

Subject: [radiojove-data] 12 Dec 2014 Io-B - S burst high speed spectrograms

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Date: 12/13/2014 15:41

To: RadioJove-Data <radiojove-data@lists.nasa.gov>

During Friday morning's Io-B observing session, the Tunable Wide Band (TWB) receiver was employed to record S bursts in full high speed glory.

The TWB is a receiver custom-built by Richard Flagg, Wes Greenman, and myself. It has a very wide (2 MHz) output bandwidth. This output is fed to a high speed digitizer that stores the signal data on a computer's hard drive. After the observation session, the data is then processed using Fourier analysis to create the high speed TWB spectrograms you see below.

In the first image below, a spectrogram made with the DPS, each vertical column of pixels is about 157 milliseconds wide. That's great, but Jovian S bursts happen much faster than that -- they can sweep through a 2 MHz bandwidth in far less than 100 milliseconds. In the DPS spectrogram, S bursts look like tiny vertical marks only one pixel wide and a dozen or so pixels tall. That's not good enough to tell much about them.

The remainder of the images below are high speed TWB spectrograms. Each TWB spectrogram, in effect, takes a 1-pixel-wide by 38-pixel-tall slice of the DPS spectrogram and blows it up into its own much larger spectrogram. The TWB spectrograms show that there is much more structure to Jovian emission the closer you look. They also make it really easy to measure the drift rates of S bursts and classify them according to their morphology.

An article describing a little more about the TWB system will be in the next issue of the Jove Bulletin. Look for it in January at better newsstands everywhere.

A more in-depth description of the TWB data processing can be found here. Caution, math!

[http://www.radiojove.org/SUG/Pubs/TWB%20Data%20Processing%20Description%20v4%20\(FGT,%202013\).pdf](http://www.radiojove.org/SUG/Pubs/TWB%20Data%20Processing%20Description%20v4%20(FGT,%202013).pdf)

A very nice, informative presentation about the TWB hardware and software, along with many other high quality, incredibly informative presentations, is available on the Jove Conference USB stick, bottom right of this page:

http://radiojove.gsfc.nasa.gov/office/order_form.html

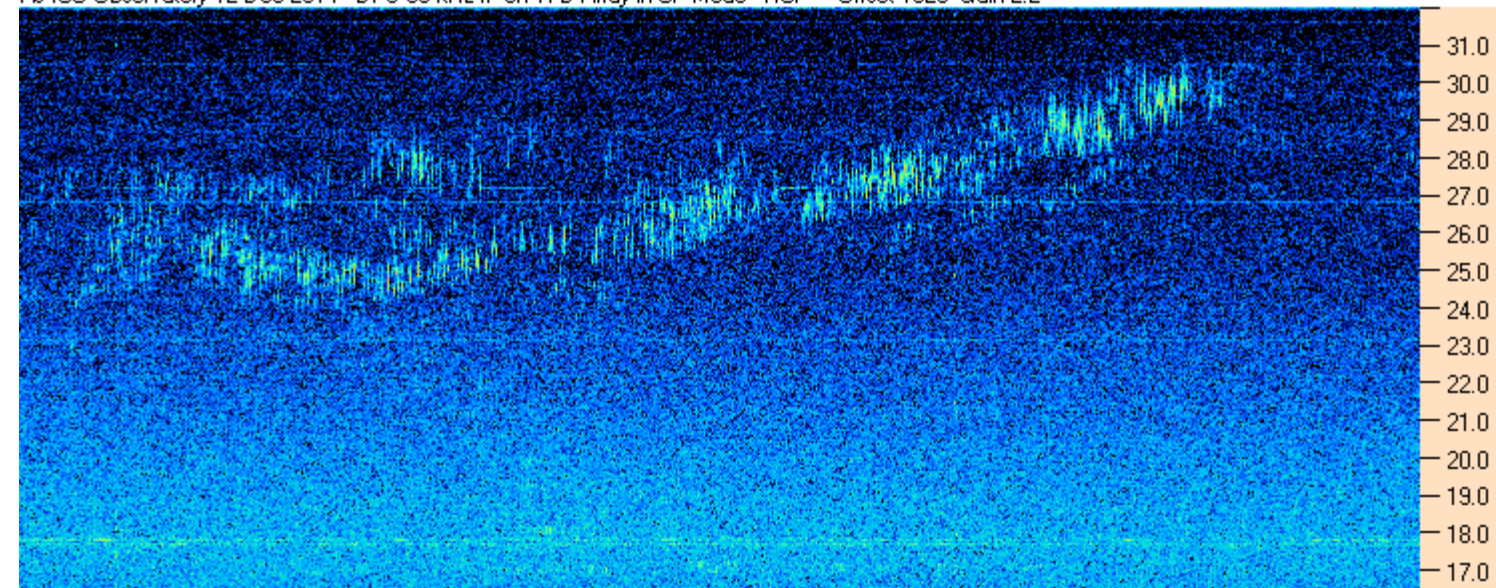
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Dave

