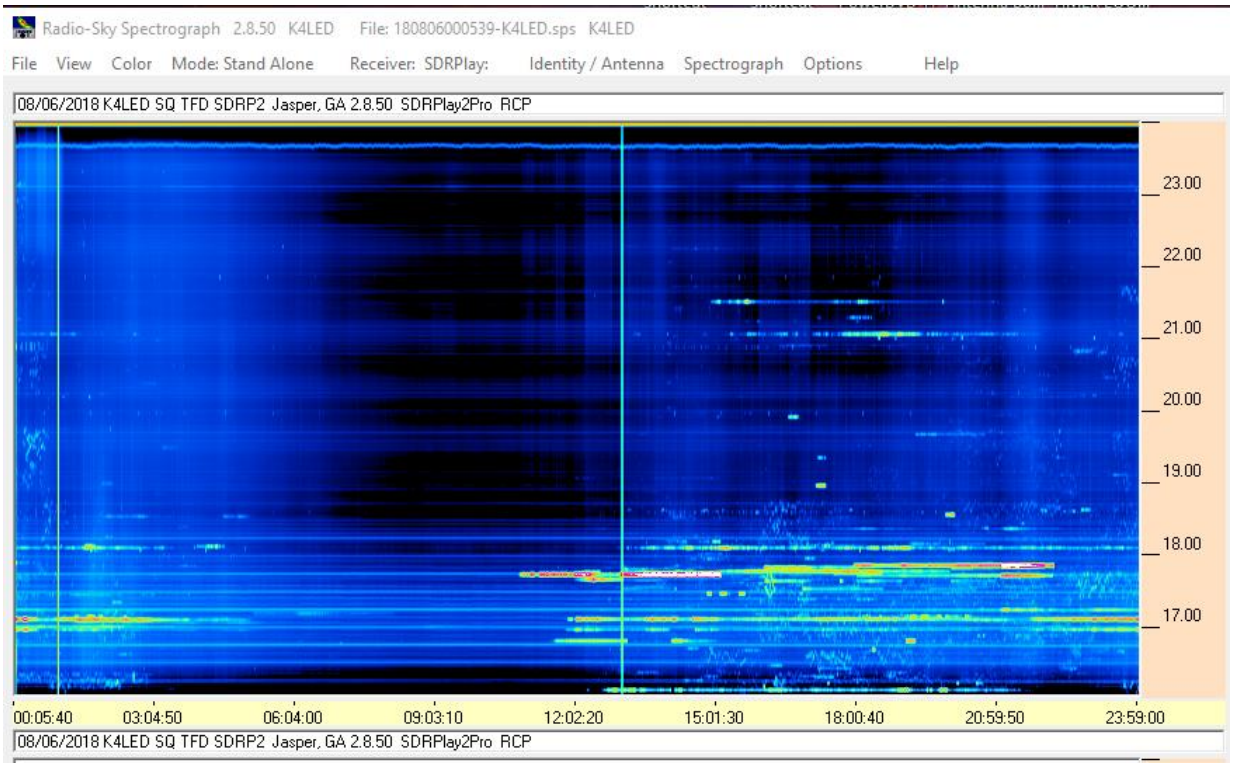
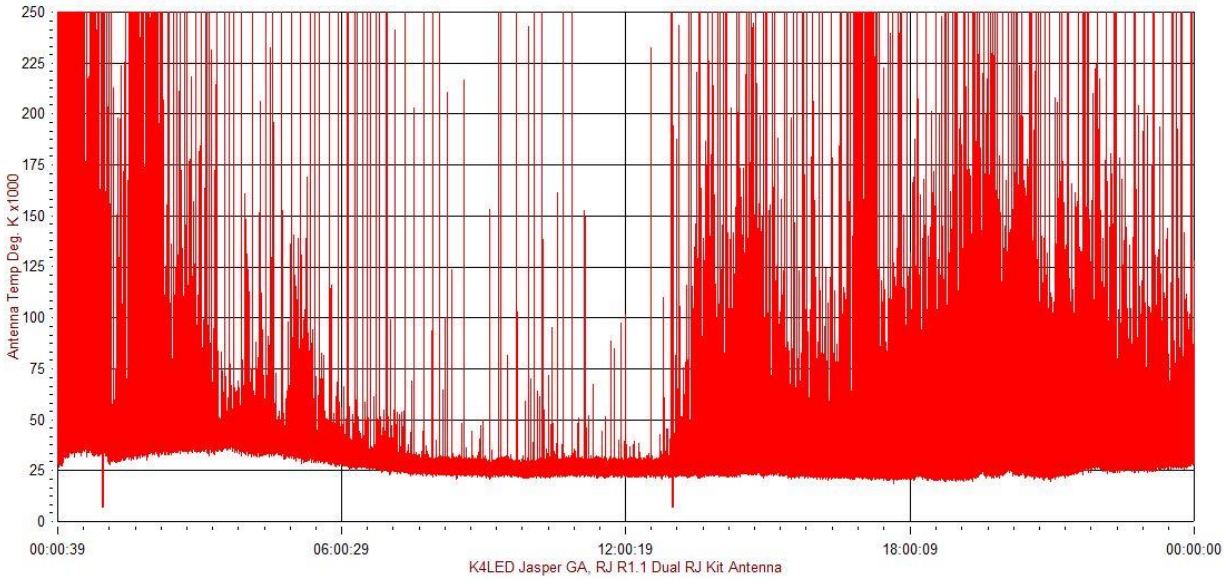
