

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



**Date: 23 December 2016**

**Object: Jupiter Io-A/C**

**Observer: JB - Unattended at beginning, attended at end of Io-A, unattended for Io-C**

|                          |                      |                          |                      |
|--------------------------|----------------------|--------------------------|----------------------|
| <b>Start of pass:</b>    | <b>1110 UT</b>       |                          |                      |
| <b>Jupiter Altitude:</b> | <b>39.6 degrees</b>  | <b>Jupiter Azimuth:</b>  | <b>155.0 degrees</b> |
| <b>Jupiter CML:</b>      | <b>198.21</b>        | <b>Jupiter Io Phase:</b> | <b>198.96</b>        |
| <b>Jupiter RA:</b>       | <b>13:15</b>         | <b>Jupiter Dec:</b>      | <b>-06:32</b>        |
| <b>Sun Altitude:</b>     | <b>-15.5 degrees</b> | <b>Sun Azimuth:</b>      | <b>107.8 degrees</b> |
| <b>Sun RA:</b>           | <b>18:01</b>         | <b>Sun Dec:</b>          | <b>-23:26</b>        |

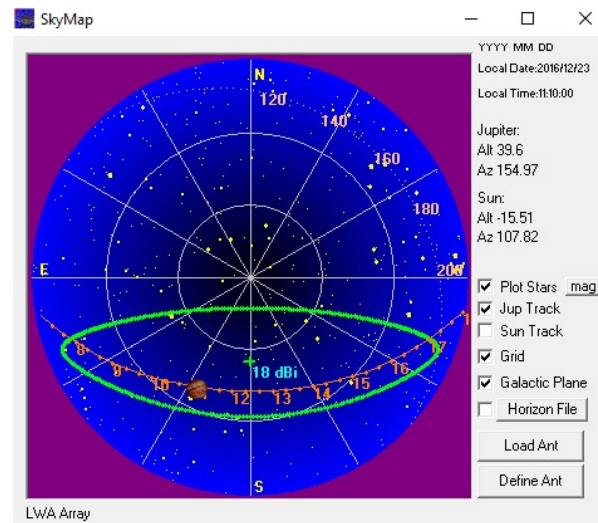
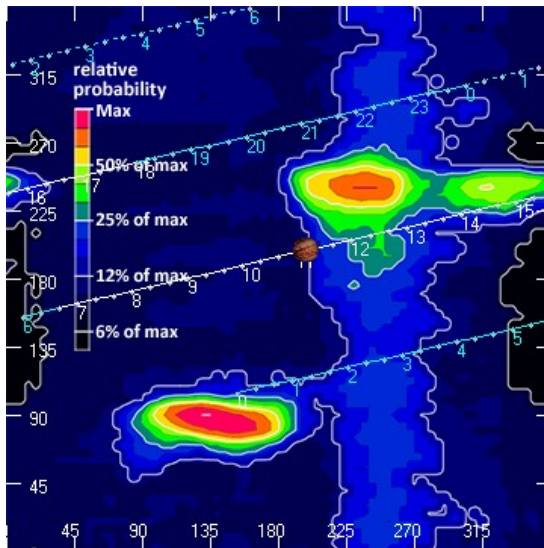
|                          |                      |                         |                      |
|--------------------------|----------------------|-------------------------|----------------------|
| <b>End of pass:</b>      | <b>1207 UT</b>       |                         |                      |
| <b>Jupiter Altitude:</b> | <b>42.6 degrees</b>  | <b>Jupiter Azimuth:</b> | <b>173.4 degrees</b> |
| <b>Jupiter CML:</b>      | <b>232.66</b>        | <b>Jupiter Io Phase</b> | <b>207.00</b>        |
| <b>Jupiter RA:</b>       | <b>13:15</b>         | <b>Jupiter Dec:</b>     | <b>-06:32</b>        |
| <b>Sun Altitude:</b>     | <b>-05.5 degrees</b> | <b>Sun Azimuth:</b>     | <b>116.4 degrees</b> |
| <b>Sun RA:</b>           | <b>18:01</b>         | <b>Sun Dec:</b>         | <b>-23:26</b>        |

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 Observations made using:

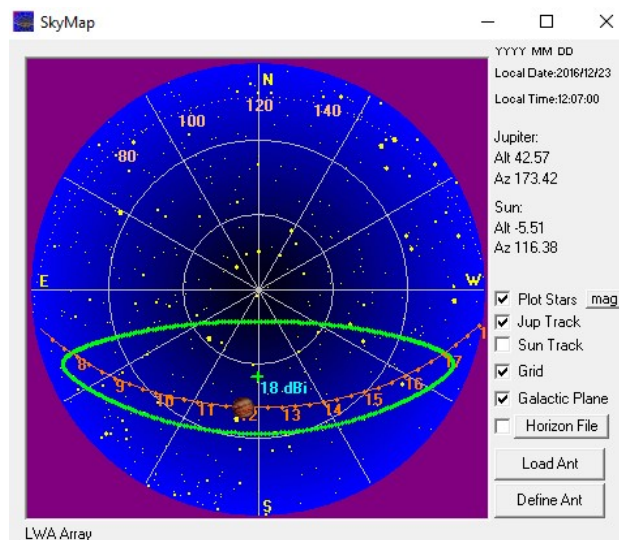
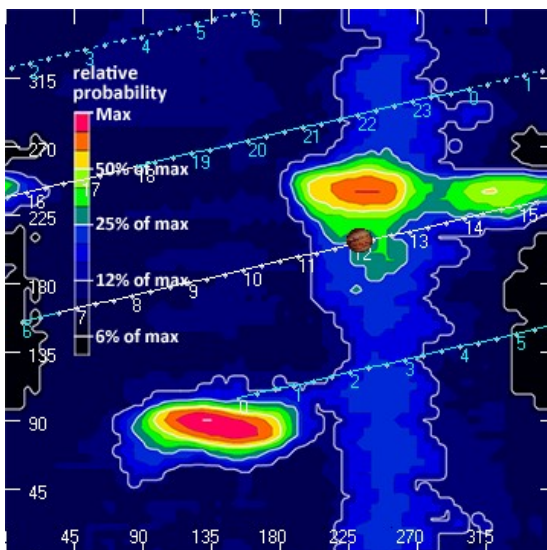
1. FSX-8S fed by the TFD array
  - a. Initially connect to array through HNRAO Multicoupler #1 and #2, port 2
    - i. HNRAO Multicoupler #1 – TFD/LCP
    - ii. HNRAO Multicoupler #2 – TFD/RCP
    - iii. Port 1 having 10 dB of gain, all other ports on Multicoupler have approximately 3 dB gain.
2. FSX-2 fed by the LWA array directly
  - a. LWA element configuration – 90 degrees
3. JOVE 2 receiver fed by phased JOVE dipoles @ 10' – phased for 2016-17 season
  - a. Calibrated 28 Nov. 2016
  - b. Connected to dipoles through HNRAO Multicoupler #3, port 1.
4. Icom R75 receiver fed by experimental DDRR antenna directly.
  - a. Calibrated 28 Nov. 2016

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## Beginning of Pass



## End of Pass

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- Observations of these emissions were made using the FSX-8S/TFD array pair along with the FSX-2/LWA pair. The FSX-2/LWA pair observed the emissions stronger than the FSX-8S/TFD pair.
- HNRAO Galactic Background through duration of event, 1110 UT – 1207 UT, averaged 33 kK
- Emissions observed here began at 1110 UT and were no longer evident by 1207 UT
- The arc of the frequency span observed here was from 19 MHz at the beginning of emissions, peaking about 27 MHz, then ending emissions at 19 MHz.
- Emissions were a series of near vertical L-bursts. No obvious S-bursts or N-events observed.
- Observed L-bursts ranged from weak to moderately weak with the strongest single burst at 1128 UT. No obvious modulation lanes.
- Strongest emissions observed with the Radio JOVE receiver/dual dipole combination at 20.1 MHz occurred at 1135 UT.

