HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq

Date: 9 March 2018

Object: Jupiter – Io-A

Observer: Unattended

Start - Time UT:	**0802**	**Planetary K-index:**	**1**
Jupiter Altitude (deg):	**27.9**	**Jupiter Azimuth (deg):**	**154.1**
Jupiter CML:	**201.69**	**Jupiter Io Phase:**	**238.88**
Jupiter RA (hr/min):	**15:23**	**Jupiter Dec (hr/min):**	**-17:21**
Hour Angle (hr/min):	**-01:35**	**Polarization**	**RCP**
Sun Altitude (deg):	**-40.1**	**Sun Azimuth (deg):**	**055.4**
Sun RA (hr/min):	**23:11**	**Sun Dec (hr/min):**	**-05:13**

End – Time UT:	**0935**		
Jupiter Altitude (deg):	**32.0**	**Jupiter Azimuth (deg):**	**179.4**
Jupiter CML:	**257.92**	**Jupiter Io Phase**	**252.08**
Hour Angle (hr/min):	**-00:02**		
Sun Altitude (deg):	**-24.1**	**Sun Azimuth (deg):**	**075.3**

Observatory Configuration

Spectrograph Receiver	Antenna	Polarization	System Loss	Multicoupler	Multicoupler port	Calibrated
FSX-8S	TFD	RCP/LCP	7.7 dB	#1 LCP #2 RCP	Port 2 +3dB Port 2 +3dB	Twice daily
FSX-2	LWA	RCP/LCP manual select		N/A	N/A	N/A
SDRPlay RSP2	TFD	RCP	-7.70 dB	#1 LCP	Port 3 +3dB	Twice daily
SDRPlay RSP2	TFD	LCP	-7.70 dB	#2 RCP	Port 3 +3dB	Twice daily
SDRPlay RSP1	Jove dipoles	Linear	-3.19 dB	N/A	N/A	N/A
JOVE II	Jove dipoles	Linear	-3.19 dB	N/A	N/A	02/20/2018
JOVE 1	TFD	RCP	-7.70 dB	N/A	N/A	03/08/2018
JOVE 1	TFD	LCP	-7.70 dB	N/A	N/A	03/08/2018

JOVE dipoles phased for 2017-2018 season
LWA antenna orientation for observation: 67.5 degrees

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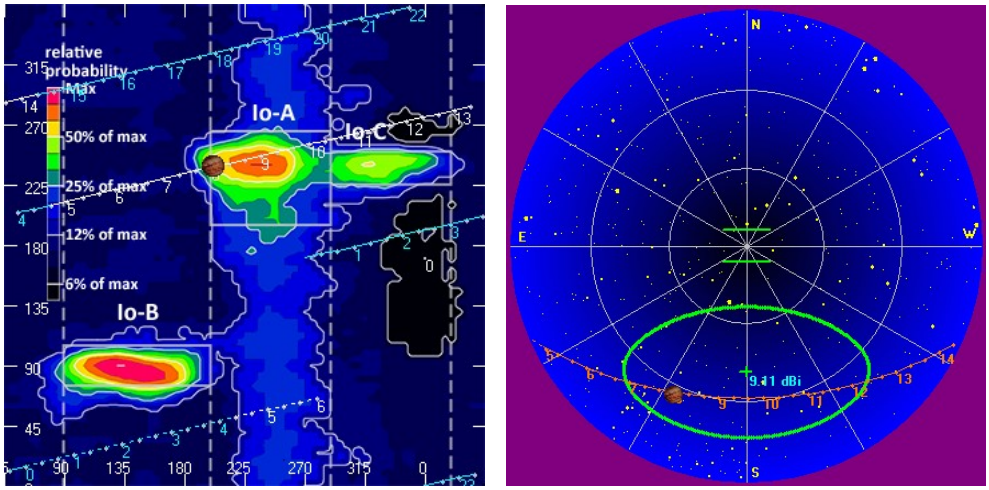
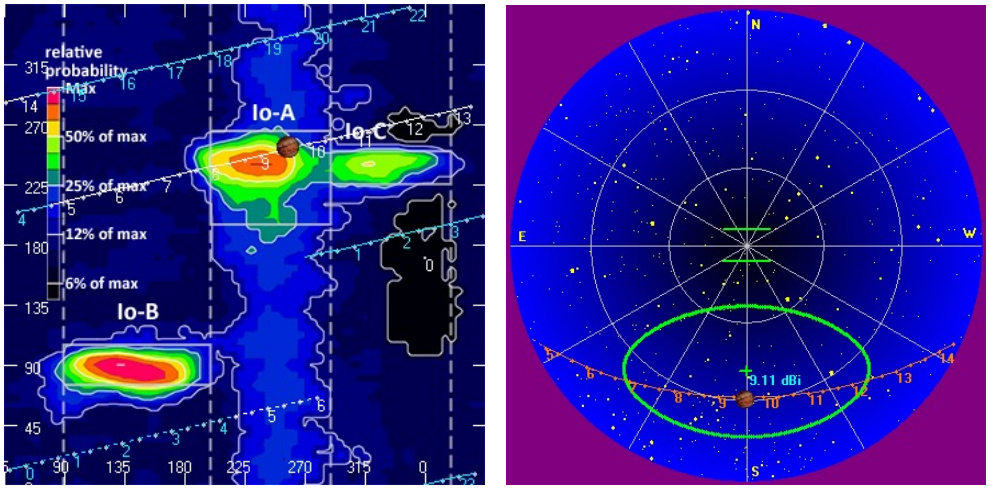


Beginning of Pass



End of Pass

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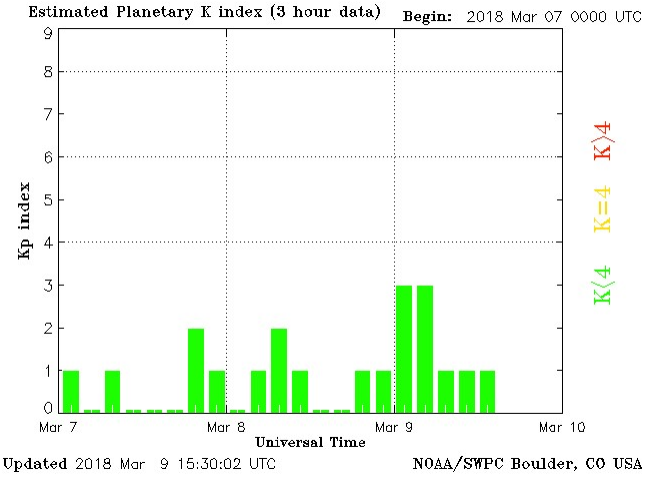
MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360	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 RCP, Io-A storm despite its position within the Io-A emission region. Emissions spanned the range of the SDRPlay RSP2/TFD array instrument, 16 MHz to 24 MHz. The FSX-8S/TFD shows emissions from 15 MHz to 27 MHz.

Observed with the FSX-8S/TFD array, FSX-2/LWA array and SDRPlay RSP2/TFD array spectrographs. It was visible on all three spectrographs, but the RSP2 provided the best resolution. The FSX-2S/LWA array observed this storm marginally better than the FSX-8/TFD array.

Modulation lanes of type L4 were measured and a graph of Slope vs CMLIII is presented at the end of this report. A graph of slope vs frequency is also presented at the end of this report.

Weak L-burst emissions with no S-bursts visible. From beginning to end, most of the emissions were weak to very weak. There were a few exceptions of strong to very strong bursts at 0858 UT through 0853 UT, with the strongest burst at 0857 UT with a pair of vertical bursts from 16 MHz to 20 MHz.

L-bursts were recorded with the Radio JOVE receiver/JOVE dipole array. Weak L-bursts ranging from 165 kK to 300 kK were visible despite the RFI present.

EOR

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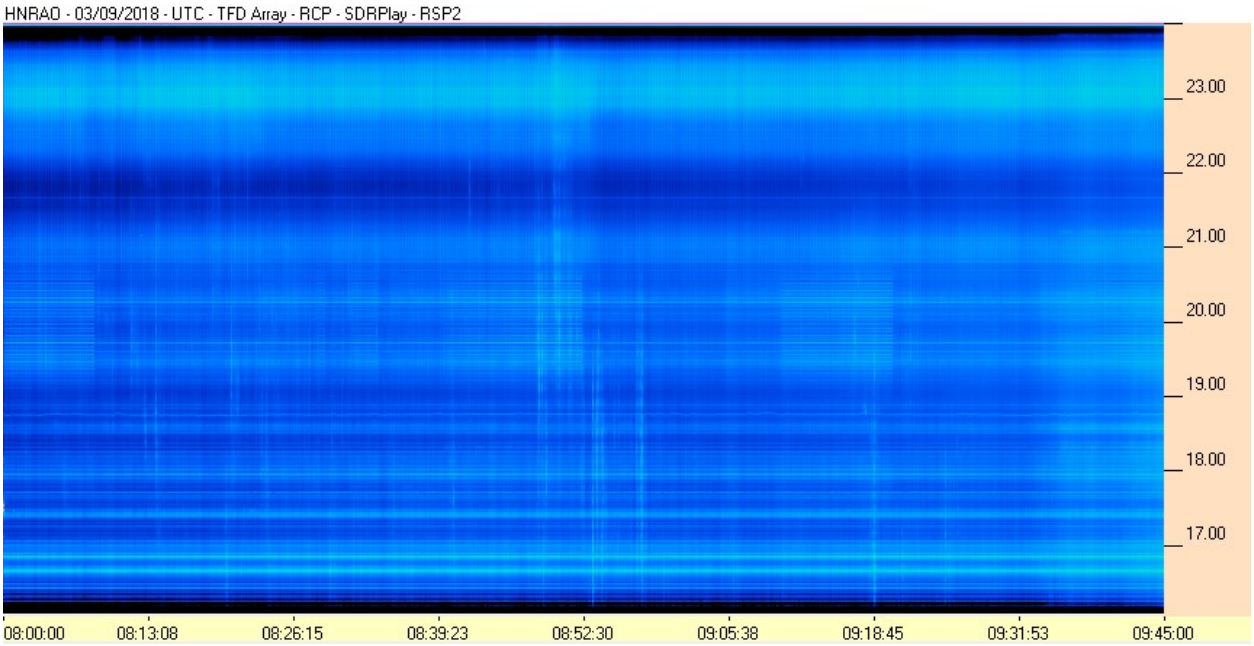
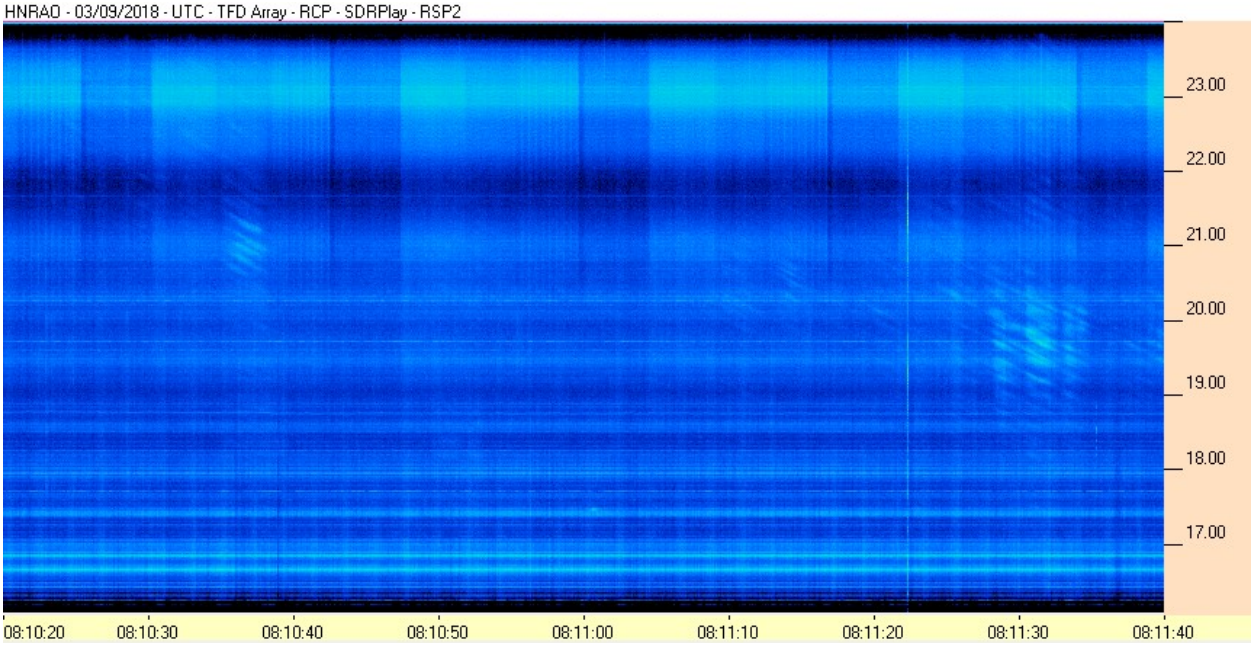
SDRPlay RSP2/TFD Array