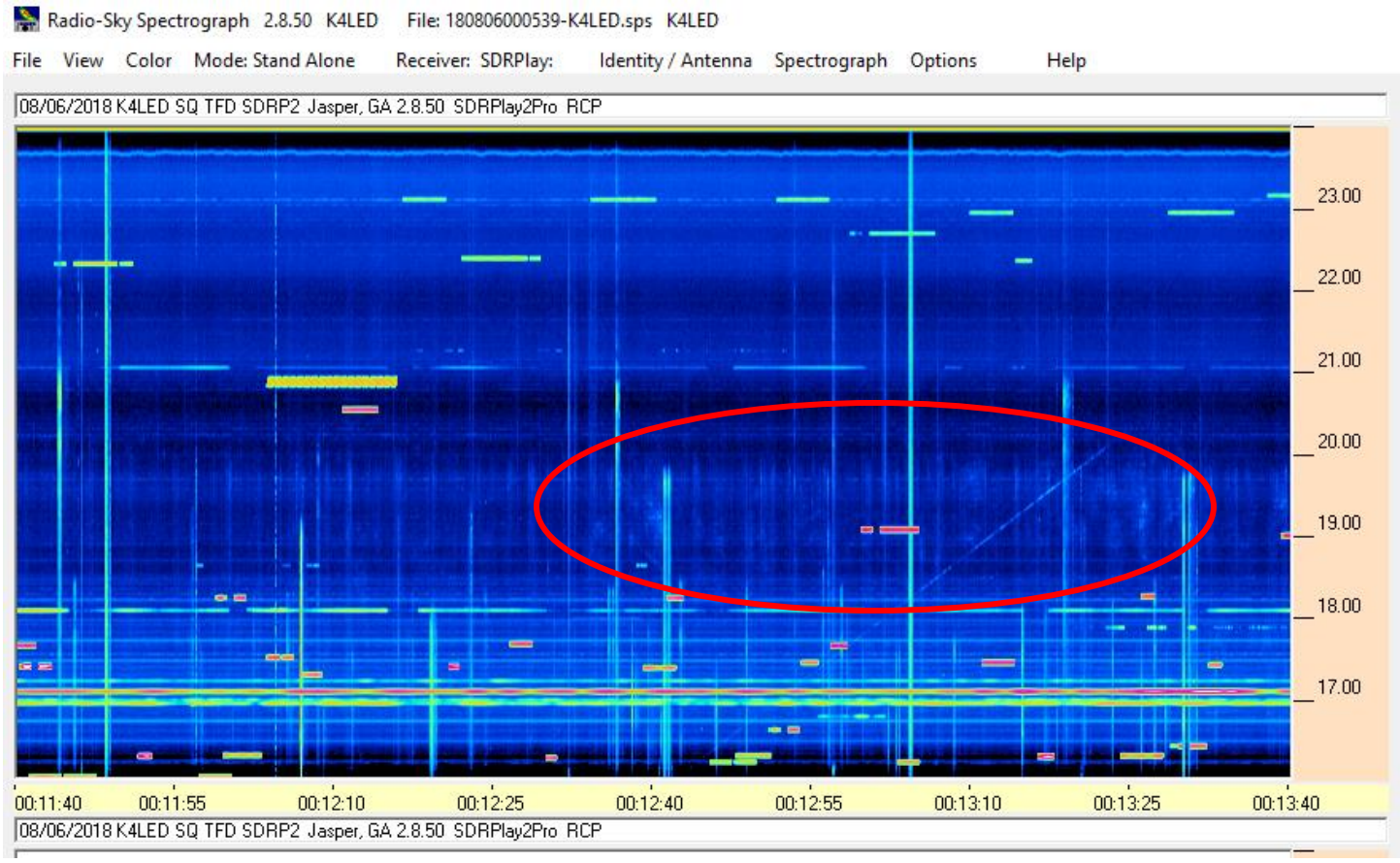
# K4LED

