HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq

Date: 22 February 2018

Object: Jupiter – Io-B

Observer: Unattended

Start of pass:	**0841 UT**	**Planetary K-index:**	**1**
Jupiter Altitude (deg):	**26.3**	**Jupiter Azimuth (deg):**	**149.5**
Jupiter CML:	**126.41**	**Jupiter Io Phase:**	**072.96**
Jupiter RA (hr/min):	**15:22**	**Jupiter Dec (hr/min):**	**-17:17**
Hour Angle (hr/min):	**-1:54**	**Polarization**	**RCP**
Sun Altitude (deg):	**-38.2**	**Sun Azimuth (deg):**	**068.9**
Sun RA (hr/min):	**22:15**	**Sun Dec (hr/min):**	**-10.51**

End of pass:	**1016**		
Jupiter Altitude (deg):	**31.9**	**Jupiter Azimuth (deg):**	**174.8**
Jupiter CML:	**183.84**	**Jupiter Io Phase**	**086.32**
Hour Angle (hr/min):	**-00:18**		
Sun Altitude (deg):	**-20.6**	**Sun Azimuth (deg):**	**086.6**

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	
JOVE 1	TFD	LCP	-7.70 dB	N/A	N/A	

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

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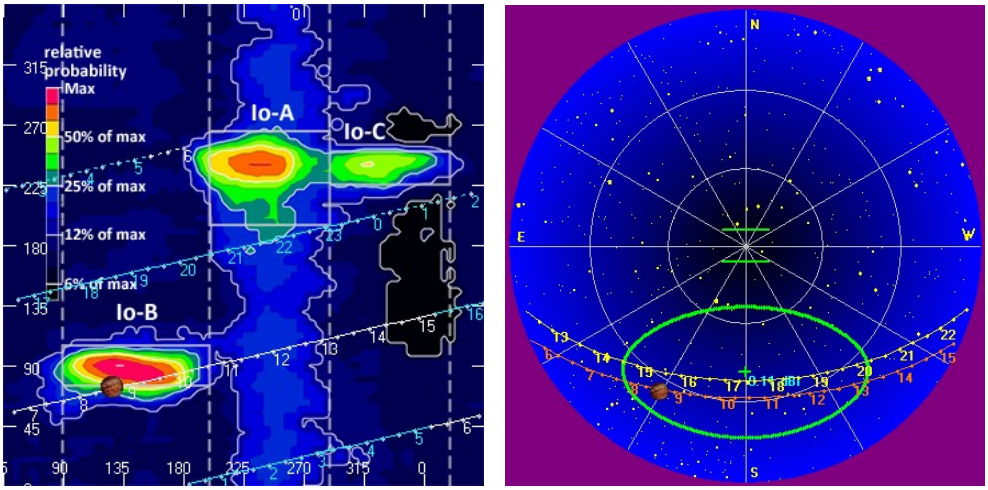
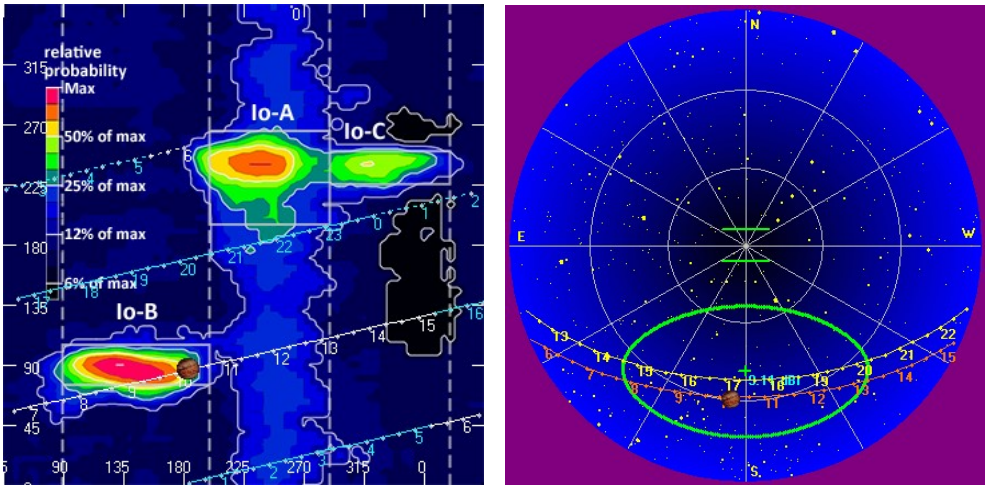


Beginning of Pass



End of Pass

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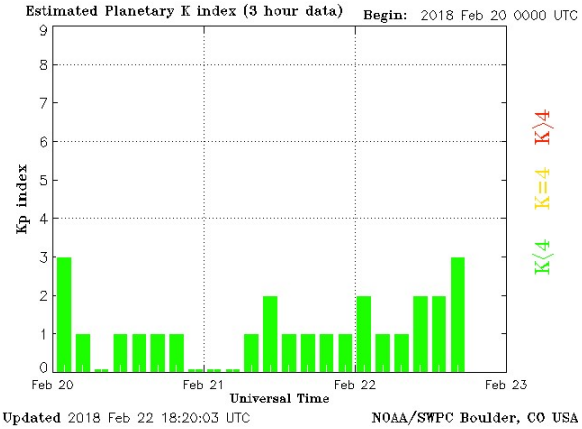

MODE	CML RANGE	Io RANGE	MAX F	POLAR	ARC	NOTES
Io-D	0-200	95-130	18	LH	Early	Also called "fourth source"
Io-B	(105 - 185)	(80-110)	39.5	RH	Early	Also called "early source"
non Io-B	80-200	0-360	38	RH	Early	Voyager info
Io-A	(200-270)	(205-260)	38	RH	Late	Also called "main source"
non-Io-A	(230-280)	0-360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

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An unattended Io-B storm lasting approximately 3 hours between 16 and 24 MHz. Composed almost exclusively S-bursts, in somewhat continuous sequences, there were long gaps of time between emission groups. The first group of S-bursts began between 20 MHz and 21 MHz and slowly drifted down to 18 MHz in approximately 4 minutes. Shortly after that group ended, more S-bursts began, again between 20 and 21 MHz and slowly drifted down to 18.5 MHz, again, in about 4 minutes. At 0852:20, an N-event (or S-burst train) began at about 22.5 MHz and slowly increased in frequency, ending up at 23 MHz in about 5 minutes time. At 0900 UT, emissions resumed with a strong group at 18.5 MHz, along with another strong N-event (or S-burst train) at 0901 UT at 23.5 MHz. It remained at 23.5 MHz for approximately 6 minutes when it began to descend in frequency to 22 MHz. At 0910 UT, a loose group of S-bursts between 16 and 18 MHz were seen. At 0932 UT another grouping of S-bursts centered around 20 MHz exhibited S-burst modulation lanes of the S2 type (see chart at end of report). A weak grouping of S2 modulation lanes were seen down as low as 16 MHz. More S-bursts at 0941 UT between 17 and 22 MHz. From this point until 1016 UT, there were spotty clusters of S-bursts.

There was activity on the Radio JOVE dual dipoles and the JOVE receiver (see SkyPipe charts at end of report).

The event was also observed with the SDRPlay RSP1 and JOVE dipoles. Being a linear antenna array, Faraday lanes are present. Due to the limited bandwidth of the JOVE dipoles, there is considerable roll off above 22 MHz. Another good test of the JOVE dipole antennas with the SDRPlay RSP1 SDR.

All SkyPipe records were uploaded to the Radio JOVE data archive.

EOR

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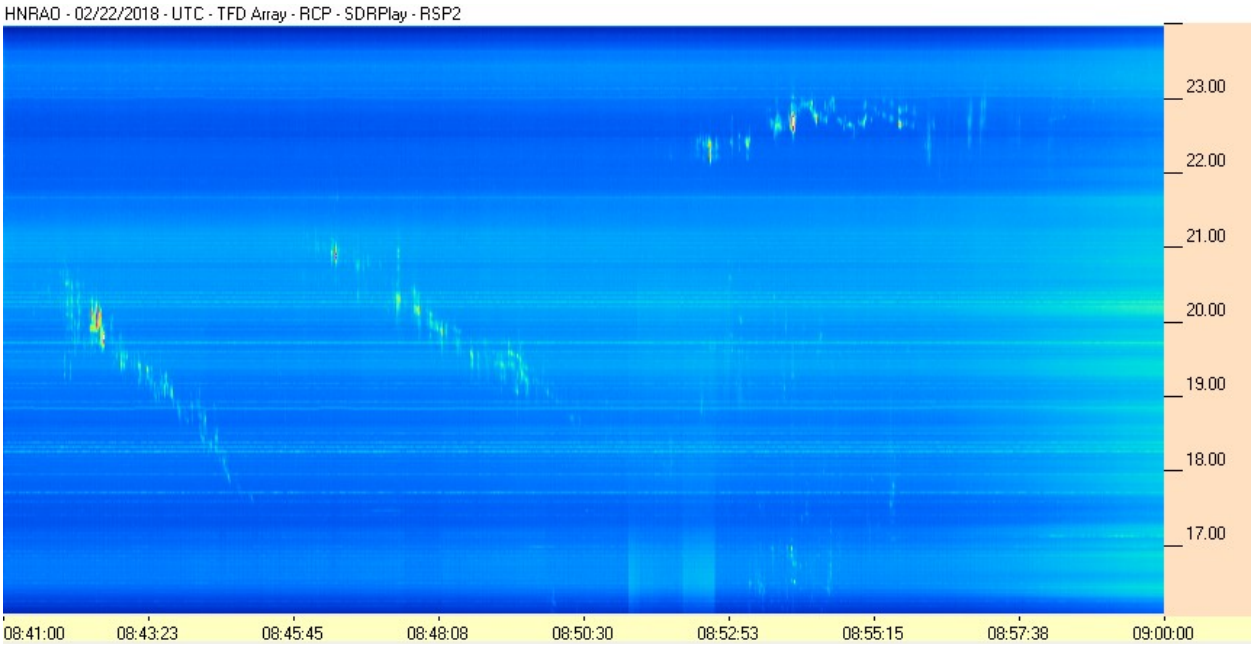
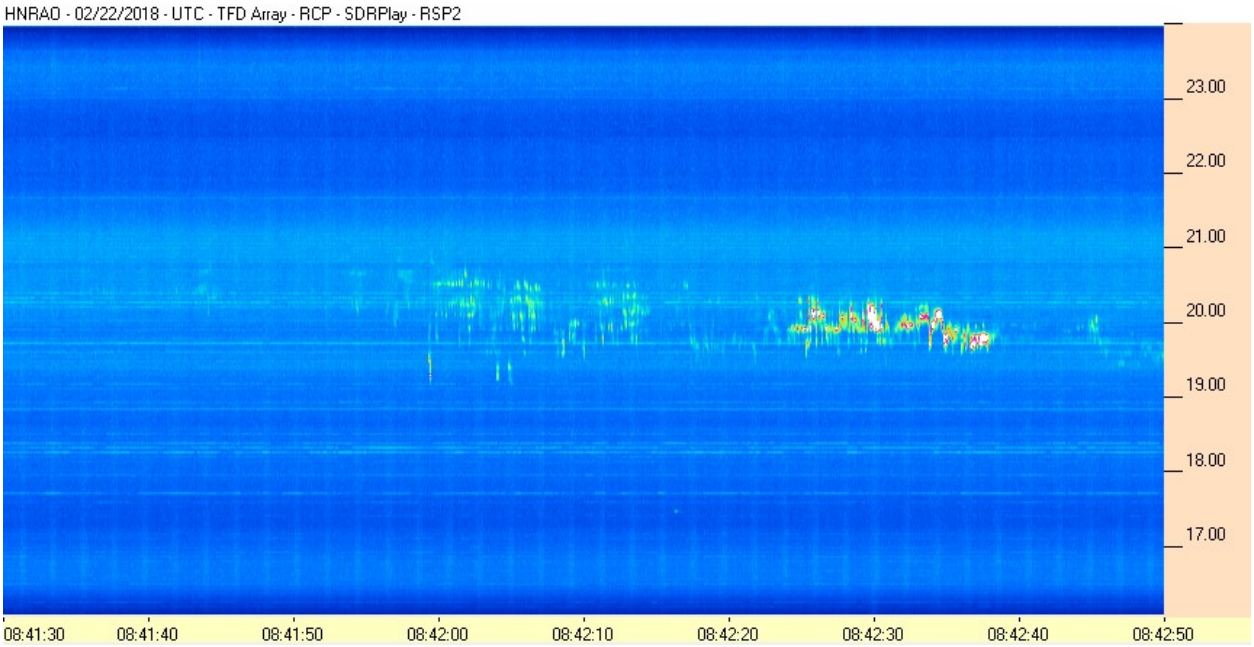
SDRPlay RSP2/TFD/RCP





