HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq

Date: April 21, 2019

Object: Jupiter – Io-D

Observer: Unattended

Start - Time UT:	**1024**	**Planetary K-index:**	**1**
Jupiter Altitude (deg):	**23.6**	**Jupiter Azimuth (deg):**	**201.4**
Jupiter CML:	**116.1**	**Jupiter Io Phase:**	**092.64**
Jupiter RA (hr/min):	**17:34**	**Jupiter Dec (hr/min):**	**-22:41**
Hour Angle (hr/min):	**01:25**	**Polarization**	**LCP**
Sun Altitude (deg):	**-1.9**	**Sun Azimuth (deg):**	**073.5**
Sun RA (hr/min):	**01:48**	**Sun Dec (hr/min):**	**11:10**

End – Time UT:	**1045**	**De:**	**-2.8**
Jupiter Altitude (deg):	**22.0**	**Jupiter Azimuth (deg):**	**206.4**
Jupiter CML:	**129.3**	**Jupiter Io Phase**	**095.59**
Hour Angle (hr/min):	**01:46**	**Duration (min):**	**21**
Sun Altitude (deg):	**02.0**	**Sun Azimuth (deg):**	**076.9**
Max Frequency MHz	**19**	**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 2017-2018 season
TFD array phased @ 35 degrees for 2017-2018 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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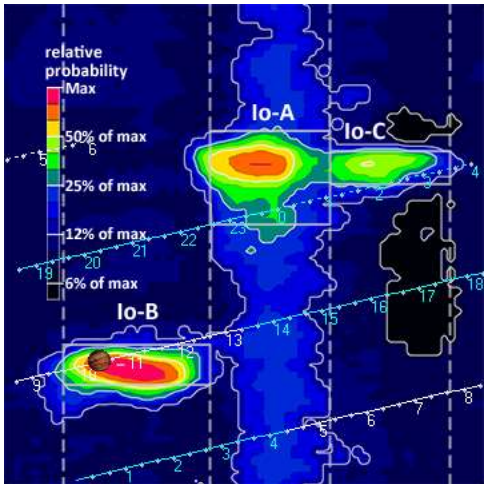
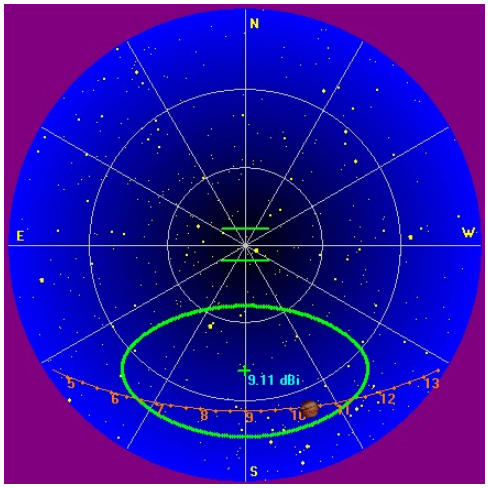
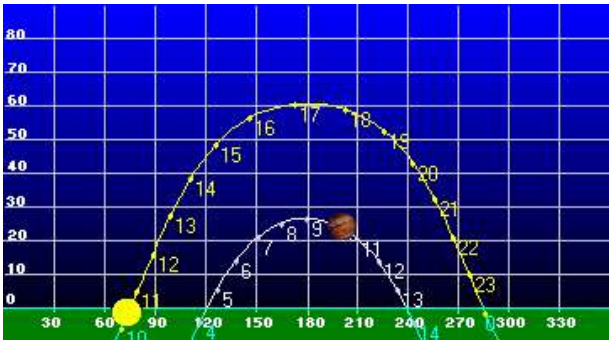




Beginning of Pass

End of Pass

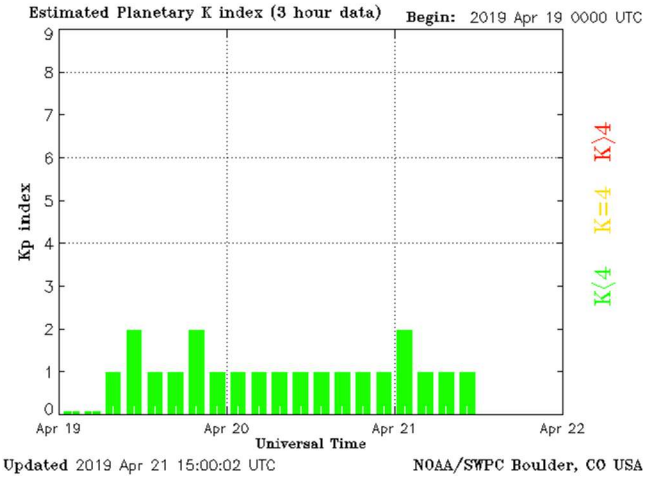


MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360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



All spectrographs and the Radio JOVE array were working. Both LCP spectrographs recorded data. Both the SDRPlay RSP2/TFD array and the FSX-8S/TFD array were able to collect data from this storm. The emissions never went above 19 MHz, so the Radio JOVE array did not record any data. The weather at the observatory was cloudy during this pass.

This Io-D storm seemed to be composed mostly of S-bursts with perhaps L-bursts in the background. It's difficult so say as the maximum resolution of the images don't provide clear evidence.

First signs of emission were at 16 MHz at 1024:11 UT, reached 19 MHz at 1036:21 UT, then dropped to 17.45 MHz at 1038:07 UT when no further emission was seen.

This was, for the most part, something I would describe as a continuous N-event. The event was split in half, in a mirror like appearance in the 1027 UT to 1031 UT portion.

There was an "undulating" appearance from 1025 UT to1039 UT. The first peak leading edge was at 1027:48 UT at 17.47 MHz rising to maximum of 18.77 MHz at 1028:29 UT, then returning to 17.45 MHz at 1028:58 UT. Changing approximately 1.3 MHz in 1 minute and 10 seconds. The middle peak(s) were not clearly defined enough to measure. However, the last peak was measurable. It started at 1035:25 UT at 17.83 degrees, rose to 19.0 MHz at 1036:21 UT, then dropped to 17.67 MHz at 1037:26 UT. This changed approximately 1.2 MHz in 2 seconds. *

There were no measurable modulation lanes.