Unattended portion of observations

- 1) 1110 UT
  - a) First indication of emissions.
  - b) 19 MHz
  - c) Weak L-burst
- 2) 1213 UT
  - a) HNRAO GB 33 kK
  - b) AJ4CO GB 28 kK
  - c) LGM GB 48 kK
- 3) 1232 UT
  - a) Storm already in progress.
  - b) Unattended prior to 1213 UT
    - i) HNRAO GB 33 kK
    - ii) LGM GB 48 kK
    - iii) AJ4CO GB 29 kK
    - iv) Jupiter past transit
      - (1) Altitude 42.74 degrees, Azimuth 182.55 degrees
    - v) Mild line noise on FSX-8S
    - vi) Mild/Moderate line noise on FSX-2
    - vii) JOVE 2/JOVE dipoles show normal background. No line noise

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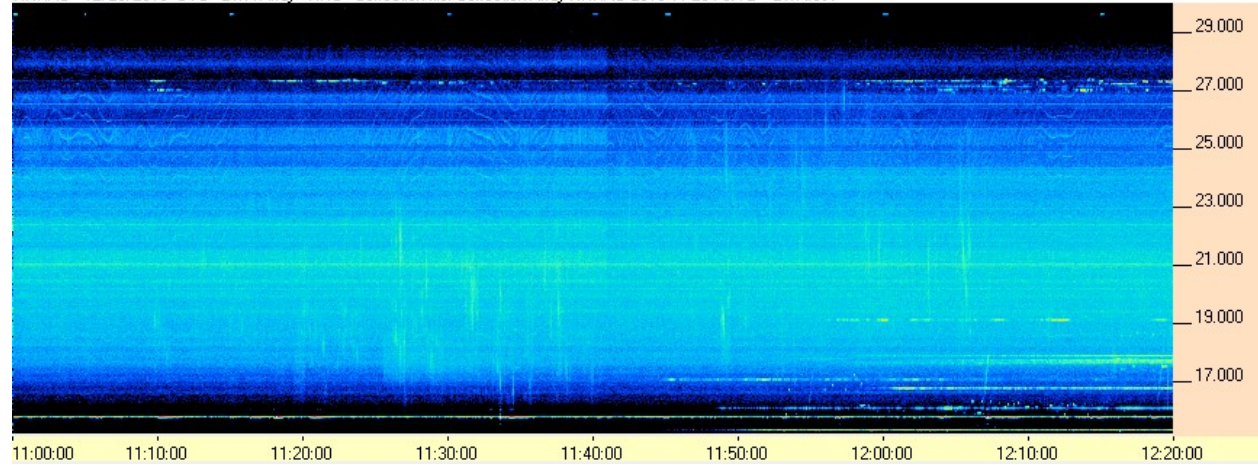
- 4) 1237 UT
  - a) SkyPipe @ HNRAO quiet
  - b) SkyPipe @ LGM noisy.
  - c) SkyPipe @ AJ4CO quiet
  
- 5) 1254 UT
  - a) **Switching FSX-2 to LCP polarization**
  
- 6) **Note:**
  - a) **RSS in server mode. On both machines displaying same time across x axis.**
  - b) **Example: 1257:57 across entire x axis.**
  
- 7) 1257 UT
  - a) HNRAO GB 37 KK
  - b) LGM GB 50KK
  - c) AJ4CO GB 29 K
  
- 8) 1330 UT
  - a) No further Io-A emissions
  - b) No Io-C emissions detected.

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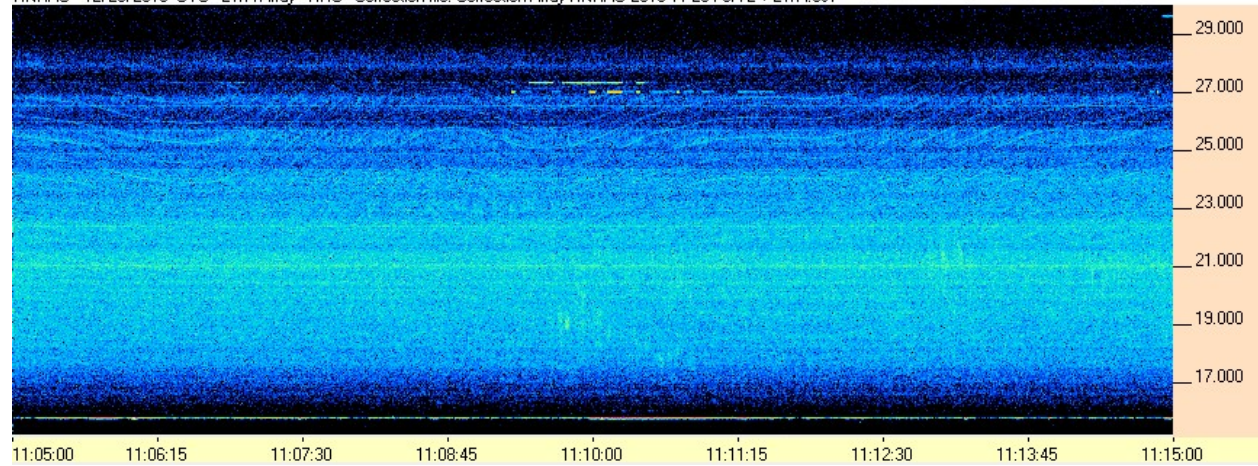