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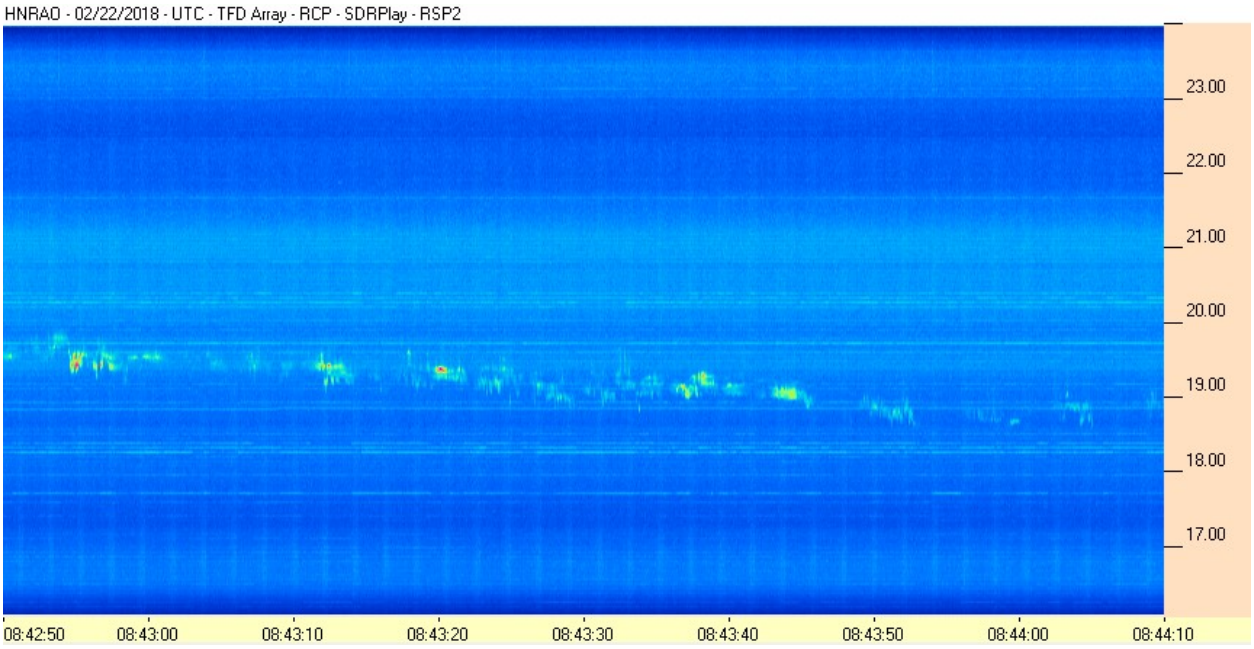

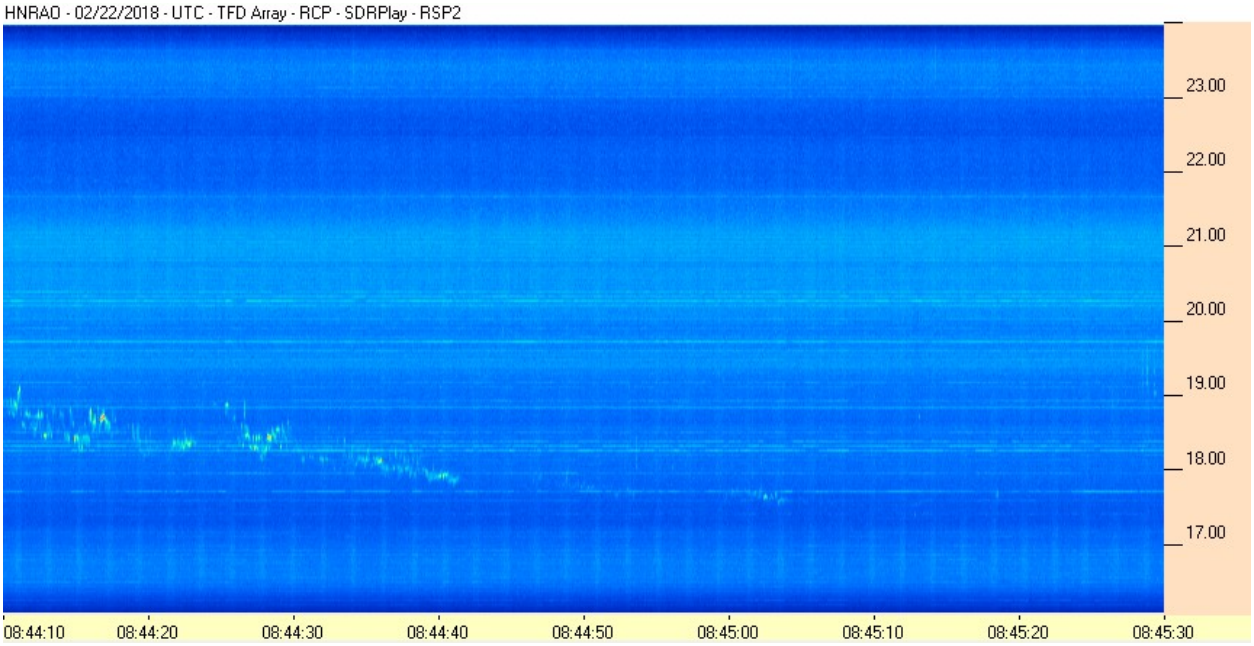

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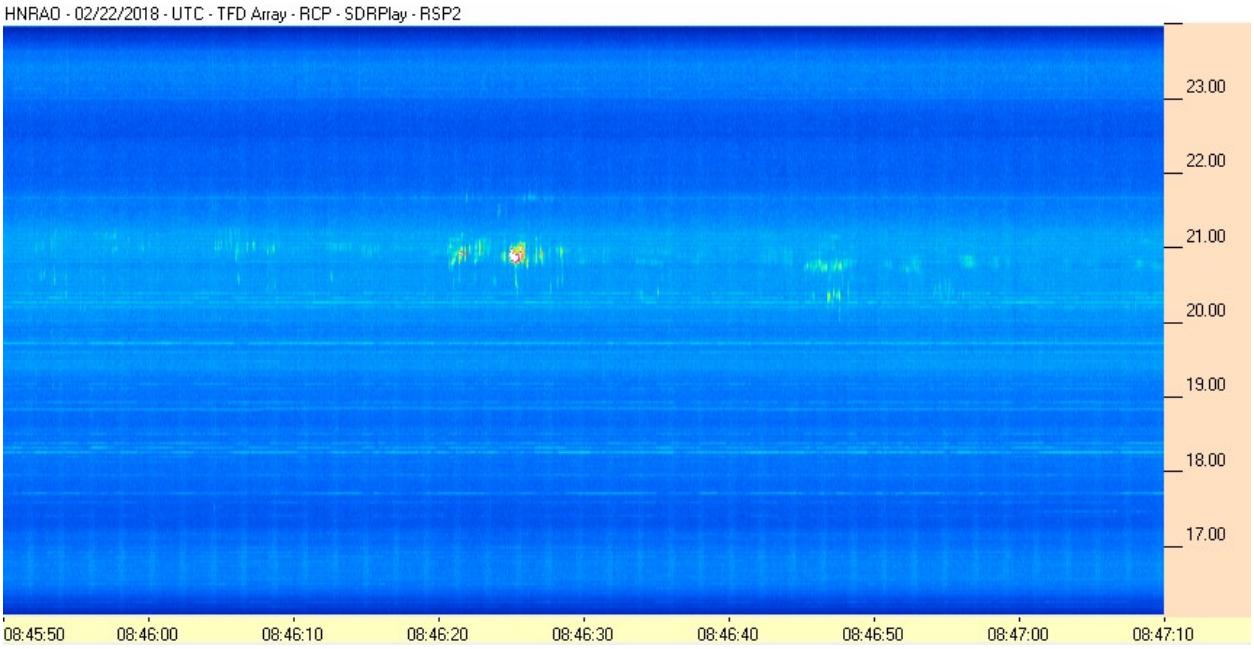

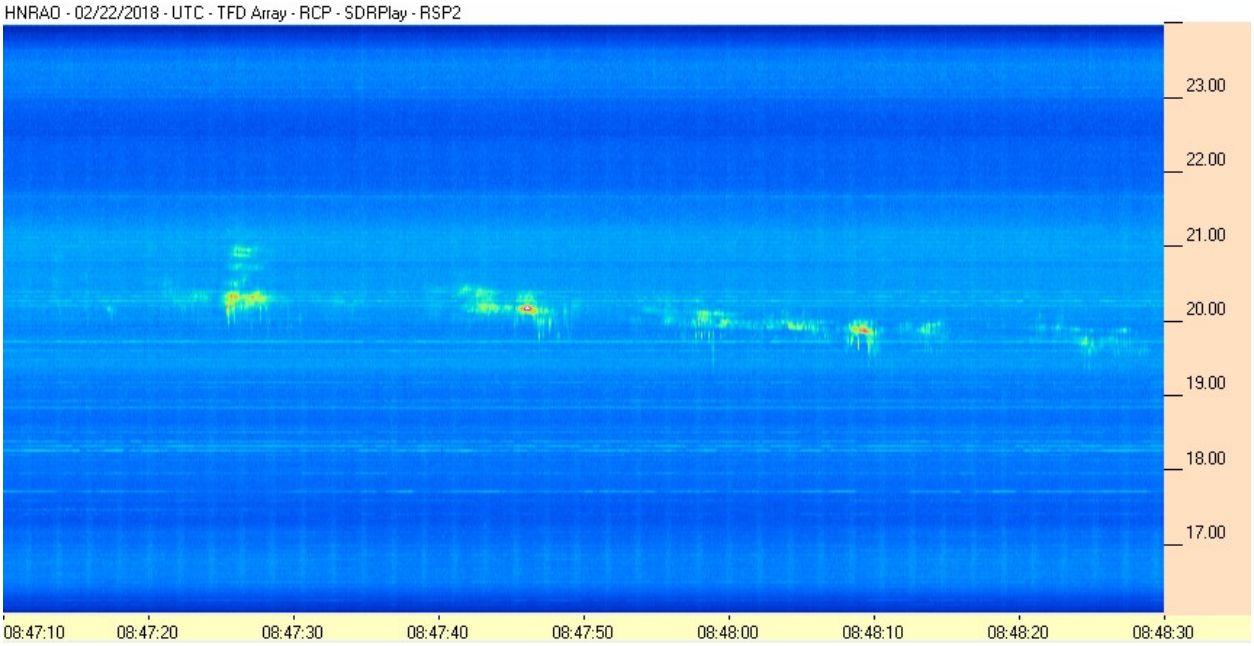

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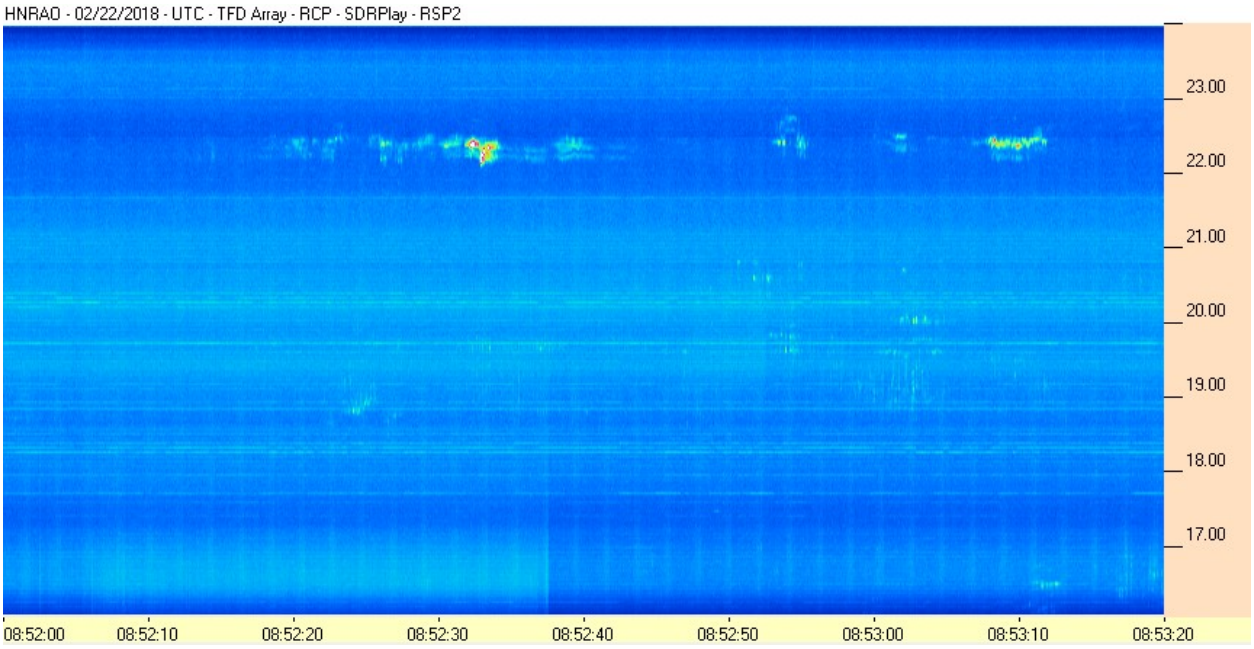