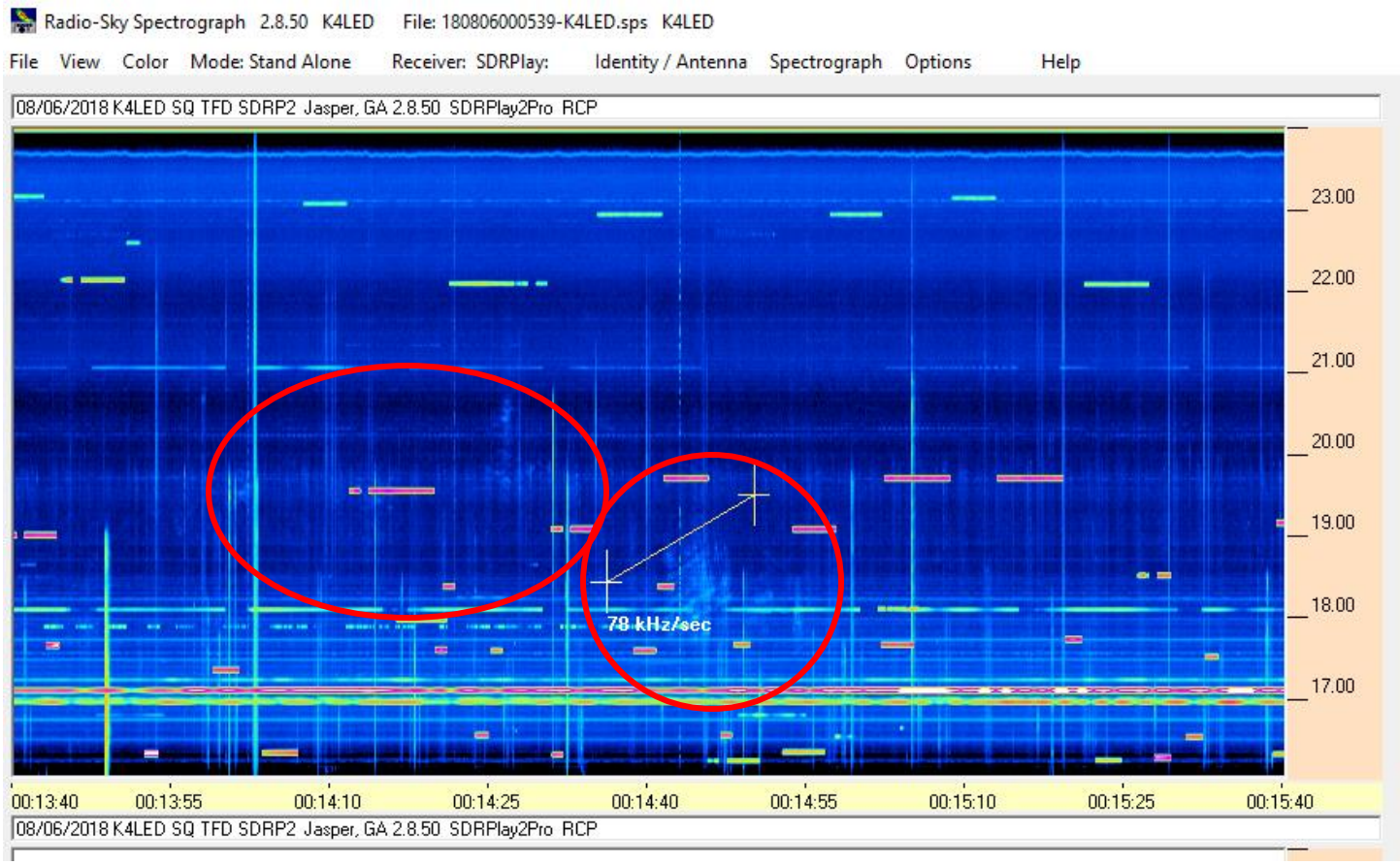
## Georgia Amateur Radio Astronomy Observatory