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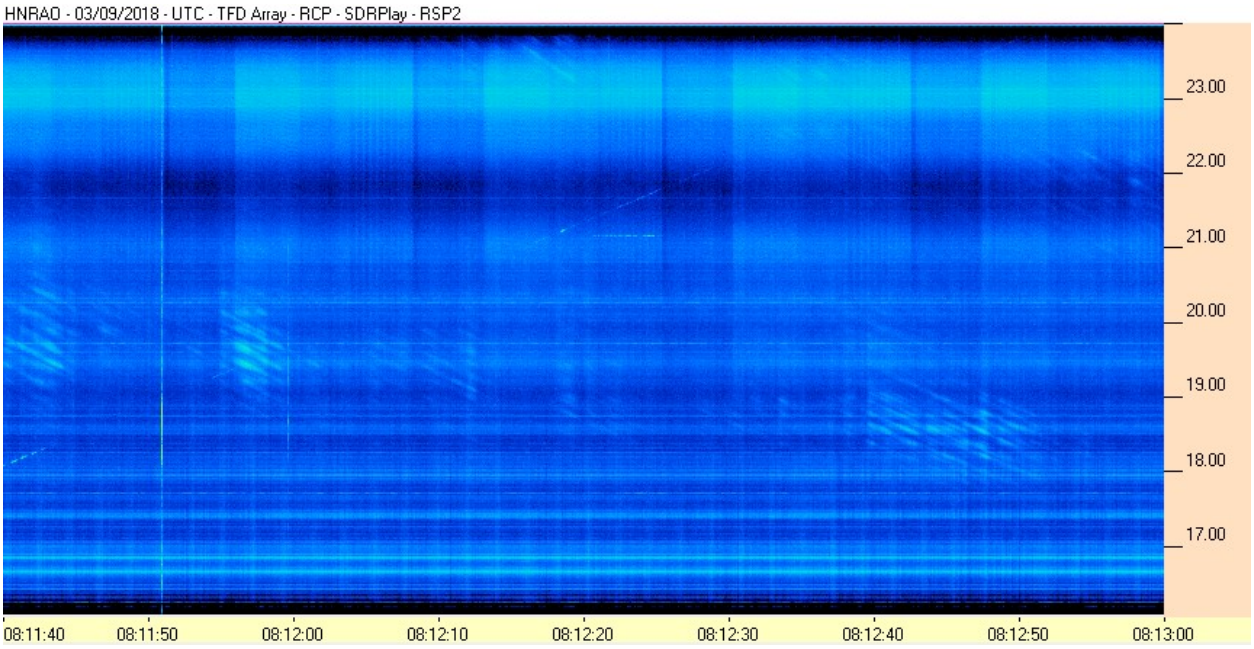

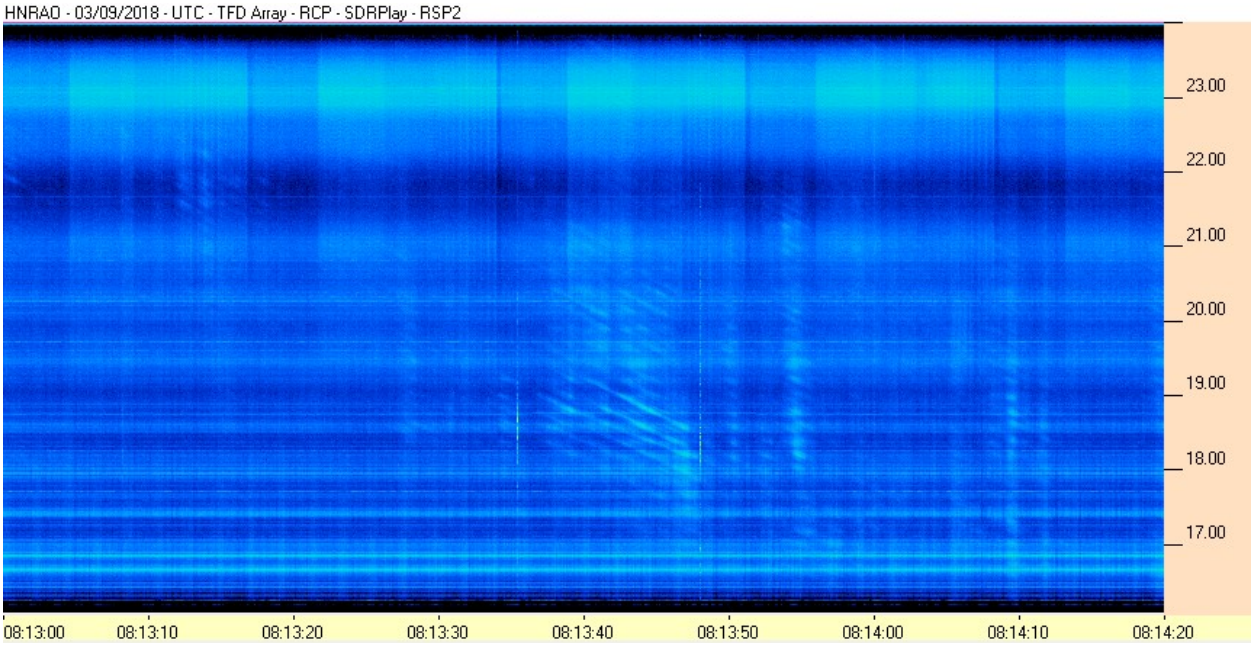

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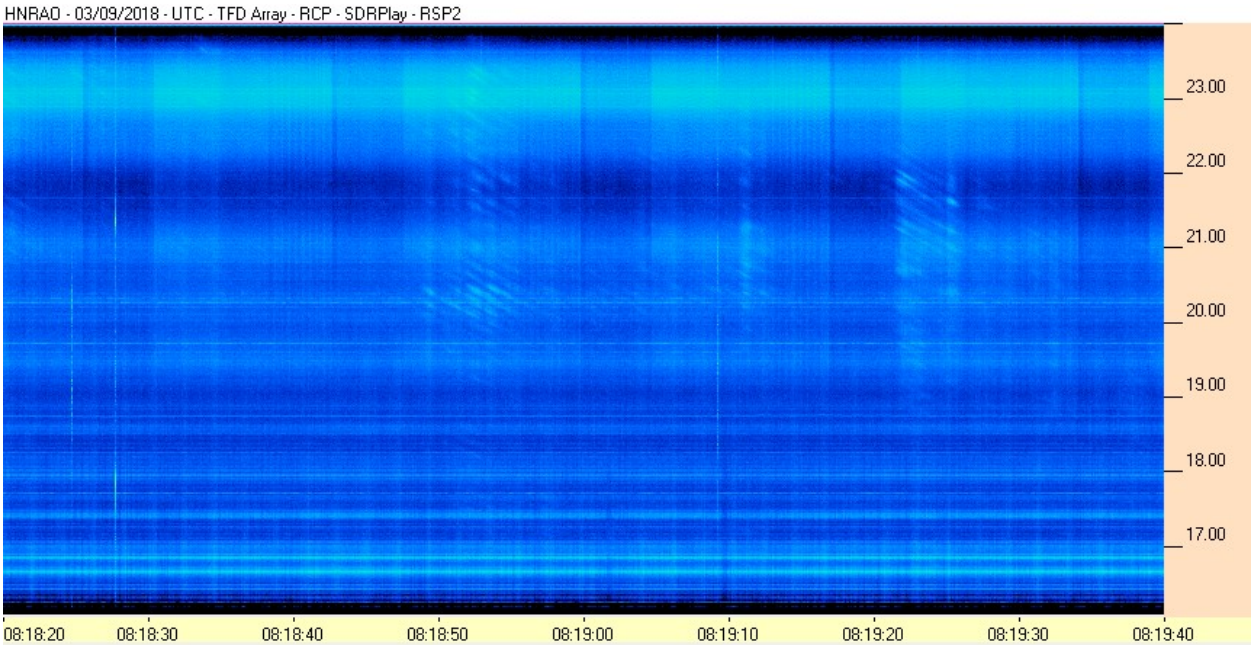

