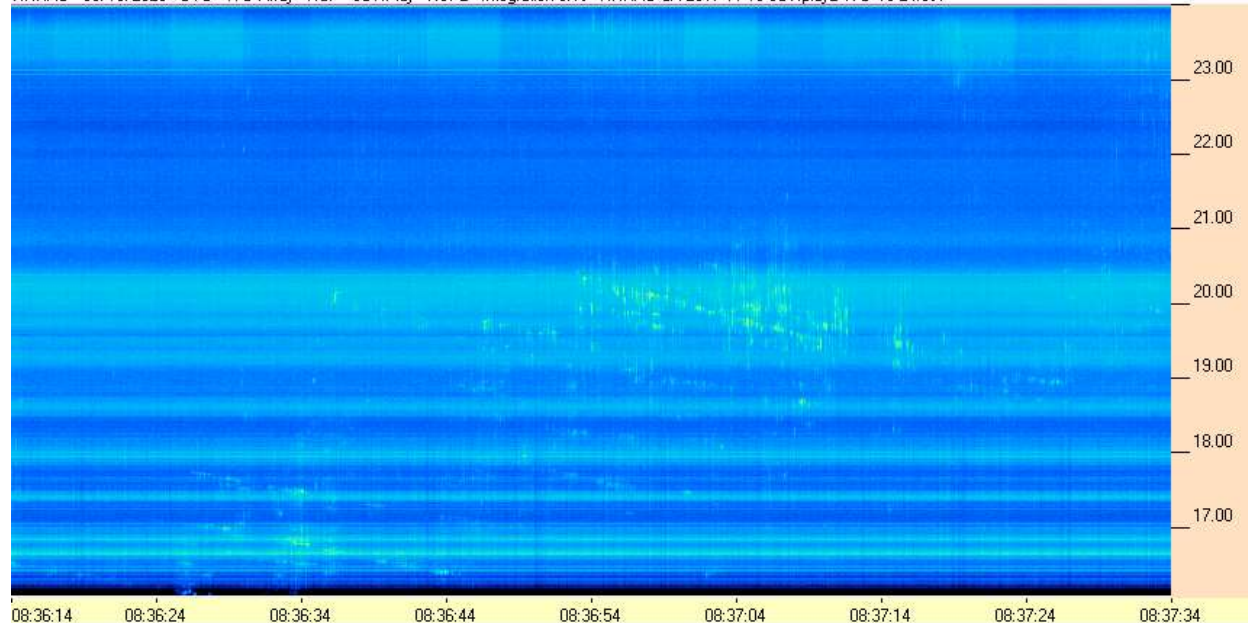
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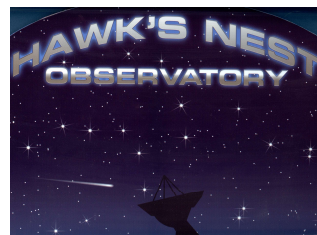
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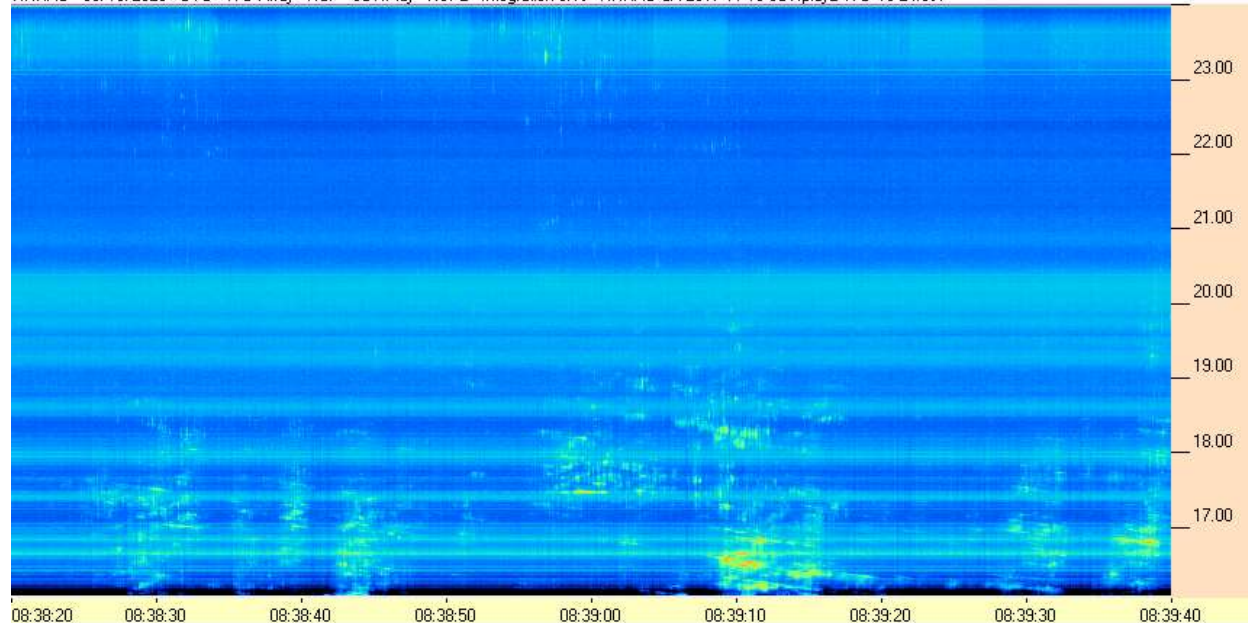
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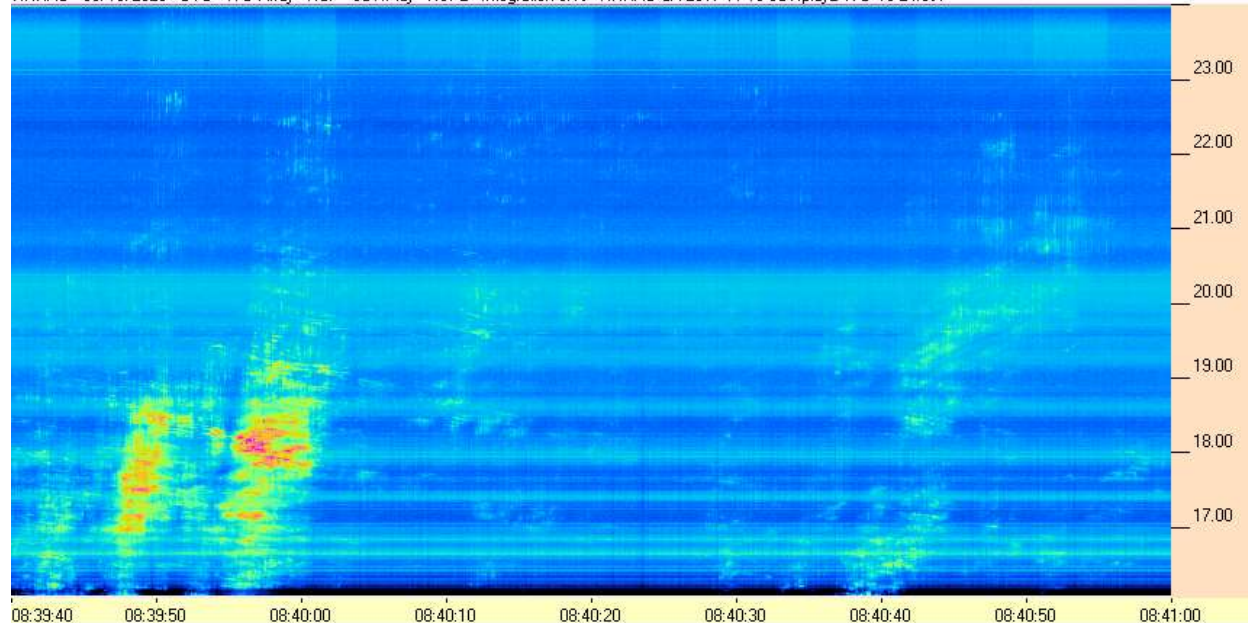
