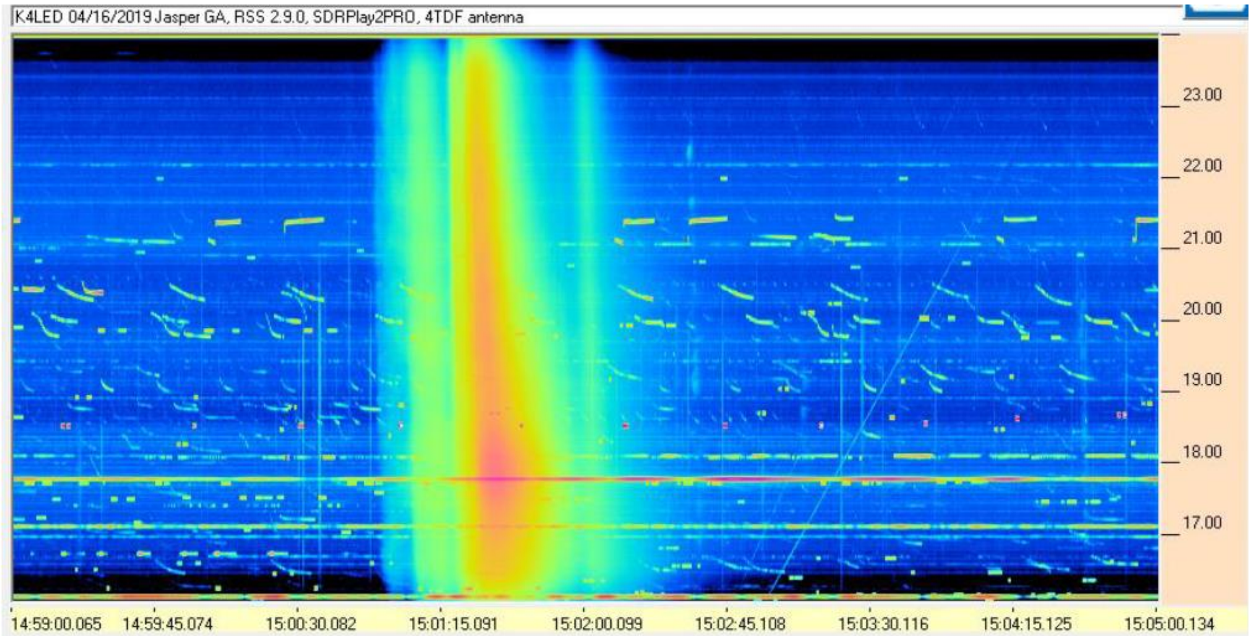
April 16, 2019 Solar Burst at 1501 UTC



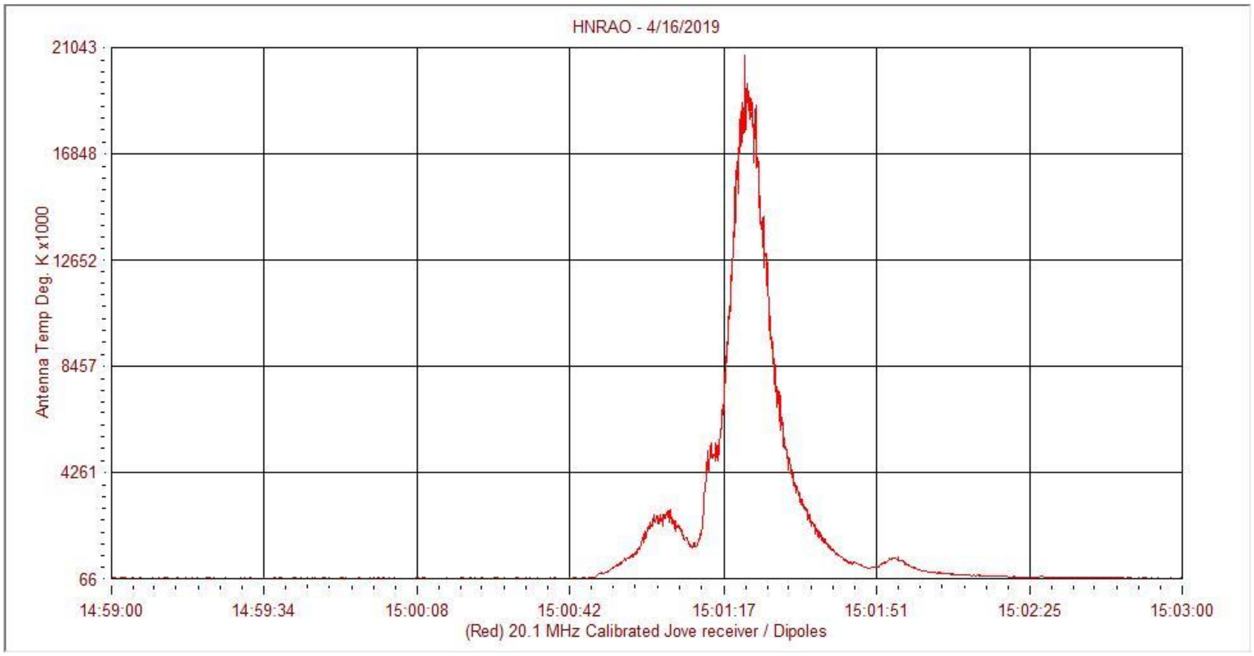
Signal strengths and spectrograms from SUG stations

