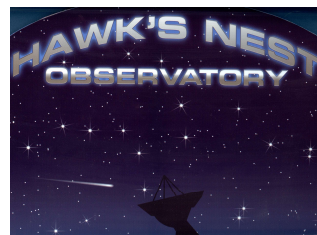


HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq



Date: July 28, 2019

Object: Jupiter – Non-Io-A

Observer: Unattended

Start - Time UT:	0246:36	Planetary K-index:	1
Jupiter Altitude (deg):	26.0	Jupiter Azimuth (deg):	193.7
Jupiter CML:	202.37	Jupiter Io Phase:	178.49
Jupiter RA (hr/min):	16:54	Jupiter Dec (hr/min):	-22:07
Hour Angle (hr/min):	00:53	Polarization	RCP
Sun Altitude (deg):	-20.0	Sun Azimuth (deg):	321.4
Sun RA (hr/min):	08:21	Sun Dec (hr/min):	19:31

End – Time UT:	0353:20	De:	-2.6
Jupiter Altitude (deg):	21.3	Jupiter Azimuth (deg):	209.8
Jupiter CML:	242.71	Jupiter Io Phase	187.93
Hour Angle (hr/min):	01:60	Duration (min):	67
Sun Altitude (deg):	-26.5	Sun Azimuth (deg):	337.0
Max Frequency MHz	24	Min Frequency MHz	16

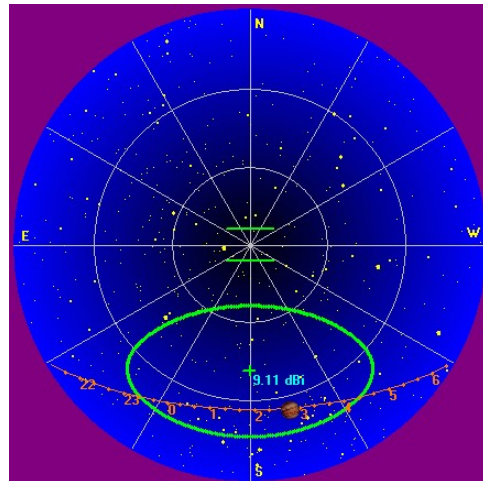
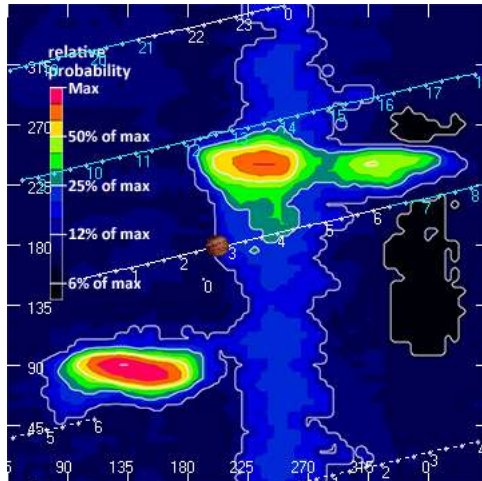
Observatory Configuration

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	7/19/2019

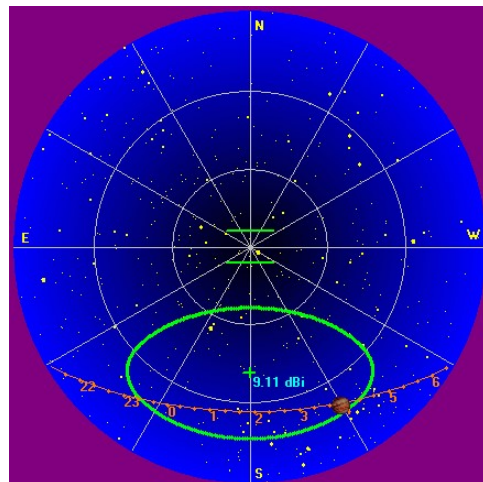
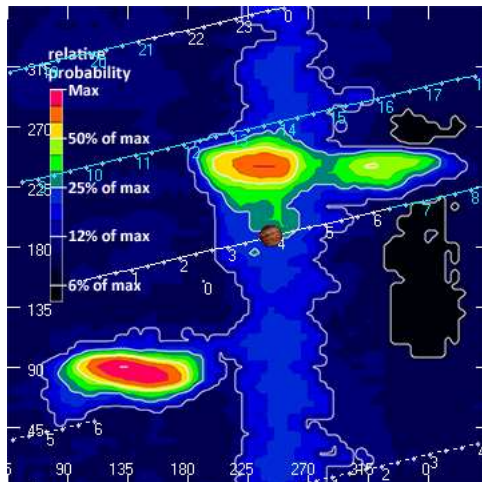
JOVE dipoles phased @ 32 degrees for 2018-2019 season
 TFD array phased @ 35 degrees for 2018-2019 season
 LWA antenna phased @ 35 degrees and orientation for observation: 45 degrees
 Radio Sky Spectrograph software version 2.9.25
 Radio-SkyPipe software version 2.7.33
 Radio-Jupiter Pro software version 3.8.2

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

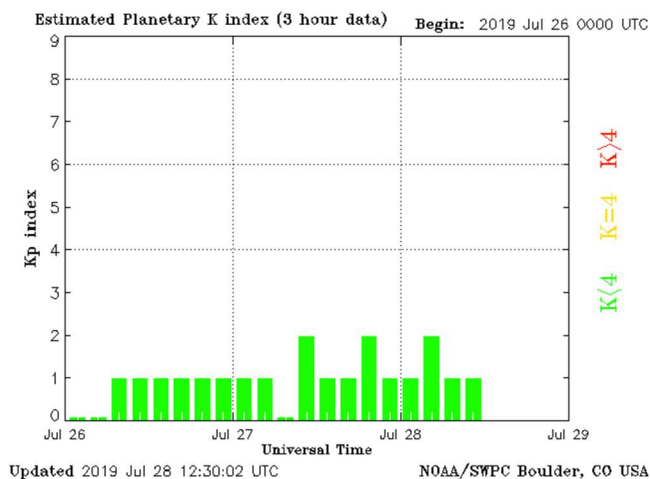


MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360	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
40.673181 N – 80.437885 W
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Jupiter/Sun angular separation = 131.9 degrees

All spectrographs, receivers and antennas were functioning normally. No known issues.

All three RCP spectrographs (FSX-8S, FSX-2 and SDRPlay RSP2 RCP) recorded data from this storm. Minor RFI was present on the SDRPlay RSP2 / TFD array telescope. RFI from an unknown source are the horizontal bright bands. A foreign broadcast station at 19.5 MHz did not interfere with data collection. As expected at this time of year, bright, narrow vertical lines are lightning discharges from distant thunderstorms. RFI was particularly bad on the JOVE II / JOVE dipole array telescope. Background noise started out at 1328 kK and rose to a peak of nearly 4000 kK during the period of emission in the 20.1 MHz frequency. As a result, no useful data was taken with this telescope.

