**HNRAO Observing Log**
**40.673181 N – 80.437885 W**
**EN90sq**


**Date: 3 April 2018**

**Object: Jupiter – Io-A**

**Observer: Unattended**

| | | | |
|---|---|---|---|
| **Start - Time UT:** | **0347** | **Planetary K-index:** | **2** |
| **Jupiter Altitude (deg):** | **8.4** | **Jupiter Azimuth (deg):** | **121.2** |
| **Jupiter CML:** | **213.49** | **Jupiter Io Phase:** | **251.56** |
| **Jupiter RA (hr/min):** | **15:20** | **Jupiter Dec (hr/min):** | **-17:05** |
| **Hour Angle (hr/min):** | **-04:09** | **Polarization** | **RCP** |
| **Sun Altitude (deg):** | **-40.2** | **Sun Azimuth (deg):** | **329.6** |
| **Sun RA (hr/min):** | **00:42** | **Sun Dec (hr/min):** | **04:31** |

| | | | |
|---|---|---|---|
| **End – Time UT:** | **0405** | | |
| **Jupiter Altitude (deg):** | **11.2** | **Jupiter Azimuth (deg):** | **124.5** |
| **Jupiter CML:** | **224.38** | **Jupiter Io Phase** | **254.12** |
| **Hour Angle (hr/min):** | **-03:51** | | |
| **Sun Altitude (deg):** | **-41.8** | **Sun Azimuth (deg):** | **335.2** |
| **Max Frequency MHz** | **23** | **Min Frequency MHz** | **16** |

## Observatory Configuration

| Spectrograph Receiver | Antenna | Polarization | System Loss | Multicoupler | Multicoupler port | Calibrated |
|---|---|---|---|---|---|---|
| FSX-8S | TFD | RCP<br>LCP | -7.95 dB<br>-7.95 dB | #2 RCP<br>#1 LCP | Port 1 +10dB<br>Port 1 +10dB | Twice daily<br>Twice daily |
| FSX-2 | LWA | RCP/LCP manual select | | N/A | N/A | N/A |
| SDRPlay RSP2 | TFD | RCP | -7.95 dB | #2 RCP | Port 2 +3dB | Twice daily |
| SDRPlay RSP2 | TFD | LCP | -7.95 dB | #1 LCP | Port 2 +3dB | Twice daily |
| JOVE 1 | TFD | RCP | -7.95 dB | #2 RCP | Port 3 +3 dB | 03/08/2018 |
| JOVE 1 | TFD | LCP | -7.95 dB | #1 LCP | Port 3 +3 dB | 03/08/2018 |
| JOVE II | Jove dipoles | Linear | -3.12 dB | #3 Linear | Port 4 +3 dB | 02/20/2018 |
| 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, Radio SkyPipe 2.7.33

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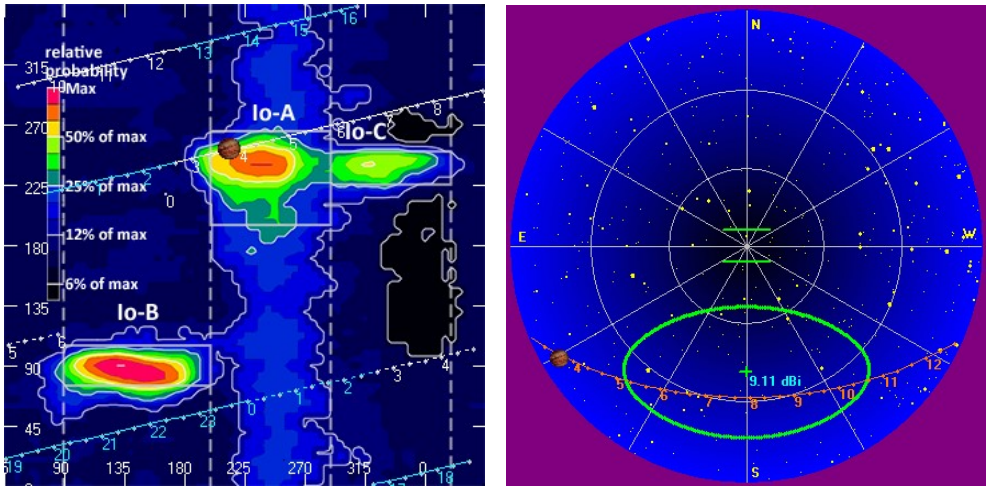
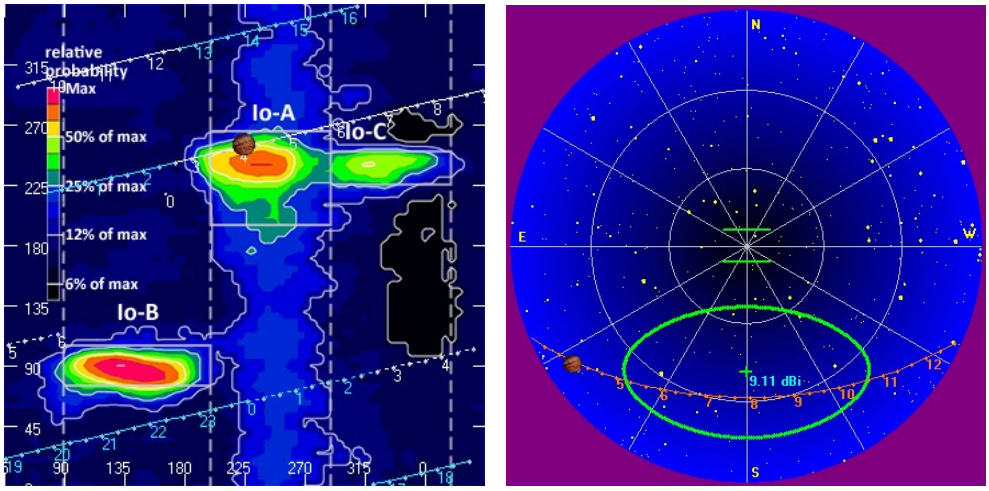



