HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq

Date: 5 May 2017

Object: Jupiter – Io-A

Observer: JB

Start of pass:	**0442 UT**	**Planetary K-index:**	**2**
Jupiter Altitude (deg):	**41.6**	**Jupiter Azimuth (deg):**	**205.7**
Jupiter CML:	**195.71**	**Jupiter Io Phase:**	**215.12**
Jupiter RA (hr/min):	**12:57**	**Jupiter Dec (hr/min):**	**-04:27**
Hour Angle (hr/min):	**01:16**	**Polarization**	**RCP**
Sun Altitude (deg):	**-33.2**	**Sun Azimuth (deg):**	**215.6**
Sun RA (hr/min):	**02:42**	**Sun Dec (hr/min):**	**15.45**

End of pass:	**0616 UT**		
Jupiter Altitude (deg):	**30.4**	**Jupiter Azimuth (deg):**	**231.4**
Jupiter CML:	**252.54**	**Jupiter Io Phase**	**228.52**
Hour Angle (hr/min):	**02:50**		
Sun Altitude (deg):	**-31.6**	**Sun Azimuth (deg):**	**018.4**

Observations made using:

1. FSX-8S fed by the TFD array
    a. 7.7 dB loss between TFD and Multicouplers.
    b. Connect to array through HNRAO Multicoupler #1 and #2, port 2
        i. HNRAO Multicoupler #1 – TFD/LCP
        ii. HNRAO Multicoupler #2 – TFD/RCP
            1. Port 1 having 10 dB of gain, all other ports have 3 dB gain.
2. FSX-2 fed by the LWA array directly
    a. LWA element configuration – 90 degrees
3. JOVE 2 receiver fed by phased JOVE dipoles @ 13’
    a. 12’ 6” phase cable - phased for 2016-17 season
    b. Calibrated 19 April 2017
    c. Connected to dipoles through HNRAO Multicoupler #3, port 1.
        i. 3.165 dB loss between Multicoupler and dipoles.
4. Icom R75 receiver fed by experimental DDRR antenna directly.
    a. Calibrated 19 April 2017
5. SDRPlay
    a. RSP1 (2) and RSP2 (1)

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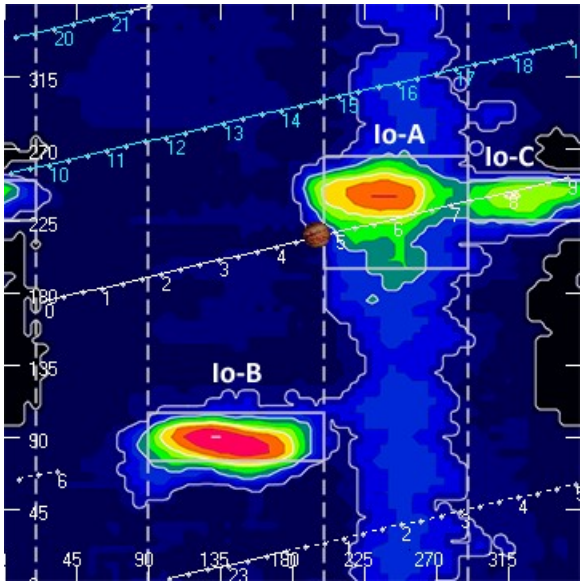
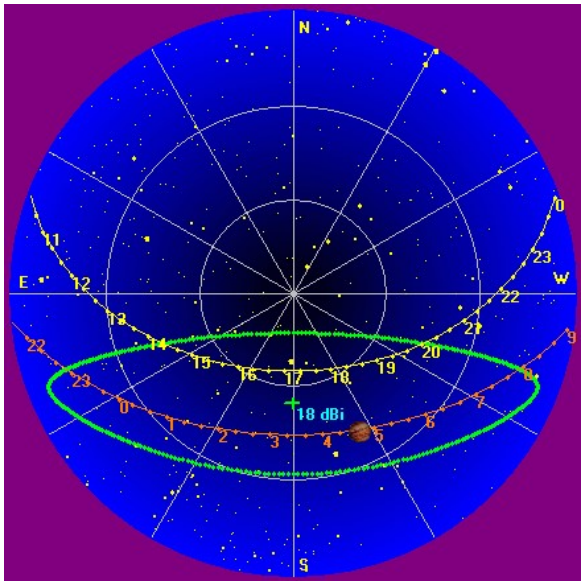
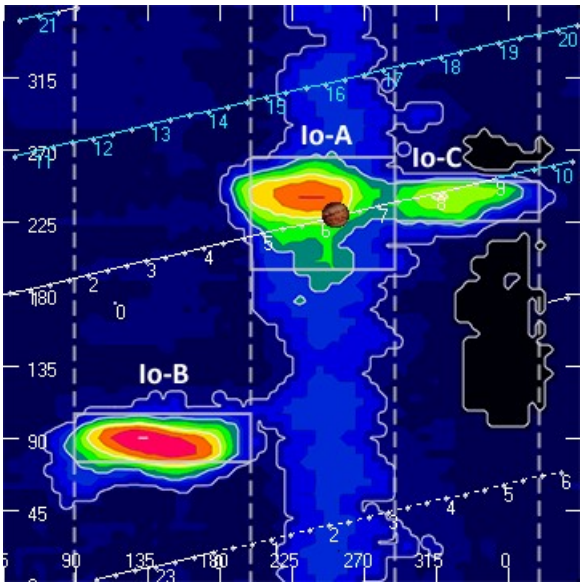
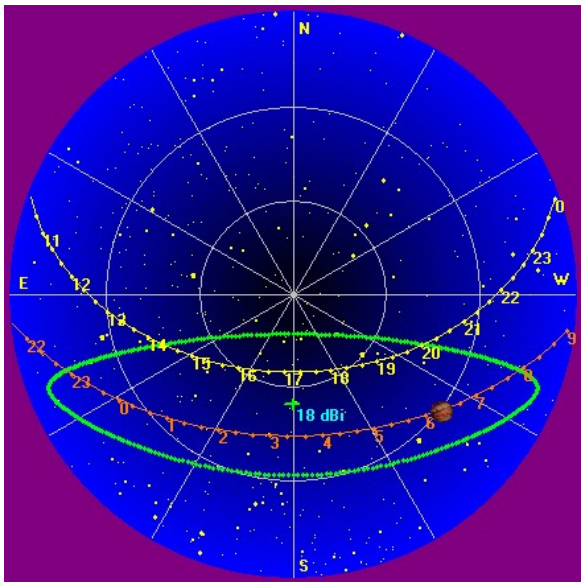


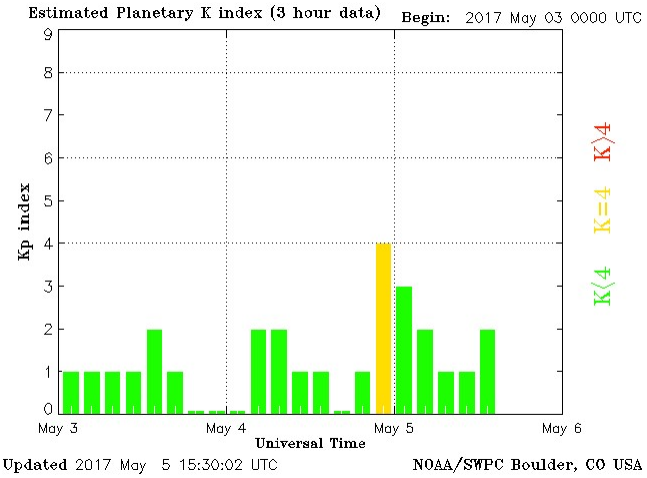


Beginning of Pass





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

An Io-A storm starting slightly earlier than indicated in the CML plot (above). L-burst drift rate undetermined by existing spectrographs. The FSX-2/LWA and FSX-8S/TFD did not resolve emissions clear enough to determine and the SDRPlay RSP2 scanning span was too narrow. L-burst emissions ranged from slightly above galactic background to strong. No S-bursts observed. Frequency range was measured from 15 MHz to 24 MHz. Negative drift modulation lanes, showing an increase in drift rate as frequency increases. Average drift rate measured at 0501 UT was -94 kHz/sec, from a low of -77 kHz/sec to a high of -121 kHz/sec. Measurements were taken at two different time periods during emissions and a plot of those measurements is presented at the end of this report. The plots suggest that an overall change in drift rate occurs throughout the storm. At 0456 UT, the drift rate at 20 MHz was -95 kHz/sec and at 0501 UT, the drift rate at 20 MHz was -105 kHz/sec. It's unknown if this difference is measurement error or a real phenomenon. More data will need to be collected so this will be investigated in other storms.