EOR

* Measurements made with Radio-Sky Spectrograph version 2.9.0

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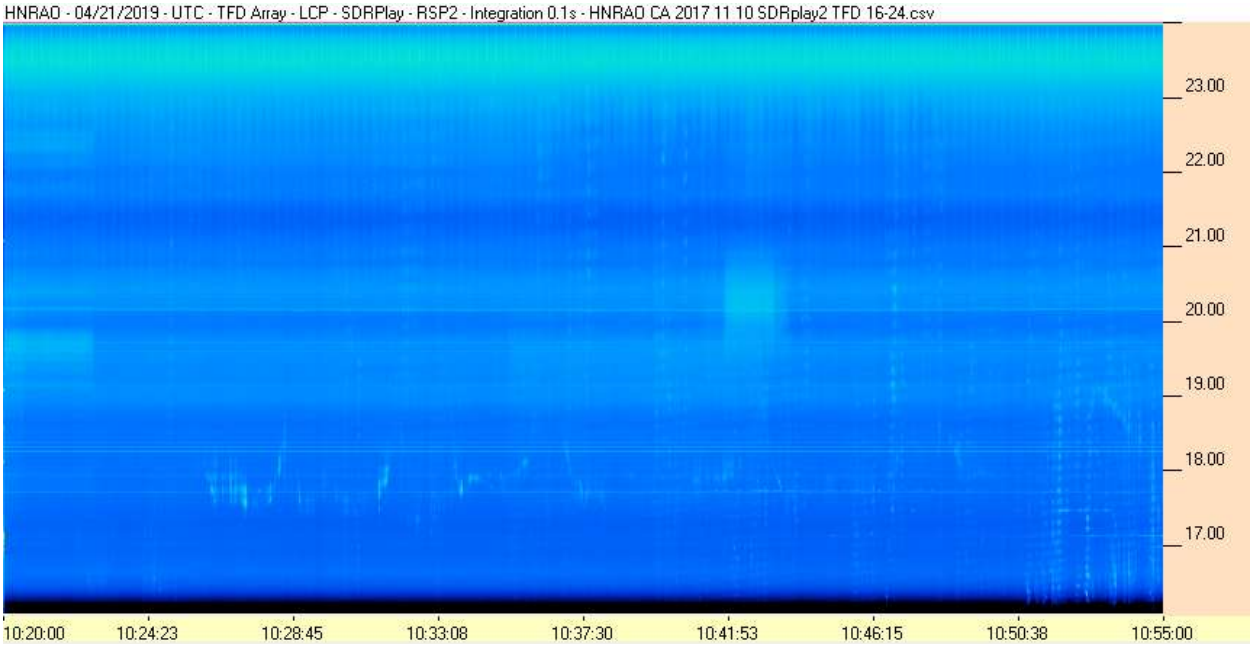
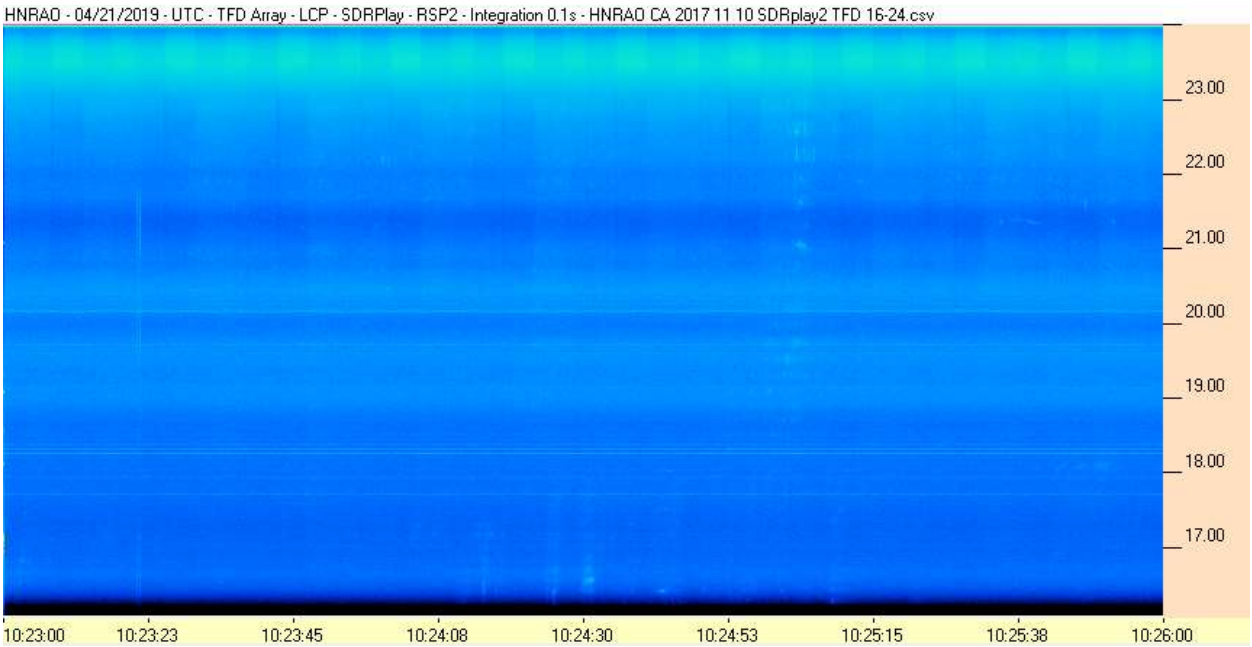
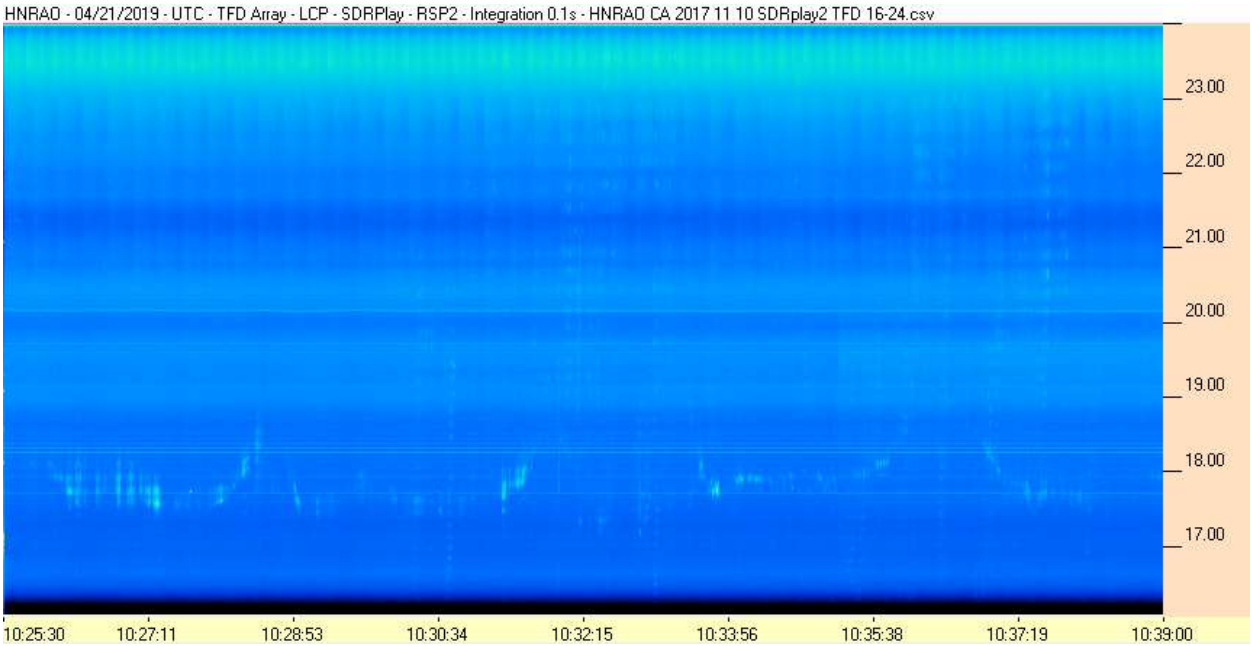
SDRPlay RSP2 / TFD Array



