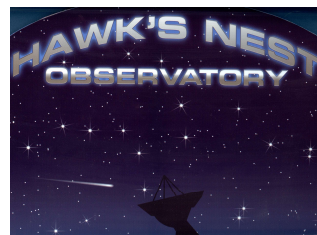


HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq



Date: June 19, 2020

Object: Io-B

Observer: Unattended

Start - Time UT:	0350	Planetary K-index:	
Jupiter Altitude (deg):	11.1	Jupiter Azimuth (deg):	131.2
Jupiter CML:	107.11	Jupiter Io Phase:	089.19
Jupiter RA (hr/min):	19:49	Jupiter Dec (hr/min):	-21:20
Hour Angle (hr/min):	-03:30	Polarization	RCP
Sun Altitude (deg):	-23.0	Sun Azimuth (deg):	338.8
Sun RA (hr/min):	05:45	Sun Dec (hr/min):	23:24

End – Time UT:	0525		
Jupiter Altitude (deg):	22.5	Jupiter Azimuth (deg):	151.1
Jupiter CML:	164.55	Jupiter Io Phase	102.58
Hour Angle (hr/min):	-01:55	Duration (min):	145
Sun Altitude (deg):	-25.9	Sun Azimuth (deg):	002.6
Max Frequency MHz	30	Min Frequency MHz	15
J/S Angular Separation	150.9	De:	-1.2

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 #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

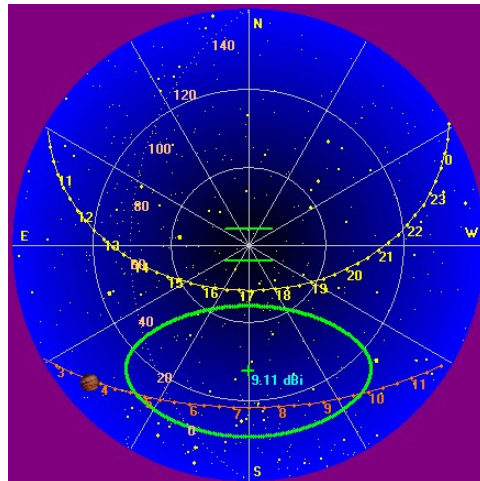
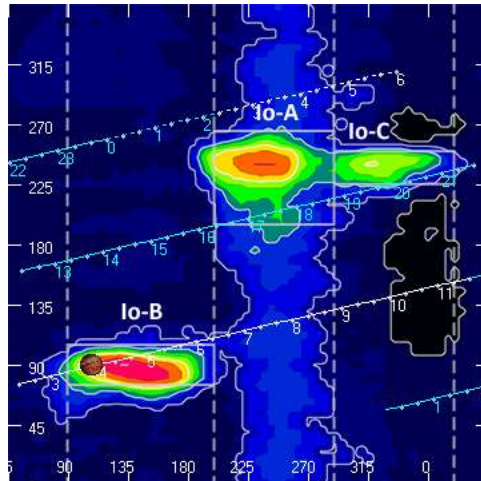
Radio Sky Spectrograph software version 2.9.30

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

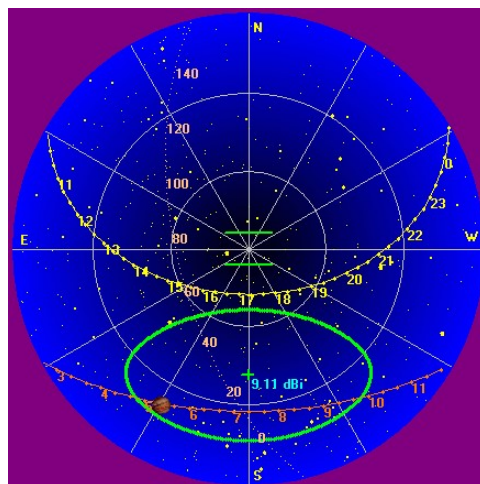
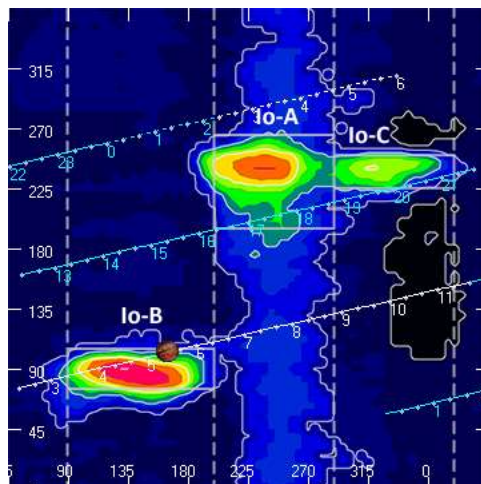
Network Time Server GpsNtp-Pi, Reeve Engineering

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

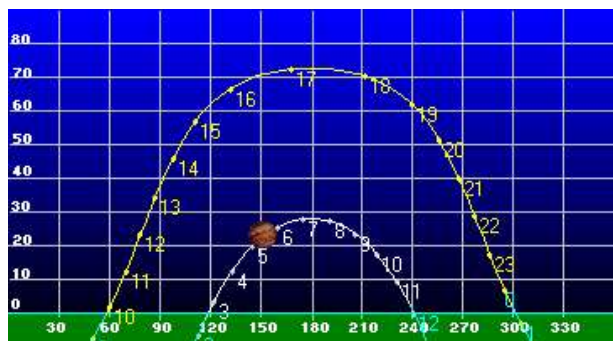
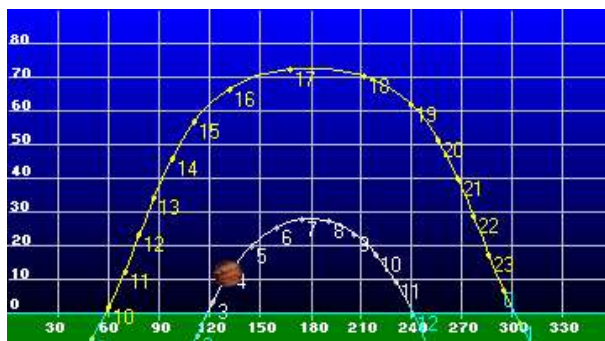
HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq



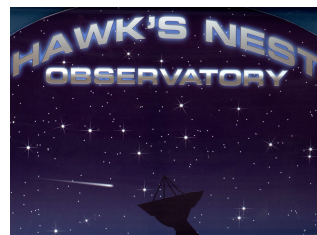
Beginning of Pass



End of Pass



HNRAO Observing Log
40.673181 N – 80.437885 W
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	

HNRAO Observing Log
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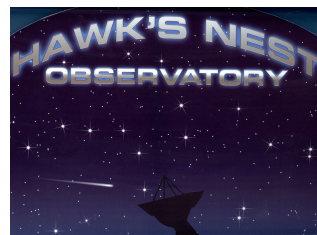


This Io-B storm was observed by all RCP spectrographs. This storm consisted of positive drift L-bursts and S-bursts. There were L2, L3 and L4 modulation lanes present during this pass. There are no SkyPipe single frequency data as the Radio JOVE radio telescope is offline due to RFI.