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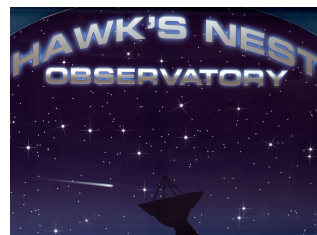
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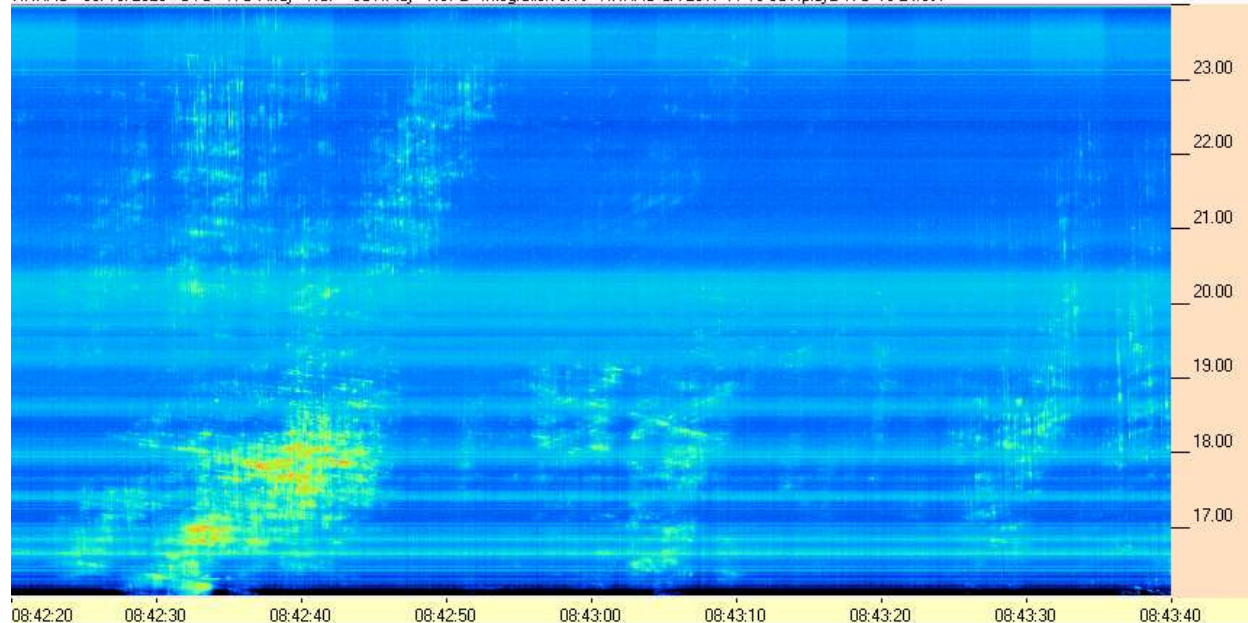
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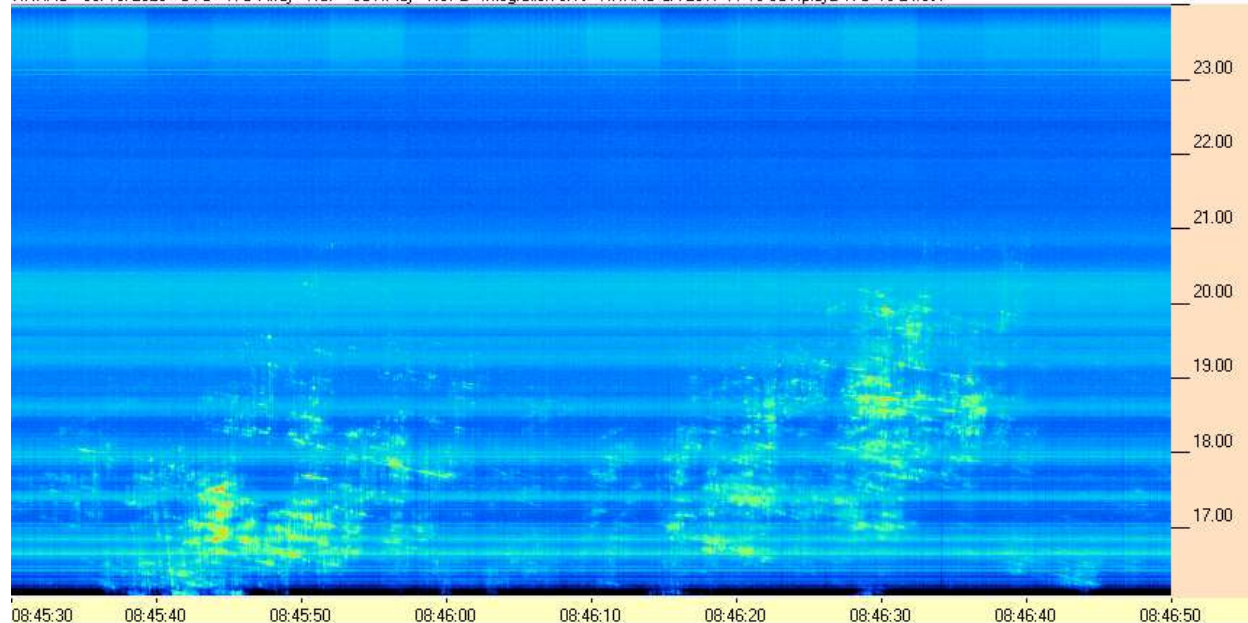
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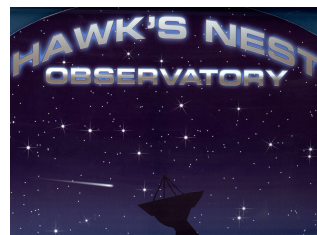
