HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq

Date: May 9, 2019

Object: Jupiter – Io-D

Observer: Unattended

Start - Time UT:	**0415**	**Planetary K-index:**	**2**
Jupiter Altitude (deg):	**10.1**	**Jupiter Azimuth (deg):**	**132.0**
Jupiter CML:	**85.25**	**Jupiter Io Phase:**	**104.45**
Jupiter RA (hr/min):	**17:30**	**Jupiter Dec (hr/min):**	**-22:38**
Hour Angle (hr/min):	**-03:30**	**Polarization**	**LCP**
Sun Altitude (deg):	**-31.1**	**Sun Azimuth (deg):**	**344.4**
Sun RA (hr/min):	**02:56**	**Sun Dec (hr/min):**	**16:44**

End – Time UT:	**0509**	**De:**	**-2.8**
Jupiter Altitude (deg):	**17.1**	**Jupiter Azimuth (deg):**	**142.7**
Jupiter CML:	**117.9**	**Jupiter Io Phase**	**112.03**
Hour Angle (hr/min):	**-02:36**	**Duration (min):**	**94**
Sun Altitude (deg):	**-32.6**	**Sun Azimuth (deg):**	**359.5**
Max Frequency MHz	**20**	**Min Frequency MHz**	**16**

Data from Radio-Jupiter Pro 3.8.2

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	TFD	RCP	-8.35 dB	#2 RCP	Port 2 +3dB	Twice daily
SDRPlay RSP2	TFD	LCP	-7.59 dB	#1 LCP	Port 2 +3dB	Twice daily
JOVE 1	TFD	RCP	-8.35 dB	#2 RCP	Port 3 +3 dB	04/20/2018
JOVE 1	TFD	LCP	-7.59 dB	#1 LCP	Port 3 +3 dB	04/20/2018
JOVE II	Jove dipoles	Linear	-3.66 dB	#3 Linear	Port 4 +3 dB	4/19/2019
SDRPlay RSP1	Experimental*					

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
* Used for testing and evaluating antenna systems
Software Radio Sky Spectrograph 2.8.50
Red = Offline

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

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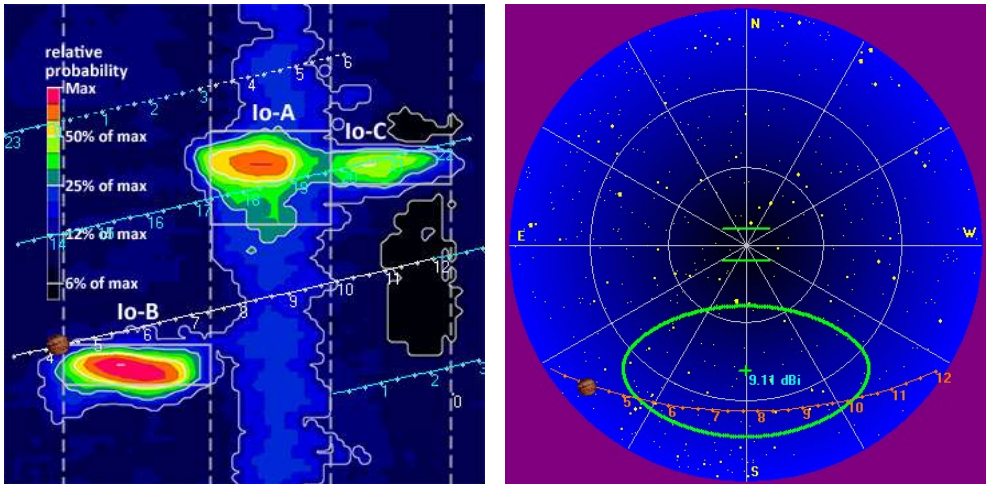
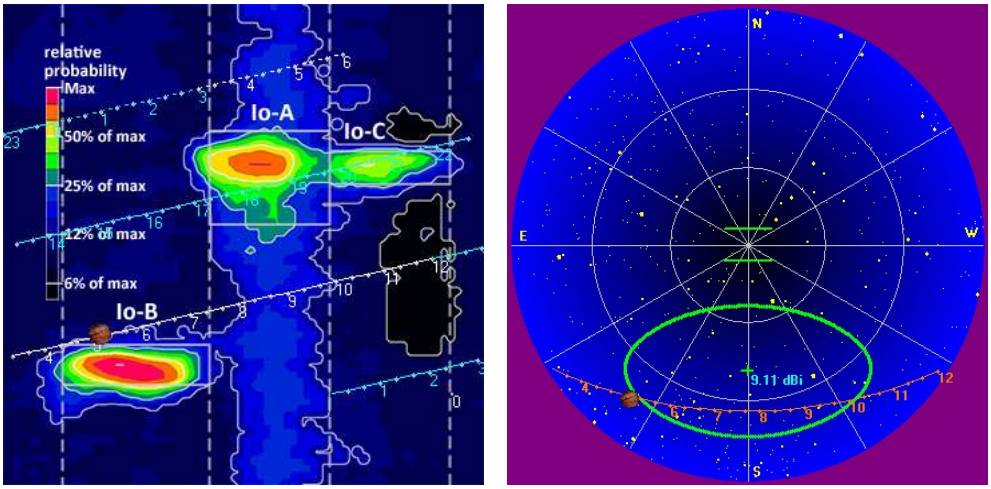
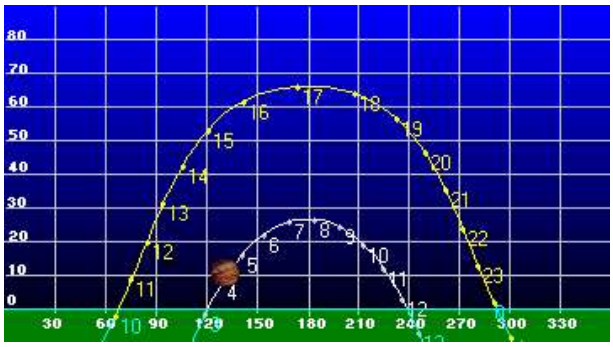