FSX-2

HNRAO - 12/23/2016 UTC - LWA Array - RHC - Correction file: Correction Array HNRAO 2016 11 20 FSX-2 + LWA.csv



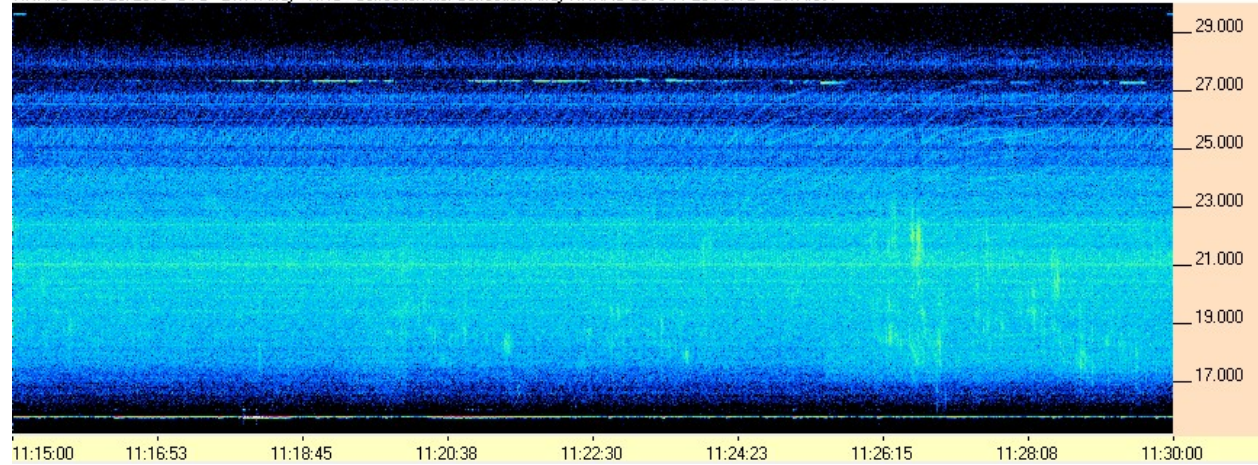
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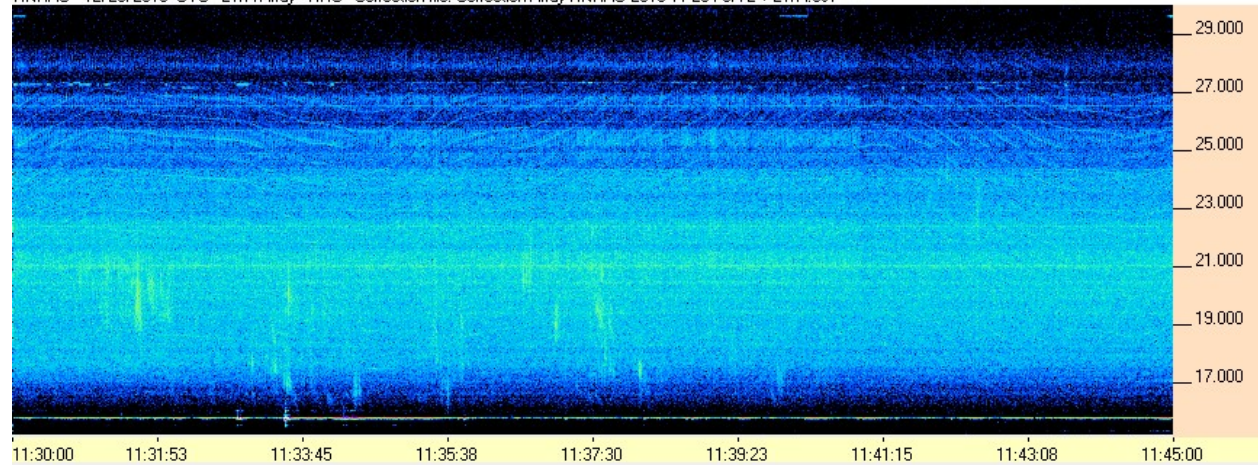