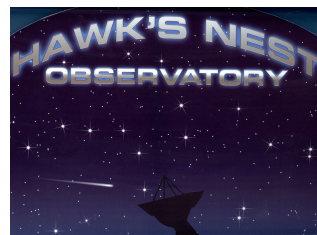
Beginning nearly an hour past transit, this was a Non-Lo-A storm with positive drift L-bursts, negative slope (L4) modulation lanes and a probable mix of S-bursts several times during the storm. An energetic emission group at 0314:44, spanning 18.5 MHz to 20 MHz could possibly be a mix of L-burst and S-bursts. At 0353:03 UT, there was a strong emission at 23 MHz that appears to be S-bursts. Scintillation was apparent throughout the storm. As has been typical of Jupiter storms this iteration, there were long periods of no emission. Most L-bursts appeared to be between 1 dB and 3 dB above the GB as observed here. There were several notable exceptions that were relatively energetic, that include the two S-burst groups mentioned above.

There was also some apparent Cass A scintillation during the storm which appear as the brighter vertical bands.

The only thing noteworthy of this storm were the several instances of stronger emissions.

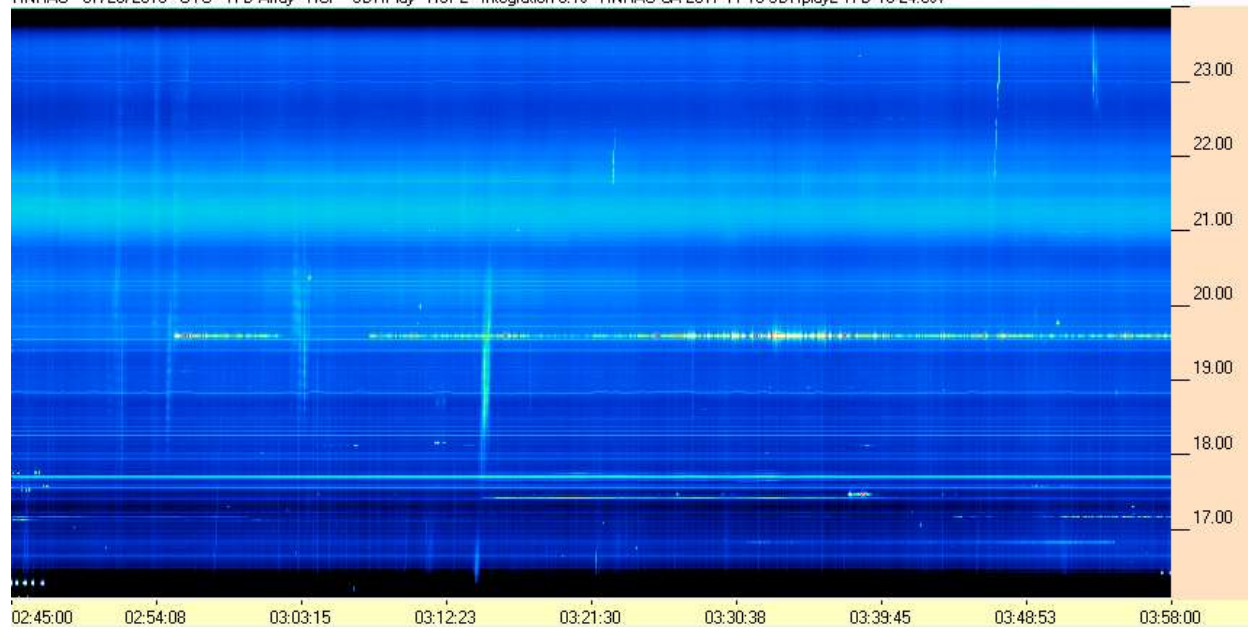
EOR

HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq

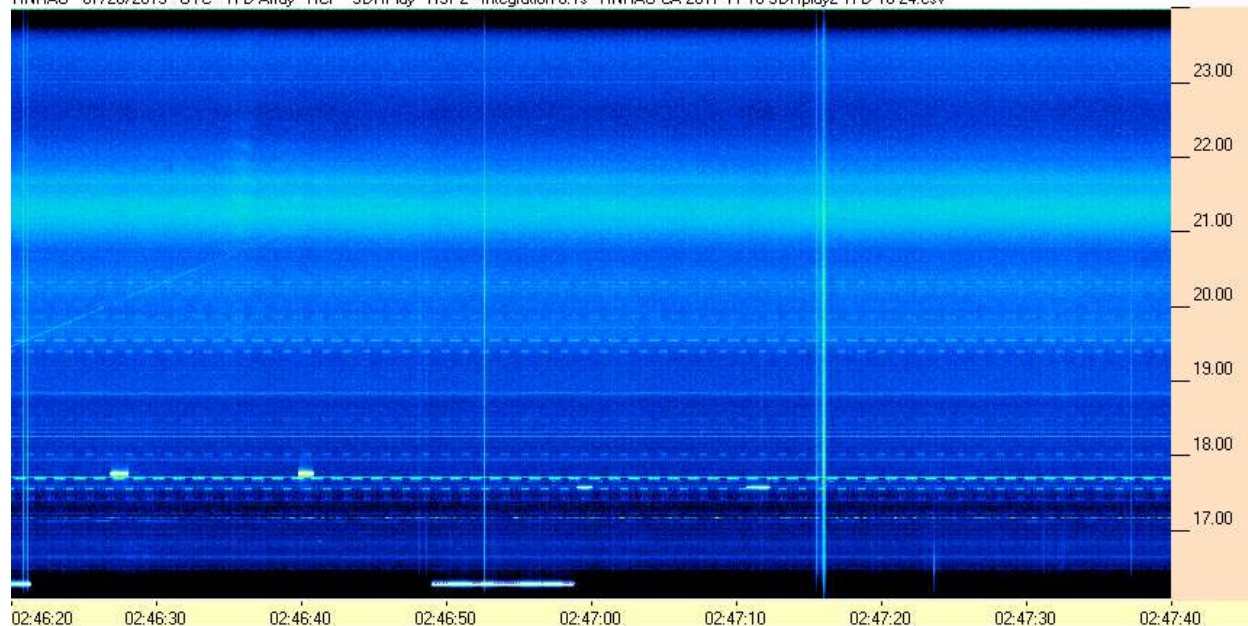


SDRPlay RSP2 / TFD Array

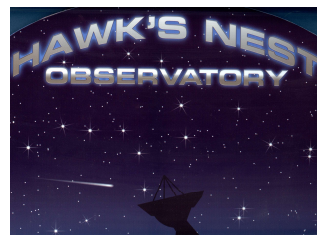
HNRAO - 07/28/2019 - UTC - TFD Array - RCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv



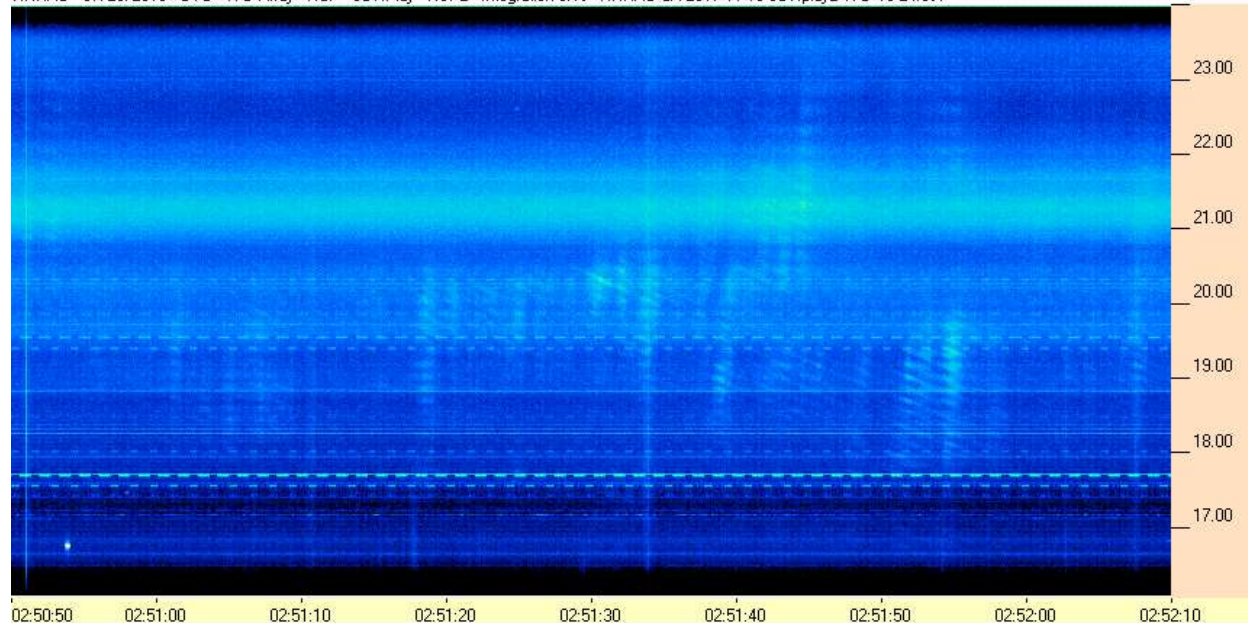
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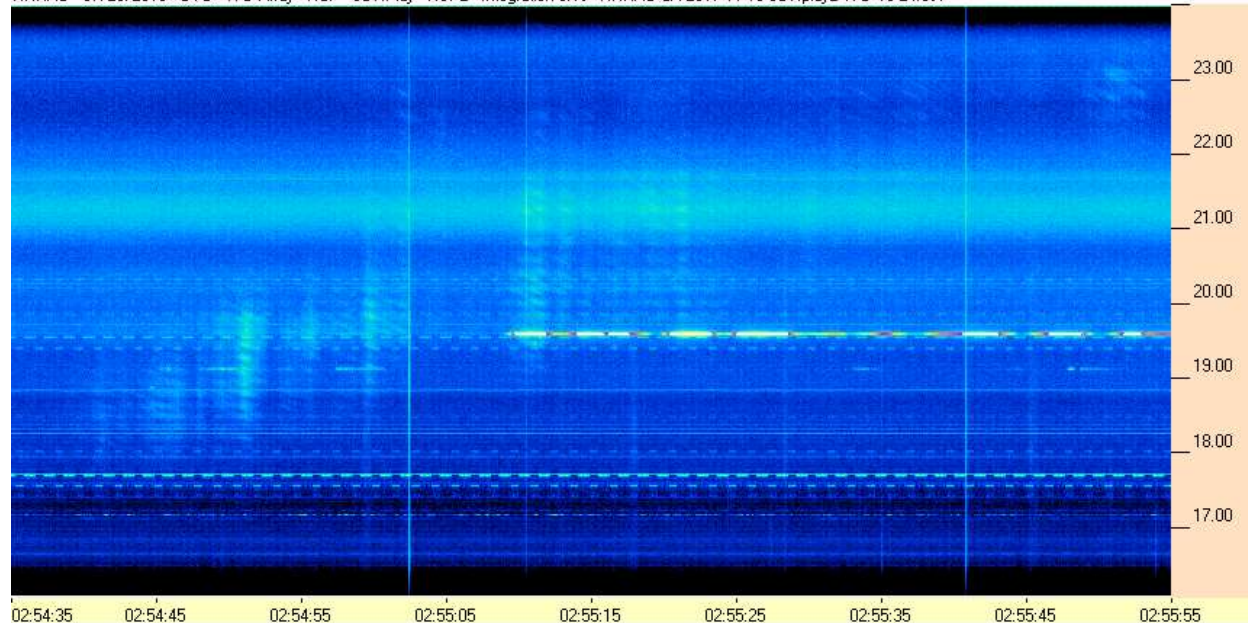
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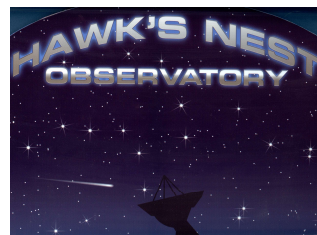
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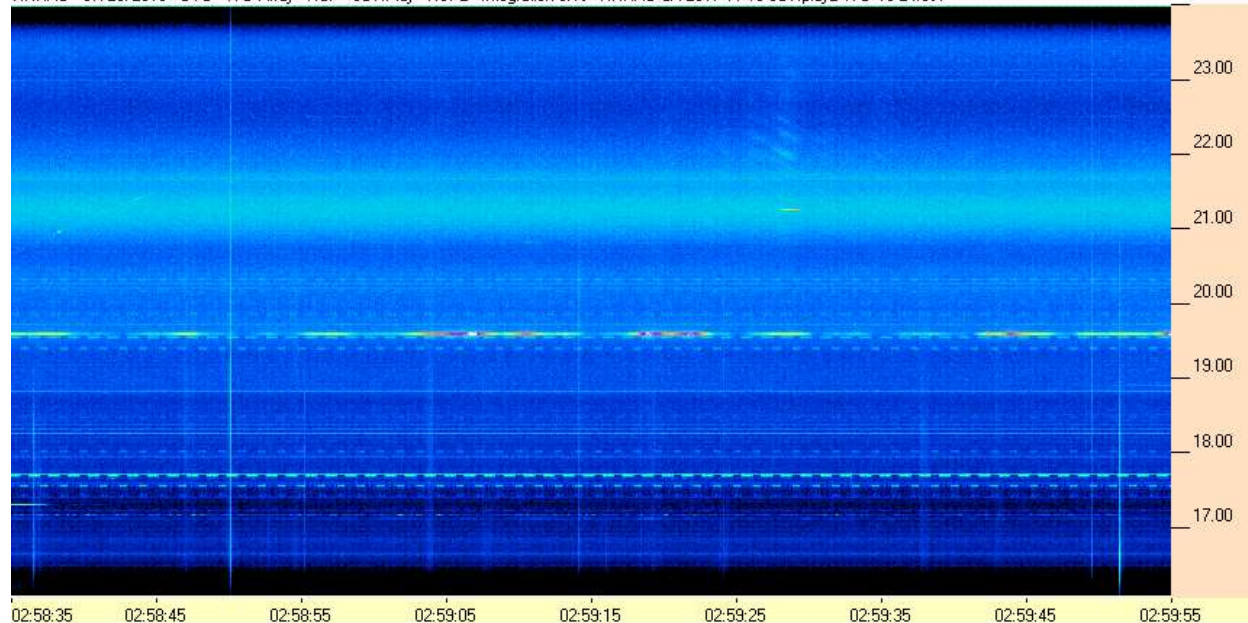
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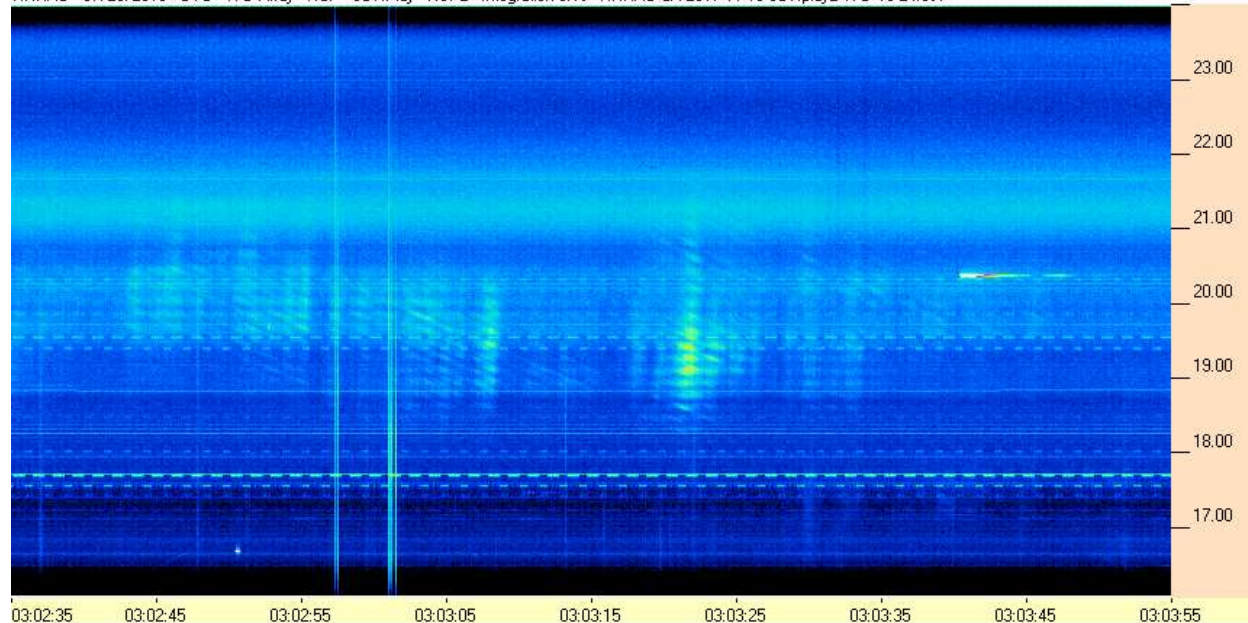