Beginning of Pass



End of Pass



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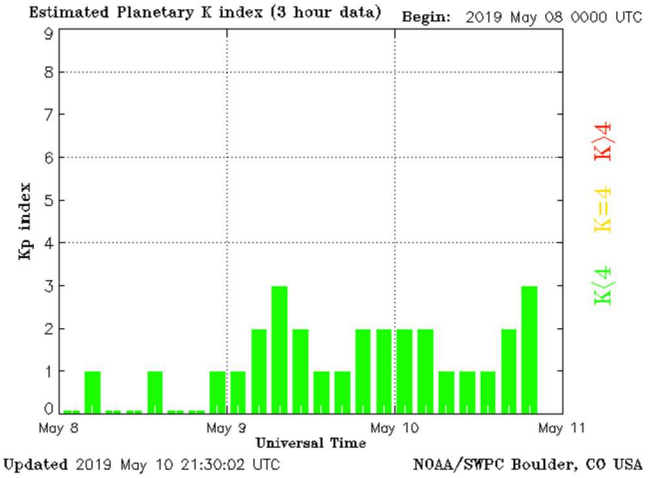
MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360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



A weak Io-D storm with LCP L-burst emissions, positive drift from 16 MHz to just at 20 MHz and L4 modulation lanes. A comparison of both RCP and LCP records from the SDRPlay RSP2 / TFD array spectrographs were compared, minute by minute to confirm this was indeed LCP emission and not an artifact of Jupiter being so far off axis. There were no RCP emissions during this time period so there was no Io-B component.

The Radio JOVE / JOVE dipole array was completely overwhelmed with RFI. The spectrographs were receiving strong foreign broadcast just below 18 MHz and so interfered somewhat with the emissions at that frequency. The SDRPlay RSP2 / TFD array spectrographs were affected by some RFI predominantly just below 21 MHz but show as brighter horizontal bars throughout the 16 MHz to 24 MHz span. Horizontal RFI bands can also be seen in the FSX-8S / TFD array as well. The source of this RFI is unknown.

All instruments were operational, however, only two LCP spectrographs were running. The SDRPlay RSP2 / TFD array resolved the emissions throughout the storm, and the FSX-8S / TFD array captured only one burst at 0433 UT.

While most of the emissions were at or a dB or so above the GB, there was one single strong burst at 04:50:41 UT at 19.9 MHz. This single burst was only recorded by the SDRPlay RSP2 / TFD array.

Emissions were not steady and were probably influenced by scintillation.

The only event of note was the very strong single burst at 0450:41 UT.

