

HNRAO Observing Log
40.673181 N – 80.437885 W
EN90sq



Date: 30 December 2016

Object: Jupiter Io-A/C

Observer: JB

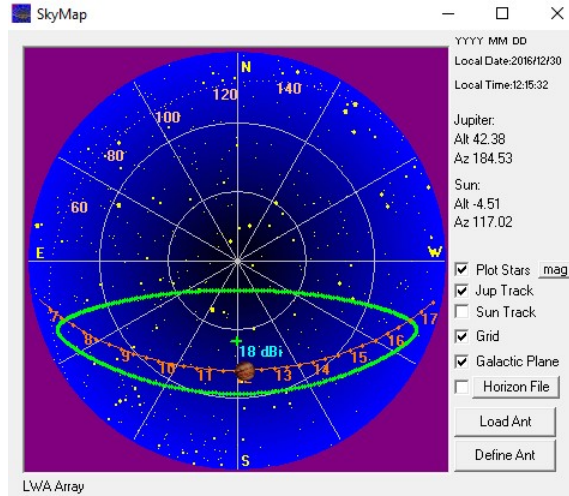
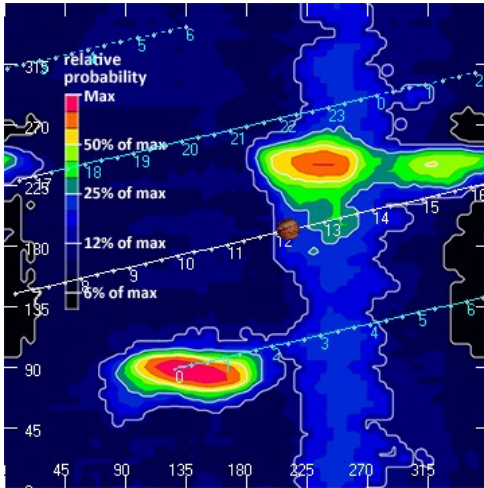
| | | | |
|--------------------------|----------------------|--------------------------|----------------------|
| Start of pass: | 1215 UT | | |
| Jupiter Altitude: | 42.4 degrees | Jupiter Azimuth: | 184.5 degrees |
| Jupiter CML: | 211.3 | Jupiter Io Phase: | 191.95 |
| Jupiter RA: | 13:18 | Jupiter Dec: | -06:50 |
| Sun Altitude: | -04.5 degrees | Sun Azimuth: | 117.0 degrees |
| Sun RA: | 18.32 | Sun Dec: | -23:14 |

| | | | |
|--------------------------|---------------------|-------------------------|----------------------|
| End of pass: | 1314 UT | | |
| Jupiter Altitude: | 39.7 degrees | Jupiter Azimuth: | 203.5 degrees |
| Jupiter CML: | 246.65 | Jupiter Io Phase | 200.20 |
| Jupiter RA: | 13:18 | Jupiter Dec: | -06:50 |
| Sun Altitude: | 04.9 degrees | Sun Azimuth: | 126.6 degrees |
| Sun RA: | 18:32 | Sun Dec: | -23.14 |