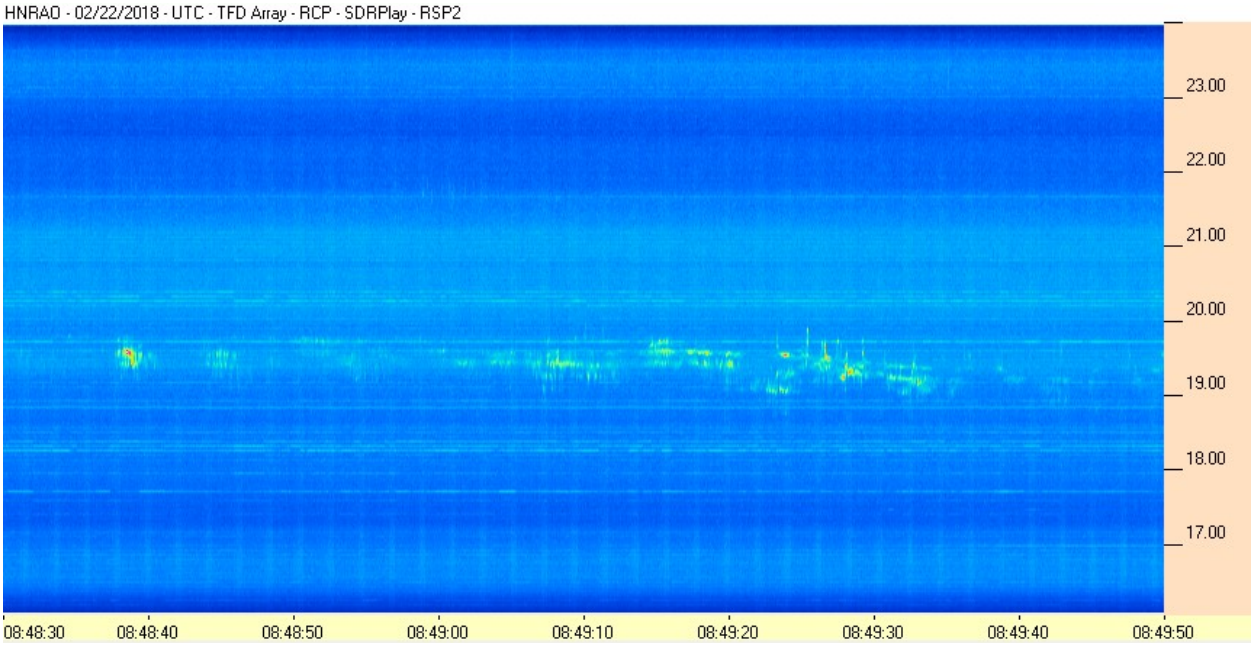

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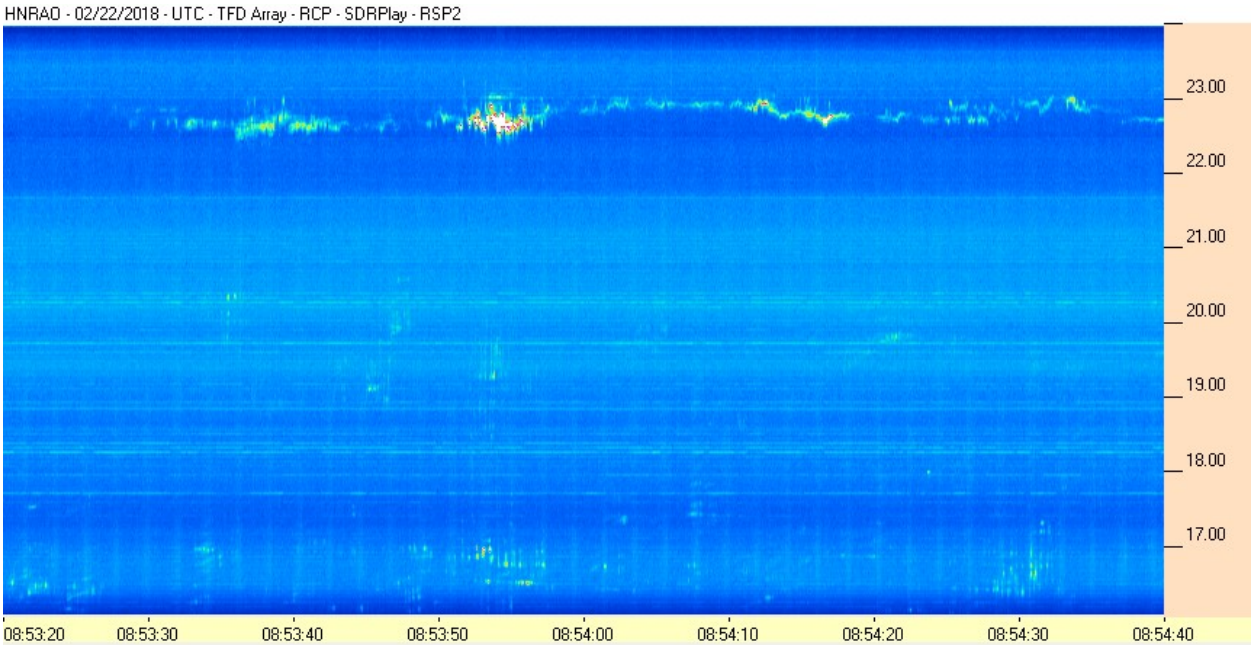

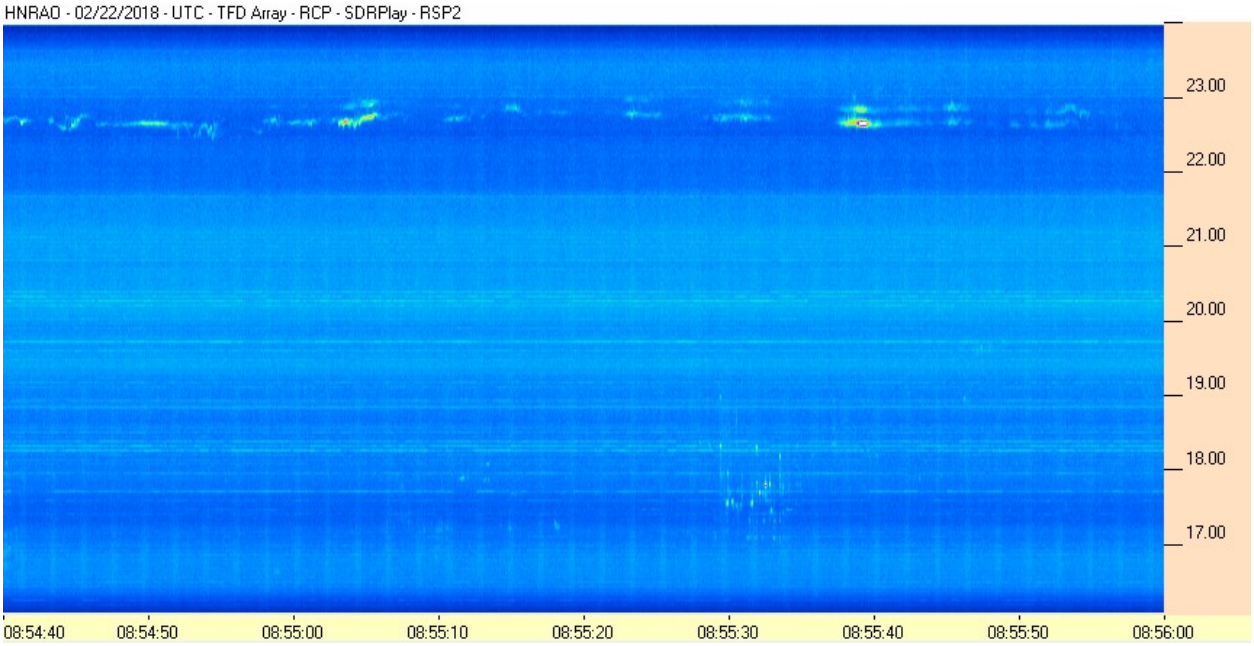

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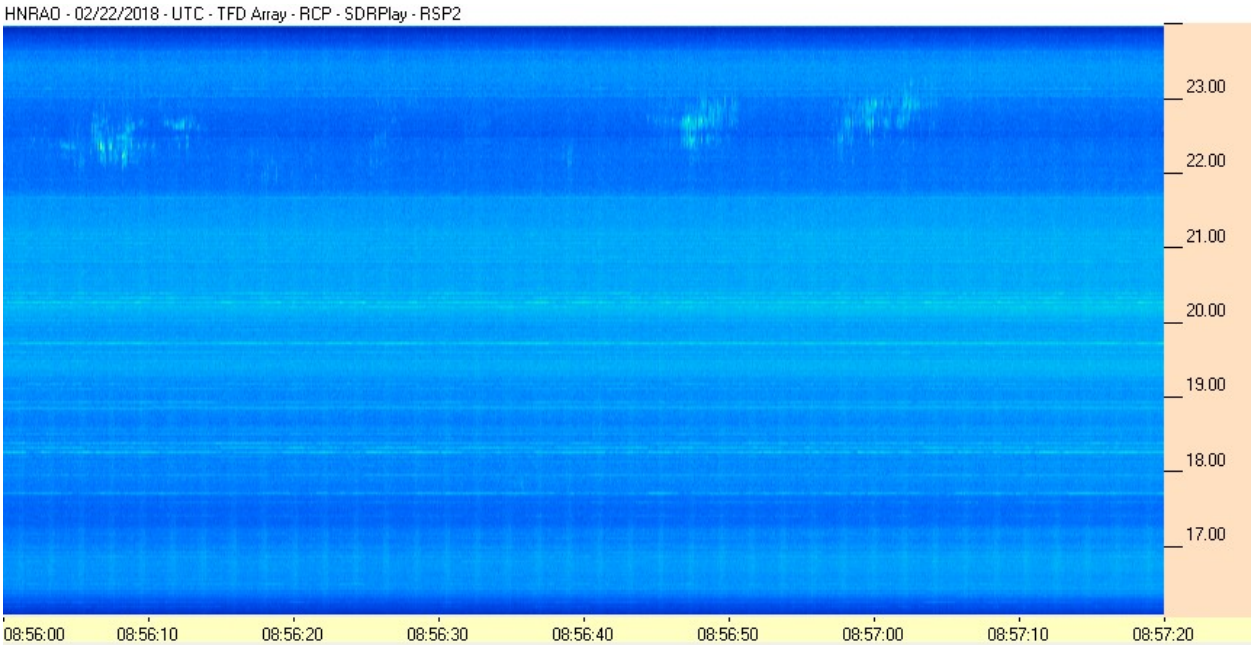

