HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq

Date: July 10, 2020

Object: Jupiter – Io-B

Observer: Unattended

Start - Time UT:	**0657:56**	**Planetary K-index:**	**2**
Jupiter Altitude (deg):	**25.3**	**Jupiter Azimuth (deg):**	**198.4**
Jupiter CML:	**144.95**	**Jupiter Io Phase:**	**071.61**
Jupiter RA (hr/min):	**19:39**	**Jupiter Dec (hr/min):**	**-21:49**
Hour Angle (hr/min):	**01:12**	**Polarization**	**RCP**
Sun Altitude (deg):	**-22.9**	**Sun Azimuth (deg):**	**024.8**
Sun RA (hr/min):	**07:12**	**Sun Dec (hr/min):**	**22:25**

End – Time UT:	**0728**		
Jupiter Altitude (deg):	**23.2**	**Jupiter Azimuth (deg):**	**205.7**
Jupiter CML:	**163.13**	**Jupiter Io Phase**	**075.85**
Hour Angle (hr/min):	**01:42**	**Duration (min):**	**30**
Sun Altitude (deg):	**-20.2**	**Sun Azimuth (deg):**	**031.7**
Max Frequency MHz	**19.5**	**Min Frequency MHz**	**16**
J/S Angular Separation	**173.4**	**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.

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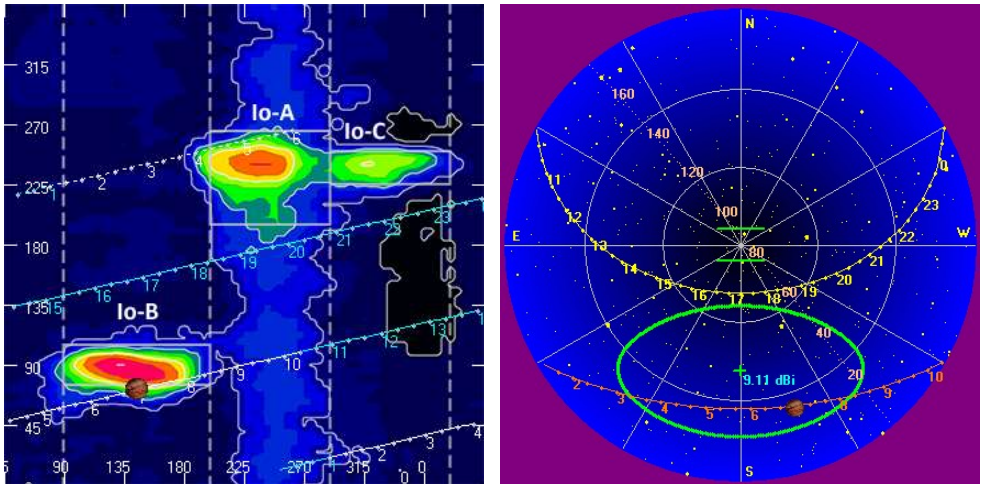
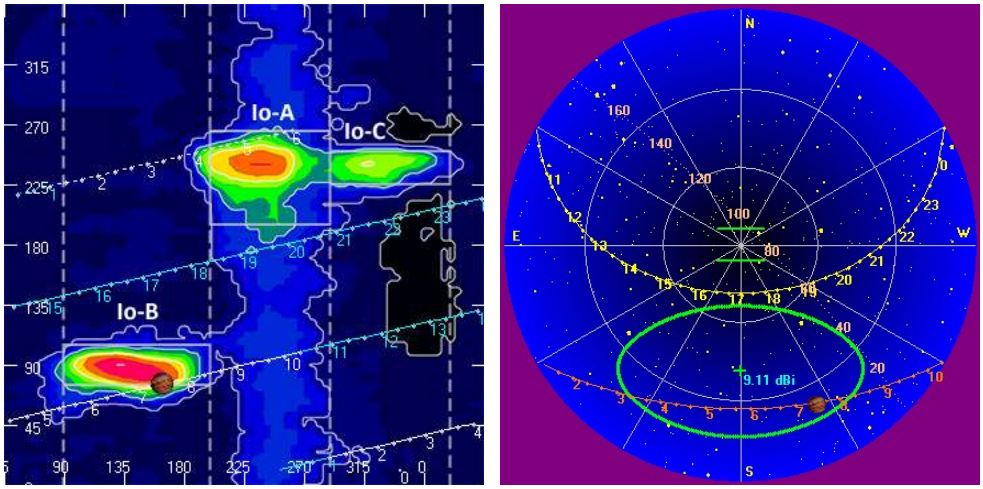