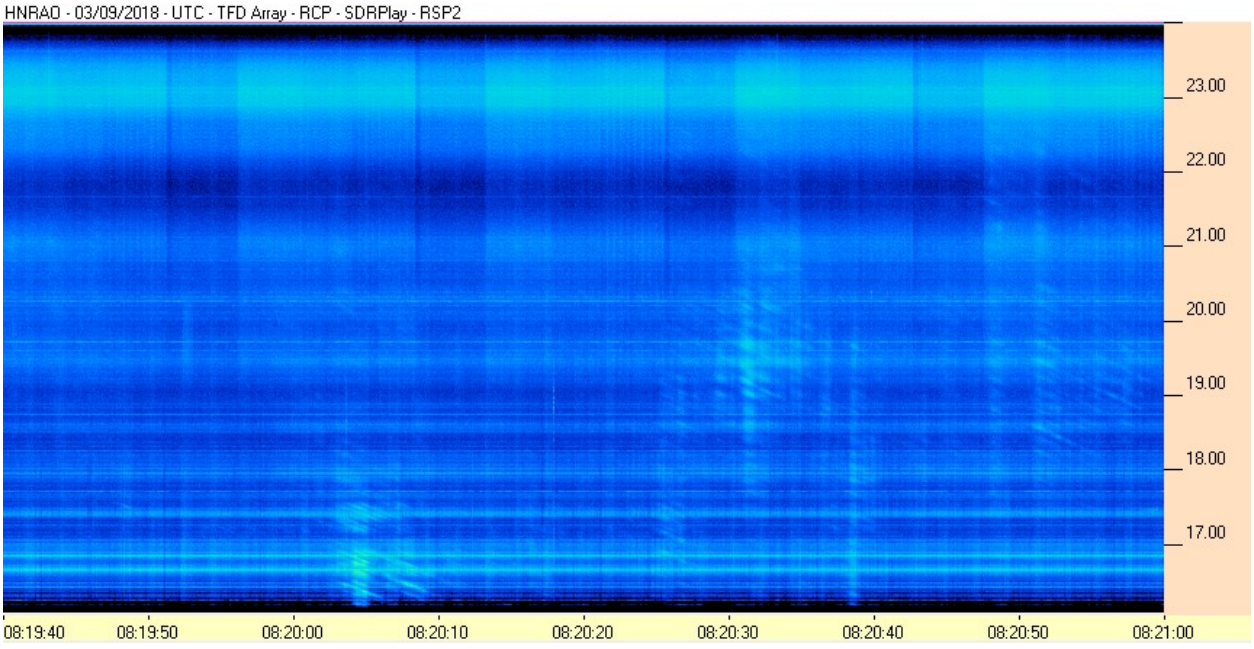

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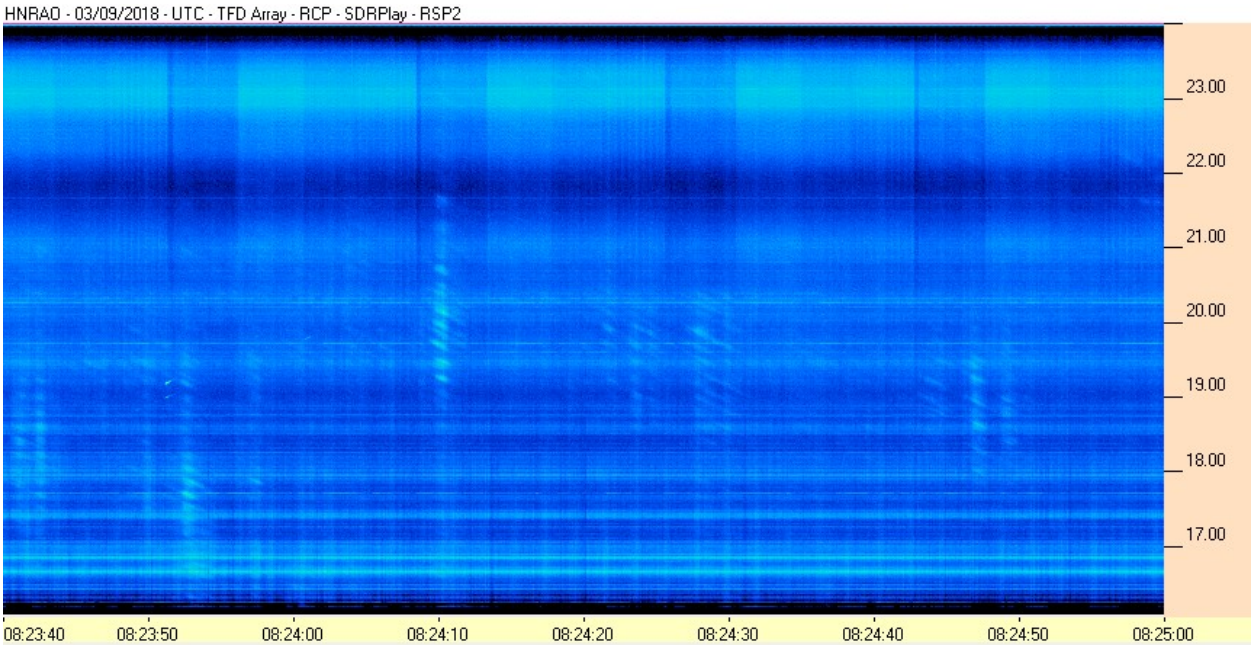

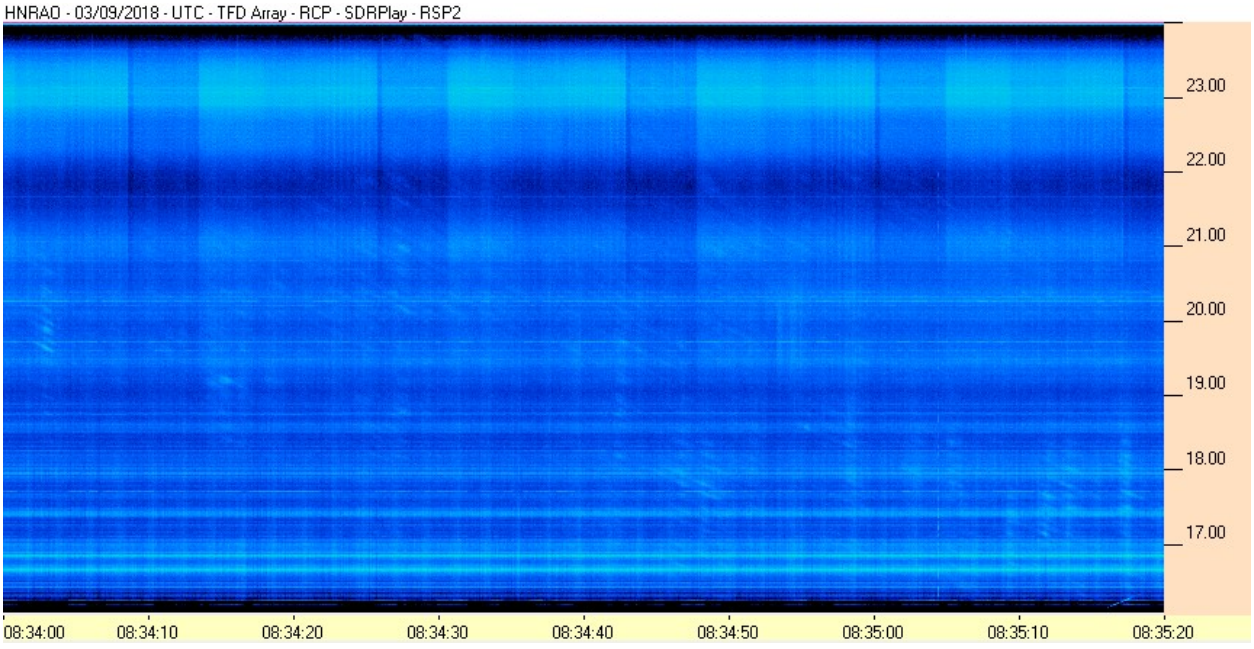

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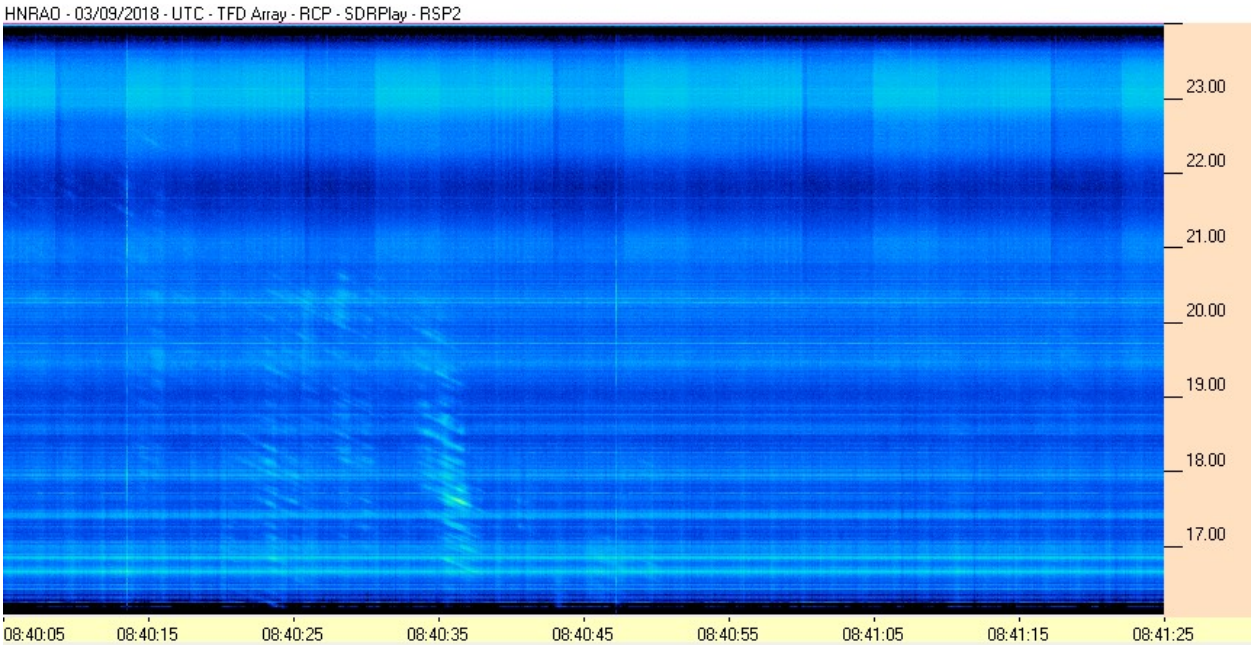

