

HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq



Date: March 15, 2020

Object: Jupiter – Io-B

Observer: Unattended

Start - Time UT:	1436	Planetary K-index:	2
Jupiter Altitude (deg):	25.2	Jupiter Azimuth (deg):	199.4
Jupiter CML:	82.77	Jupiter Io Phase:	086.98
Jupiter RA (hr/min):	19:33	Jupiter Dec (hr/min):	-21:45
Hour Angle (hr/min):	01:15	Polarization	RCP
Sun Altitude (deg):	32.4	Sun Azimuth (deg):	127.9
Sun RA (hr/min):	23:36	Sun Dec (hr/min):	-02:34

End – Time UT:	1612		
Jupiter Altitude (deg):	15.9	Jupiter Azimuth (deg):	221.1
Jupiter CML:	140.8	Jupiter Io Phase	100.63
Hour Angle (hr/min):	02:52	Duration (min):	97
Sun Altitude (deg):	43.8	Sun Azimuth (deg):	154.9
Max Frequency MHz	24	Min Frequency MHz	16
J/S Angular Separation	061.4	De:	-1.6

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	3/12/2020

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

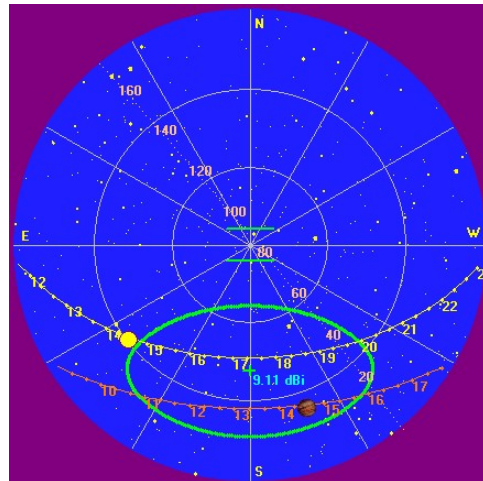
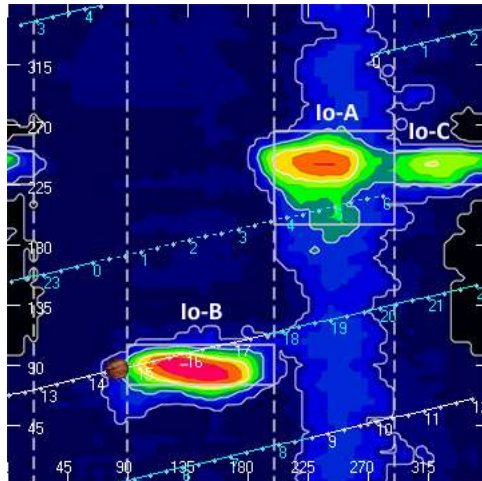
Radio Sky Spectrograph software version 2.9.30

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

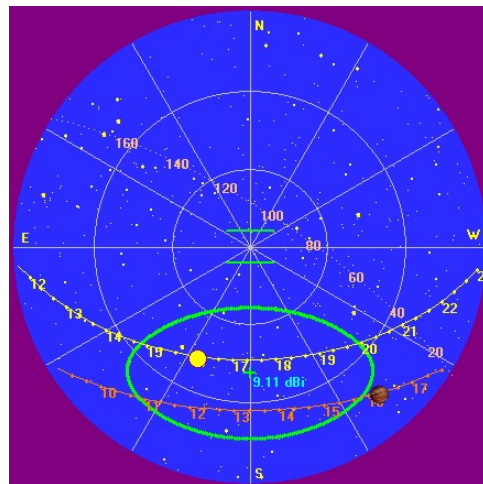
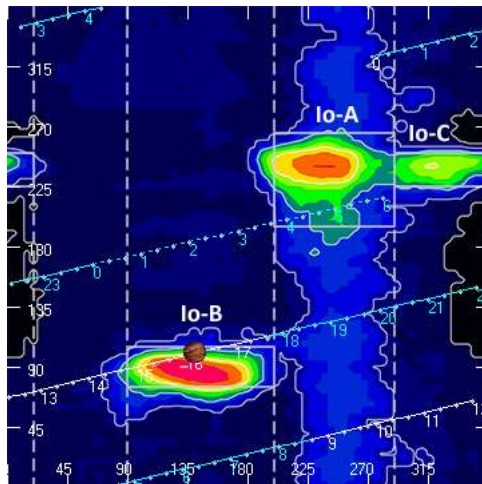
Network Time Server GpsNtp-Pi, Reeve Engineering

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

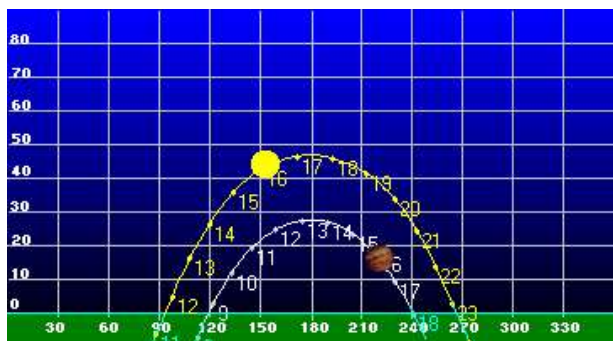
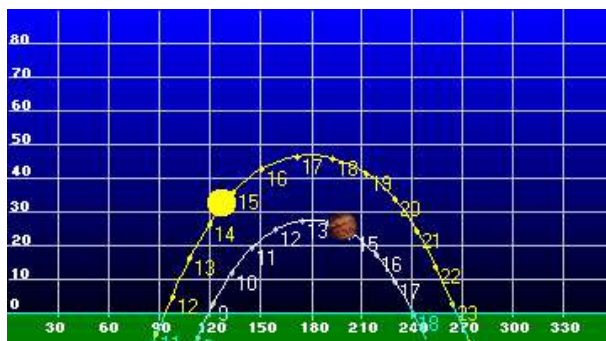
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Beginning of Pass



End of Pass



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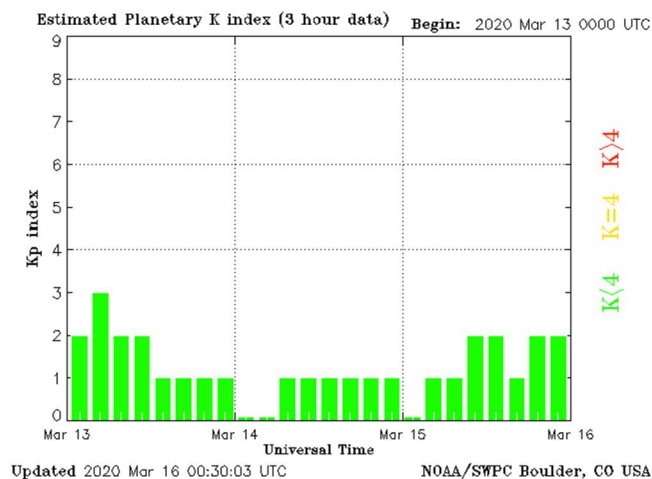


MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360	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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Weather at observatory:

Clear. High of 50 degrees F. at time of observation.

Status of observatory equipment:

All observatory antennas and receivers working nominally. No known hardware issues were noted in the log. Only the FSX-8S spectrograph and the SDRPlay RSP2/RSP, both using the TFD array, produced useable data. Software issues prevented data being recorded by the FSX-2 / LWA spectrograph. Software used was RSS 2.9.30.

RFI:

Clearly foreign broadcast station from 18 MHz down are very strong, obscuring some of the Io-B emissions below 18 MHz. Horizontal bright banding centered around 20 MHz and 22 MHz are from an unknown RFI source. Powerline RFI made the Radio JOVE data unusable. Ionospheric "sweepers" were not going much higher than 20 MHz.

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This RCP Io-B storm began with weak with L2 modulation lanes at 1436:12 UT between 22 MHz and 24 MHz. These lanes were slightly above GB. Until the very end of the observed emissions, this storm produced weak L-bursts.

L2 modulation lanes continued to be observed between 22 MHz and 24 MHz but were spaced with little to no observed emissions. At 1446 UT a group of L2 modulation lanes span from 18 MHz to 24 MHz, the first observed L-bursts below 22 MHz. This group was also just slightly above GB by 1 or 2 db.

At 1449 UT, stronger L2 modulation lanes were seen between 18 MHz and 20 MHz. These were perhaps 3 db above GB.

A very small cluster of S-bursts with a bandwidth of approximately .5 MHz were observed at 1536:30 with the brightest burst at 18.8 MHz.

At 1551:06 UT, the L2 (positive slope) modulations became L3 modulation lanes (cross hatched). It is also noted that at this time the intensity of the L-bursts became much stronger. The L3 modulation lanes continued to be observed until the very end of the storm.

Some of the strongest bursts were observed at this point. At 1536:46 UT, 19.5 MHz, a single burst was perhaps +6 db above GB. Another similar burst was observed at 1553:58 UT, at 19.3 MHz. Yet another of these high intensity singular bursts was observed at 1554:14 UT at 19.3 MHz. The intensity of these three bursts suggest to me S-burst origin but the visual evidence is not conclusive.

The time period between 1552:50 UT and 1554:50 represented the most intense period of emissions during this storm.

Overall, this storm can be summarized as weak L-burst emissions, with possible S-bursts, until the last 4 minutes of the storm. It was dominated by L2 modulation lanes until they became L3 modulation lanes at the very end.

Nothing else of note.

