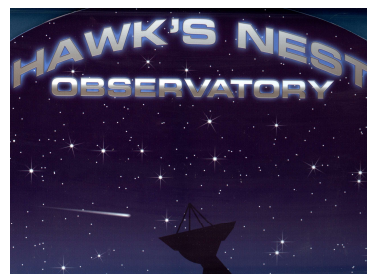


**HNRAO Observing Log**  
**40.673181 N – 80.437885 W**  
**EN90sq**



**Date: March 29, 2019**

**Object: Jupiter – Io-B**

**Observer: Unattended**

|                                |               |                               |               |
|--------------------------------|---------------|-------------------------------|---------------|
| <b>Start - Time UT:</b>        | <b>0731</b>   | <b>Planetary K-index:</b>     | <b>2</b>      |
| <b>Jupiter Altitude (deg):</b> | <b>14.3</b>   | <b>Jupiter Azimuth (deg):</b> | <b>138.1</b>  |
| <b>Jupiter CML:</b>            | <b>148.05</b> | <b>Jupiter Io Phase:</b>      | <b>067.67</b> |
| <b>Jupiter RA (hr/min):</b>    | <b>17:33</b>  | <b>Jupiter Dec (hr/min):</b>  | <b>-22;40</b> |
| <b>Hour Angle (hr/min):</b>    | <b>-02:58</b> | <b>Polarization</b>           | <b>RCP</b>    |
| <b>Sun Altitude (deg):</b>     | <b>-37.4</b>  | <b>Sun Azimuth (deg):</b>     | <b>043.0</b>  |
| <b>Sun RA (hr/min):</b>        | <b>00:24</b>  | <b>Sun Dec (hr/min):</b>      | <b>02:32</b>  |

|                                |               |                               |               |
|--------------------------------|---------------|-------------------------------|---------------|
| <b>End – Time UT:</b>          | <b>0809</b>   | <b>De:</b>                    | <b>-2.8</b>   |
| <b>Jupiter Altitude (deg):</b> | <b>18.8</b>   | <b>Jupiter Azimuth (deg):</b> | <b>146.0</b>  |
| <b>Jupiter CML:</b>            | <b>171.03</b> | <b>Jupiter Io Phase</b>       | <b>073.04</b> |
| <b>Hour Angle (hr/min):</b>    | <b>-02:20</b> | <b>Duration (min):</b>        | <b>38</b>     |
| <b>Sun Altitude (deg):</b>     | <b>-32.1</b>  | <b>Sun Azimuth (deg):</b>     | <b>052.6</b>  |
| <b>Max Frequency MHz</b>       | <b>22</b>     | <b>Min Frequency MHz</b>      | <b>18</b>     |

Data from Radio-Jupiter Pro 3.8.2

## Observatory Configuration

| <b>Spectrograph Receiver</b> | <b>Antenna</b> | <b>Polarization</b>      | <b>System Loss</b>   | <b>Multicoupler</b> | <b>Multicoupler port</b>     | <b>Calibrated</b>          |
|------------------------------|----------------|--------------------------|----------------------|---------------------|------------------------------|----------------------------|
| FSX-8S                       | TFD            | RCP<br>LCP               | -8.35 dB<br>-7.59 dB | #2 RCP<br>#1 LCP    | Port 1 +10dB<br>Port 1 +10dB | Twice daily<br>Twice daily |
| FSX-2                        | LWA            | RCP/LCP<br>manual select |                      | N/A                 | N/A                          | N/A                        |
| SDRPlay RSP2                 | TFD            | RCP                      | -8.35 dB             | #2 RCP              | Port 2 +3dB                  | Twice daily                |
| SDRPlay RSP2                 | TFD            | LCP                      | -7.59 dB             | #1 LCP              | Port 2 +3dB                  | Twice daily                |
| JOVE 1                       | TFD            | RCP                      | -8.35 dB             | #2 RCP              | Port 3 +3 dB                 | 04/20/2018                 |
| JOVE 1                       | TFD            | LCP                      | -7.59 dB             | #1 LCP              | Port 3 +3 dB                 | 04/20/2018                 |
| JOVE II                      | Jove dipoles   | Linear                   | -3.66 dB             | #3 Linear           | Port 4 +3 dB                 | 08/21/2018                 |
| SDRPlay RSP1                 | Experimental*  |                          |                      |                     |                              |                            |