The first signs of the Io-B emissions were recorded at 0349:46 UT at 20.8 MHz. Following that, the observed emissions can best be described as spattering L-bursts between 20 MHz and 23 MHz. This part of the storm consisted spattered L-bursts separated by long periods on no recorded activity. This was do to, probably, interstellar and or ionospheric scintillation. At 0413:53 UT, the first suggestion of L2 modulation lanes were observed at 21 MHz. By 0423:10 UT, the L2 modulation lanes were clearly recognized between 19 MHz and 22 MHz. The L-burst spattering and faint L2 modulation lanes were again seen between 0423:40 UT and 0424:40 UT. At 0440:40, S-bursts began with an approximately 1 MHz bandwidth at 20.5 MHz. At 0442:20 UT, a large grouping of very strong S-bursts were recorded between 16 MHz and 20 MHz with a particularly strong group at 0443:10 UT. At 0447 UT, S-bursts with L4 modulations were observed, suggesting this storm would most likely contain L3 modulation lanes. S-bursts at this point spanned from 16 MHz to 24 MHz. From 0448:10 UT and continuing through out the major portion of the remaining storm, L3 modulation lanes were dominant. Also, at 0449:40 UT, the strongest emissions of this storm began. Two particularly strong groupings were recorded between 0450:23 UT and 0450:40 UT. These were the strongest emissions observed during this storm. Both of these groups had bandwidths of approx. 1 MHz and were centered at 18.5 MHz. There were several smaller groups withing each group what were strong enough to saturate the spectrograph. The positive drift of the storm brought the next strong cluster to be centered at 19 MHz. L3 modulation lanes continue to be recorded. Between 0455:40 UT and 0456:15 UT the emission drift has moved high enough that the next brief group of L-bursts and S-bursts with L4 modulation lanes were recorded centered at 23 MHz with a 1 MHz bandwidth. From this point until the end of the storm there were only weak spattering of L-bursts.

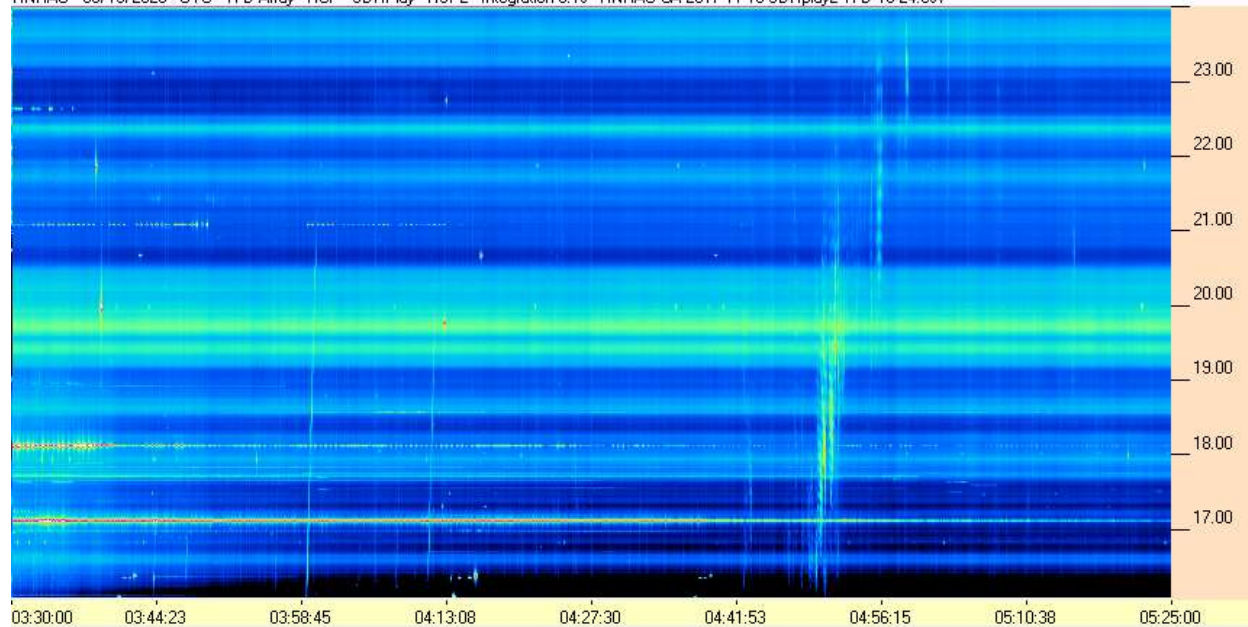
EOR

HNRAO Observing Log
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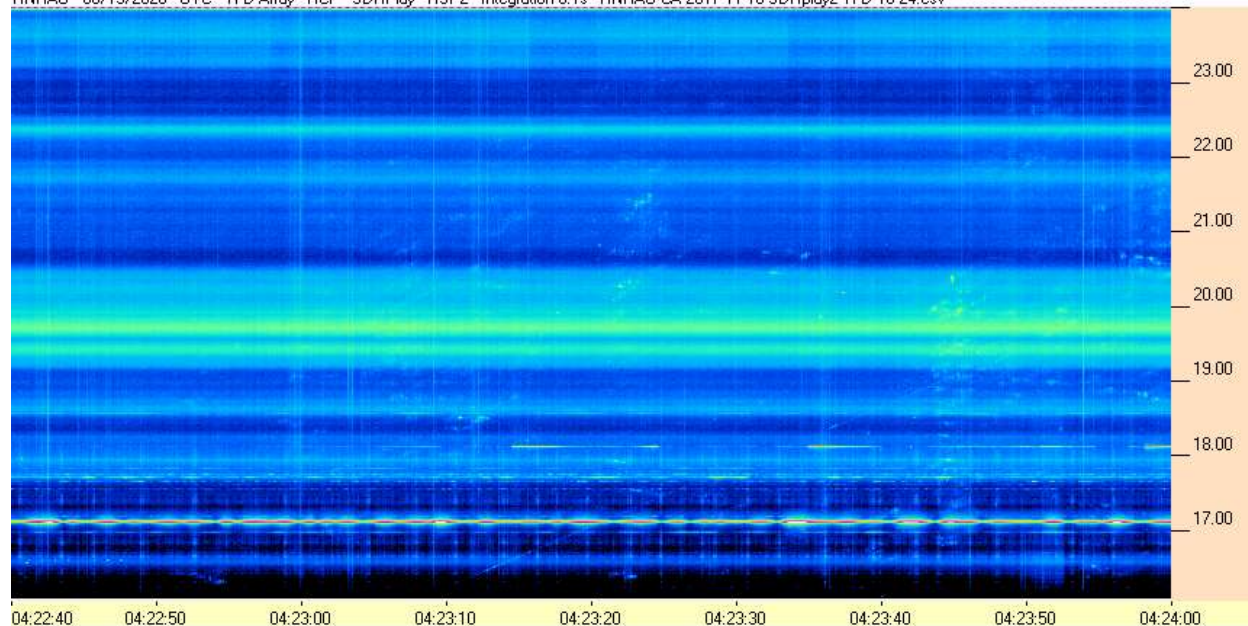