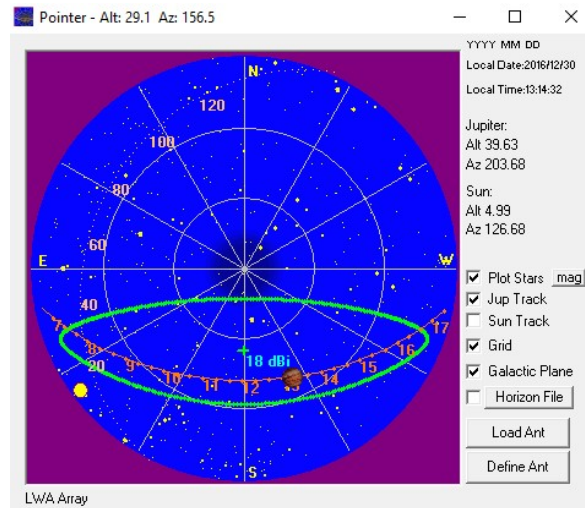
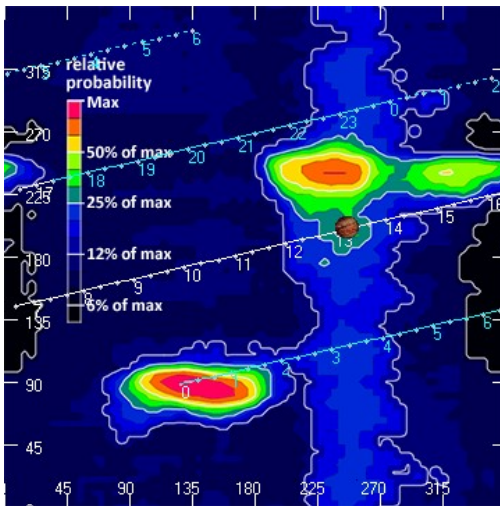
 Observations made using:

1. FSX-8S/TFD 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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Overall a weak and uneventful storm. Weak L-bursts starting at 1215 UT followed by a long period of no activity. All activity was RHC. Activity picking up again at approximately 1300 UT and ending at 1314 UT. Negative sloping arc starting at approximately 1300 UT @ 28 MHz and ending at 1314 UT below 15 MHz. The most active period was between approximately 1300 UT until the end at 1314 UT. Mixed results between FSX-2/LWA pair and FSX-8S/TFD pair. Some emissions were stronger on one but not the other. Overall I would say this event was better captured with the FSX-8S/TFD pair. No observable Radio JOVE activity at 20.1 MHz. Overwhelming power line interference starting approximately 1530 UT made further observations impossible. If there was any Io-C, I was unable to observe it.

- Initial conditions
 - Outside observatory temperature 28 F
 - Partly cloudy with Light Snow
 - Cuban broadcast stations @ 17.5 MHz
 - Moderate strong on FSX-2/LWA
 - Light to moderate on FSX-8S/TFD
 - Line noise
 - FSX-2 is clear
 - FSX-8S/TFD has very slight line noise
 - Sweepers 15-19 MHz
 - FSX-2
 - CO 422
 - CG 3.5
 - FSX-8S/TFD
 - CO 817
 - CG 3.5
 - On port 2 of Multicoupler on RCP 1 and LCP 2
 - Jove 2/dipoles on port 4 of multicoupler 3

- GB
 - HNRAO 30 kK
 - LGM JOVE 48 kK TFD 42 kK
 - AJ4CO 32 kK

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- 1) 1215 UT
 - a) First sign of emissions
 - b) L-bursts – 17-19 MHz
 - c) Jupiter past transit
- 2) 1250 UT
 - a) 19 second of power line
- 3) 1257 UT
 - a) 1 ½ minute burst of line noise
 - i) JOVE
 - ii) FSX-2/LWA
 - iii) FSX-8S/TFD
- 4) 1302 UT
 - a) Brief weak Jupiter 23-25 MHz
 - b) L-burst
 - c) Weak Jupiter 25-27 MHz
 - d) Stronger on FSX-8S/TFD
 - e) Weak emissions follow in descending arc.
- 5) 1303 UT
 - a) Slightly stronger emissions 23-25 MHz
 - b) Continued negative slope
 - c) Continue to be stronger on FSX-8S/TFD
- 6) 1304 UT
 - a) Emissions stronger
 - i) 22-24 MHz
- 7) 1305 UT
 - a) Brief line 1 minute burst noise
 - b) Followed by another at 1305:33 for 16 seconds
- 8) 1306 UT
 - a) Weak emissions
 - b) Stronger on FSX-2/LWA
 - c) Line noise 1307 UT few seconds
 - d) Line noise 1307271308 UT

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- 9) 1308 UT
 - a) Weak emissions continue
 - b) 19-21 MHz negative slope

- 10) 1309 UT
 - a) L-bursts on JOVE
 - b) Weak on FSX-2/LWA
 - c) Weaker on FSX-8S/TFD
 - d) Emissions no longer negative slope
 - e) Holding between 17 MHz and 19 MHz