Beginning of Pass



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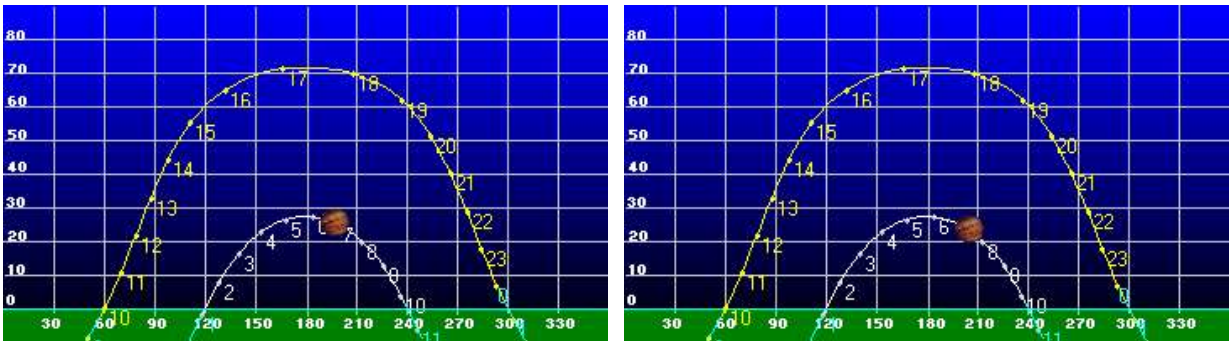
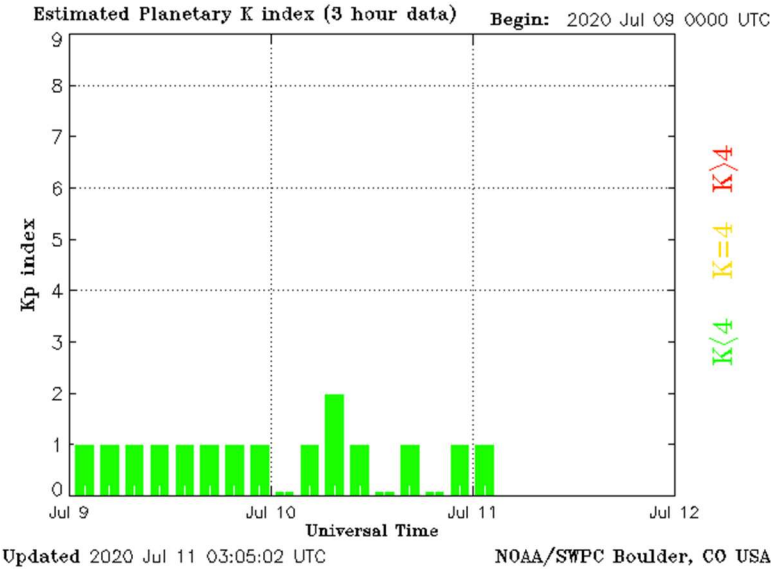


MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360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



This was a brief but very energetic Io-B emission group. RCP S-bursts throughout the period of activity. Early signs of activity were at 18 MHz. These S-bursts were in the form of undulating lines slightly above the GB. With no build up in intensity, these S-bursts suddenly rose in intensity to many times the GB and at times reached saturation of the receiver. These emissions had extraordinarily little deviation in bandwidth, about 5 kHz, during the most intense period of activity from 0659:42 UT and 0701:24 UT. There was apparent scintillation fading from 0702:26 UT until the start of another strong group at 0703:12 UT. This was the pattern for the remainder of this activity. Brief periods of S-burst N-event activity spaced with fading emissions below the GB. At 0708:36 UT the N-event activity became blended with a flurry of S-bursts spanning 3 MHz, from 16 MHz to 19 MHz. There were modulation lanes intermixed with the S-bursts here and it's difficult to determine if they are L2 or S2 modulation lanes. This flurry of S-burst activity began at 0709 UT and continued unit about 0710:10 UT when it faded to, or below, the GB. For the remainder of this activity, there were only small clusters of very weak S-bursts that rose to slightly above the GB to fade below the GB.

Radio Sky Spectrograph software on the FSX-8S spectrograph had shut down on it's own sometime before the activity so there is no record with that spectrograph.

It's difficult to remember an N-event this well defined and intense in the past few years. This would be a classic example of such an event.