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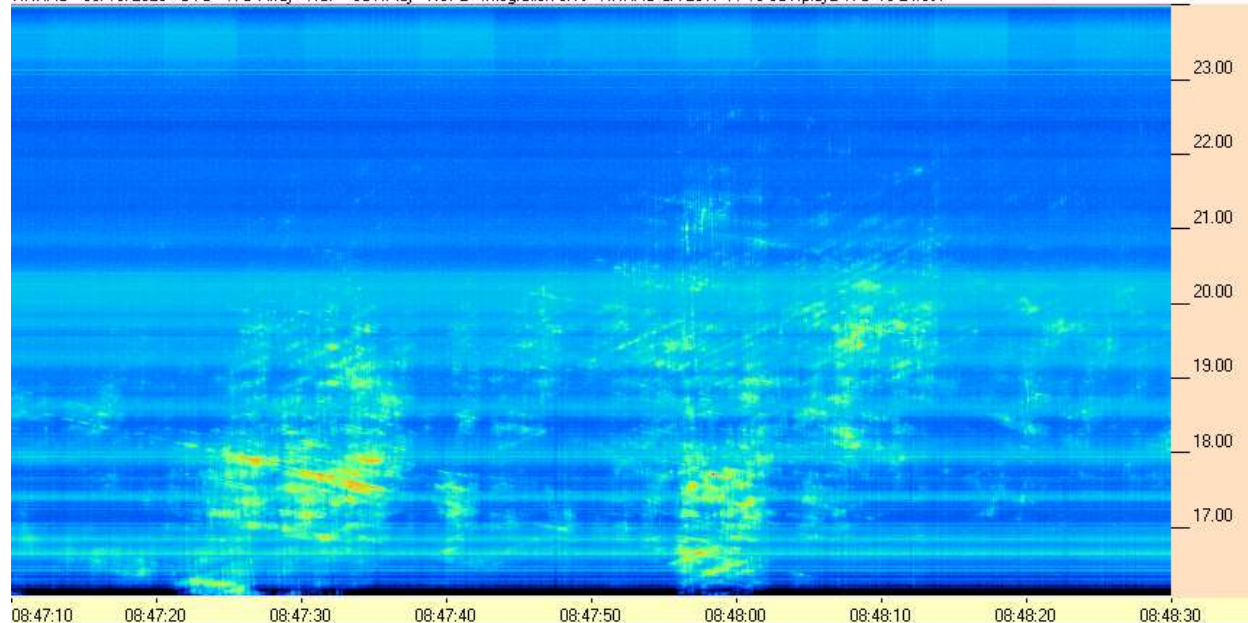
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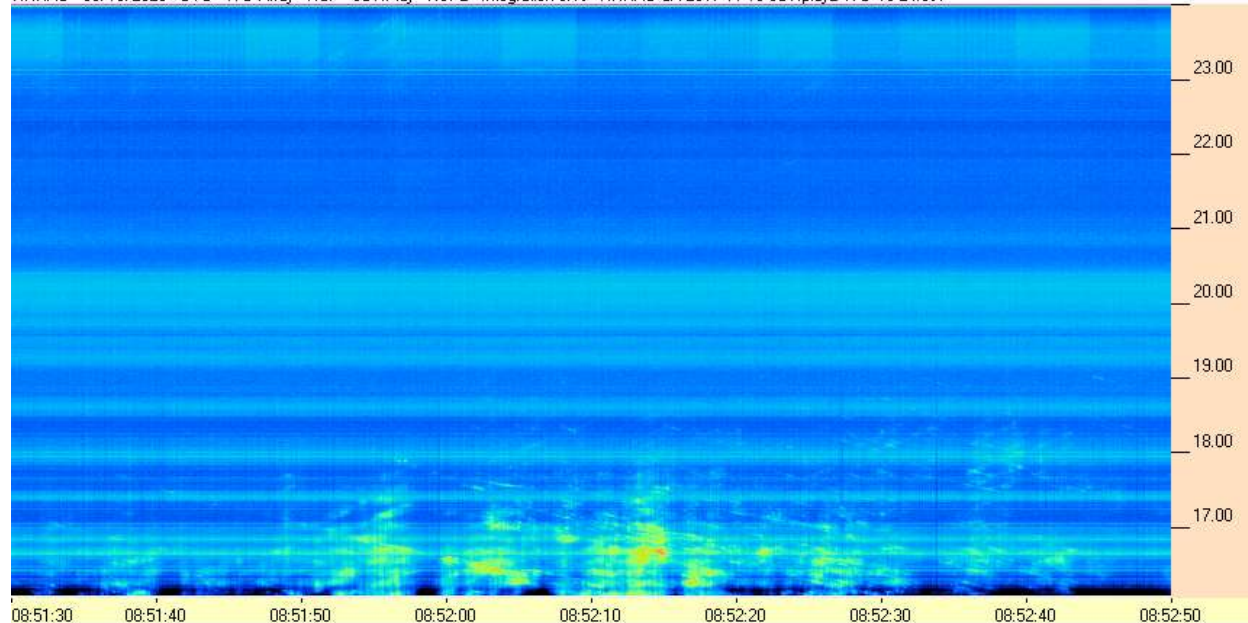
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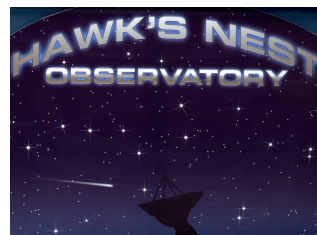
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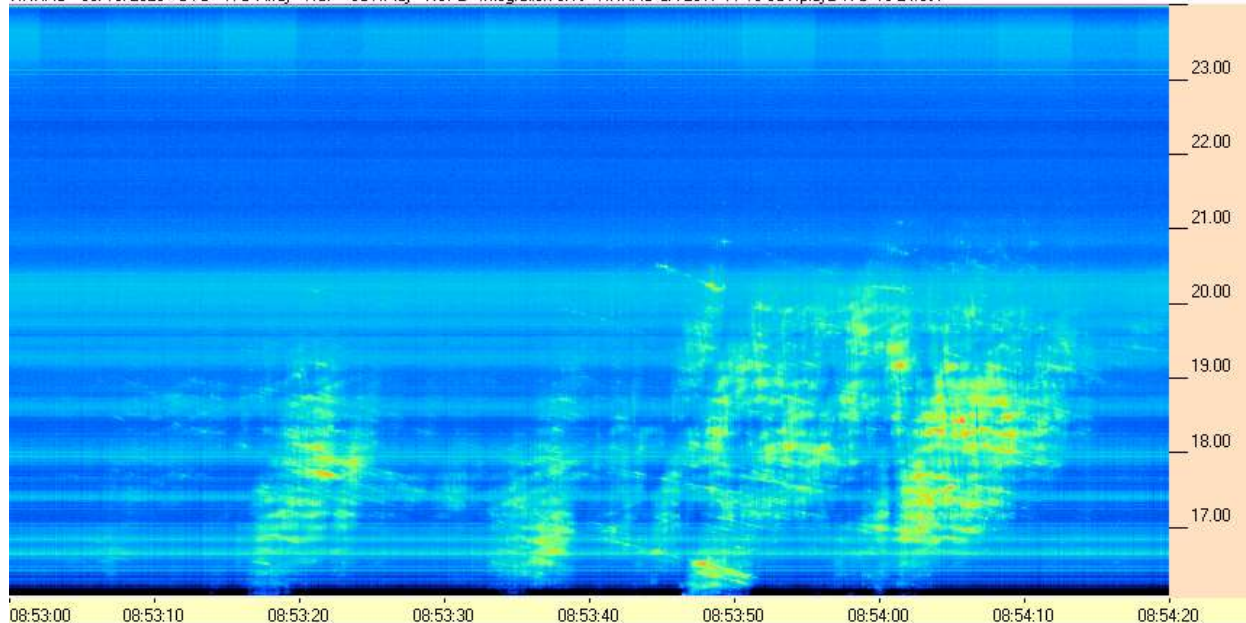