- 11) 1310 UT
 - a) Strongest burst yet
 - b) Sweepers 15-21 MHz

- 12) 1311 UT
 - a) Emissions begin negative slope again
 - b) 15-17 MHz

- 13) 1313 UT
 - a) Emissions drop below 15 MHz

- 14) 1314 UT
 - a) Jupiter in tail of Io-A
 - b) Emissions have ceased
 - c) Emissions have lasted 1 hour at this point. All emissions weak to very weak
 - d) Only one brief showing on JOVE SkyPipe chart as arc passed through 20 MHz

- 15) 1318 UT
 - a) GB
 - i) HNRAO 34 kK
 - ii) LGM JOVE 49 kK TFD 46 kK
 - iii) AJ4CO 32 kK

- 16) 1321 UT
 - a) 19 seconds of line noise on JOVE
 - b) FSX-2/LWA clear of line noise
 - c) FSX-8S/TFD. Very very weak. Hard to see.

HNRAO Observing Log
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17) 1323 UT

- a) Sweepers 15-20 MHz
 - i) Stronger on FSX-2/LWA
- b) Jupiter remains quiet
- c) Cuban broadcast stations at 17.5 MHz
 - i) Stronger on FSX-2/LWA

18) 1330 UT

- a) GB
 - i) HNRAO 33 kK
 - ii) LGM JOVE 51 kK TFD 49 kK
 - iii) AJ4CO 32 kK
- b) Jupiter 1 hour past transit
- c) Sun
 - i) Altitude 0.7 degrees.
 - ii) Azimuth 130 degrees

19) 1334 UT

- a) Sweeper 15-20 MHz
- b) Stronger on FSX-2/LWA
- c) 14 seconds of line noise on JOVE/SkyPipe

20) 1346 UT

- a) Sweeper 15 MHz to 21 MHz
- b) Background level on SkyPipe beginning to rise due to precipitation static
- c) Light snow falling
- d) LGM and AJ4CO remain steady

21) 1350 UT

- a) 14 seconds of line noise on Jove/SkyPipe

22) 1354 UT

- a) Broadcast station at 15.3 MHz
 - i) Very strong on FSX-8S/TFD.
 - ii) Not as strong on FSX-2/LWA

HNRAO Observing Log
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23) 1400 UT

- a) GB
 - i) HNRAO 37 kK
 - ii) LGM JOVE 56 kK TFD 49 kK
 - iii) AJ4CO 31 kK
- b) Sweeper 15-22 MHz
- c) Switching FSX-2/LWA to LCP polarization
- d) Changed banner on RSP to reflect change

24) 1404 UT

- a) GB
 - i) HNRAO 36 kK – Snow fall ended. Returned to normal

25) 1405 UT

- a) 14 seconds of line noise on JOVE/SkyPipe
- b) Odd spikes on experimental R75/DDRR/SkyPipe
- c) Jupiter 2 hours past transit. Continued quiet. Halfway between Io-A and Io-C
- d) Broadcasts on 15.3 MHz
- e) Stronger on FSX-2/LWA

26) 1410 UT

- a) Cuban broadcast at 17.5 MHz beginning to overload FSX-8S/TFD
- b) Sweeper 15-23 MHz

27) 1417 UT

- a) Large spikes on R75/DDRR.

28) 1421 UT

- a) 14 seconds of line noise on JOVE/SkyPipe
- b) Sweeper 15-21 MHz
- c) FSX-8S/TFD continues to be over loaded by broadcast stations
- d) FSX-2/LWA shows minor overload but negligible

29) 1425 UT

- a) Sweeper 15-26 MHz

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30) 1430 UT

- a) GB
 - i) HNRAO 36 kK
 - ii) LGM JOVE 62 kK TFD 53 kK
 - iii) AJ4CO 35 kK
- b) Jupiter remains quiet

31) 1435 UT

- a) Sweeper 15-25 MHz

32) 1436 UT

- a) 14 seconds of line noise JOVE/SkyPipe

33) 1452 IT

- a) 14 seconds of line noise Jove/SkyPipe

34) 1453 UT

- a) What sound like L-bursts on Jove/Dipoles but no confirmation on either spectrograph.