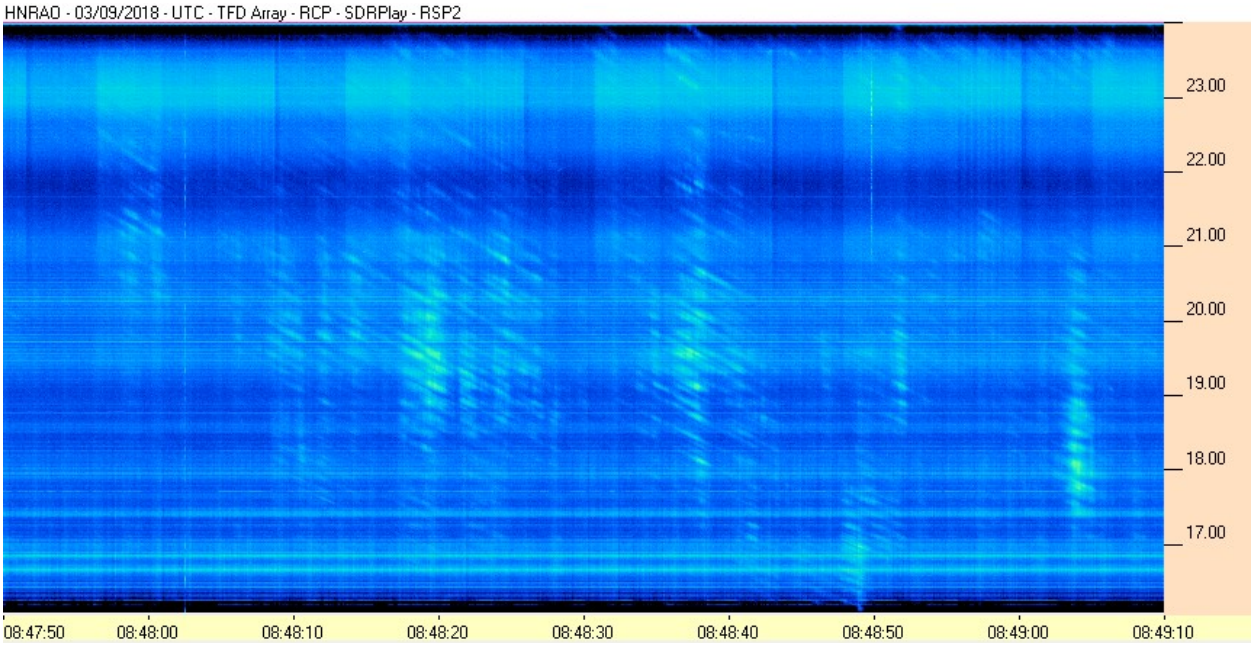

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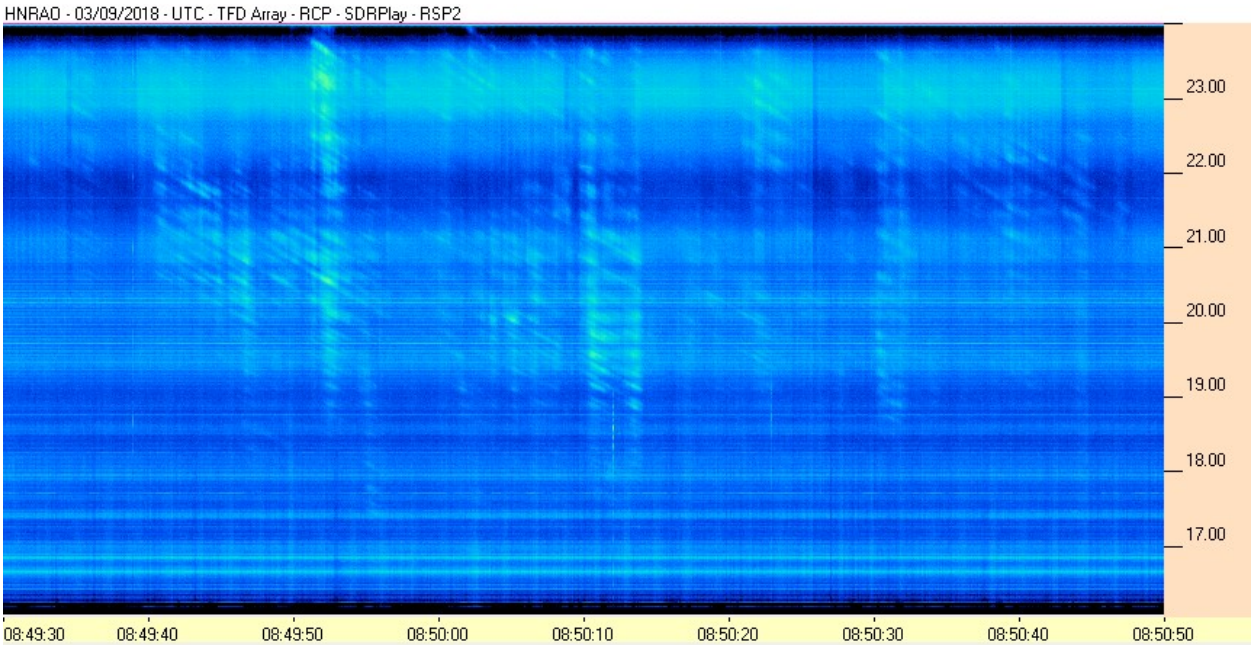

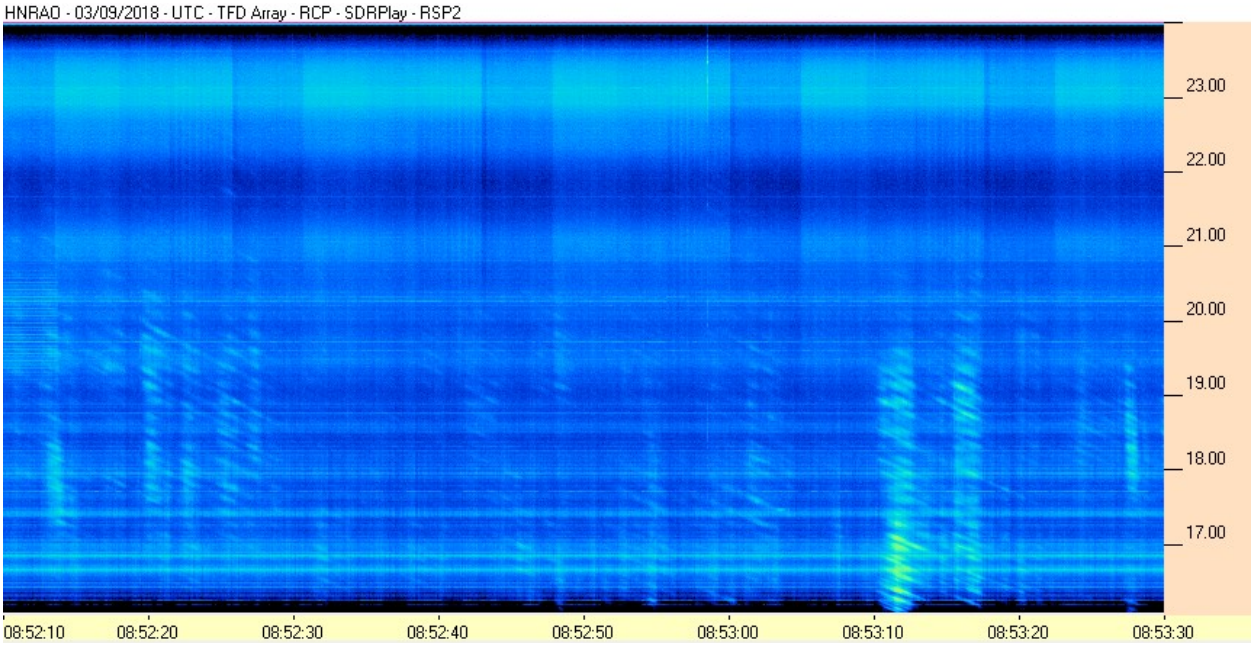

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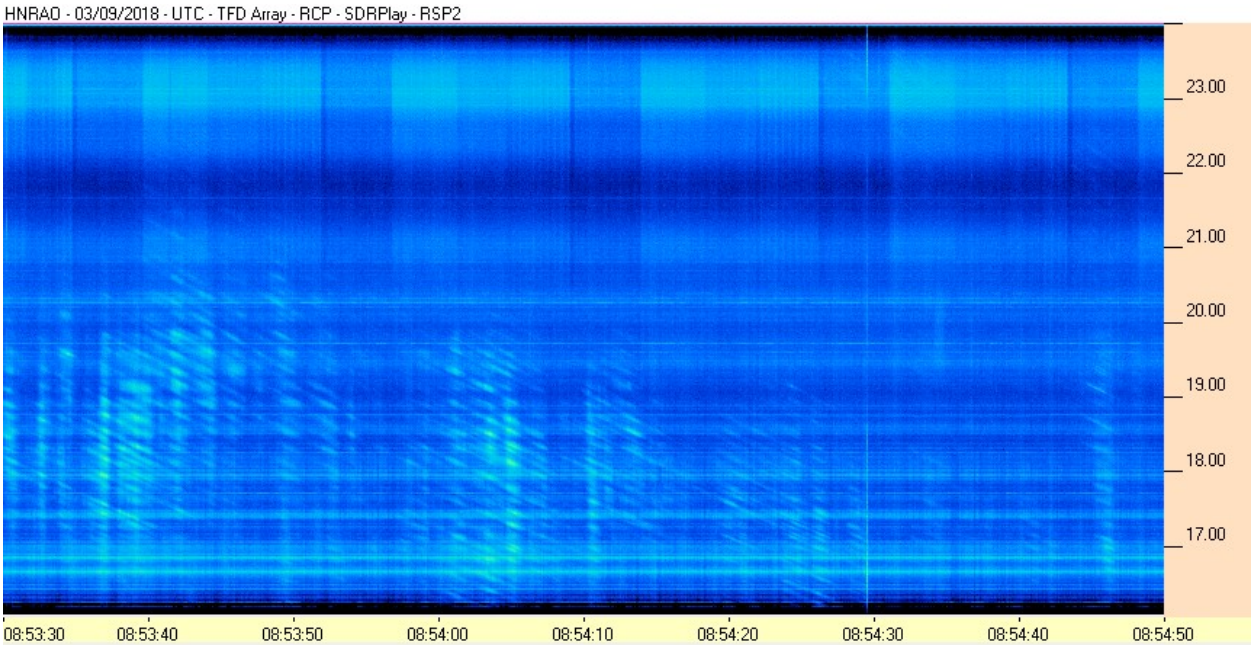