EOR

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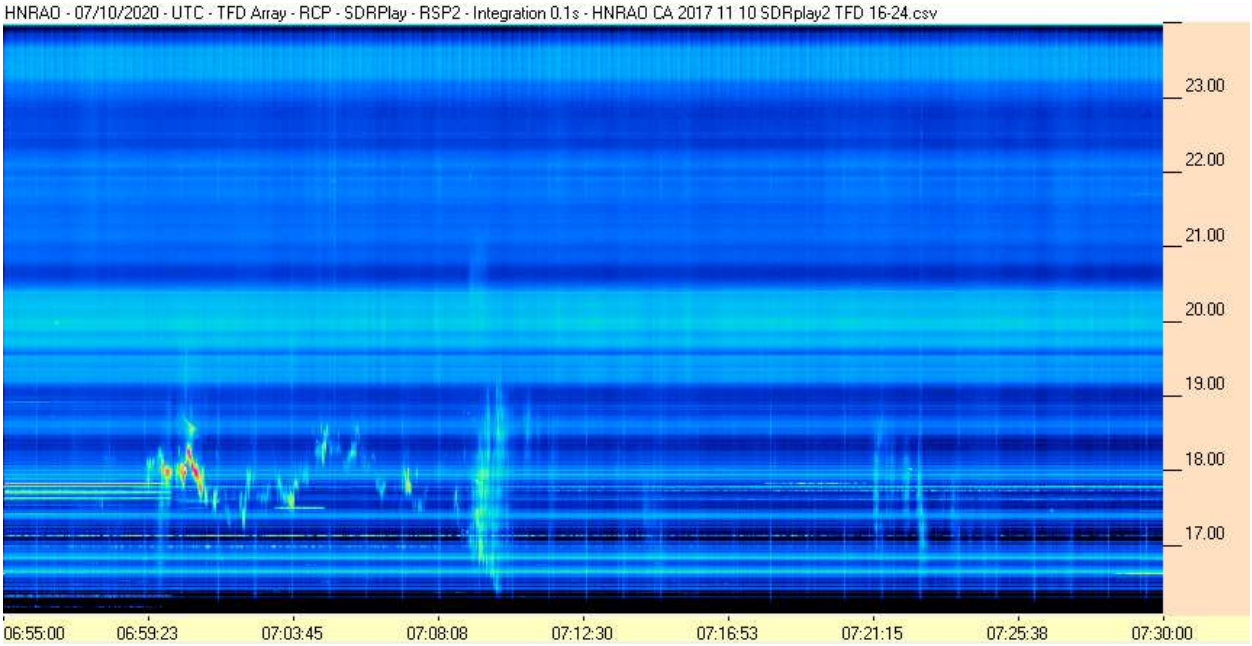
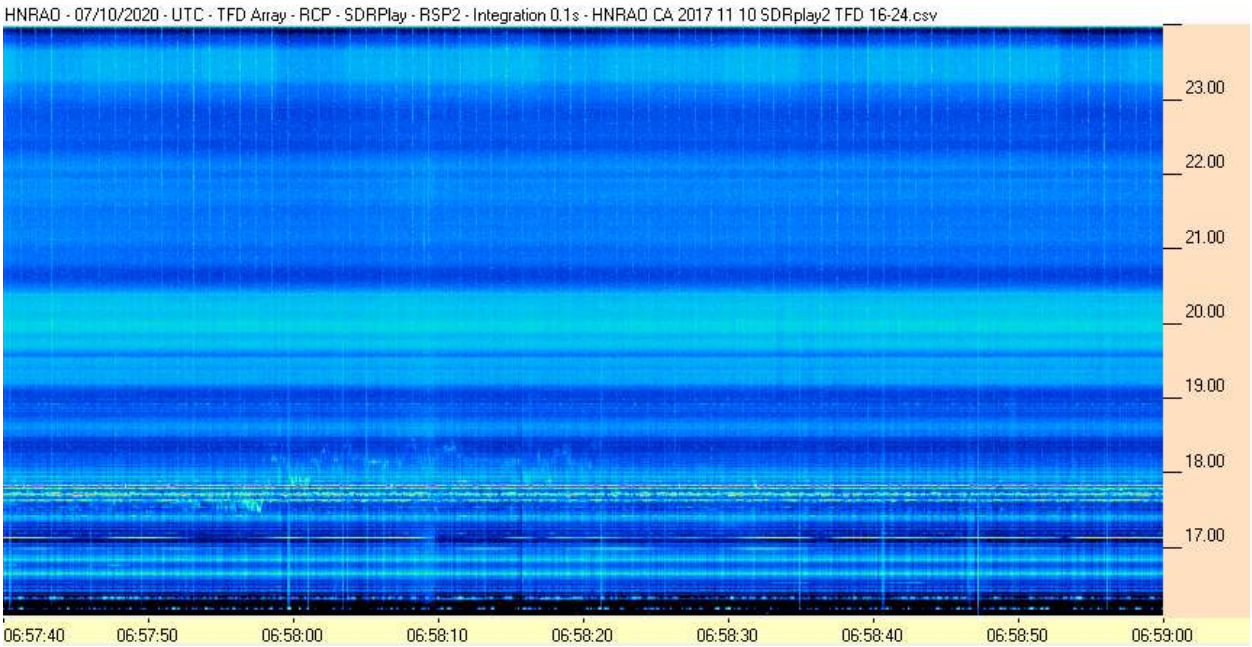
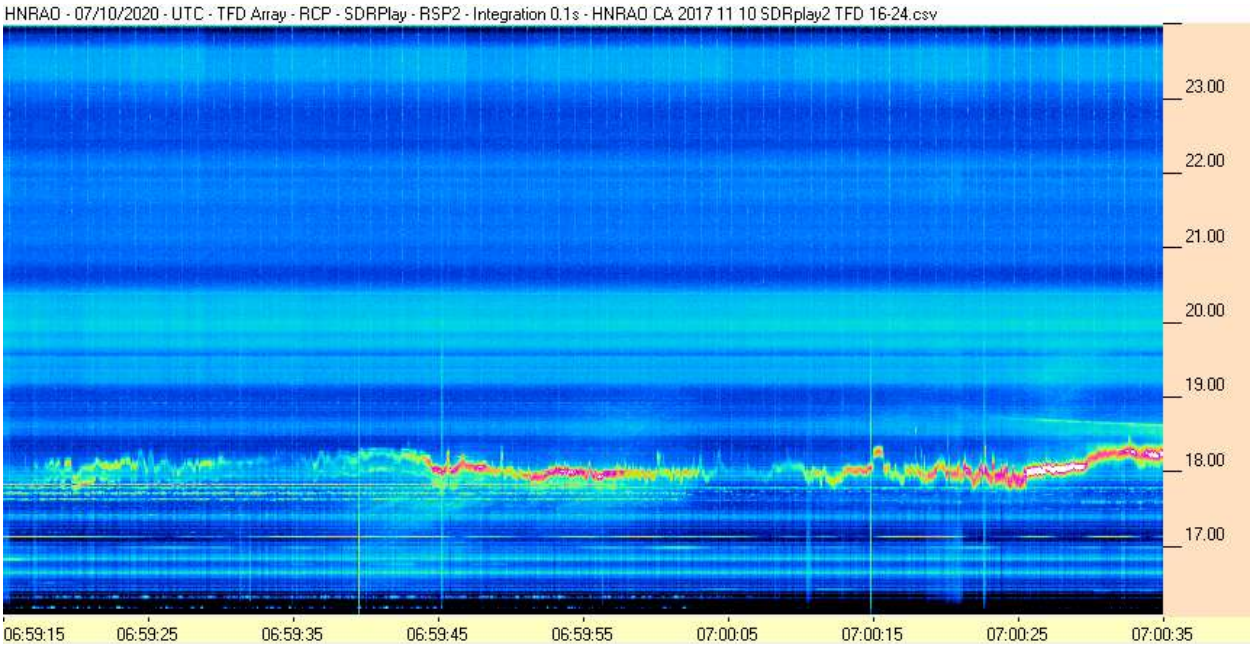
SDRPlay RSP2/RCP – TFD Array