SDRPlay RSP2 / RCP – TFD Array

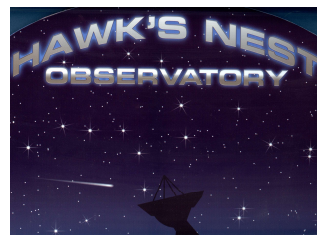
HNRAO - 06/19/2020 - UTC - TFD Array - RCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv



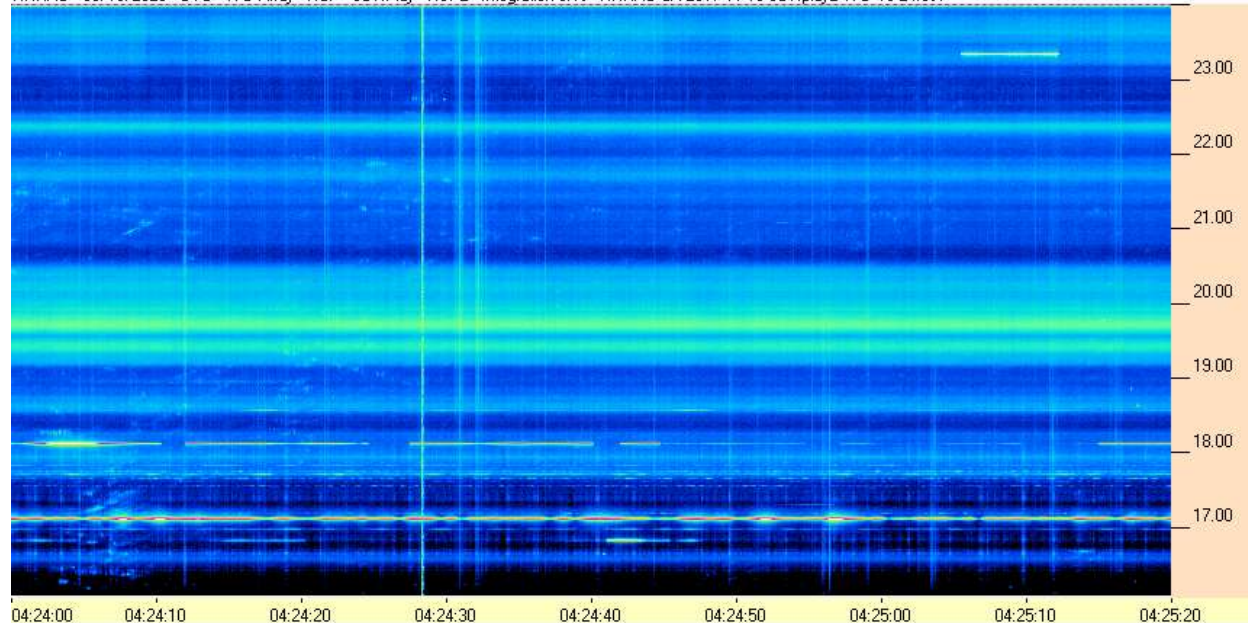
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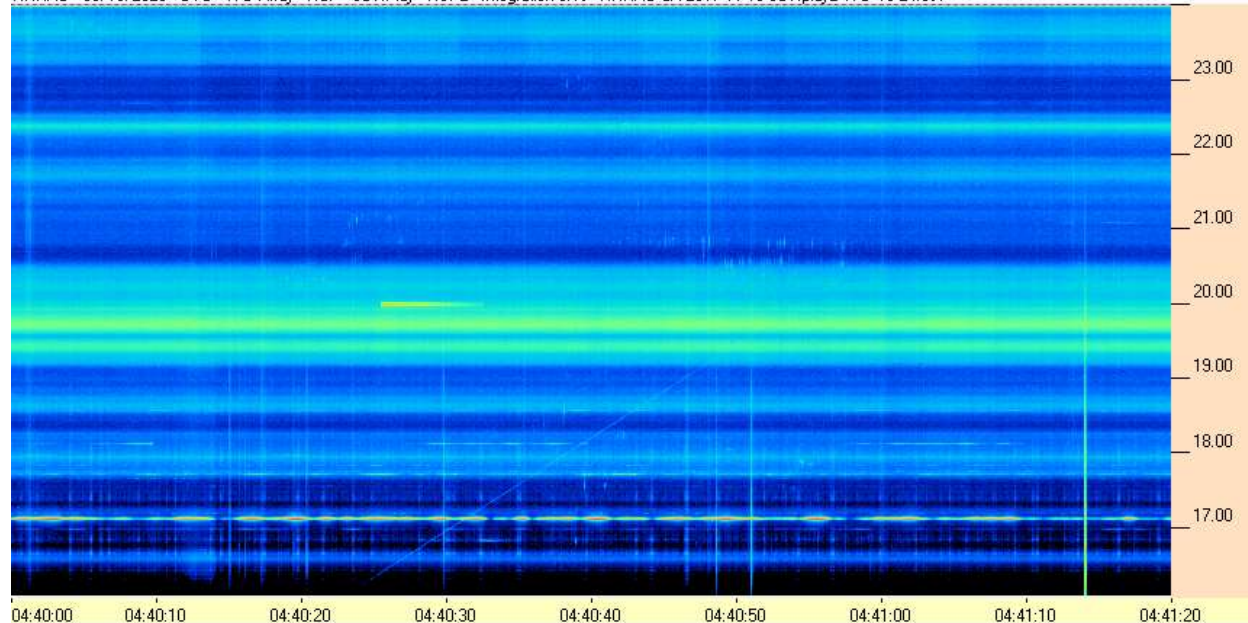
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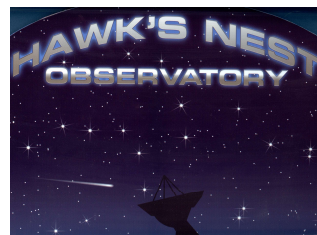
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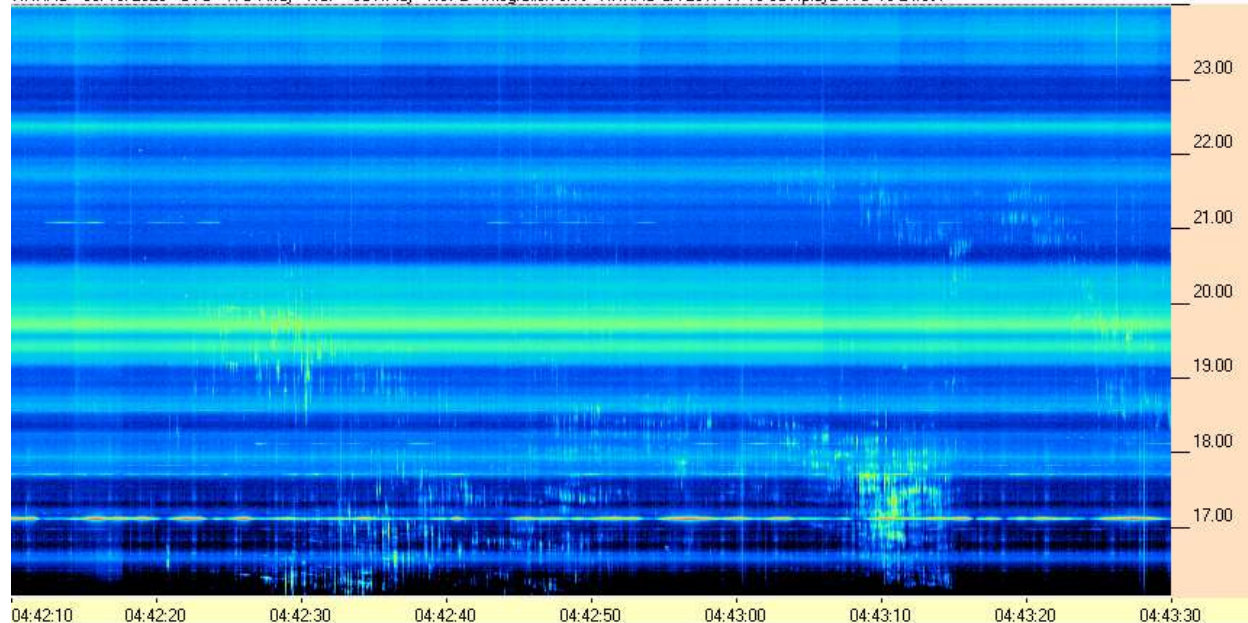