**Beginning of Pass**




**End of Pass**

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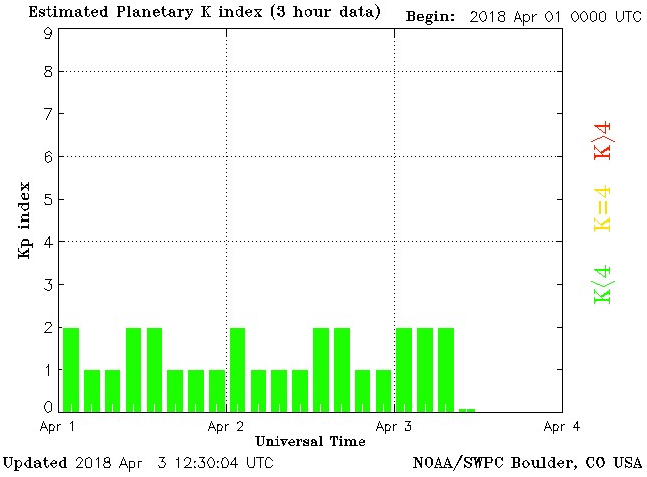
| MODE | CML RANGE | Io RANGE | MAX F | POLAR | ARC | NOTES |
|---|---|---|---|---|---|---|
| Io-D | 0-200 | 95-130 | 18 | LH | Early | Also called "fourth source" |
| Io-B | (105 - 185) | (80-110) | 39.5 | RH | Early | Also called "early source" |
| non Io-B | 80-200 | 0-360 | 38 | RH | Early | Voyager 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 | |




An unremarkable Io-A storm lasting 58 minutes. For a change the observatory was not bothered by RFI. Emissions were L-bursts and spanned a frequency range of 16-23 MHz.

L4 modulation lanes were identified throughout the duration of the storm and measured.

The emissions were very weak. The SDRPlay RSP2 was able to successfully observe the emissions, and while detected with the FSX-8S / TFD, they were just above the noise floor. The FSX-2 / LWA was able to detect emissions marginally better than the FSX-8S / TFD, most likely due to lower beam angle of the LWA array.

There were no Skypipe records of emissions as they were below the noise floor of the Jove receiver / Jove dipoles.

The most notable thing about this storm is that it was observed with Jupiter just over 8 degrees above the horizon.

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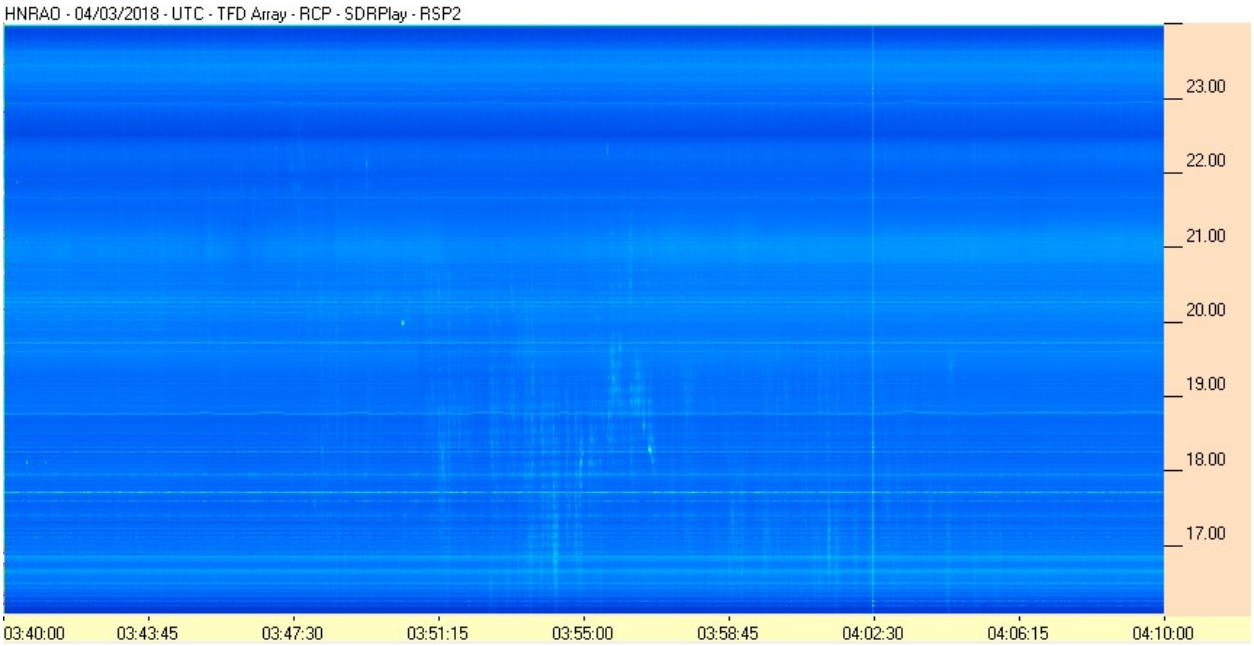
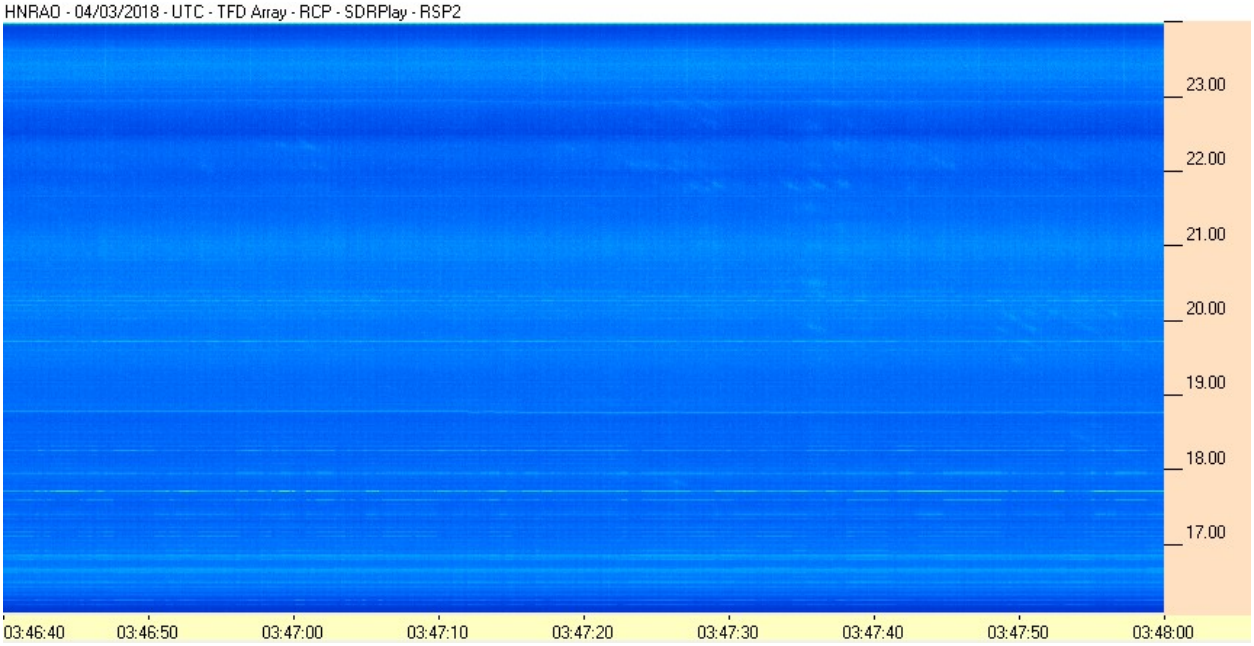
## SDRPlay RSP2 / TFD



