

HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq



Date: July 24, 2019

Object: Jupiter – Io-C

Observer: JB

Start - Time UT:	2224	Planetary K-index:	2
Jupiter Altitude (deg):	08.6	Jupiter Azimuth (deg):	129.3
Jupiter CML:	312.03	Jupiter Io Phase:	251.13
Jupiter RA (hr/min):	16:54	Jupiter Dec (hr/min):	-22:07
Hour Angle (hr/min):	-03:43	Polarization	LCP
Sun Altitude (deg):	23.5	Sun Azimuth (deg):	277.0
Sun RA (hr/min):	08:08	Sun Dec (hr/min):	20:11

End – Time UT:	2240	De:	-2.7
Jupiter Altitude (deg):	11.0	Jupiter Azimuth (deg):	132.2
Jupiter CML:	321.71	Jupiter Io Phase	253.41
Hour Angle (hr/min):	-03:27	Duration (min):	16
Sun Altitude (deg):	20.5	Sun Azimuth (deg):	279.5
Max Frequency MHz	21	Min Frequency MHz	19.5

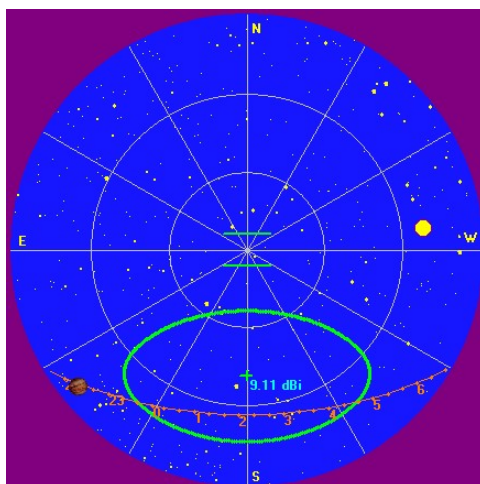
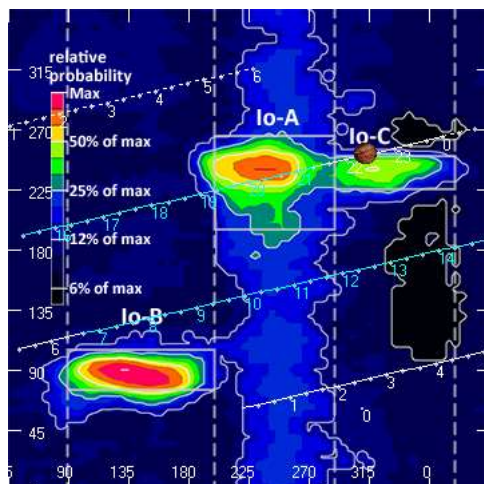
Observatory Configuration

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

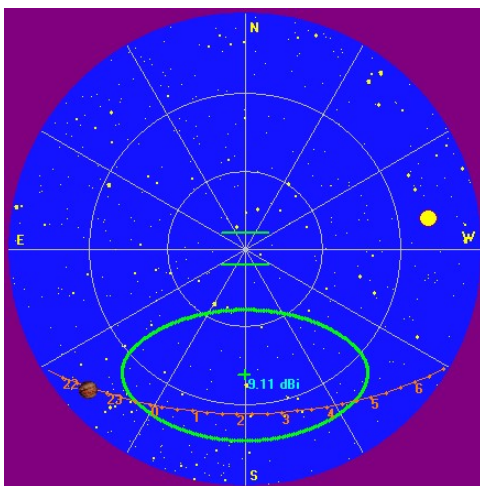
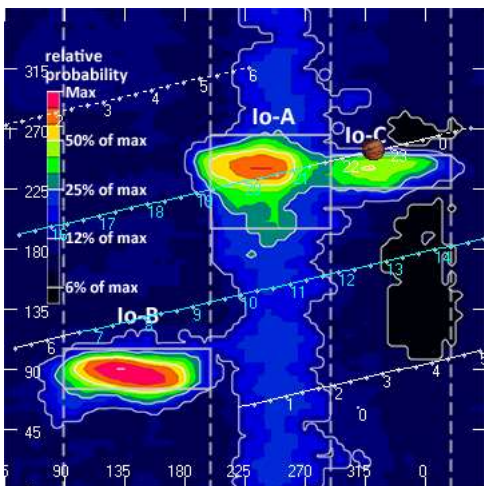
JOVE dipoles phased @ 32 degrees for 2018-2019 season
 TFD array phased @ 35 degrees for 2018-2019 season
 LWA antenna phased @ 35 degrees and orientation for observation: 45 degrees
 Radio Sky Spectrograph software version 2.9.25
 Radio-SkyPipe software version 2.7.33
 Radio-Jupiter Pro software version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