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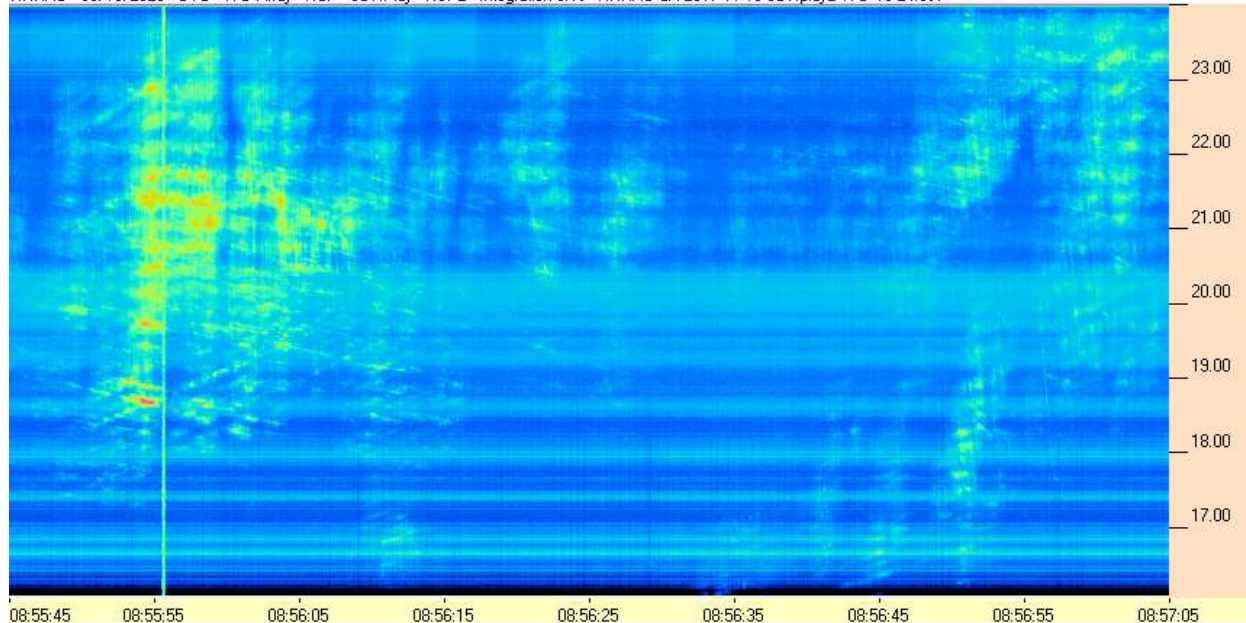
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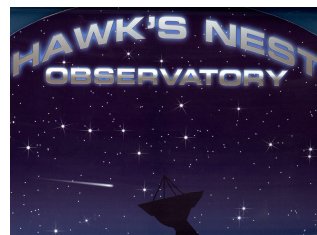
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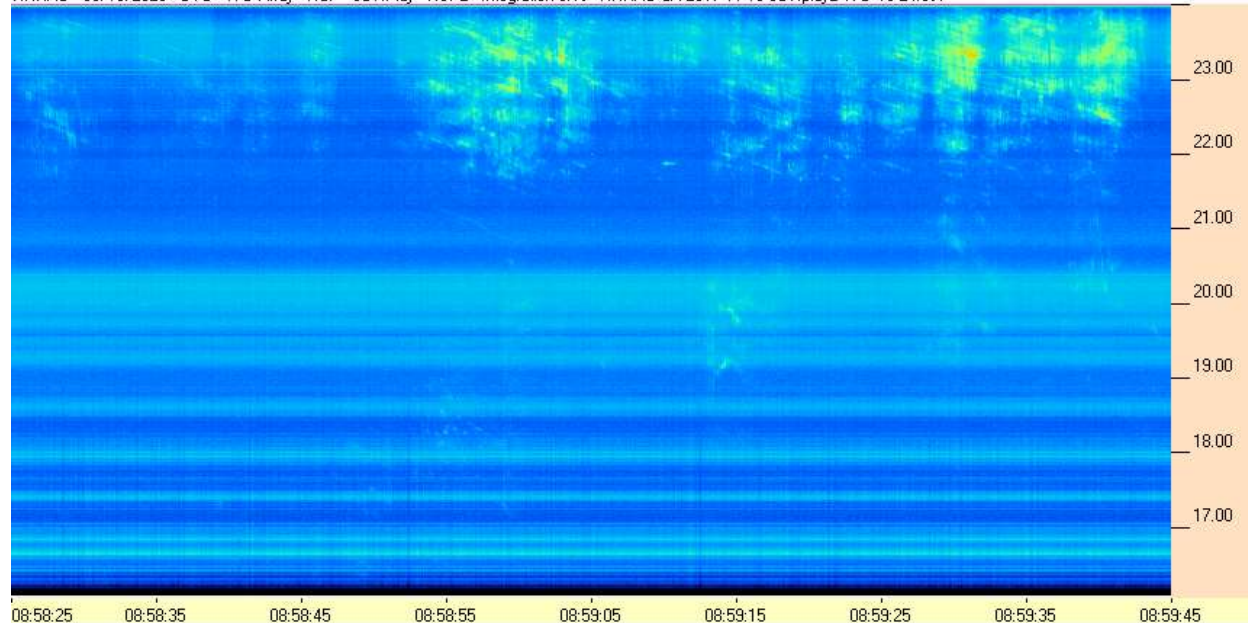
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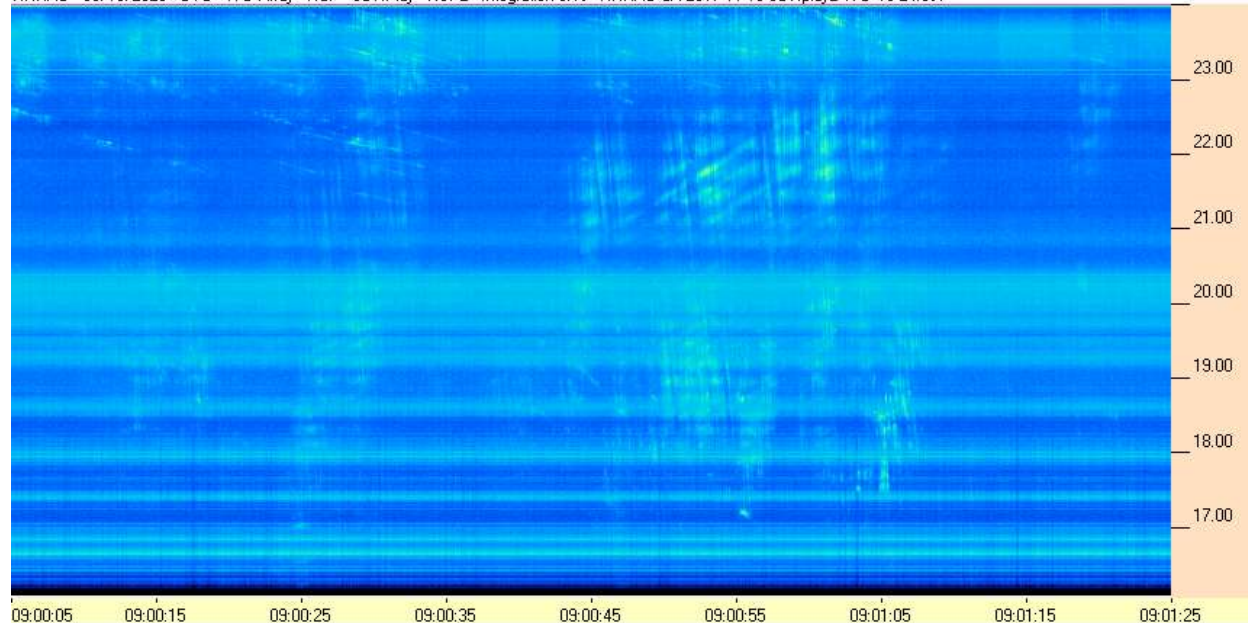