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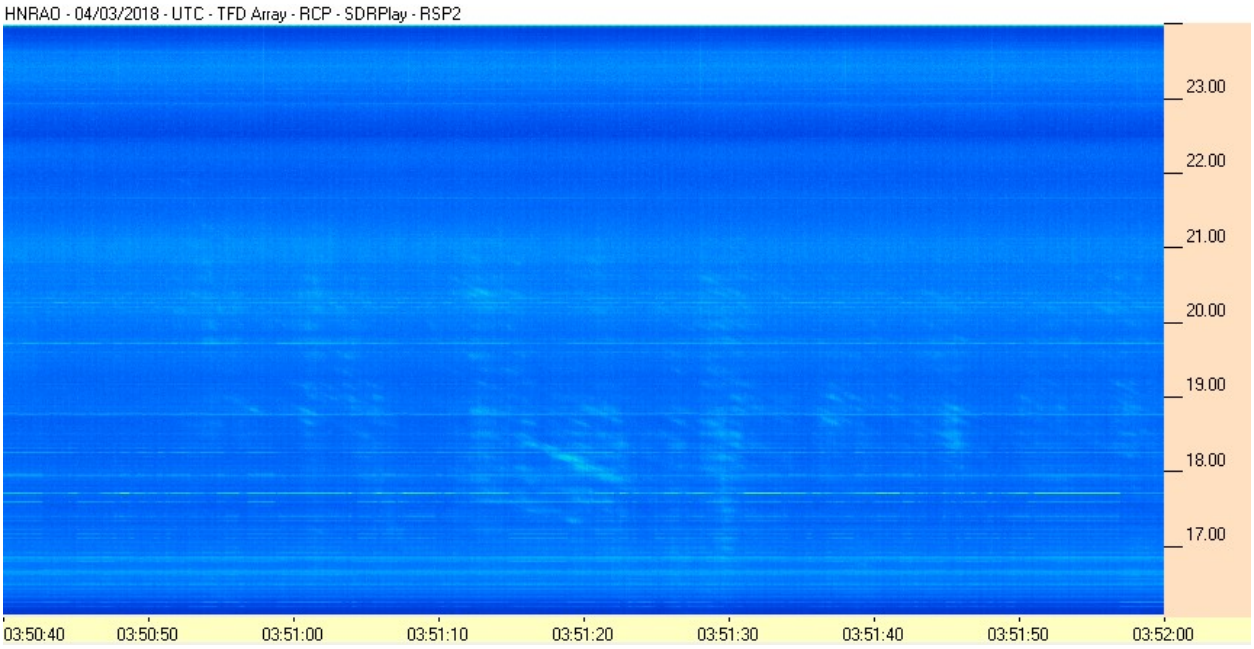