EOR

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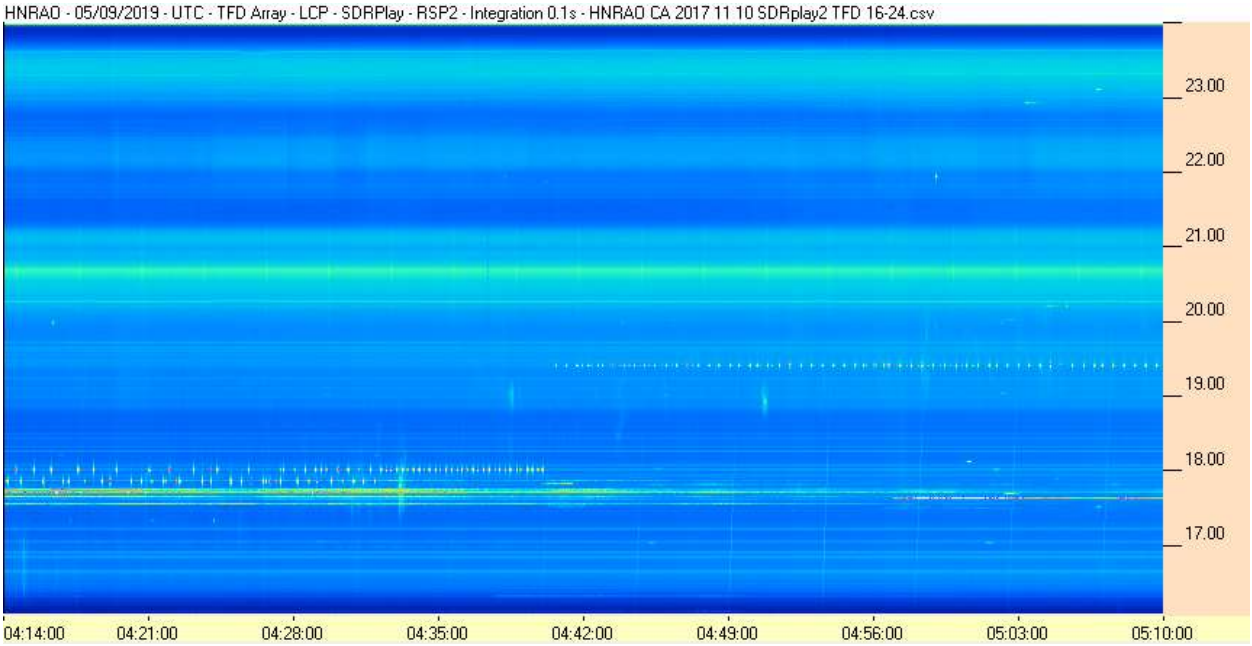