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

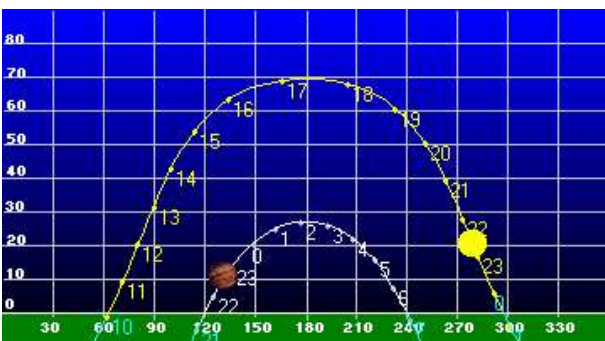
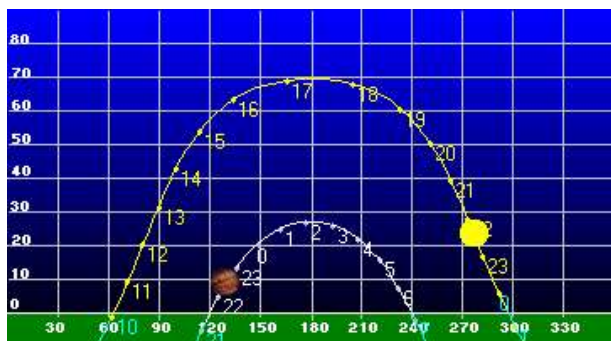
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Beginning of Pass



End of Pass



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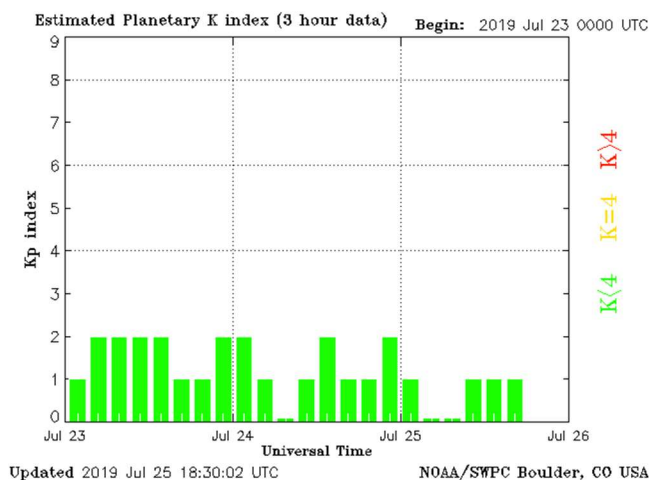


MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360	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 is 133.9 degrees.

All spectrographs and receivers and antennas were functioning normally. No known issues. Galactic background as measured by the JOVE II receiver / JOVE dipole array was 89 kK. No RFI was apparent in the JOVE II receiver except for distant lightning spikes typical of this time of year. The SDRPlay RSP2 / TFD spectrograph observed foreign broadcast stations that were very strong and made observations difficult but not impossible.

An Io-C storm that was unexpected due to the time of day and position of Jupiter in the sky. Jupiter was above the horizon but 3 hours and 45 minutes from transit.

Cluster of S-bursts at 2226:50 UT. L-bursts at 2231:50 UT with faint L4 modulation lanes. A stronger grouping of L-bursts at MHz at 2232:05 UT. From 2233:20 UT through 2234:10 UT there is a horizontal group of L-bursts at 19.65 MHz while from 2235:55 UT through 2234:40 UT, there was a parallel group of L-bursts centered around 22.2 MHz. More L-bursts at 2234:50 UT with faint L4 modulation lanes. The last positively identified L-bursts were at 2239:50 UT.

It's possible that the FSX-8S / TFD array did record some of this storm. There is a corresponding grouping from 2233:38 UT at 19.5 MHz through 2235:40 UT at 22.7 MHz that is quite possibly what the SDRPlay RSP2 / TFD array observed. It is apparent in the broader view of the storm from start to end but trying to zoom in diminishes the ability to separate the storm from the background, but it is there from 2232 UT through 2235:08 UT.

The FSX-2 / LWA array was set for RCP and so was not observing this storm.

The SkyPipe chart from the JOVE II receiver / JOVE dipole array was suggestive in showing bursts from this storm. Two higher peaks between 2226:23 UT and 2227 UT rise above the GB suggesting the same cluster seen in the spectrograph data centered at 2226:50 UT at 22.2 MHz. The rise in the SkyPipe trace at 2233:57 UT corresponds to a group of L-bursts at the same time in the spectrograph data at 22.2 MHz. 2235:10 UT. I will call these inconclusive.