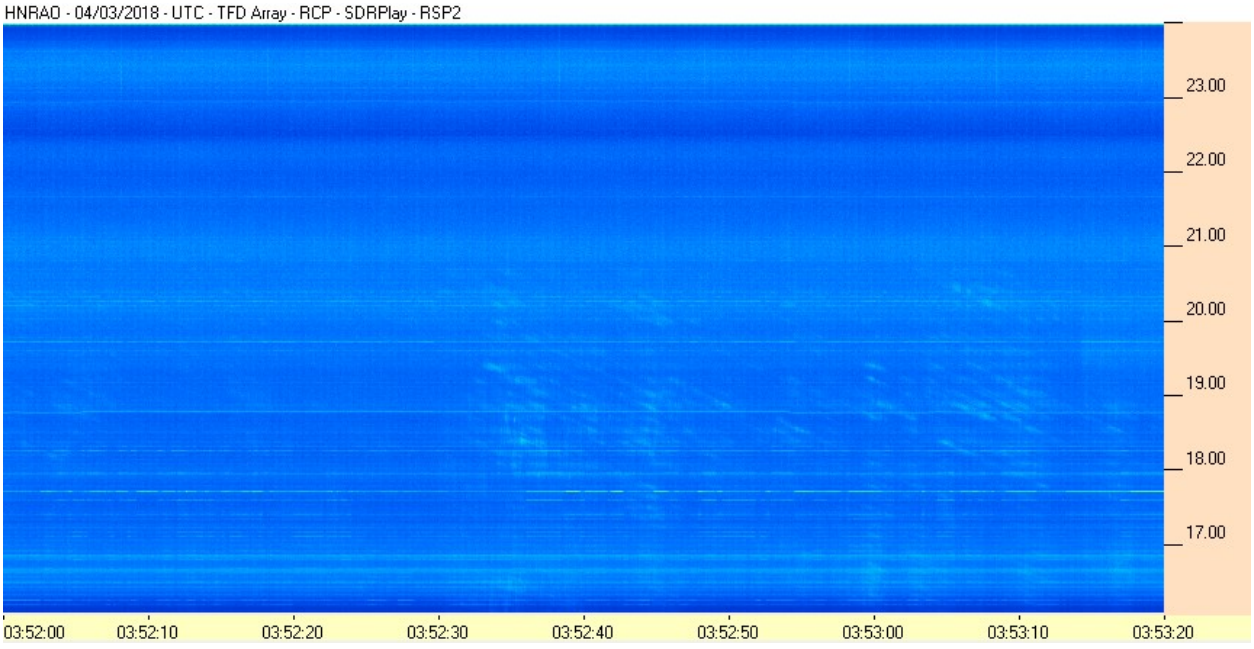

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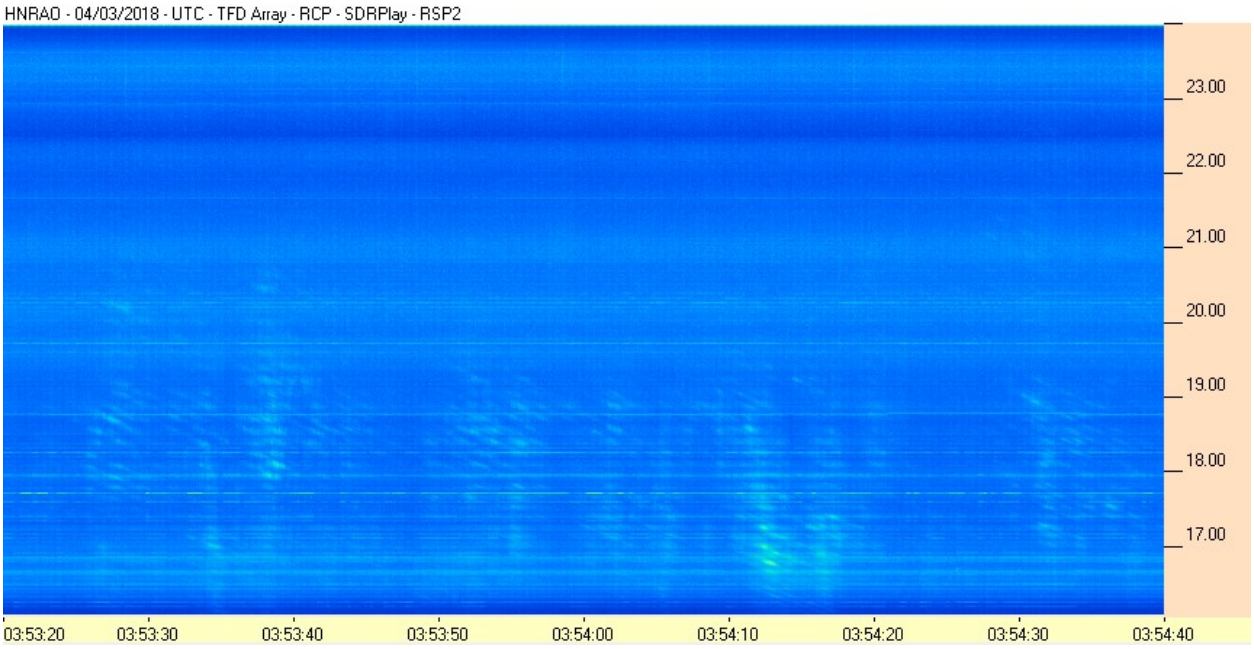