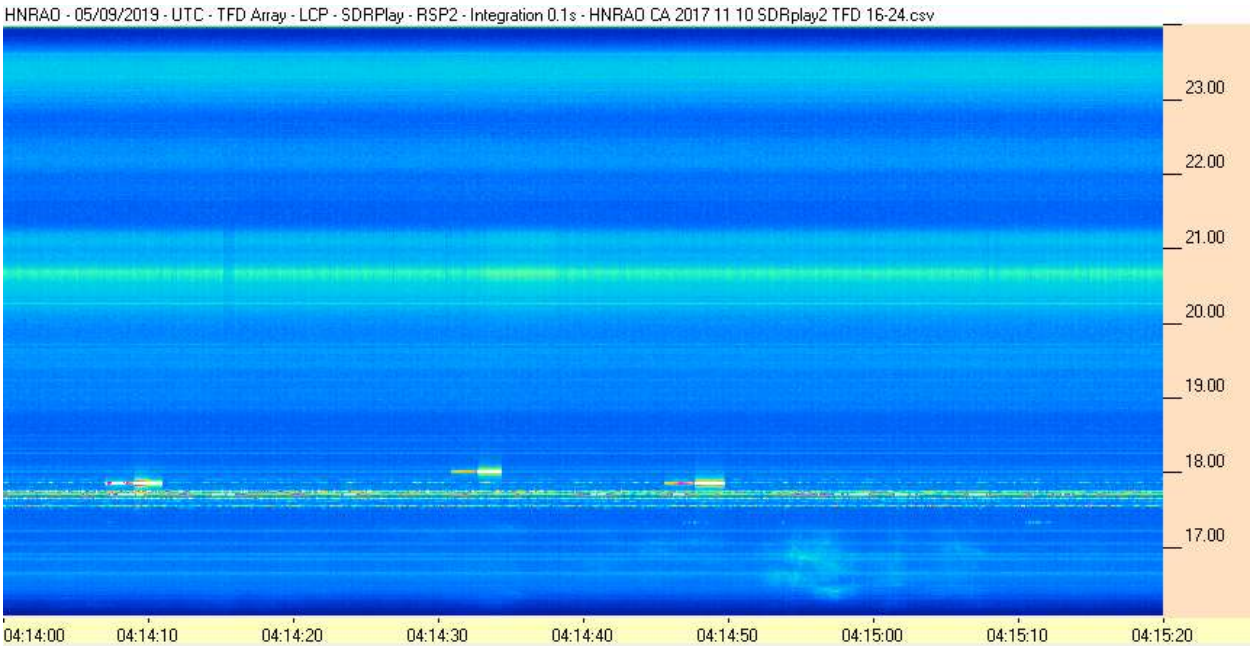
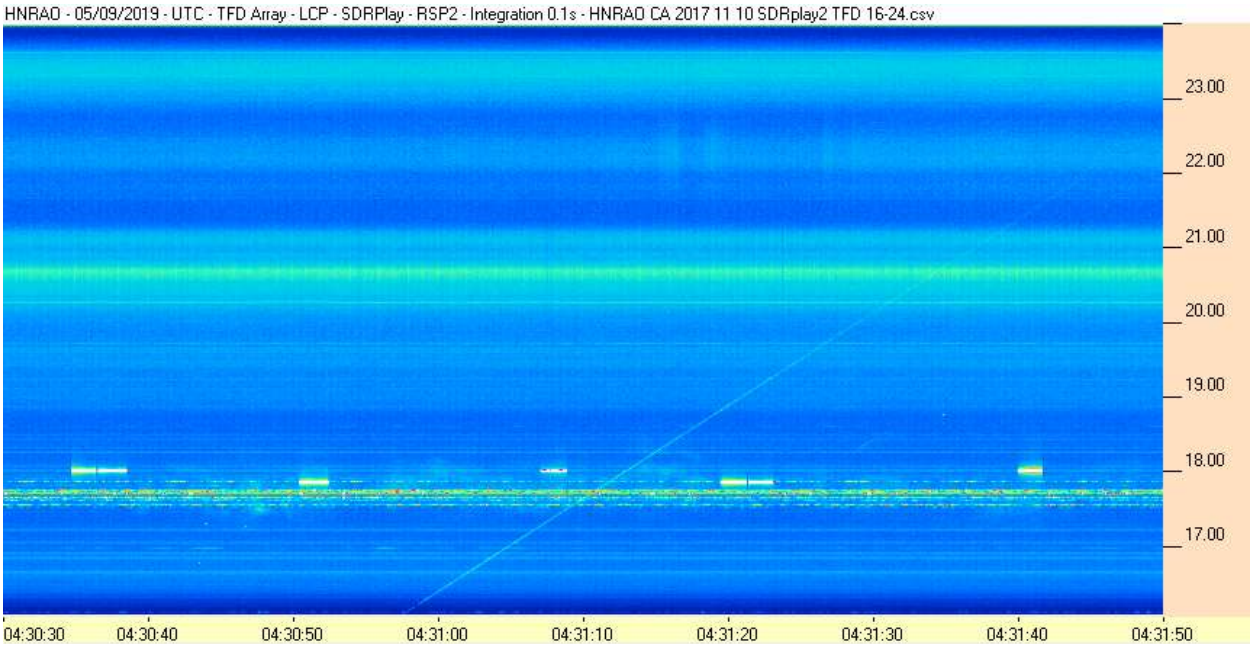