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10:30:34
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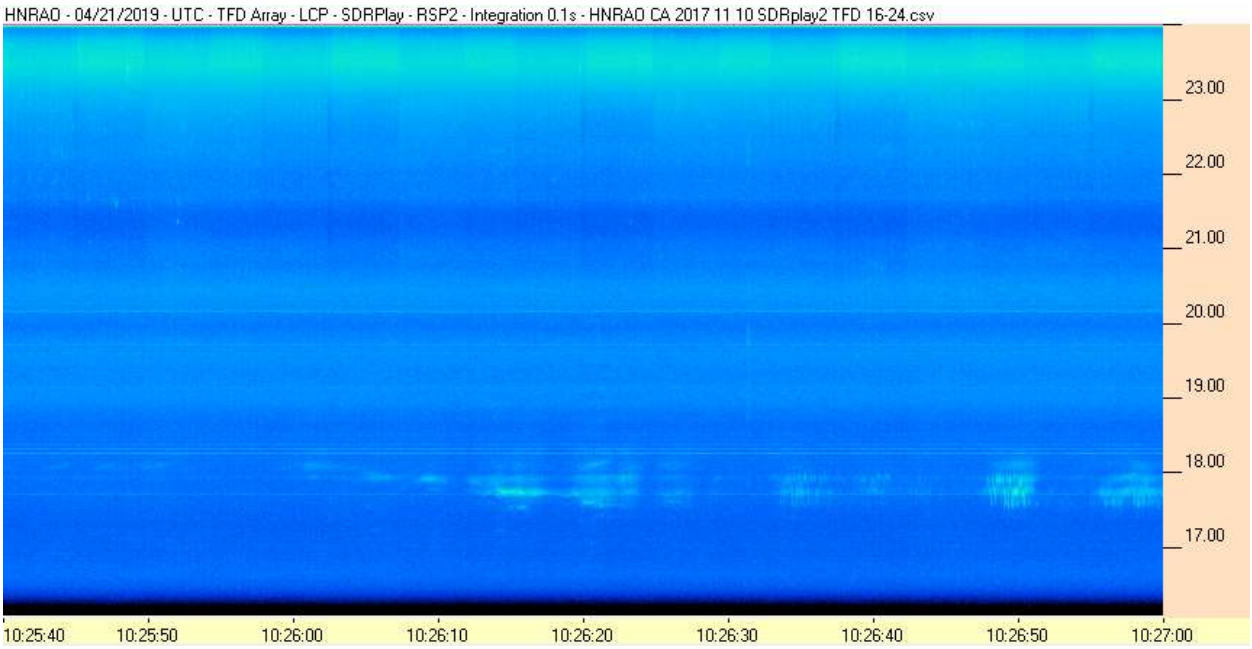
10:33:56
10:35:38
10:37:19
10:39:00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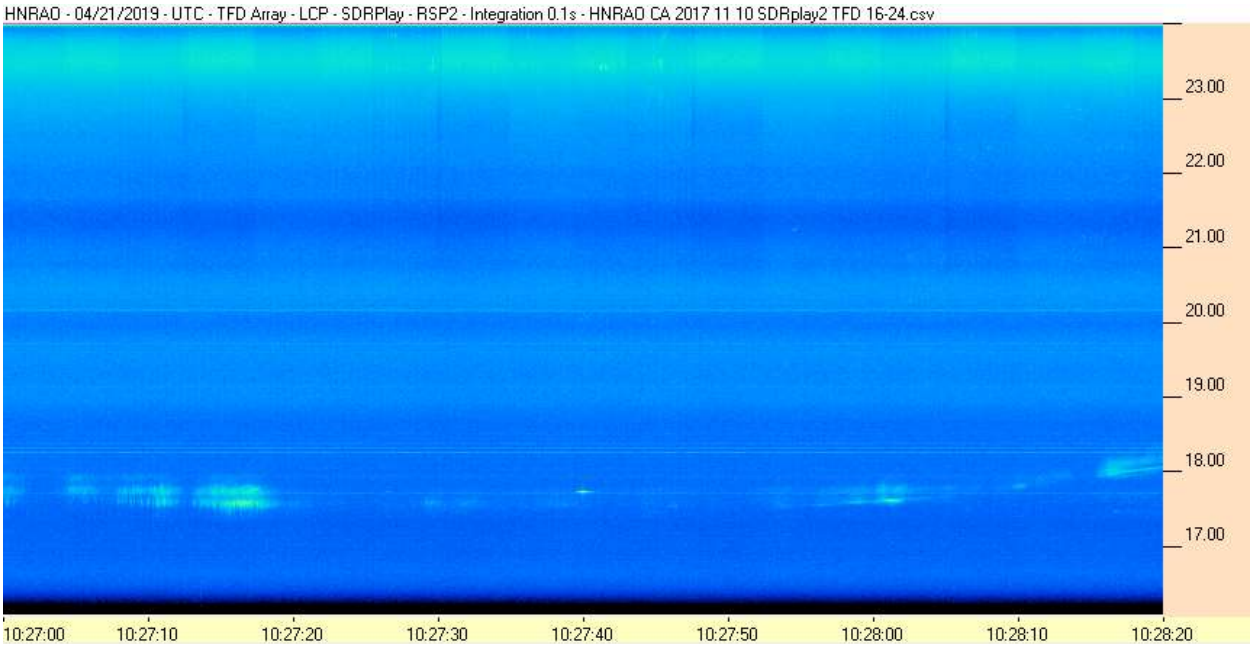
10:26:40
10:26:50