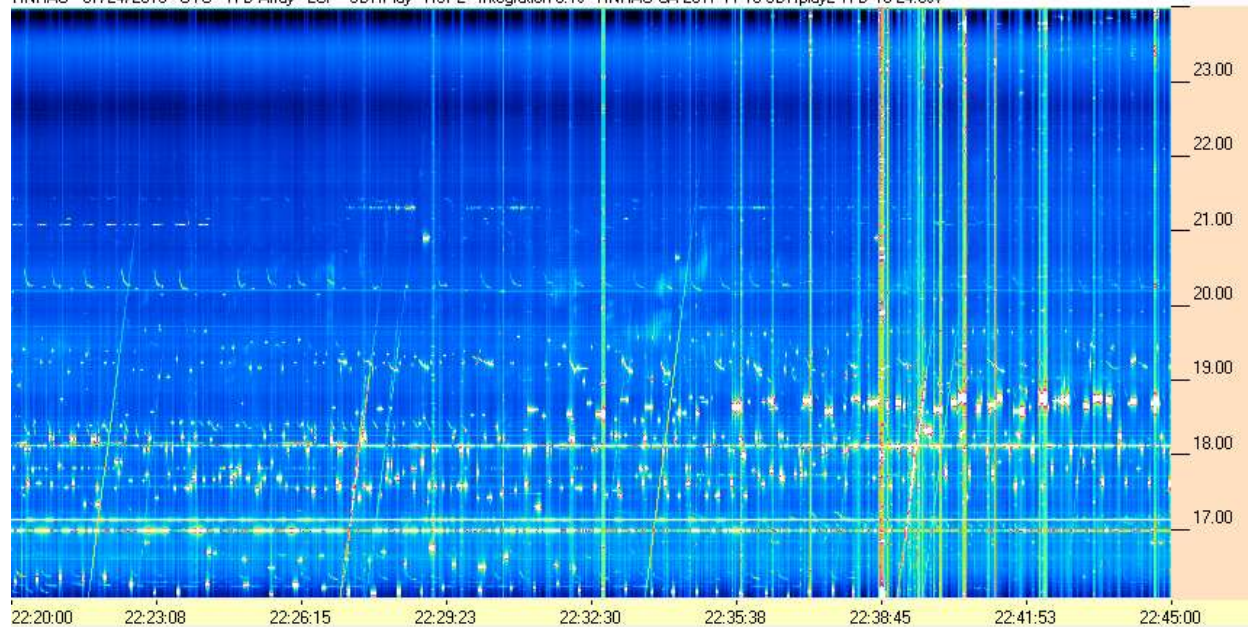
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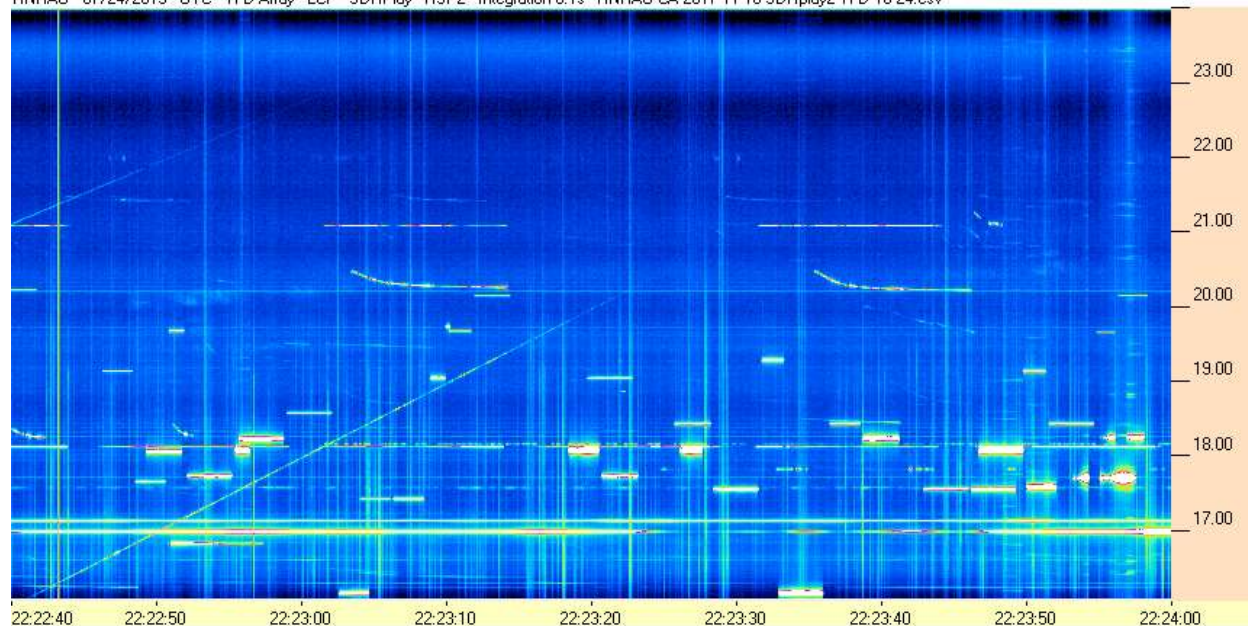