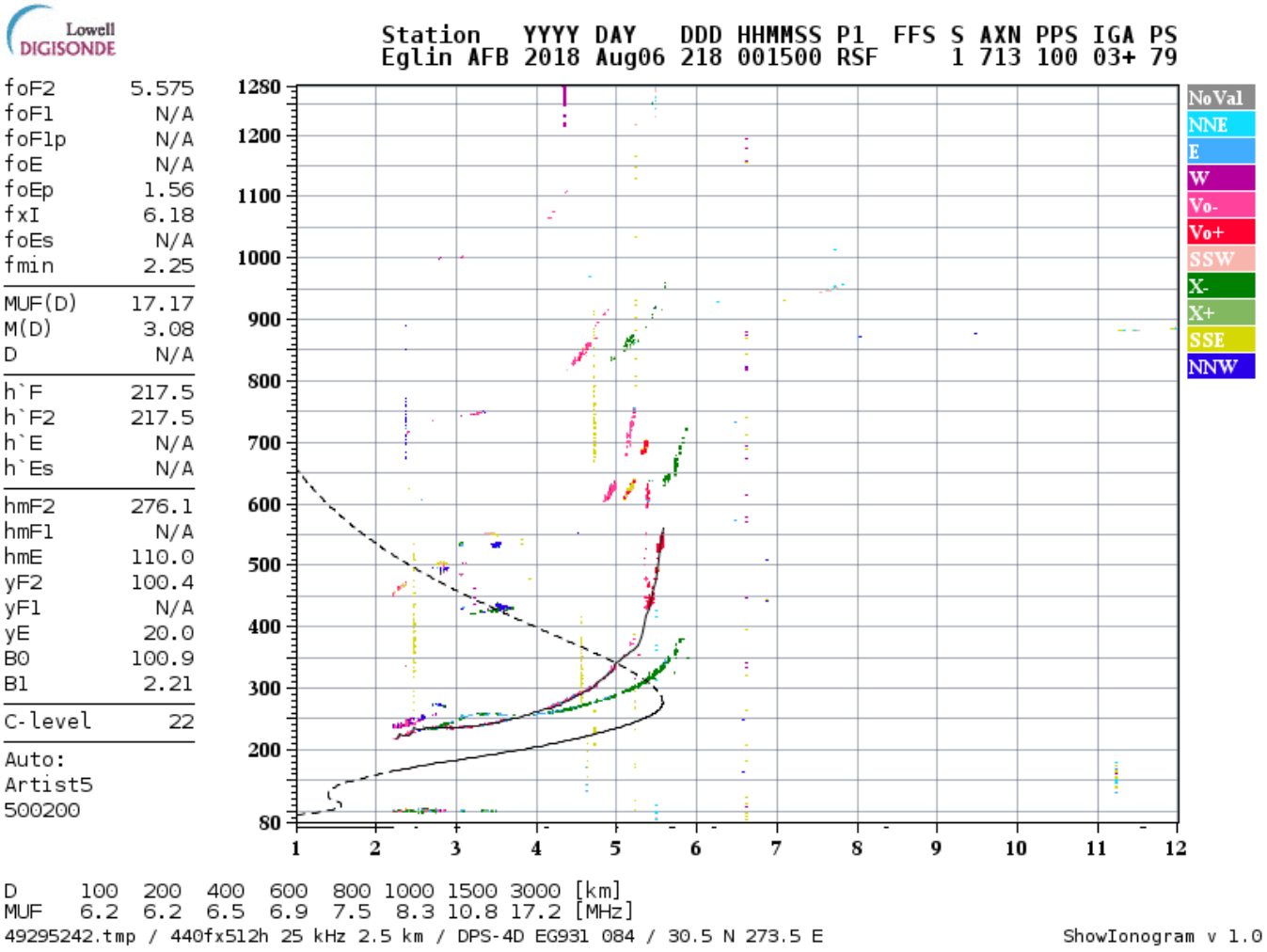
**Observation Date: 08-06-2018, 0:00:00 to 23:59:00 UTC**
**Location: Lat. 34.42322 N, Lon. -84.49413 W (Jasper, GA 30143)**
**Object: Io-B**
**Observer: Larry E. Dodd**
**Receivers: Flagg FSX11, SDRPlay2PRO, Flagg RJ1.1**
**Software: SkypipeII 2.7.34, Spectrograph 2.8.50**
**Antennas: Radio Jove Dual Dipole Kit, Typinski Square TFD**