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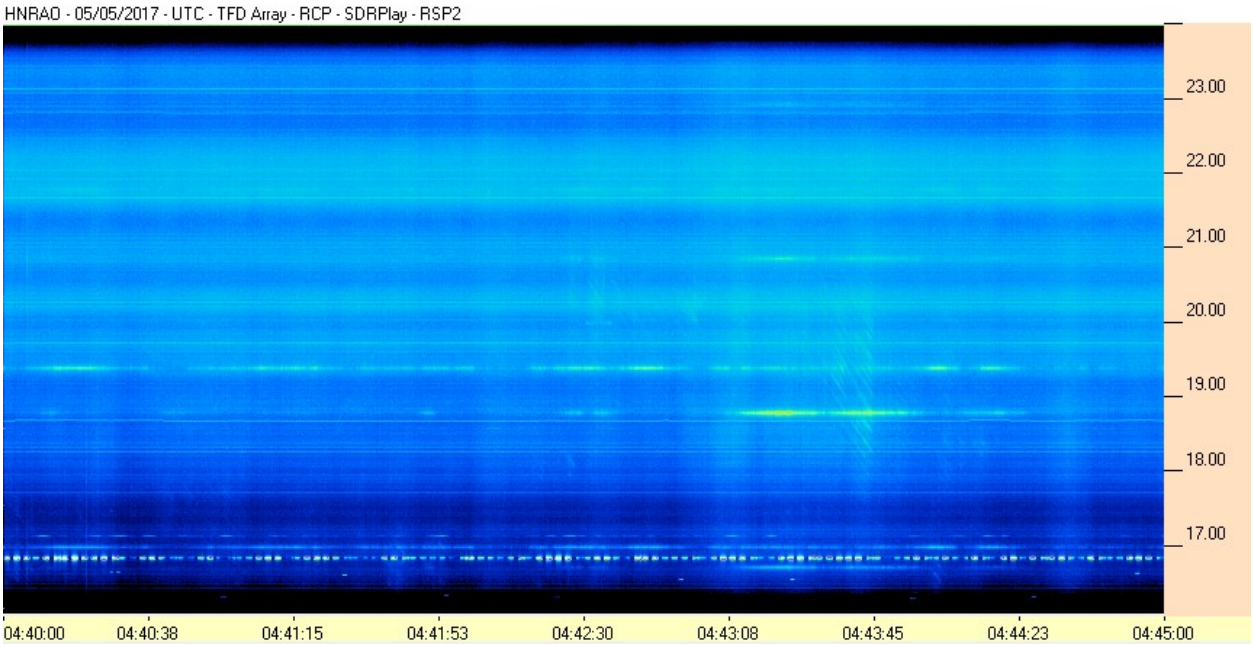
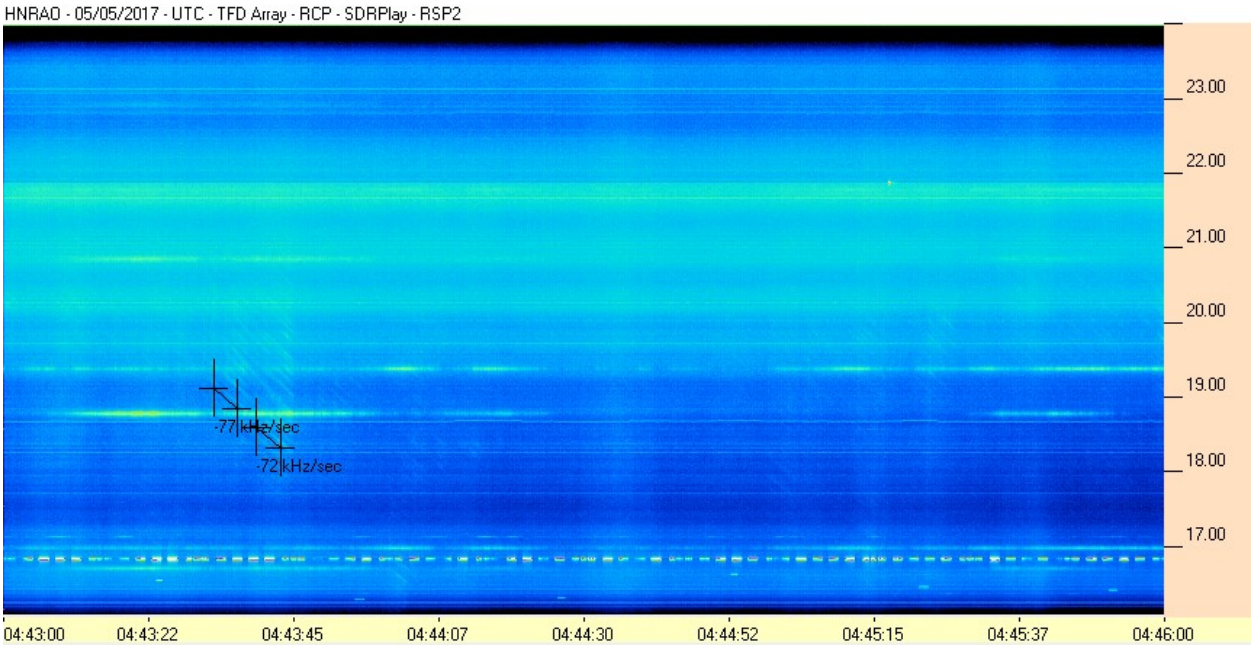
SDRPlay RSP2/TFD Pair





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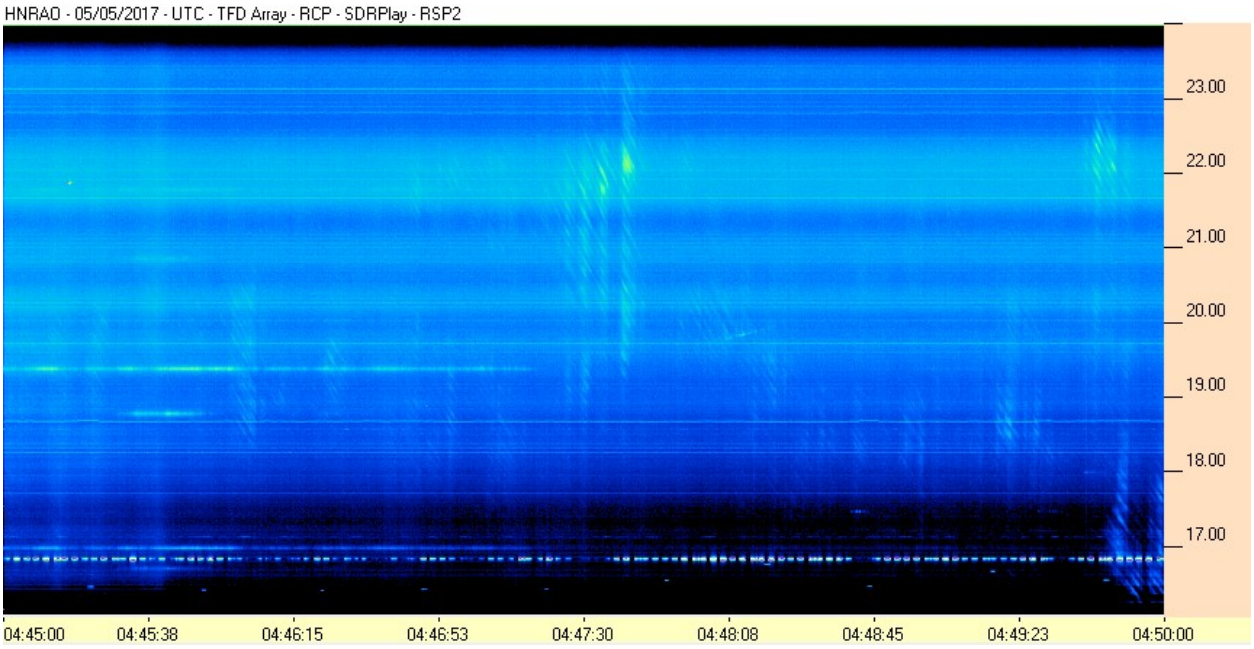