SDRPlay RSP2 / TFD Array

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



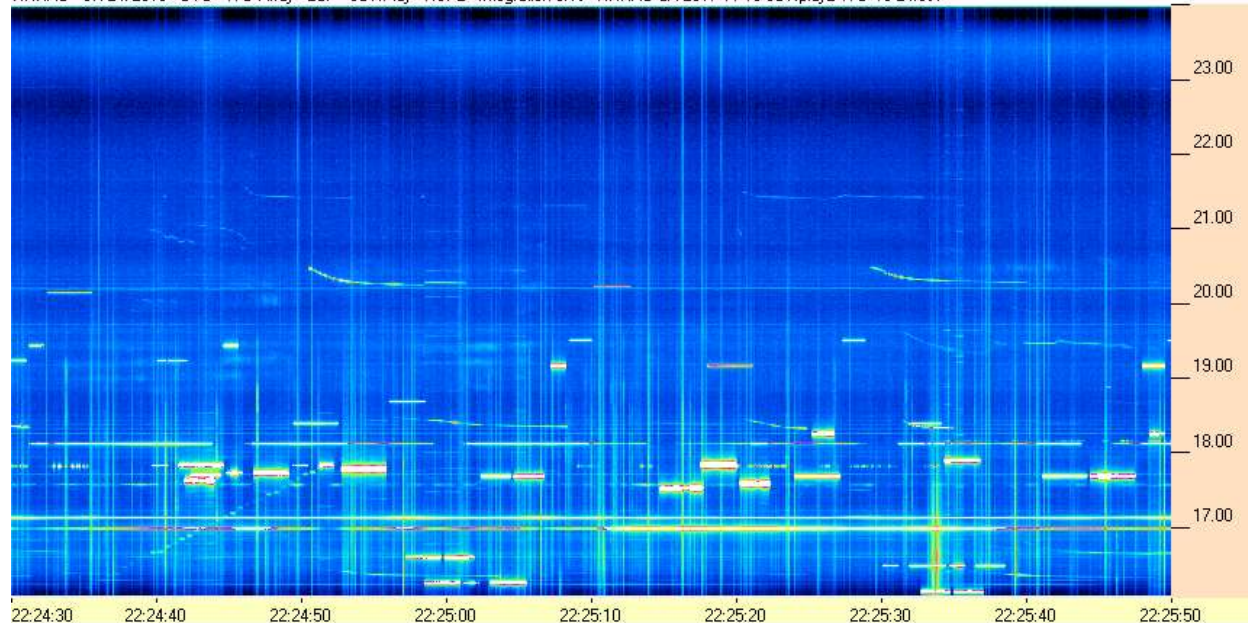
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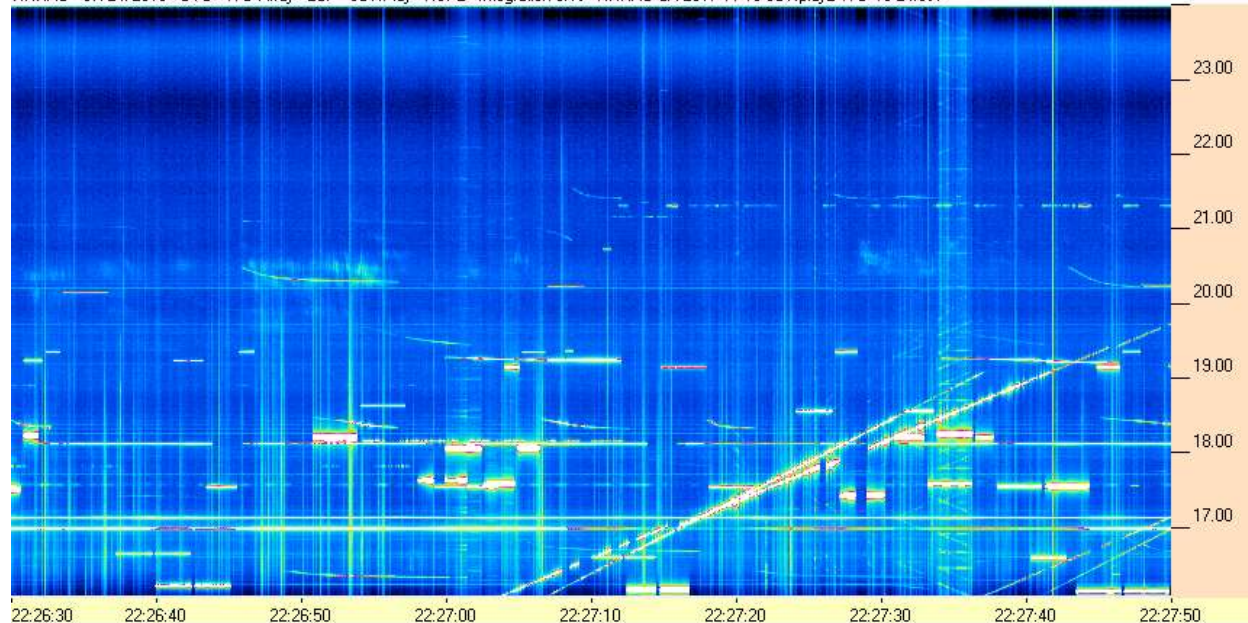