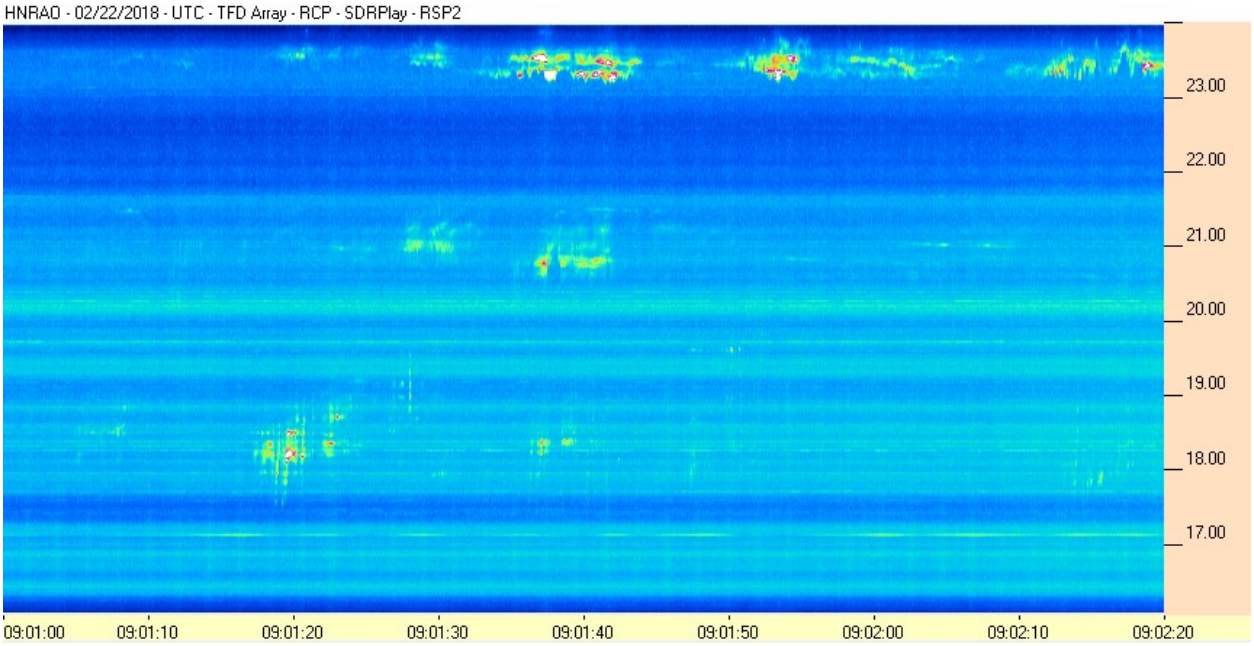

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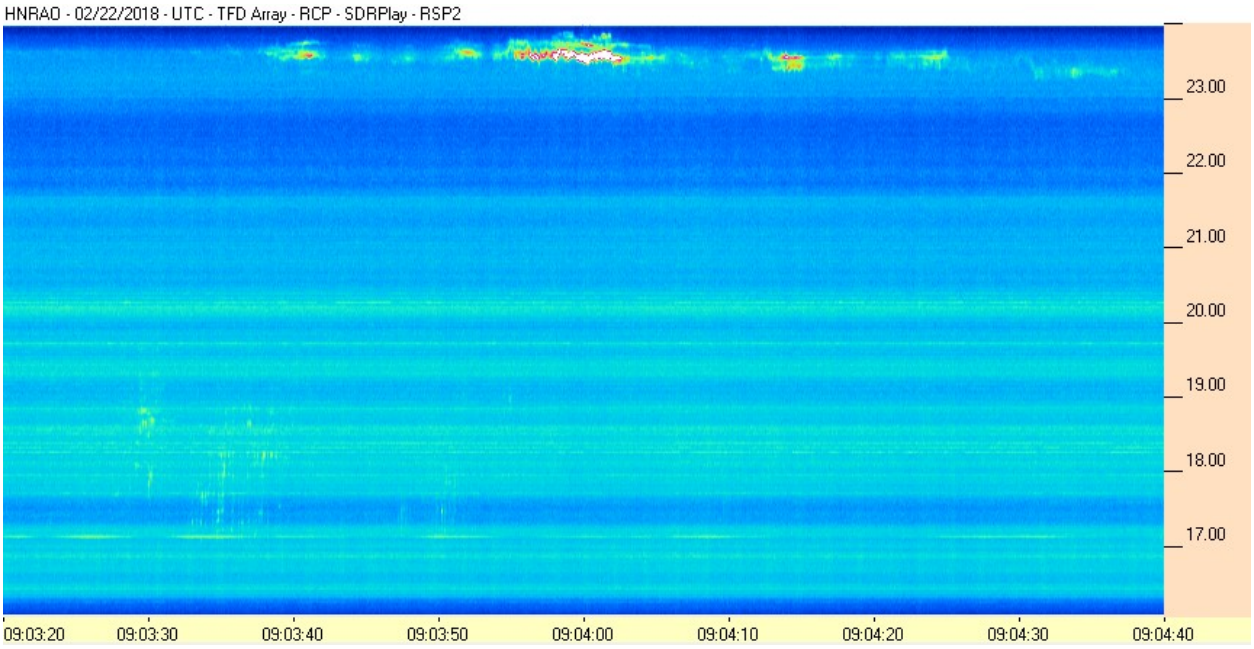