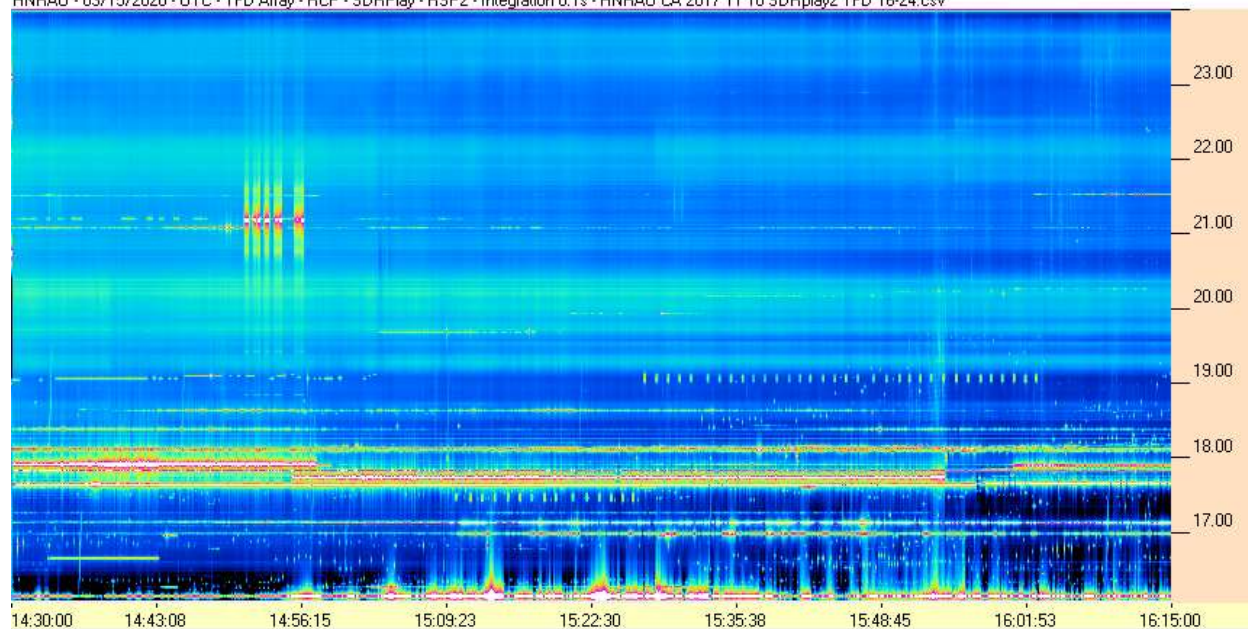
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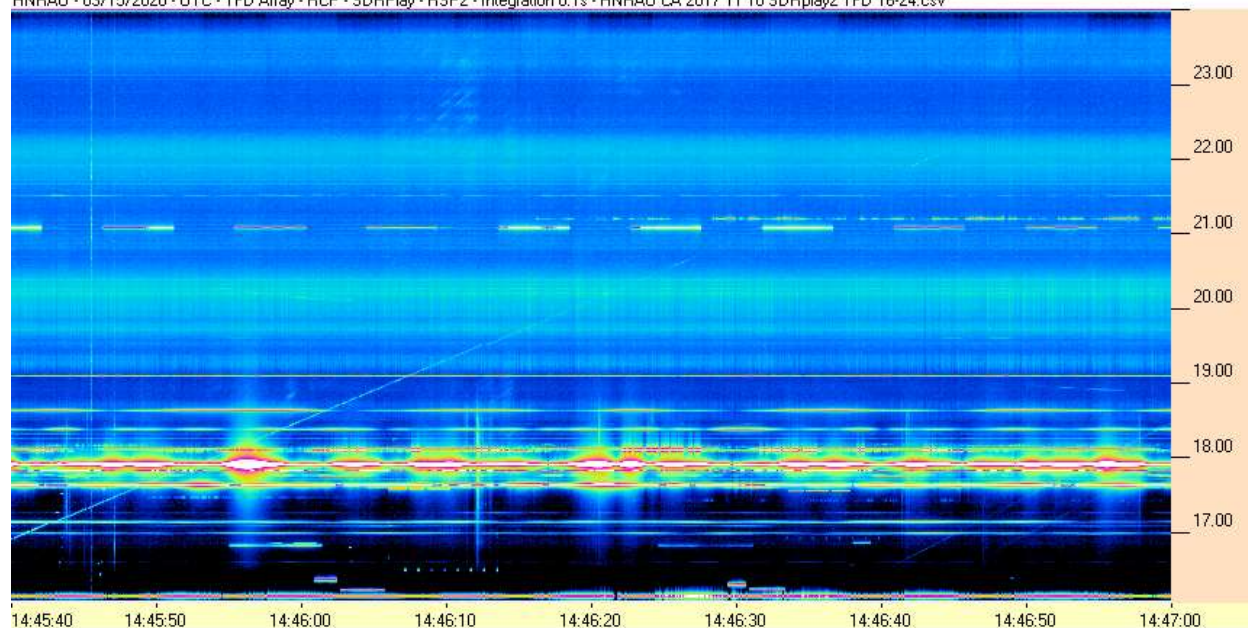


SDRPlay RSP2 / TFD Array

HNRAO - 03/15/2020 - UTC - TFD Array - RCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv