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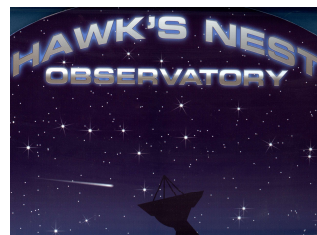
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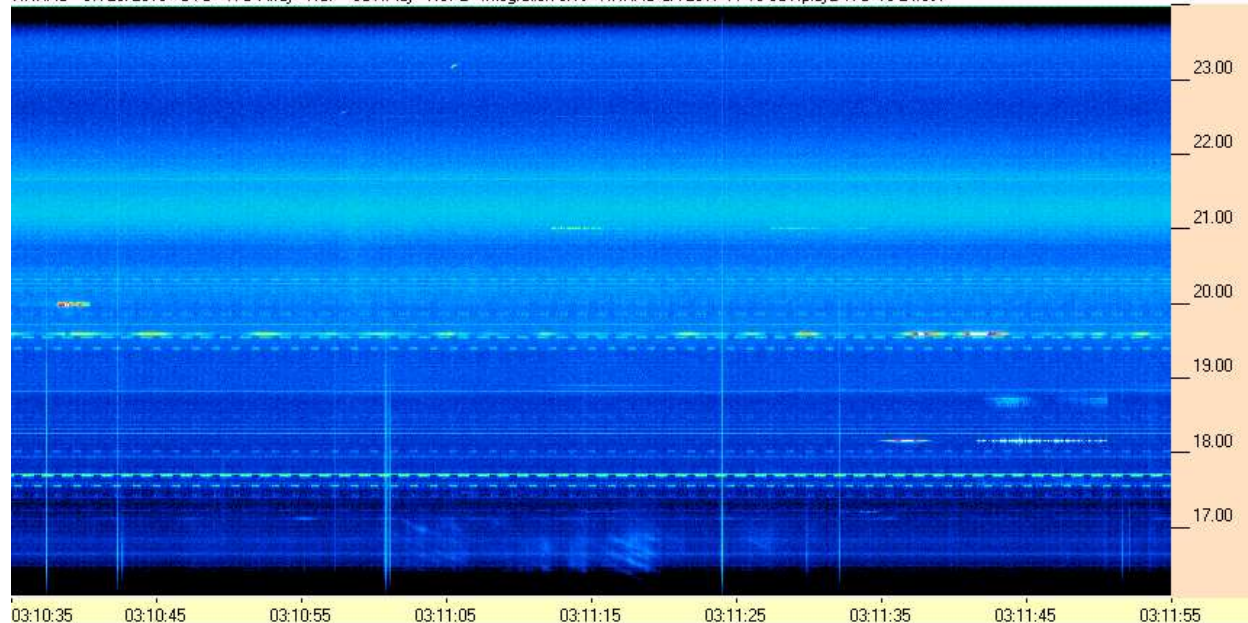
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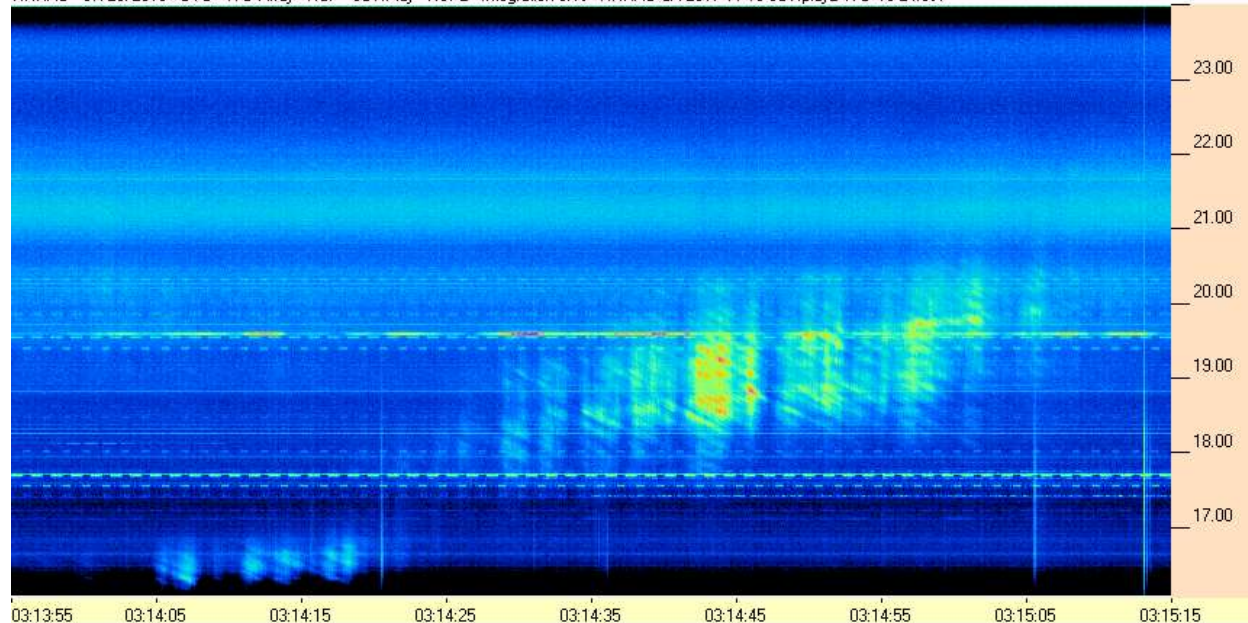
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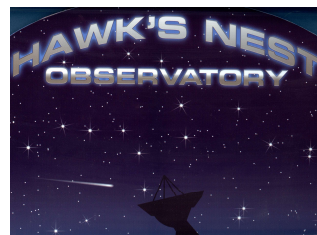