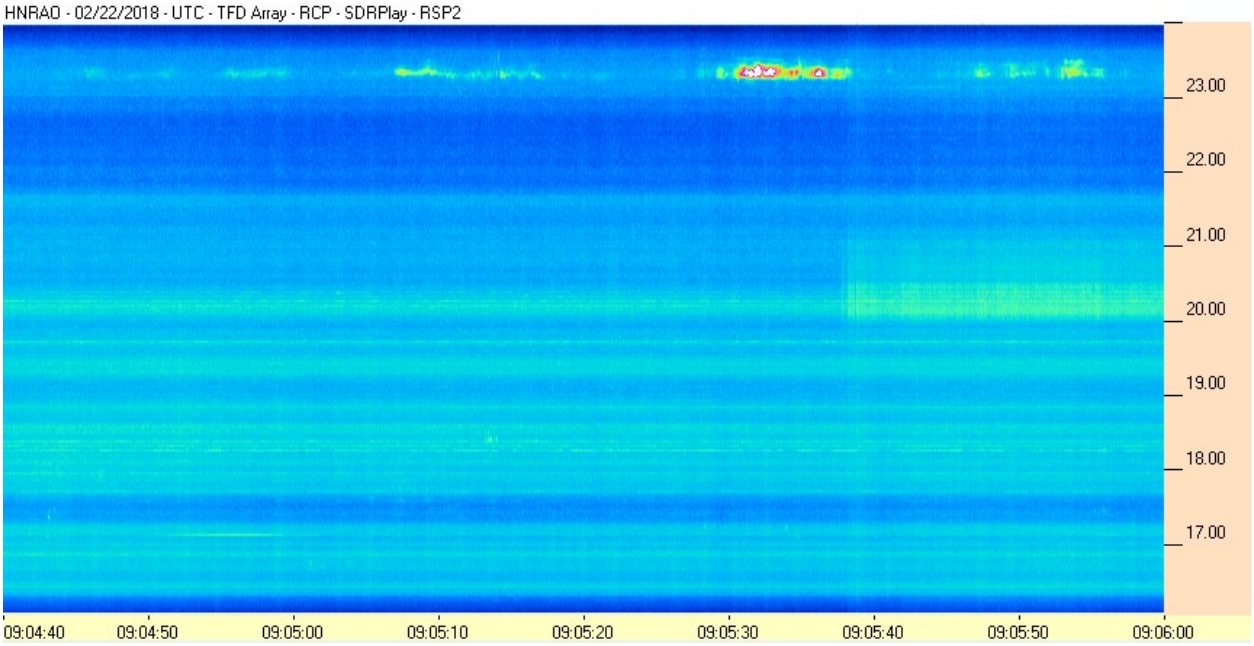

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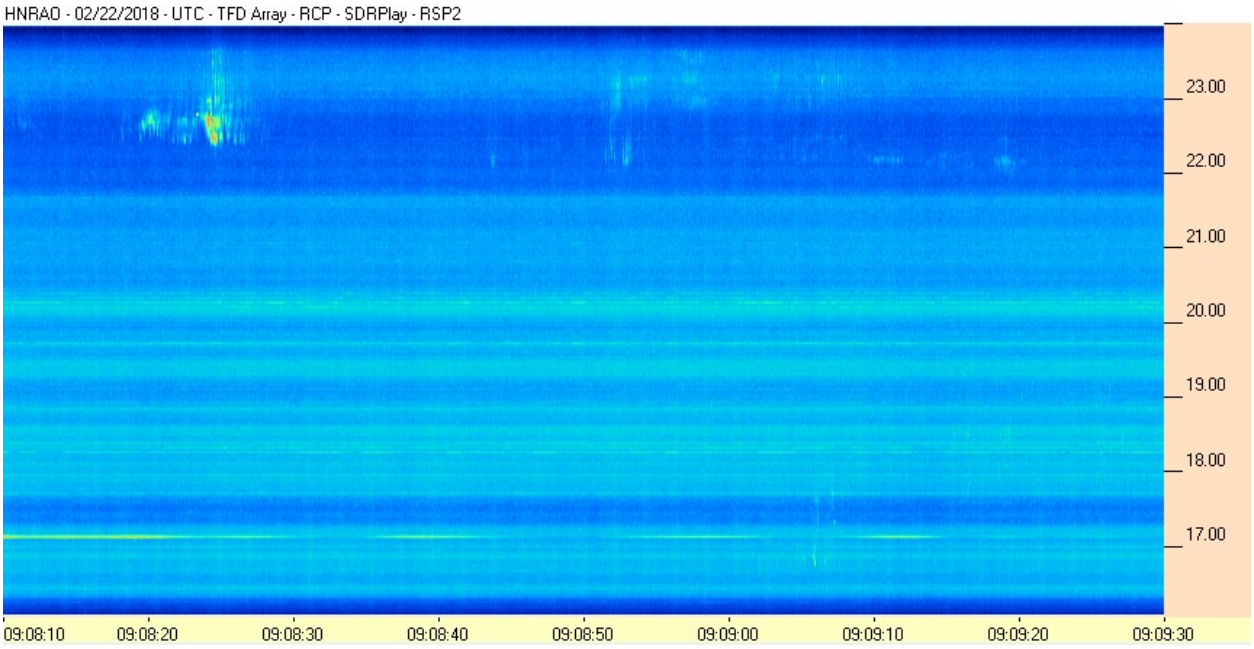
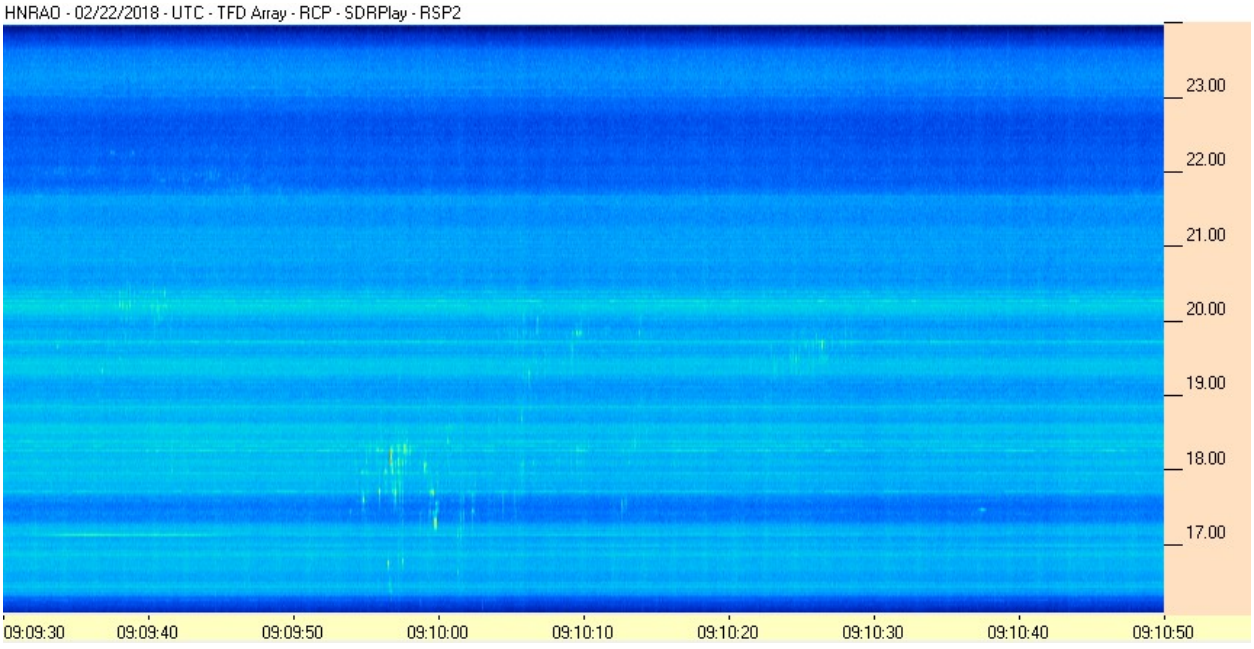
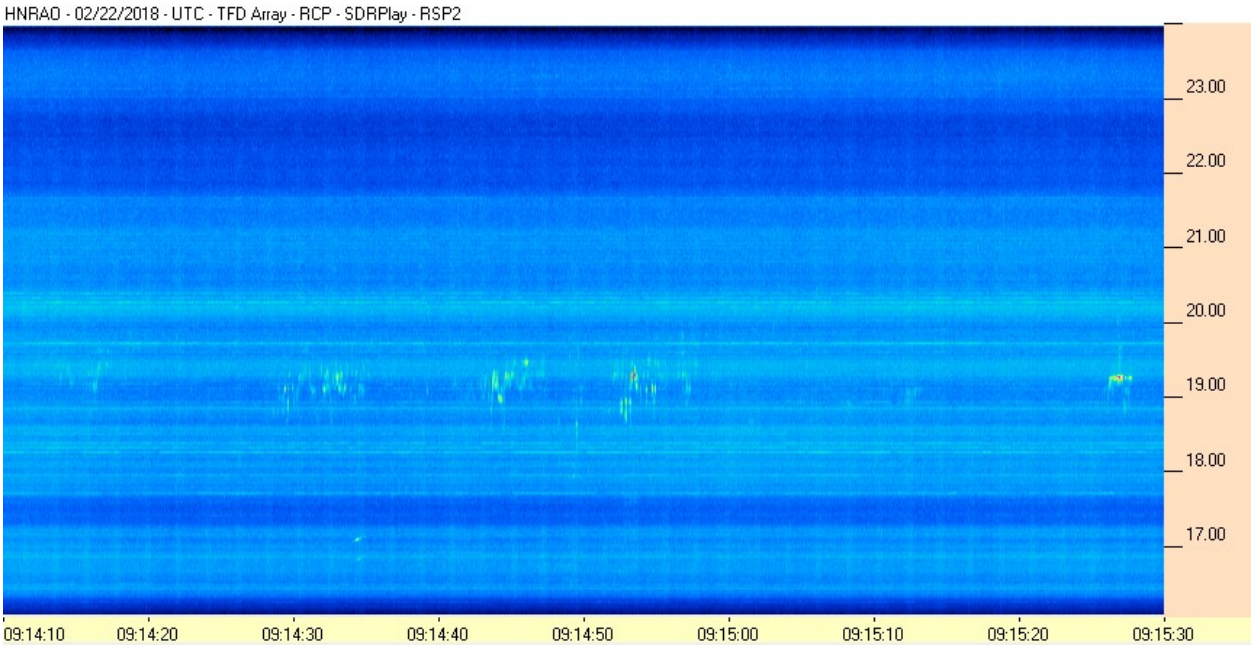
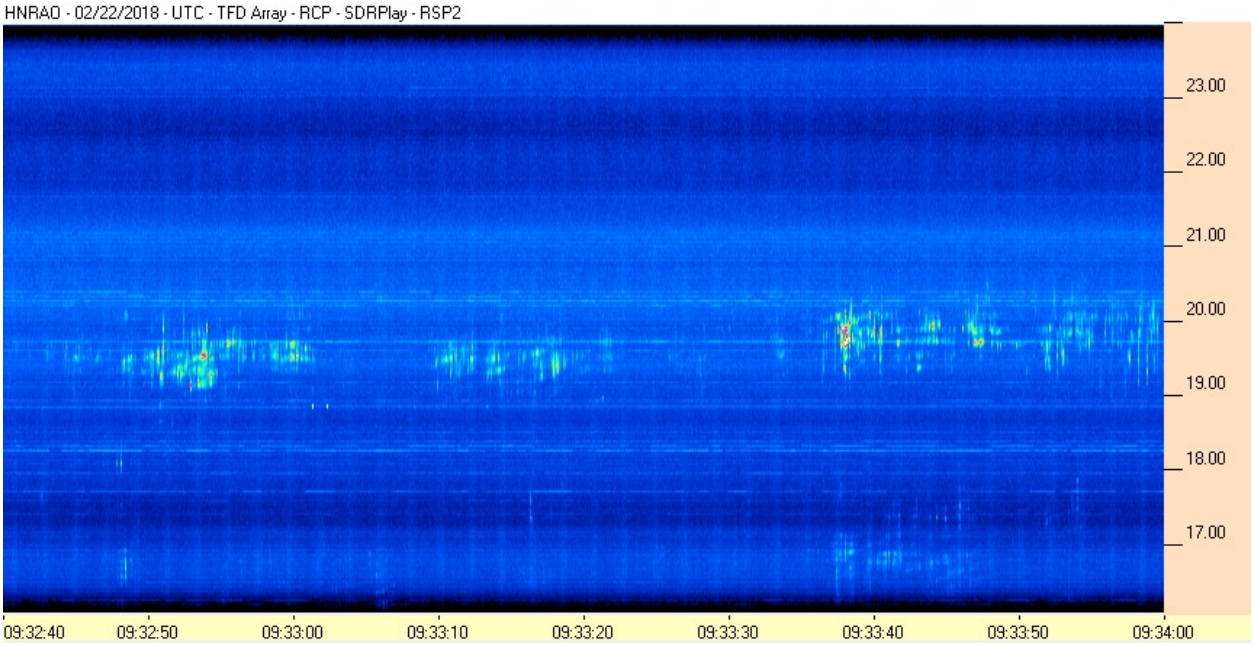
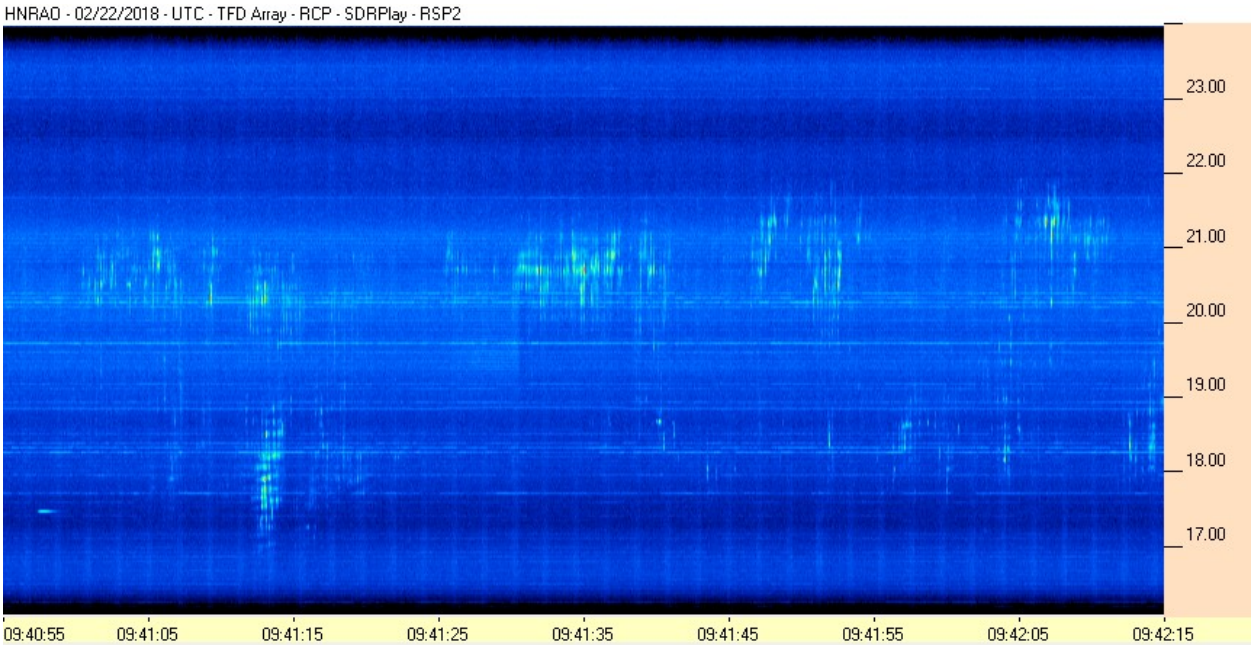





HNRAO - 02/22/2018 - UTC - TFD Array - RCP - SDRPlay - RSP2
23.00
22.00
21.00
20.00
19.00
18.00
17.00
09:14:10
09:14:20
09:14:30
09:14:40
09:14:50
09:15:00
09:15:10
09:15:20
09:15:30


HNRAO - 02/22/2018 - UTC - TFD Array - RCP - SDRPlay - RSP2
23.00
22.00
21.00
20.00
19.00
18.00
17.00
09:32:40
09:32:50
09:33:00
09:33:10
09:33:20
09:33:30
09:33:40
09:33:50
09:34:00


HNRAO - 02/22/2018 - UTC - TFD Array - RCP - SDRPlay - RSP2
23.00
22.00
21.00
20.00
19.00
18.00
17.00
09:40:55
09:41:05
09:41:15
09:41:25
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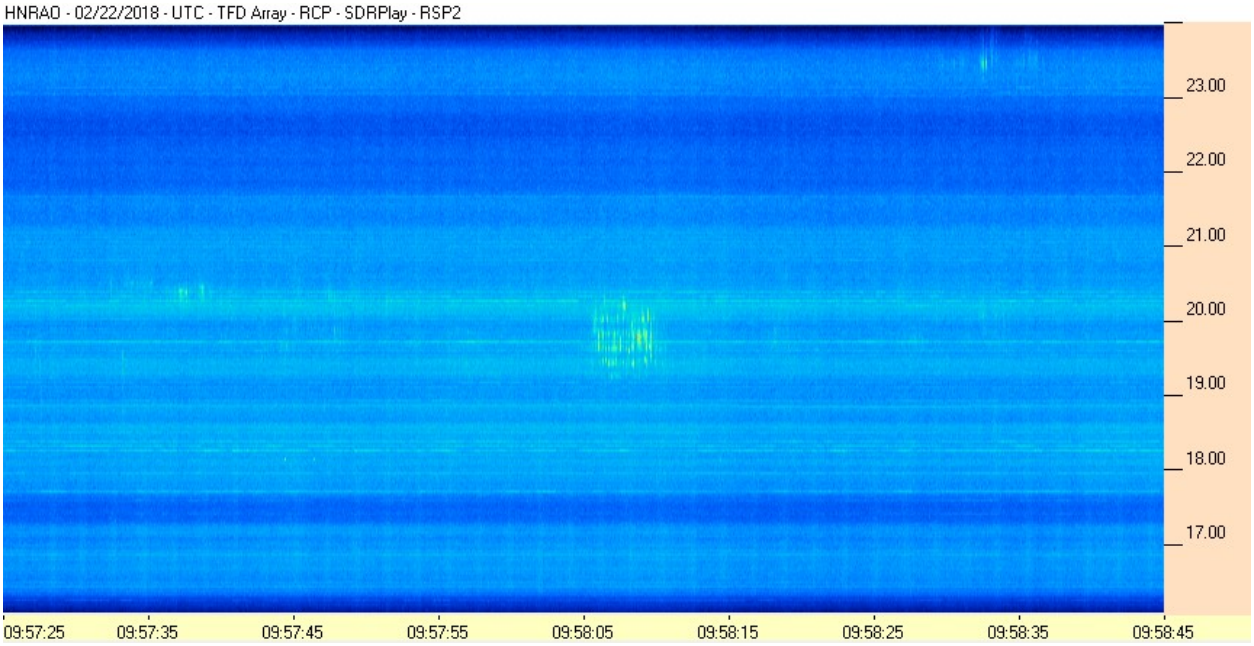
09:41:45
09:41:55
09:42:05
09:42:15


HNRAO - 02/22/2018 - UTC - TFD Array - RCP - SDRPlay - RSP2
23.00
22.00
21.00
20.00
19.00
18.00
17.00
09:57:25
09:57:35
09:57:45
09:57:55
09:58:05
09:58:15
09:58:25
09:58:35
09:58:45