AJ4CO Observatory 12 Dec 2014

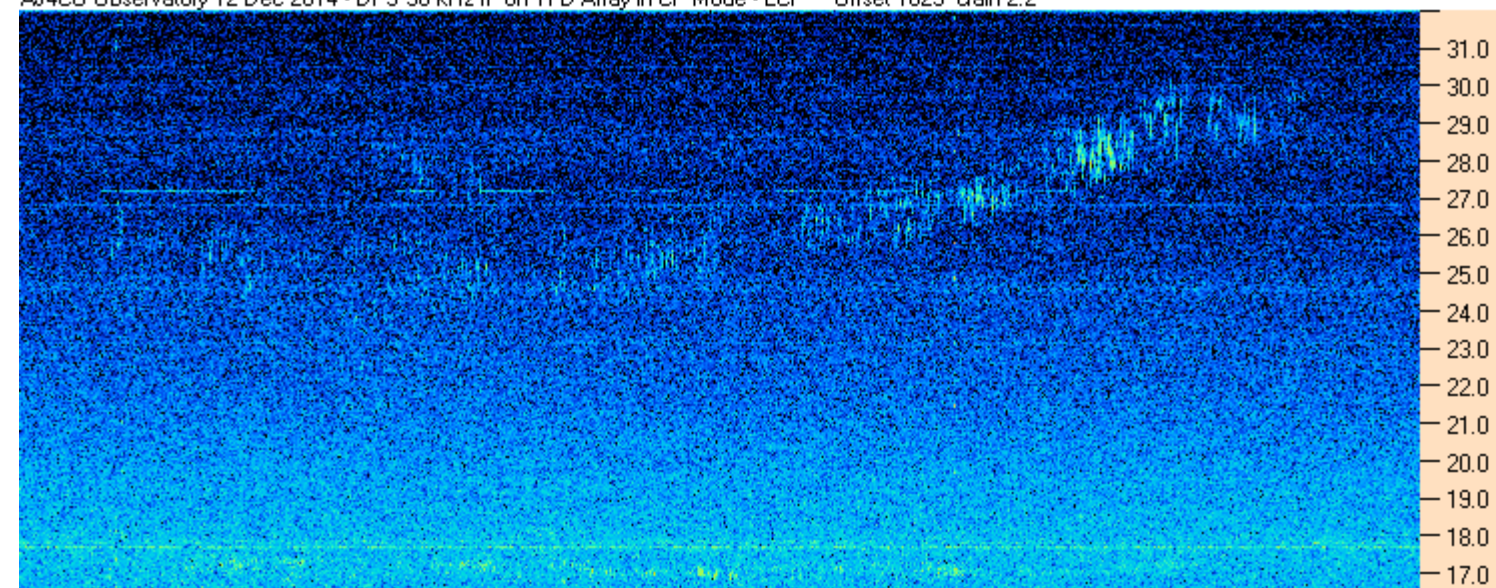
DPS spectrogram, 110 seconds total width, 1 pixel in width = 157 milliseconds.

AJ4C0 Observatory 12 Dec 2014 - DPS 30 kHz IF on TFD Array in CP Mode - RCP Offset 1825 Gain 2.2