10:27:00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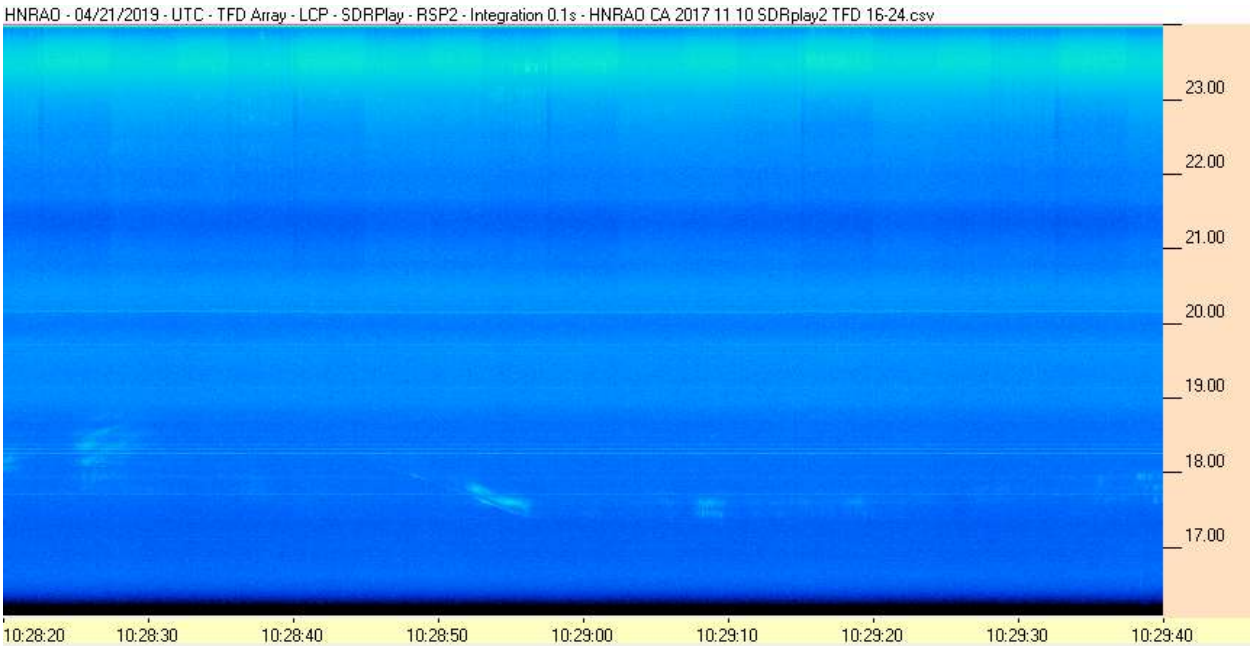
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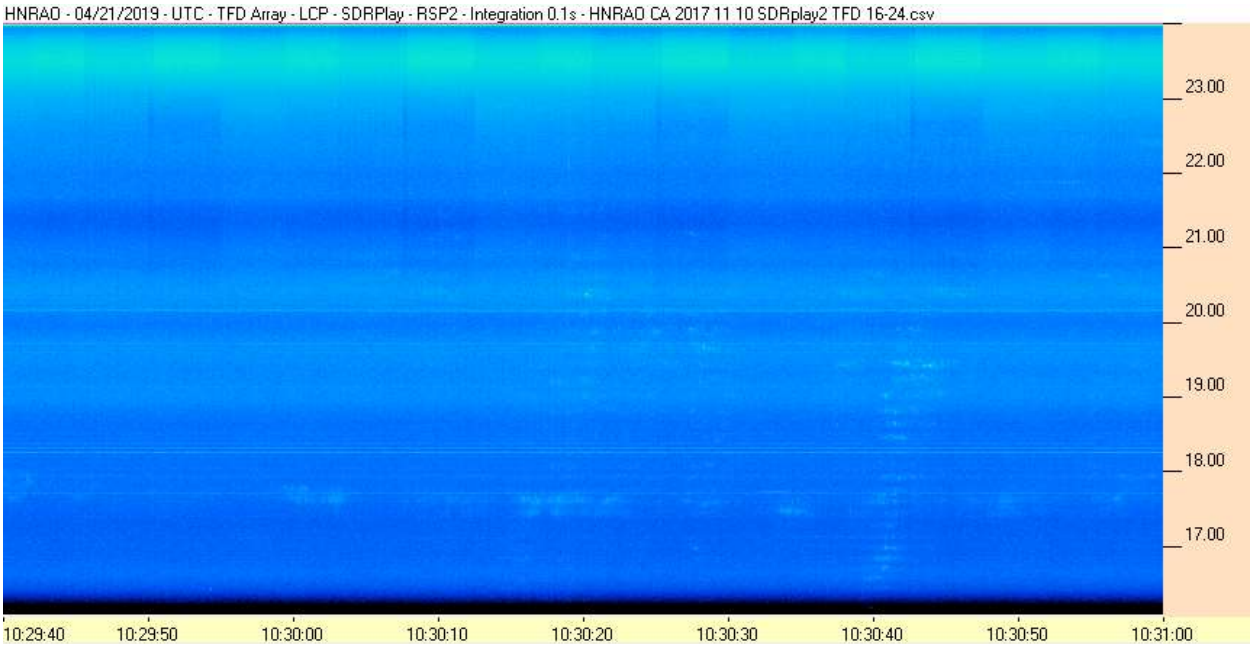
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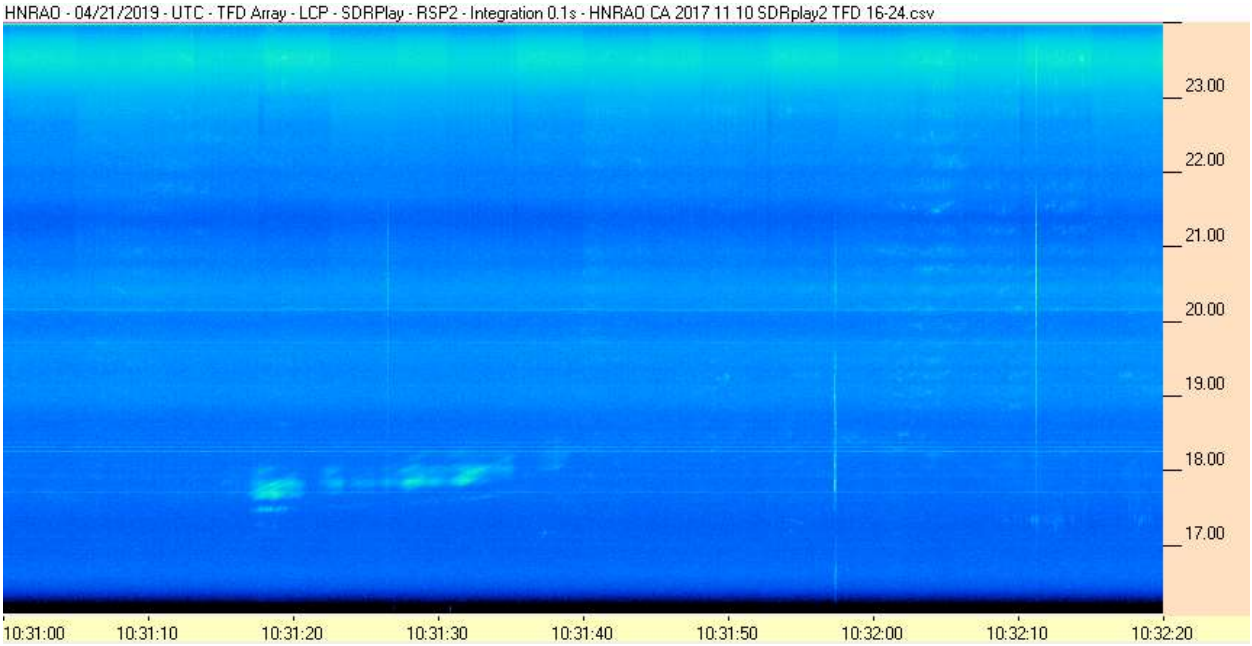