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06:59:35
06:59:45
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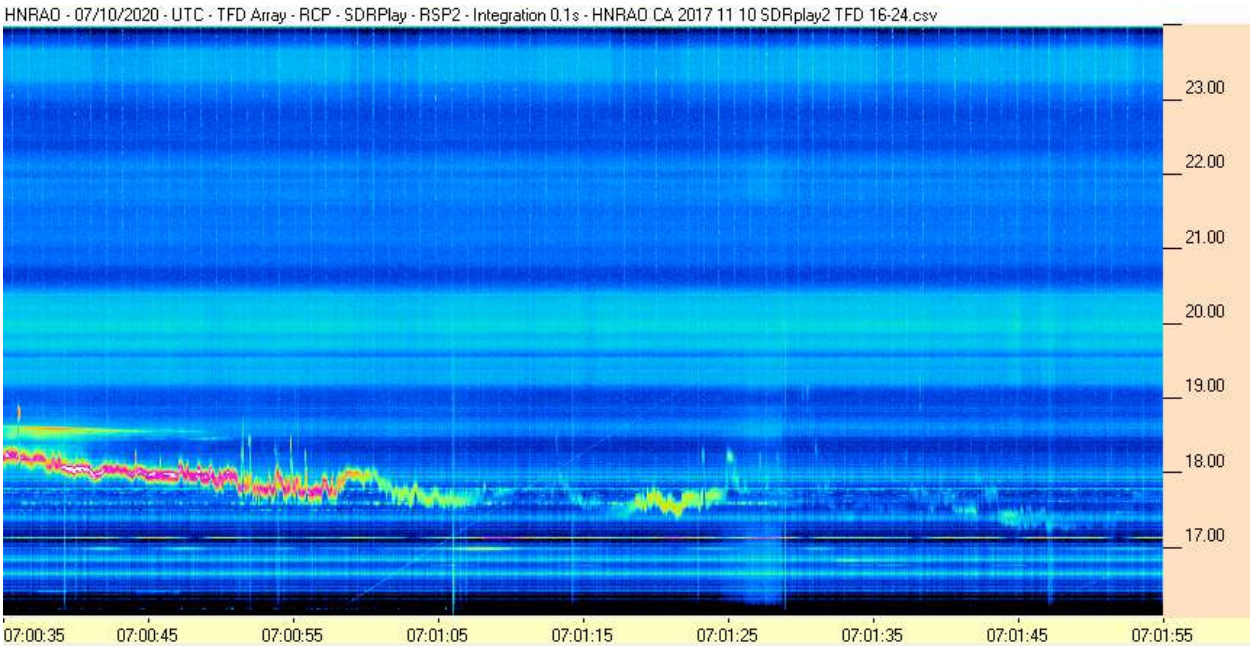
07:00:35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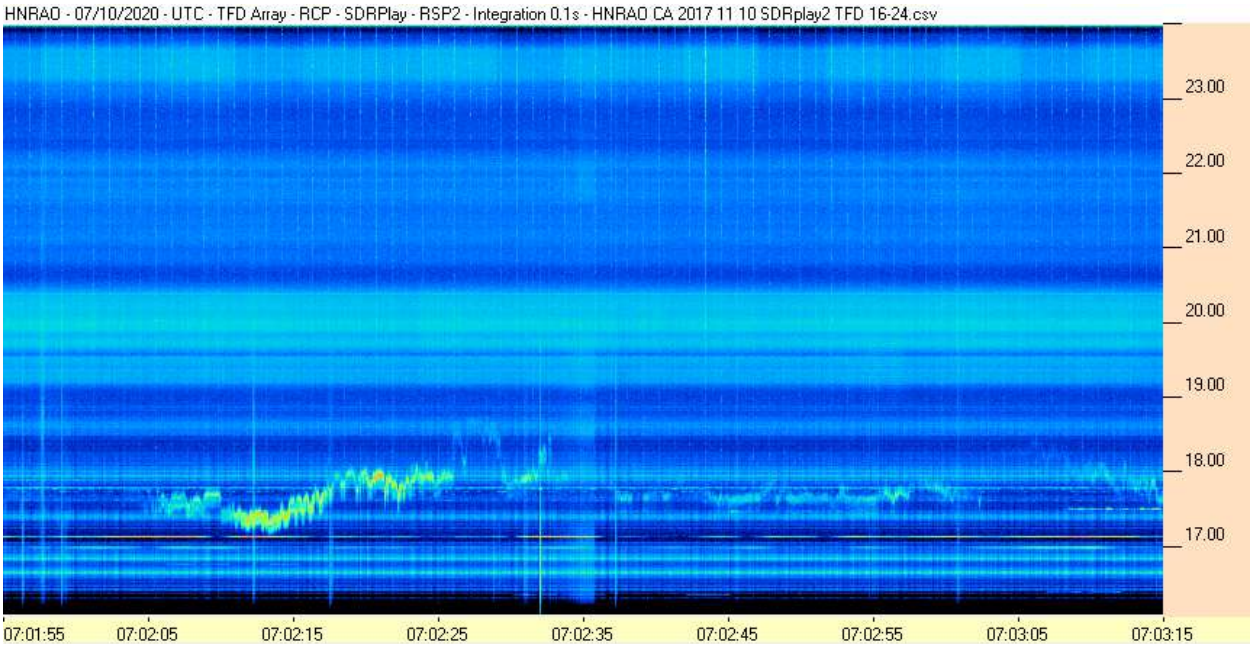