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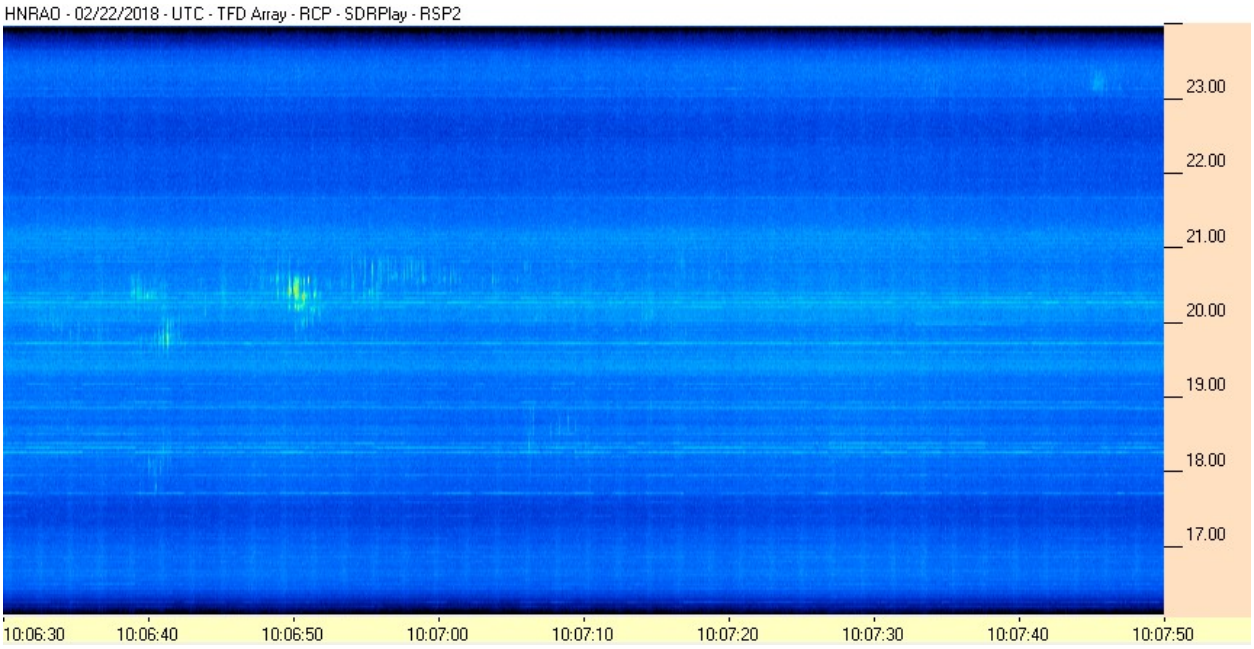
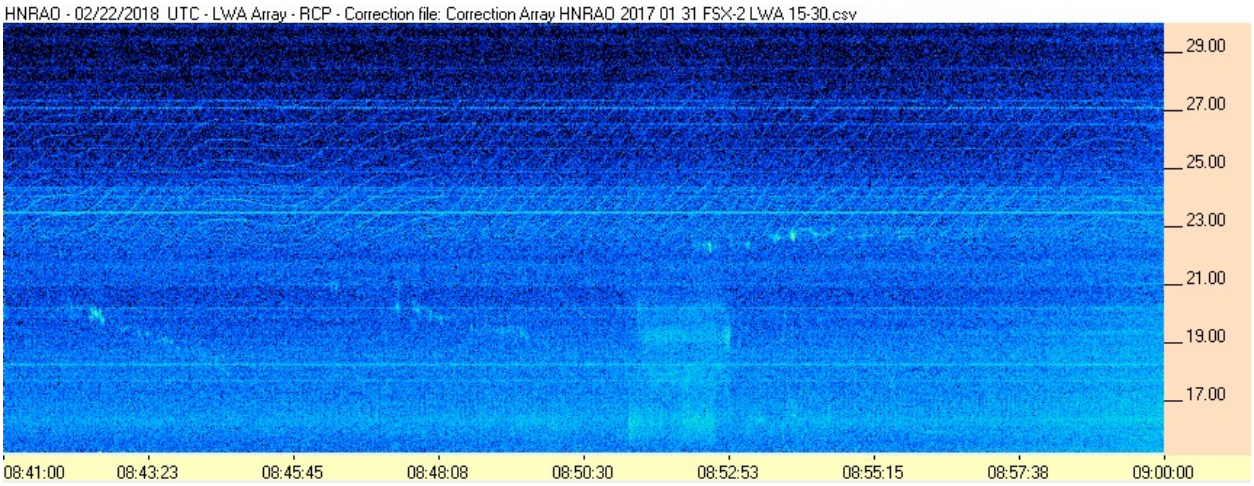
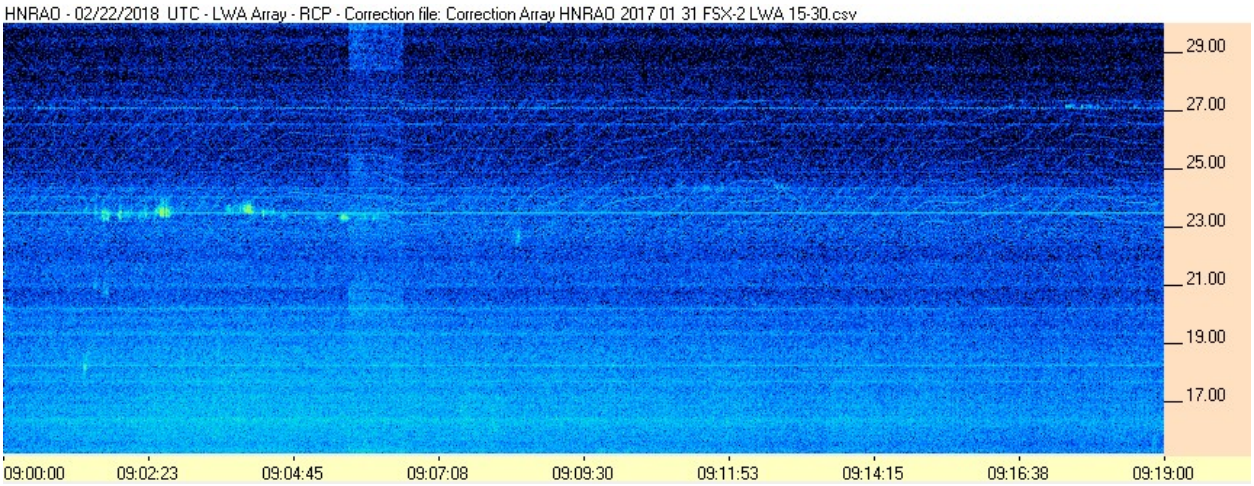
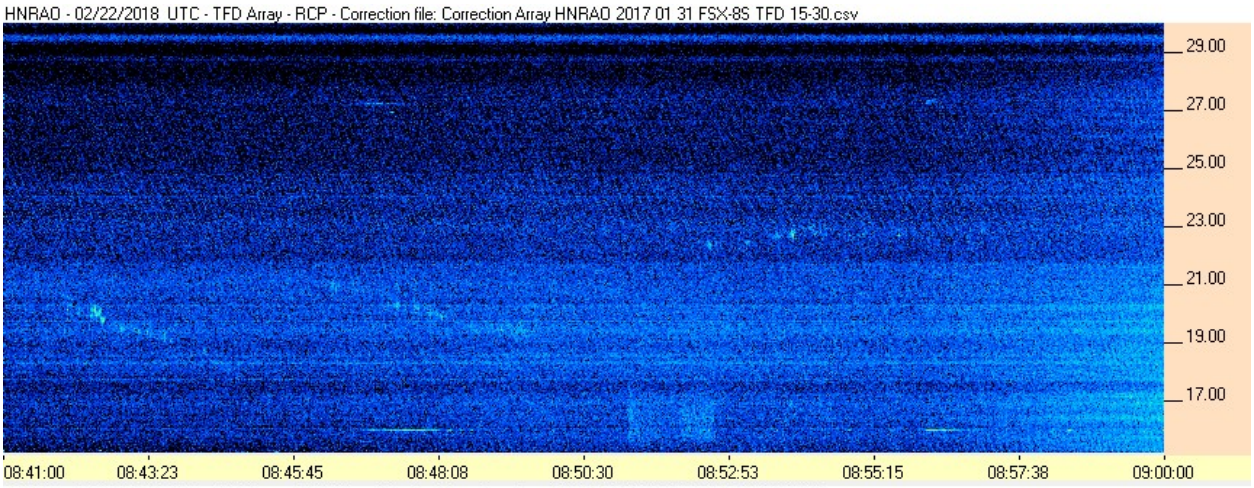


FSX-2/LWA





FSX-8S/TFD



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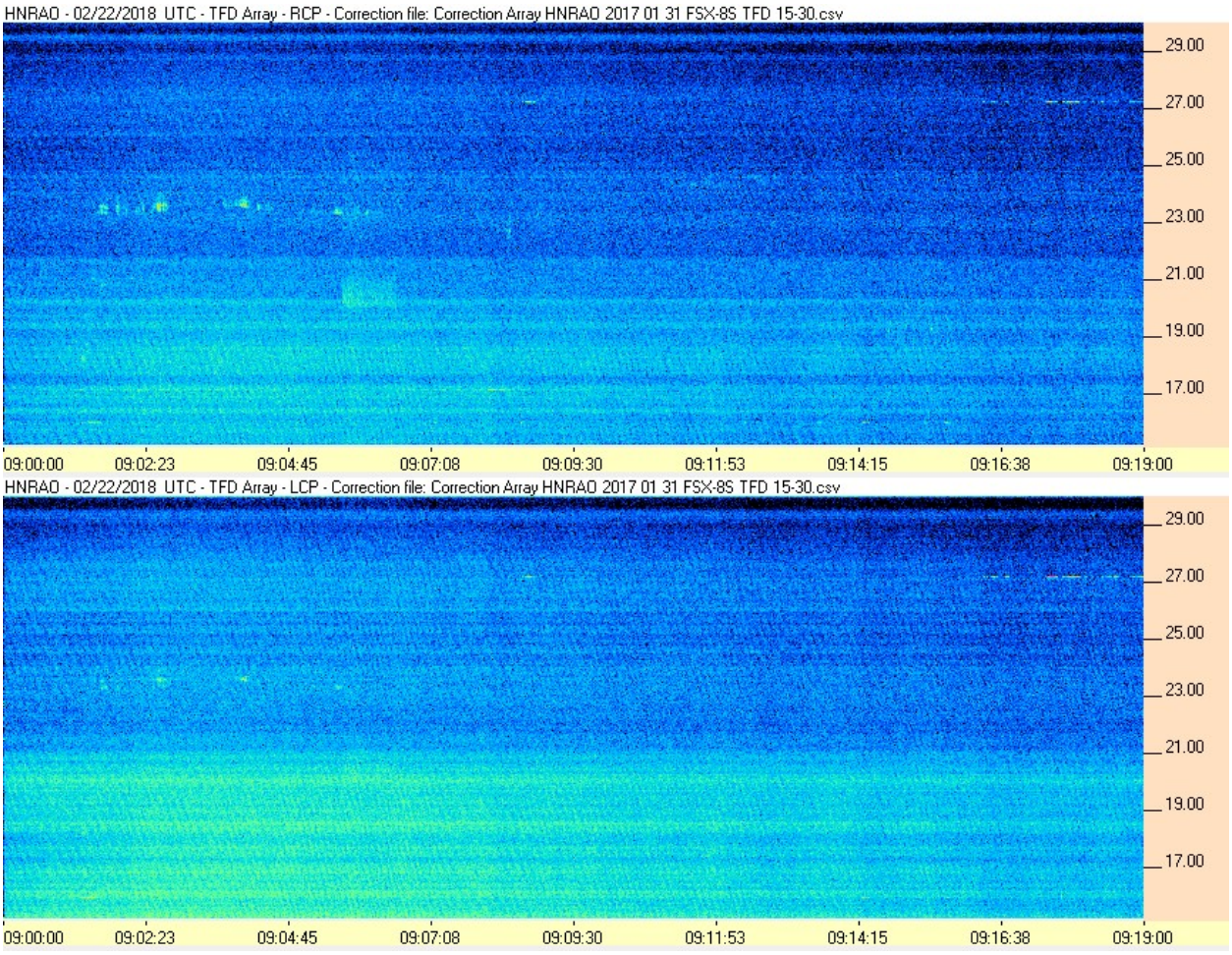