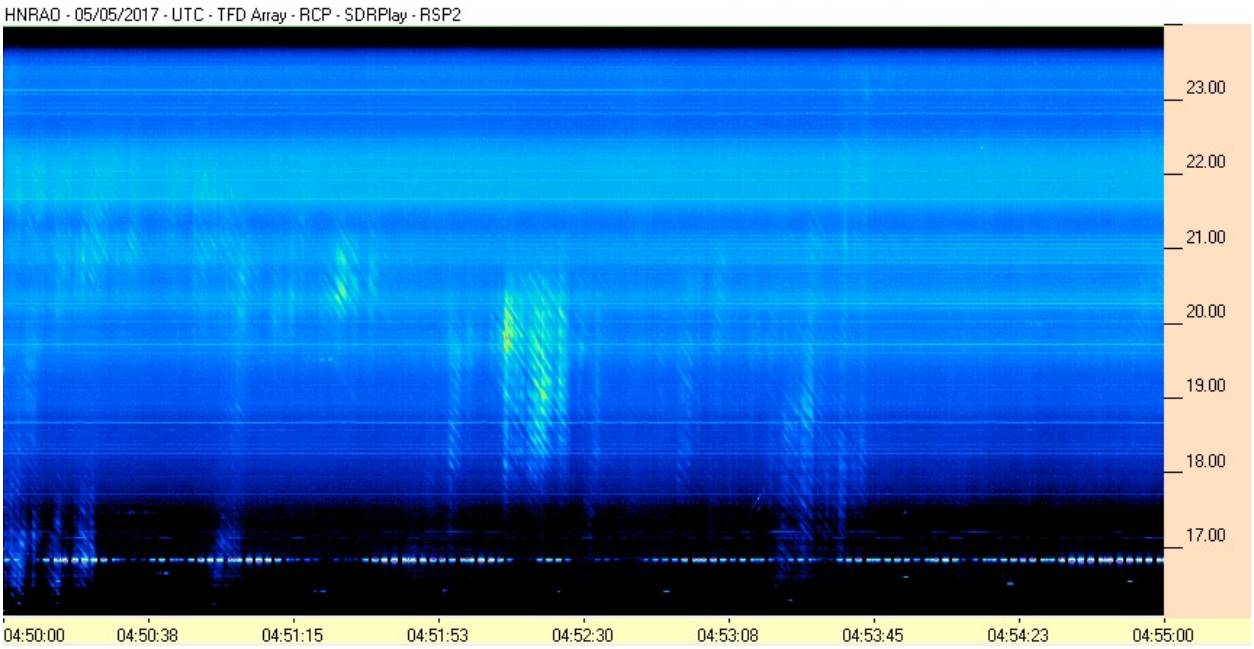

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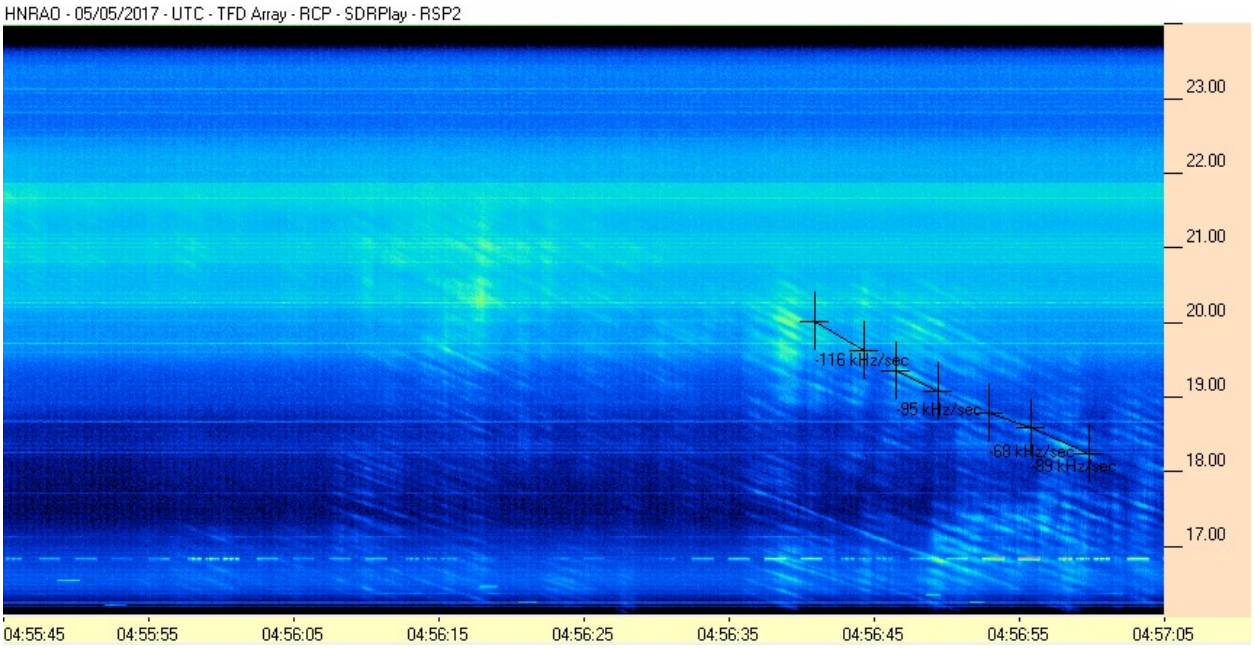