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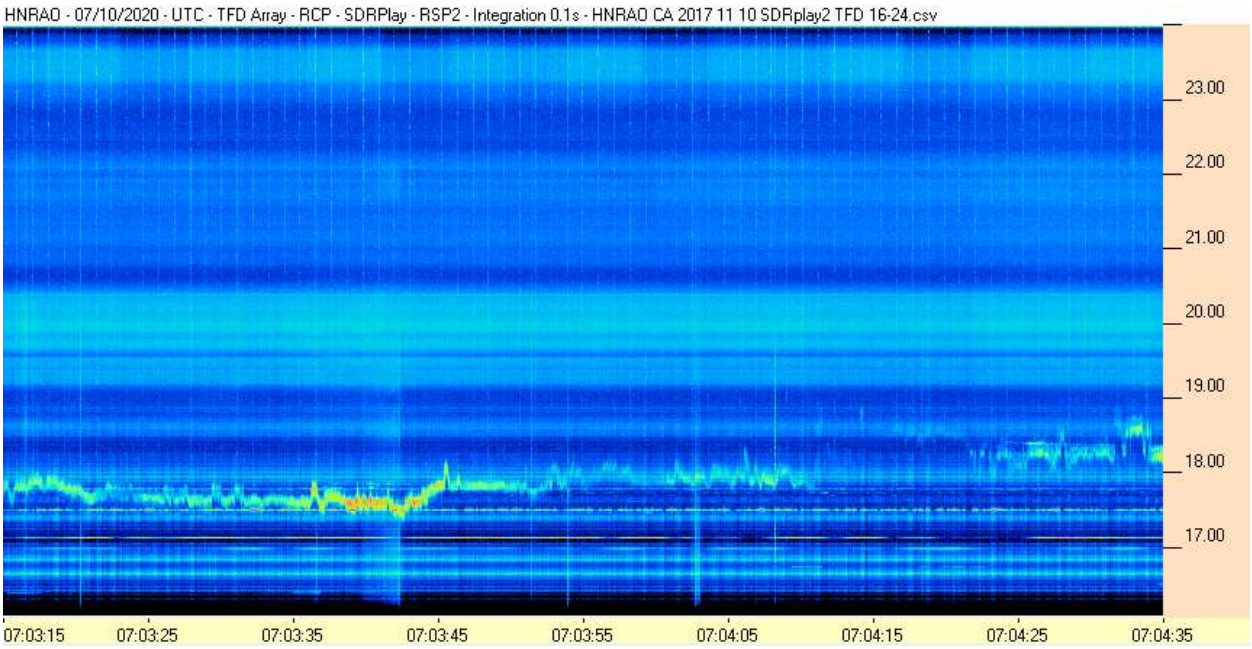
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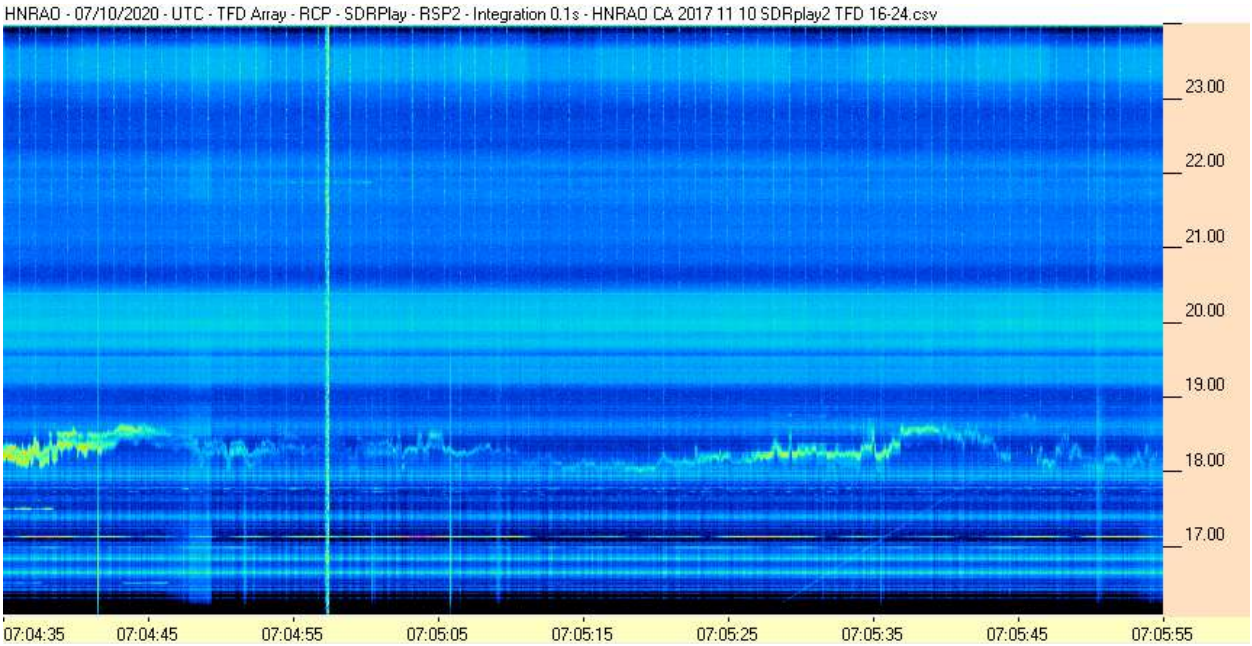
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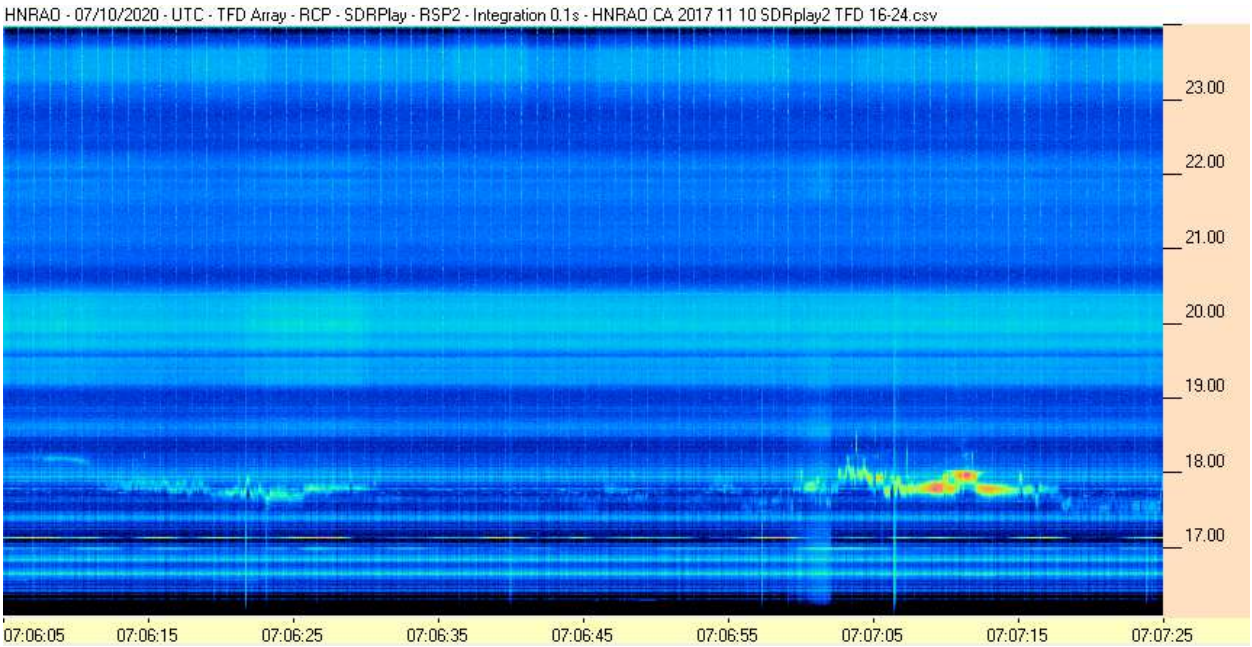