35) 1456 UT

- a) Sweeper passing through 20 MHz, heard on JOVE
 - i) Not visible on either spectrograph

36) 1457 UT

- a) More activity on Jove/dipoles that sound like L-bursts. No confirmation on either spectrograph.

37) 1500 UT

- a) GB
 - i) HNRAO 39 kK
 - ii) LGM JOVE 75 kK TFD 57 kK
 - iii) AJ4CO 37 kK
- b) Sweeper 15-24 MHz

38) 1505 UT

- a) 30 seconds of line noise on Jove/SkyPipe
 - i) Also on FSX-8S/TFD
 - ii) Not on FSX-2/LWA

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39) 1509 UT

- a) 1 min 40 seconds of line noise on Jove/SkyPipe
 - i) Also on FSX-8S/TFD
 - ii) Not on FSX-2/LWA
- b) Jupiter remains quiet
- c) RJP shows 14% probability going into Io-C region

40) 1512 UT

- a) Sweeper 15-25 MHz
- b) Cuban broadcast station at 17.5 MHz quieting. Not overloading FSX-8S/TFD.

41) 1518 UT

- a) Both spectrographs quiet and free from broadcast overload

42) 1523 UT

- a) Sweeper 15-24 MHz.

43) 1529 UT

- a) GB
 - i) HNRAO 39 kK
 - ii) LGM Jove 115 kK TFD 57 kK
 - iii) AJ4CO 38 kK
- b) RJP 13% probability

44) 1529:30 UT

- a) Terrible line noise on all receivers
- b) Jove/dipoles 251 kK.
- c) Observations of any Jupiter impossible.
- d) Span 20-29 MHz but strongest at 24 MHz

45) 1547:41 UT

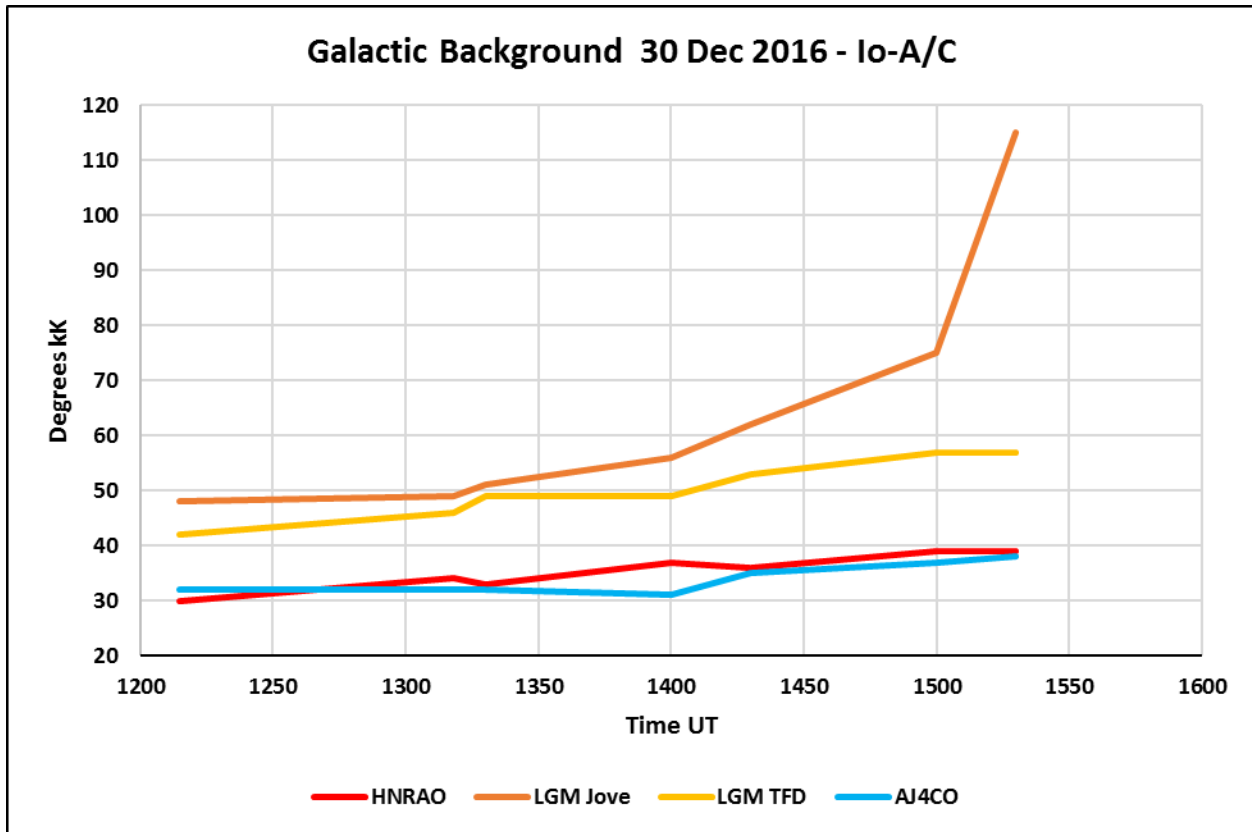
- a) Line noise briefly stopped, one brief arc, then resumed