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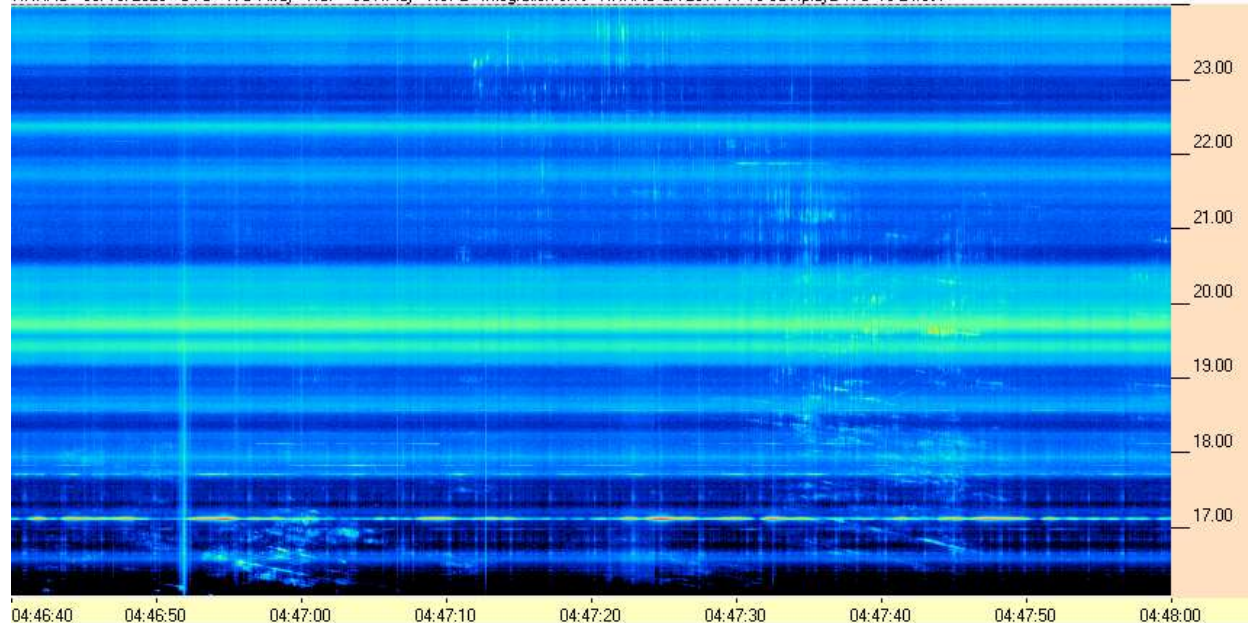
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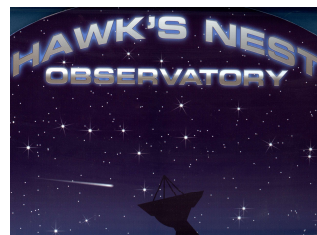
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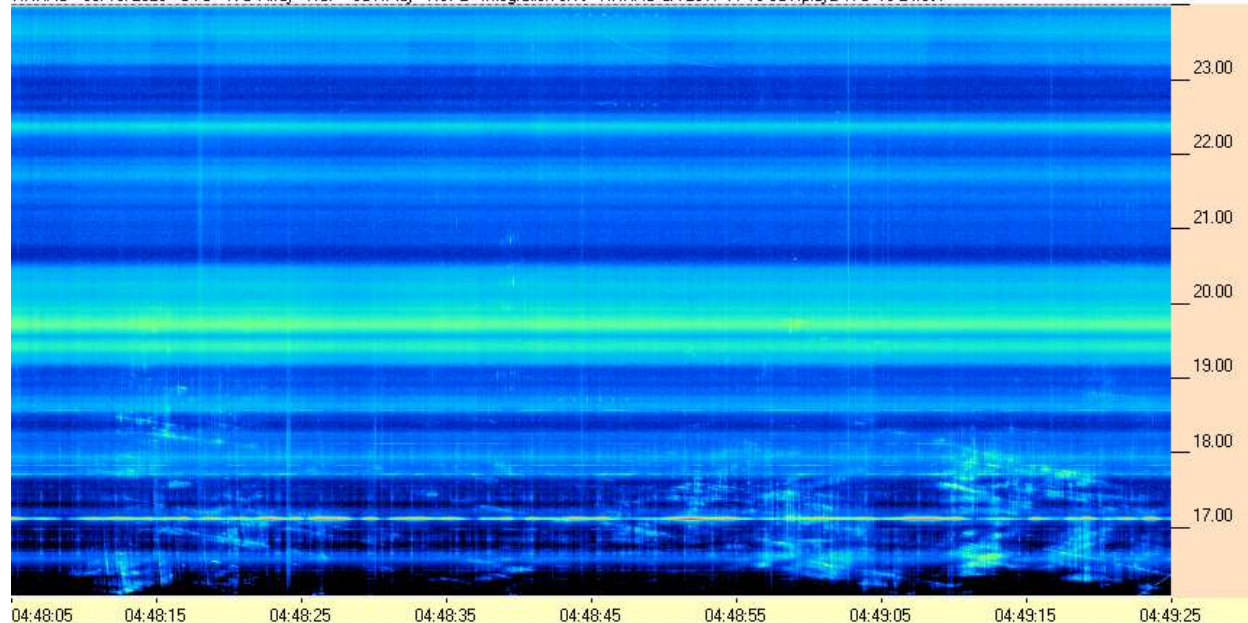
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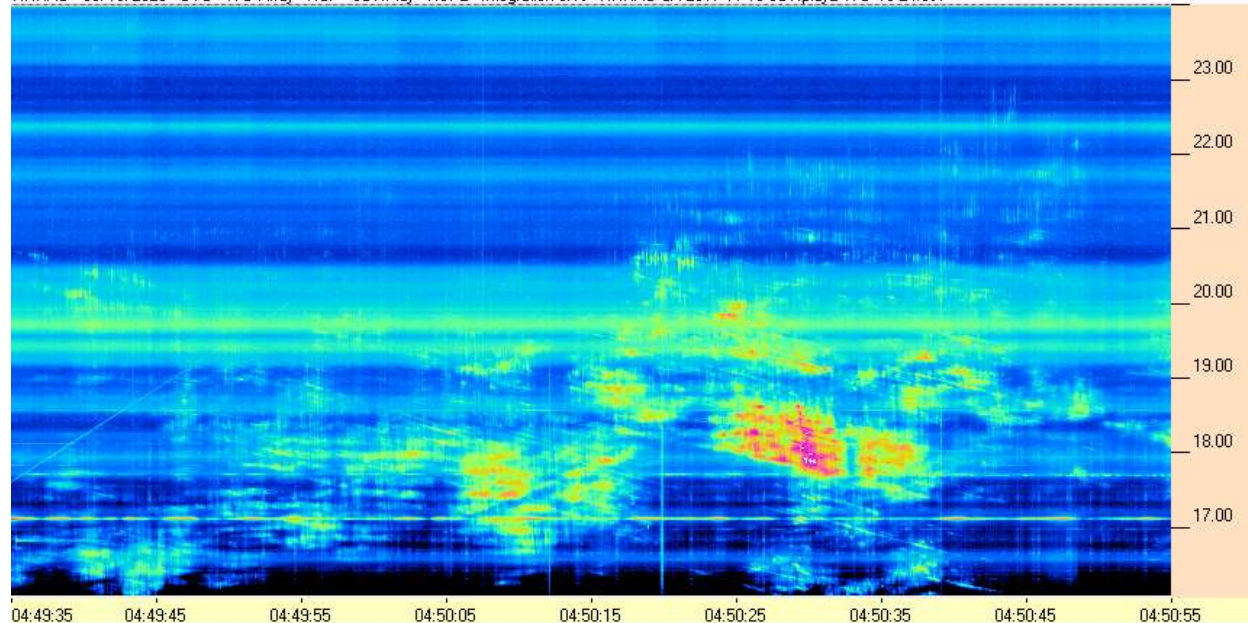
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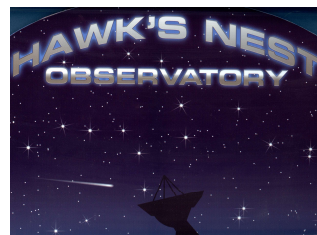