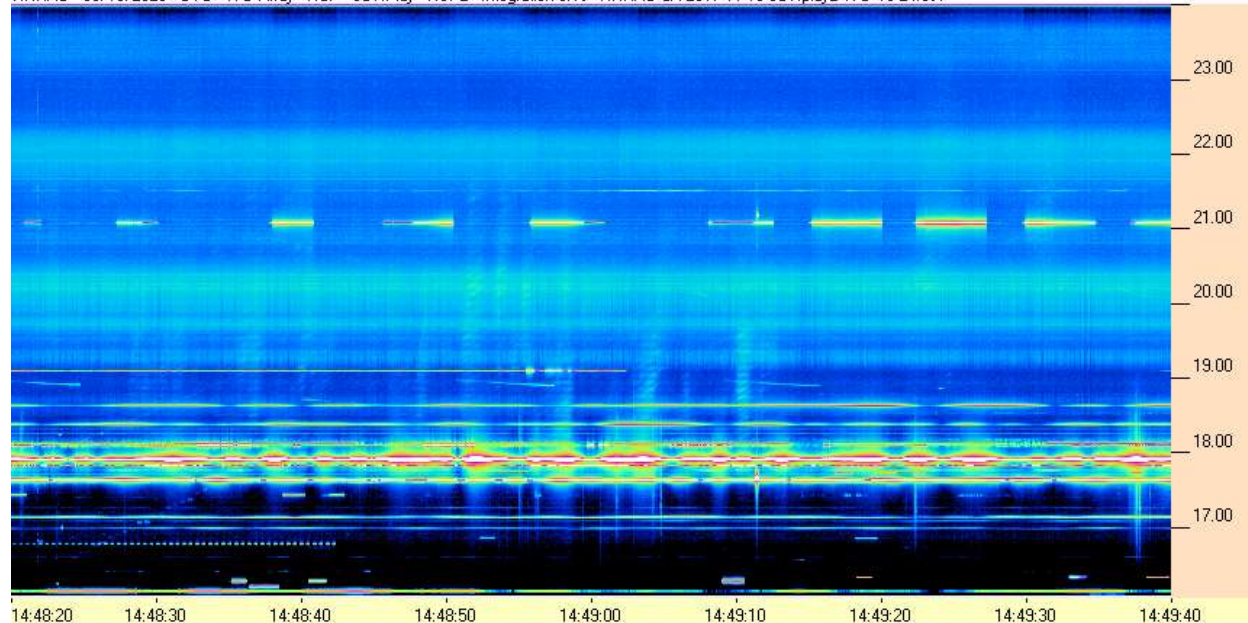
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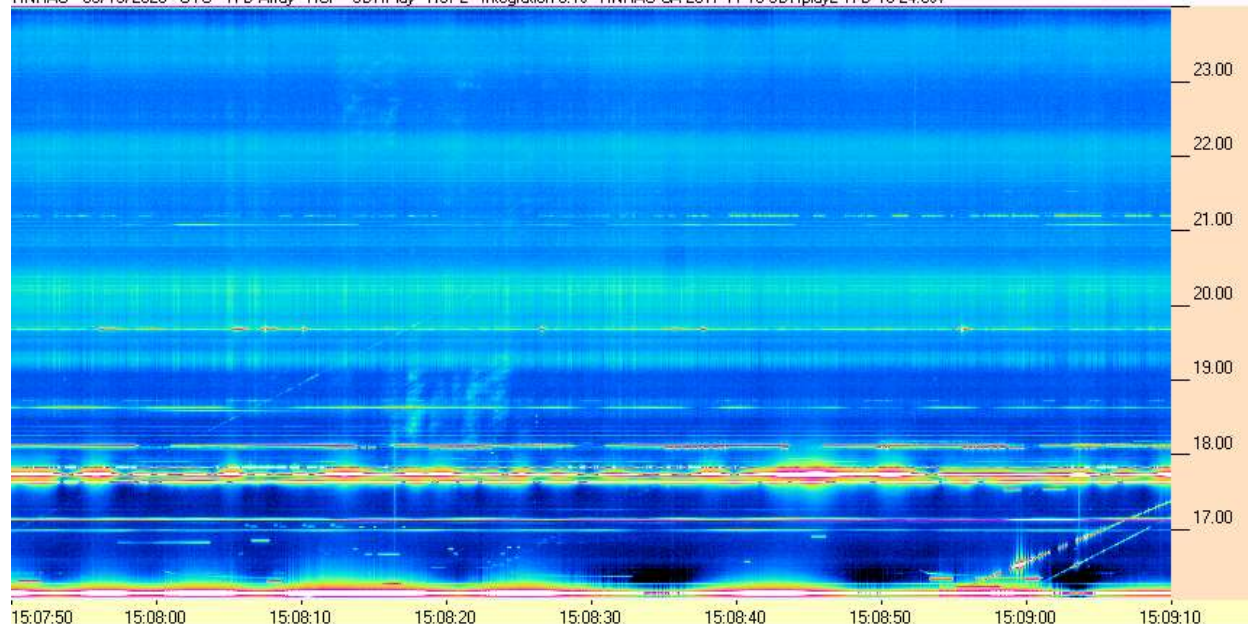
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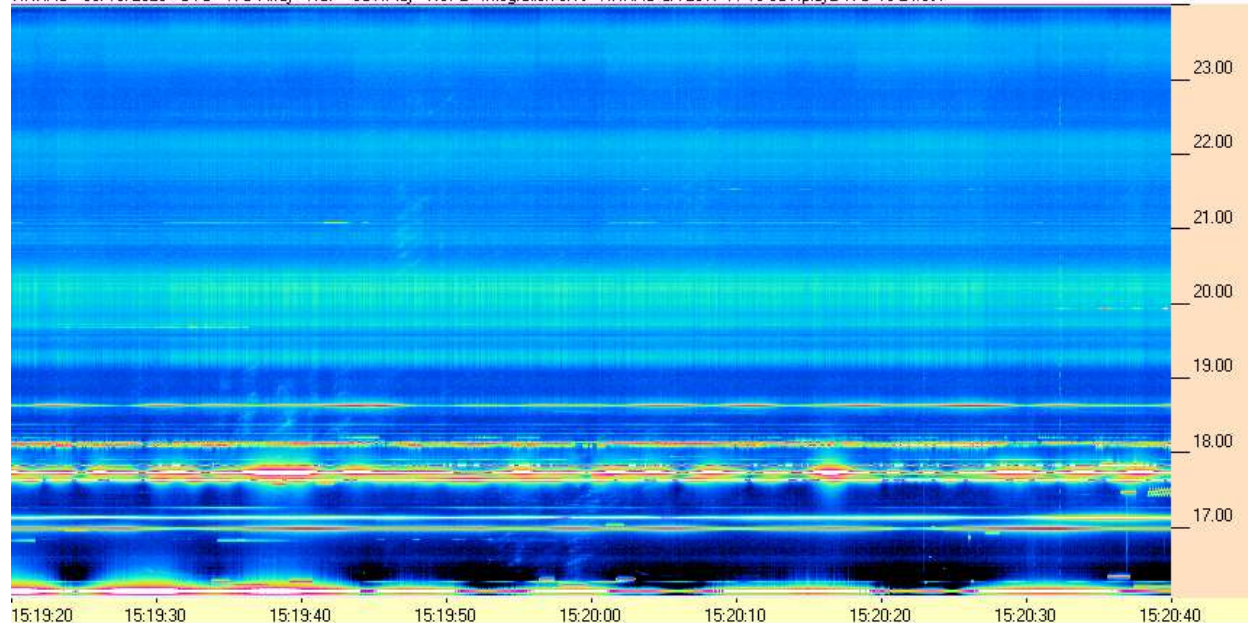
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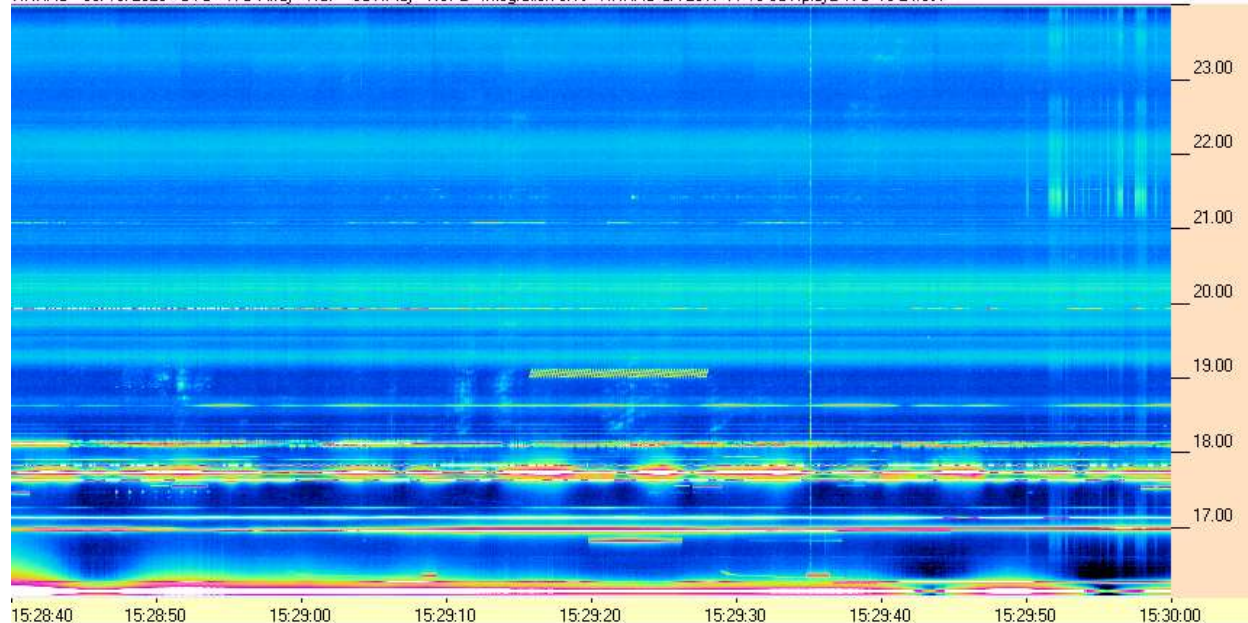
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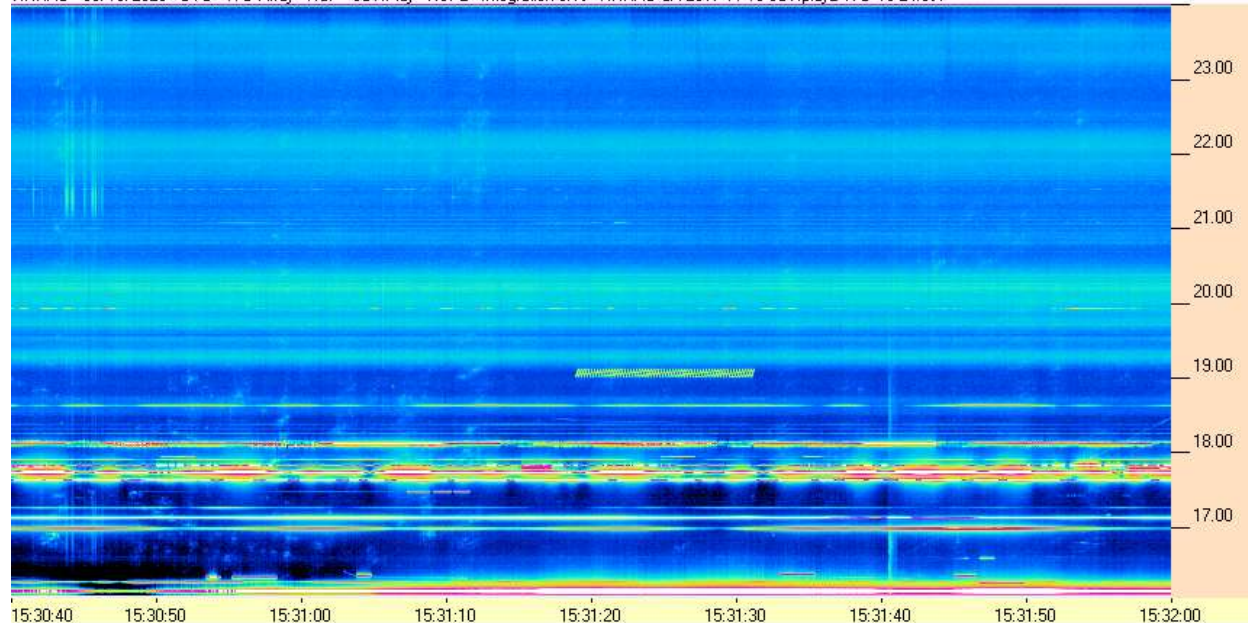
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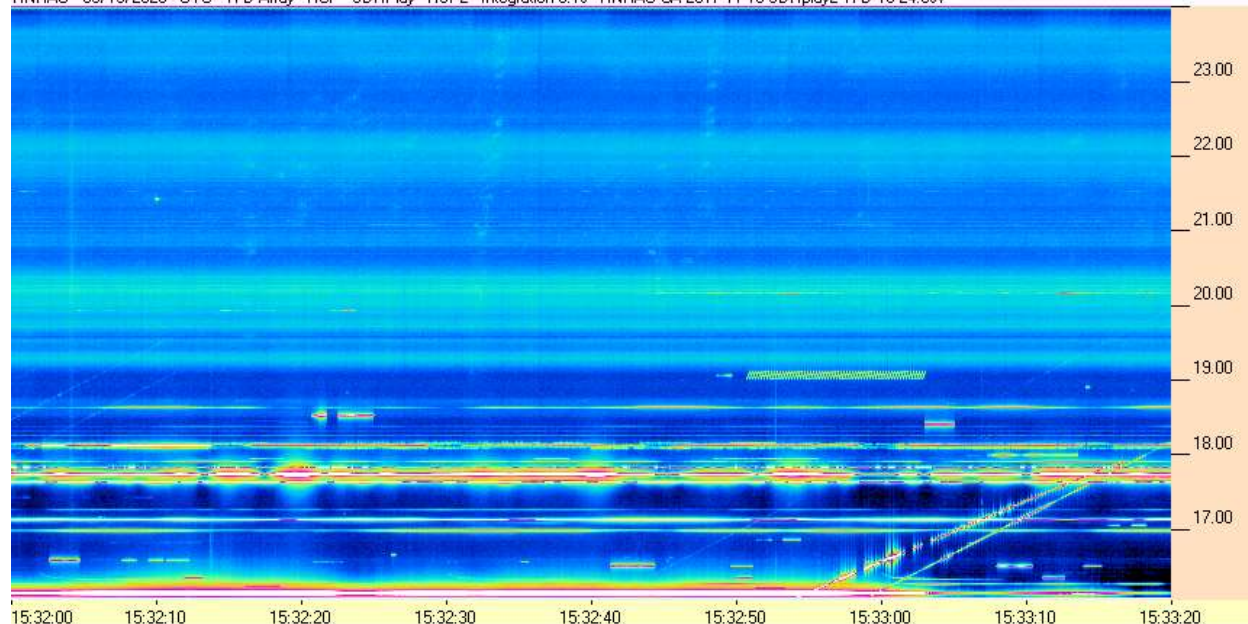