46) 1600 UT

- a) Calling the observation session over.
- b) Line noise has overwhelmed both spectrographs and Jove receiver

End of Report

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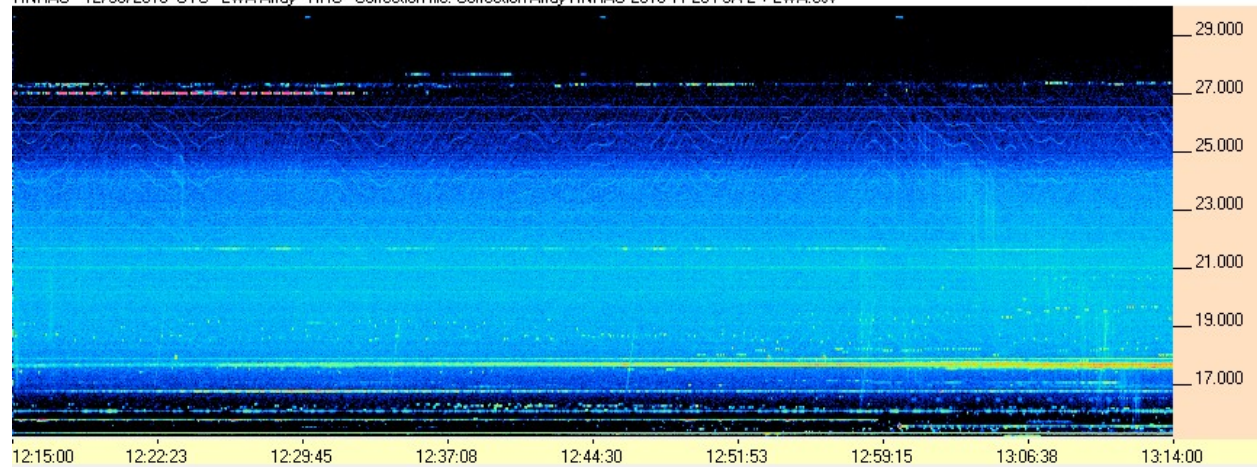