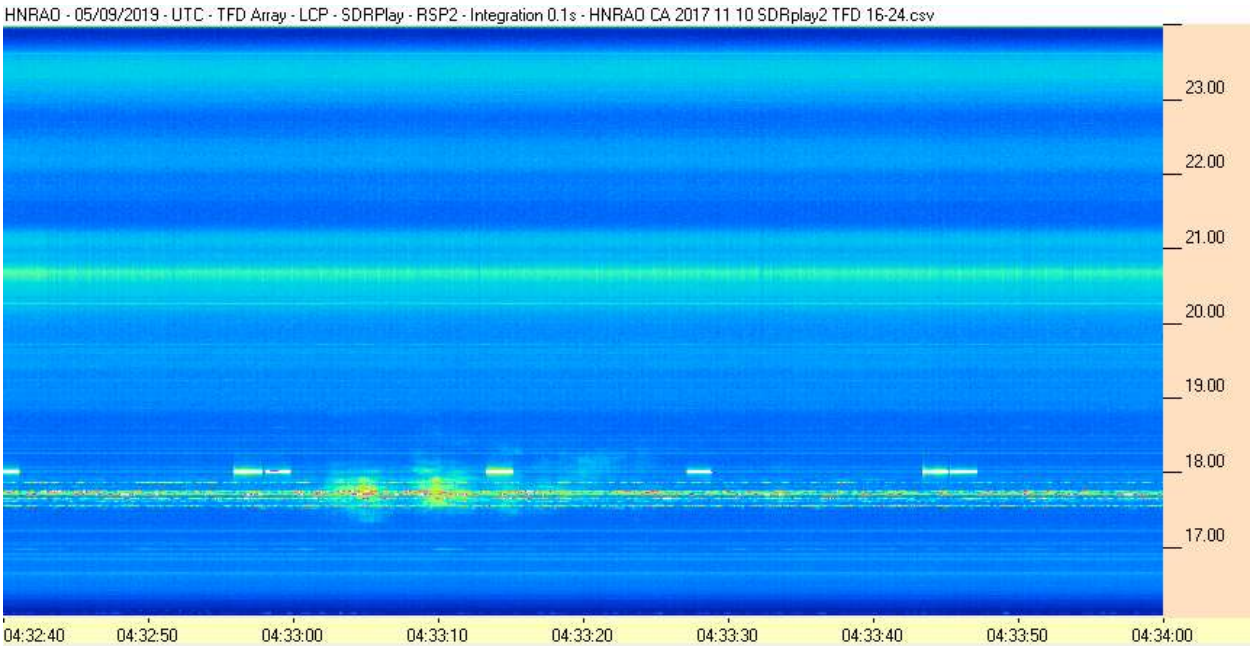
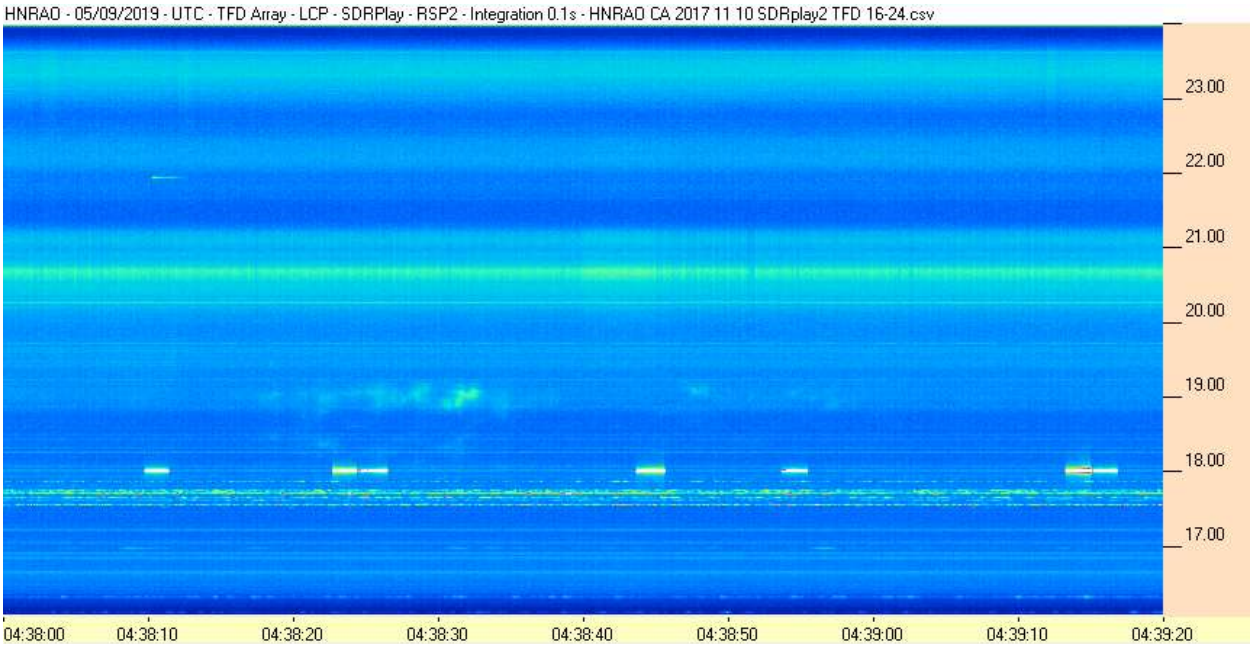
SDRPlay RSP2 / TFD Array