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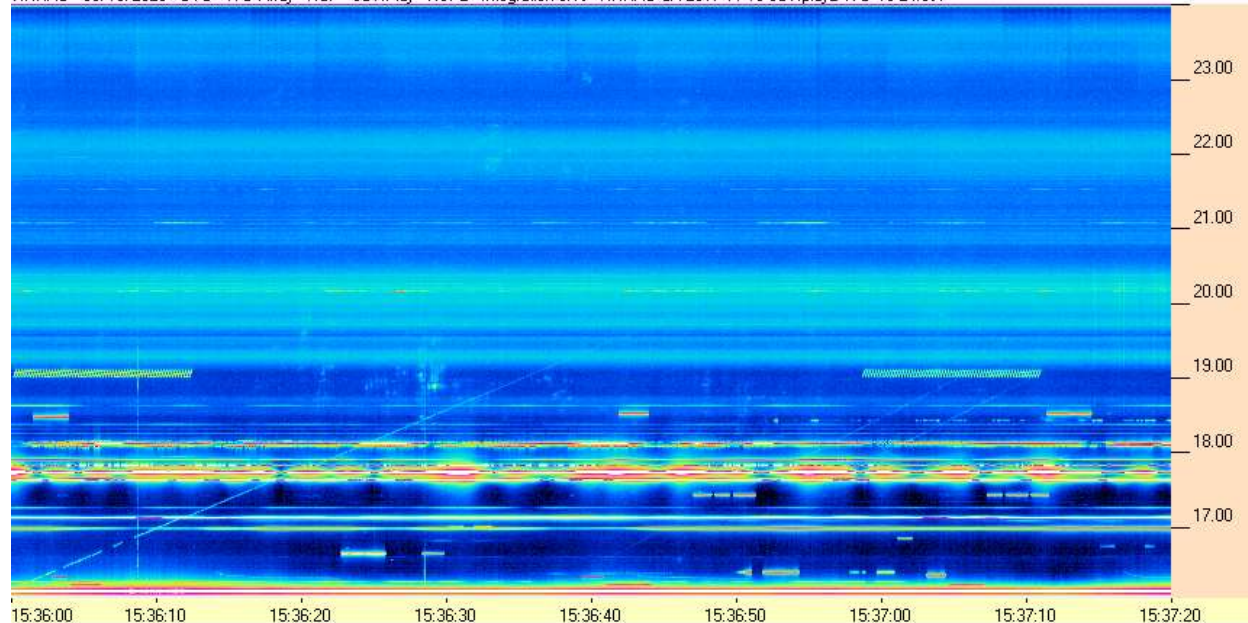
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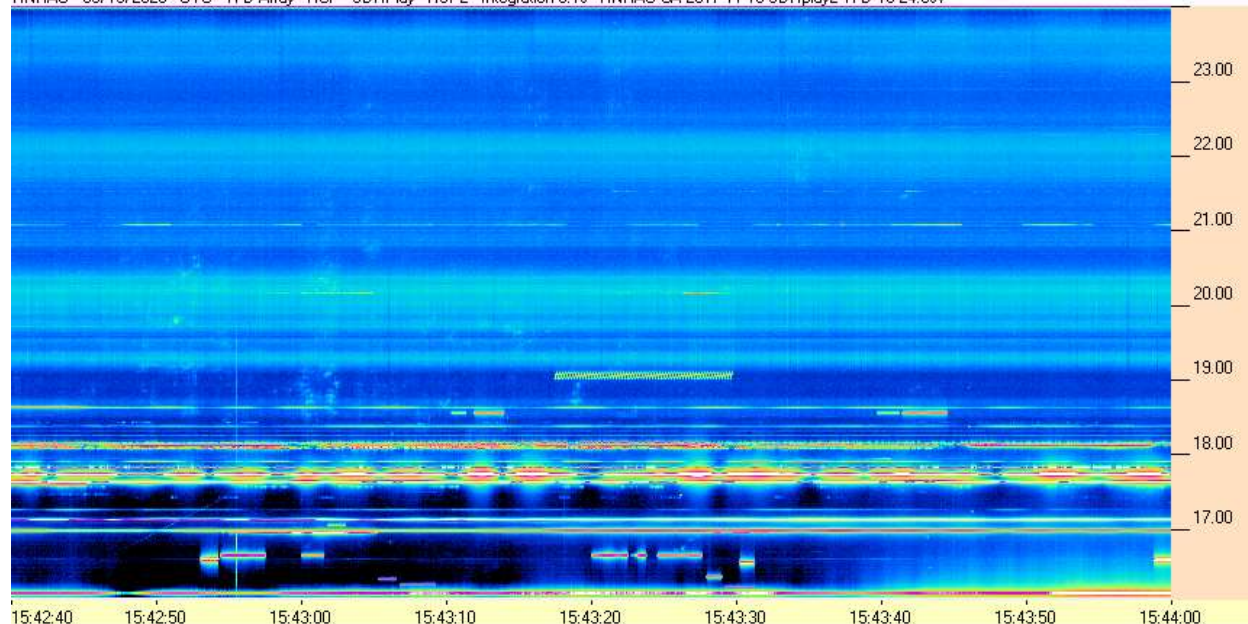
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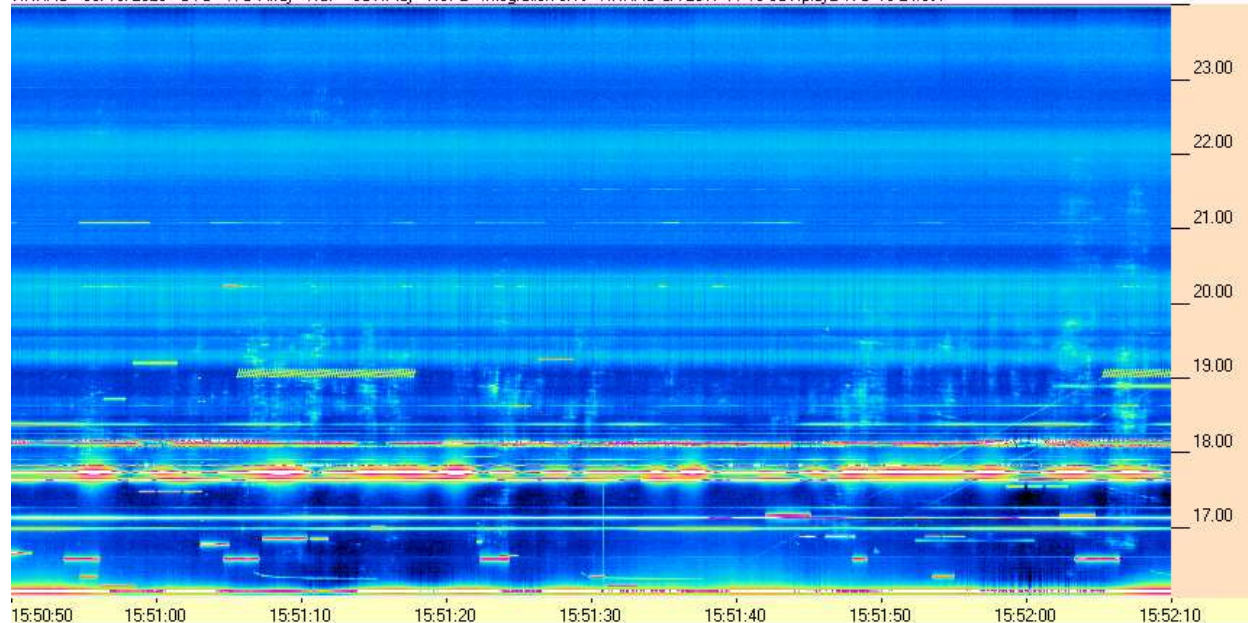
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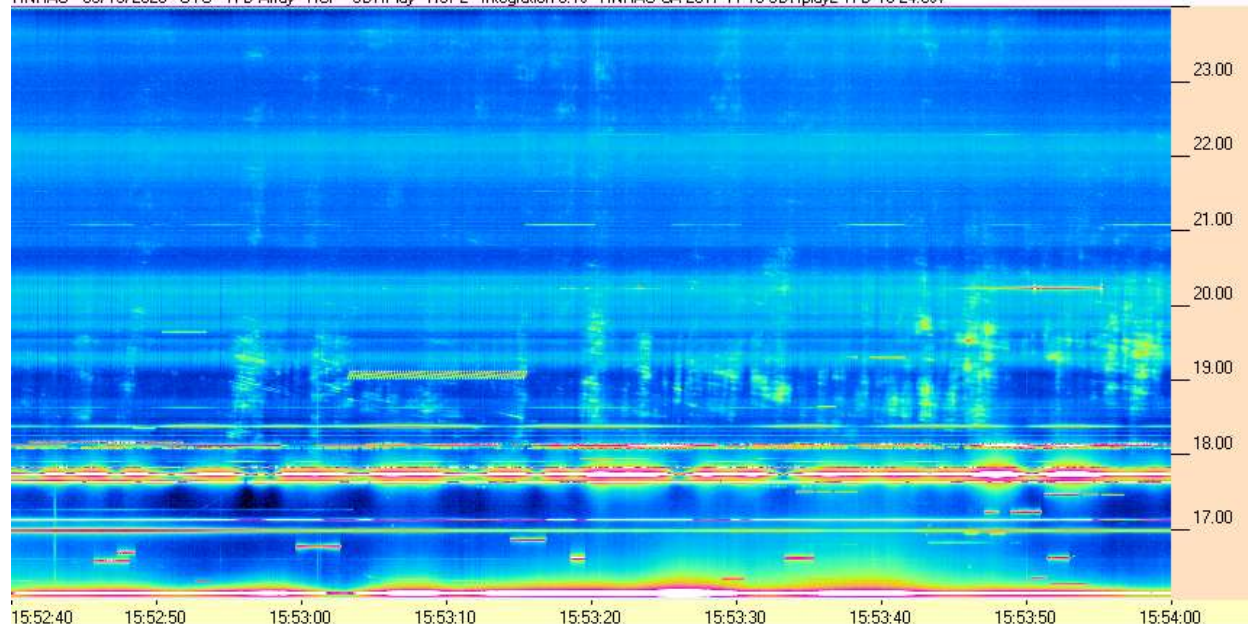
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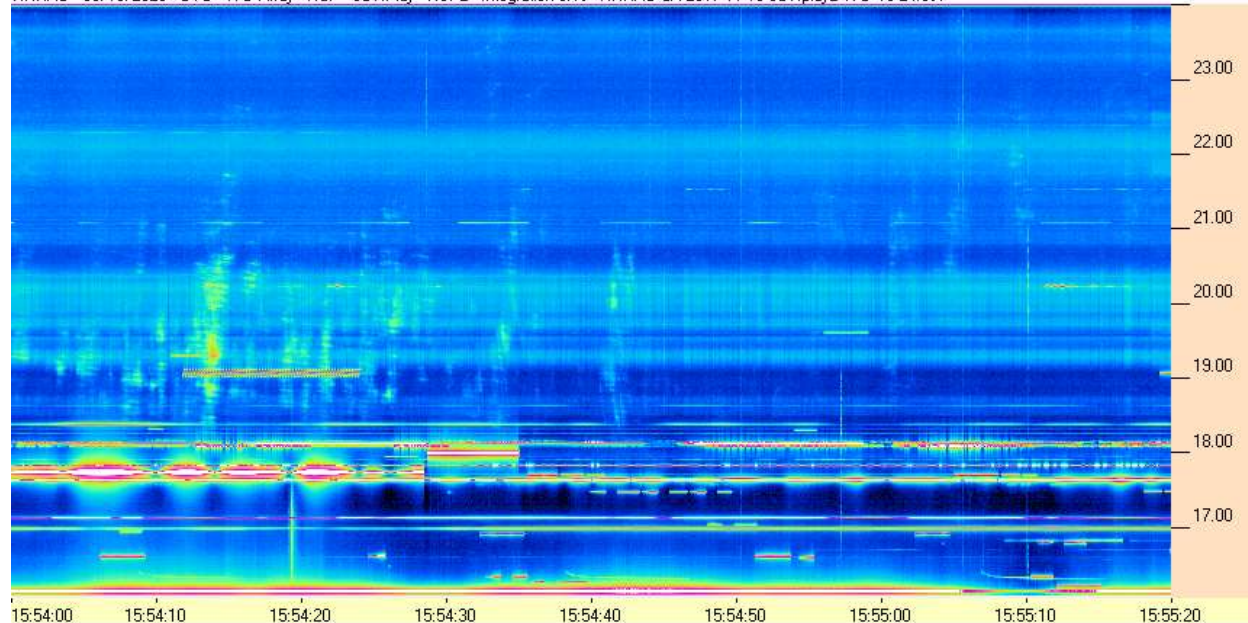
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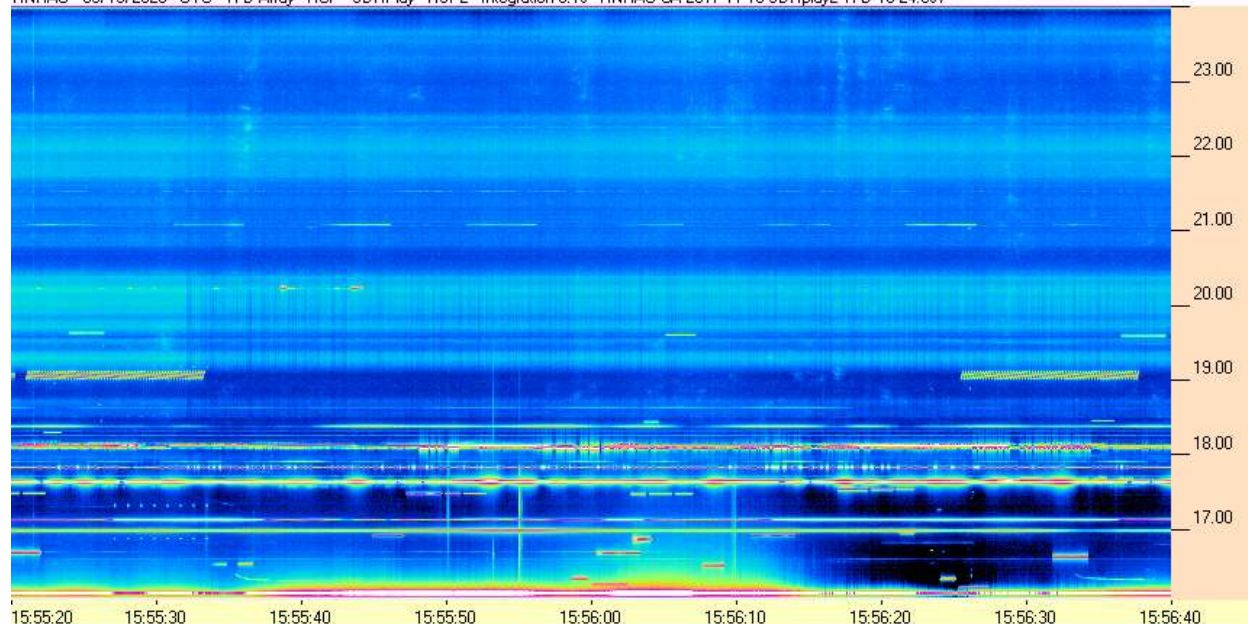