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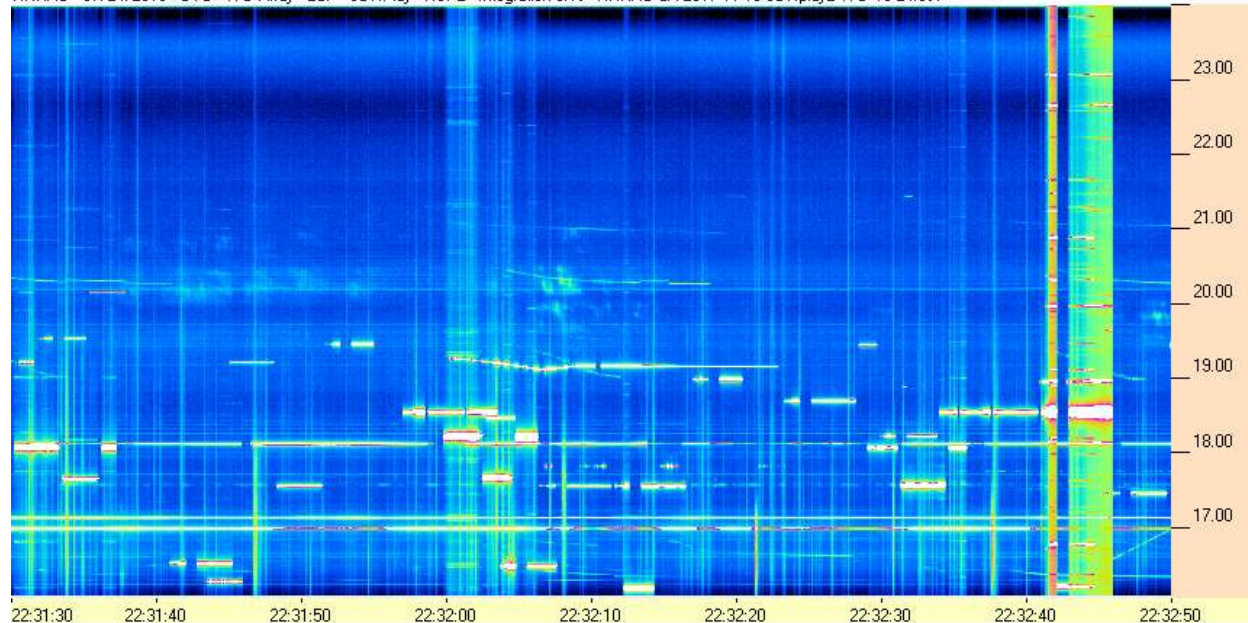
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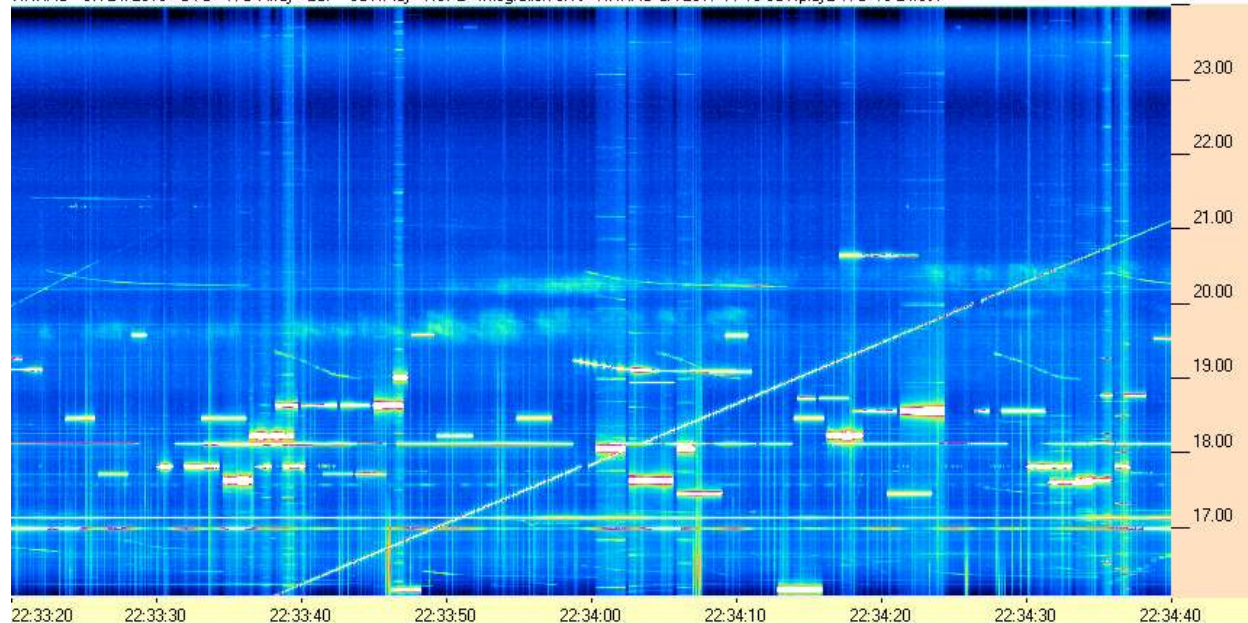