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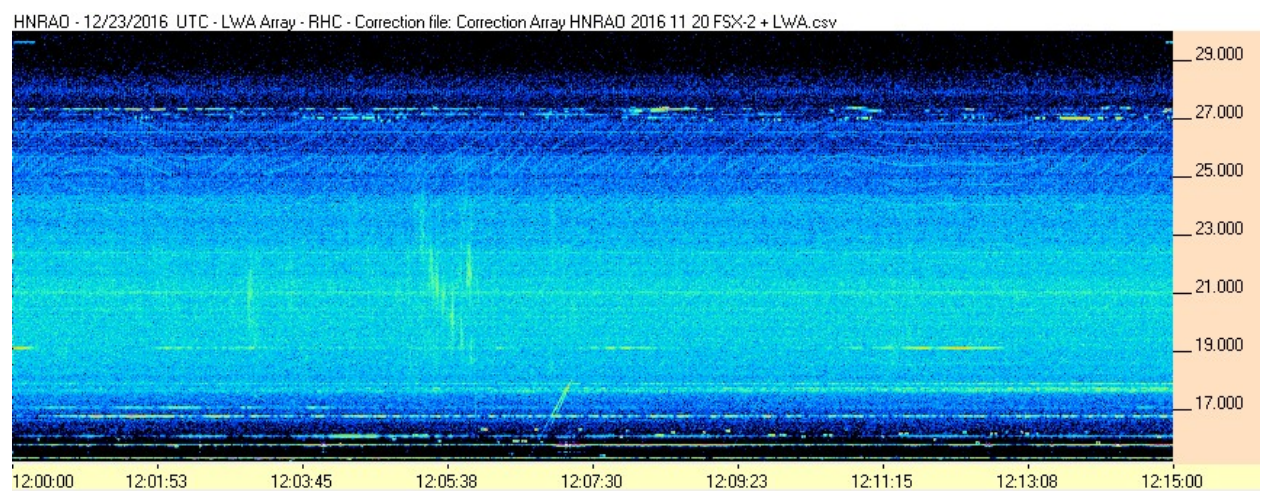
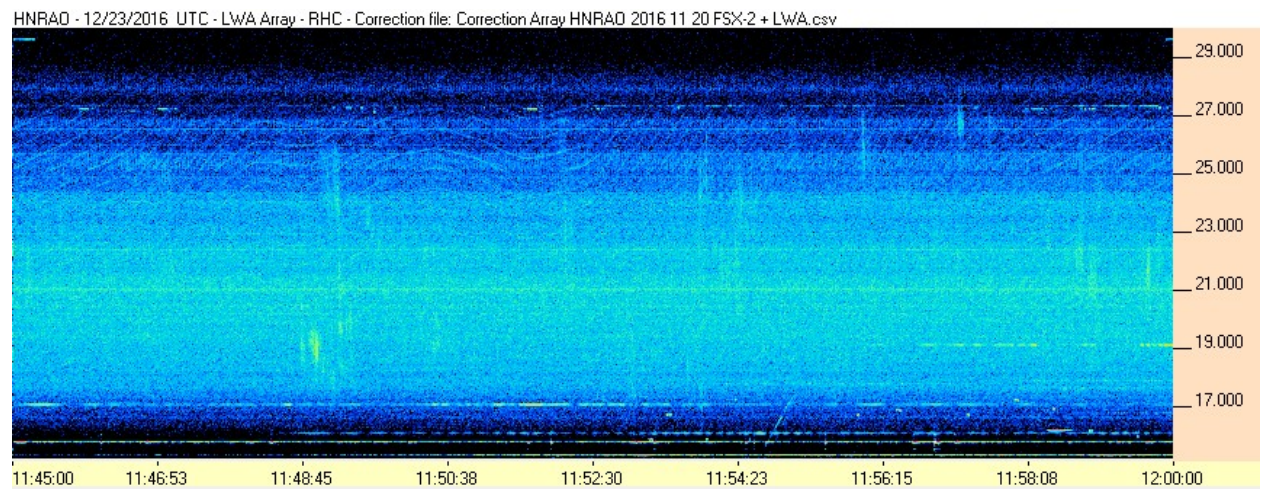
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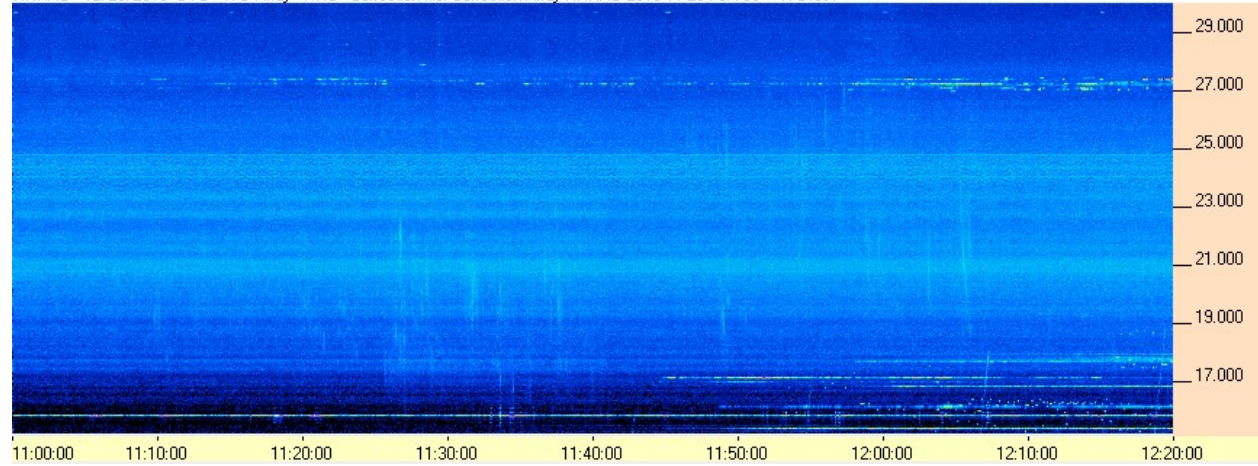