JOVE dipoles phased @ 32 degrees for 2017-2018 season

TFD array phased @ 35 degrees for 2017-2018 season

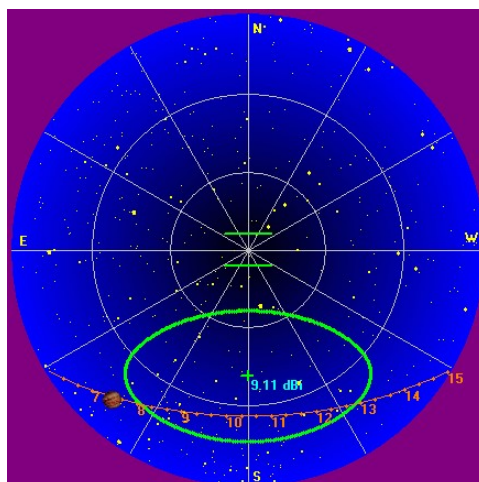
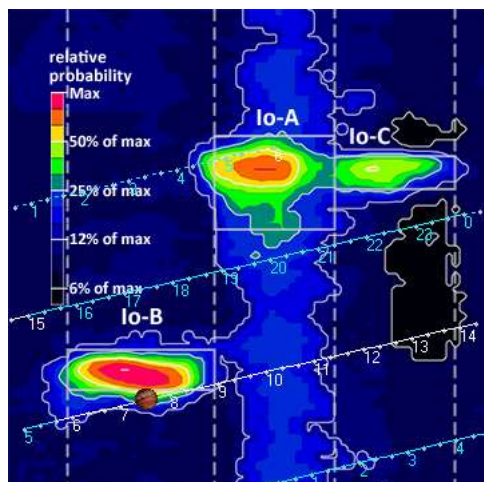
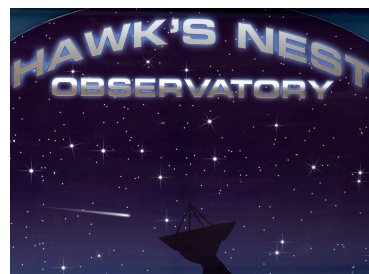
LWA antenna phased @ 35 degrees and orientation for observation: 45 degrees

\* Used for testing and evaluating antenna systems

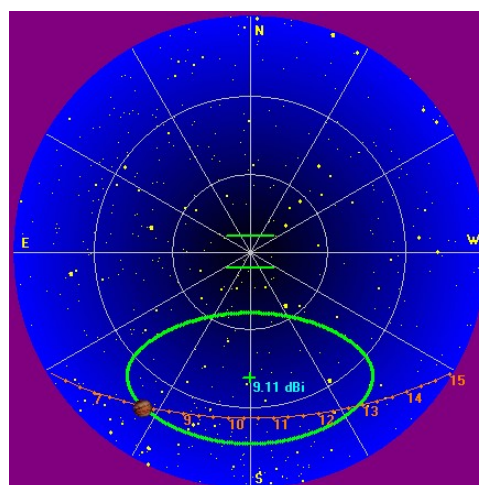
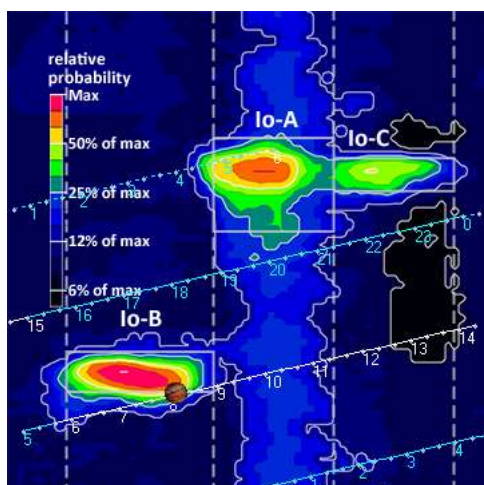
Software Radio Sky Spectrograph 2.8.50

Red = Offline

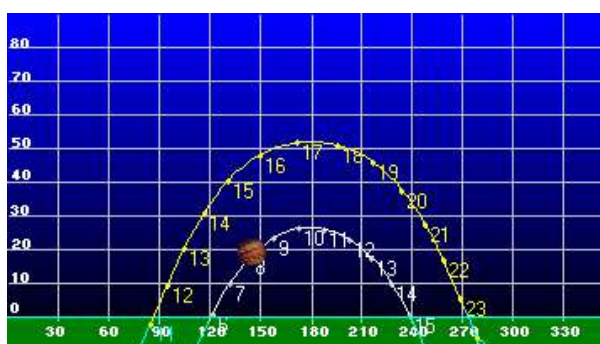
**HNRAO Observing Log**  
**40.673181 N – 80.437885 W**  
**EN90sq**