09:44:00 09:44:16 09:44:31 09:44:47 09:45:03 09:45:19 09:45:34 09:45:50

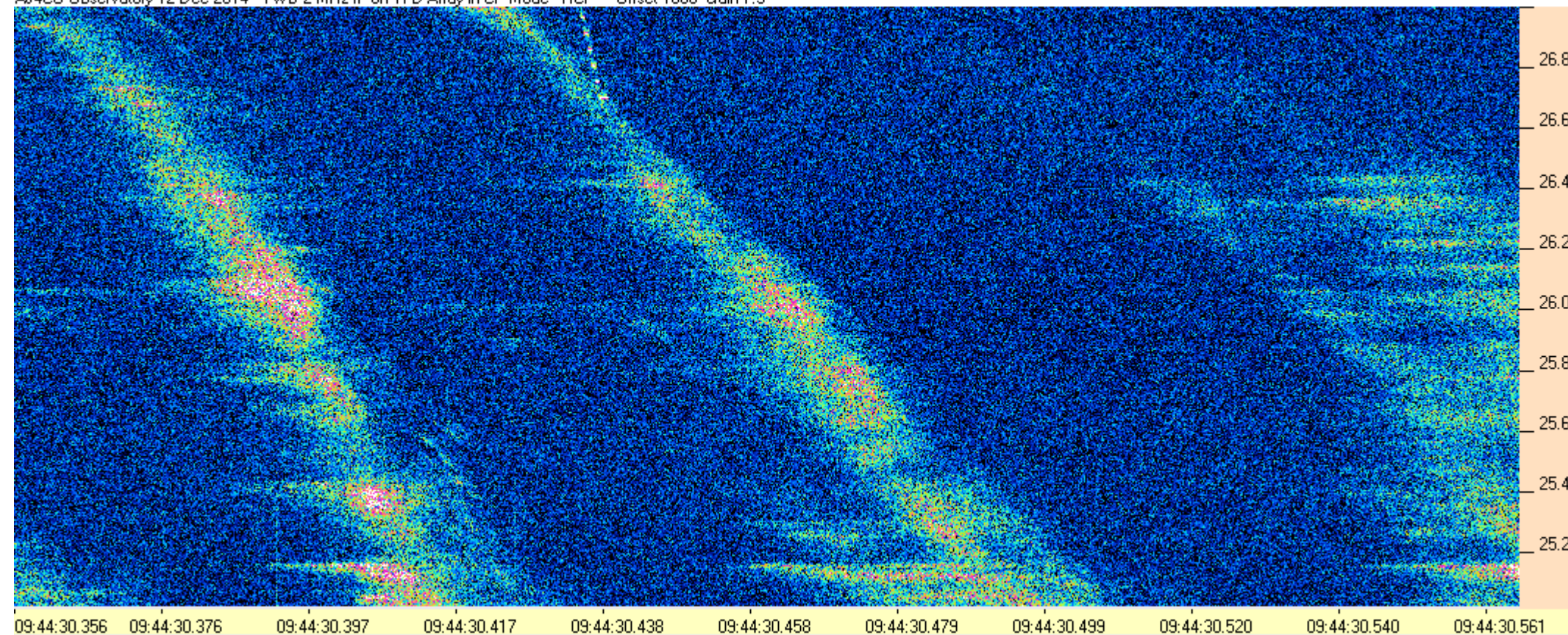
AJ4C0 Observatory 12 Dec 2014 - DPS 30 kHz IF on TFD Array in CP Mode - LCP Offset 1825 Gain 2.2



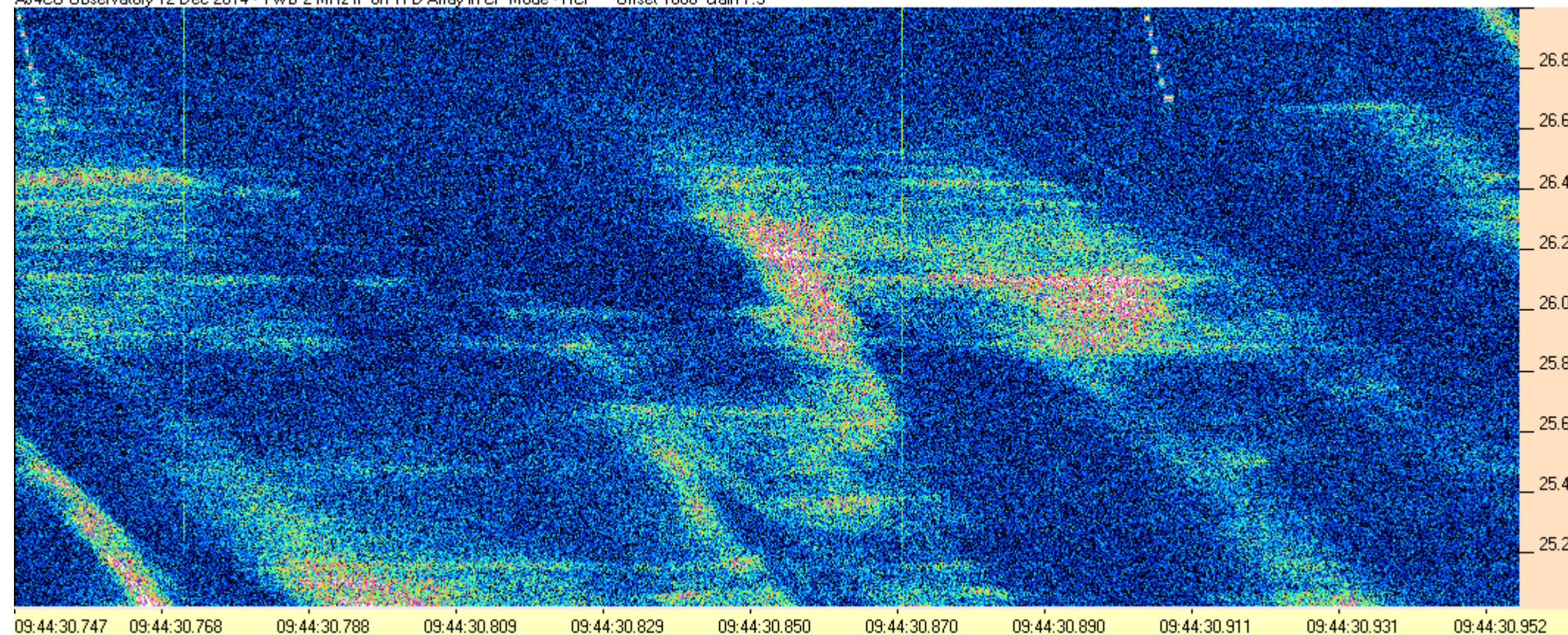
TWB spectrogram, 210 milliseconds total width, 1 pixel in width = 205 microseconds.