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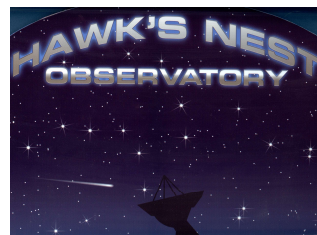
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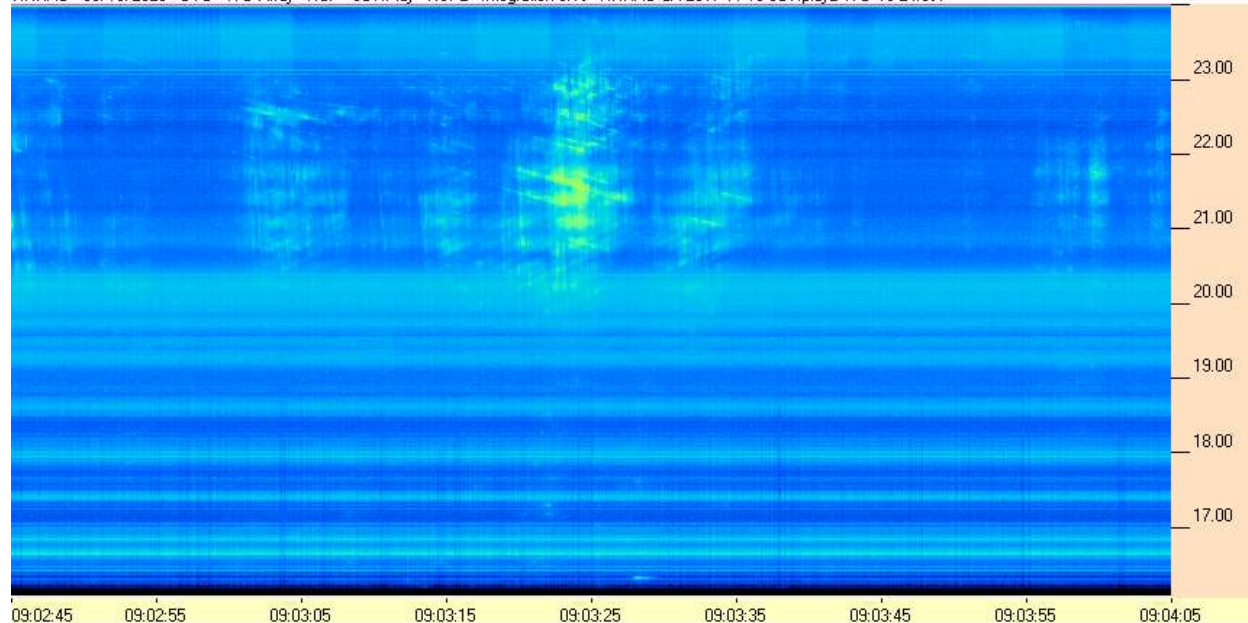
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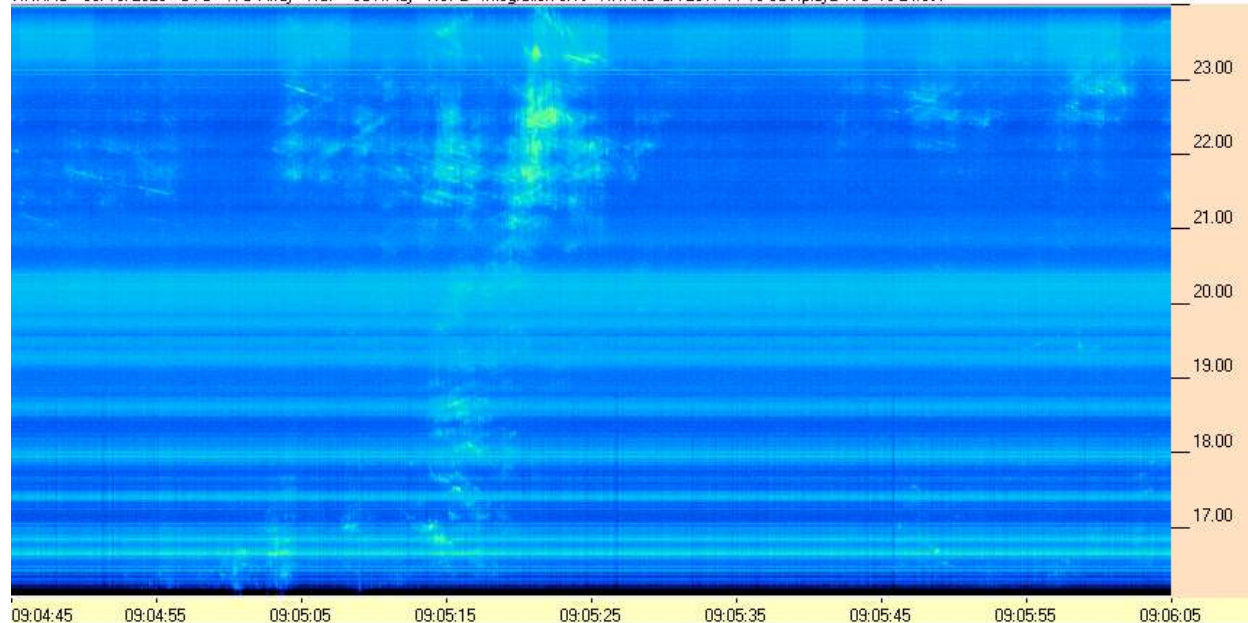
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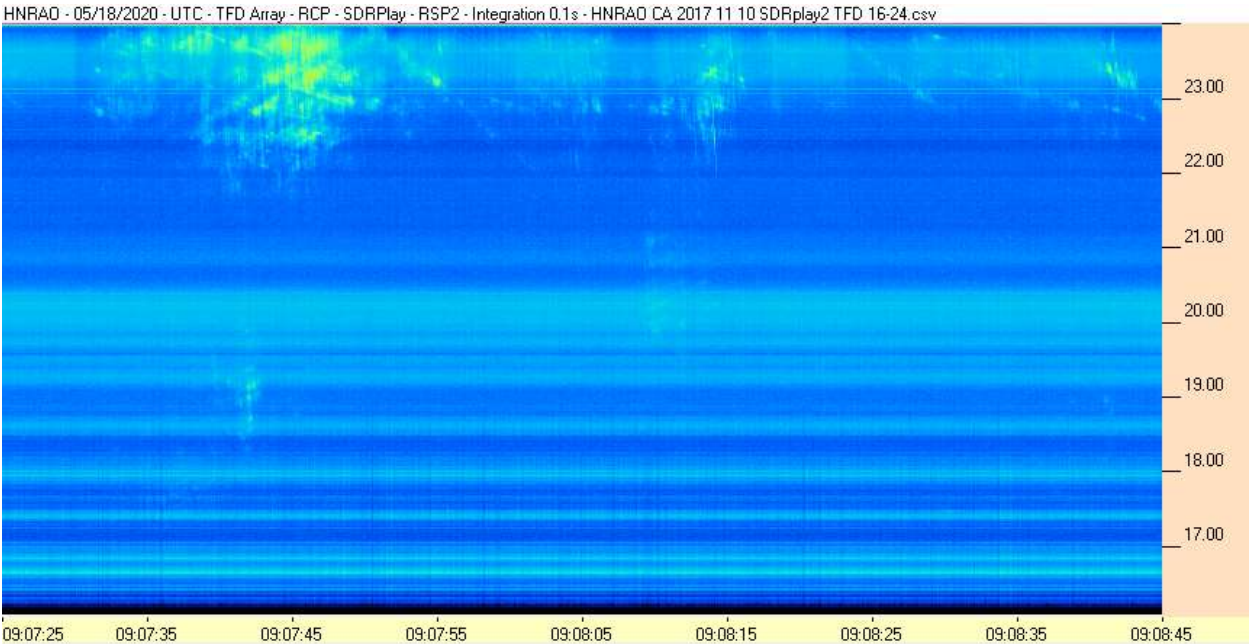