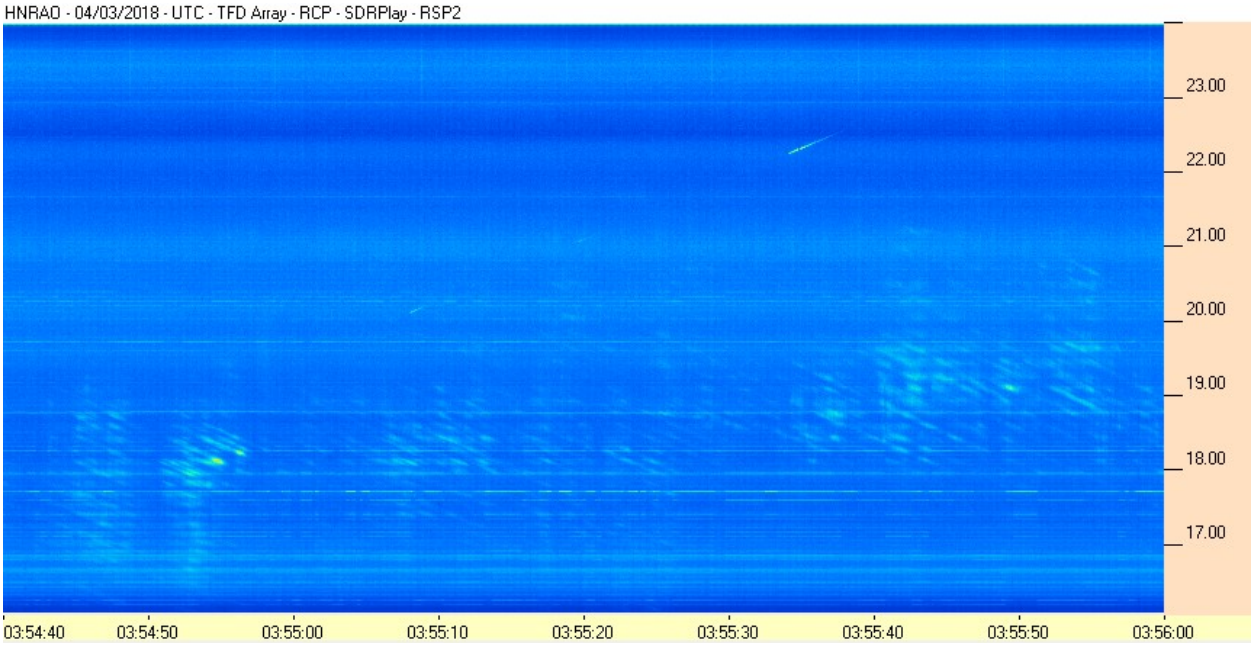

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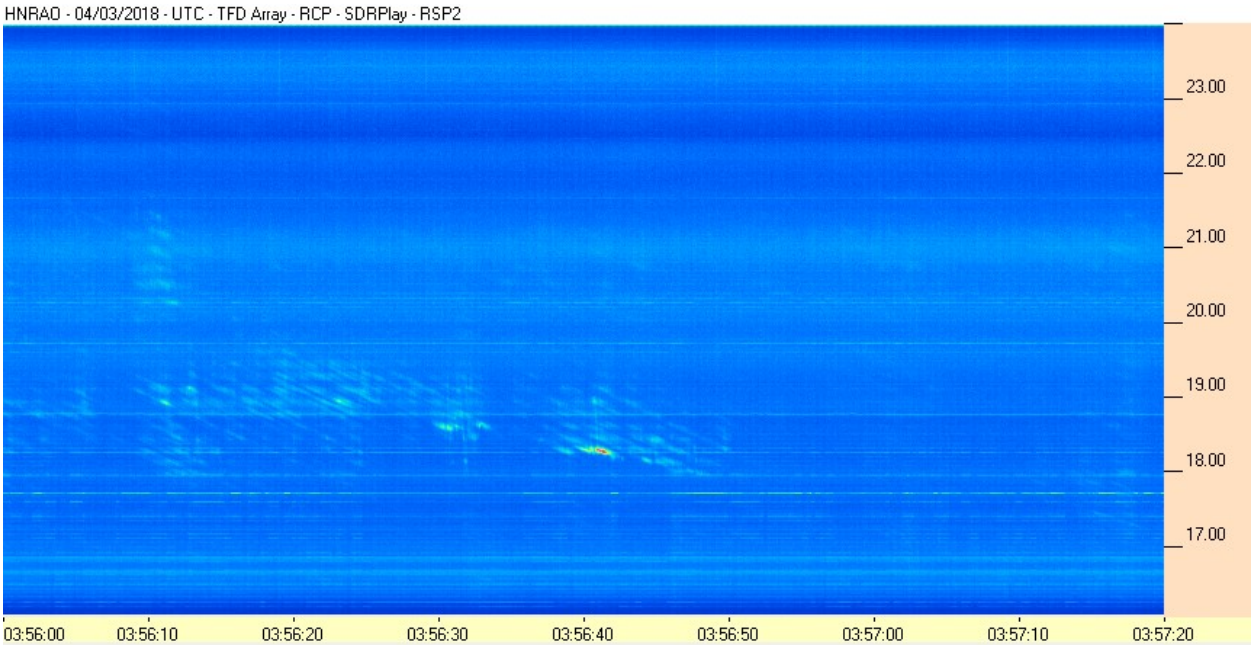