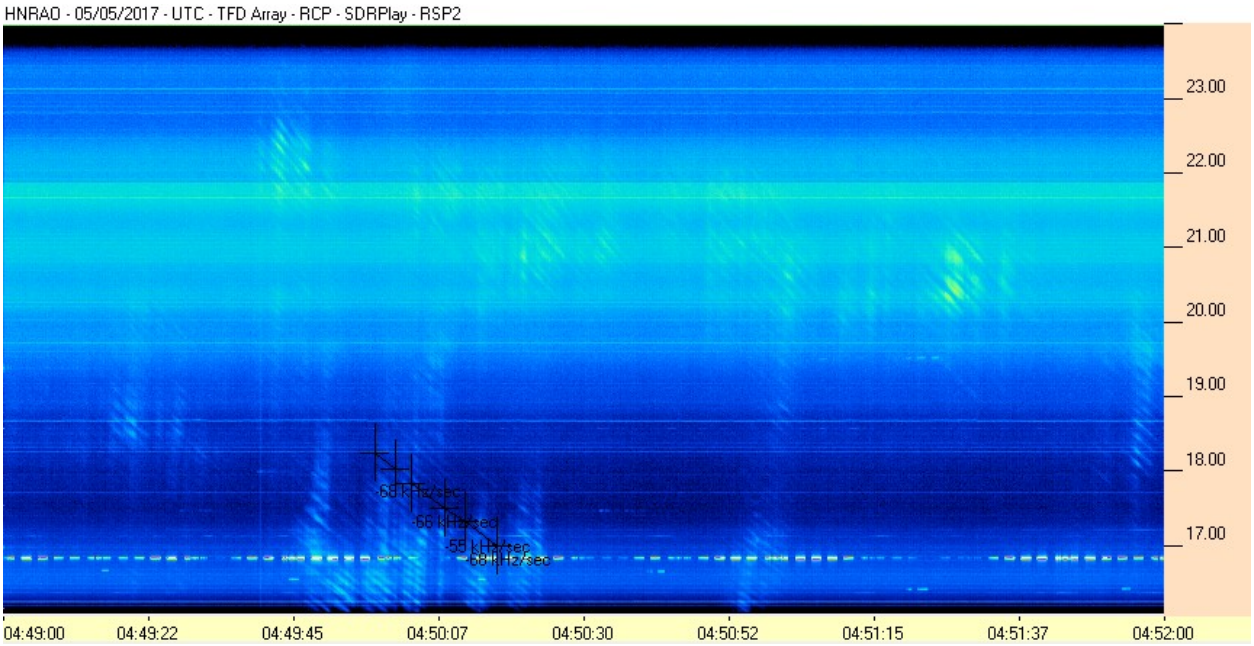

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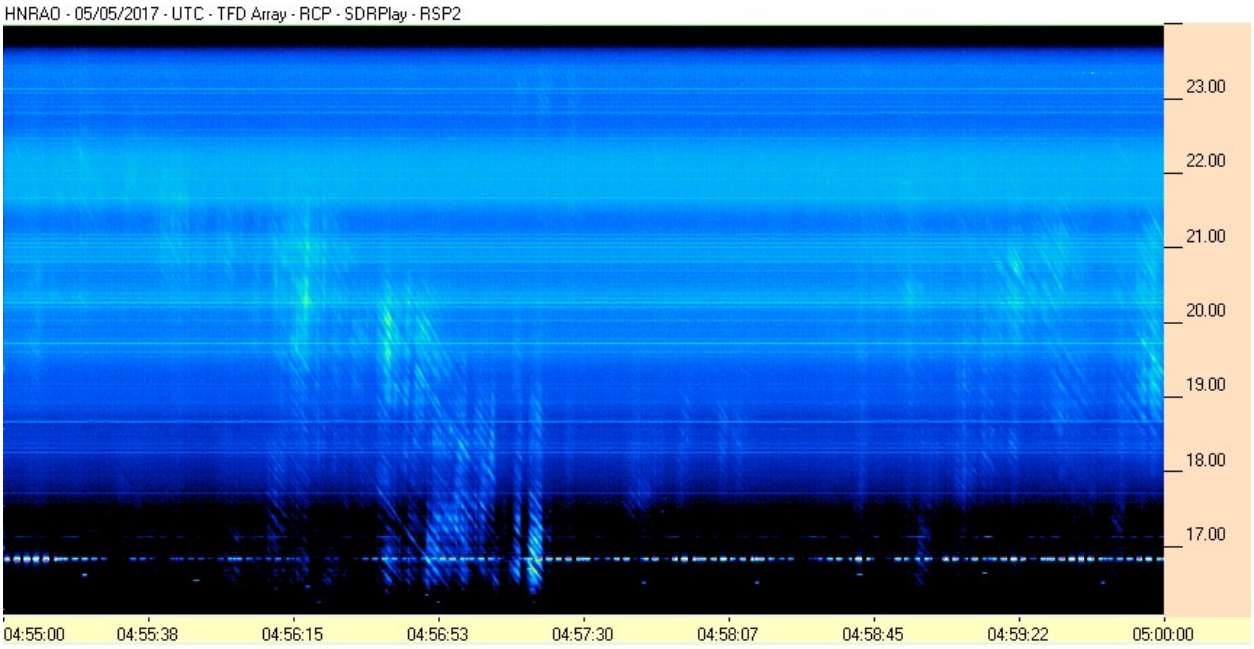