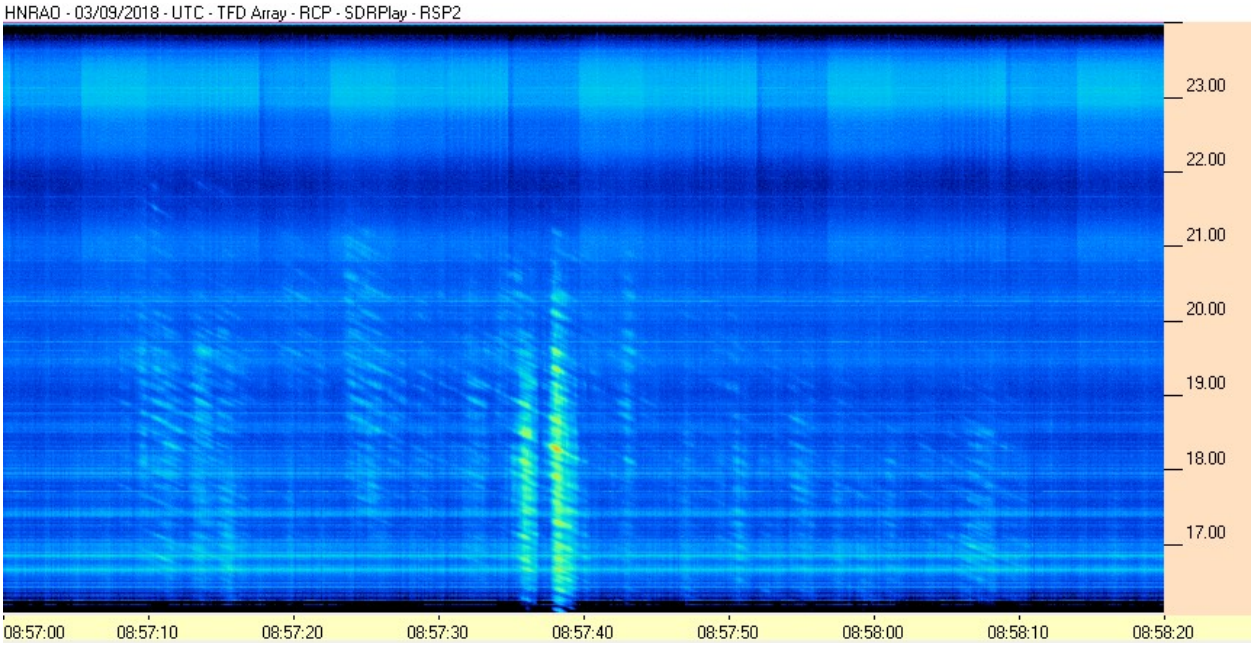

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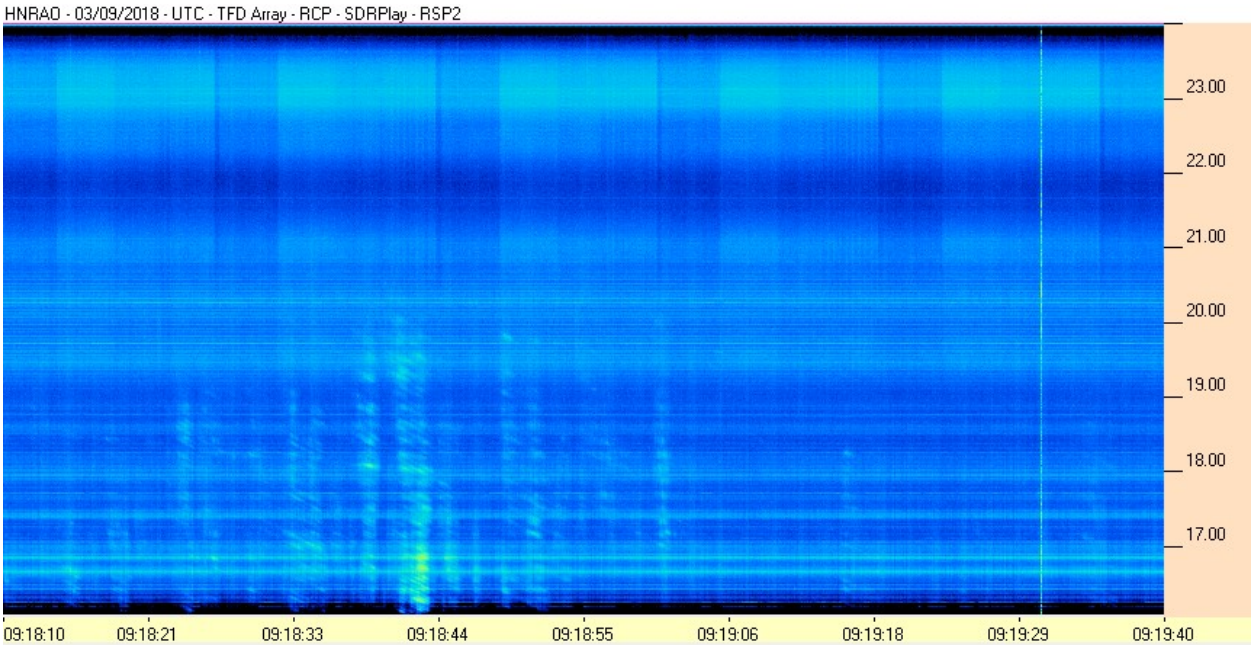
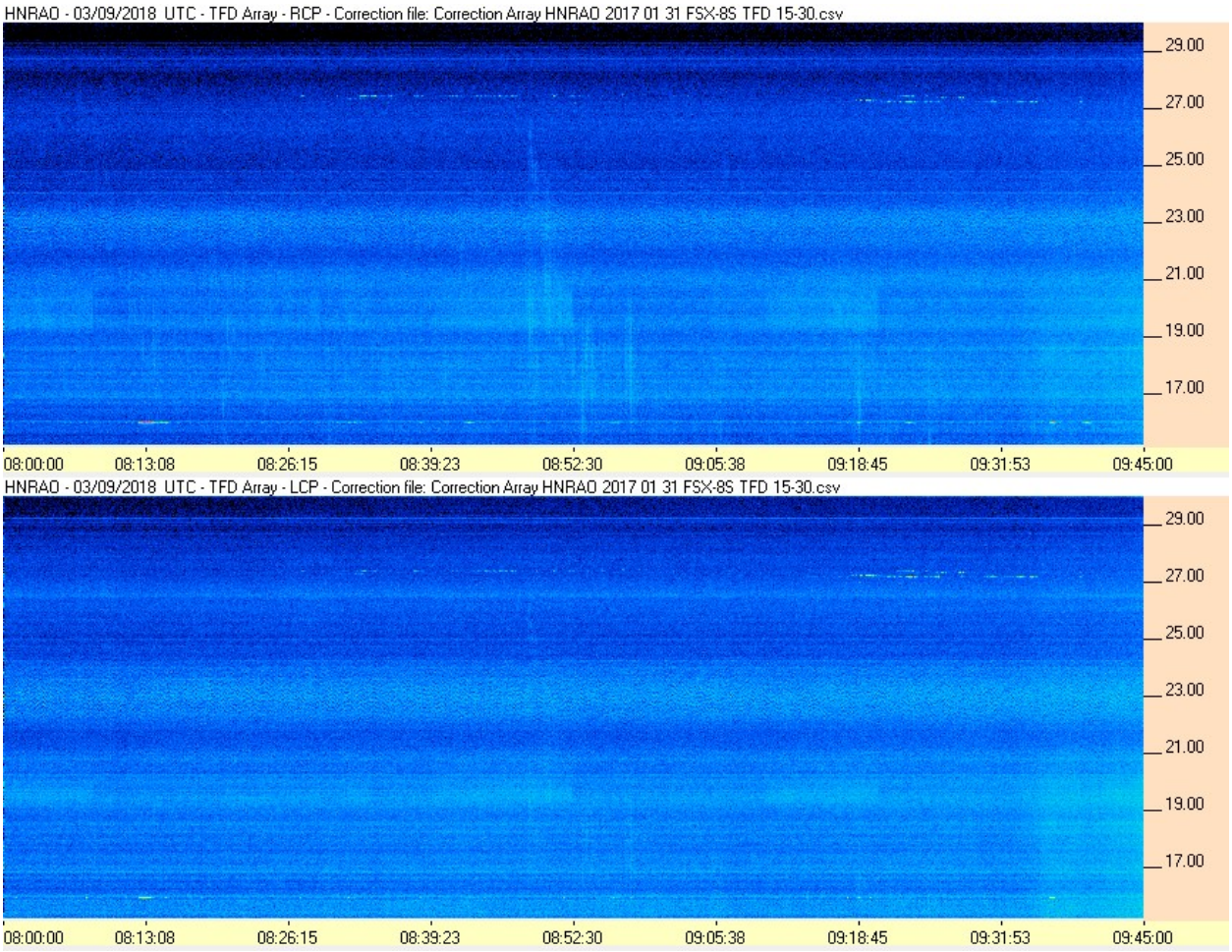
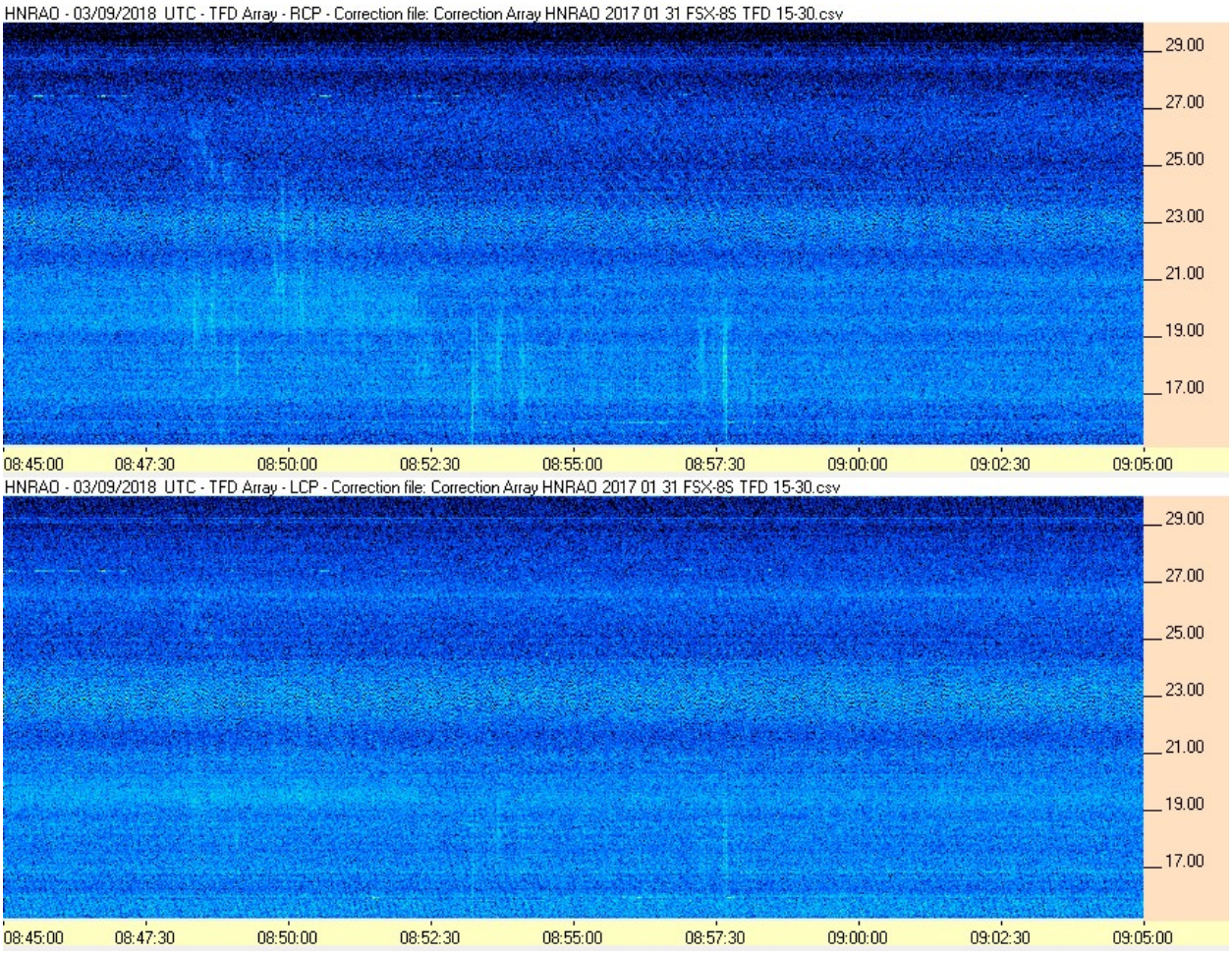