Radio-Sky Spectrograph 2.8.50 K4LED File: 180806000539-K4LED.sps K4LED
File View Color Mode: Stand Alone Receiver: SDRPlay: Identity / Antenna Spectrograph Options Help
08/06/2018 K4LED SQ TFD SDRP2 Jasper, GA 2.8.50 SDRPlay2Pro RCP
23.00
22.00
21.00
20.00
19.00
18.00
17.00
00:11:40
00:11:55
00:12:10
00:12:25
00:12:40
00:12:55
00:13:10
00:13:25
00:13:40
08/06/2018 K4LED SQ TFD SDRP2 Jasper, GA 2.8.50 SDRPlay2Pro RCP


Radio-Sky Spectrograph 2.8.50 K4LED File: 180806000539-K4LED.sps K4LED
File View Color Mode: Stand Alone Receiver: SDRPlay: Identity / Antenna Spectrograph Options Help
08/06/2018 K4LED SQ TFD SDRP2 Jasper, GA 2.8.50 SDRPlay2Pro RCP
78 kHz/sec
23.00
22.00
21.00
20.00
19.00
18.00
17.00
00:13:40
00:13:55
00:14:10
00:14:25
00:14:40
00:14:55
00:15:10
00:15:25
00:15:40
08/06/2018 K4LED SQ TFD SDRP2 Jasper, GA 2.8.50 SDRPlay2Pro RCP