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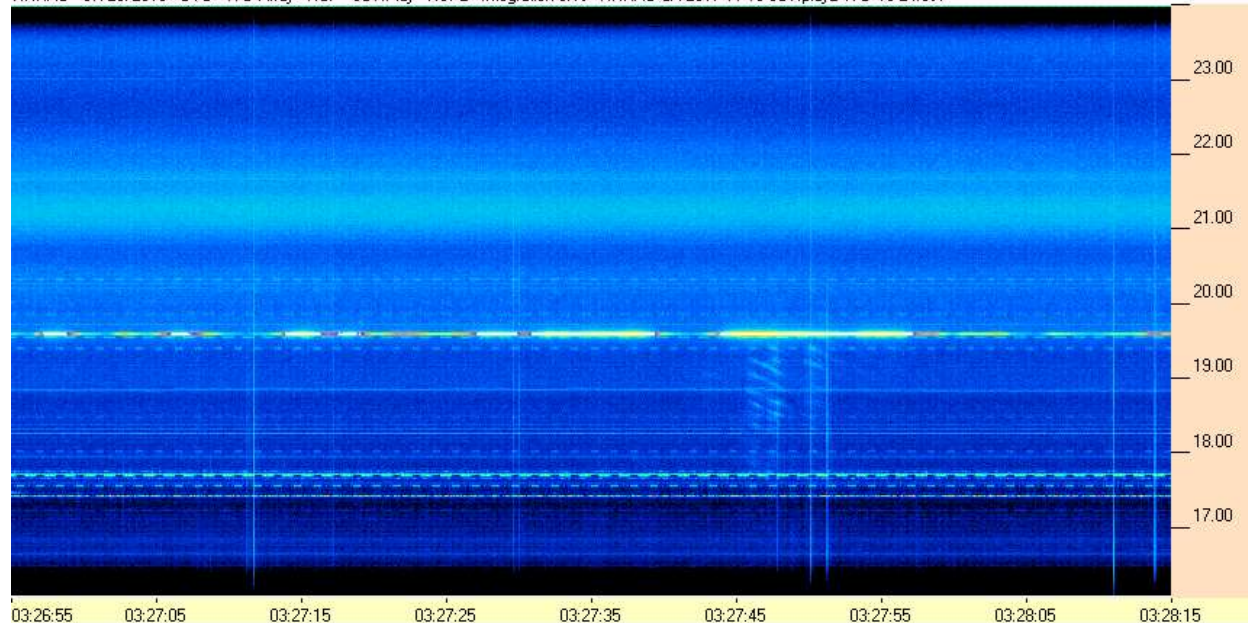
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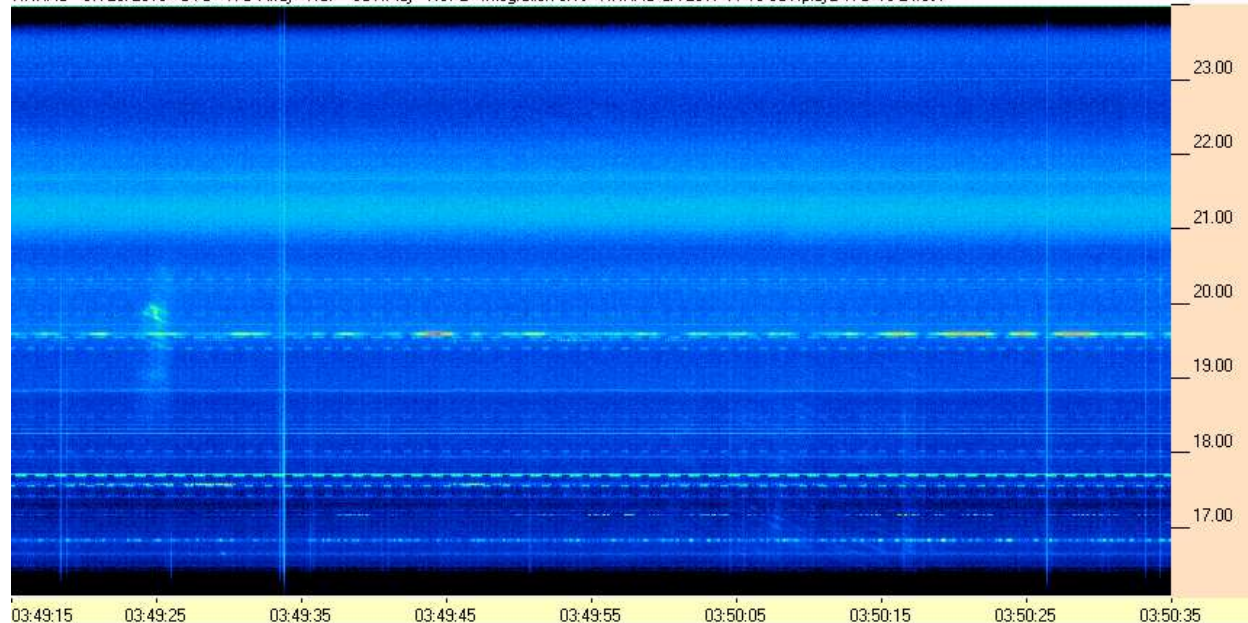
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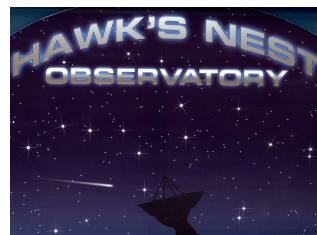
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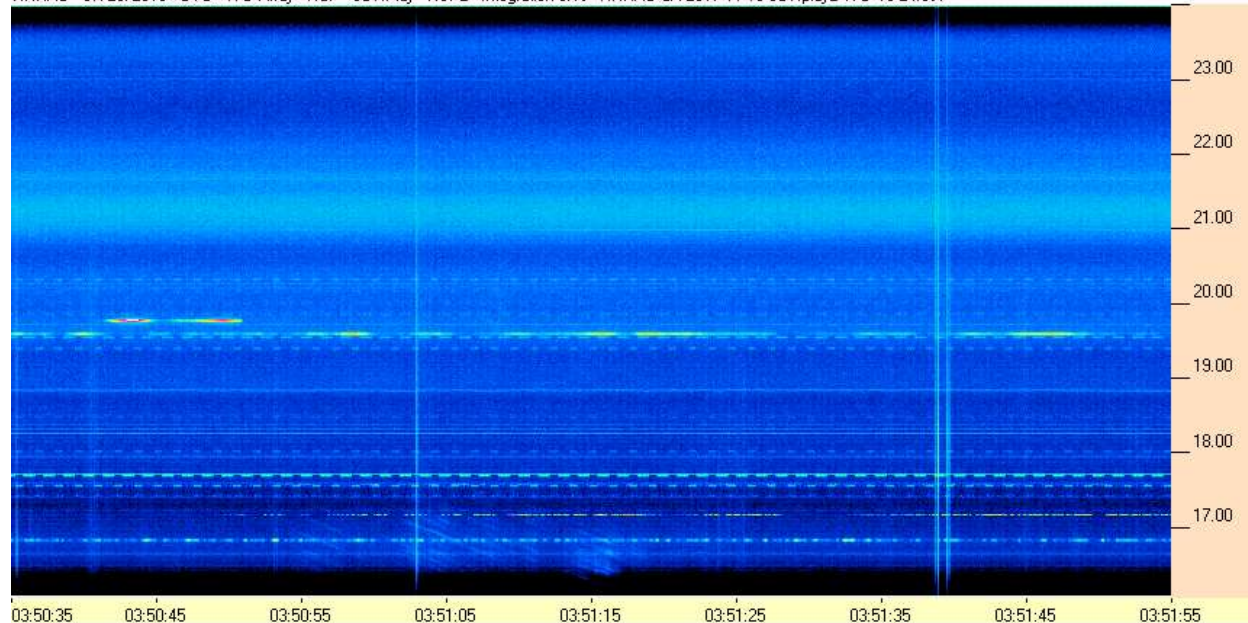