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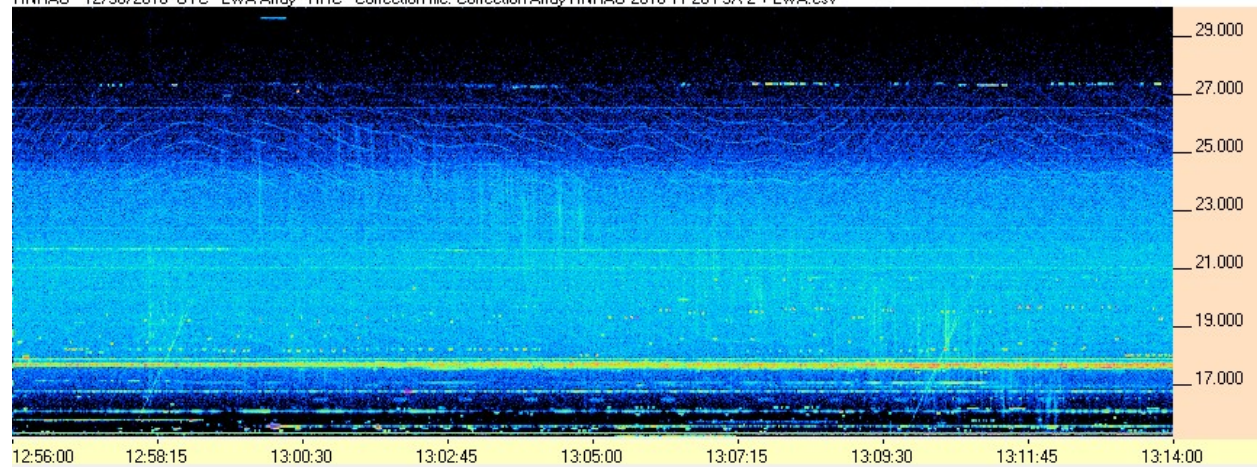


FSX-2

HNRAO - 12/30/2016 UTC - LWA Array - RHC - Correction file: Correction Array HNRAO 2016 11 20 FSX-2 + LWA.csv



HNRAO - 12/30/2016 UTC - LWA Array - RHC - Correction file: Correction Array HNRAO 2016 11 20 FSX-2 + LWA.csv