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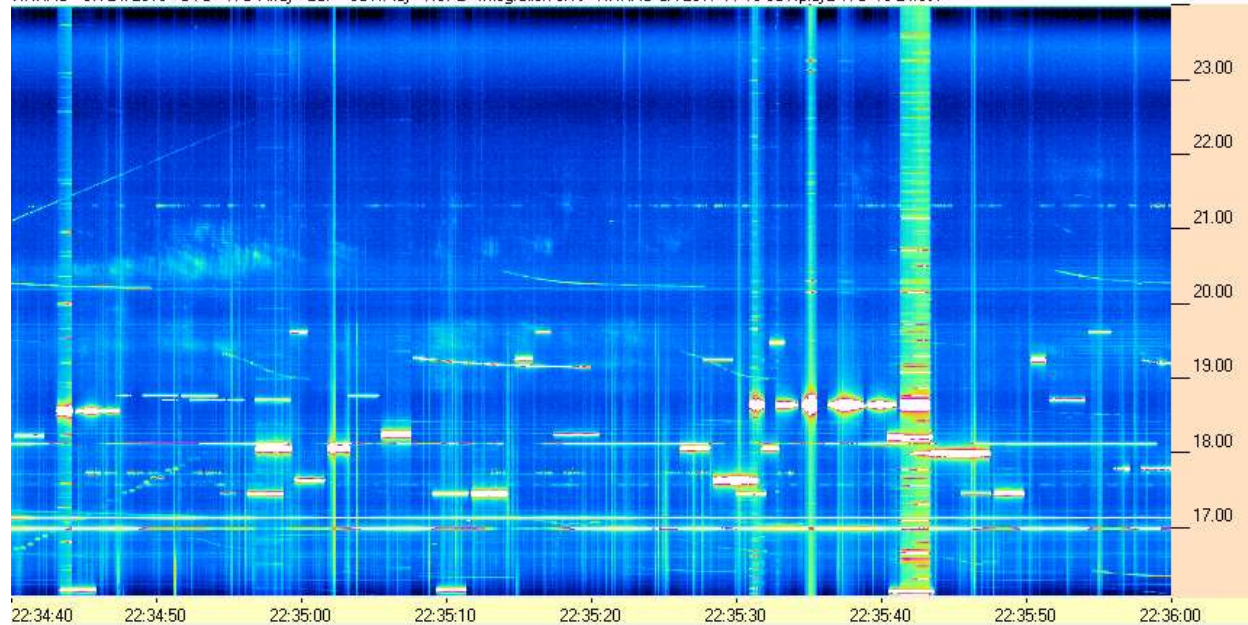
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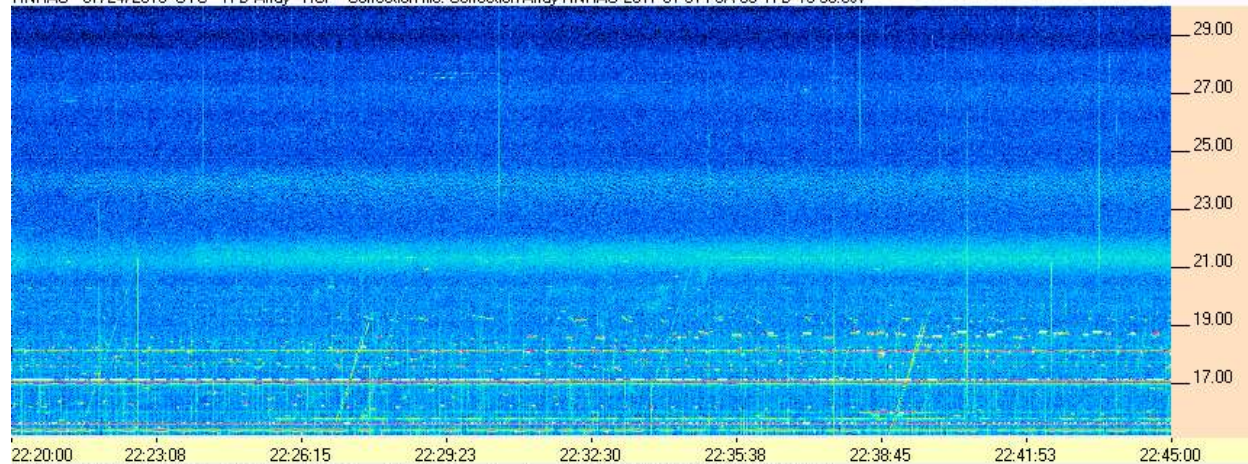