With the help of all the SUG observers

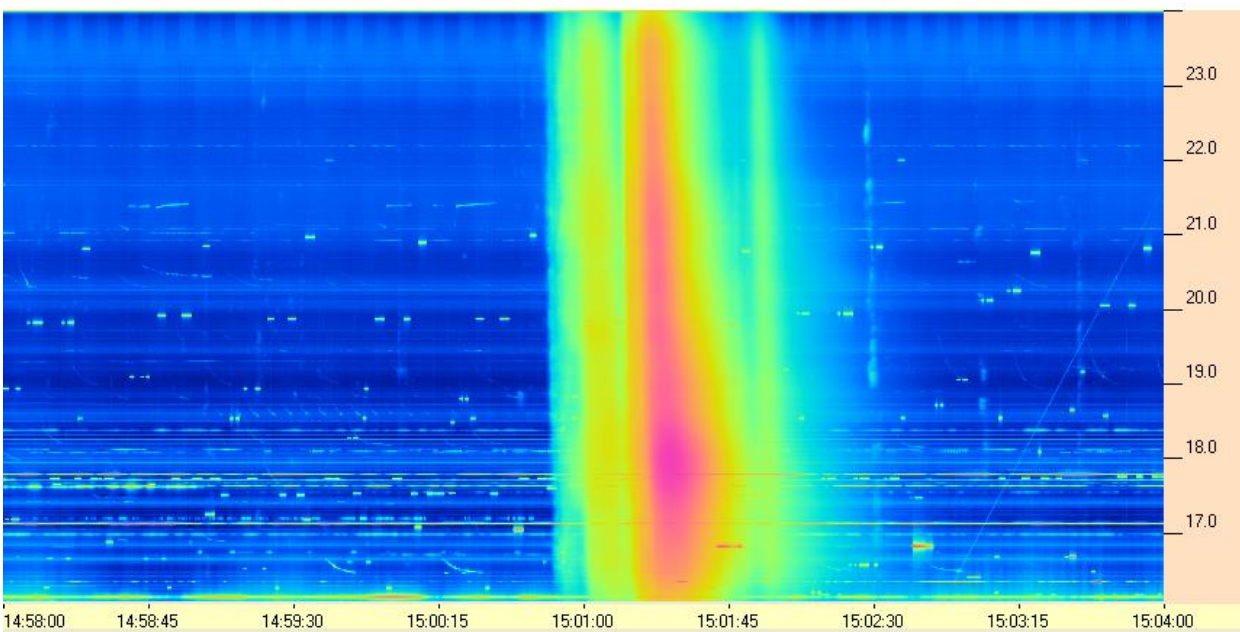
R. S Flagg

19 May 2019

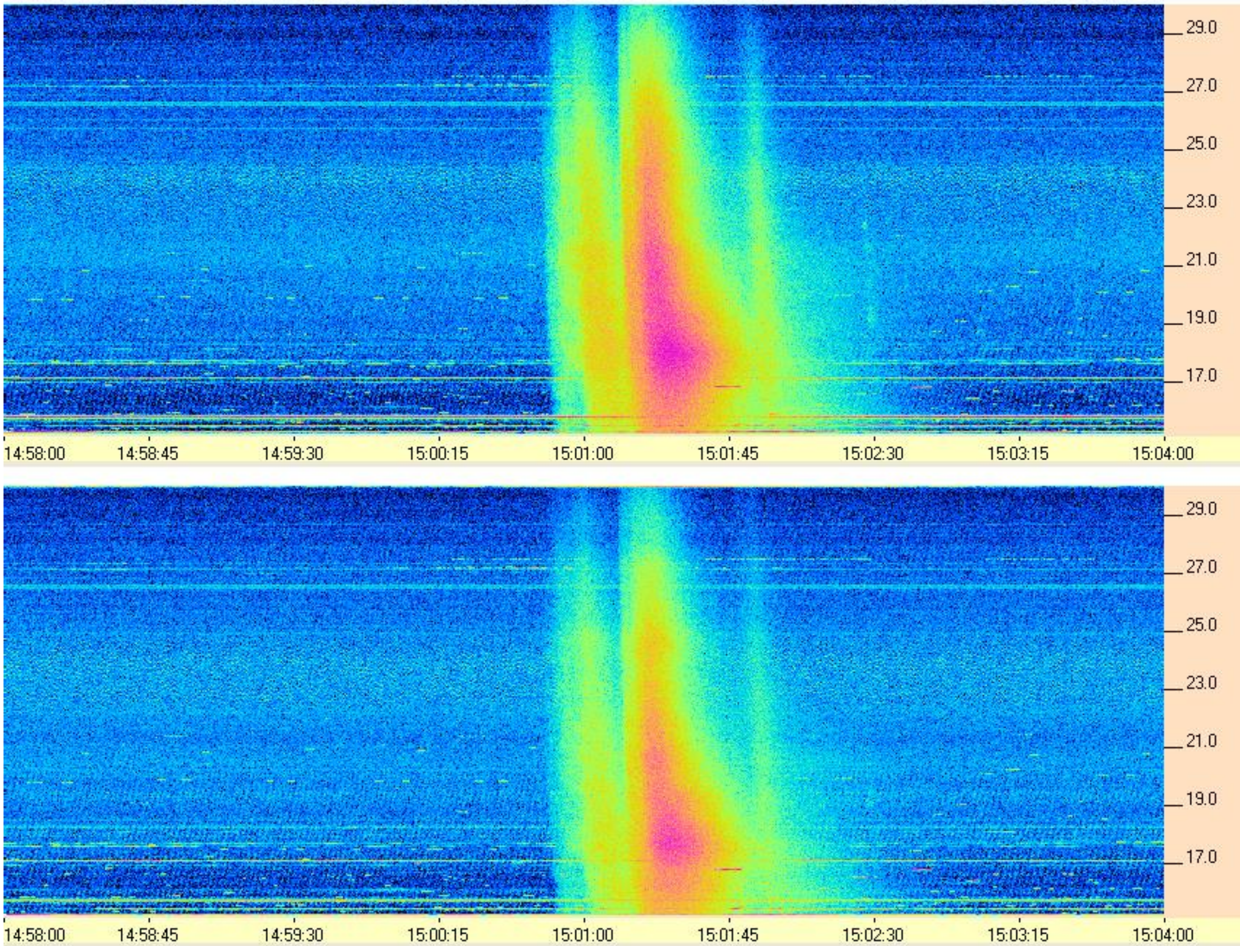
HNRAO