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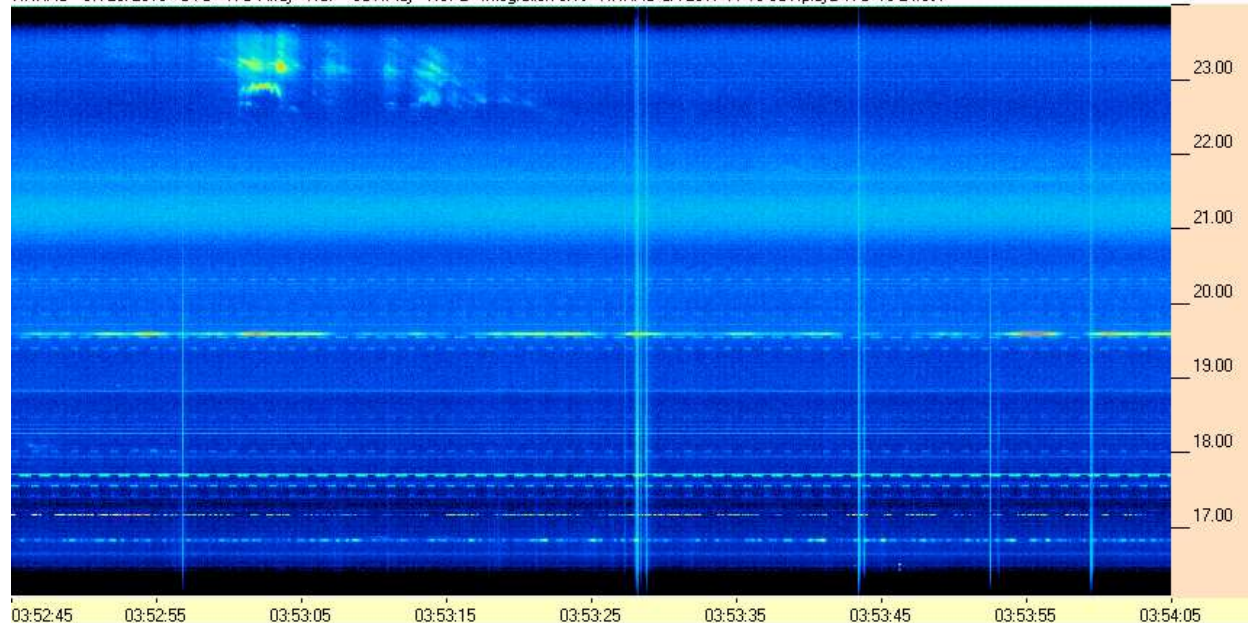
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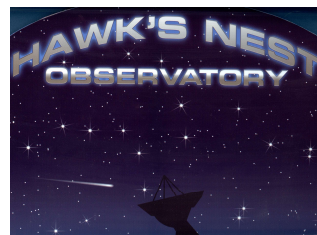
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HNRAO - 07/28/2019 - UTC - TFD Array - RCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv