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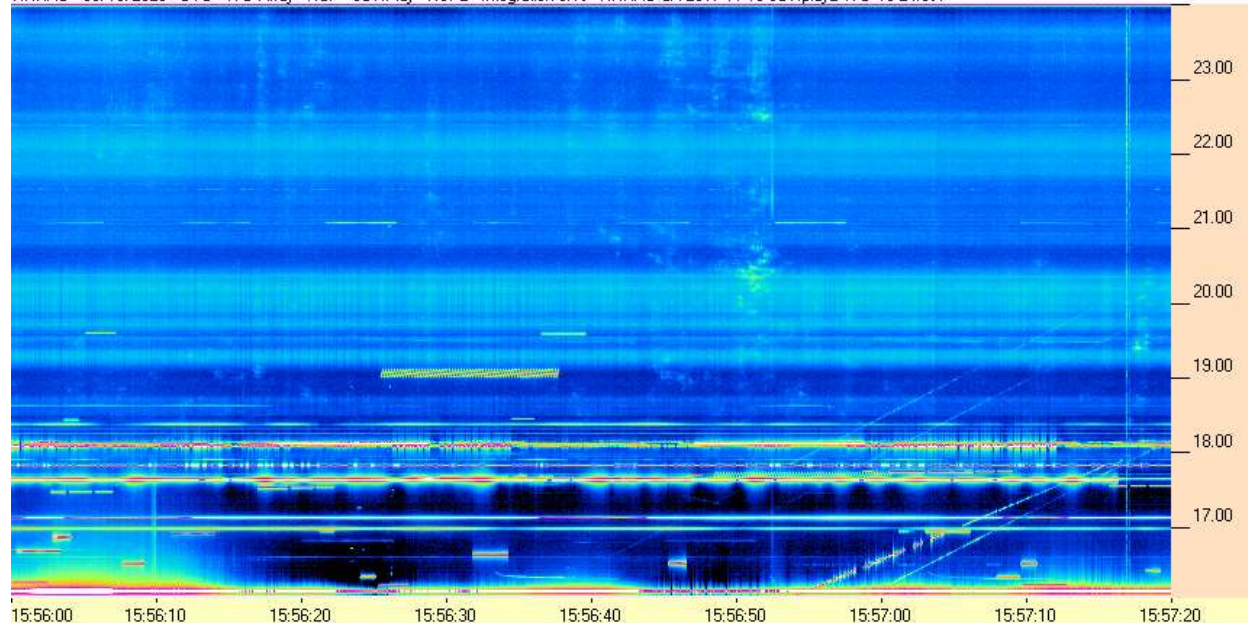
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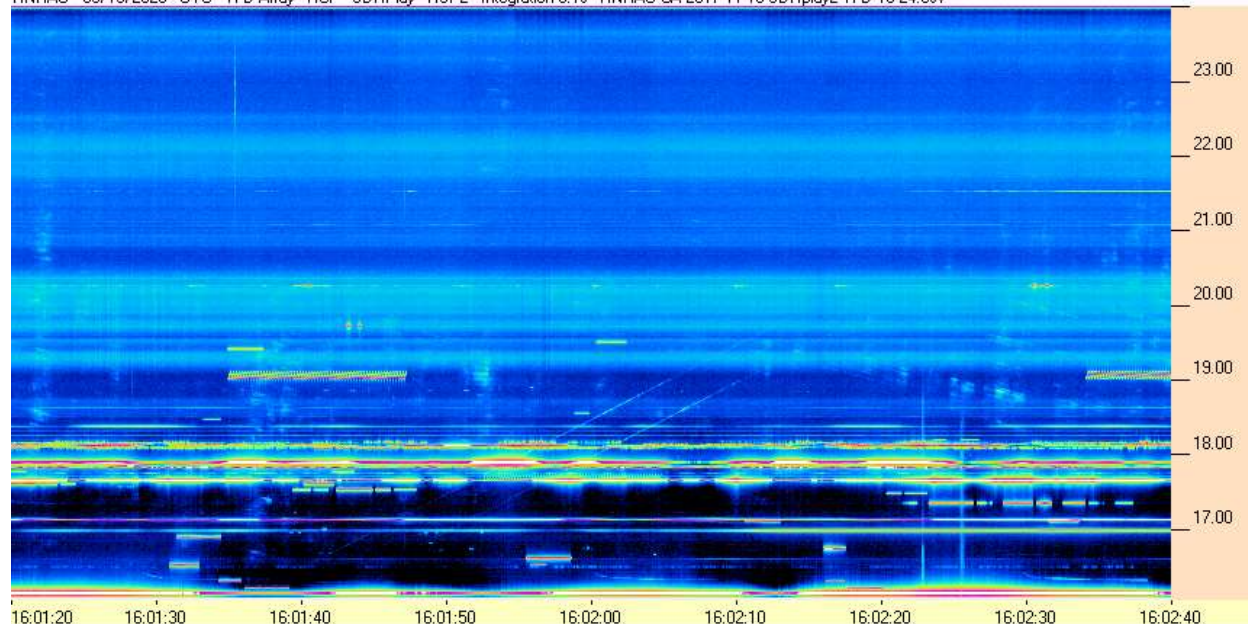
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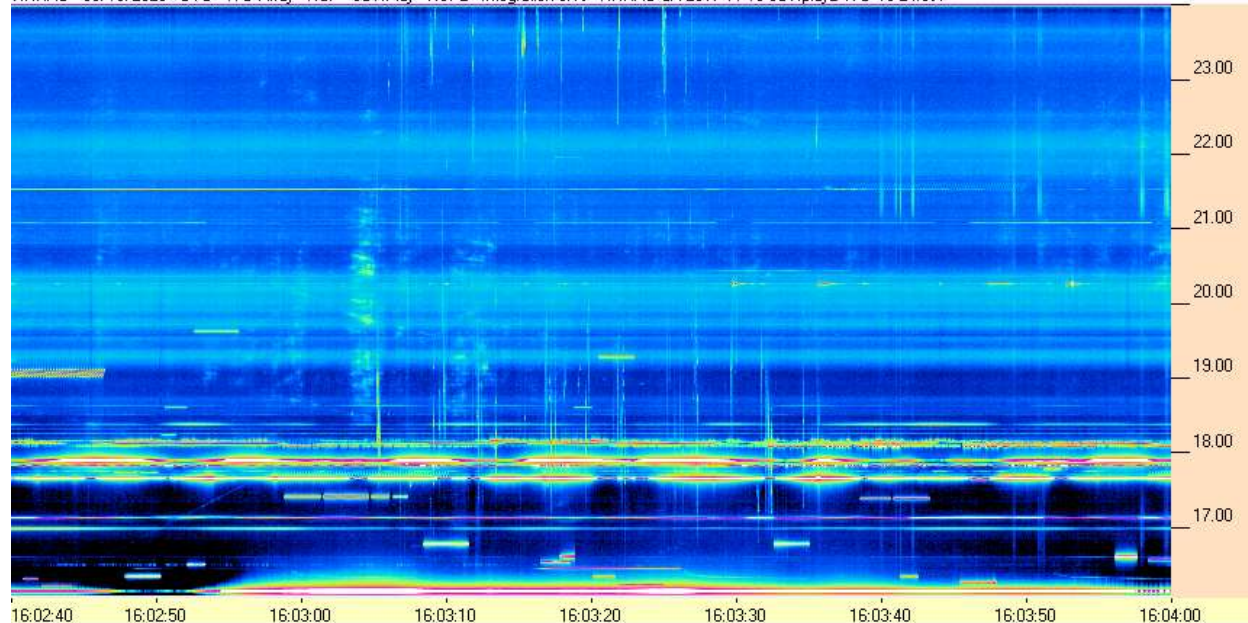
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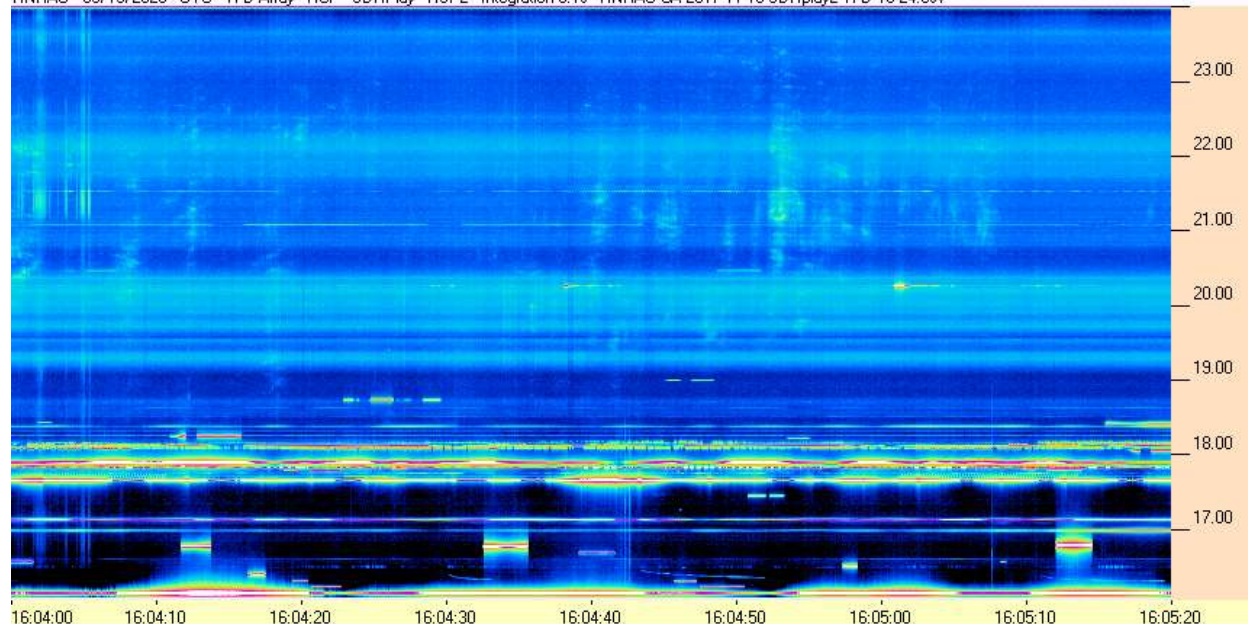
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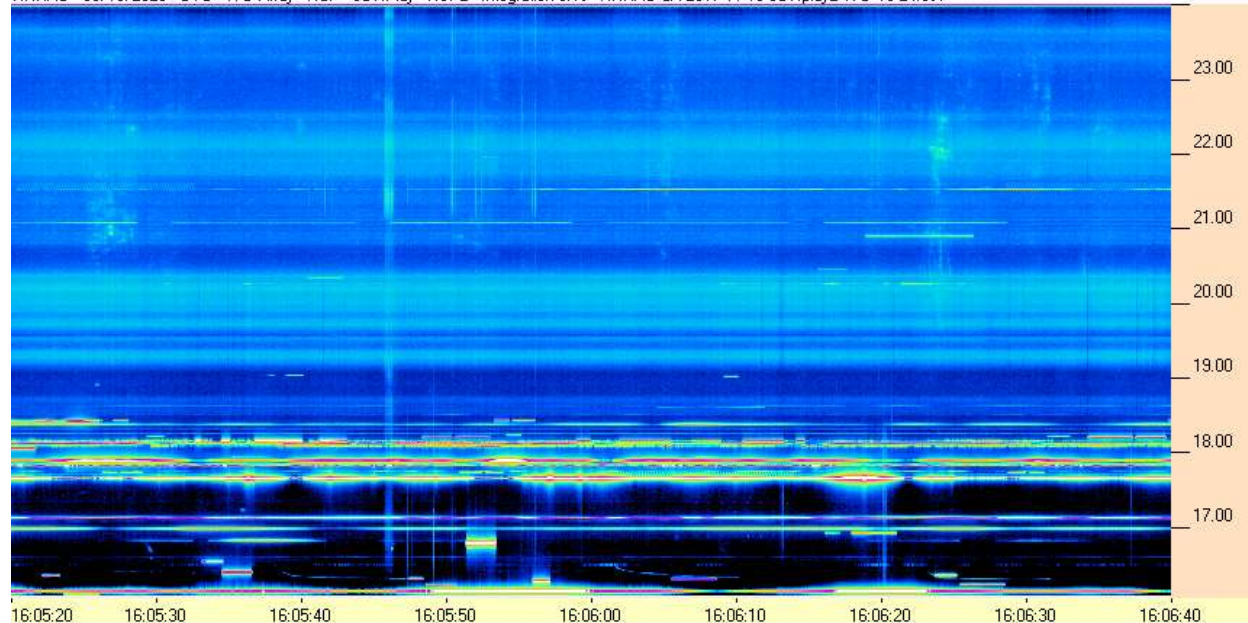