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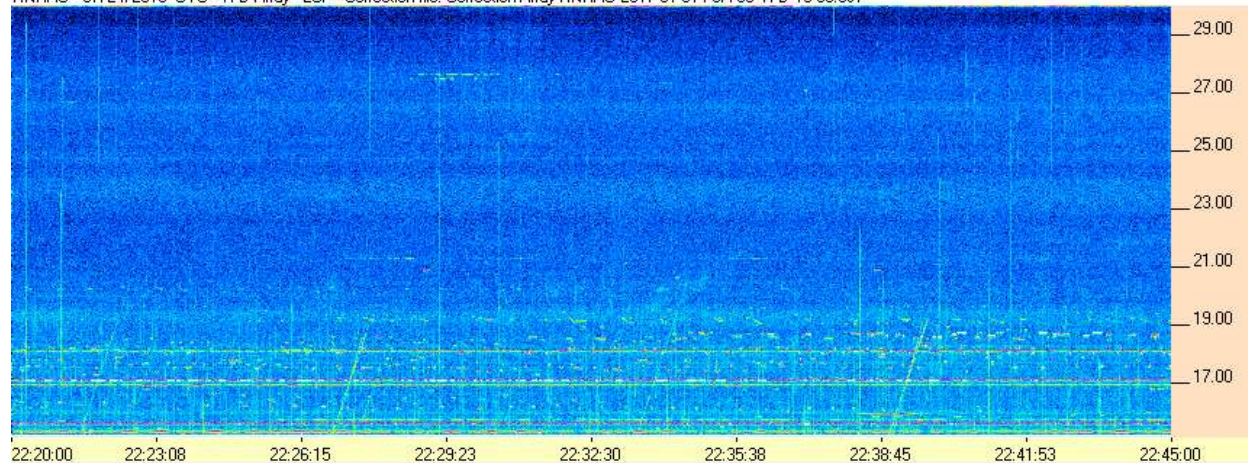