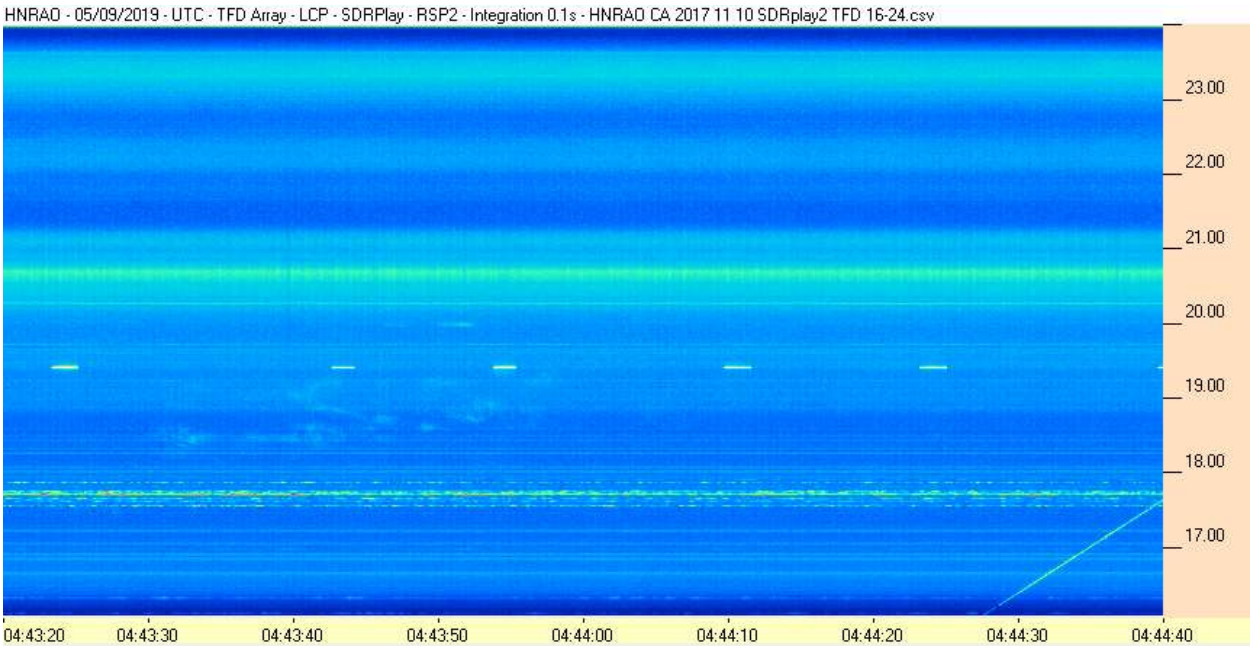


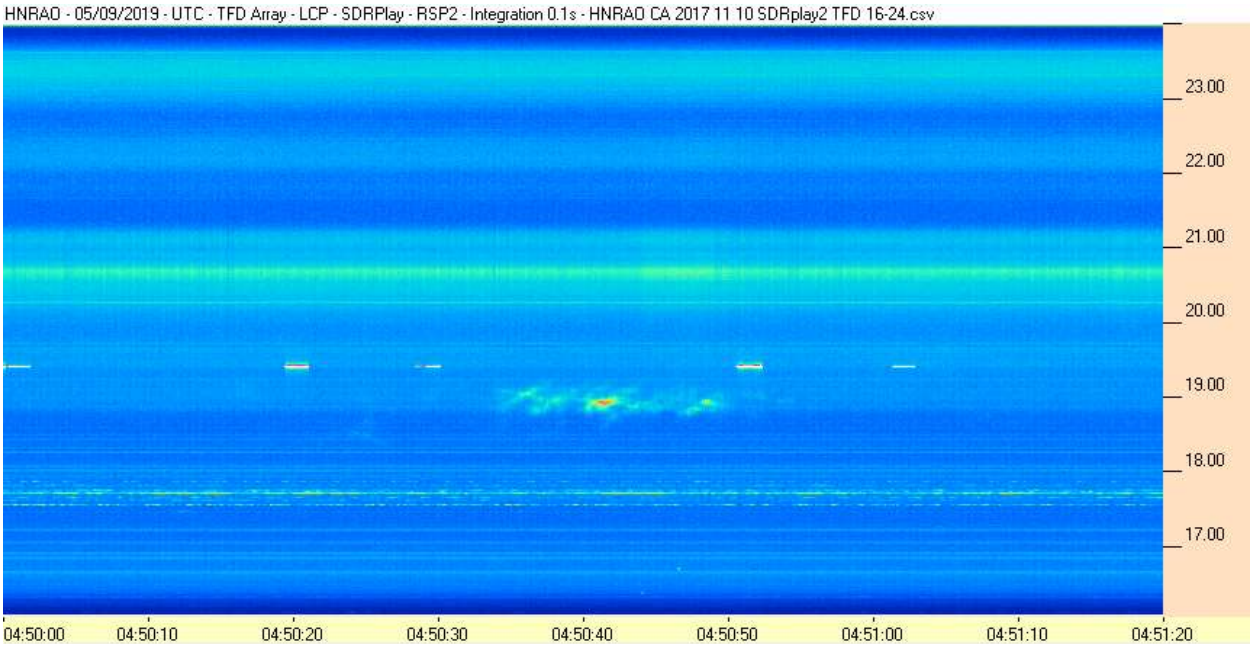


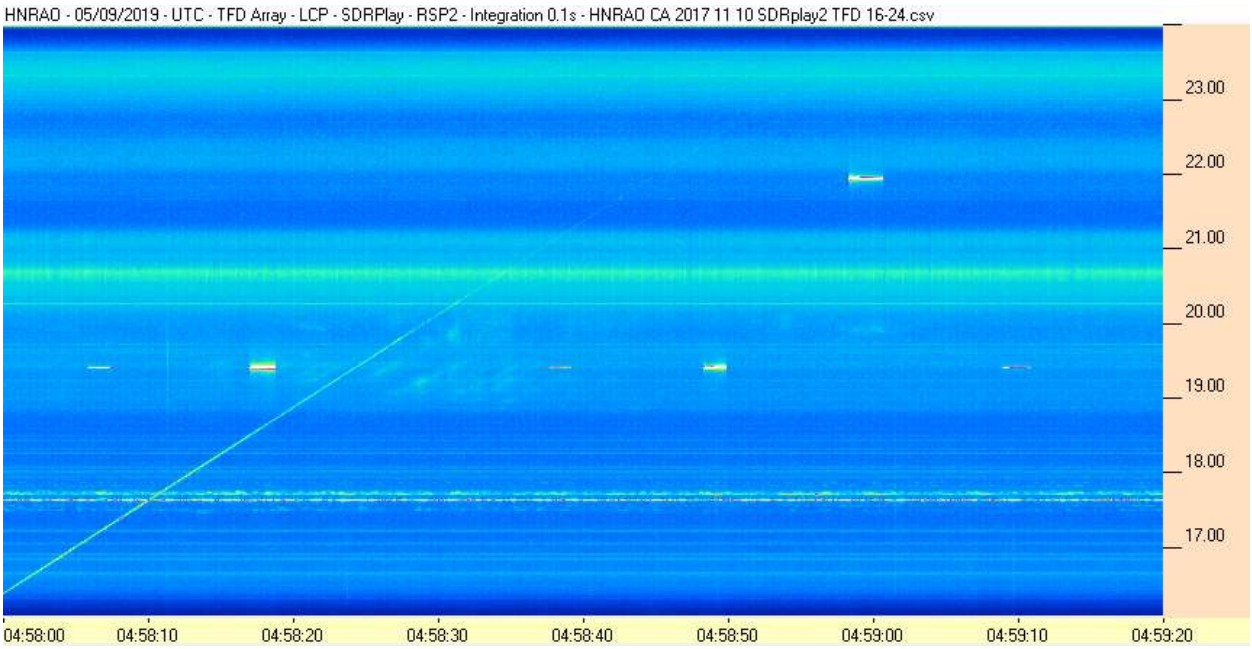

HNRAO - 05/09/2019 - UTC - TFD Array - LCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv
23.00
22.00
21.00
20.00
19.00
18.00
17.00
04:30:30
04:30:40
04:30:50
04:31:00
04:31:10
04:31:20
04:31:30
04:31:40
04:31:50