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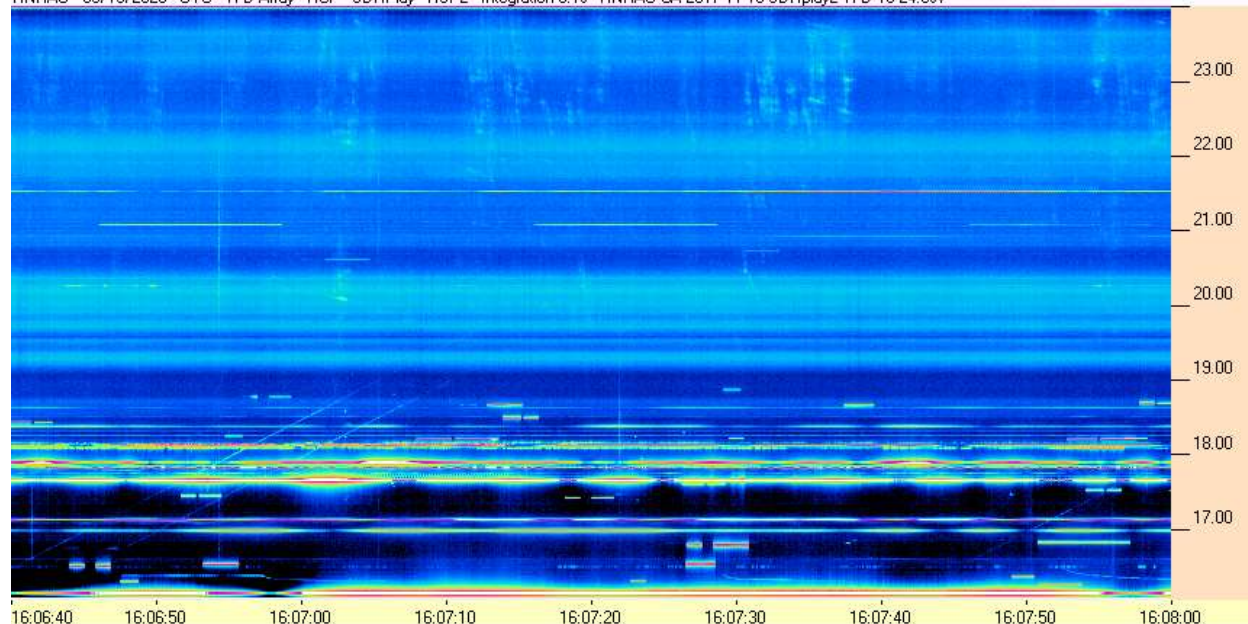
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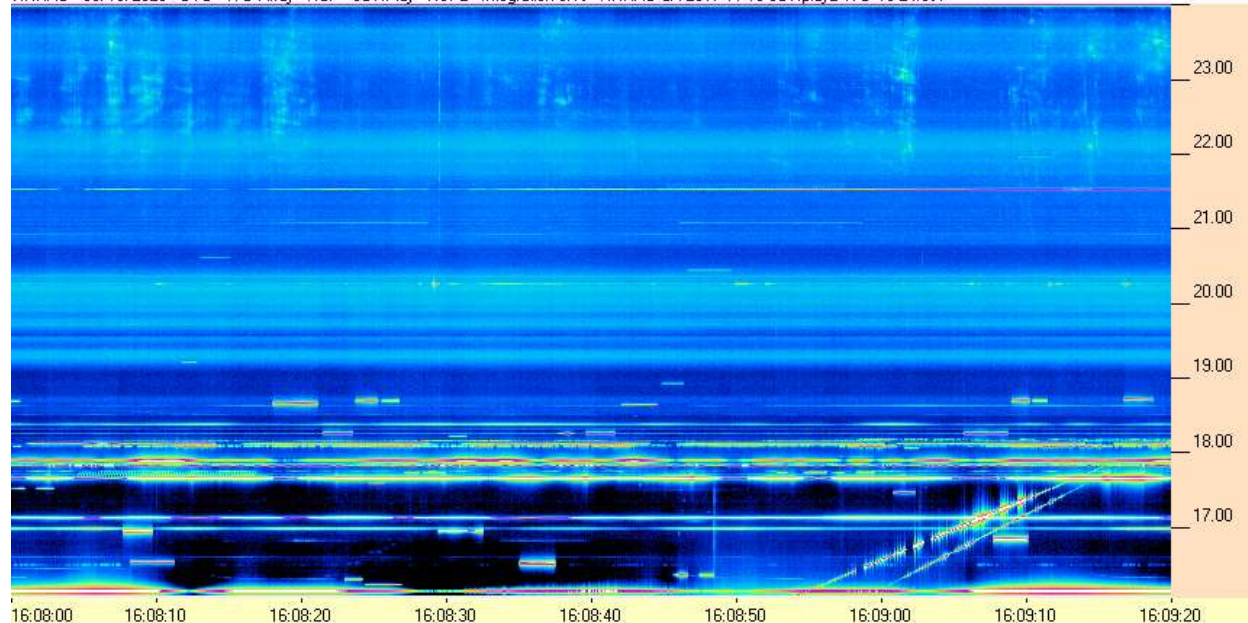
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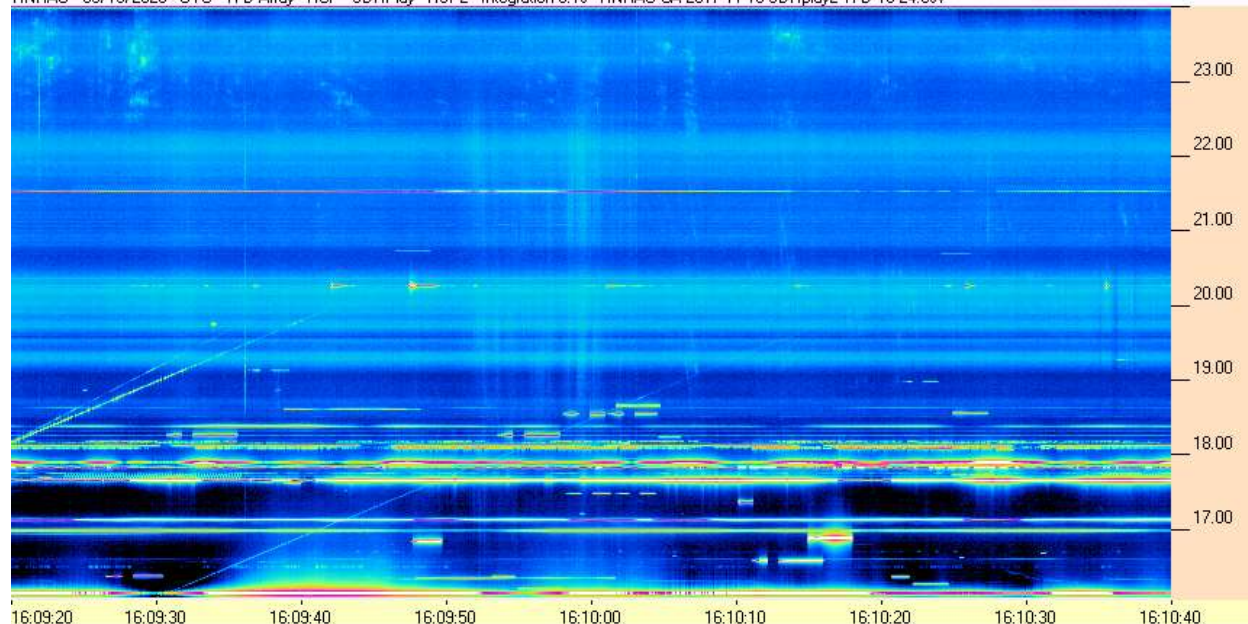
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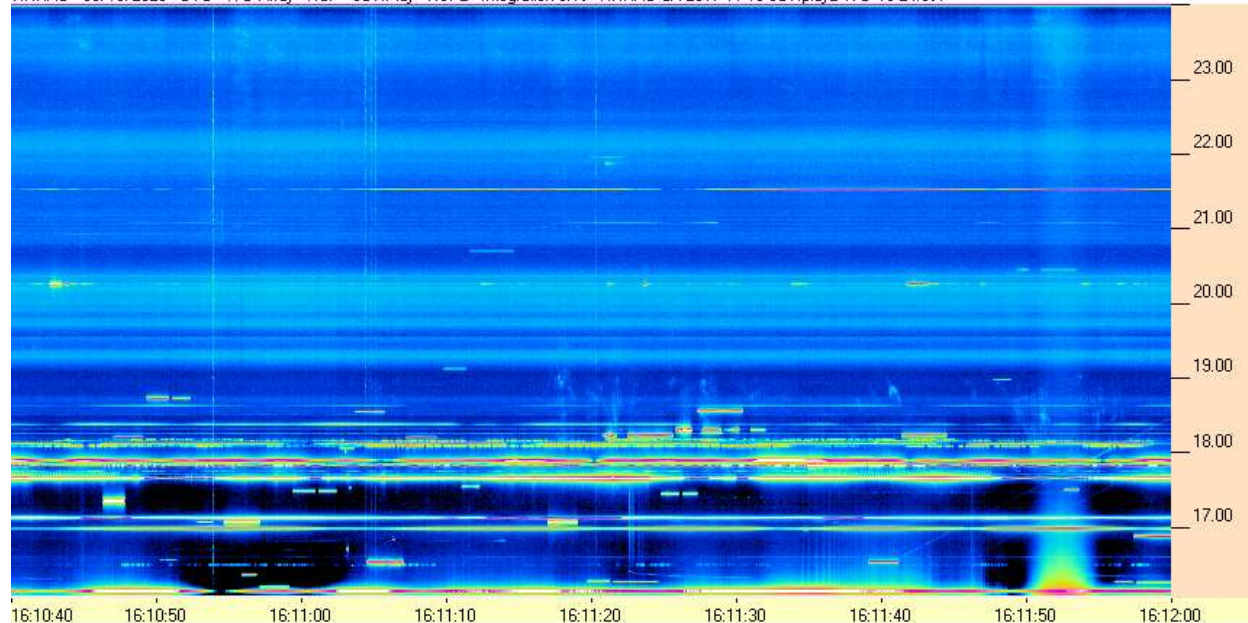
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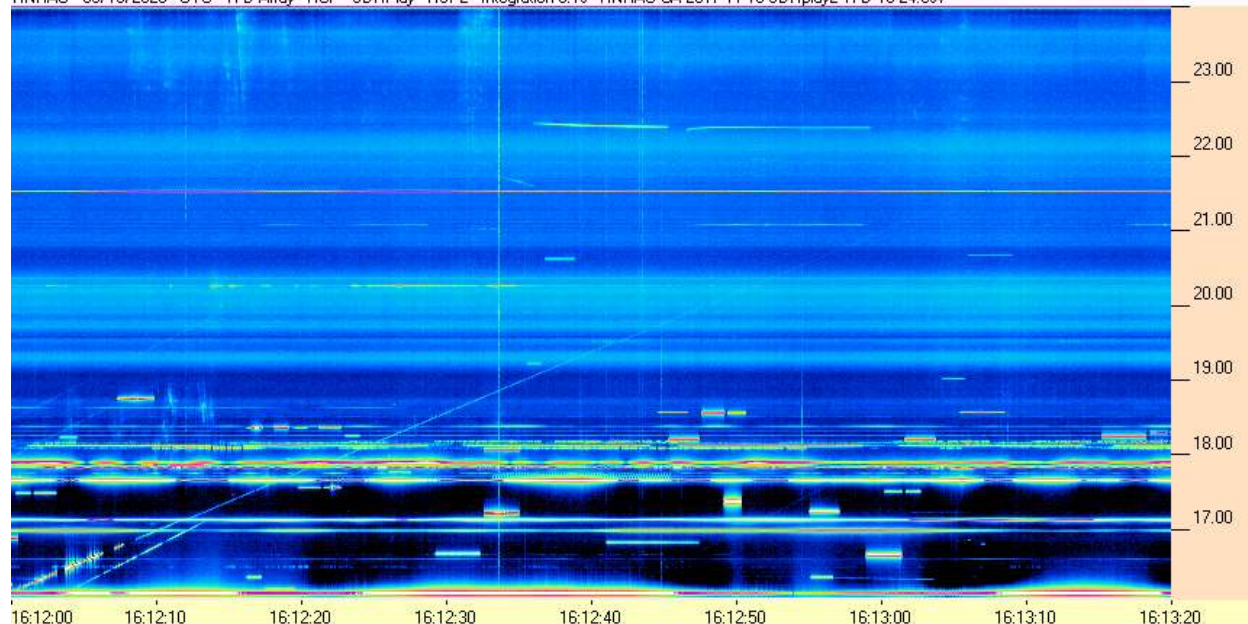
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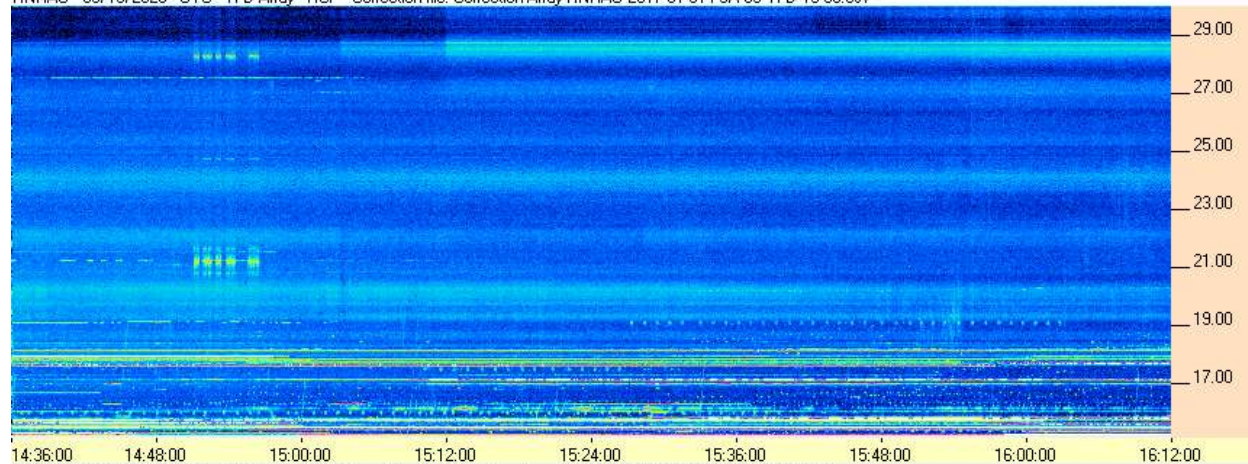