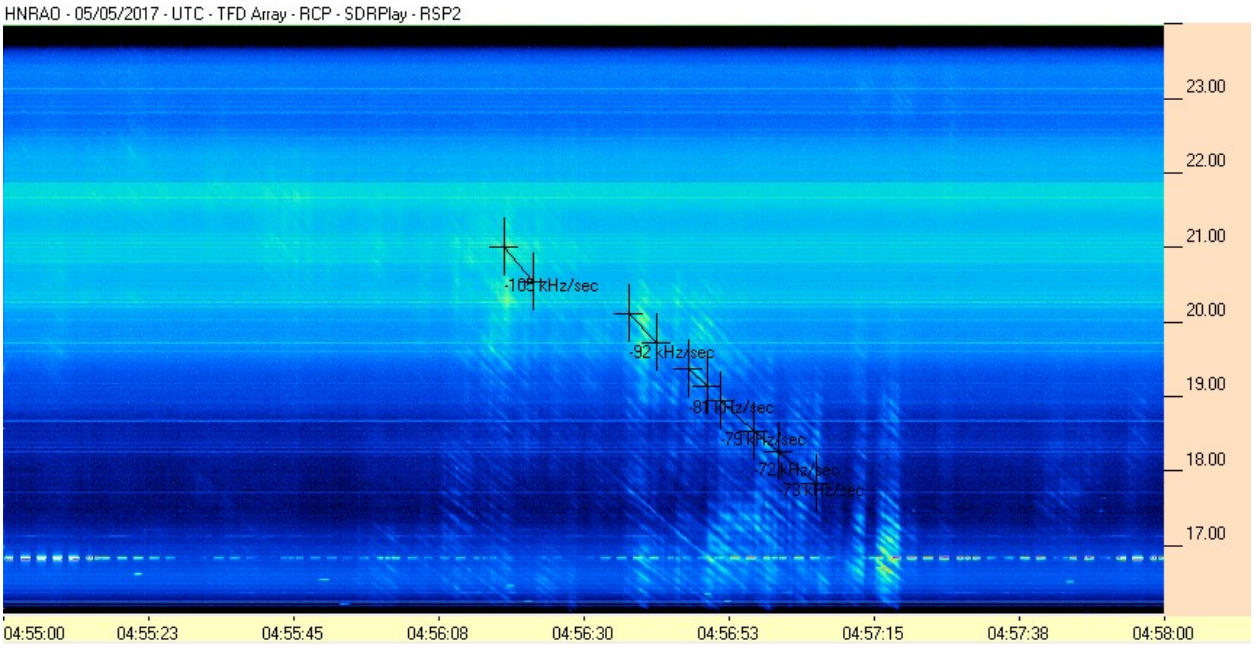

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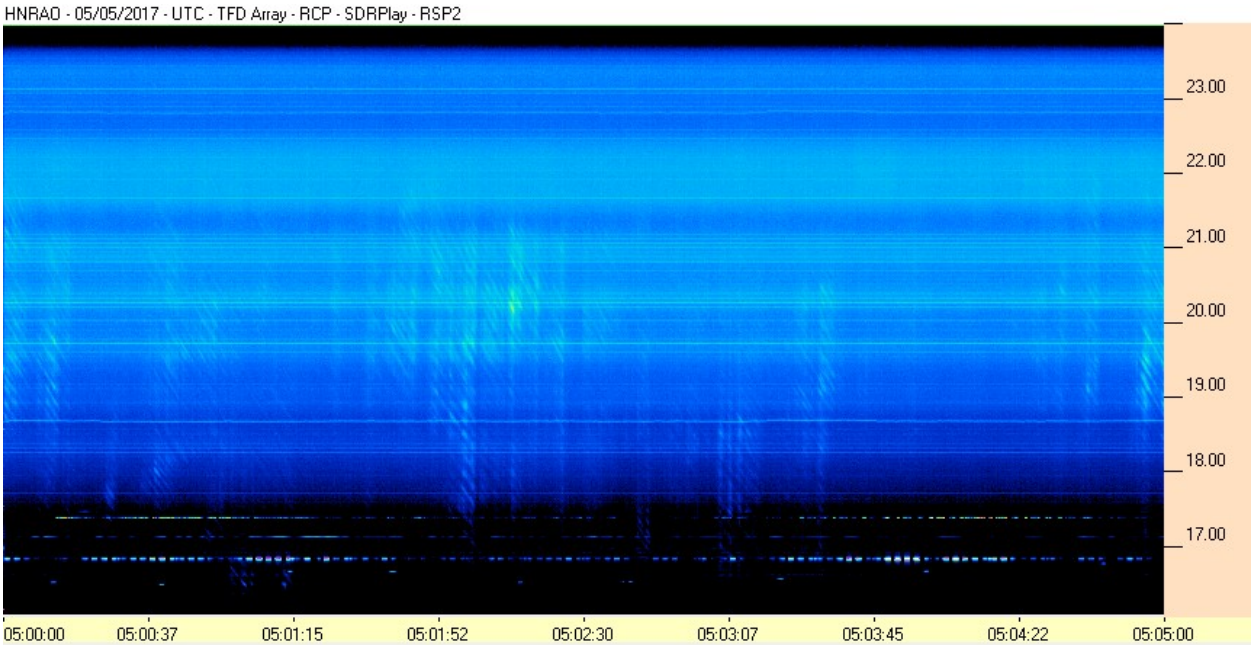
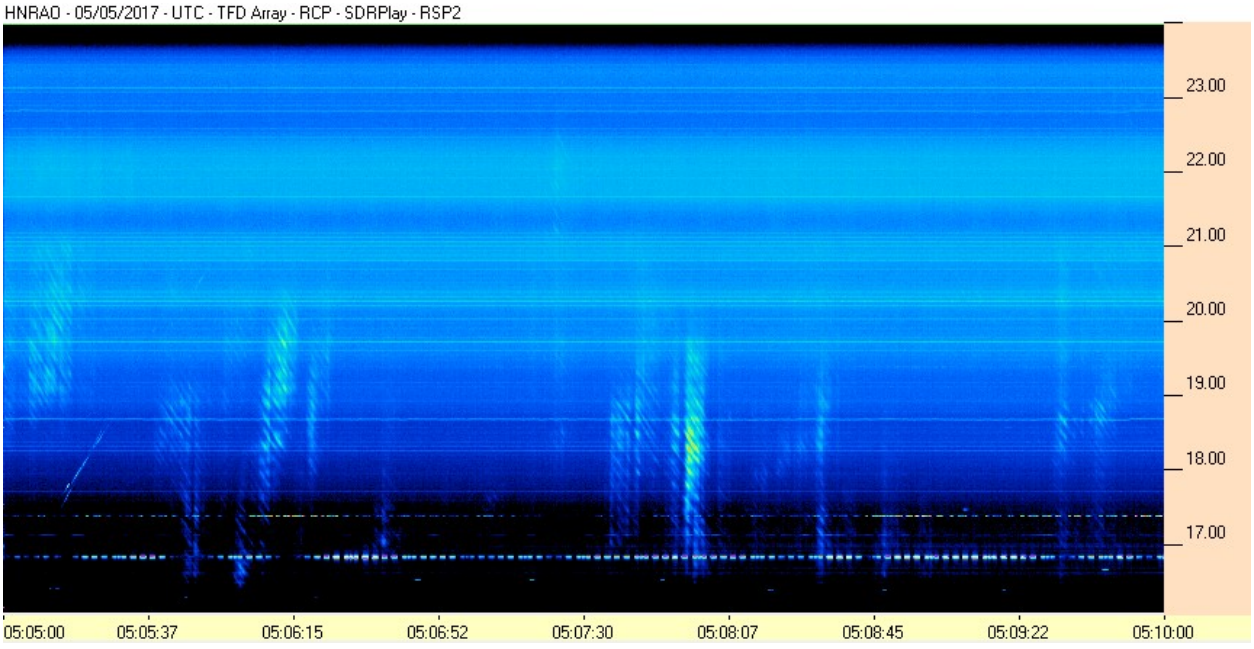
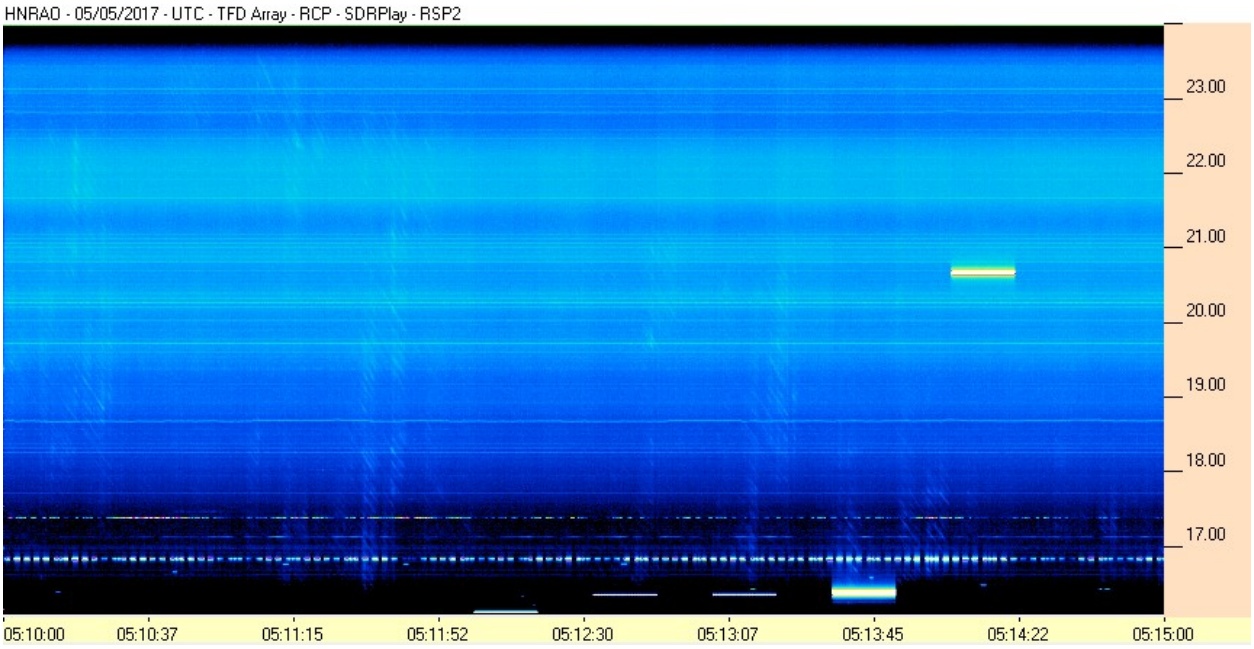
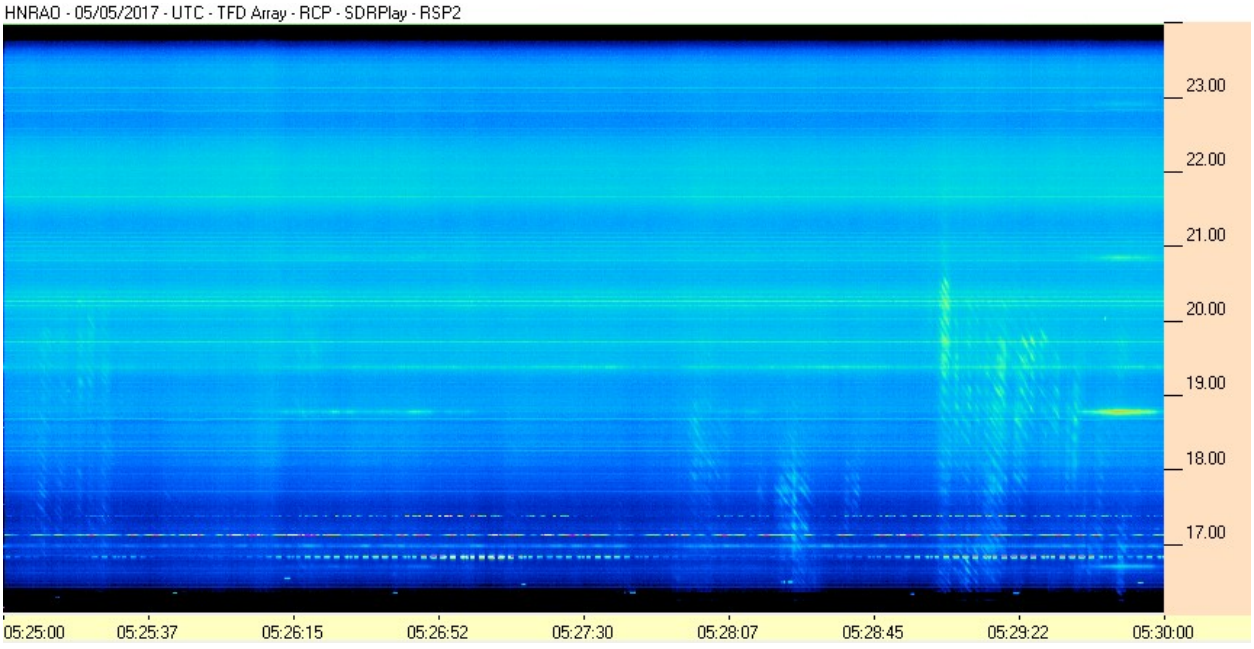