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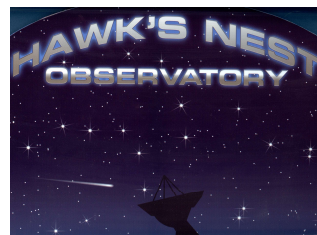
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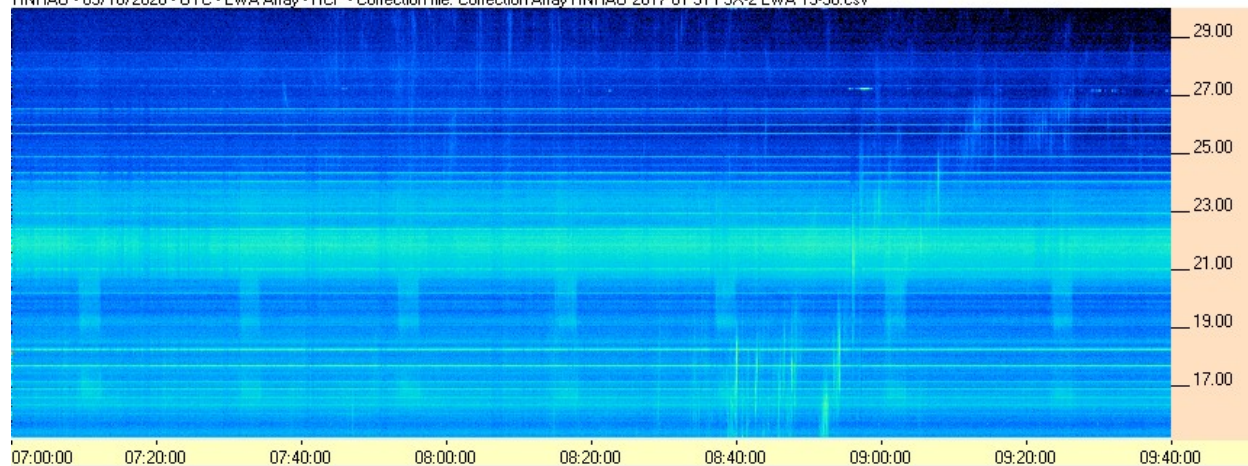


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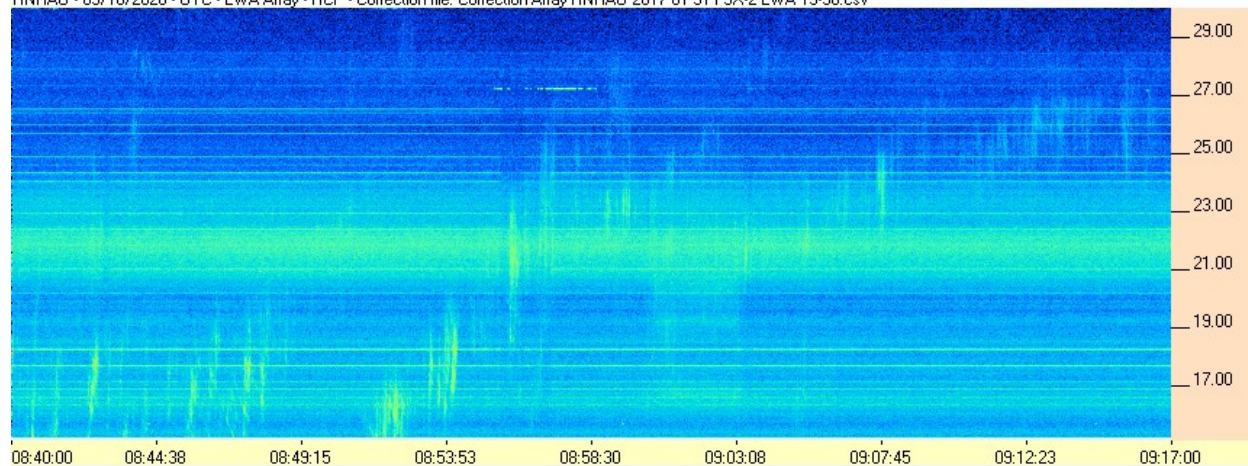


FSX-2 – LWA Array