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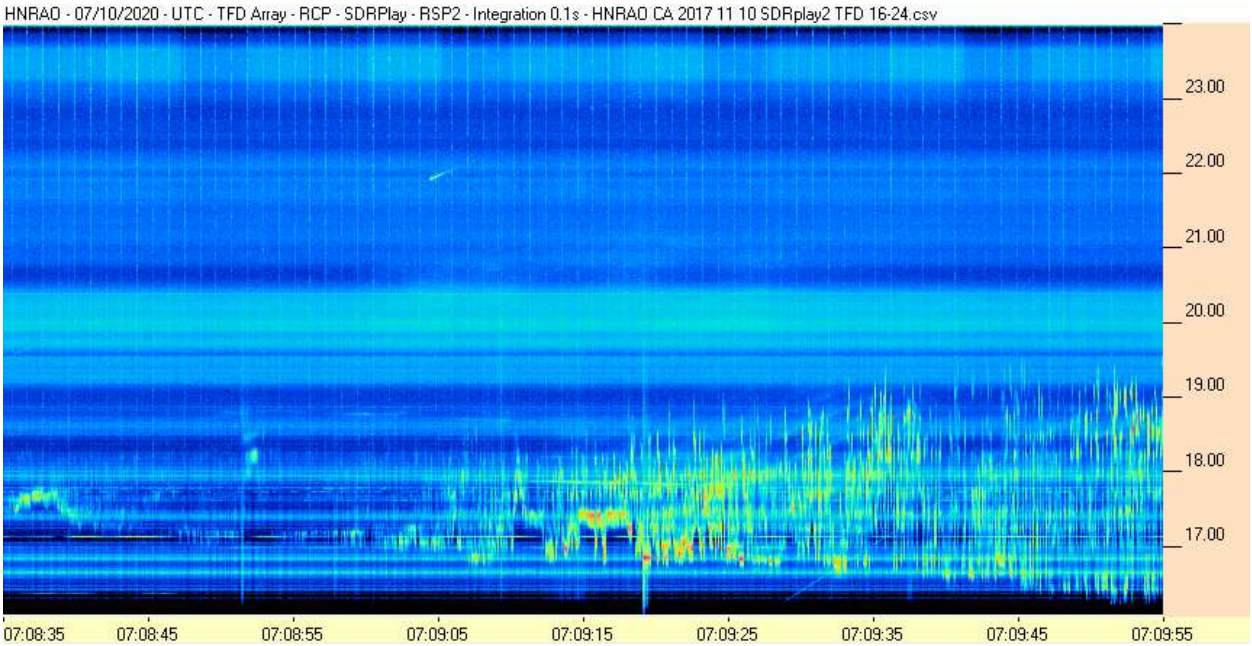
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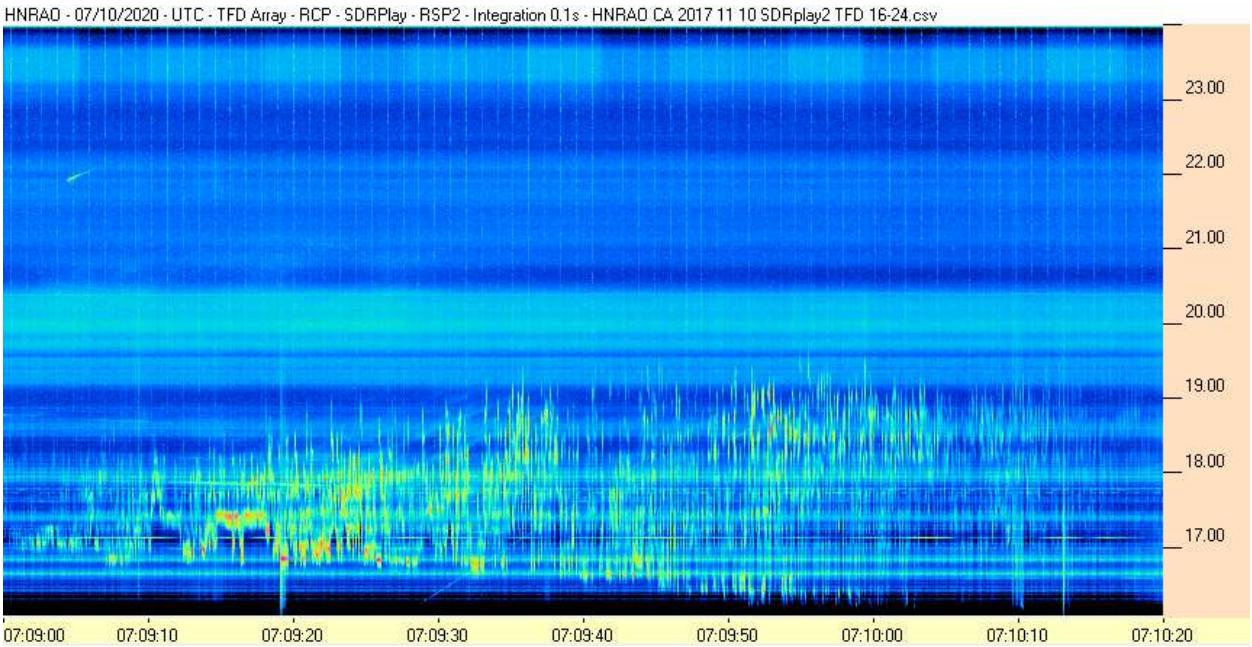
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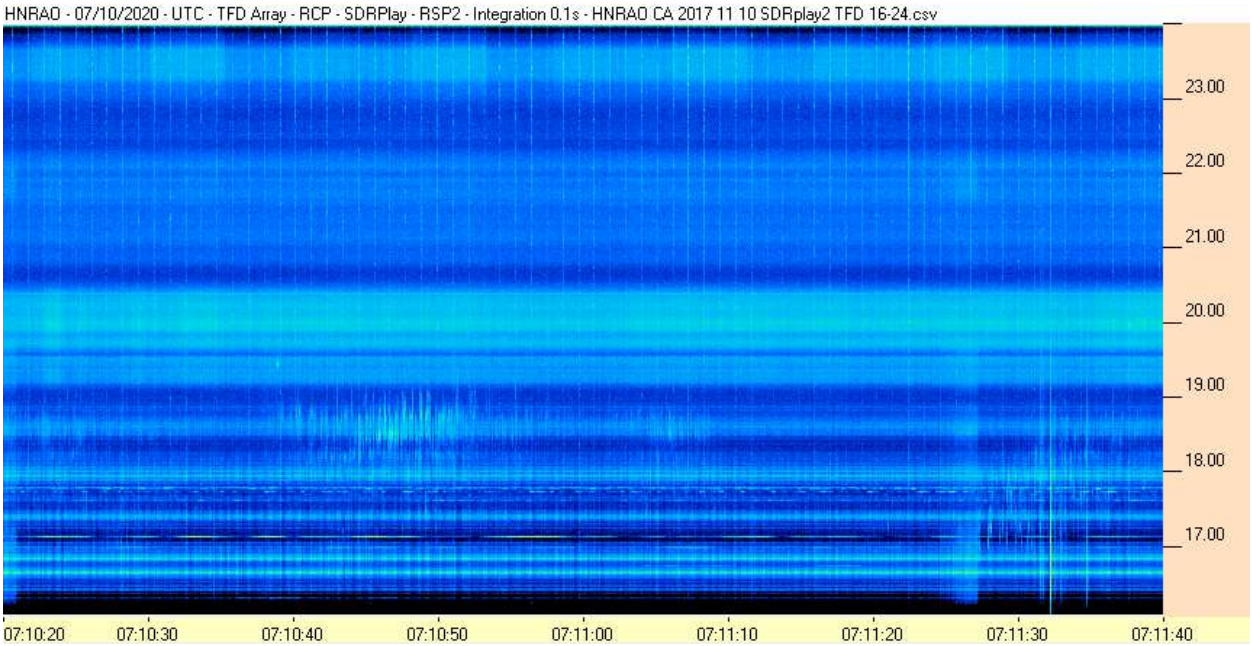