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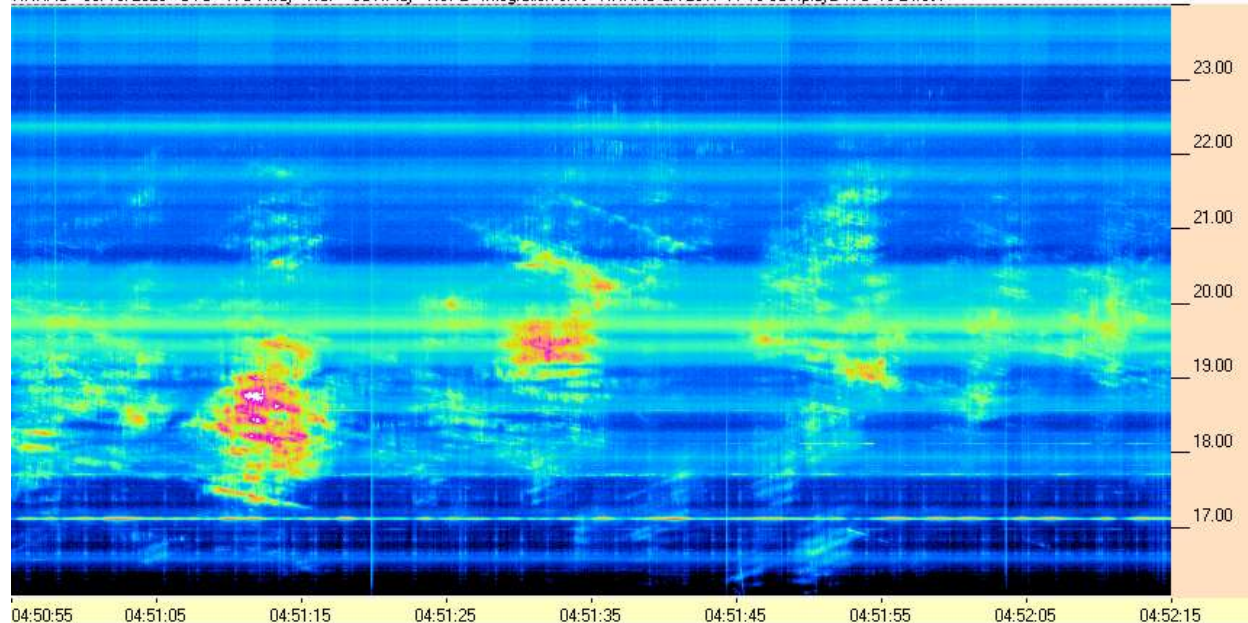