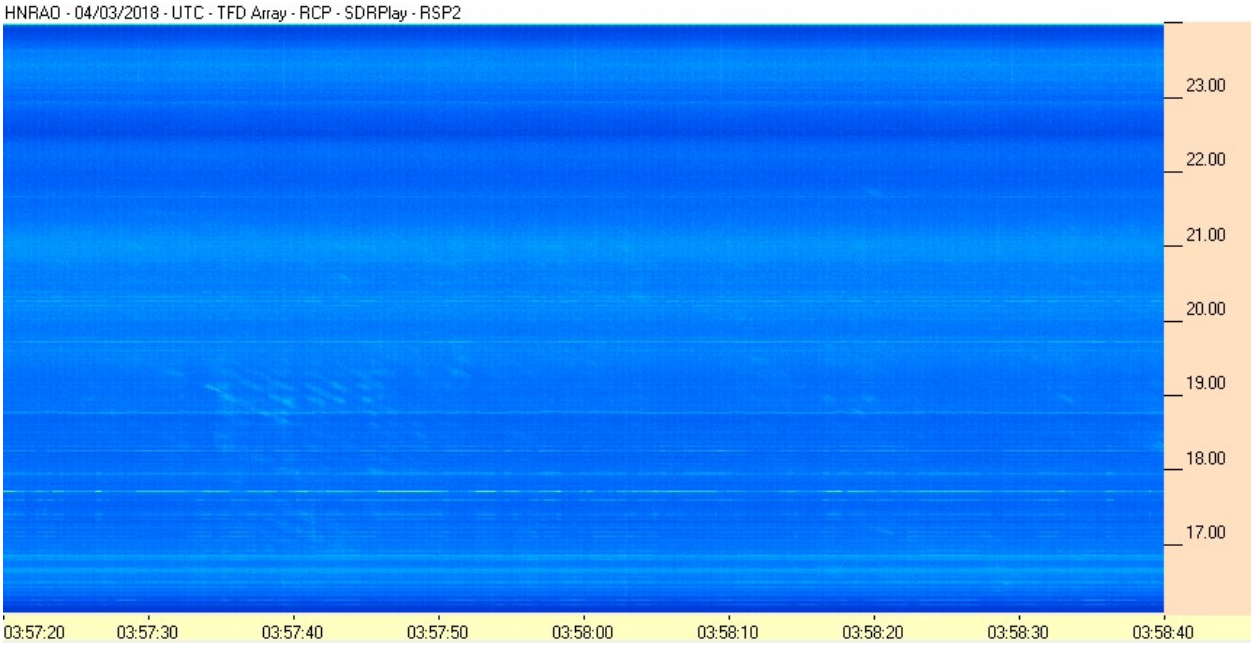

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