HNRAO – Jove dual dipole maximum antenna temperature about 21 MK

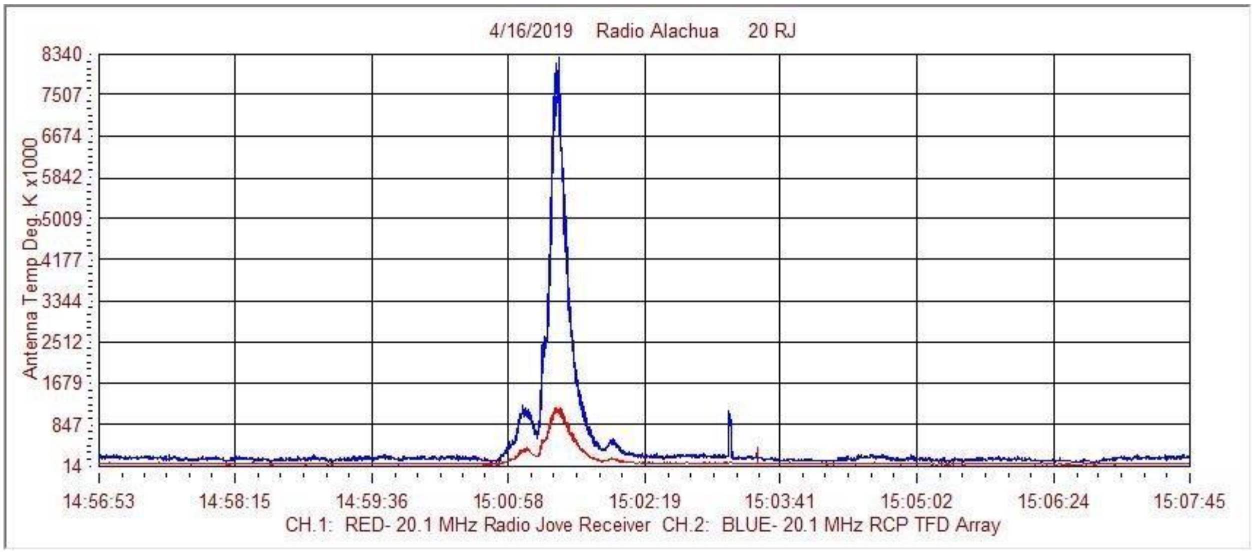


HNRAO – TFD – RCP - RSP2



HNRAO – TFD – FSX8S – RCP (top), LCP (bottom)