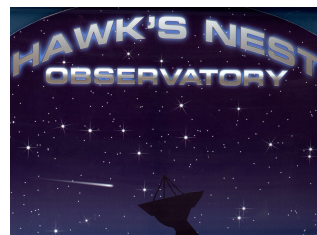
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HNRAO - 05/18/2020 - UTC - LWA Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-2 LWA 15-30.csv

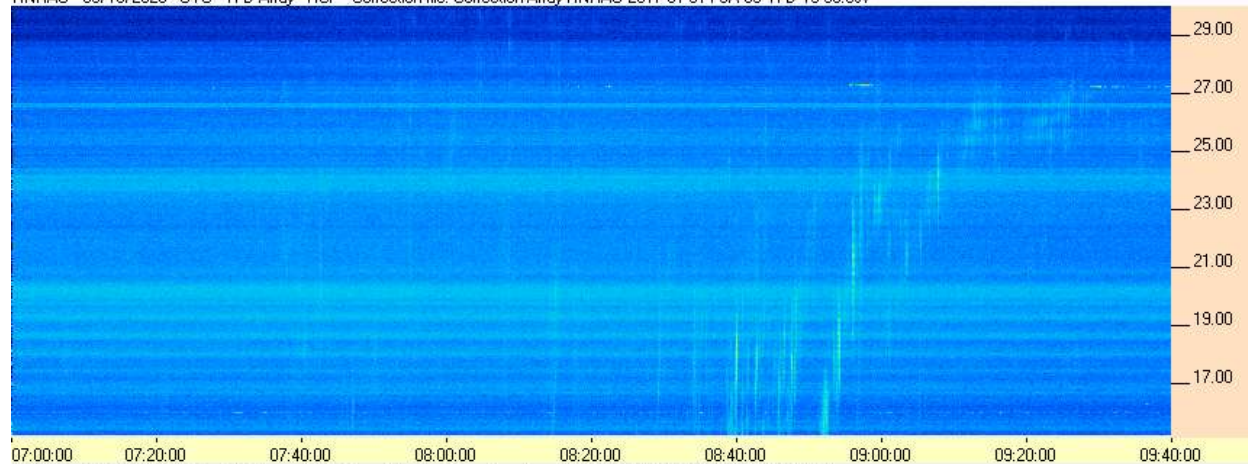


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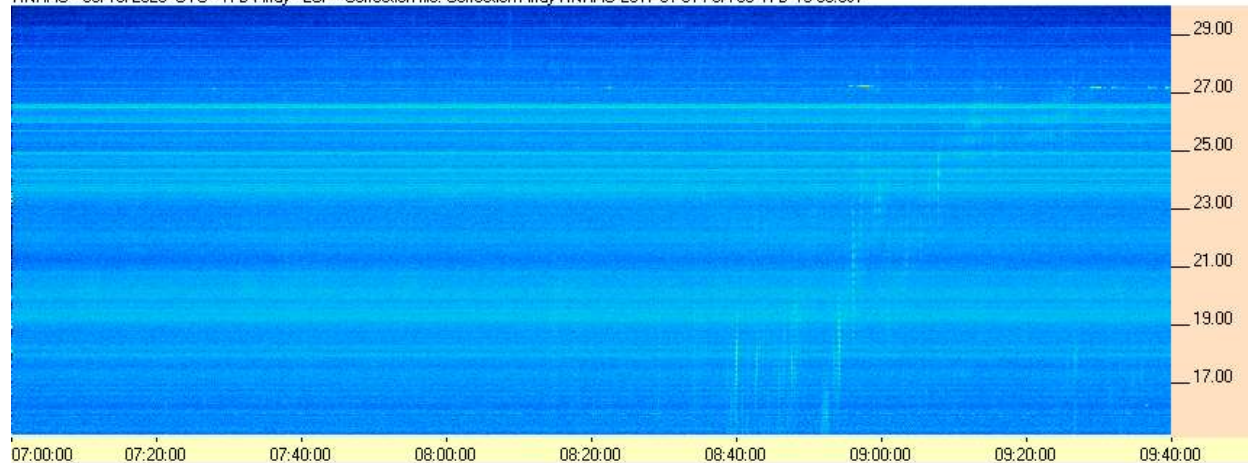


FSX-8S – TFD Array