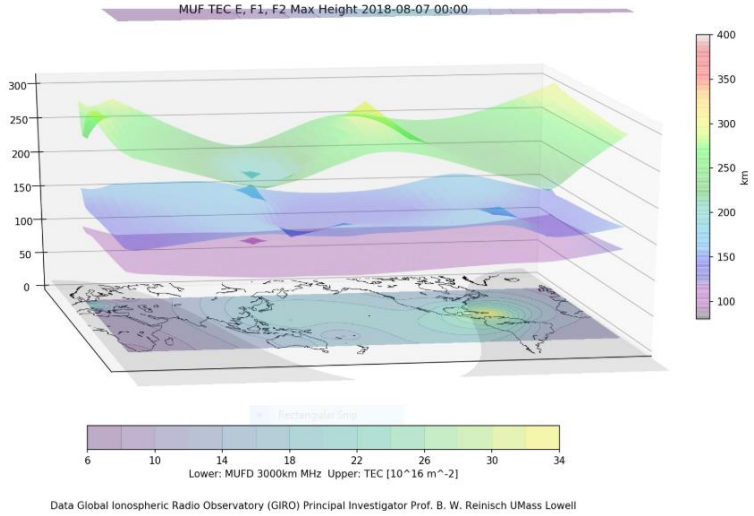

**References for Interpreting the Ionogram:**

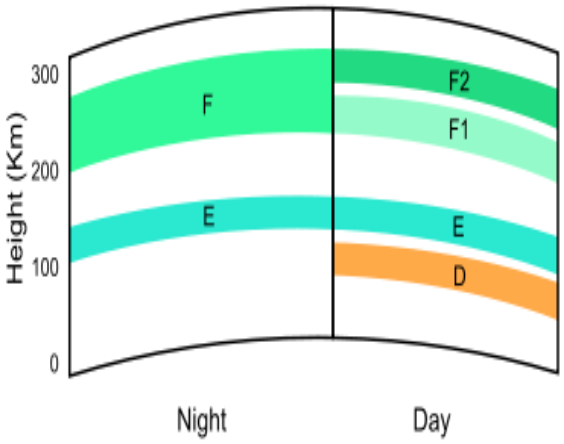
http://www.sws.bom.gov.au/IPSHosted/INAG/uag_23a/UAG_23A_indexed.pdf

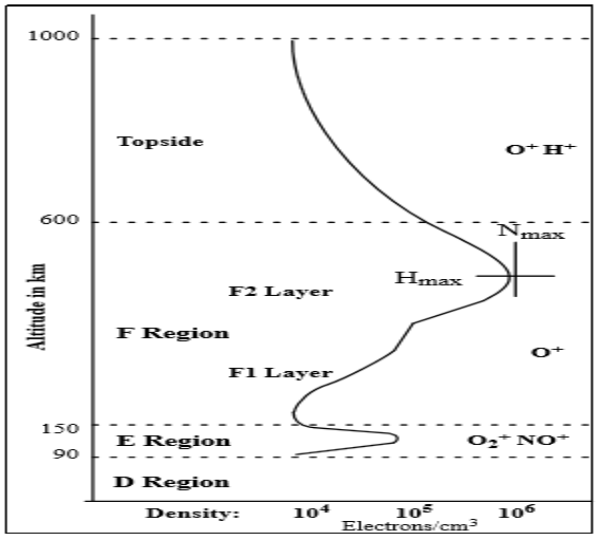
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.404.5517&rep=rep1&type=pdf

https://www.hfunderground.com/wiki/index.php/Ionosonde

**Ionosphere Layers, MUF, Total Electron Content**




The critical frequency is the limiting frequency at or below which a radio wave is reflected by an ionospheric layer at vertical incidence. If the transmitted frequency is higher than the plasma frequency of the ionosphere, then the electrons cannot respond fast enough, and they are not able to re-radiate the signal. It is calculated as shown below:

$$f_{\text{critical}} = 9 \times \sqrt{N}$$

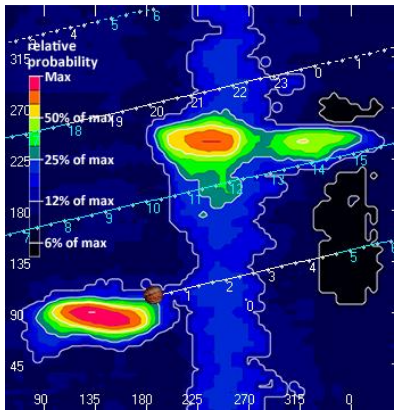
where N = electron density per $m^3$ and $f_{critical}$ is in Hz.

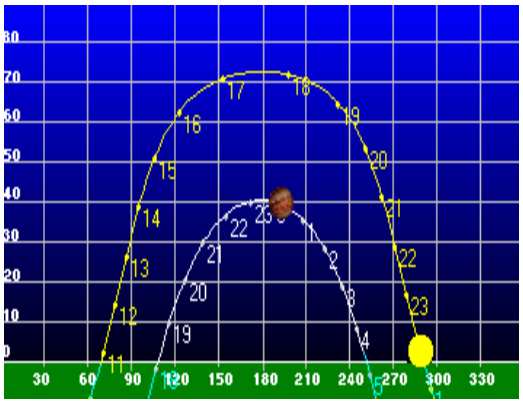
The Maximum Usable Frequency (MUF) is defined as the upper frequency limit that can be used for transmission between two points at a specified time.