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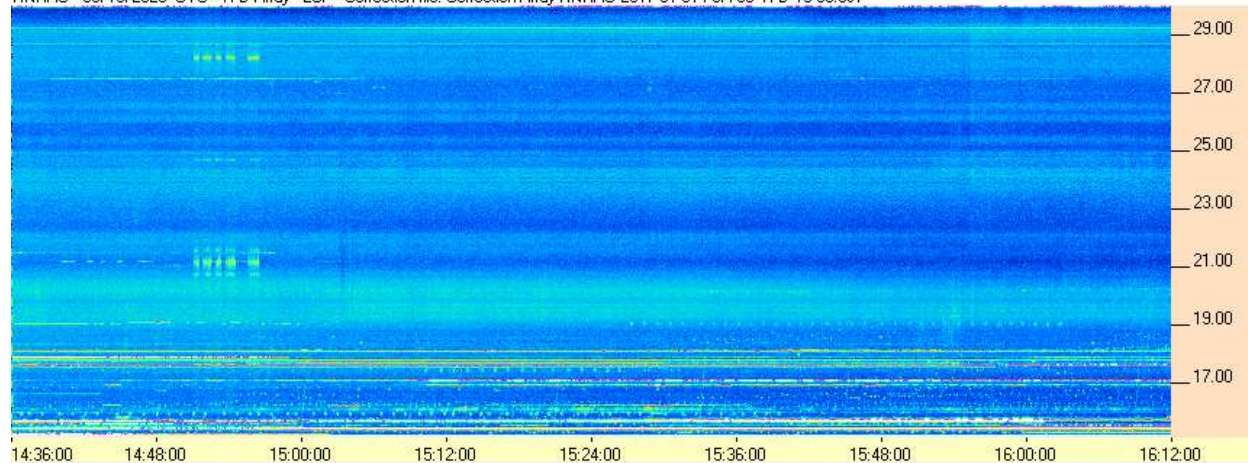