FSX-8S/TFD Array




HNRAO - 03/09/2018 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
08:45:00
08:47:30
08:50:00
08:52:30
08:55:00
08:57:30
09:00:00
09:02:30
09:05:00
HNRAO - 03/09/2018 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
08:45:00
08:47:30
08:50:00
08:52:30
08:55:00
08:57:30
09:00:00
09:02:30
09:05:00

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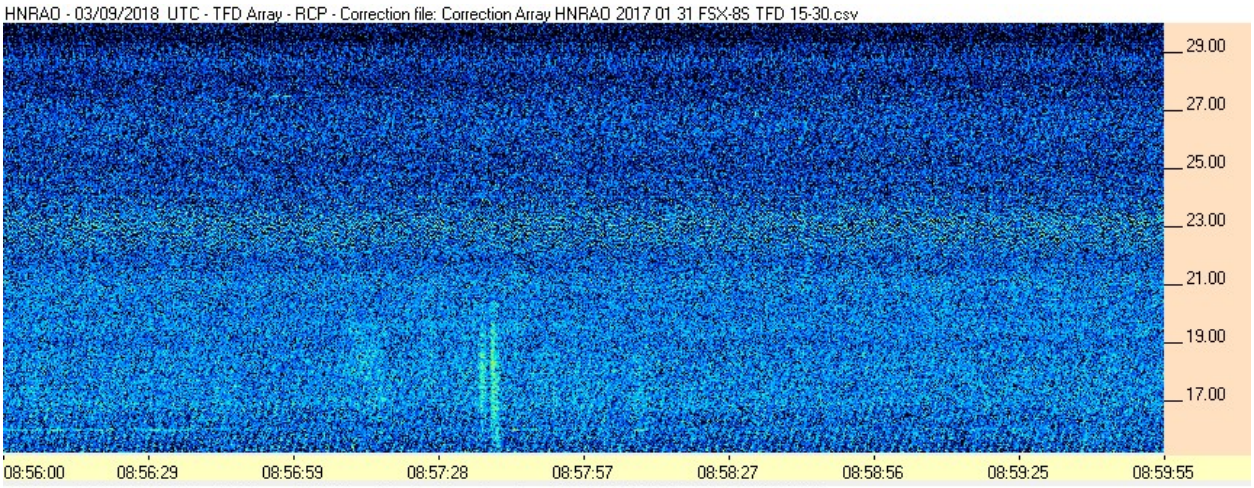

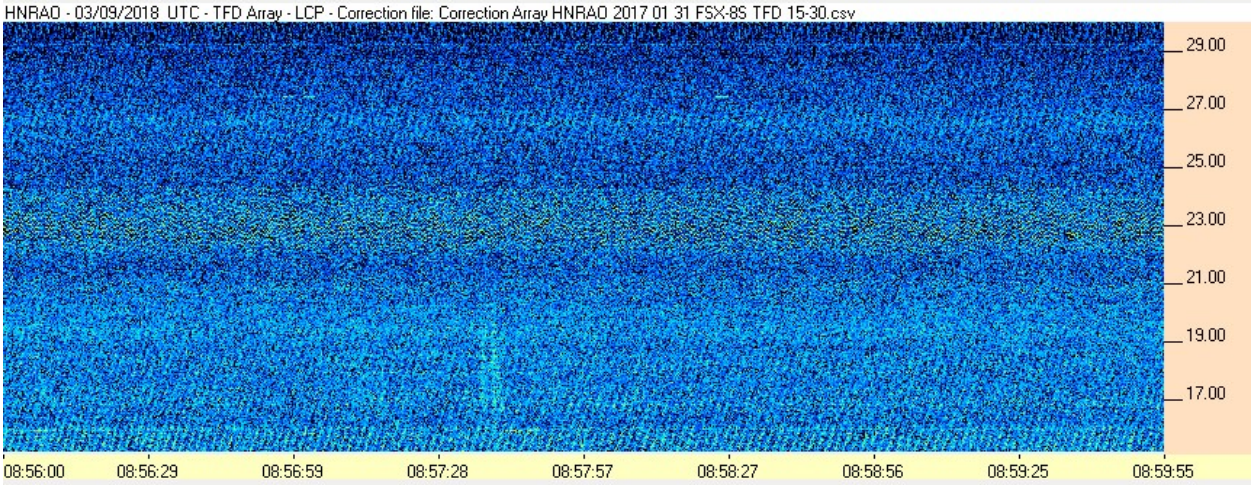

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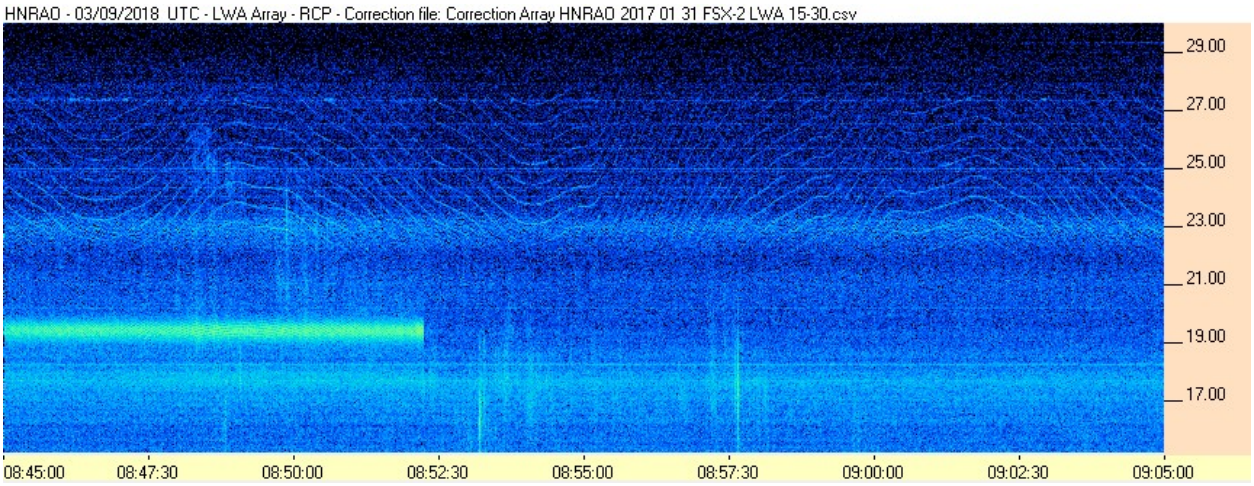
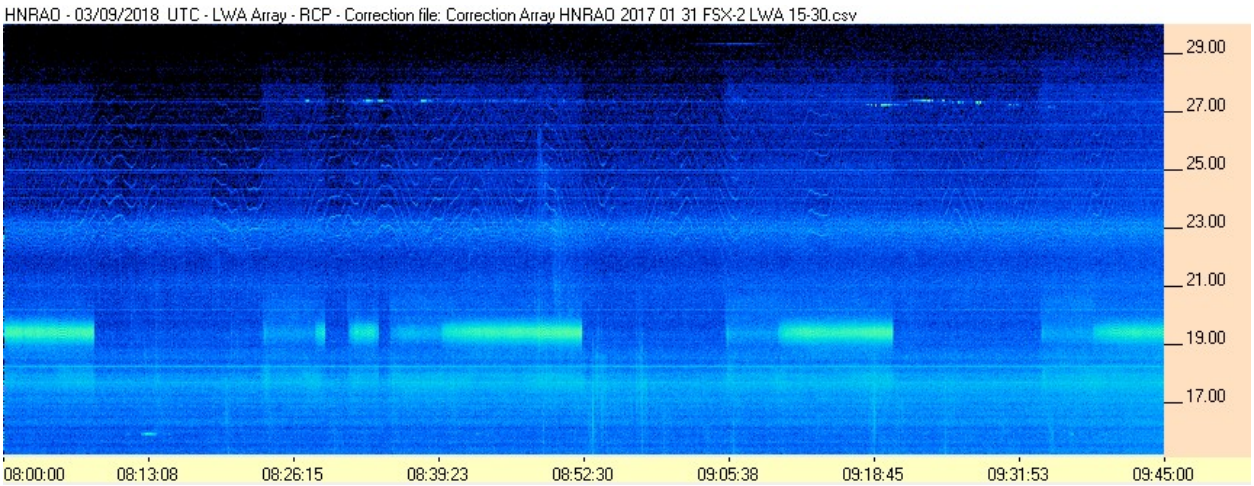
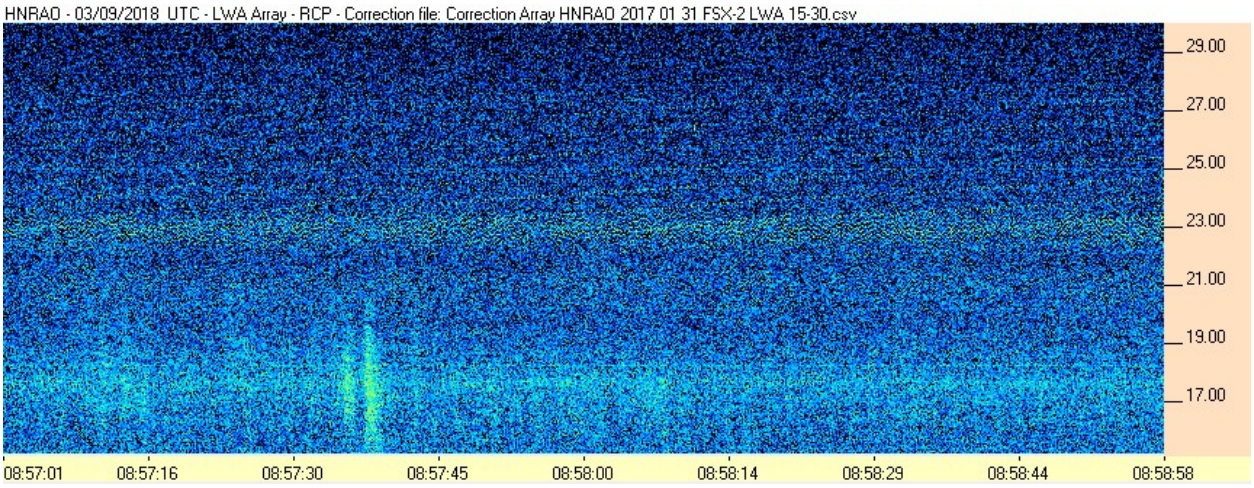
FSX-2/LWA Array