HNRAO Observing Log

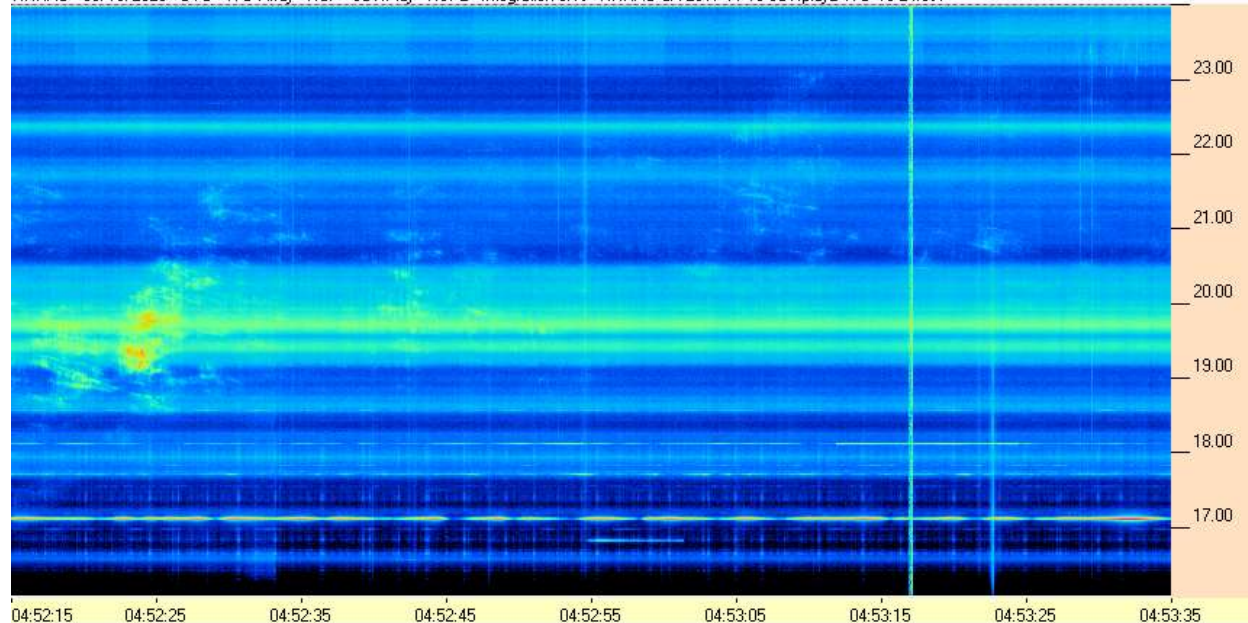
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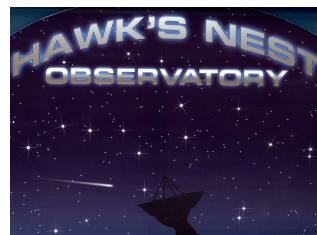
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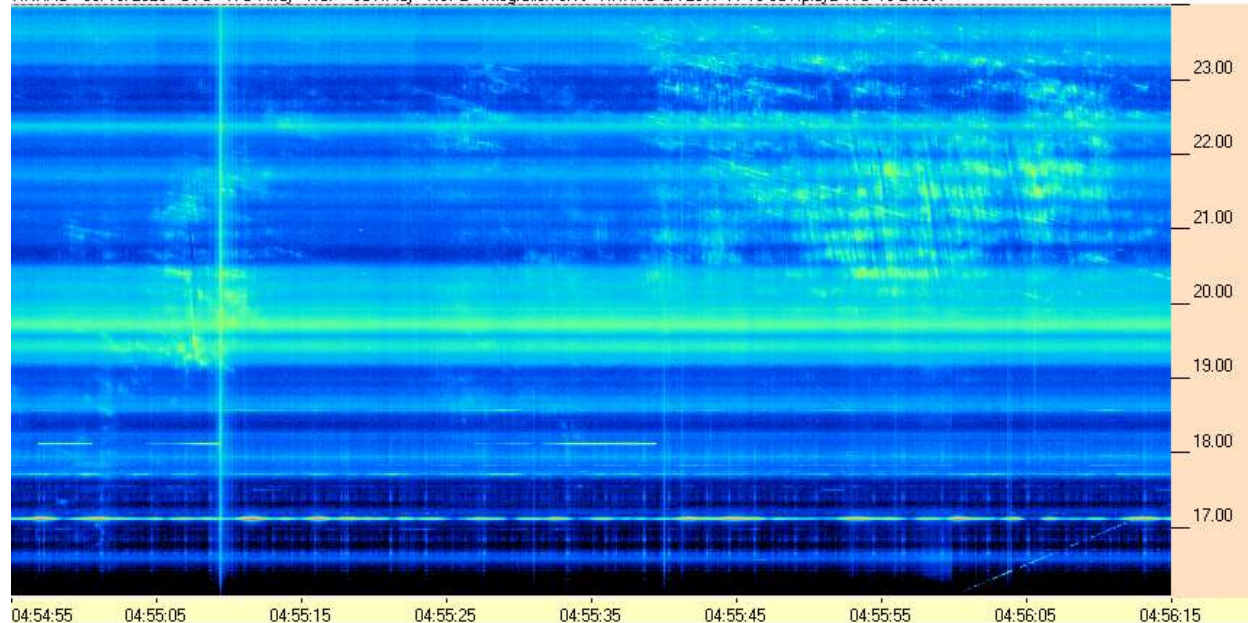
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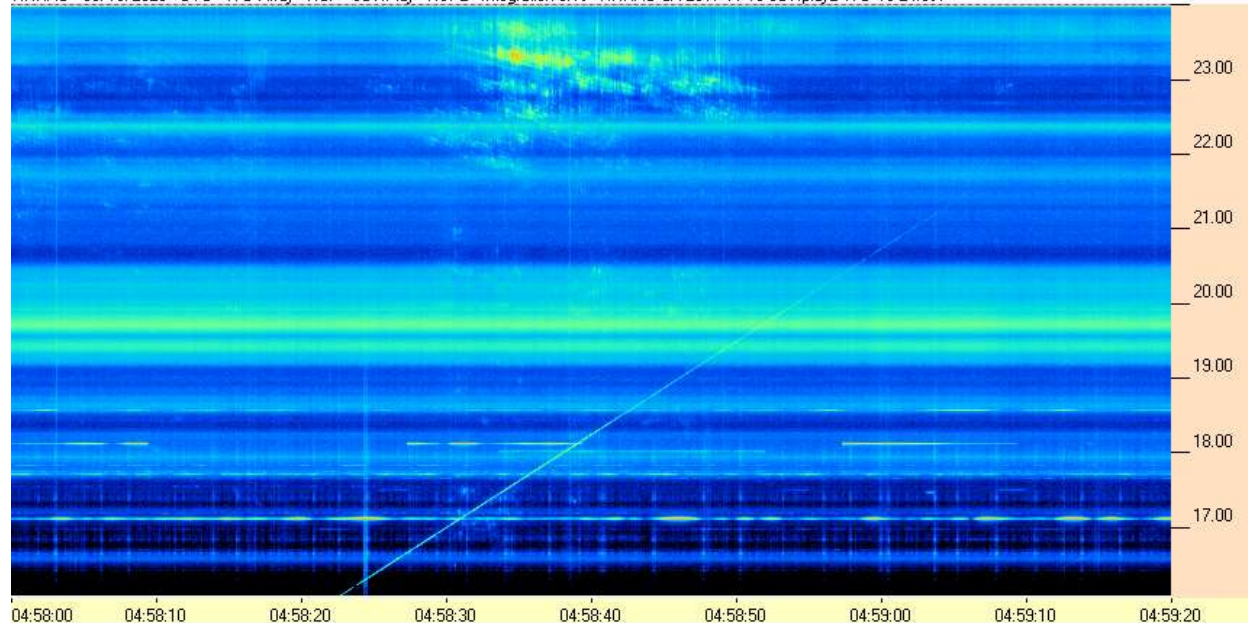
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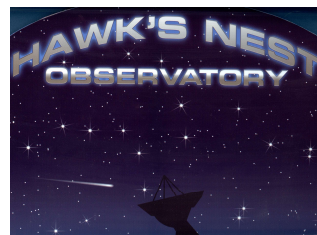