Each TWB spectrogram corresponds to an area in the DPS spectrogram only 1 pixel wide and 38 pixels tall.

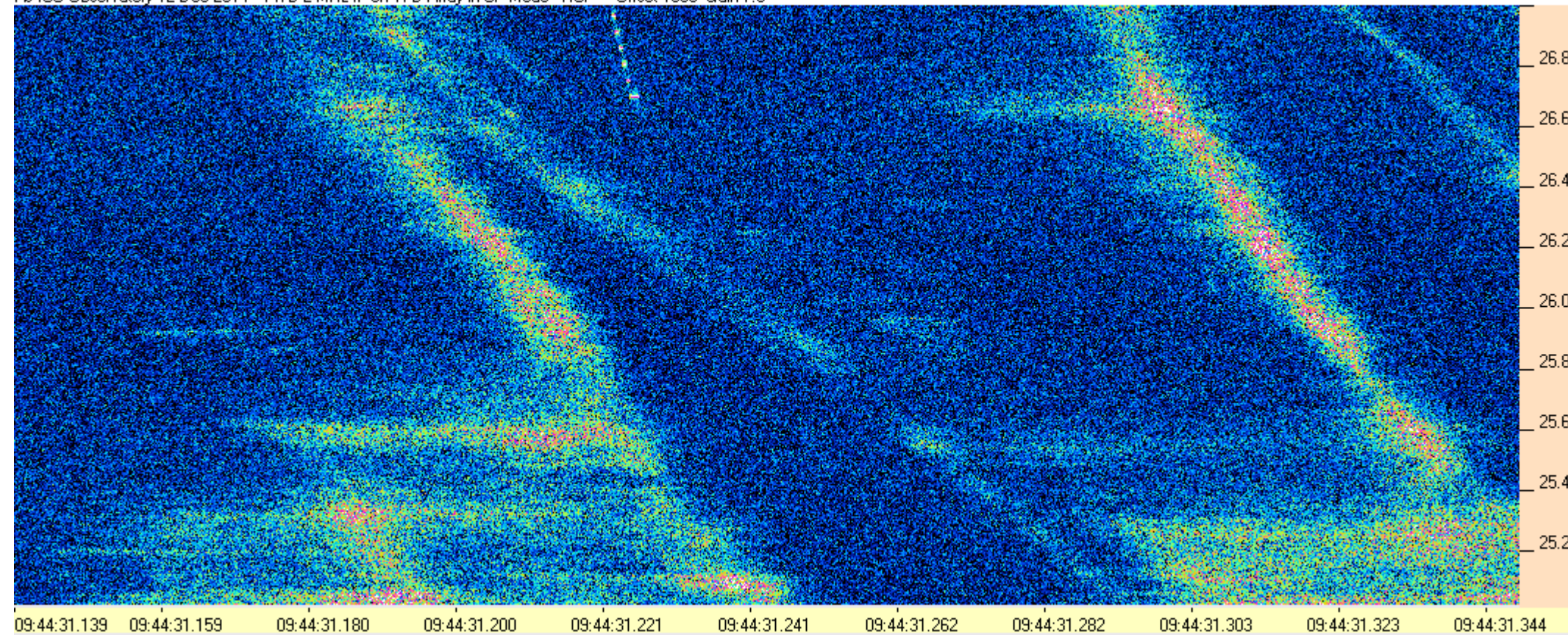
AJ4CO Observatory 12 Dec 2014 - TWB 2 MHz IF on TFD Array in CP Mode - RCP Offset 1060 Gain 7.5



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