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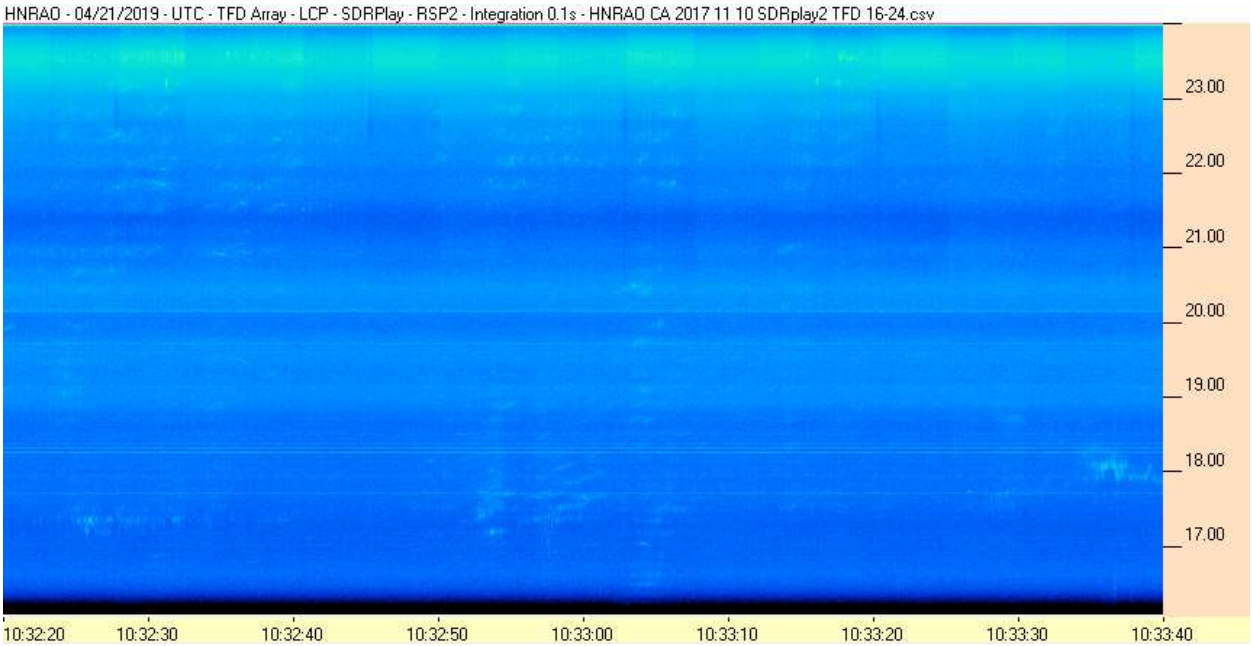
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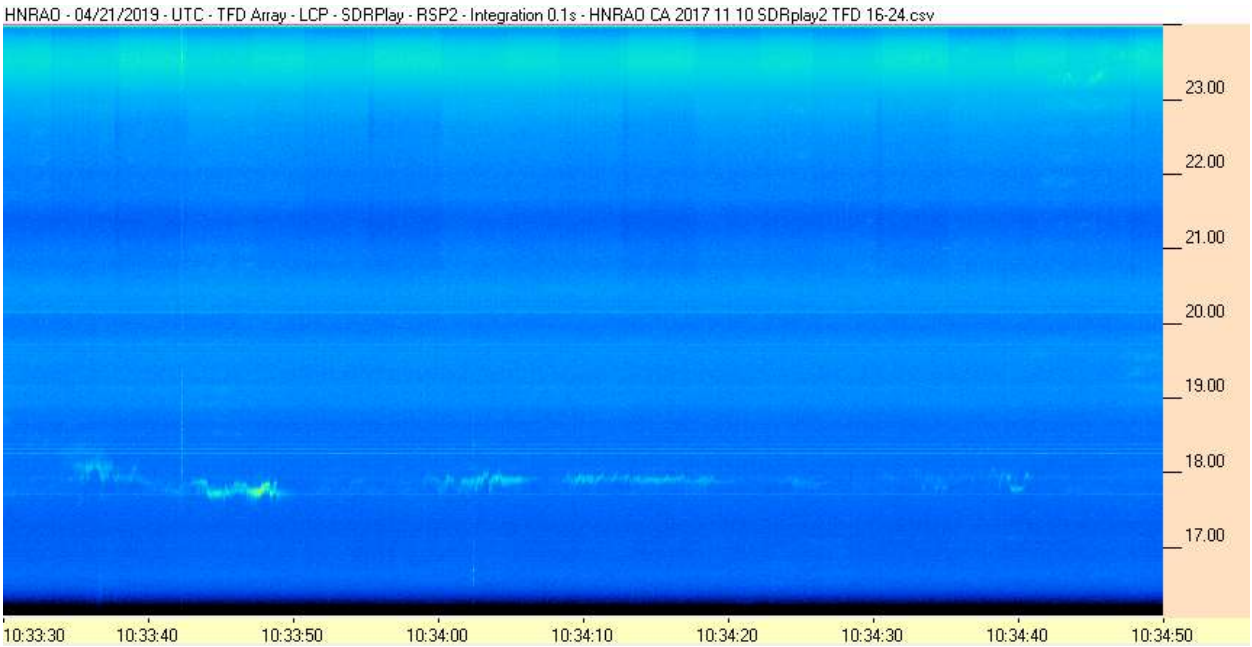
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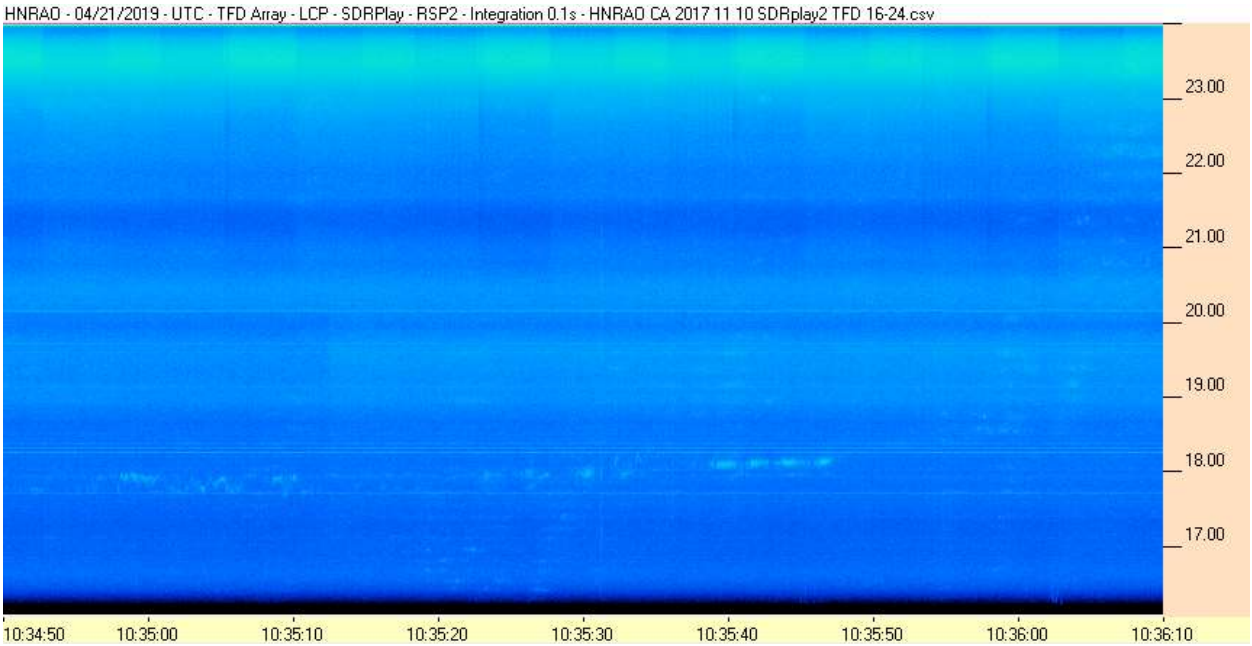