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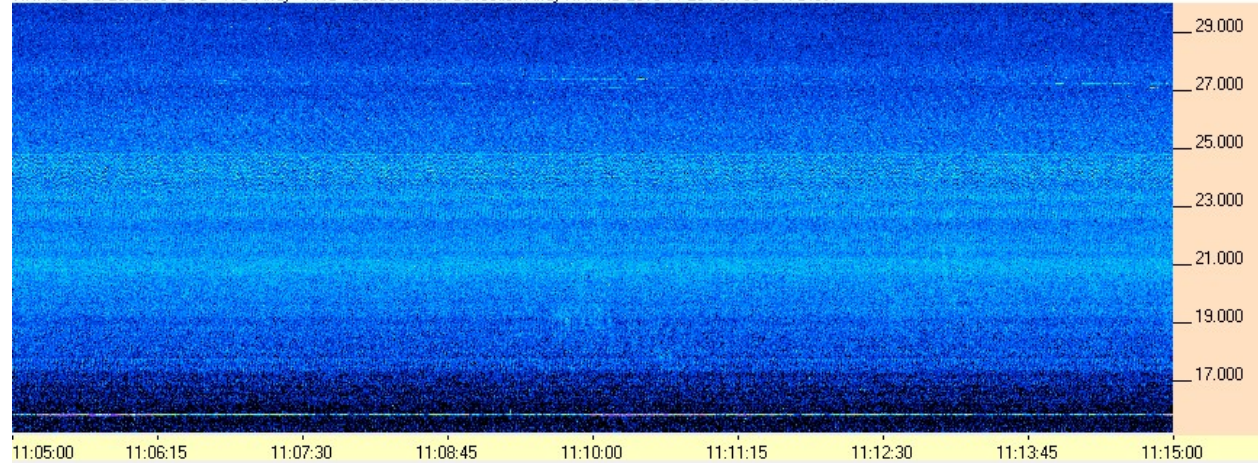