**Beginning of Pass**

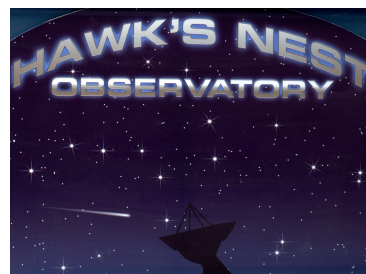


**End of Pass**



# HNRAO Observing Log

40.673181 N – 80.437885 W  
EN90sq

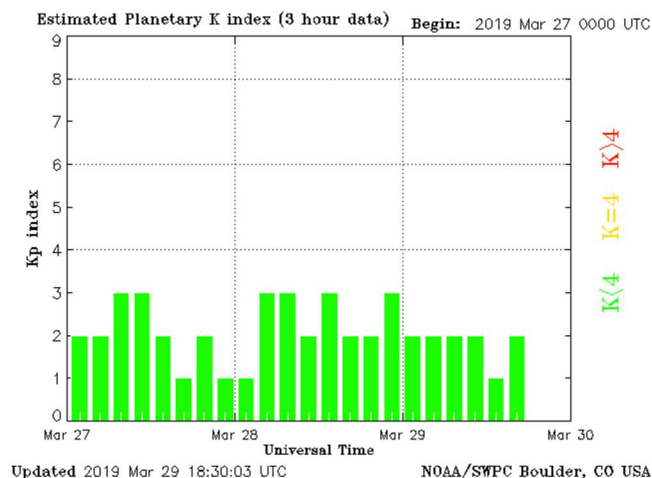


| MODE     | CML RANGE   | Io RANGE  | MAX F | POLAR | ARC   | NOTES                       |
|----------|-------------|-----------|-------|-------|-------|-----------------------------|
| Io-D     | 0-200       | 95-130    | 18    | LH    | Early | Also called "fourth source" |
| Io-B     | (105 - 185) | (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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A brief low pass Io-B storm dominated by S-bursts. Emissions didn't seem to exceed 3-4 dB above GB as observed here. N-events were present through much of the observed time of emission. There appeared to be positive drift modulation lanes at 0756:30 UT and possibly more at 0800 UT, however, they were not enough to be to make a positive identification.

All instruments were observing during the storm. The only spectrograph to record the event was the SDRPlay RSP2/TFD array pair and the Radio Jove receiver / Jove dipole array.

While there were no strong bursts observed, those observed were intense enough to be recorded on the calibrated SkyPipe record. Strongest recorded bursts observed here were between 250 and 300 kK equivalent antenna temperature.

Nothing else of note.