FSX-8S / TFD Array

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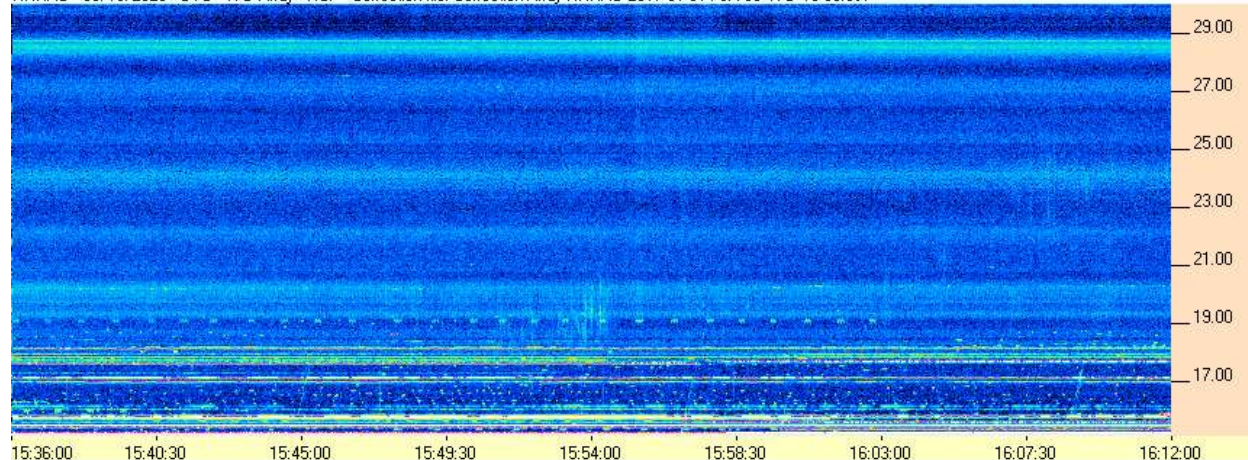
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