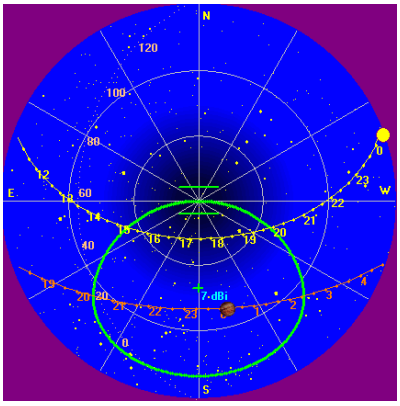
$$f_{\text{muf}} = \frac{f_{\text{critical}}}{\sin \alpha}$$

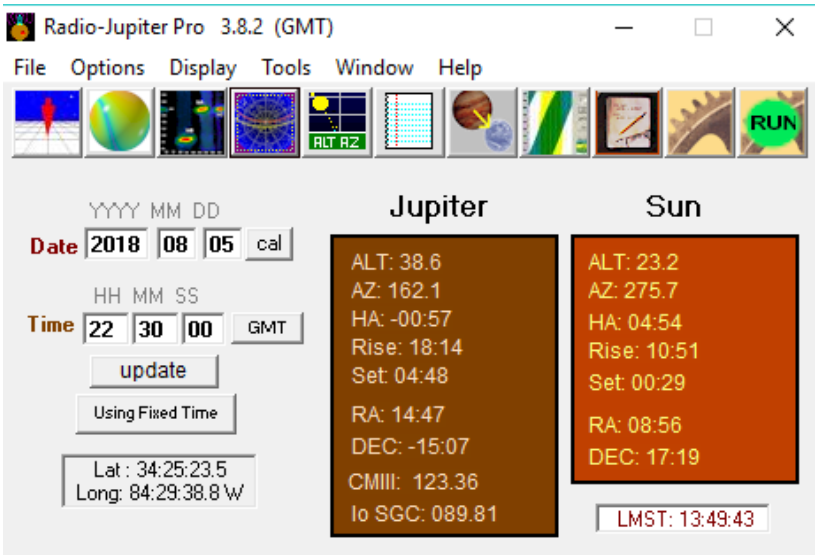
where $\alpha$ = angle of attack, the angle of the wave relative to the horizon, and sin is the sine function.

**Reference: https://en.wikipedia.org/wiki/Ionosphere**



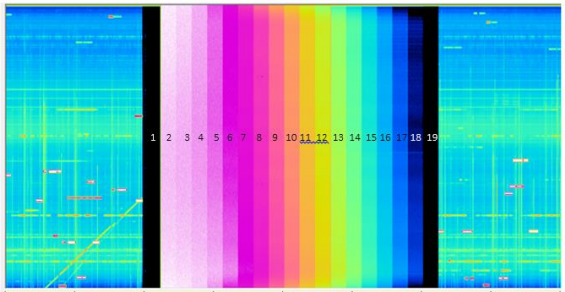






AUTOMATED CALIBRATION COLOR BAR TEST PATTERN AND DATA

ACTUAL MEASURED DATA



| STEP | TEMPERATURE | ATTENUATION |
|---|---|---|
| 1 | >1 kK | 101 dB |
| 2 | 104.0 MK | 0 dB |
| 3 | 66.9 MK | 3 dB |
| 4 | 36.3 MK | 6 dB |
| 5 | 19.1 MK | 9 dB |
| 6 | 9.6 MK | 12 dB |
| 7 | 4.5 MK | 15 dB |
| 8 | 2.3 MK | 18 dB |
| 9 | 1.2 MK | 21 dB |
| 10 | 602.0 kK | 24 dB |
| 11 | 296.6 kK | 27 dB |
| 12 | 133.0 kK | 30 dB |
| 13 | 92.2 kK | 33 dB |
| 14 | 51.6 kK | 36 dB |
| 15 | 32 .0 kK | 39 dB |
| 16 | 22.6 kK | 42 dB |
| 17 | 17.9 kK | 45 dB |
| 18 | 12.0 kK | 48 dB |
| 19 | >1 kK | 101 dB |



**Larry**

End of Report