FSX-8S

HNRAO - 12/23/2016 UTC - TFD Array - RHC - Correction file: Correction Array HNRAO 2016 11 20 FSX-8S + TFD.csv



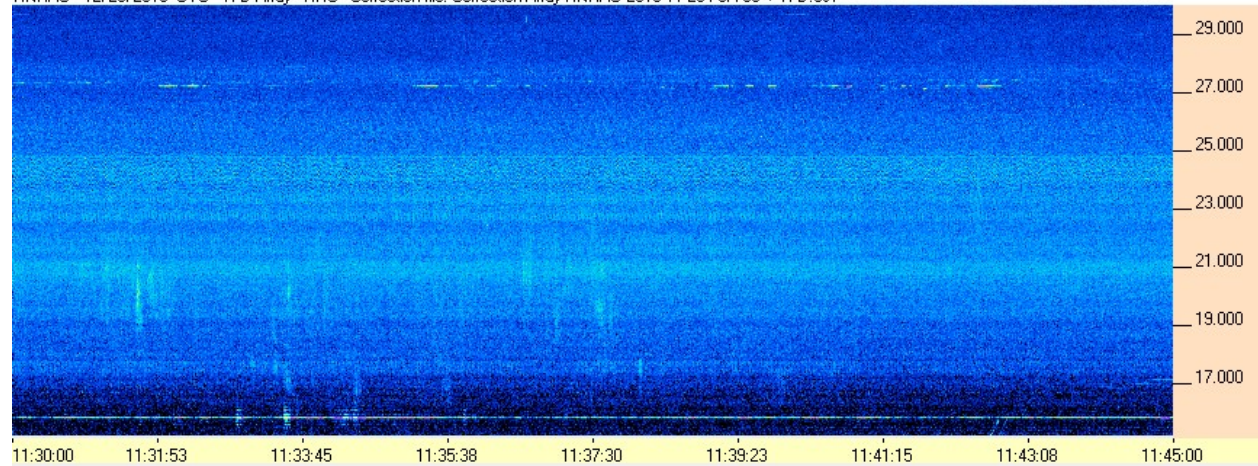
HNRAO - 12/23/2016 UTC - TFD Array - RHC - Correction file: Correction Array HNRAO 2016 11 20 FSX-8S + TFD.csv