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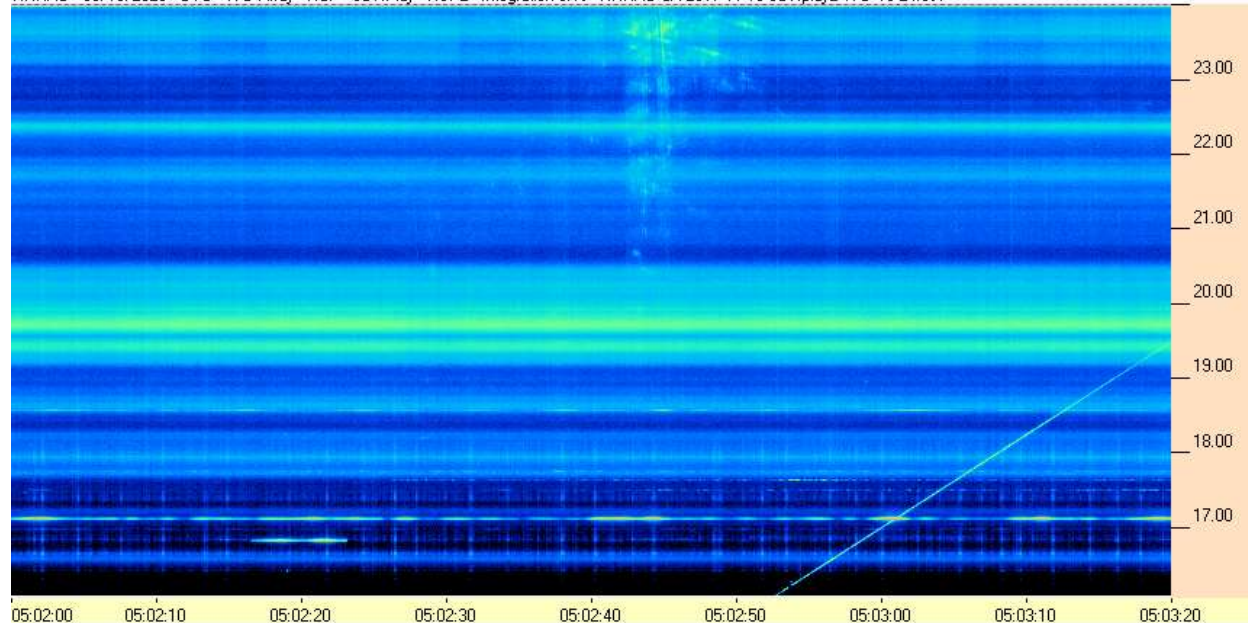


HNRAO Observing Log

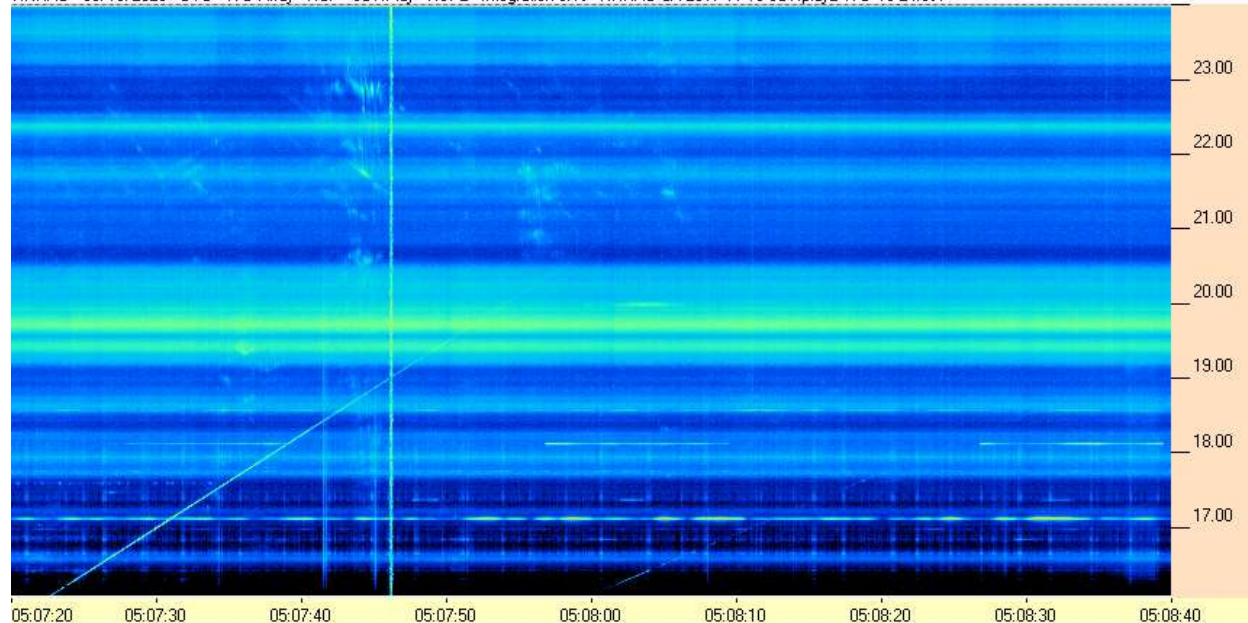
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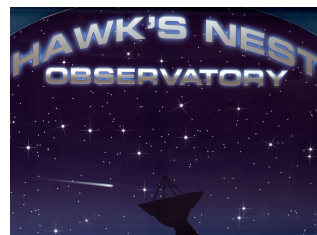
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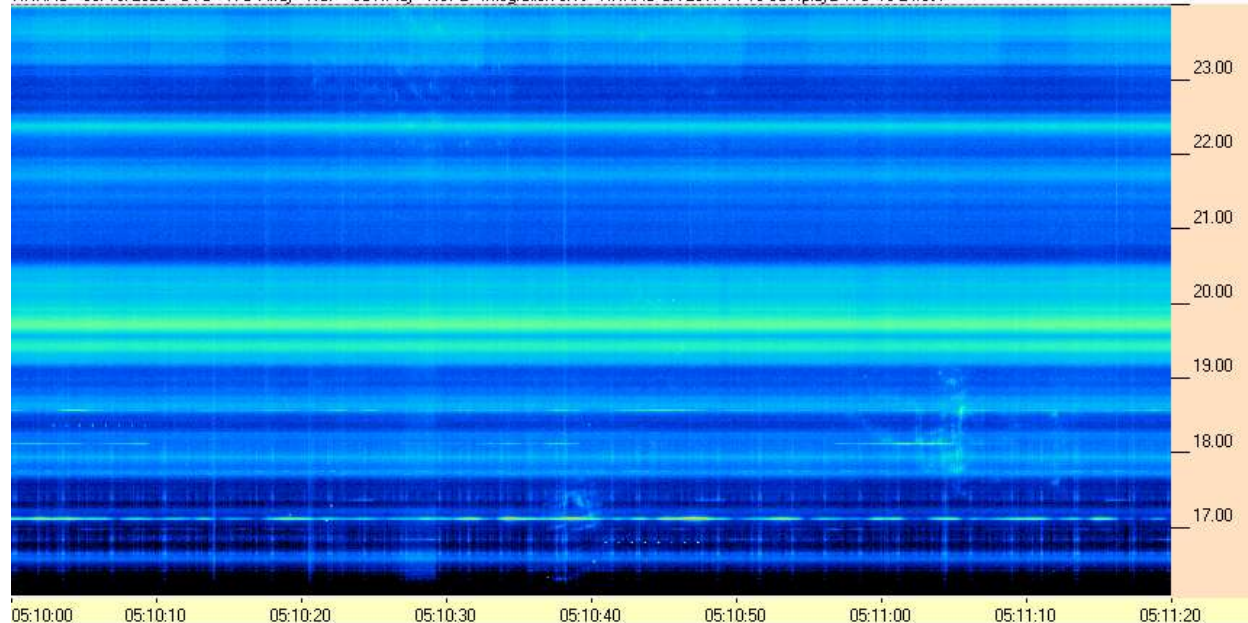
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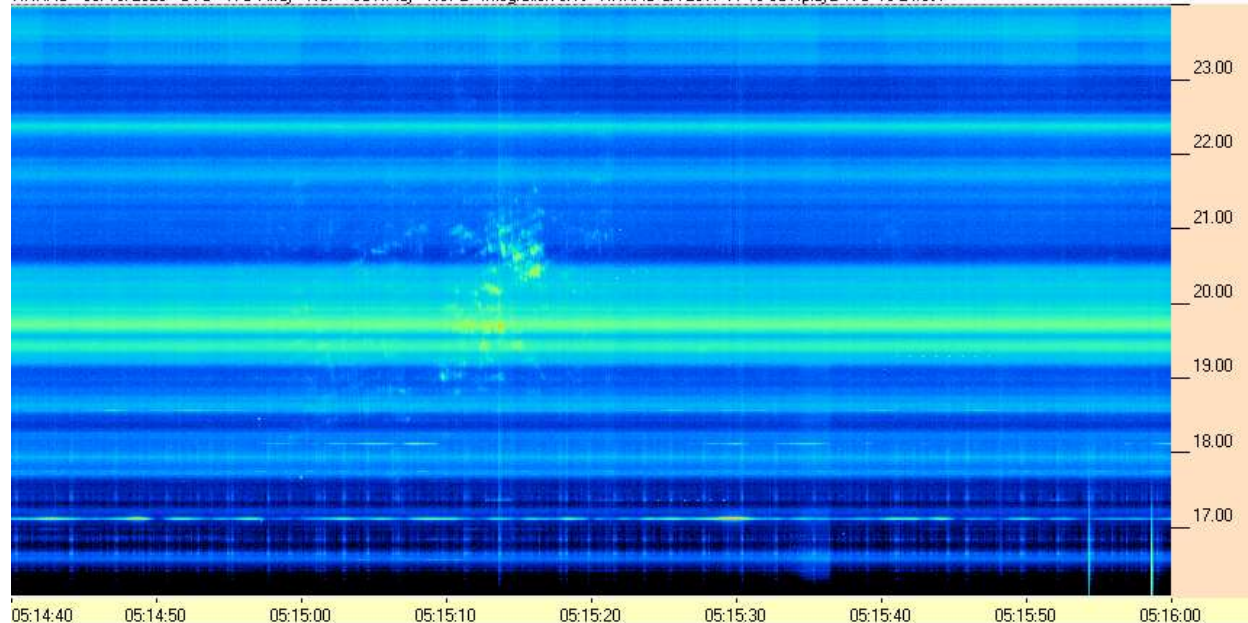
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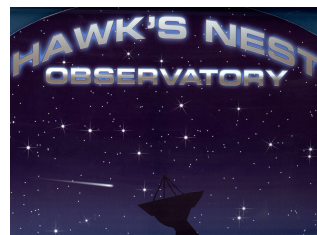
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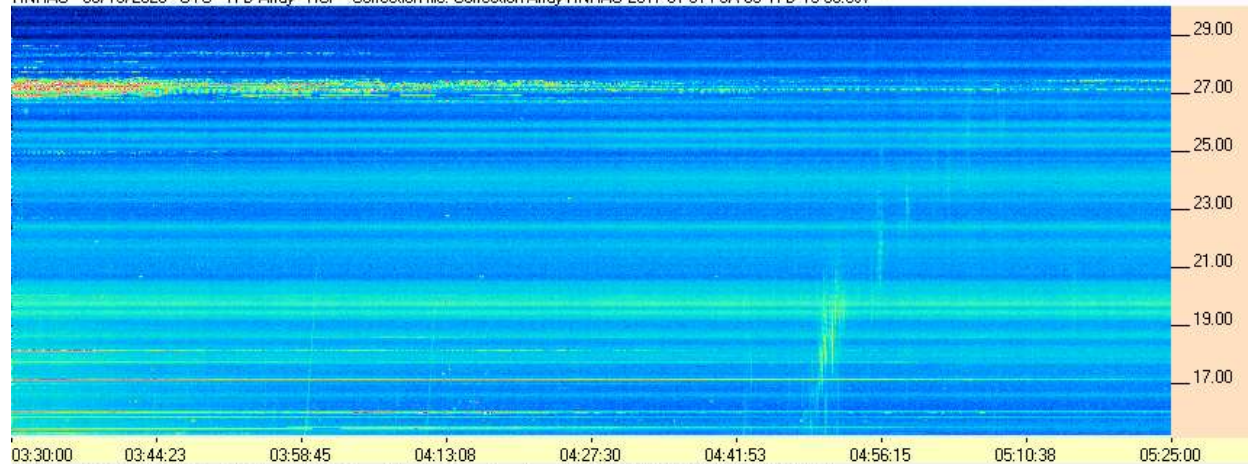