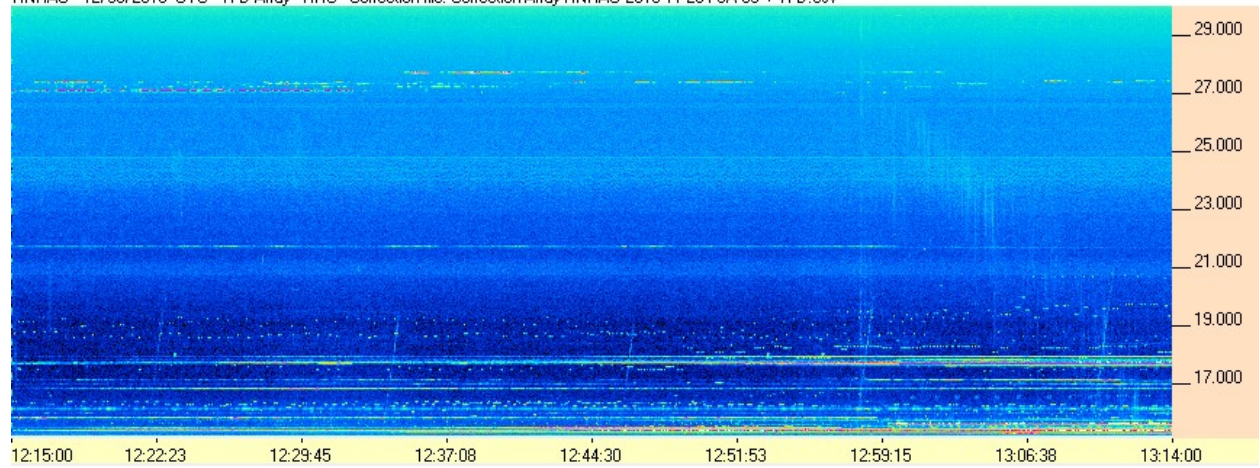


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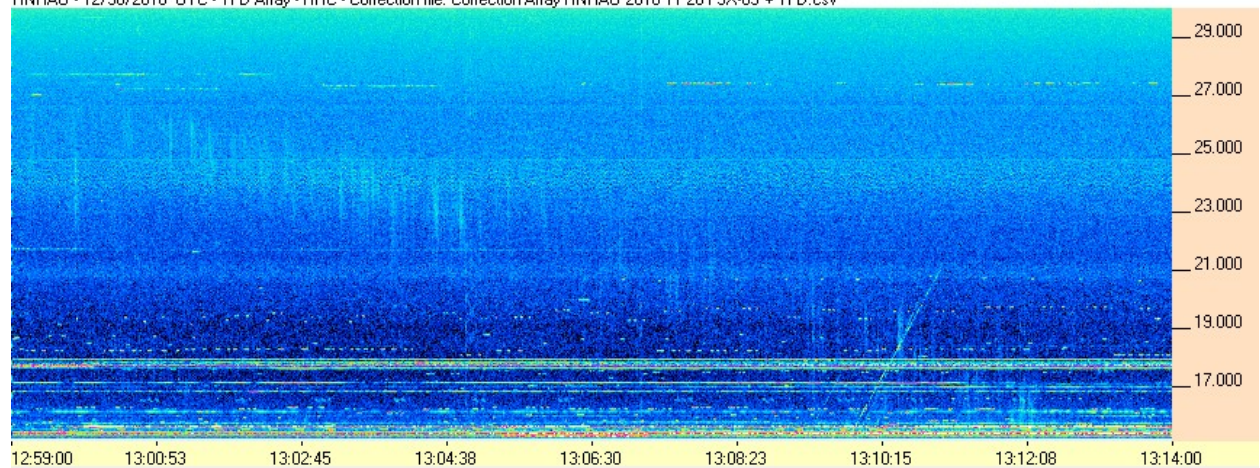


FSX-8S

HNRAO - 12/30/2016 UTC - TFD Array - RHC - Correction file: Correction Array HNRAO 2016 11 20 FSX-8S + TFD.csv



HNRAO - 12/30/2016 UTC - TFD Array - RHC - Correction file: Correction Array HNRAO 2016 11 20 FSX-8S + TFD.csv

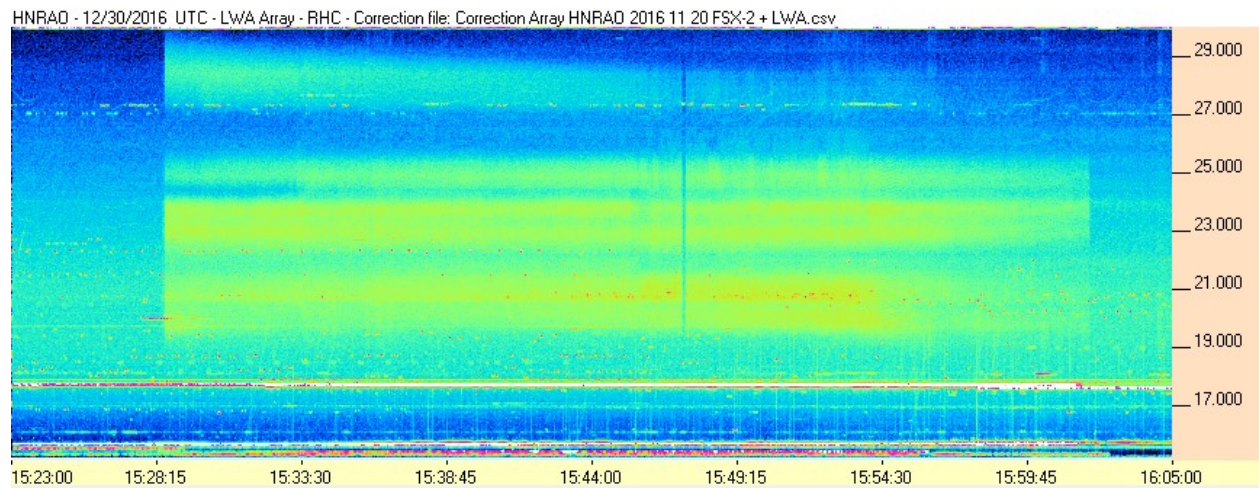


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RFI

FSX-2



FSX-8S