HNRAO - 03/09/2018 UTC - LWA Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-2 LWA 15-30.csv
29.00
27.00
25.00
23.00
21.00
19.00
17.00
08:57:01
08:57:16
08:57:30
08:57:45
08:58:00
08:58:14
08:58:29
08:58:44
08:58:58

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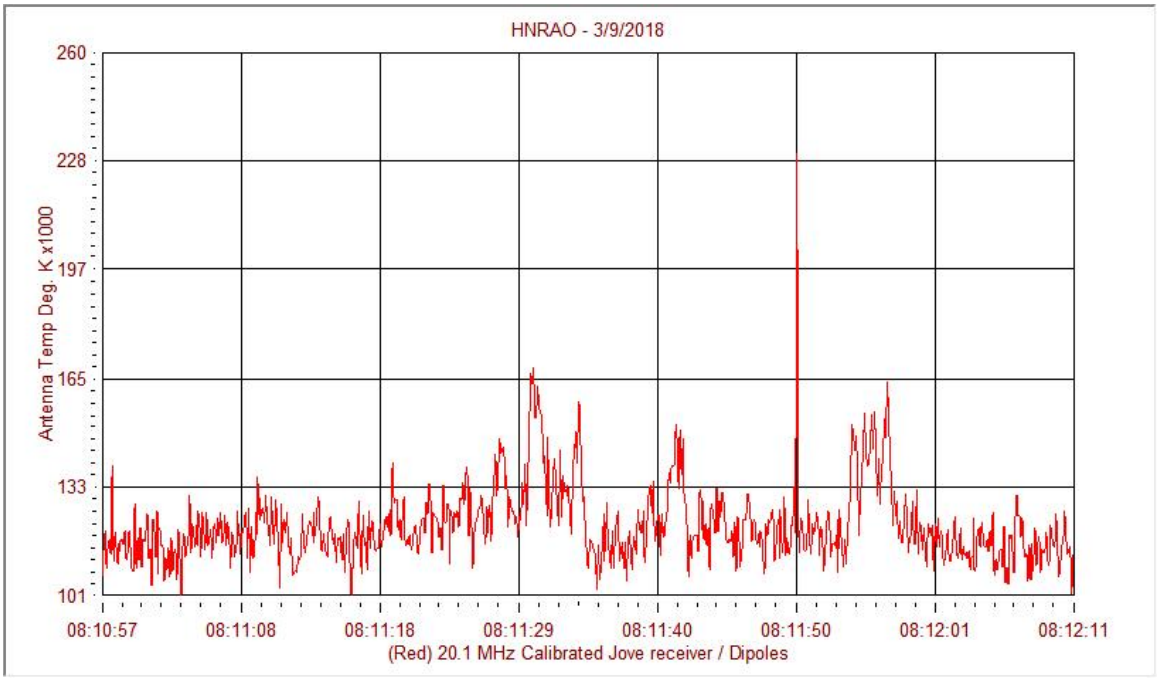
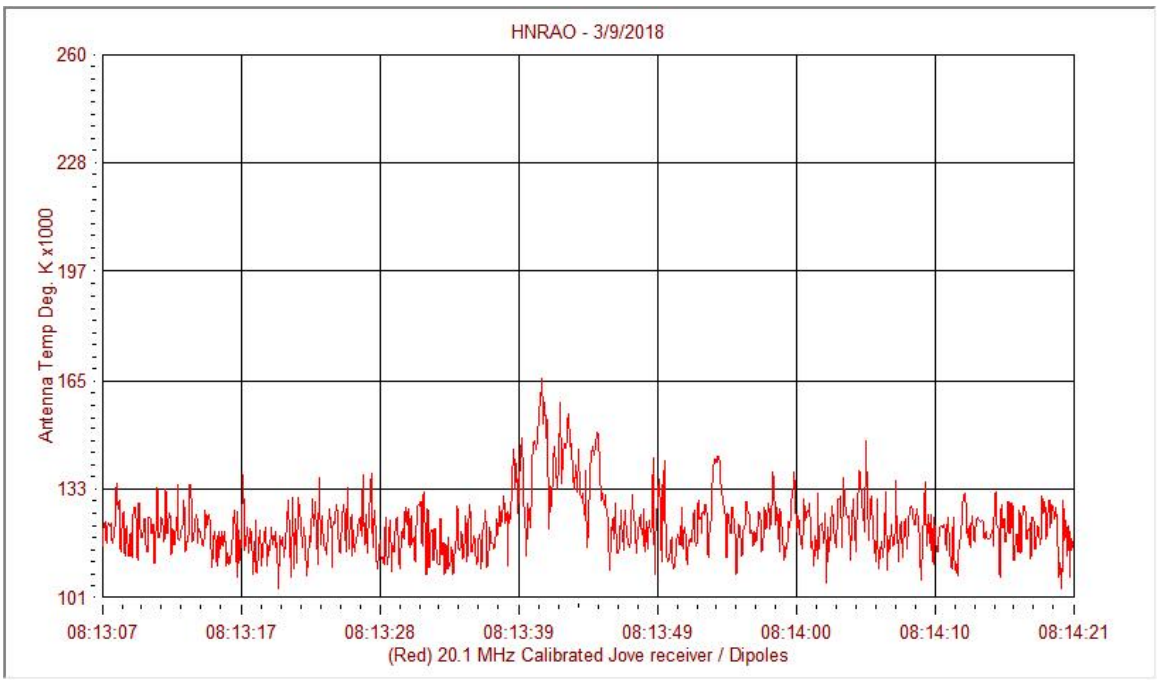
Radio JOVE Receiver/JOVE dipole array