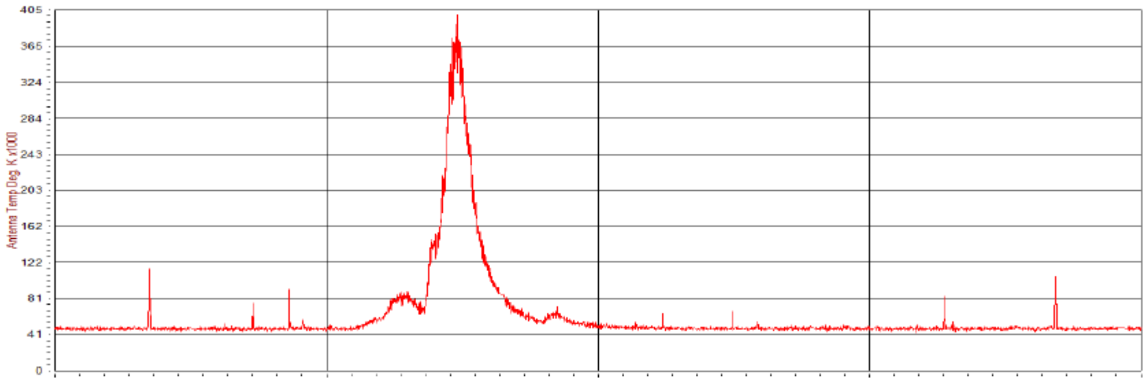
Radio Alachua



Radio Alachua – Blue TFD array RCP maximum antenna temperature about 8.3 MK

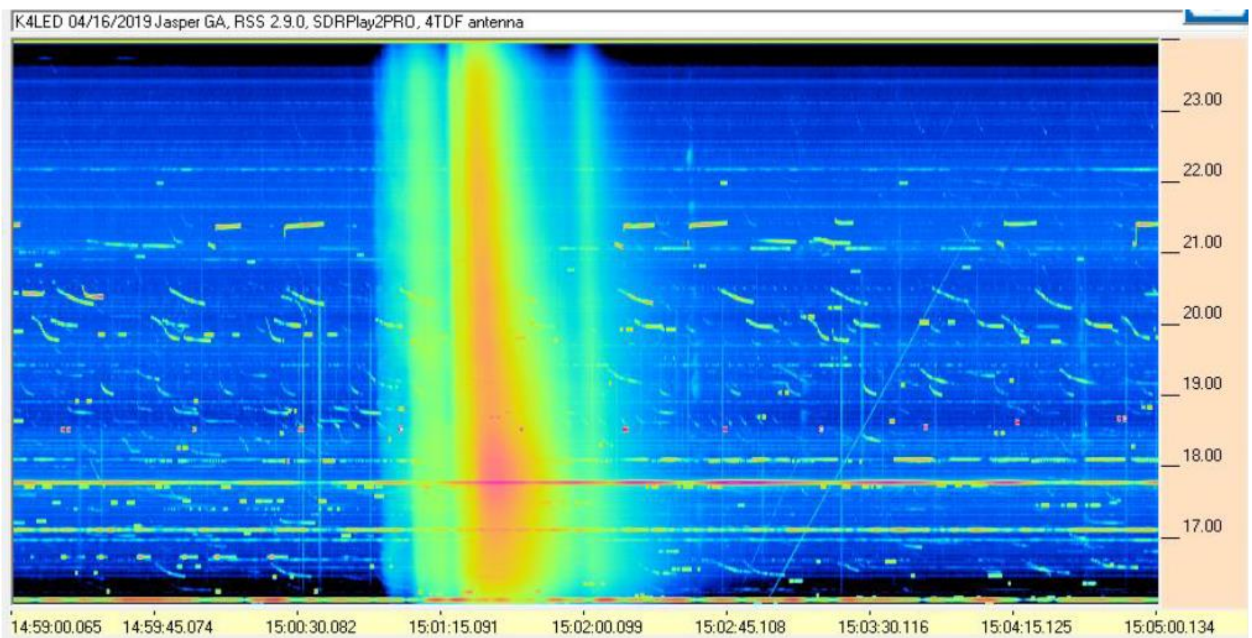
Red Jove dual dipole – possibly defective power combiner. Max temp 1 Mk

K4LED, Jasper, GA.



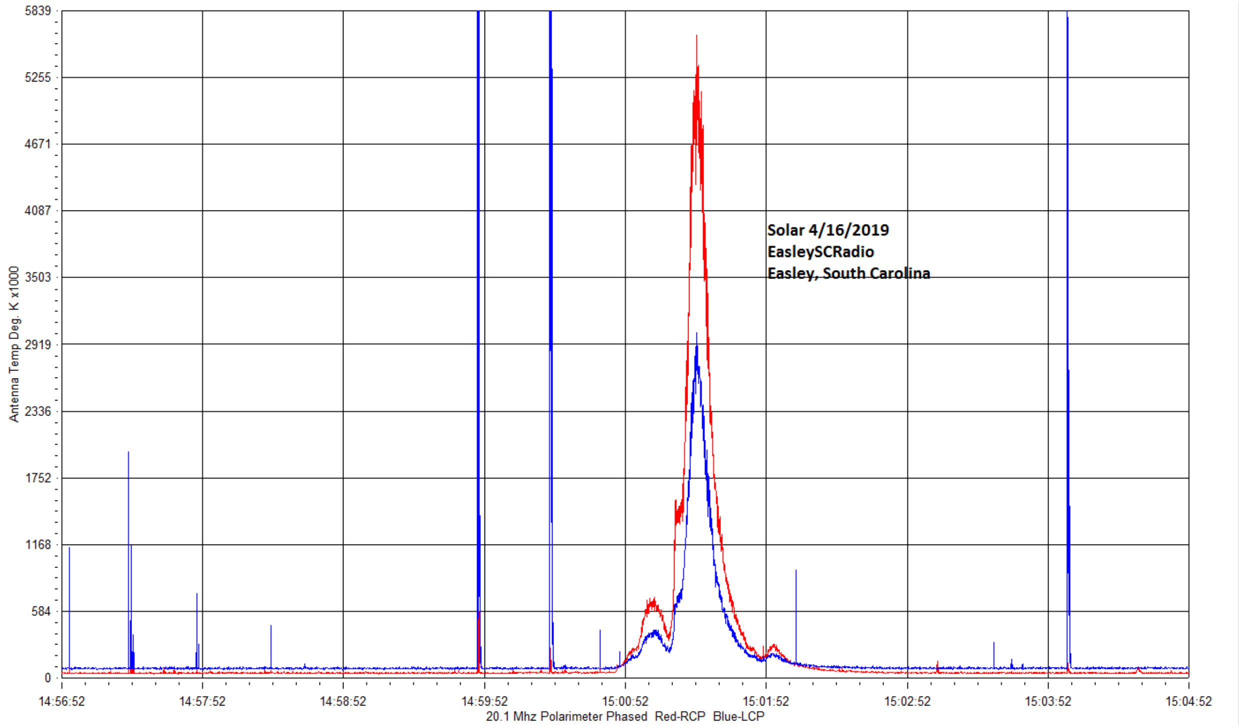
K4LED - TFD – RCP, max antenna temp 365 kK, RCP