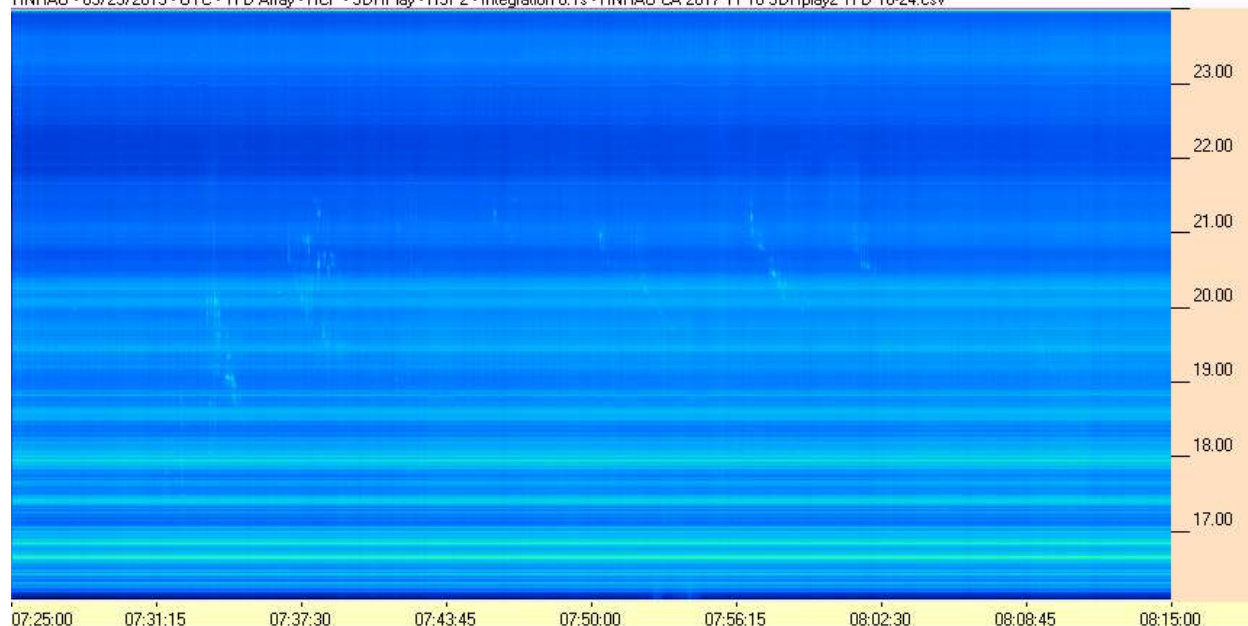
EOR

**HNRAO Observing Log**  
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**EN90sq**

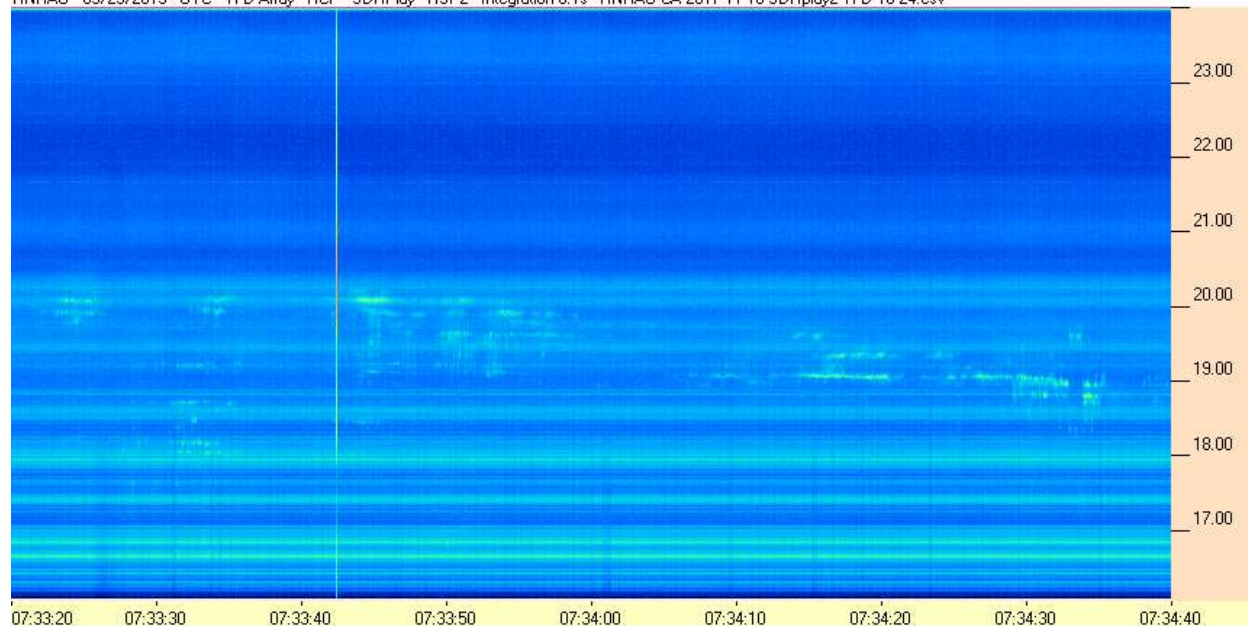


**SDRPlay RSP2/TFD Array**

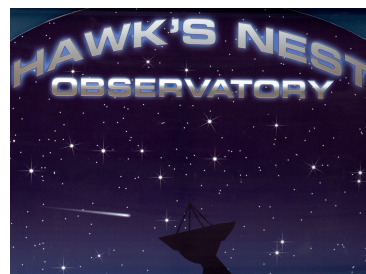
HNRAO - 03/29/2019 - UTC - TFD Array - RCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv



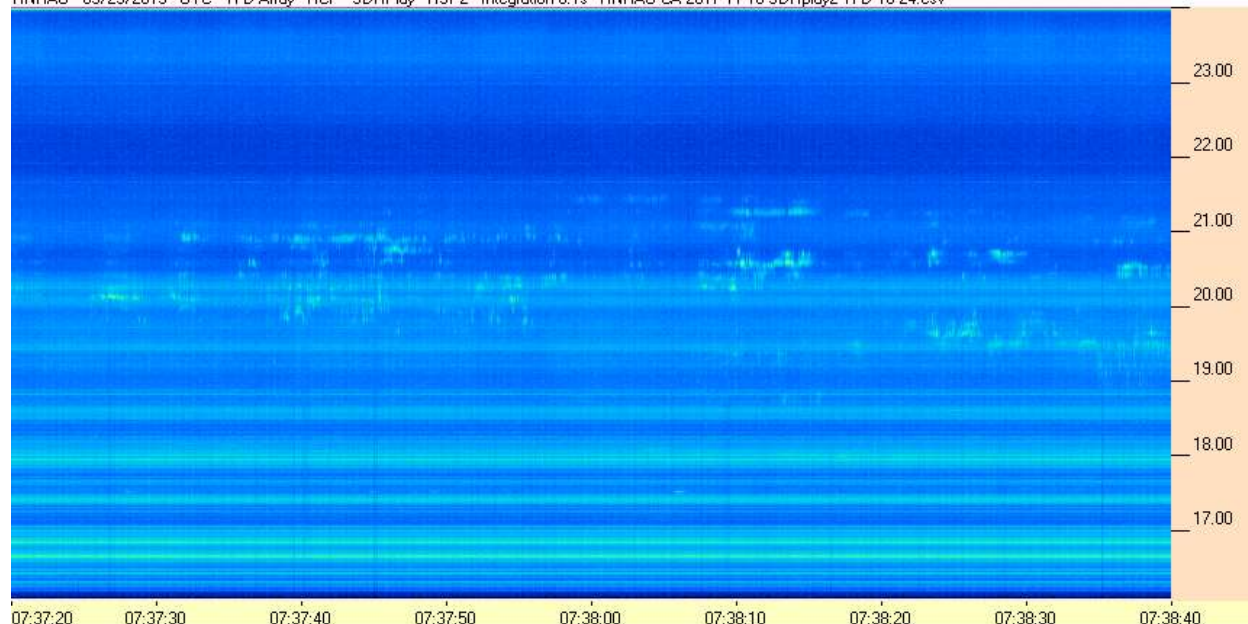
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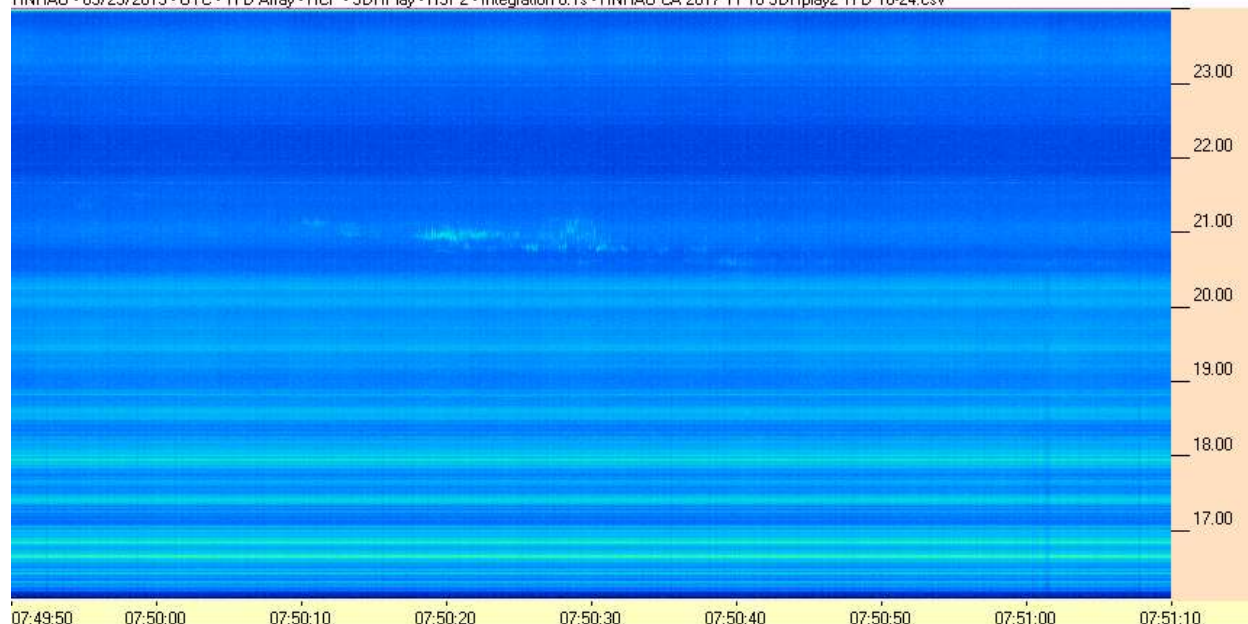
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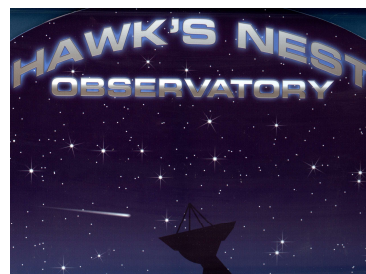
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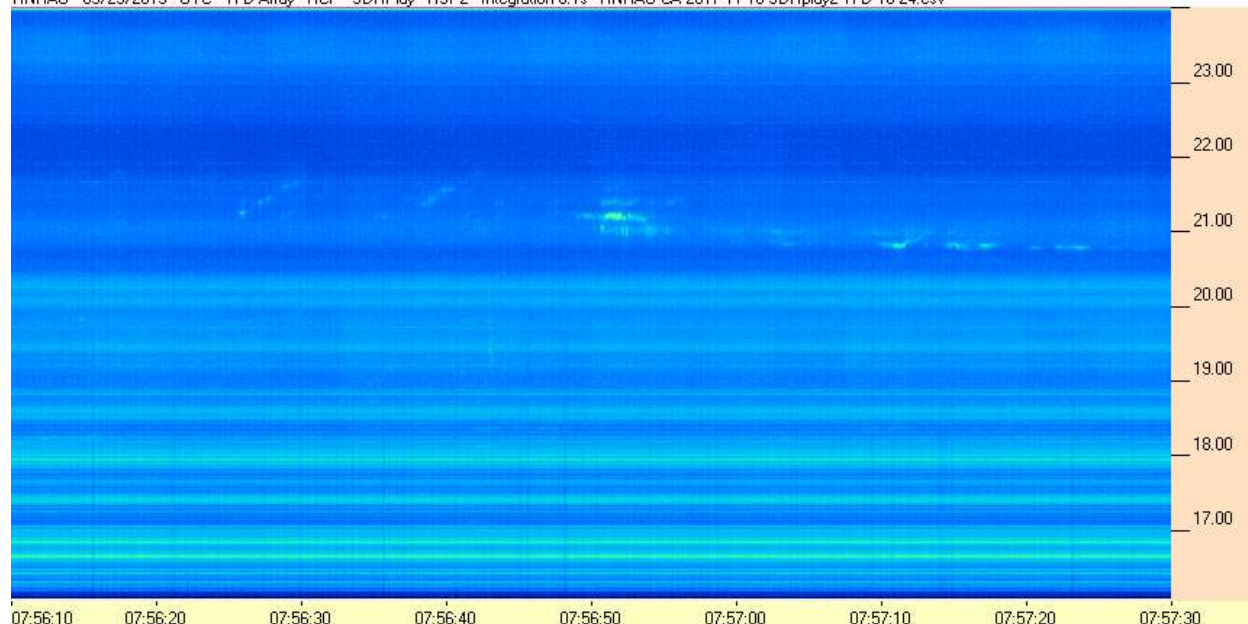