HNRAO - 05/09/2019 - UTC - TFD Array - LCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv
23.00
22.00
21.00
20.00
19.00
18.00
17.00
04:32:40
04:32:50
04:33:00
04:33:10
04:33:20
04:33:30
04:33:40
04:33:50
04:34:00

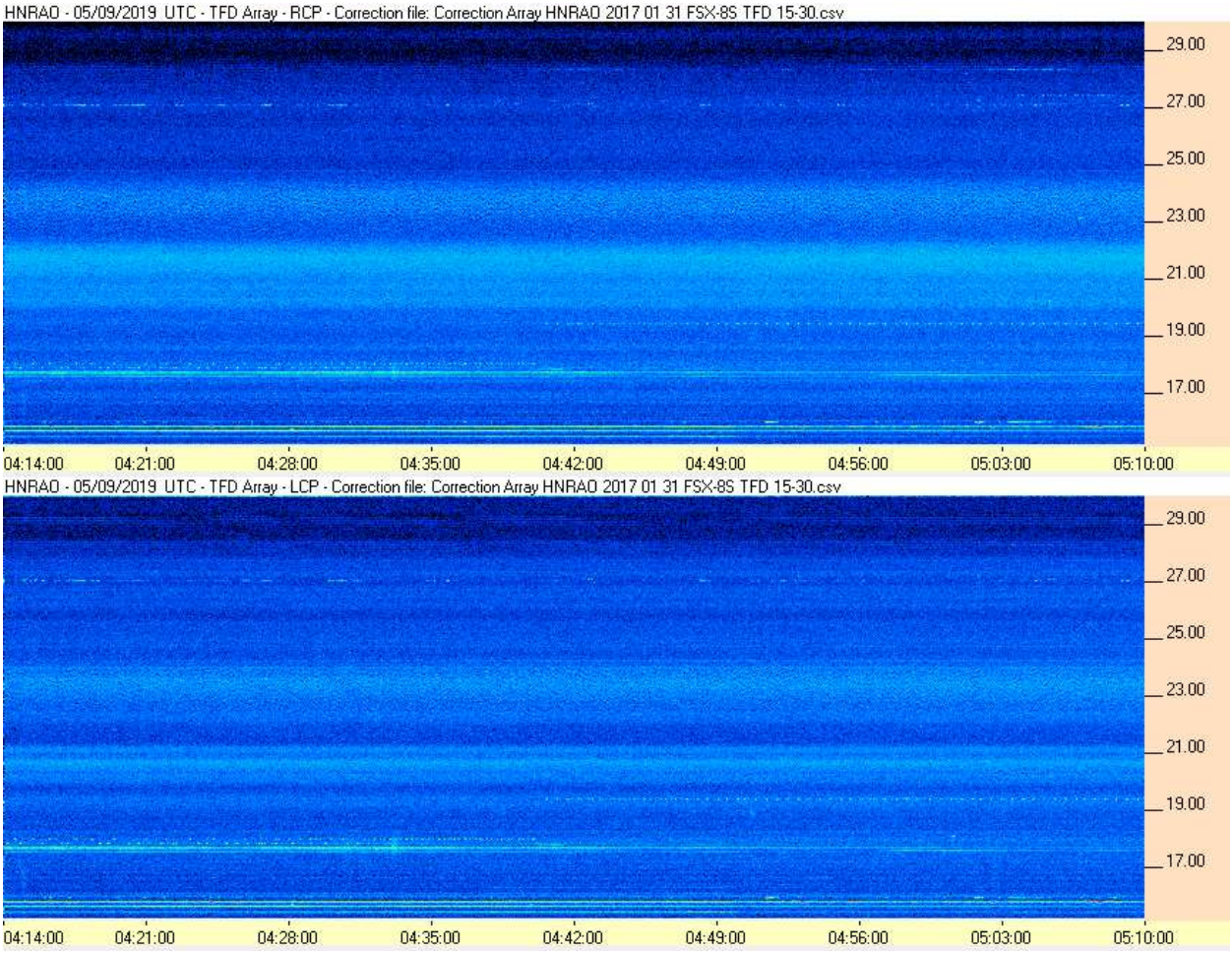

HNRAO - 05/09/2019 - UTC - TFD Array - LCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv
23.00
22.00
21.00
20.00
19.00
18.00
17.00
04:38:00
04:38:10
04:38:20
04:38:30
04:38:40
04:38:50
04:39:00
04:39:10
04:39:20