HNRAO - 05/05/2017 - UTC - TFD Array - RCP - SDRPlay - RSP2
23.00
22.00
21.00
20.00
19.00
18.00
17.00
05:10:00
05:10:37
05:11:15
05:11:52
05:12:30
05:13:07
05:13:45
05:14:22
05:15:00


HNRAO - 05/05/2017 - UTC - TFD Array - RCP - SDRPlay - RSP2
23.00
22.00
21.00
20.00
19.00
18.00
17.00
05:25:00
05:25:37
05:26:15
05:26:52
05:27:30
05:28:07
05:28:45
05:29:22
05:30:00

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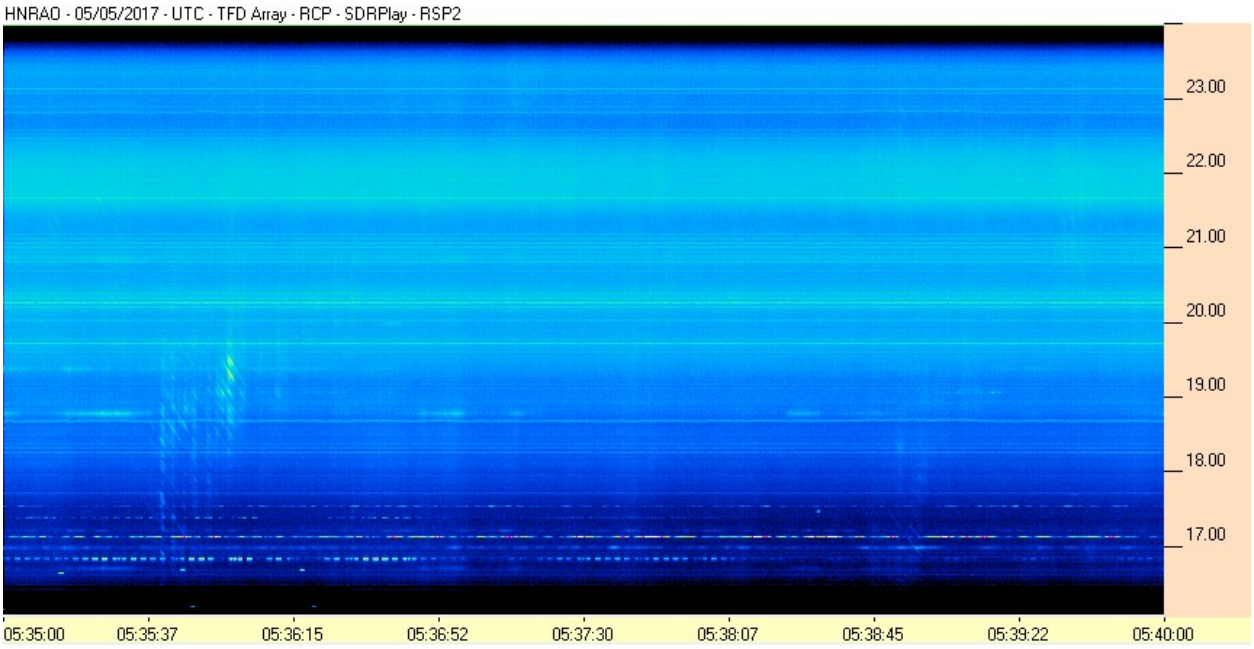