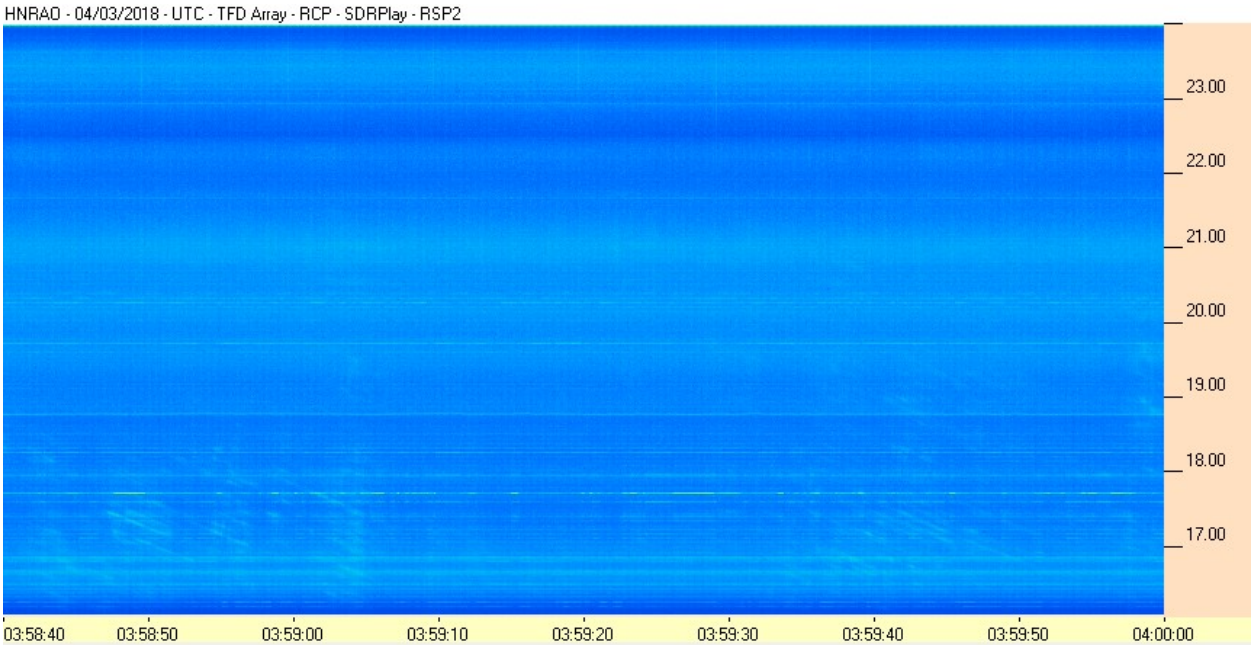
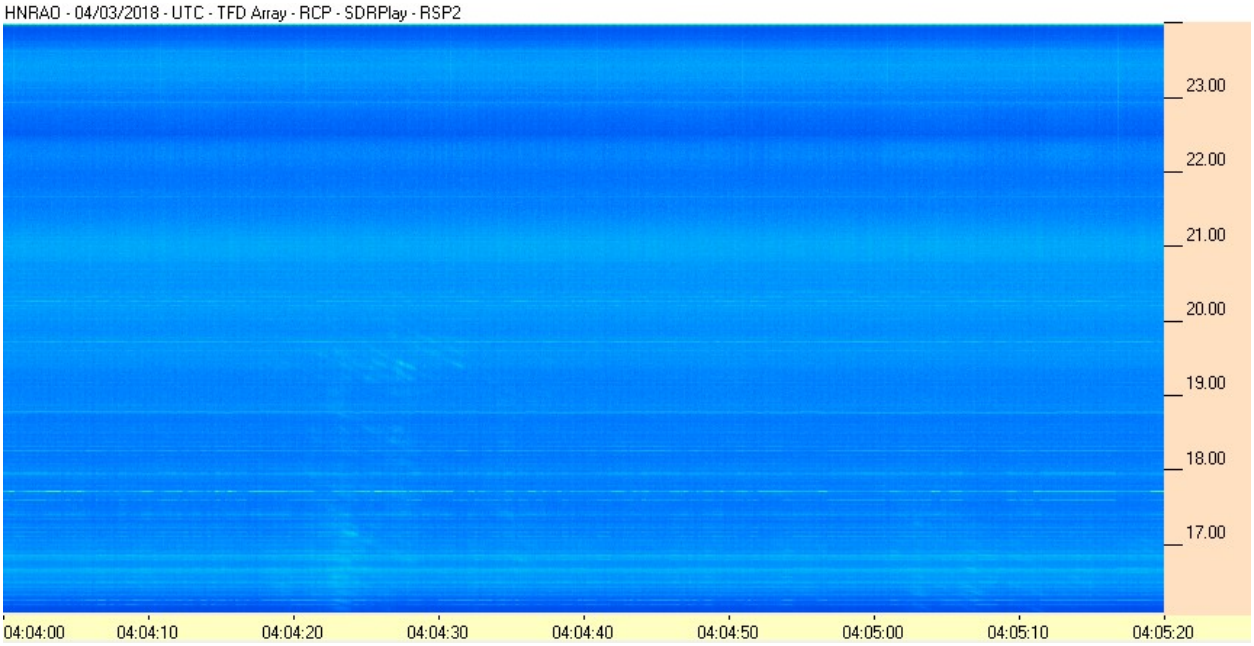
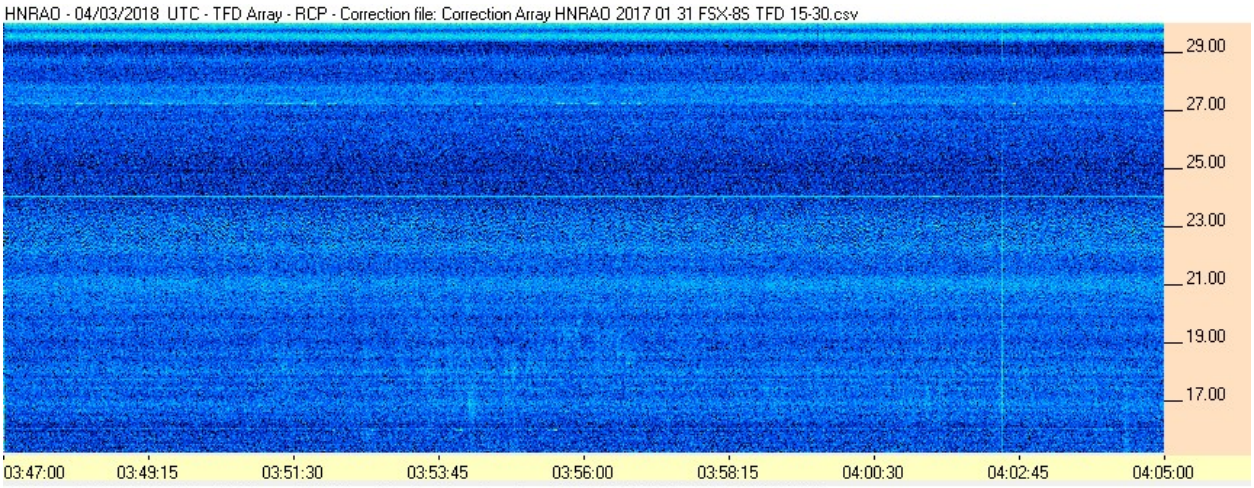