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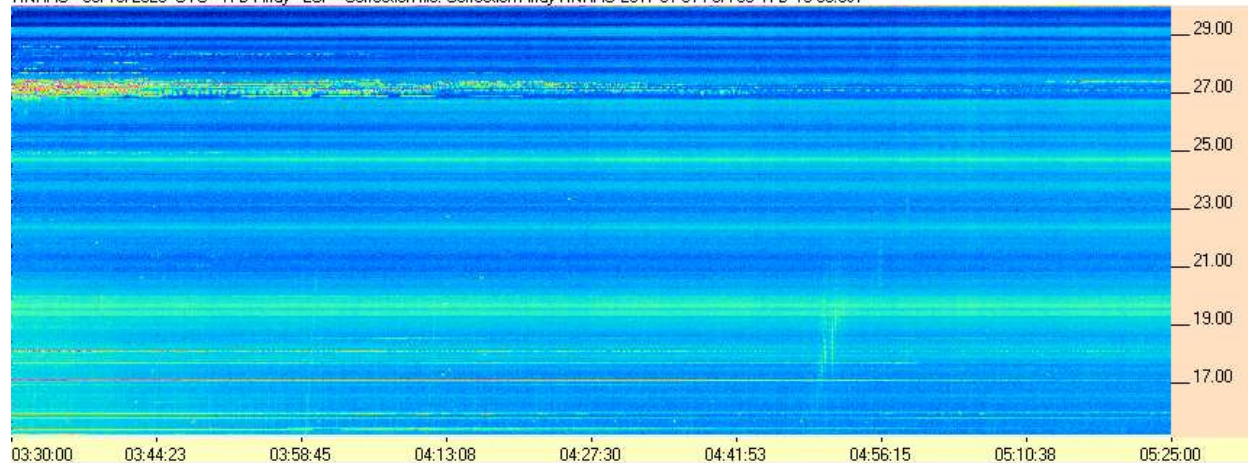


FSX-8S – TFD Array

HNRAO - 06/19/2020 - UTC - TFD Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv



HNRAO - 06/19/2020 - UTC - TFD Array - LCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv



HNRAO Observing Log
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FSX-2 – LWA Array