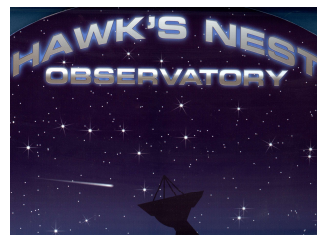
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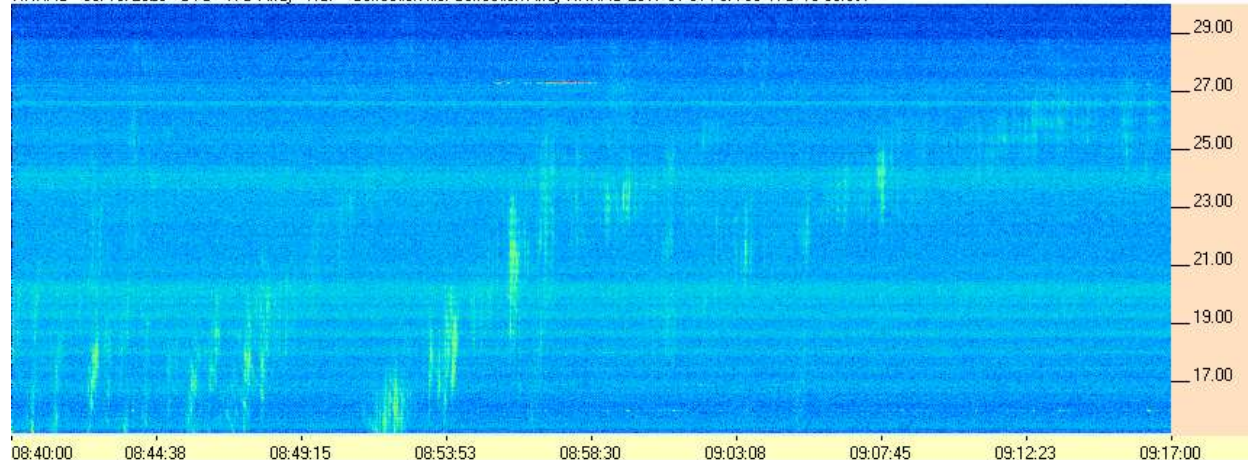
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HNRAO - 05/18/2020 - UTC - TFD Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv



HNRAO - 05/18/2020 - UTC - TFD Array - LCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv