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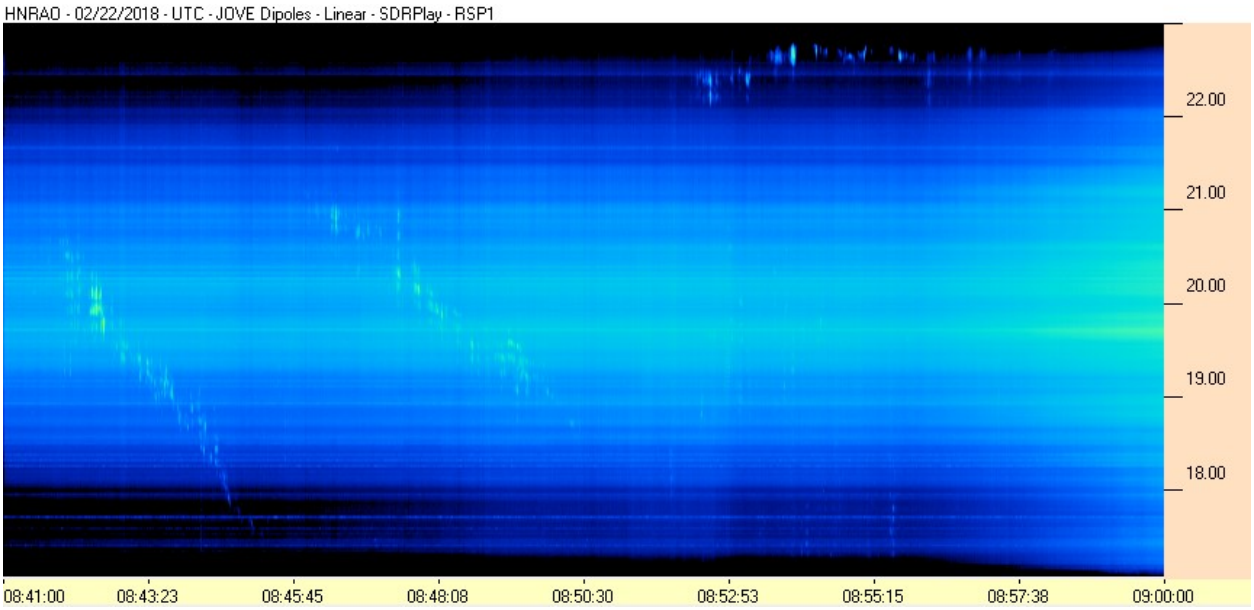
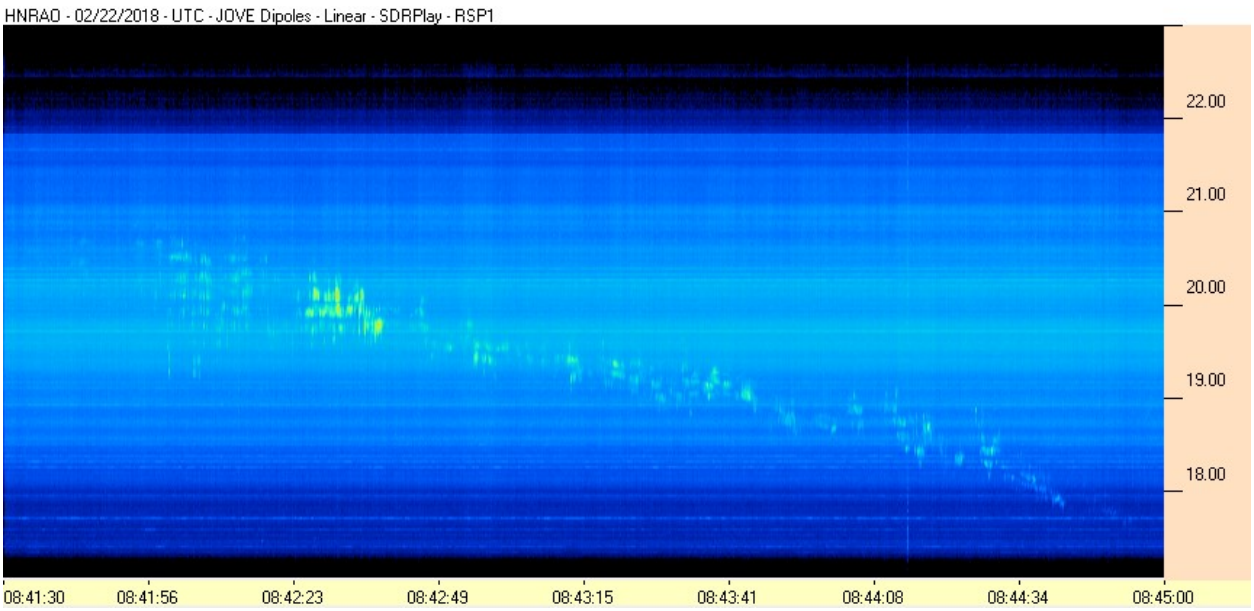
SDRPlay RSP1/JOVE Dipoles





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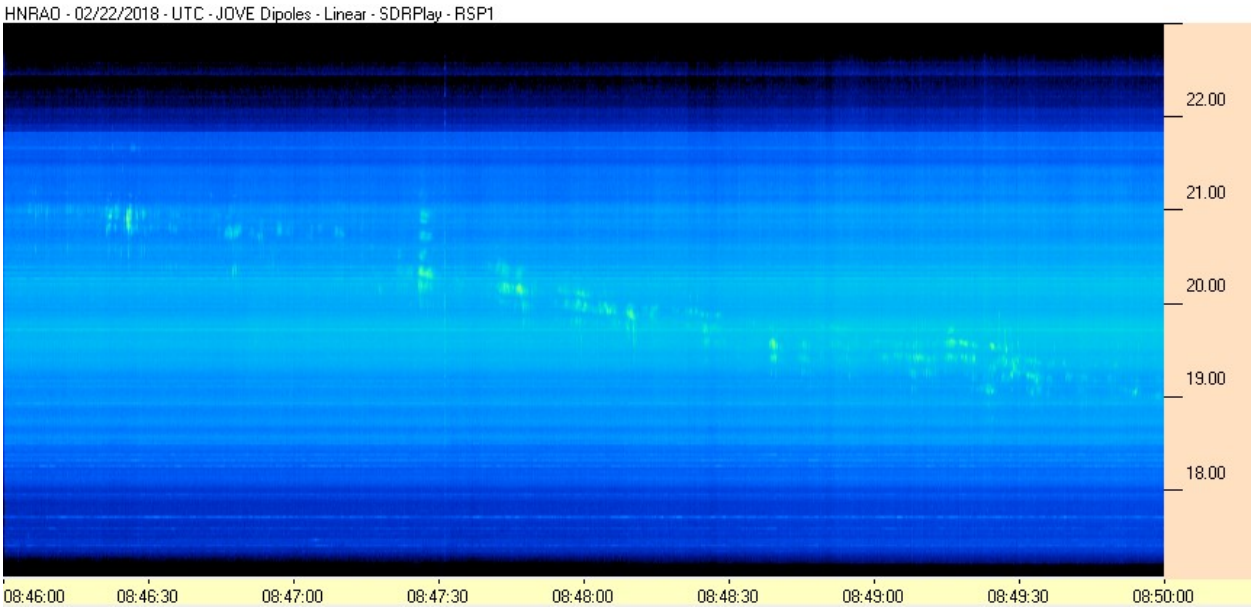

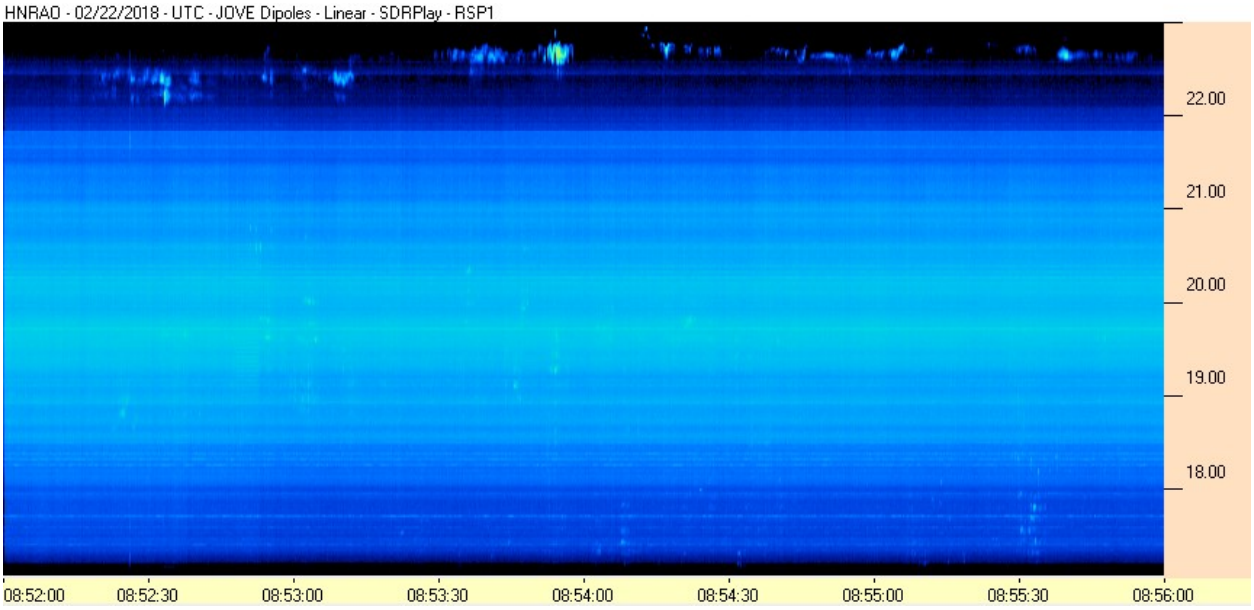

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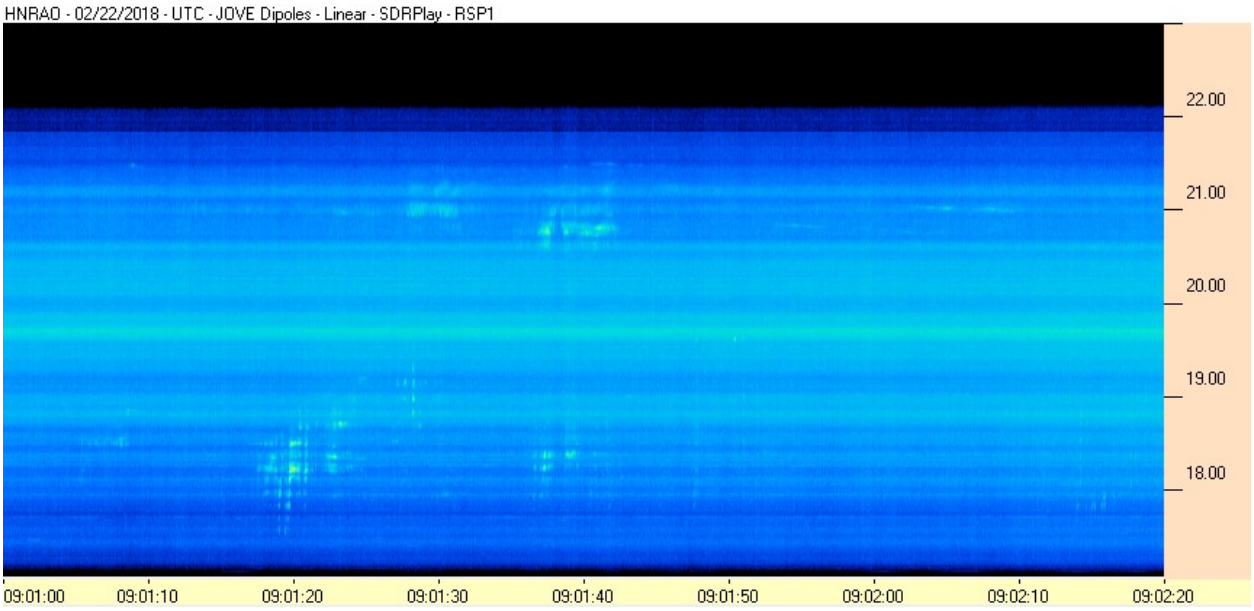