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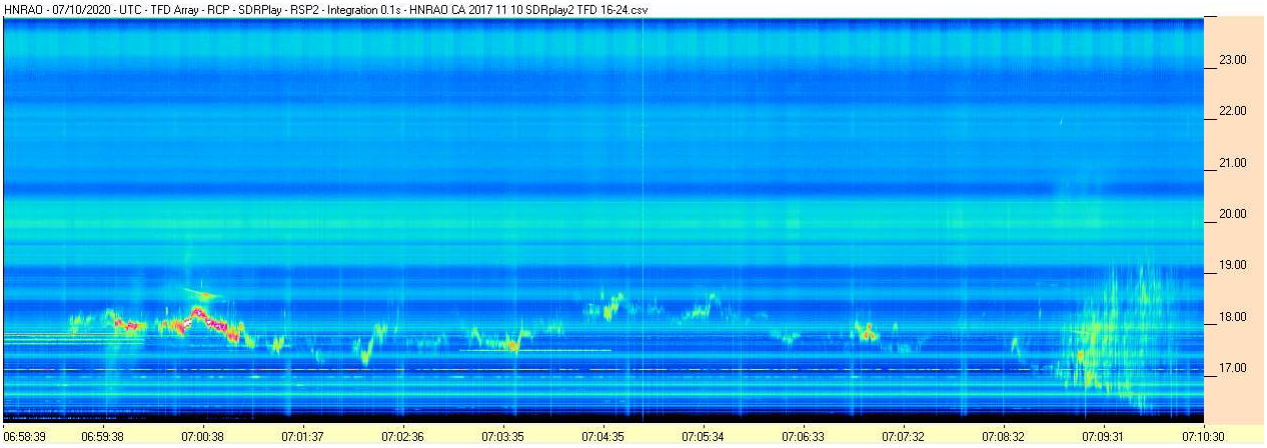
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07:00:38
07:01:37
07:02:36
07:03:35
07:04:35
07:05:34
07:06:33
07:07:32
07:08:32
07:09:31
07:10:30