## FSX-8S / TFD



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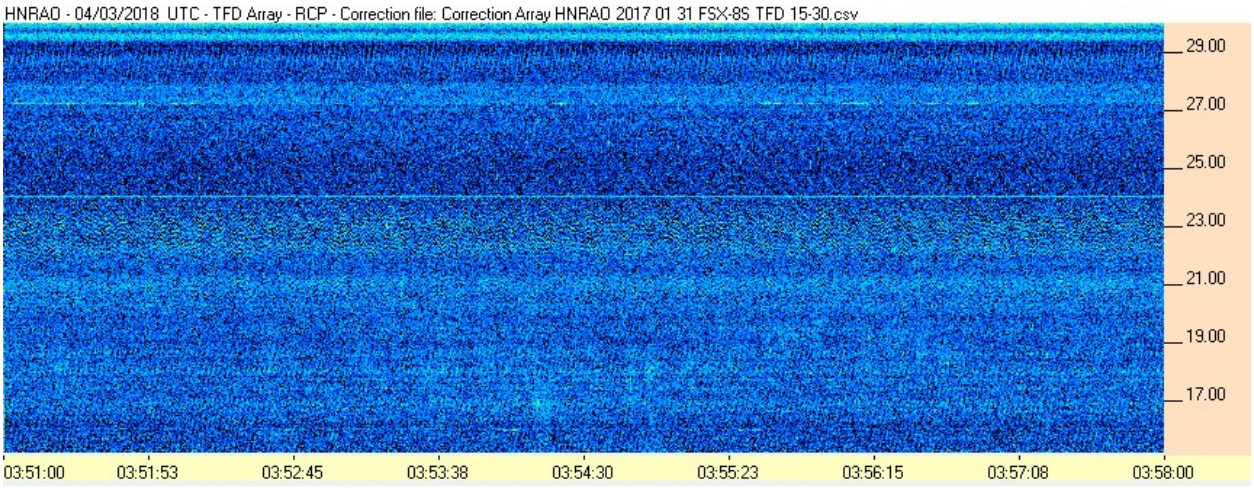
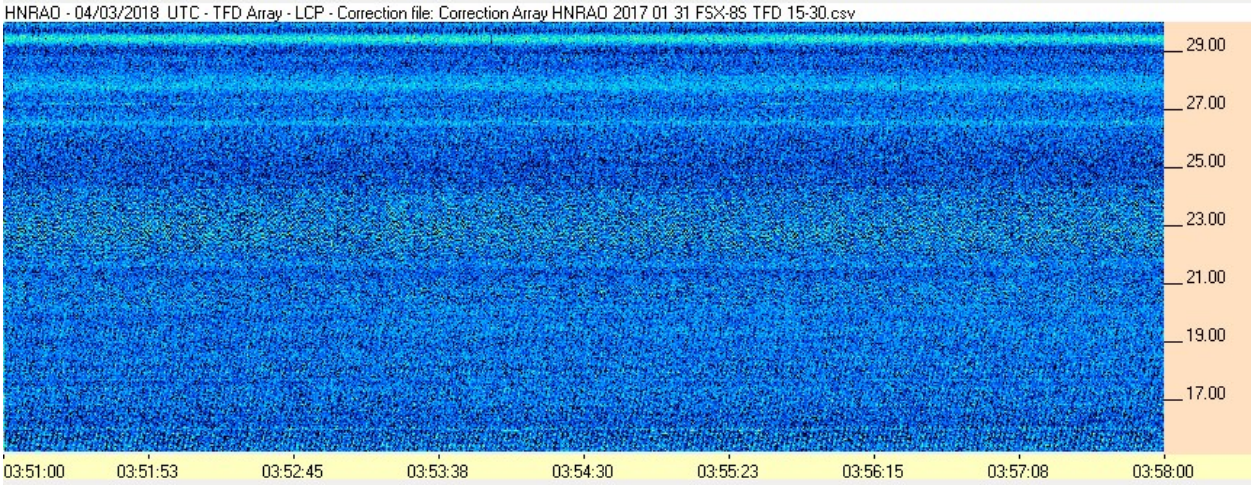
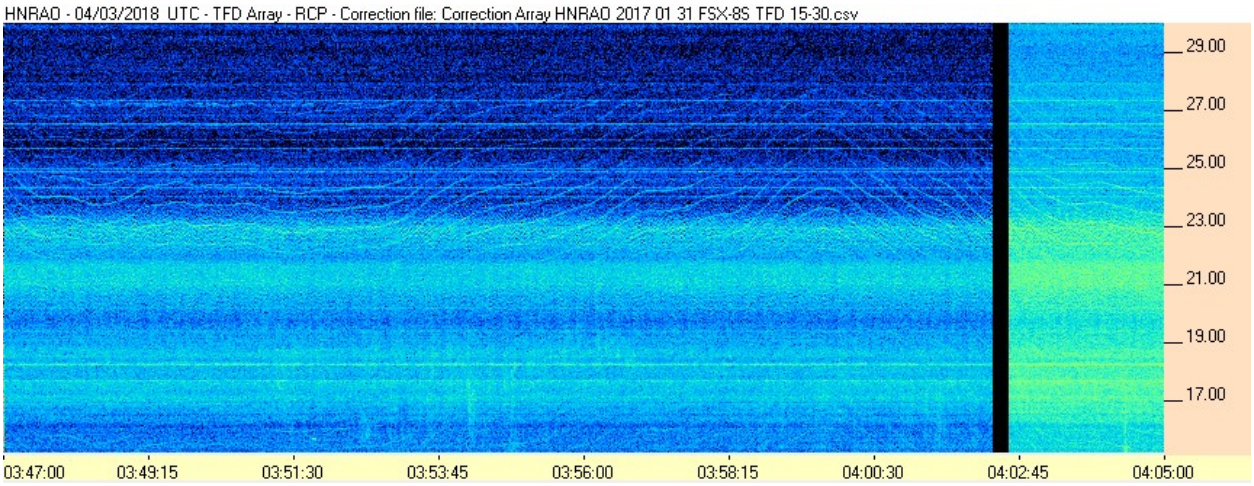
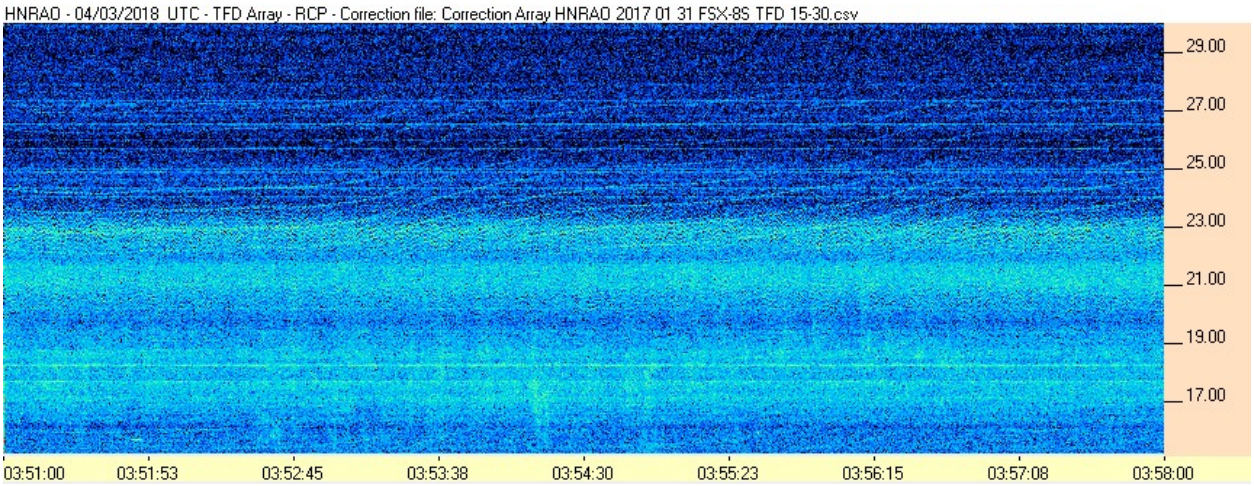


## FSX-2 / LWA



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