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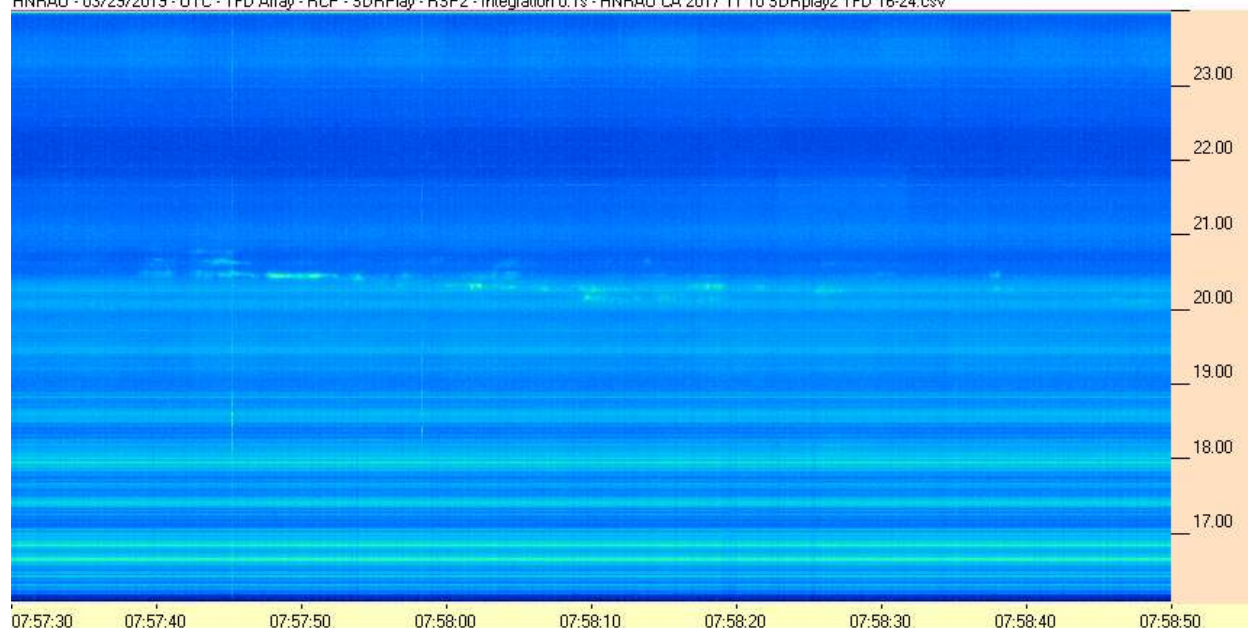
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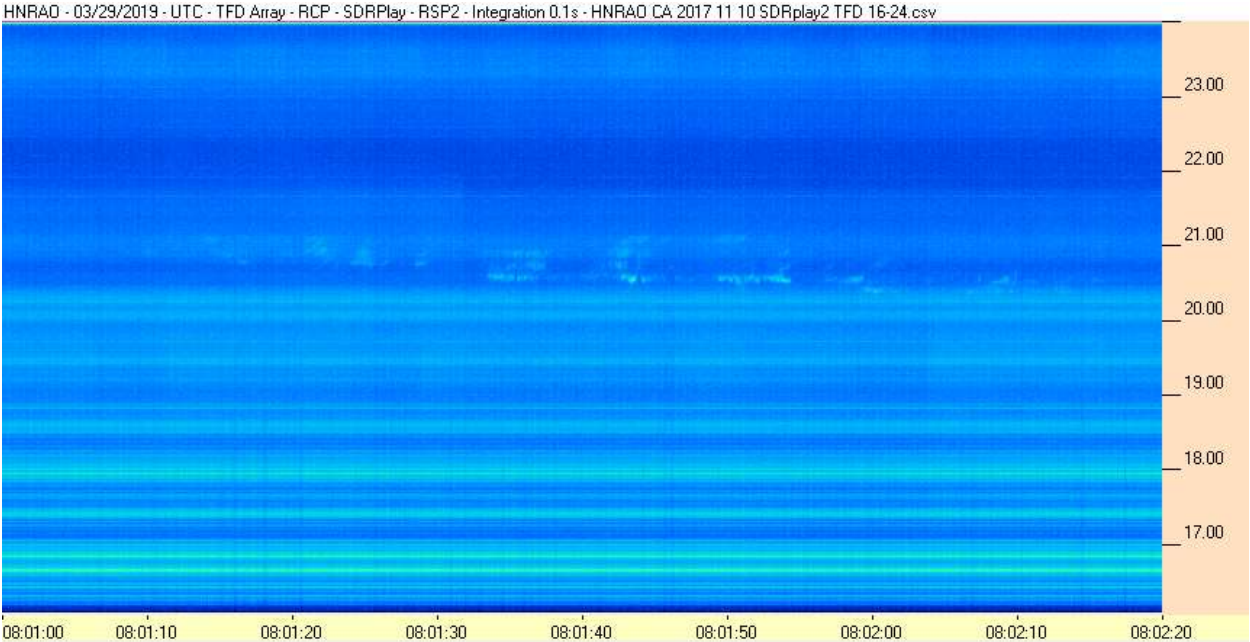
HNRAO - 03/29/2019 - UTC - TFD Array - RCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv



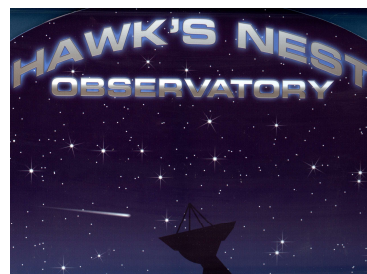
HNRAO - 03/29/2019 - UTC - TFD Array - RCP - SDRPlay - RSP2 - Integration 0.1s - HNRAO CA 2017 11 10 SDRplay2 TFD 16-24.csv



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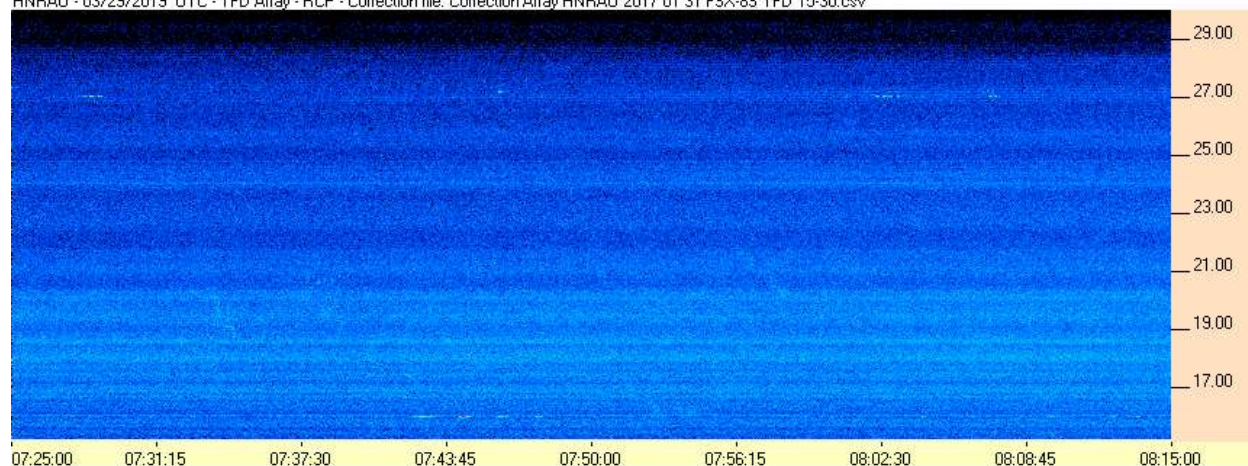