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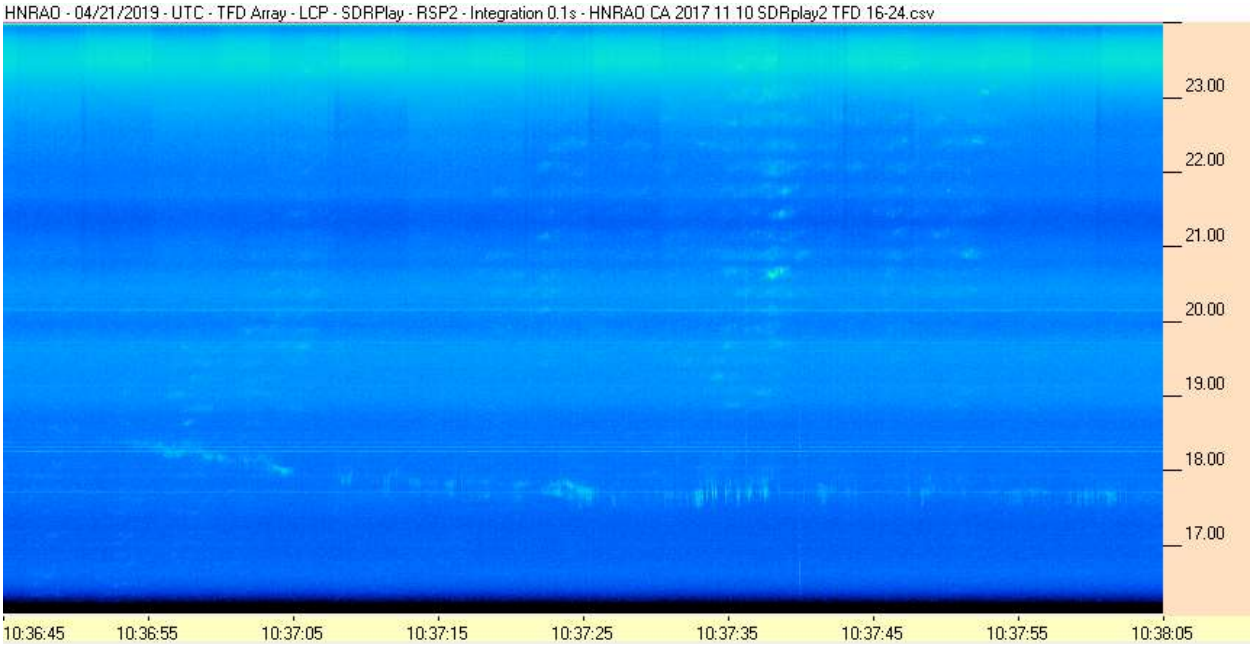
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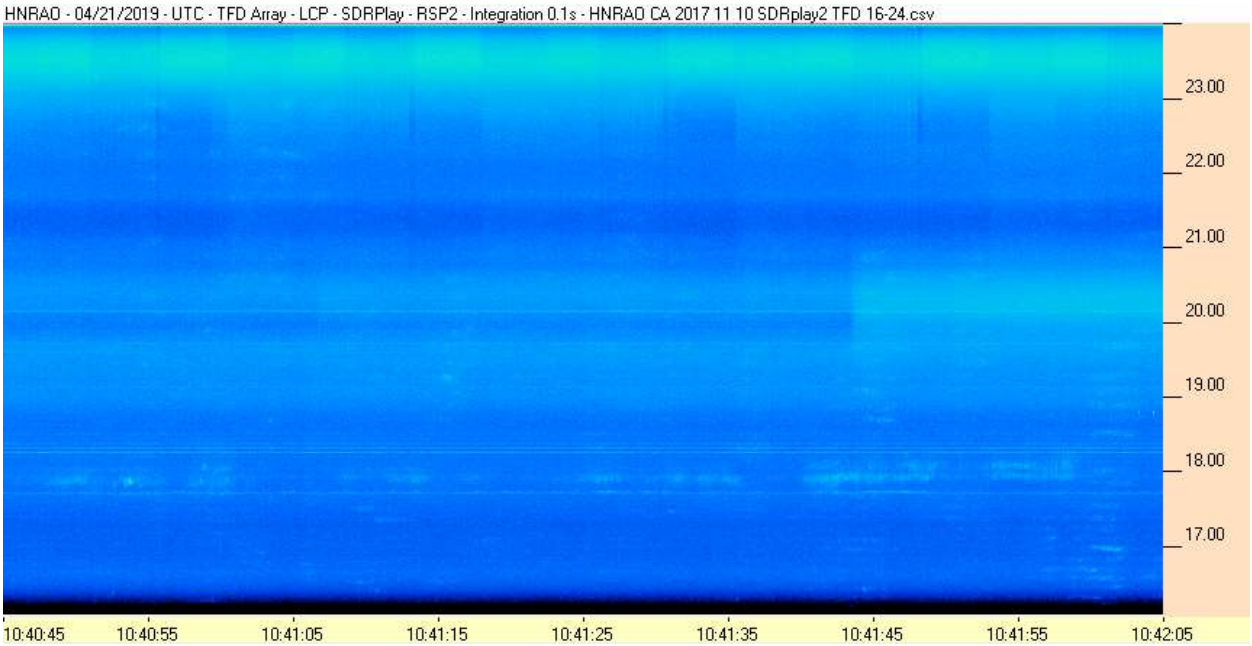
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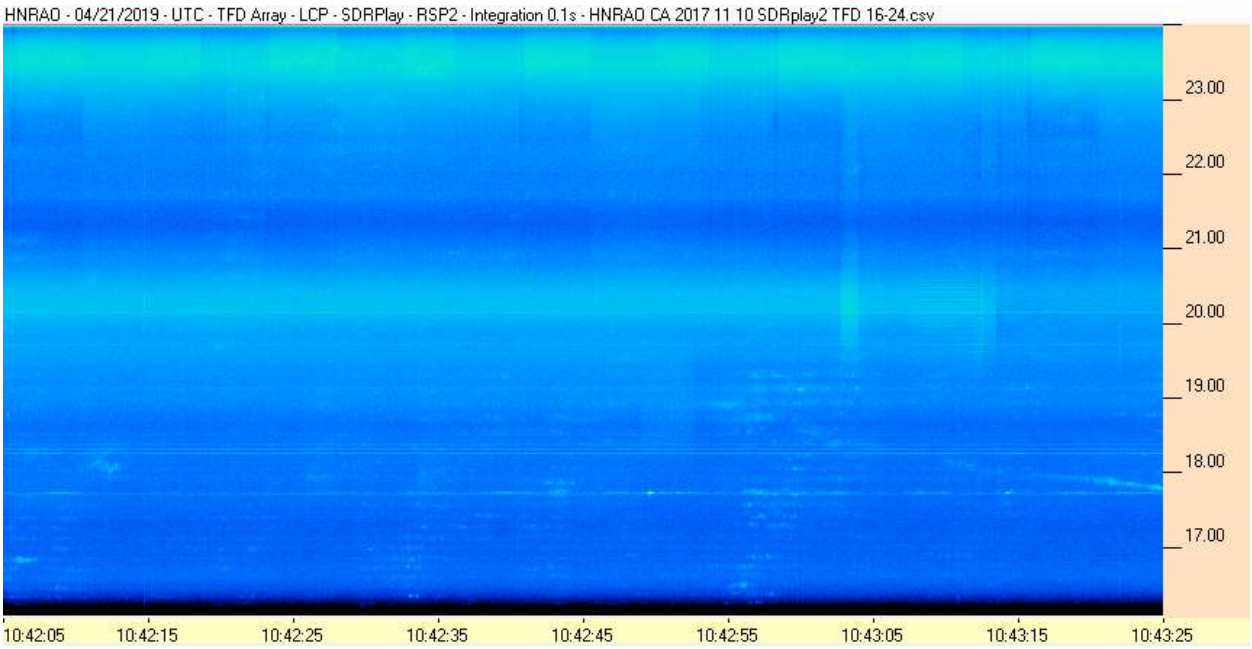