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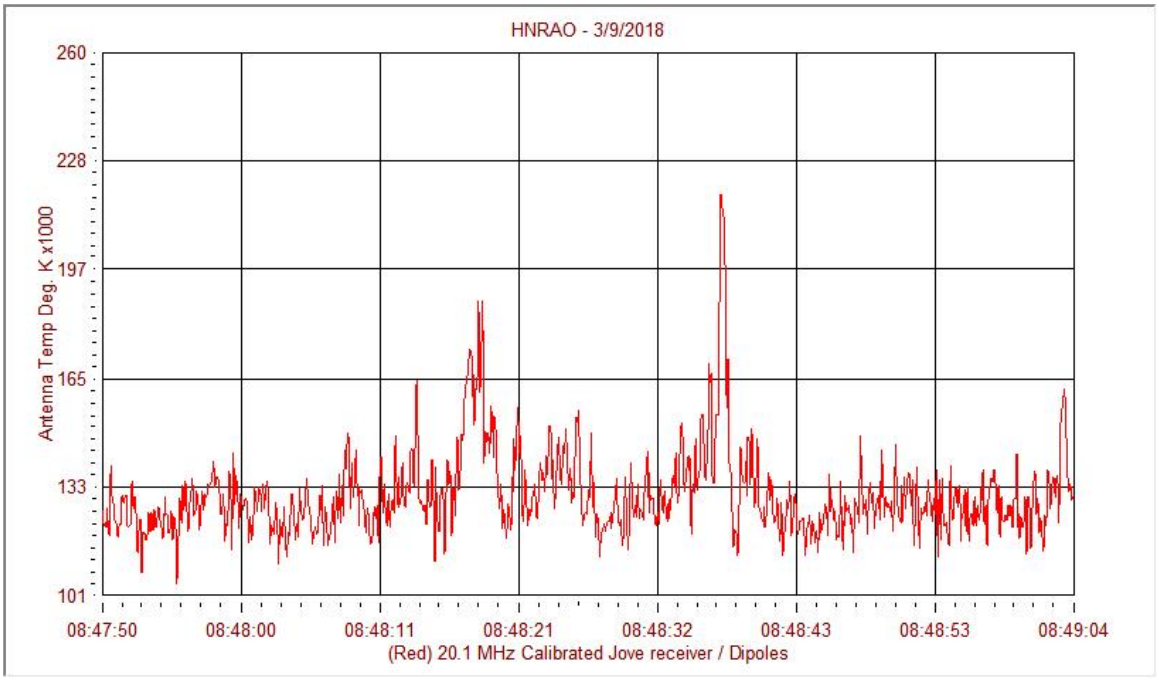
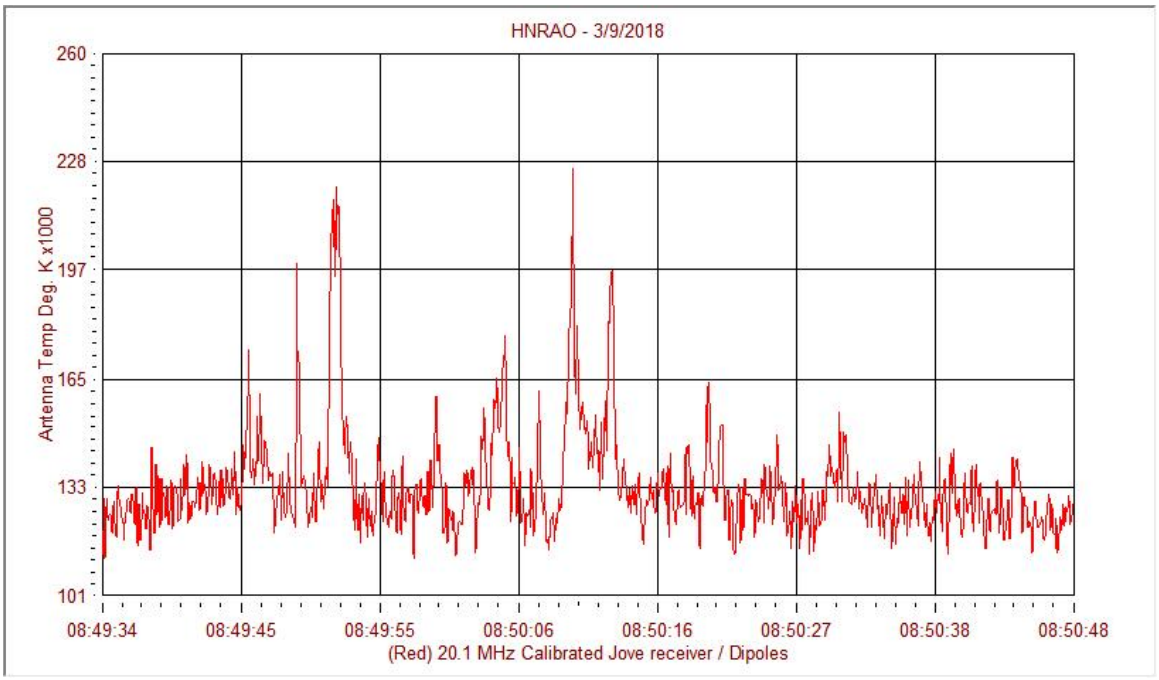
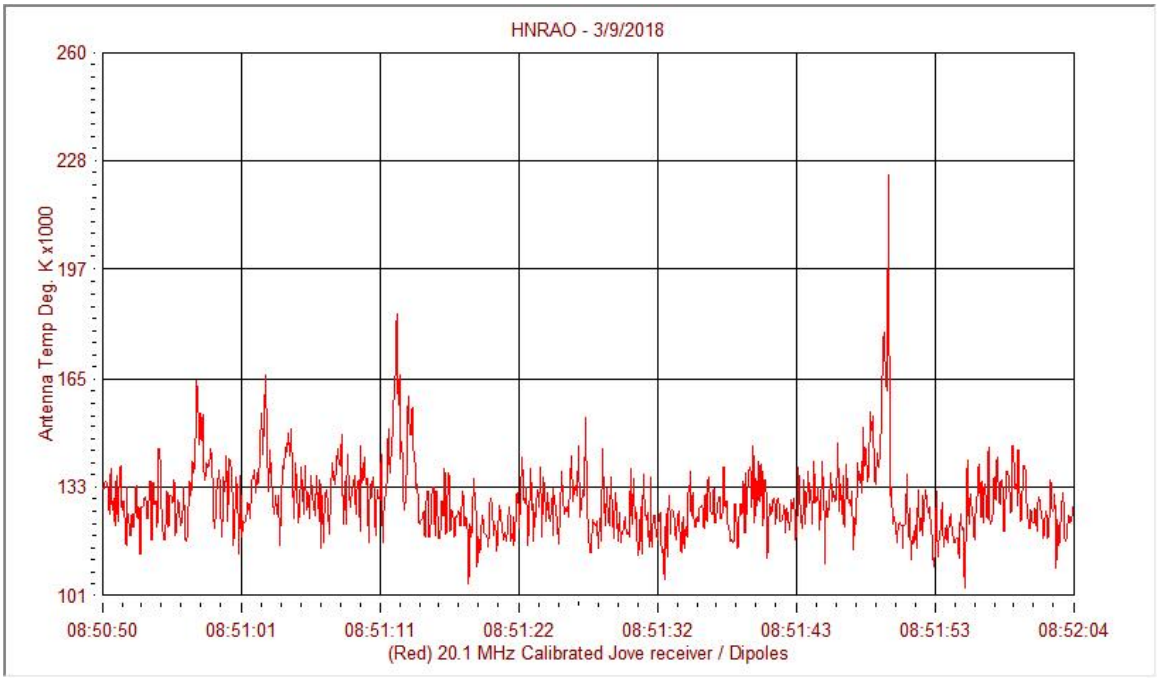
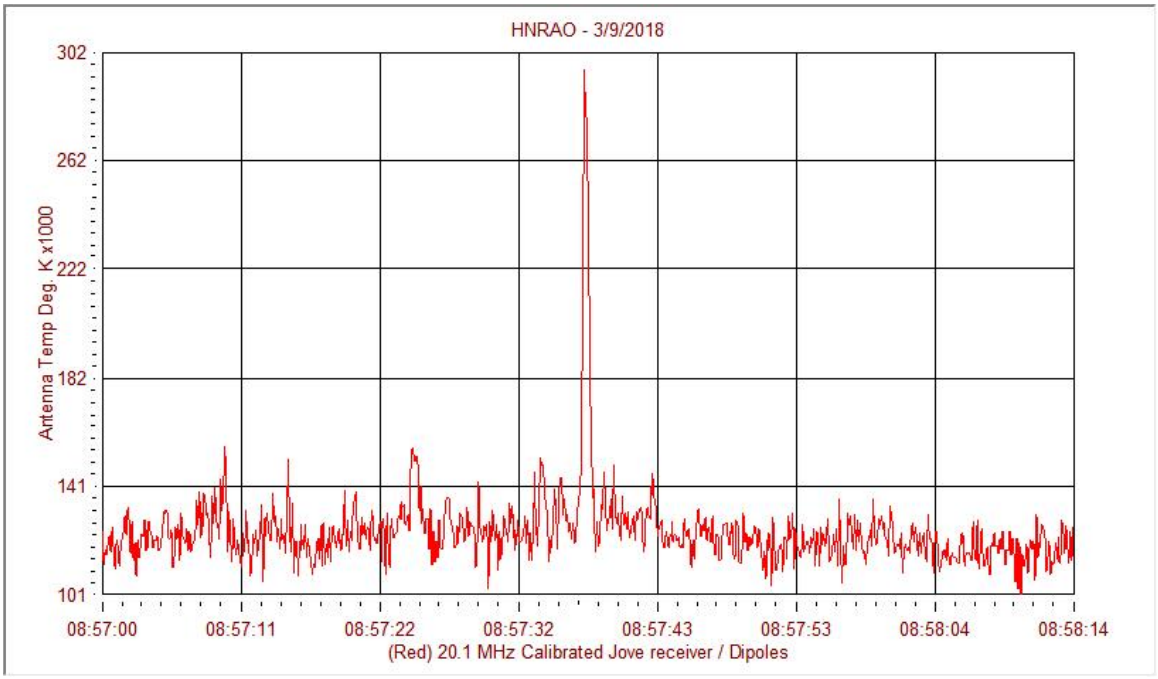


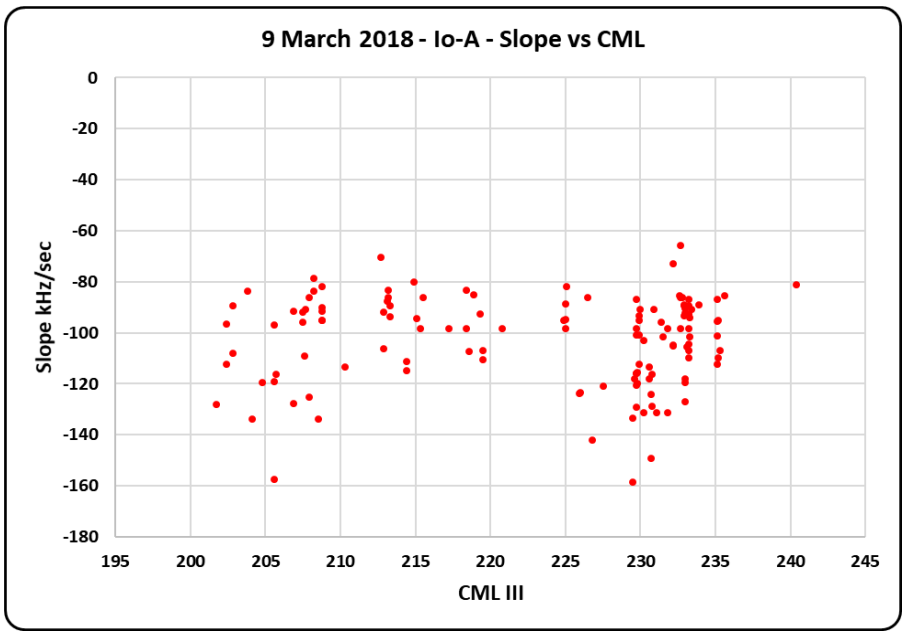



HNRAO - 3/9/2018
260
228
197
165
133
101
Antenna Temp Deg. K x1000
08:50:50
08:51:01
08:51:11
08:51:22
08:51:32
08:51:43
08:51:53
08:52:04
(Red) 20.1 MHz Calibrated Jove receiver / Dipoles


HNRAO - 3/9/2018
302
262
222
182
141
101
Antenna Temp Deg. K x1000
08:57:00
08:57:11
08:57:22
08:57:32
08:57:43
08:57:53
08:58:04
08:58:14
(Red) 20.1 MHz Calibrated Jove receiver / Dipoles

Measured Modulation Lanes

Slope kHz/sec vs CML III



Slope kHz/sec vs Frequency MHz