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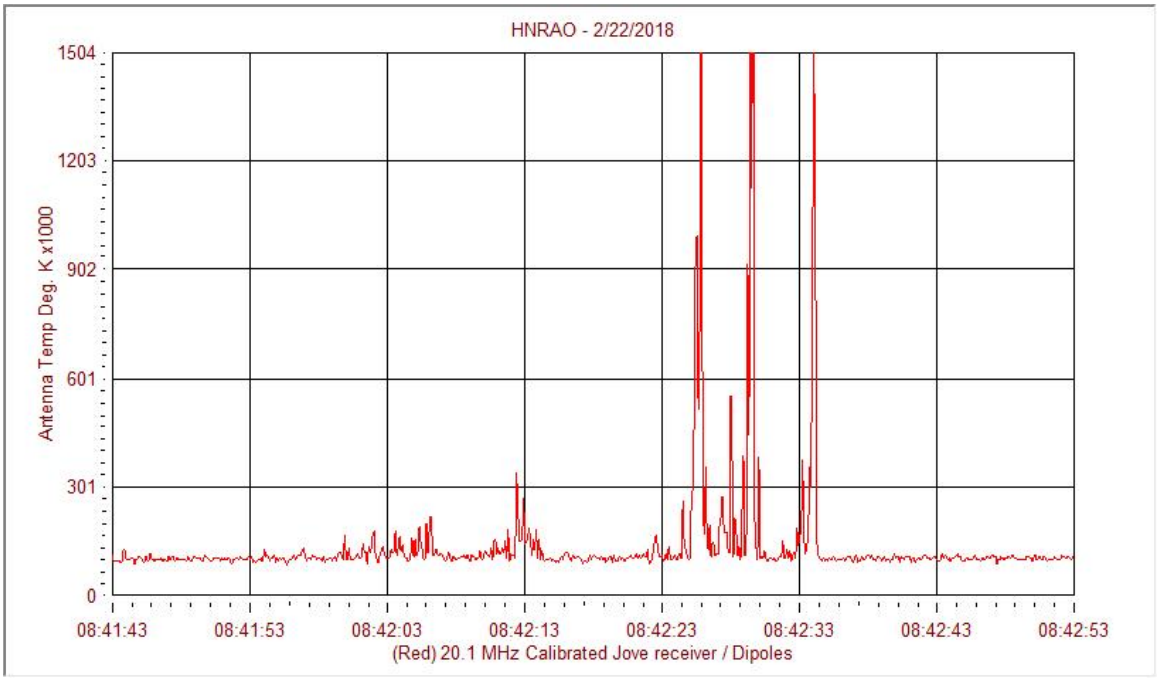
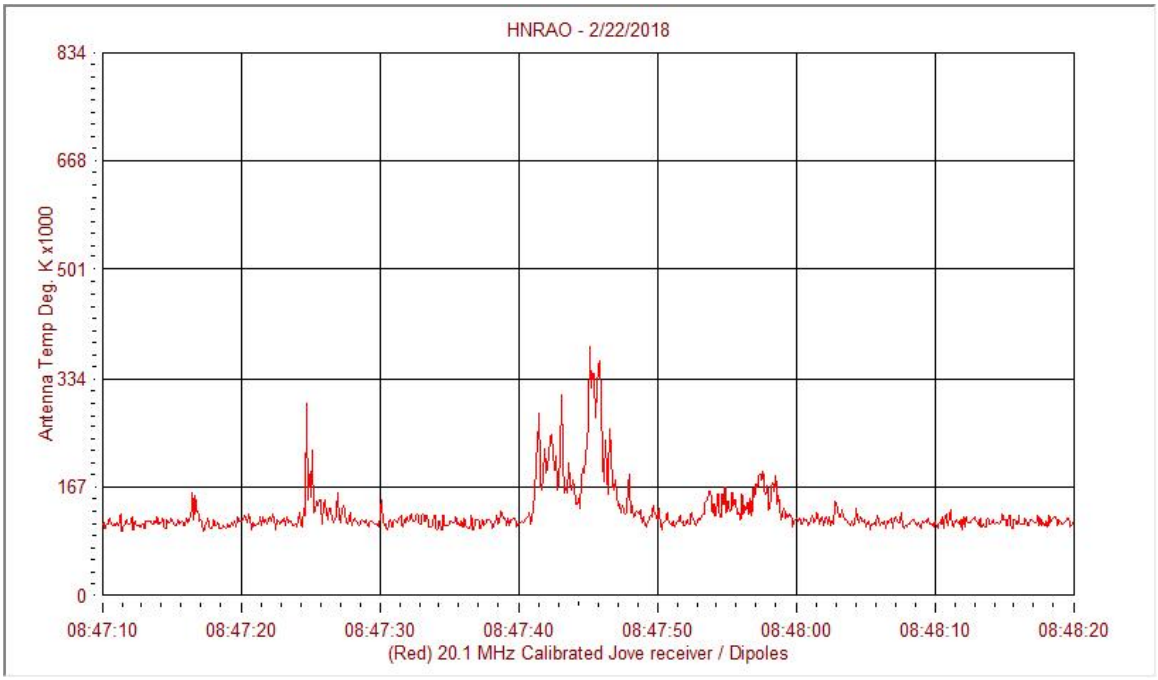
JOVE II receiver/JOVE dipole array





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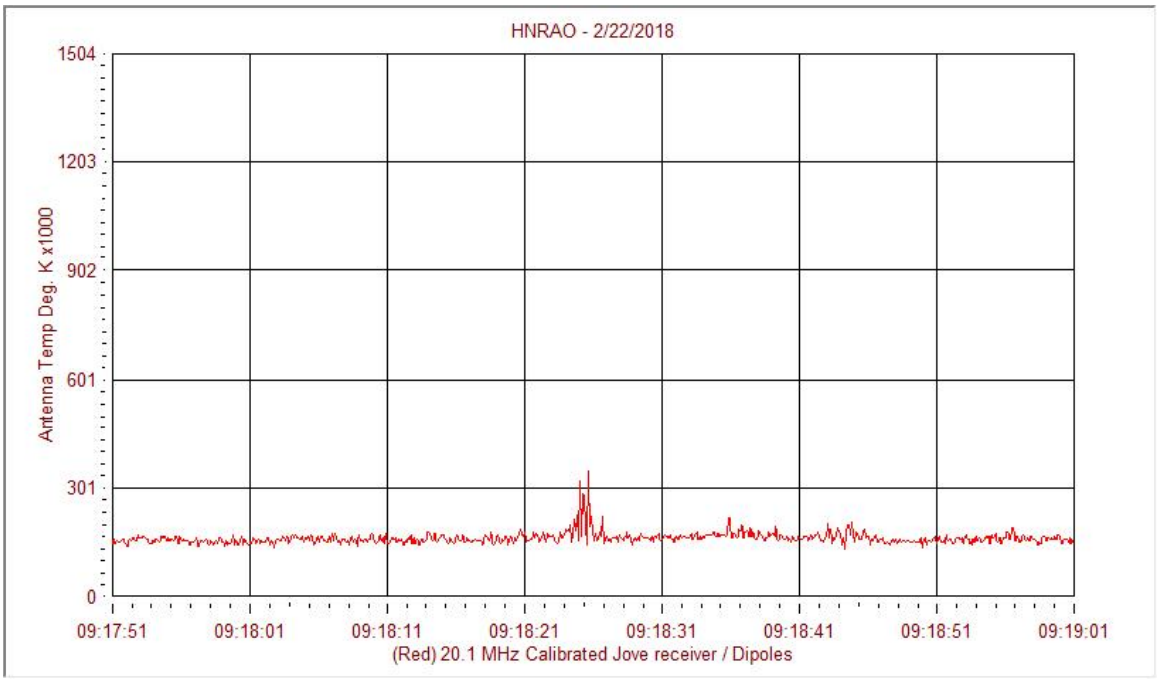

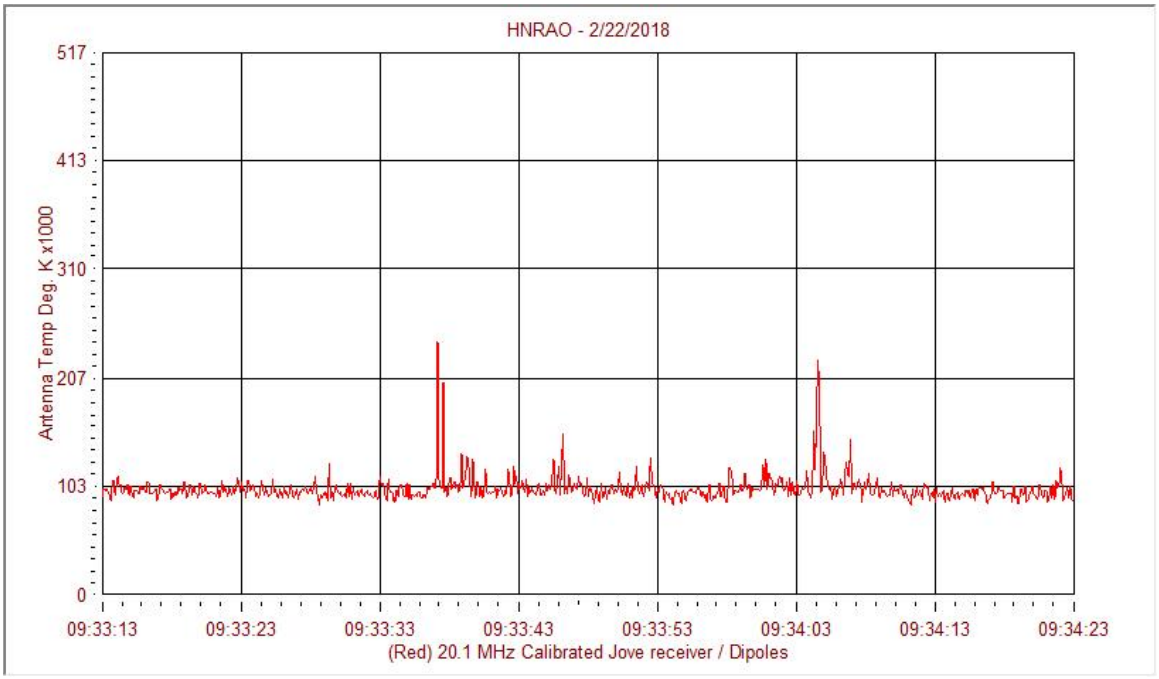

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Measured Modulation Lanes

Antenna	Start	Stop	Mid	Freq 1	Freq 2	Slope	CML	Io Phase	Equipment	Type	Center Freq
RHC	2/22/2018 09:32	2/22/2018 09:32	2/22/2018 09:32	19203	19675	118.1	157.7	80.3	SDRPlay	S2	19.4
RHC	2/22/2018 09:32	2/22/2018 09:32	2/22/2018 09:32	19242	19636	115.7	157.8	80.3	SDRPlay	S2	19.4
RHC	2/22/2018 09:33	2/22/2018 09:33	2/22/2018 09:33	19302	19675	106.8	158	80.3	SDRPlay	S2	19.5
RHC	2/22/2018 09:33	2/22/2018 09:33	2/22/2018 09:33	19380	19813	105.6	158	80.3	SDRPlay	S2	19.6
RHC	2/22/2018 09:33	2/22/2018 09:33	2/22/2018 09:33	16468	16763	95.2	158.3	80.4	SDRPlay	S2	16.6
RHC	2/22/2018 09:33	2/22/2018 09:33	2/22/2018 09:33	16783	17039	79.9	158.3	80.4	SDRPlay	S2	16.9
RHC	2/22/2018 09:33	2/22/2018 09:33	2/22/2018 09:33	19361	19793	139.6	158.2	80.4	SDRPlay	S2	19.6
RHC	2/22/2018 09:41	2/22/2018 09:41	2/22/2018 09:41	17806	18003	109.3	162.8	81.4	SDRPlay	S2	17.9
RHC	2/22/2018 09:41	2/22/2018 09:41	2/22/2018 09:41	17688	17944	127.9	162.9	81.4	SDRPlay	S2	17.8
RHC	2/22/2018 09:41	2/22/2018 09:41	2/22/2018 09:41	16960	17177	103.1	162.8	81.4	SDRPlay	S2	17.1
RHC	2/22/2018 10:03	2/22/2018 10:03	2/22/2018 10:03	18160	18593	131.2	176.3	84.6	SDRPlay	S2	18.4
RHC	2/22/2018 10:06	2/22/2018 10:06	2/22/2018 10:06	20030	20364	176	178.3	85	SDRPlay	S2	20.2