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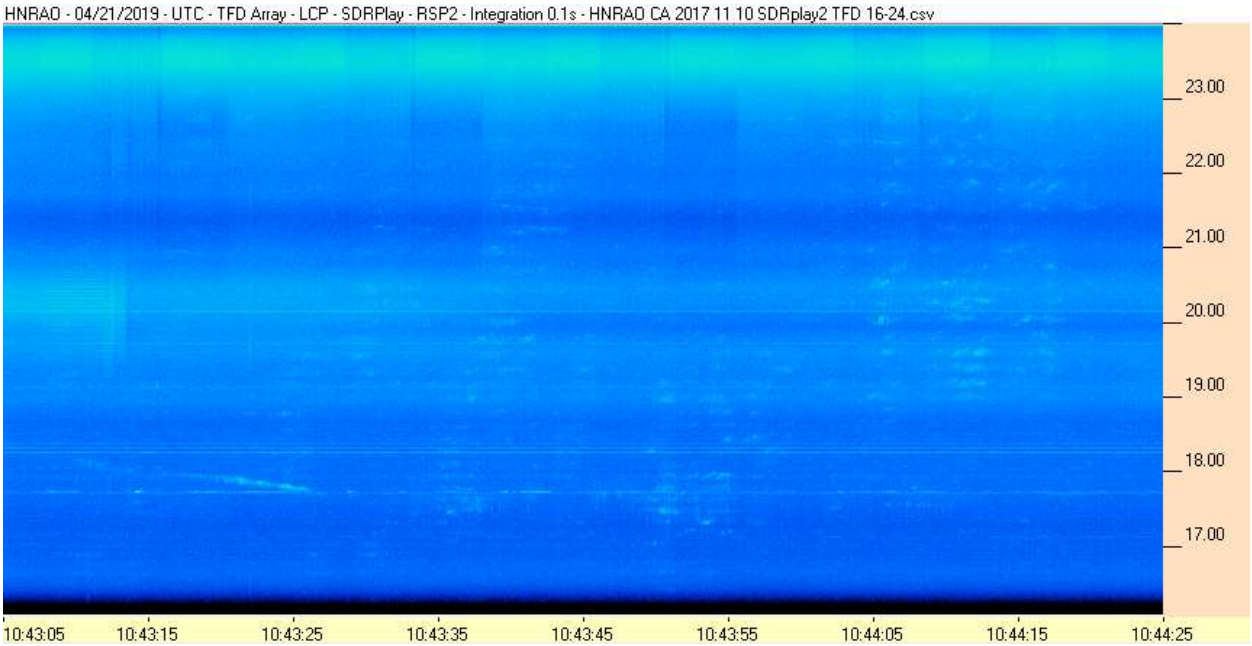
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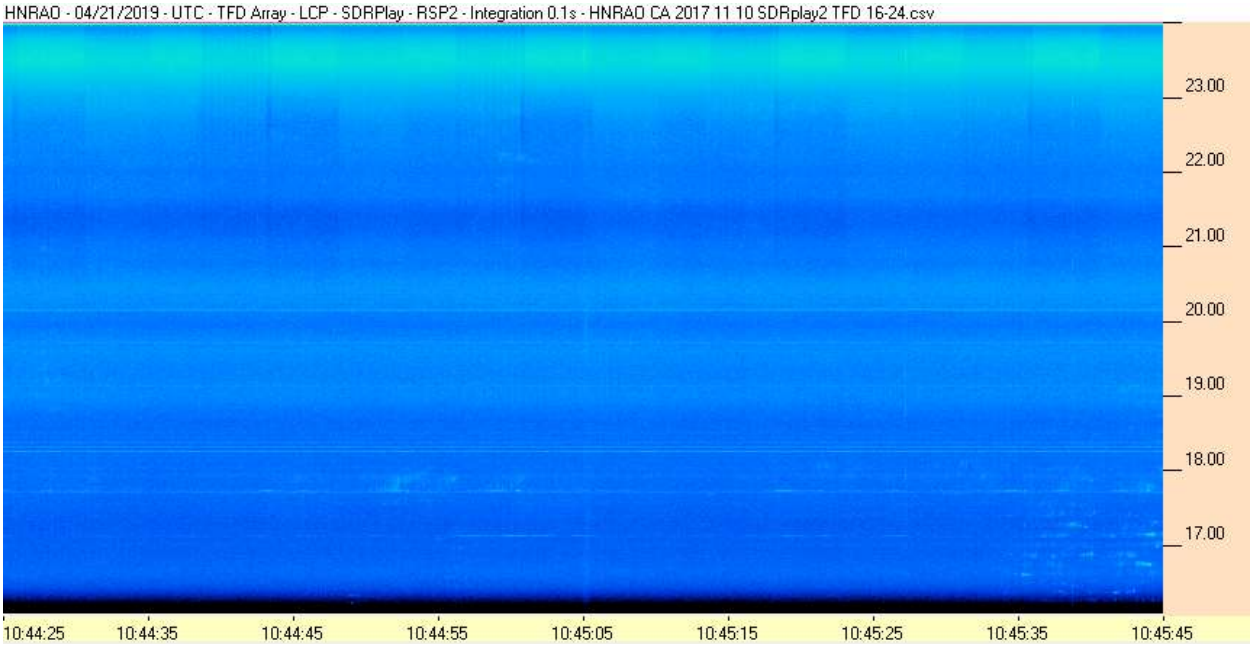
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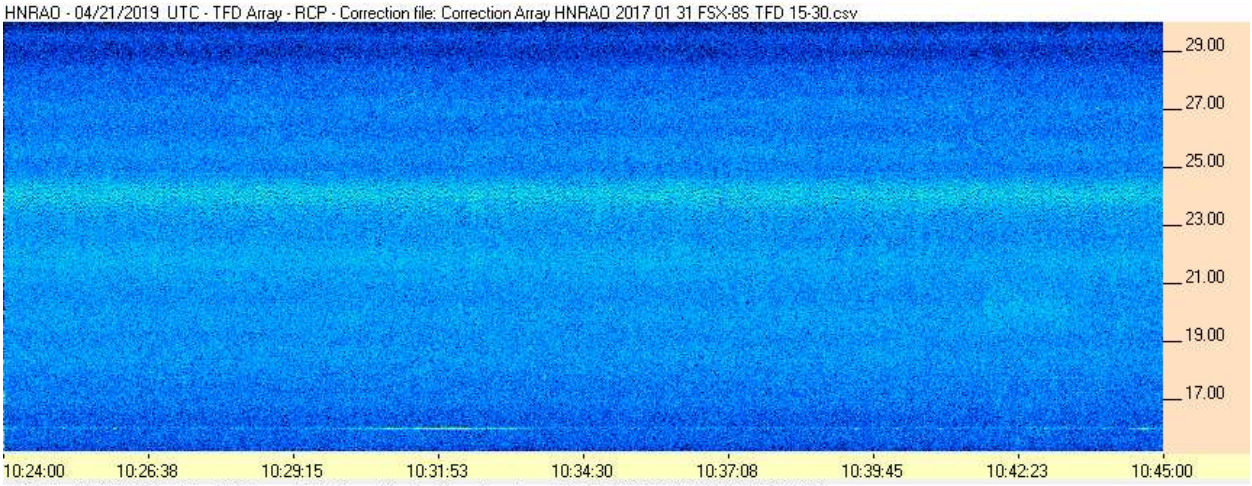
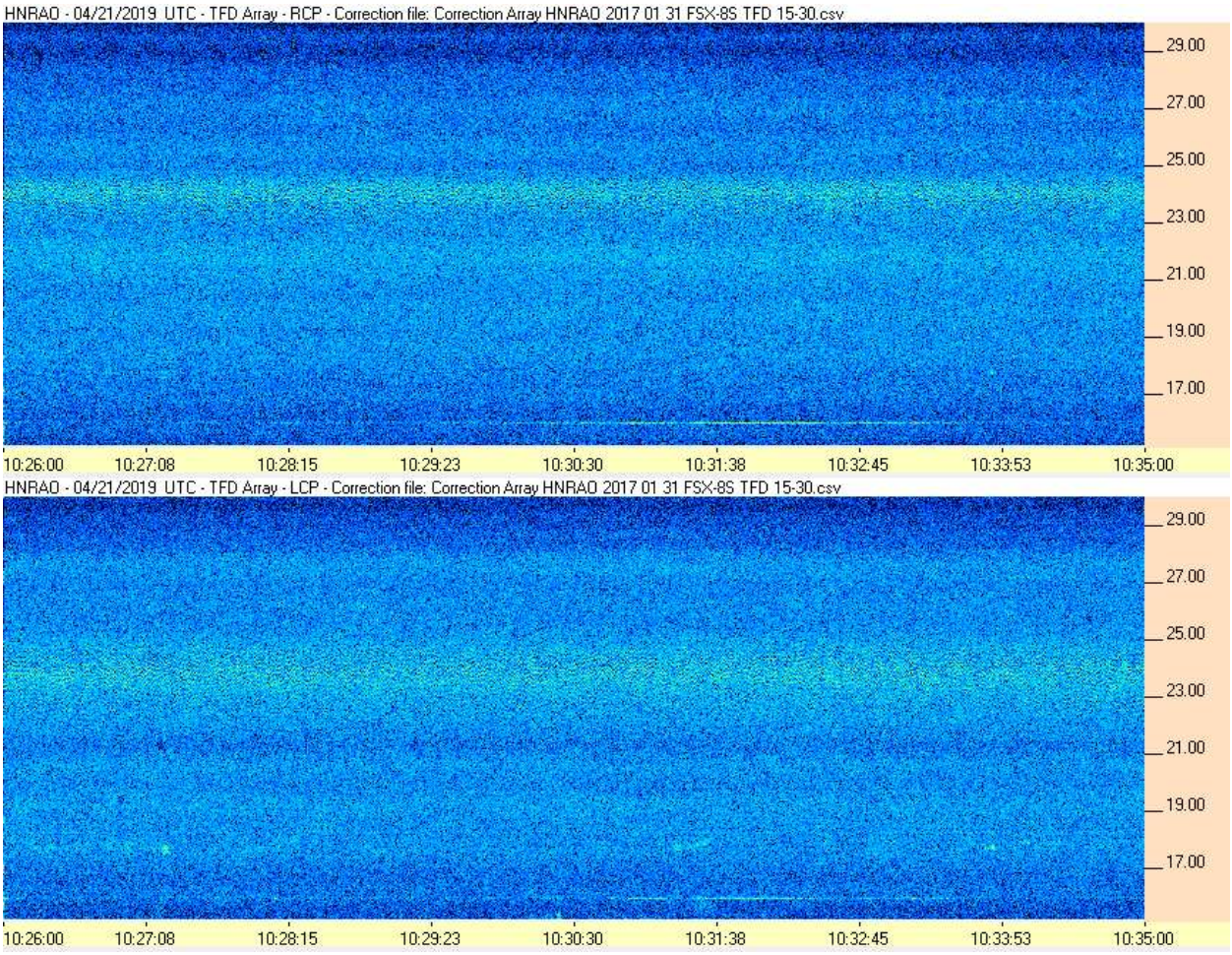
FSX-8S / TFD Array