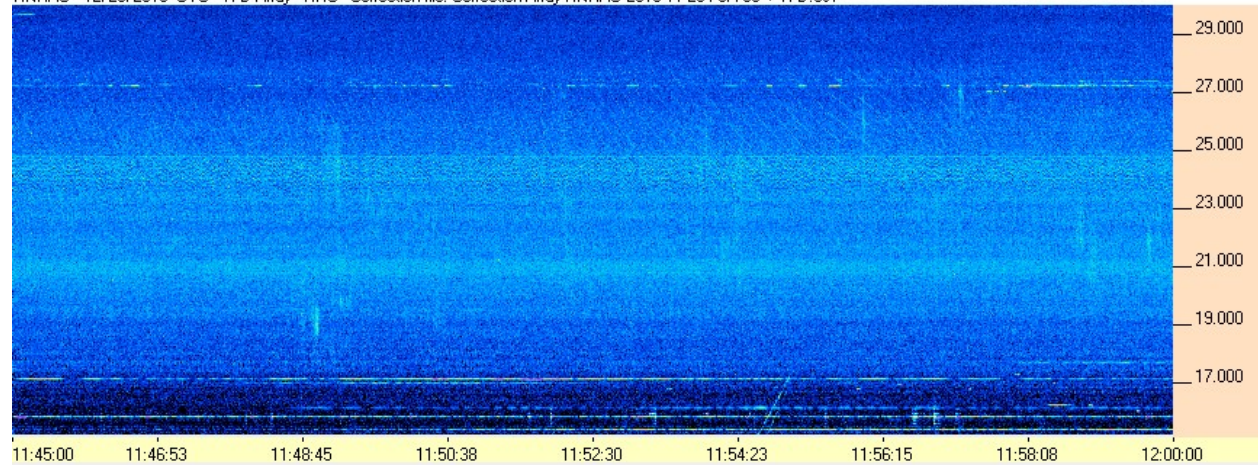
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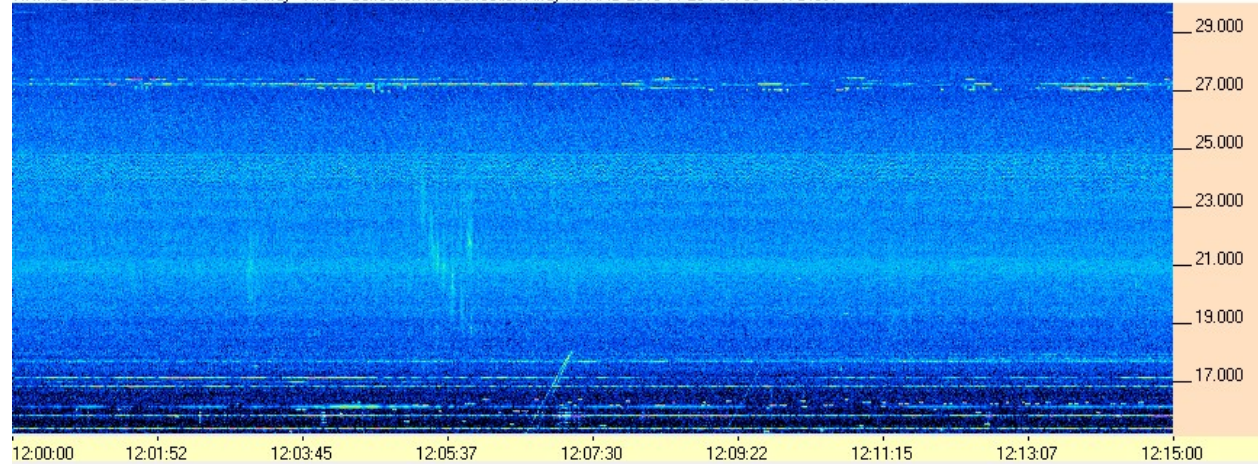
HNRAO - 12/23/2016 UTC - TFD Array - RHC - Correction file: Correction Array HNRAO 2016 11 20 FSX-8S + TFD.csv



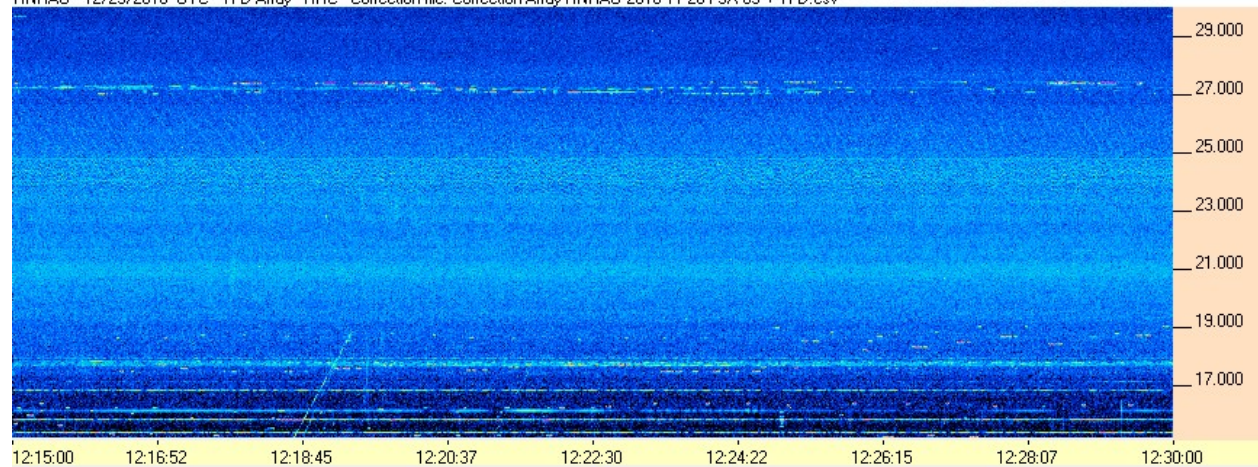
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**Radio JOVE/SkyPipe**