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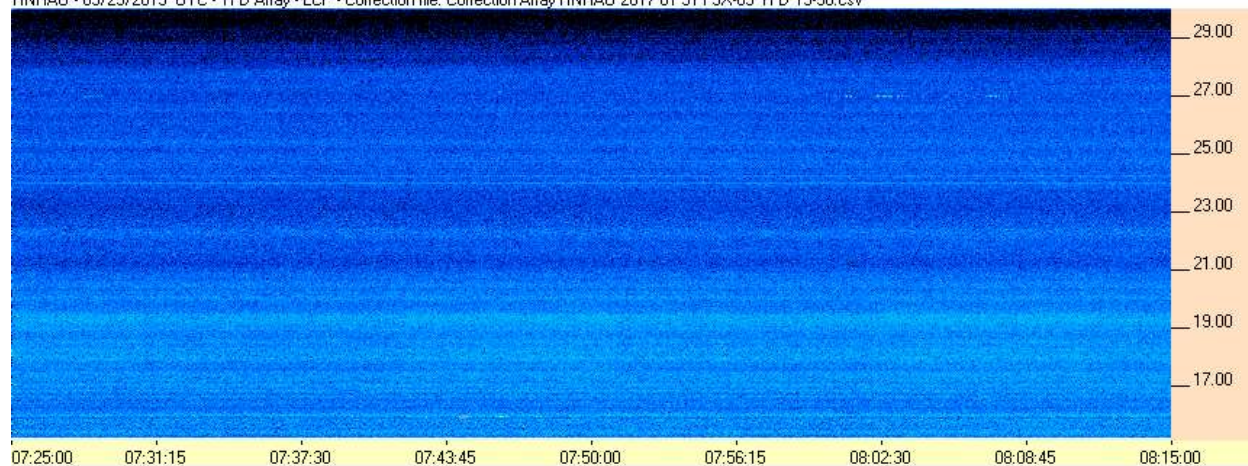


**FSX-8S/TFD Array**

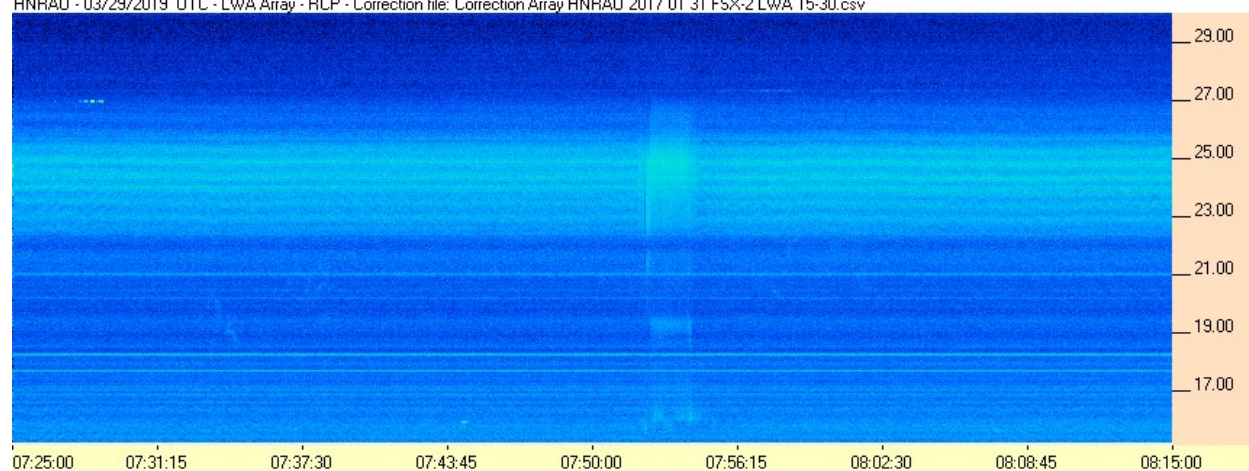
HNRAO - 03/29/2019 UTC - TFD Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv



HNRAO - 03/29/2019 UTC - TFD Array - LCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-8S TFD 15-30.csv



HNRAO - 03/29/2019 UTC - LWA Array - RCP - Correction file: Correction Array HNRAO 2017 01 31 FSX-2 LWA 15-30.csv



**HNRAO Observing Log**  
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**EN90sq**