FSX-8S / TFD Array

HNRAO - 07/24/2019 UTC - TFD Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv



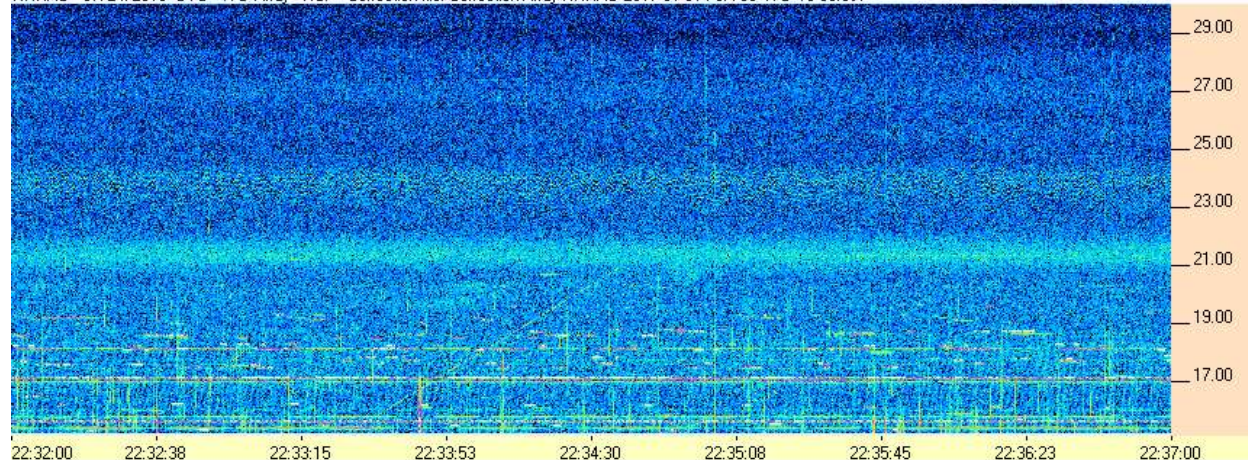
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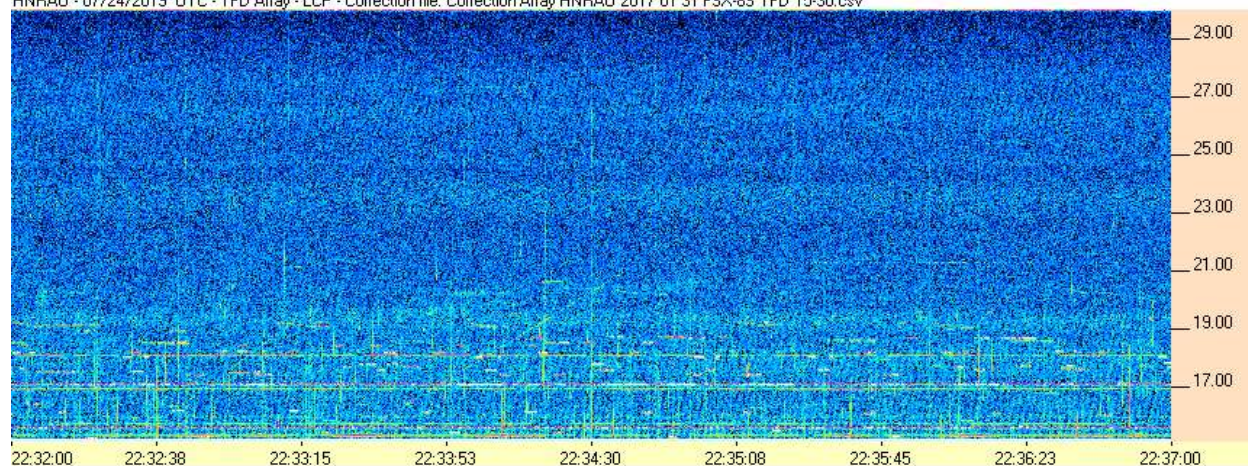
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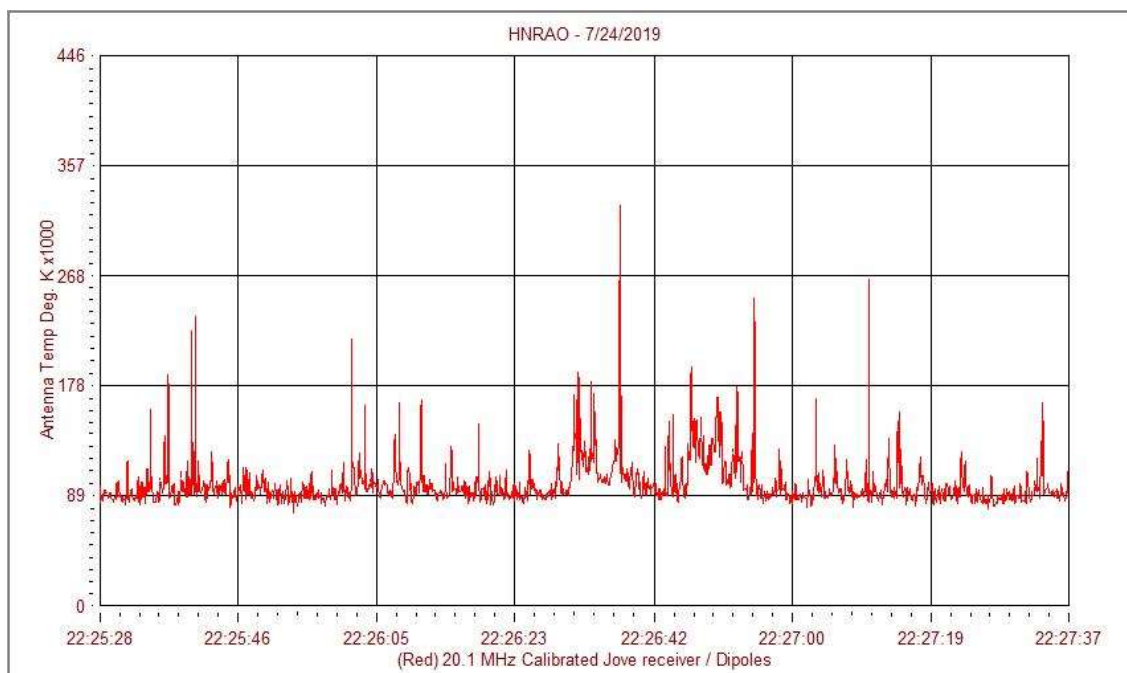
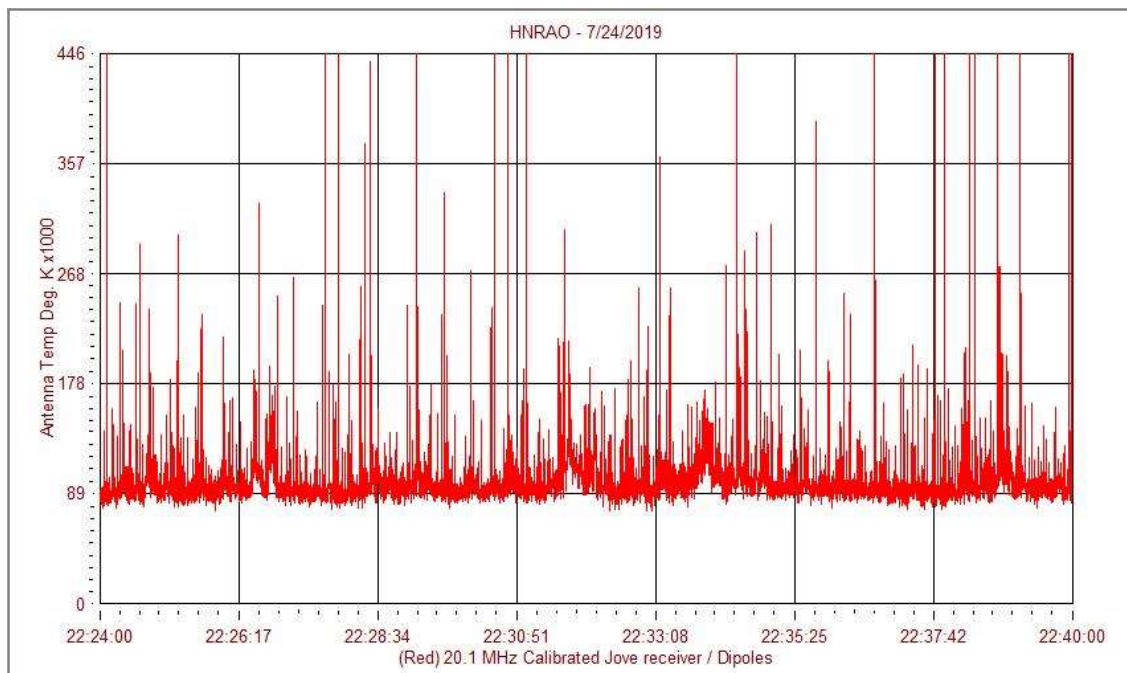
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JOVE II receiver / JOVE dipole array



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