Possible cut TFD coax feed line



K4LED – SDRPlay - RSP2 - 4 el TFD - RCP

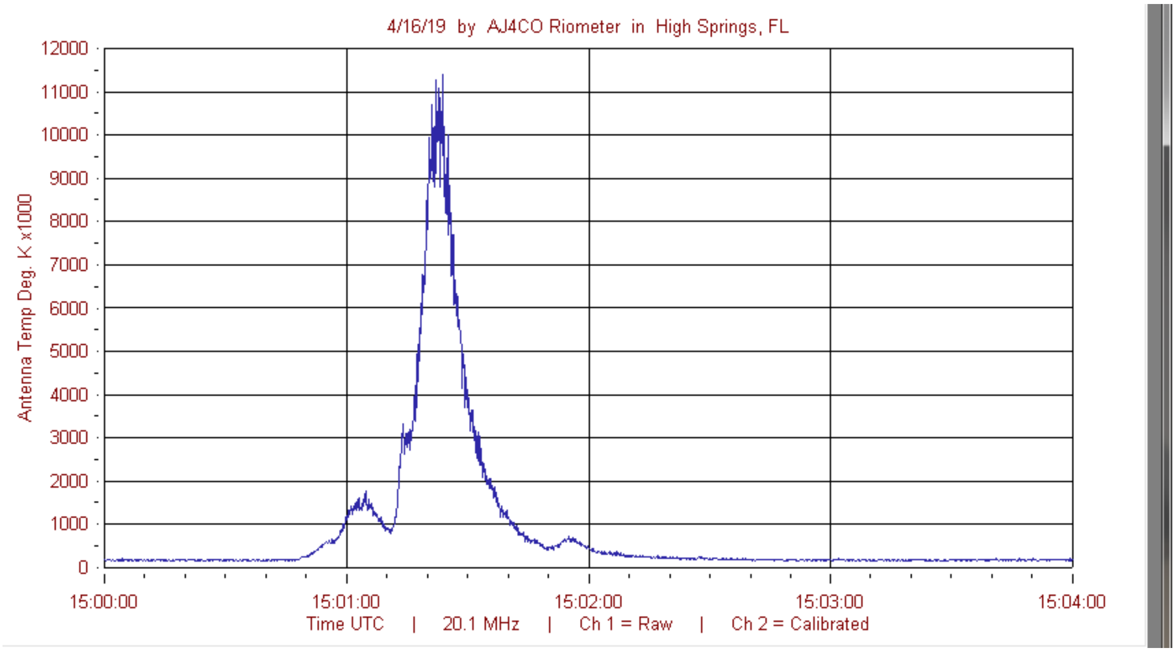
EasleySCRadio



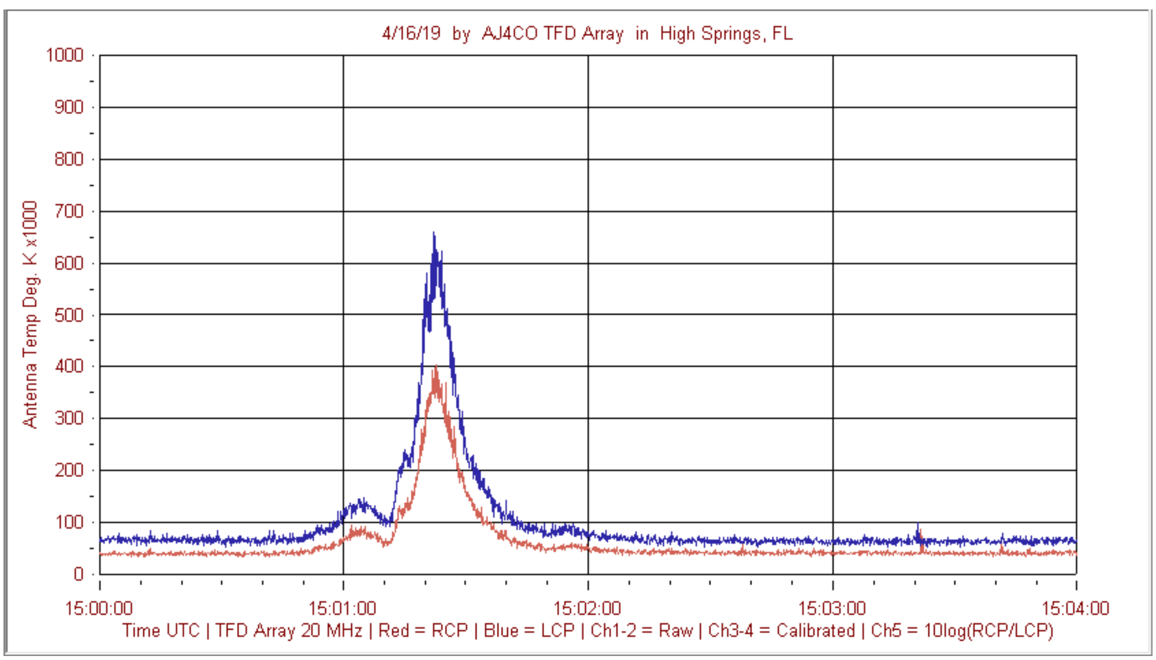
EasleySCRadio, 20.1 MHz polarimeter square dipole array