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HNRAO - 04/21/2019 UTC - TFD Array - LCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv
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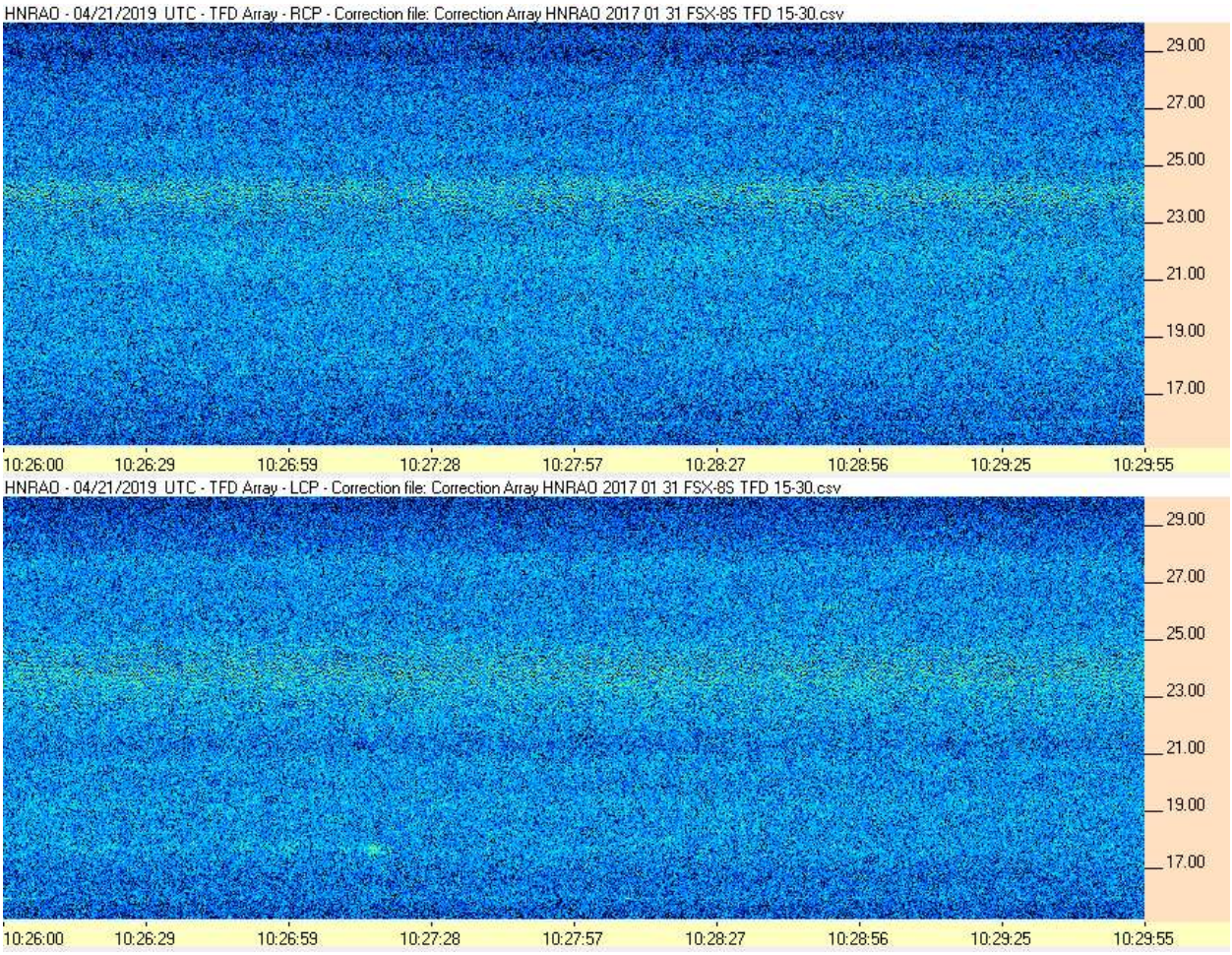
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HNRAO - 04/21/2019 UTC - TFD Array - LCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv
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