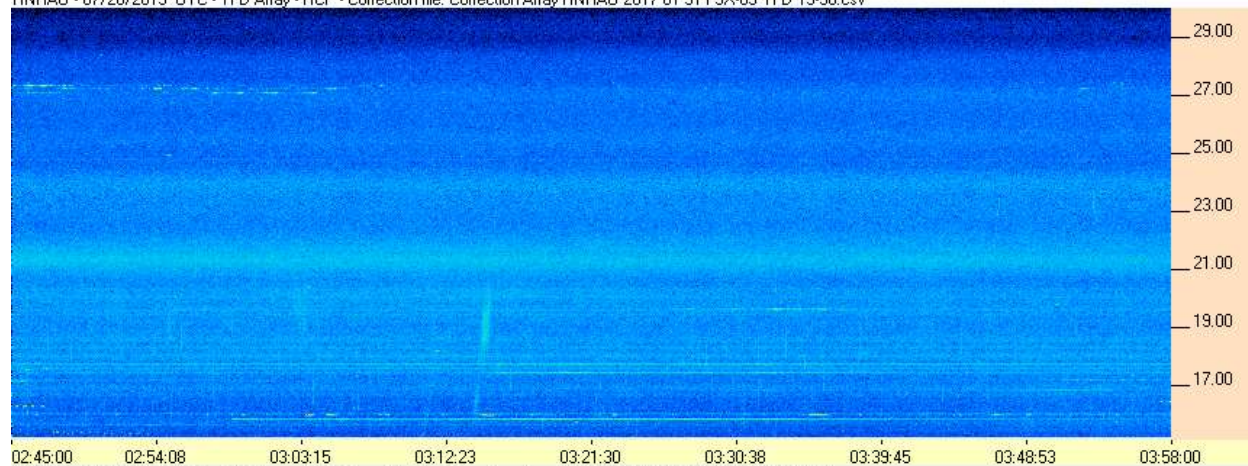


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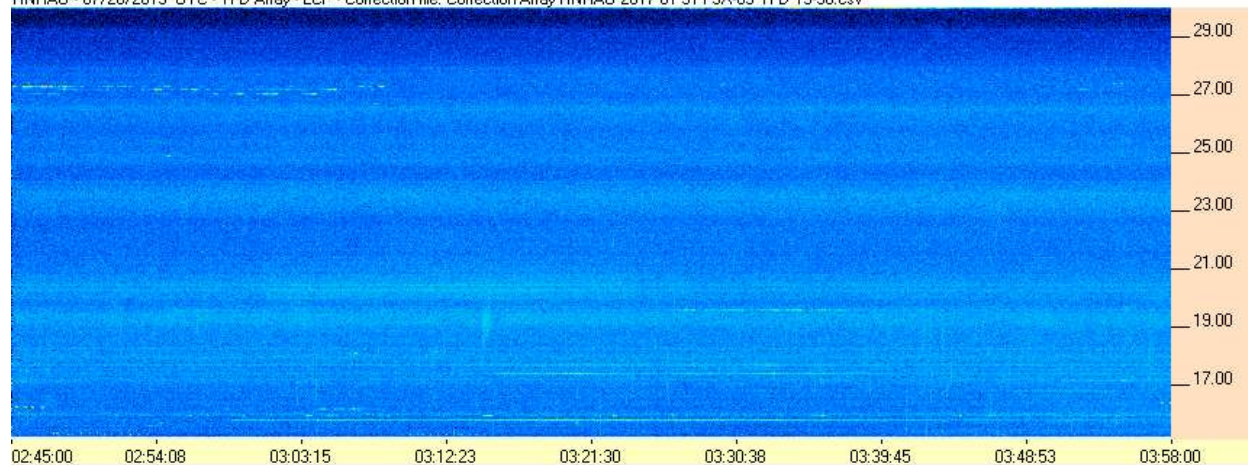


