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

**An analysis of an RSP Solar Radio Burst on April 13, 2019 as observed at HNRAO**

Below is the 1137 UT solar burst from April 13, 2019 as recorded at HNRAO in Industry, PA.

This burst was recorded with the SDRPlay RSP2 / TFD antenna centered at 20 MHz, and an SDRPlay RSP2 / LWA antenna centered at 74 MHz. The SkyPipe chart was fed from a Radio JOVE receiver and the JOVE dual dipole array at 20.1 MHz.

NOAA designated this as: Event 950, from 1136 UT to 1137 UT. Reported by Sagamore Hill, MA, USA. RSP (Sweep-frequency radio burst) from 025-180 MHz. It was classified as a type III/2.

Image 1 is the burst from 70 MHz to 78 MHz. Image 2 is the same burst from 16 MHz to 24 MHz. Image 3 is the 20.1 MHz single frequency SkyPipe chart of the same burst.

This burst demonstrates that the higher frequency component of a solar radio burst will arrive at the Earth before the lower frequencies. Higher frequencies are emitted earlier as an electron jet responsible for the emission travels outward from the Sun.*

The drift rate of the burst from 78 MHz to 70 MHz was measured at -11.4 MHz/sec. The drift rate of the burst from 24 MHz to 16 MHz was measured at -3.8 MHz/sec, a difference of 7.6 MHz/sec.

The emission appears quite different in the two frequency ranges with breaks in the emission at HF frequencies. This effect may be due to either density changes in the electron jet as it travels further from the Sun, or possibly propagation effects in the Earth's ionosphere.

The leading edge of the burst at 78 MHz occurred at 1137:11 UTC and the leading edge of the burst at 16 MHz was at 1137:17 UTC showing that the 78 MHz portion of the burst arrived at the antenna 6 seconds earlier than the 16 MHz portion.

As the electron jet moves outward from the sun, its velocity and hence the rate of frequency change decreases.

JB/RF

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* I presented a talk, “Dual Frequency Solar/Jupiter Radio Telescope”, in 2008 at the SARA conference at NRAO, Green Bank, WV in which I presented a year worth of single frequency data at 144 MHz and 20.1 MHz demonstrating this characteristic. This research was part of a grant awarded to me by the South Carolina NASA Space Grant Consortium while I was an Adjunct Professor and Planetarium Director at South Carolina State University.

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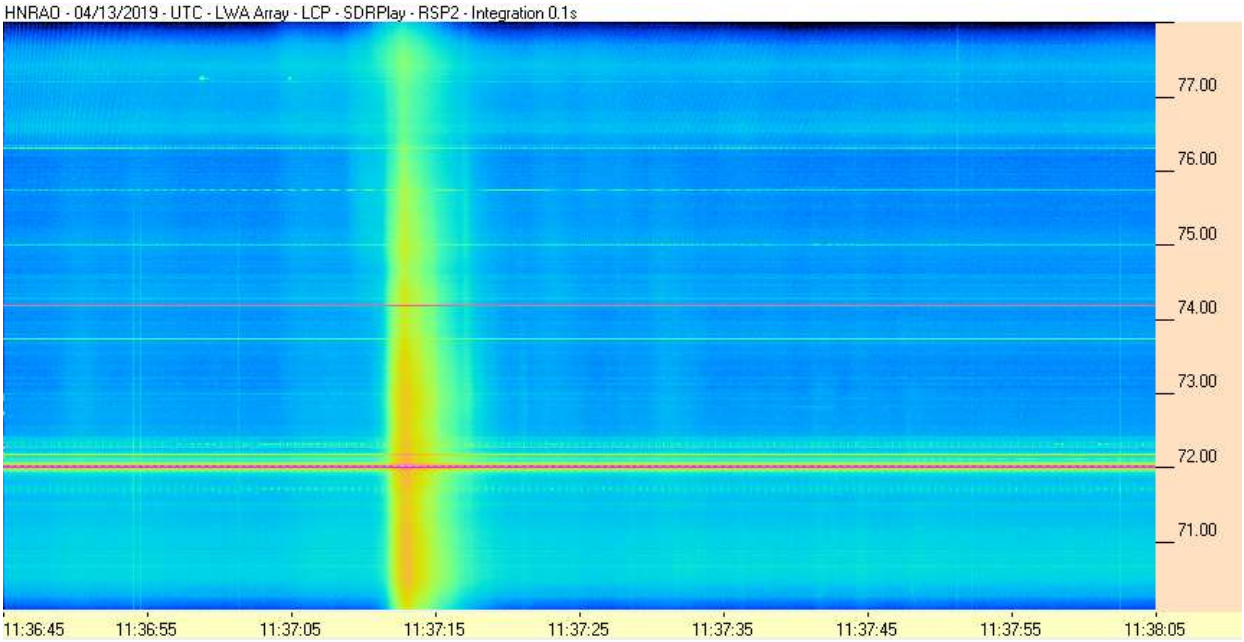