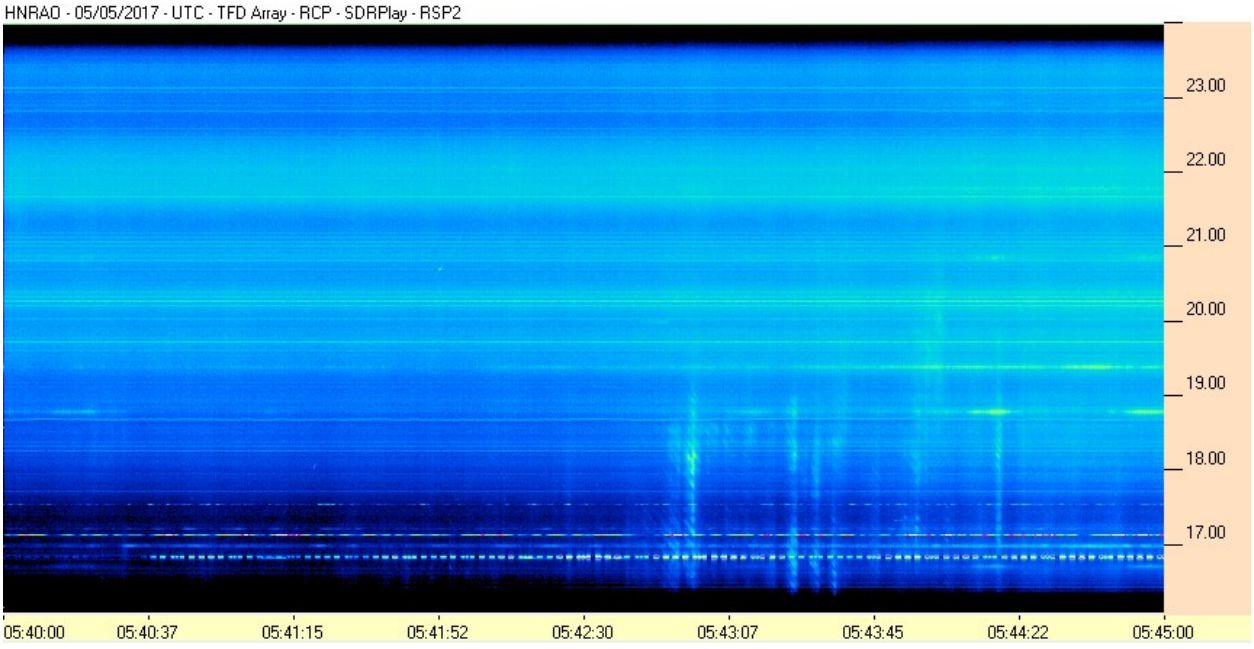

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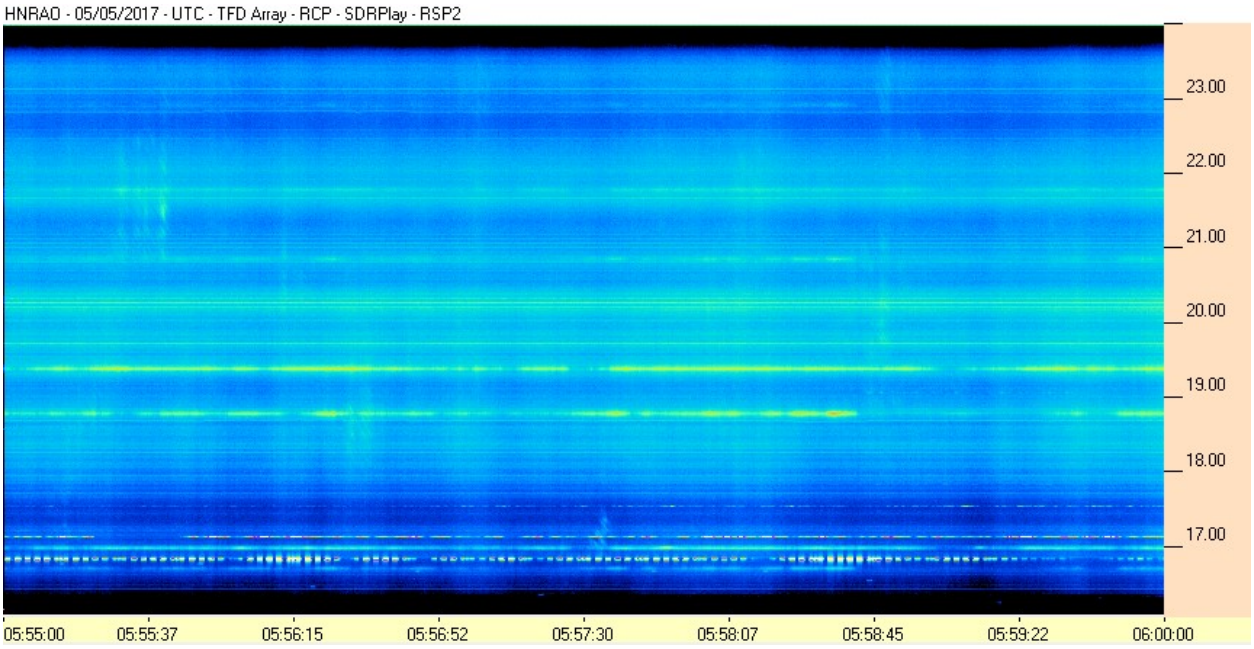
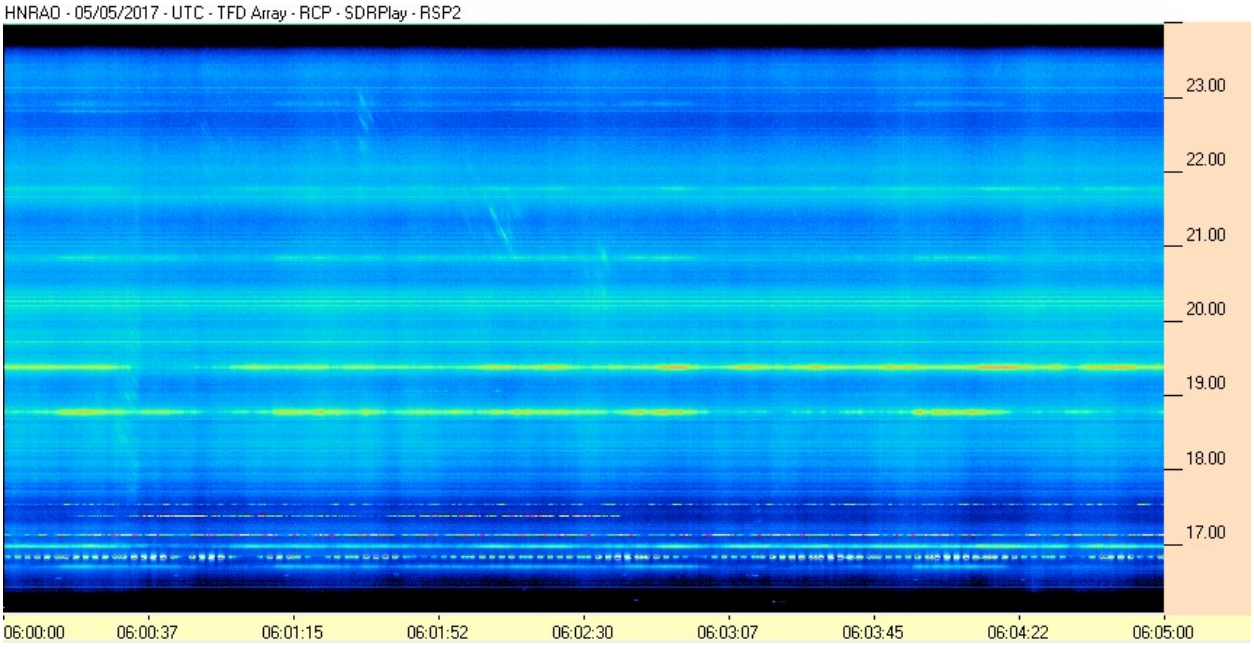
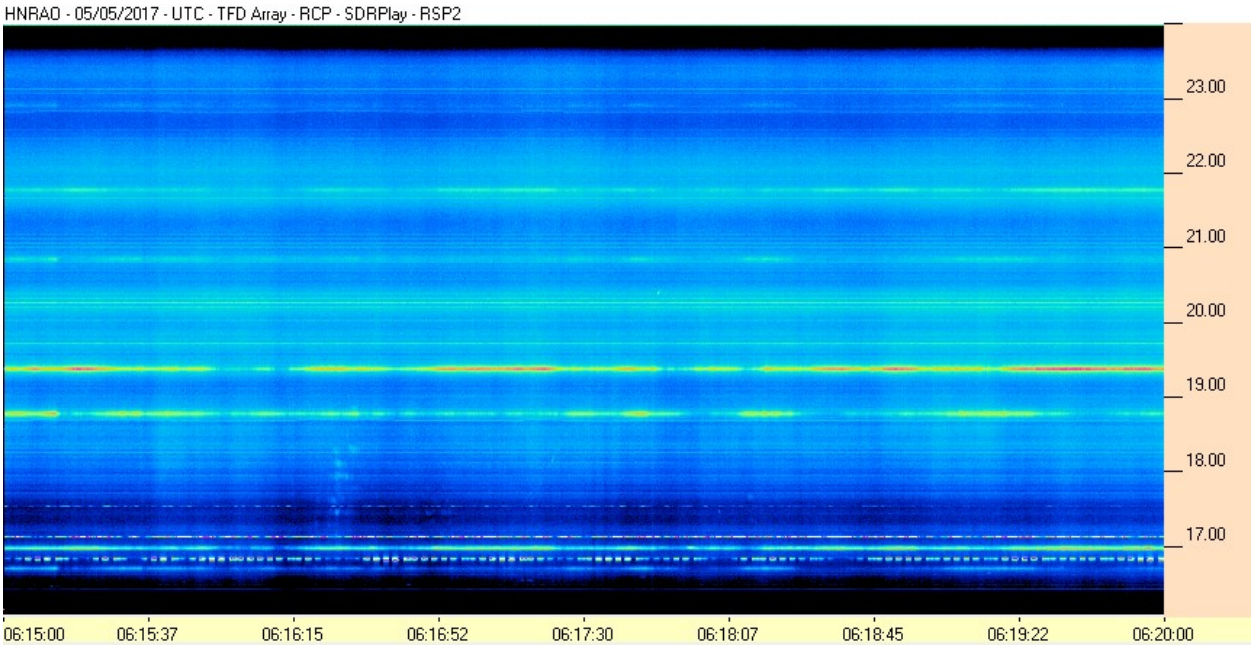
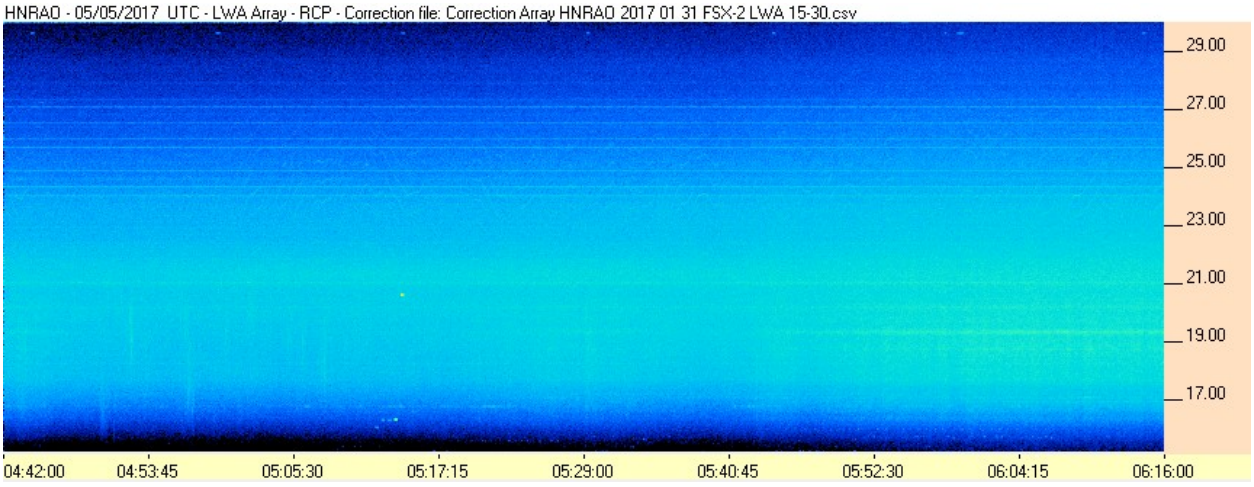