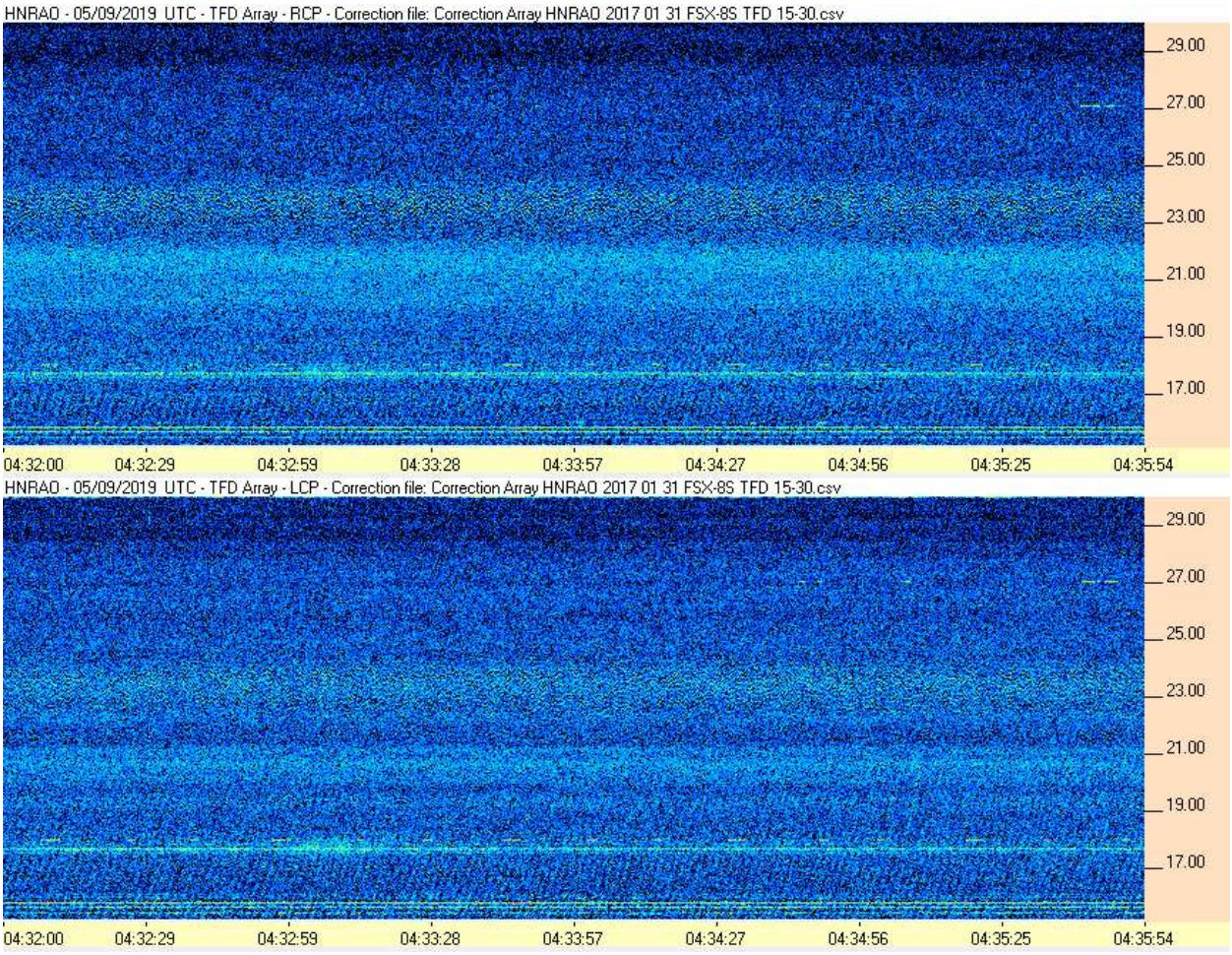

HNRAO - 05/09/2019 - UTC - TFD Array - LCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv
23.00
22.00
21.00
20.00
19.00
18.00
17.00
04:43:20
04:43:30
04:43:40
04:43:50
04:44:00
04:44:10
04:44:20
04:44:30
04:44:40


HNRAO - 05/09/2019 - UTC - TFD Array - LCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv
23.00
22.00
21.00
20.00
19.00
18.00
17.00
04:50:00
04:50:10
04:50:20
04:50:30
04:50:40
04:50:50
04:51:00
04:51:10
04:51:20


HNRAO - 05/09/2019 - UTC - TFD Array - LCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv
23.00
22.00
21.00
20.00
19.00
18.00
17.00
04:58:00
04:58:10
04:58:20
04:58:30
04:58:40
04:58:50
04:59:00
04:59:10
04:59:20

FSX-8S / TFD Array




HNRAO - 05/09/2019 UTC - TFD Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv
29.00
27.00
25.00
23.00
21.00
19.00
17.00
04:32:00
04:32:29
04:32:59
04:33:28
04:33:57
04:34:27
04:34:56
04:35:25
04:35:54
HNRAO - 05/09/2019 UTC - TFD Array - LCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv
29.00
27.00
25.00
23.00
21.00
19.00
17.00
04:32:00
04:32:29
04:32:59
04:33:28
04:33:57
04:34:27
04:34:56
04:35:25
04:35:54