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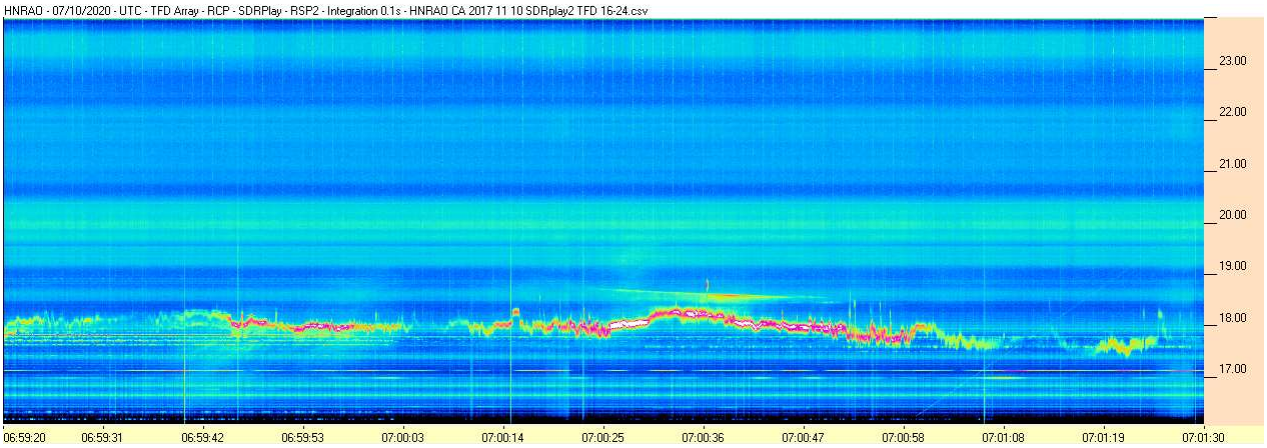

FSX-2 / LWA Array