FSX-2/LWA Pair



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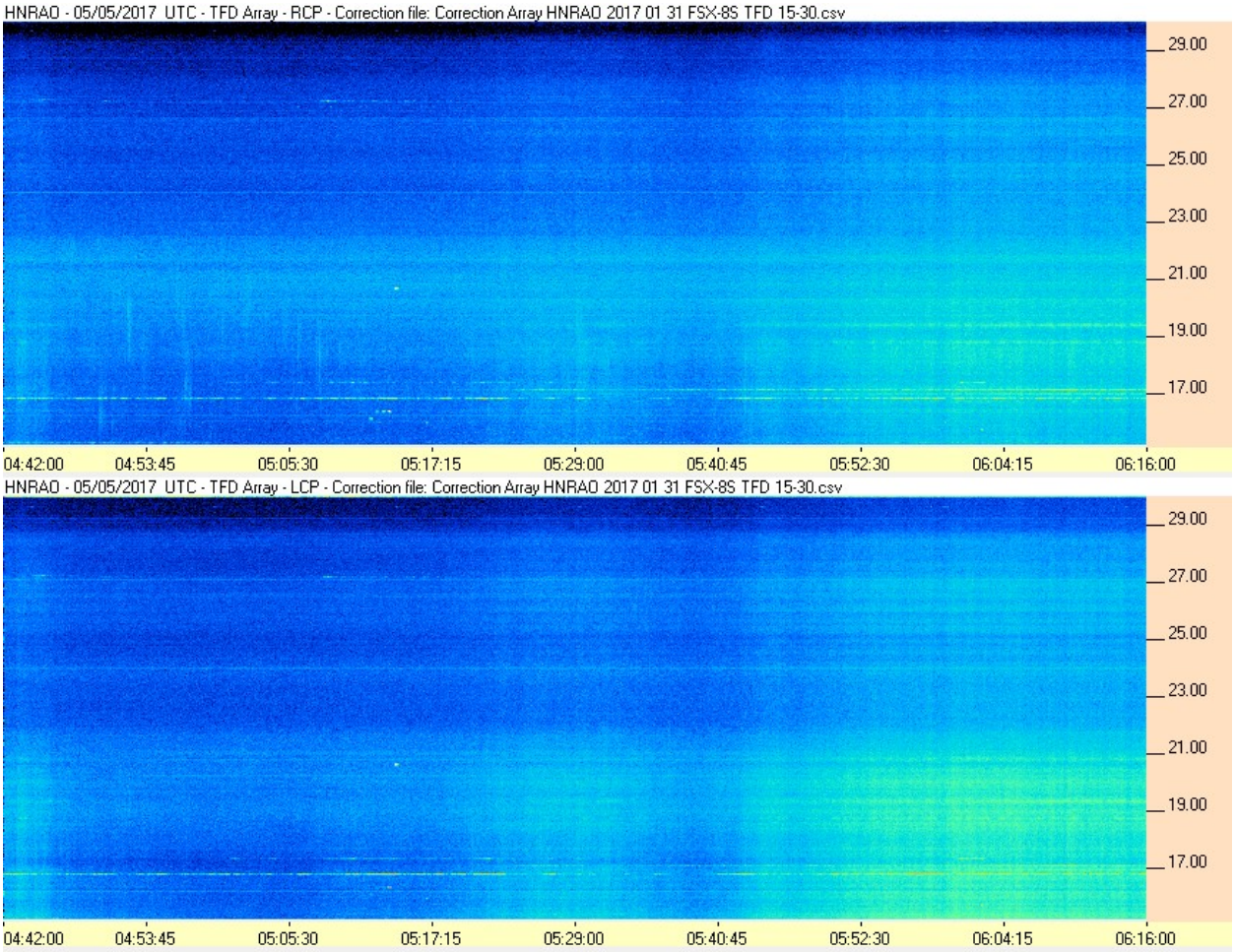
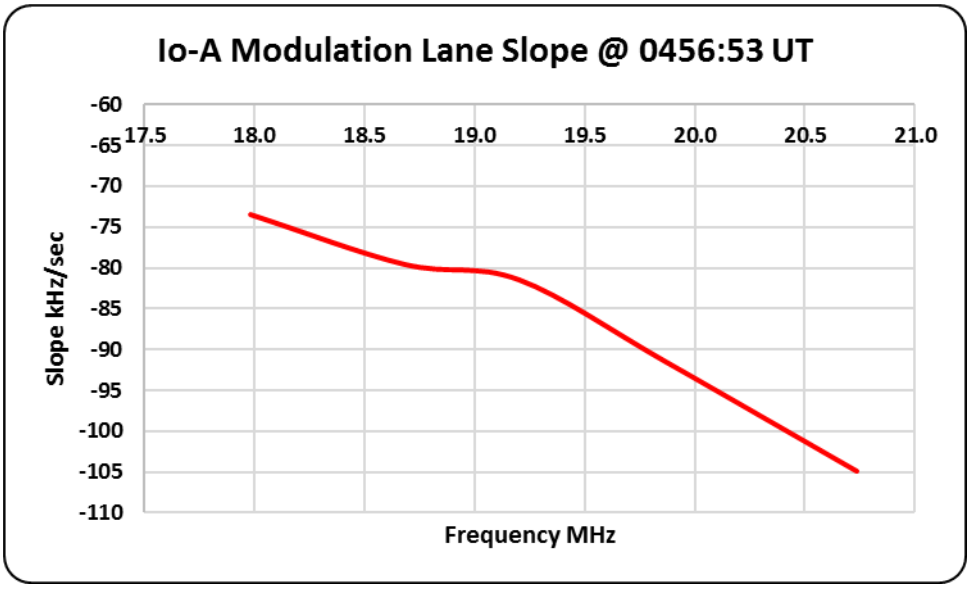
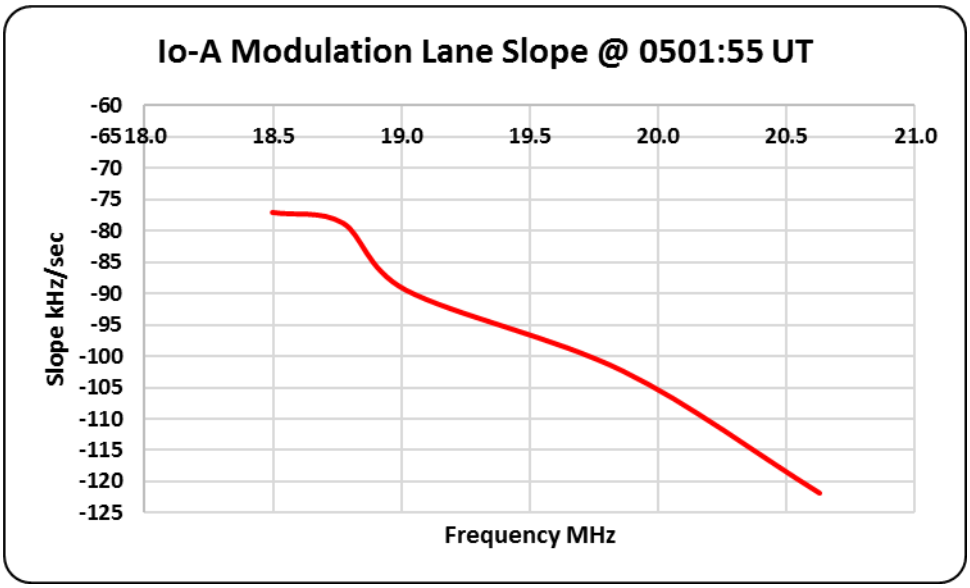
FSX-8S/TFD Pair




Io-A Modulation Lane Slope @ 0456:53 UT
Slope kHz/sec
-60
-65
-70
-75
-80
-85
-90
-95
-100
-105
-110
17.5
18.0
18.5
19.0
19.5
20.0
20.5
21.0
Frequency MHz


Io-A Modulation Lane Slope @ 0501:55 UT
Slope kHz/sec
-60
-65
-70
-75
-80
-85
-90
-95
-100
-105
-110
-115
-120
-125
18.0
18.5
19.0
19.5
20.0
20.5
21.0
Frequency MHz