Red RCP, max temp 5.2 MK, Blue LCP, Max temp 2.9 MK

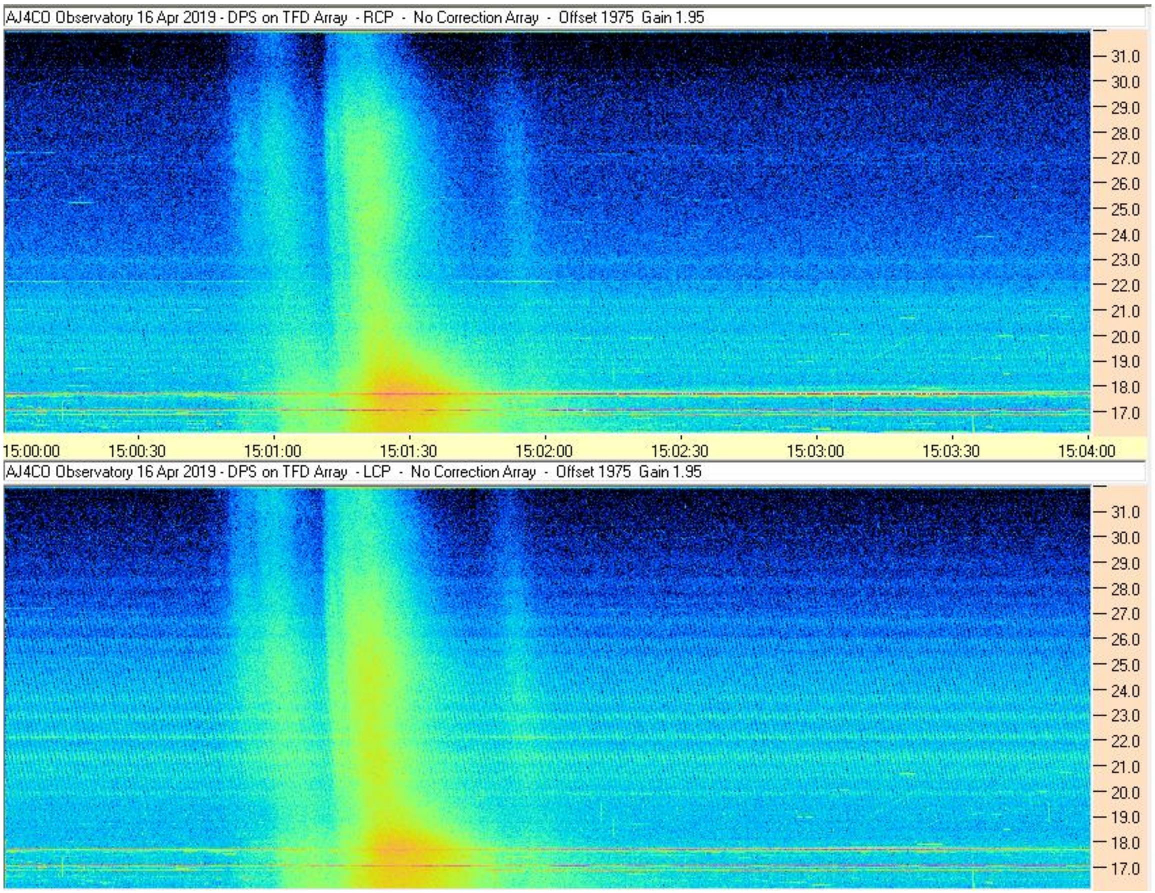
AJ4CO



AJ4CO Riometer, zenith, max temp 11 M

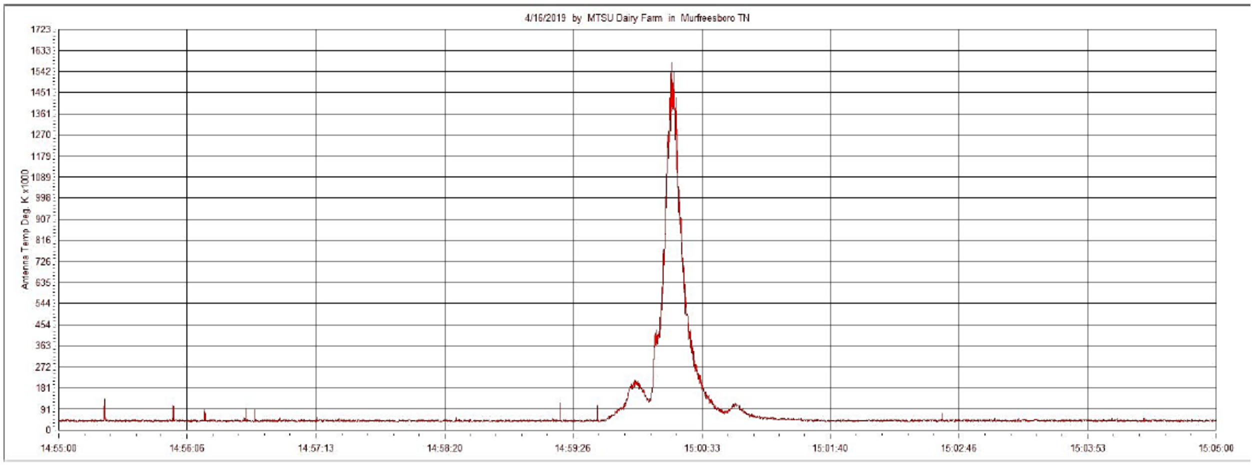


AJ4CO - 8 el TFD , Red RCP max temp 375 kK, blue LCP max temp 600 kK

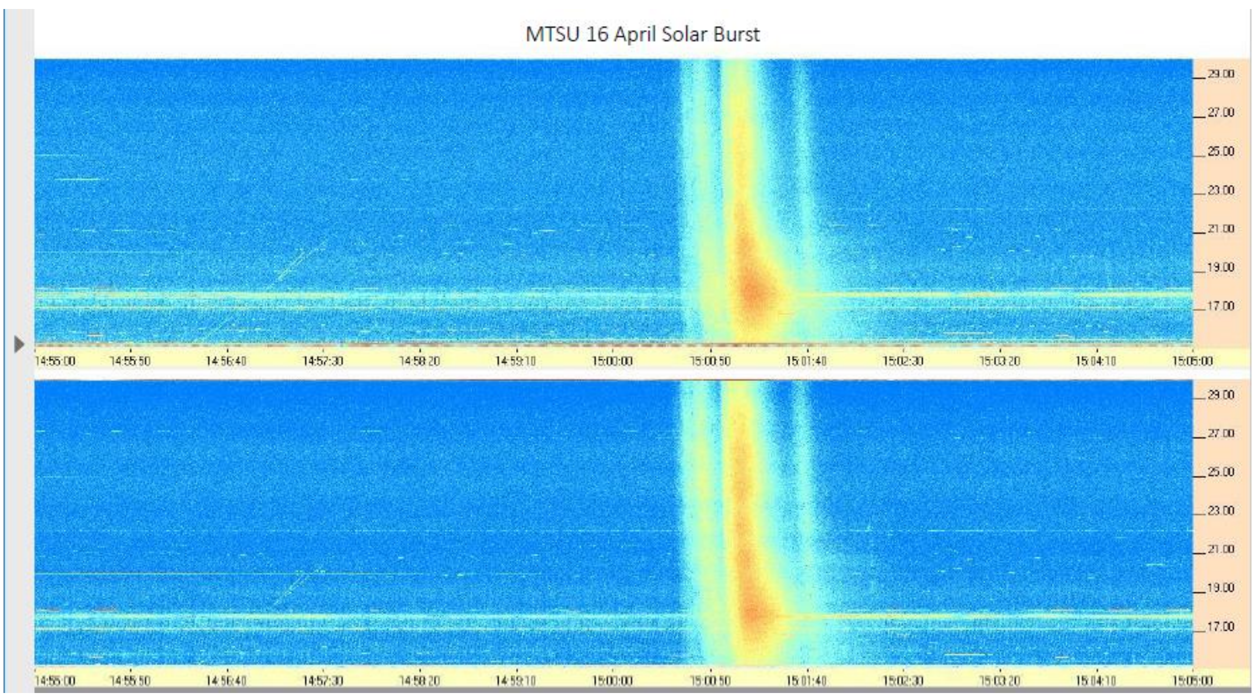


AJ4CO 8el TFD

MTSU

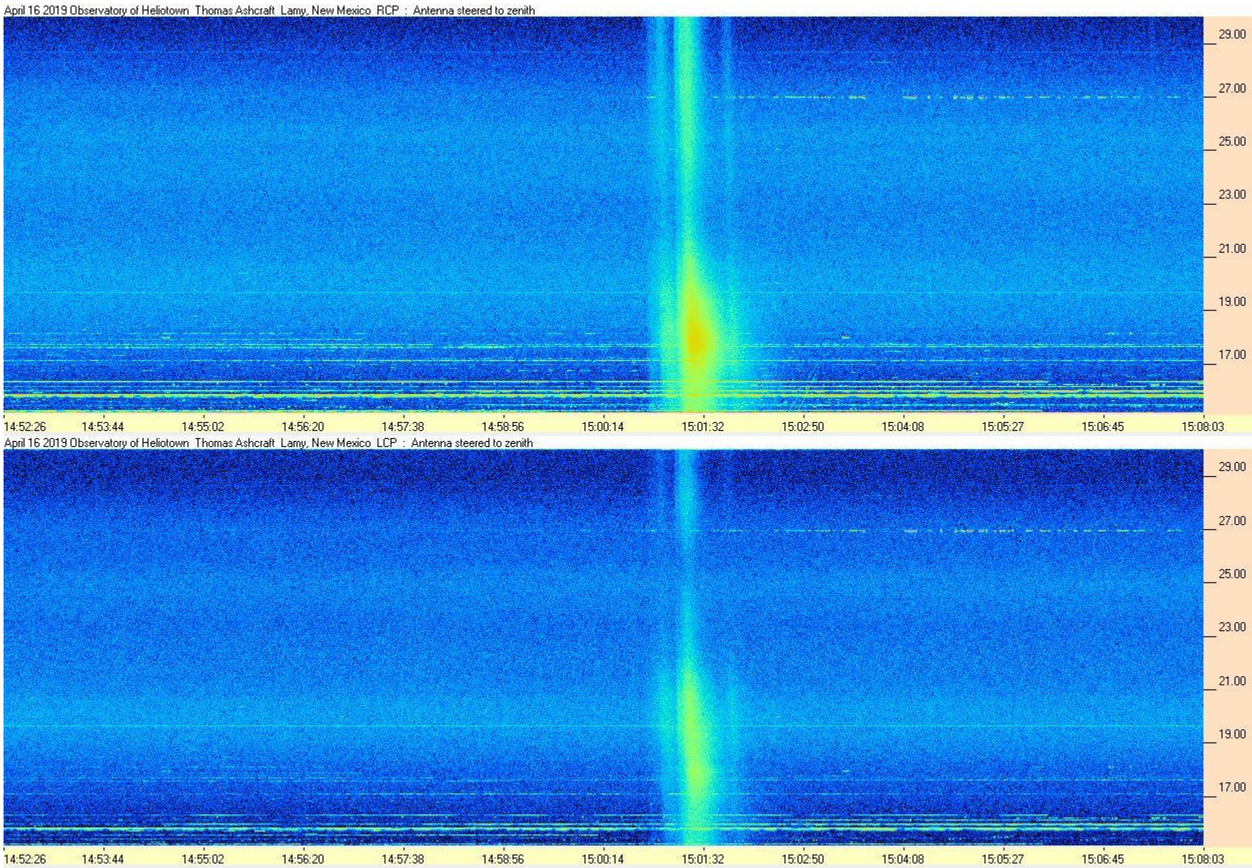


MTSU – Jove dual dipole 1.5MK



MTSU - 4 el TFD – Top RCP, Bottom LCP

Heliotown



Heliotown – 4el TFD – Top RCP, Bottom LCP

Measured antenna temperatures

The following table includes station coordinates, antenna type, beam center azimuth and elevation, sun azimuth and elevation as seen from each station, the angular separation between the beam center and the sun, antenna polarization, and the measured peak temperature of the 1501 UTC solar burst.

The angle between the center of the antenna beam and the sun was obtained using Typinski's angle calculator at http://www.typnet.net/AJ4CO/Calculators/Calculators.htm