**Image 1**

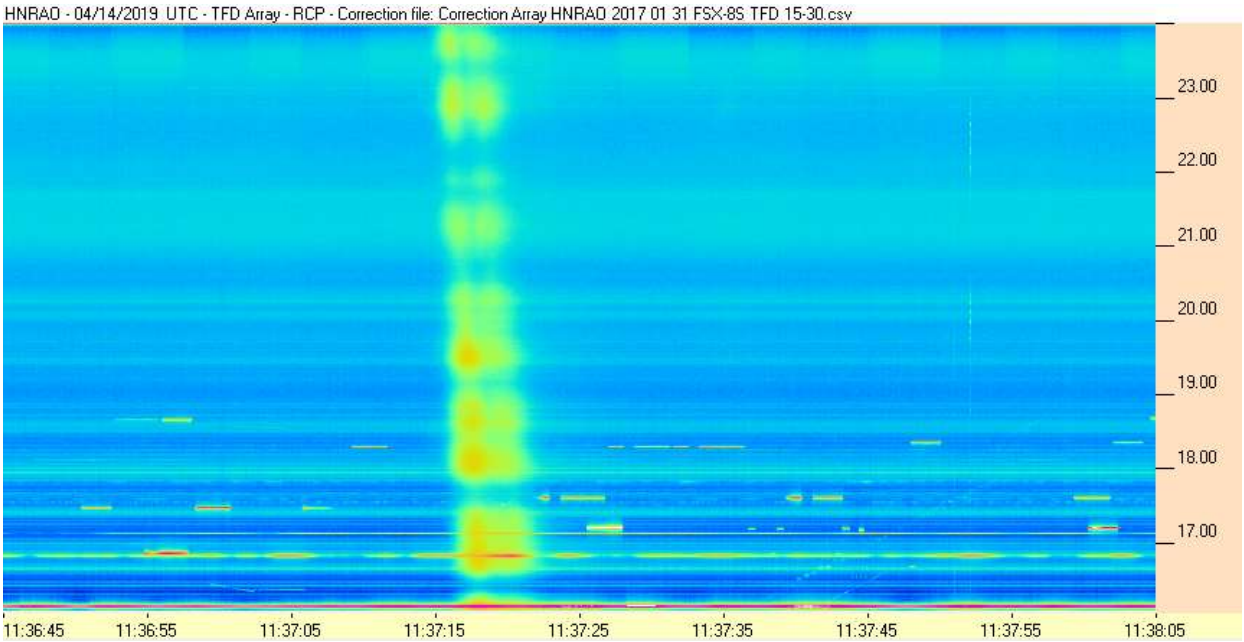


**Image 2**

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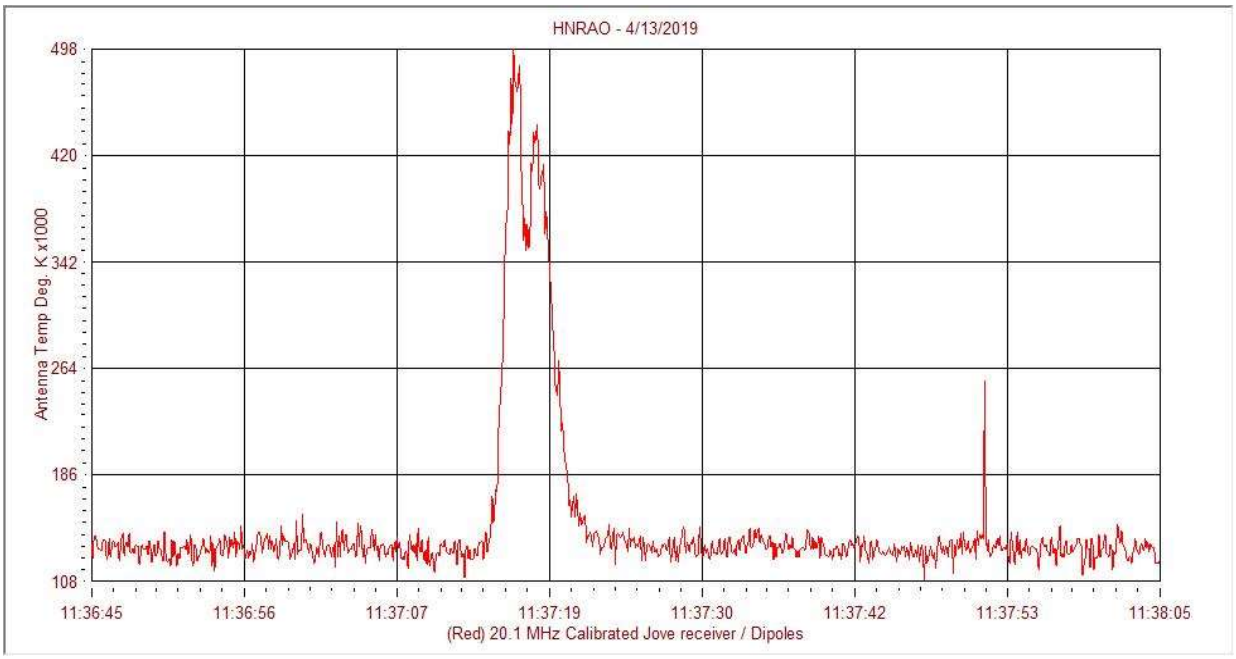


**Image 3**