FSX-8S / TFD Array

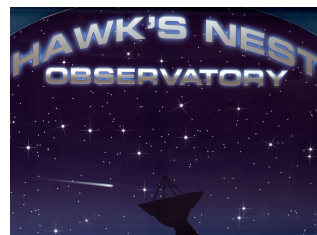
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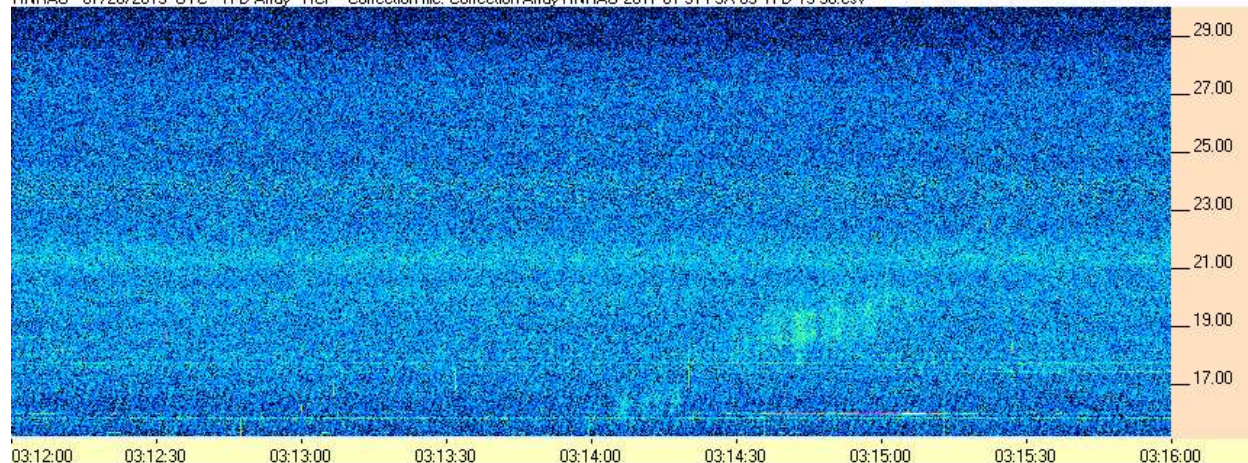
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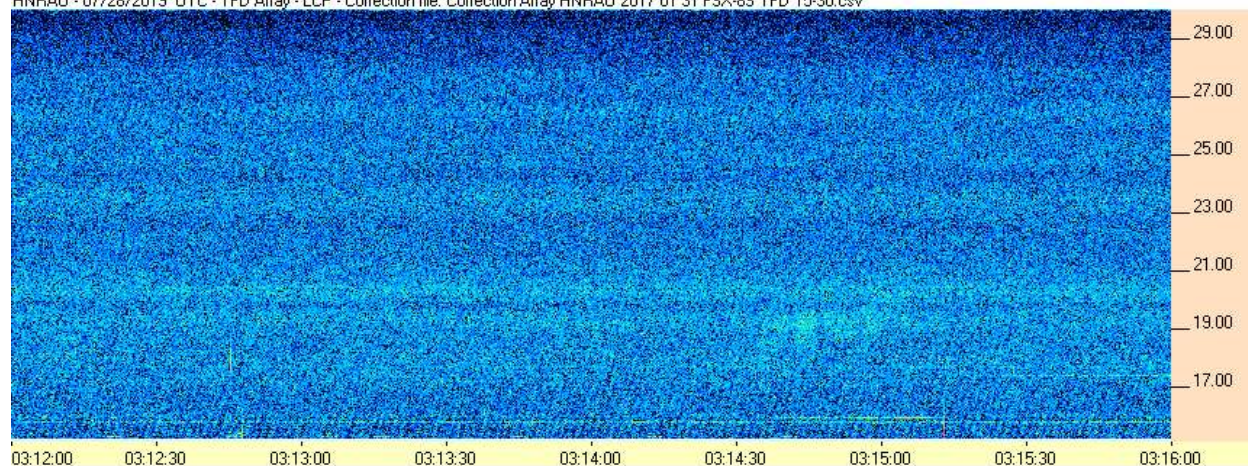
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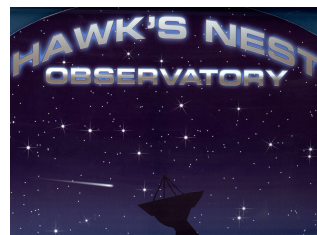
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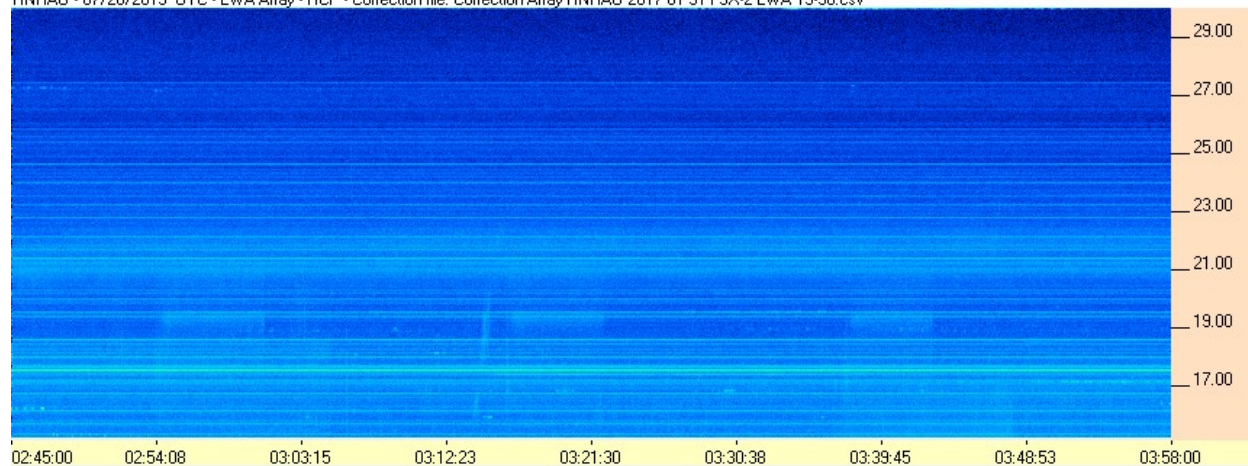


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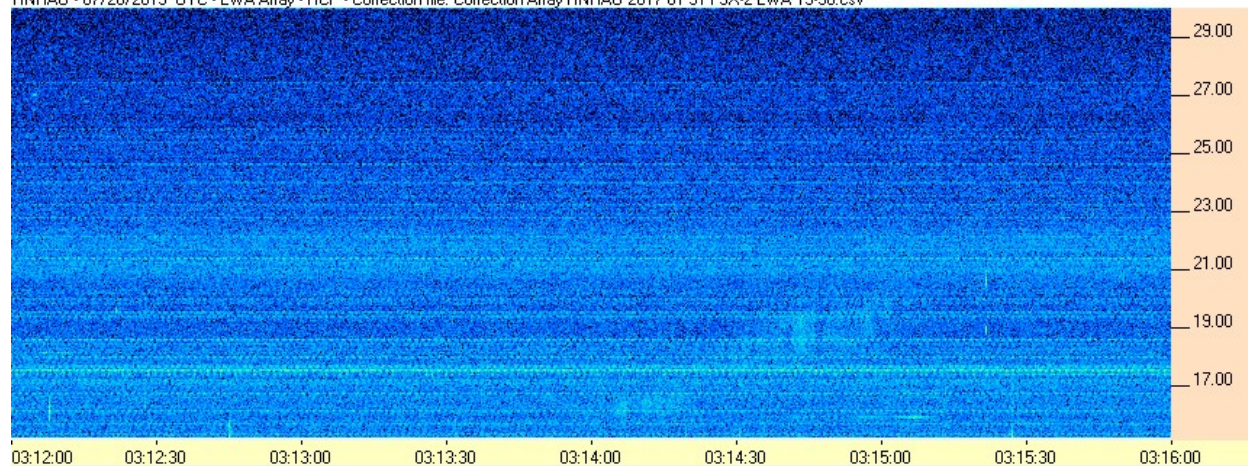


FSX-2 / LWA Array

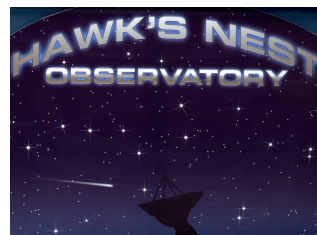
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HNRAO - 07/28/2019 UTC - LWA Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-2 LWA 15-30.csv



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JOVE II receiver / JOVE dipole array