There is a huge disparity between measured temperatures with a minimum of 365 kK (K4LED) and a maximum of 21 MK (HNRAO). This is a range of almost 18 dB. At K4LED a cut coax feed line (combiner to dipole feedpoint) on the TFD was discovered a few weeks after this burst and may be responsible for the low temperature measured at that station.

Low temperatures were also measured at AJ4CO using the 8 element TFD (380 and 600 kK). This may be due to the narrower beam of the 8 element TFD array – although one might expect that in the EW direction the beamwidth would be equal to the 4 el TFD arrays.

The "east coast" stations all exhibited an angular separation between their beam center and the sun on the order of -44 degrees. This off axis angle would generally put the Sun on the edge of the beam where the gain gradient would be highest. This may explain some of the differences in antenna temperature measured at the different stations. Careful modeling of the antenna beams when steered far from zenith is necessary to confirm this possibility.

Station	Lat	Lon	Antenna	Beam*	Sun**	SEP***	Pol	Temp
HNRAO	40.7	80.4	JOVE Dual Dipole	180/32	127/47	-42.6	Lin	21MK
HNRAO	40.7	80.4	4el TFD	180/35	127/47	-40.9	R/LCP	images
Alachua	29.8	82.5	4 el TFD	180/40	114/51	-45.9	RCP	8.3MK
K4LED	34.4	84.5	4 el TFD	180/40	117/48	-44.7	RCP	365kK
EasleySC	34.83	82.60	4 dipole 20 MHz polarimeter	180/35	117/48	-47.5	RCP	5.2MK
EasleySC	34.83	82. 60	4 dipole 20 MHz polarimeter	180/35	117/48	-47.5	LCP	2.9MK
AJ4CO	29.84	82.62	Riometer (Jove dual dipoles + reflectors	Zenith	114/51	-39	Lin	11 MK
AJ4CO	29.84	82.62	8 element TFD	180/42	114/51	-44.7	RCP	600 kK
AJ4CO	29.84	82.62	8 element TFD	180/42	114/51	-44.7	LCP	380 kK
Heliotown	35.5	105.9	4 el TFD	Zenith	101/31	-59		image
MTSU	35.9	86.3	4 el TFD	180/45	116/45	-44		image
MTSU	35.9	86.3	JOVE Dual Dipole	180/50	116/45	-42.2	Lin	1.5MK

* Beam center azimuth/elevation angle

** Azimuth and elevation angle of the sun at 1501 UTC

*** Angular separation between the antenna beam center and the sun at 1501 UTC