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To: EDGES Group

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Subject: Tests of the changes in signature with local time, and temperature and humidity.

Table 1 shows the signature search results along with temperatures

UT	Rack	AMB	HUM%	RECVR	FREQ.	SNR	AMP	Width
10	306.9	301.3	18.6	299.0	79.7	6.4	0.74	23.9
12	304.0	300.4	21.4	289.6	78.9	21.7	0.63	20.8
14	302.1	300.0	24.9	298.5	78.1	28.8	0.72	18.9
16	300.9	299.6	27.1	298.4	78.1	29.7	0.65	19.4
18	300.0	299.4	29.1	298.2	78.5	29.3	0.61	19.1
20	299.2	299.1	30.5	298.1	78.1	24.9	0.60	19.2
22	298.9	299.0	31.4	298.0	78.1	21.8	0.73	19.3

Table 1. Temperatures of the rack, ambient along with humidity at the end of the conduit and inside the receiver averaged 2016_252 to 2017_094 along with signature search results for 10 UT to 22 UT.

The receiver temperature is controlled at $273+25C = 298$ K. The measured temperature which is from a thermistor located near the VNA 4-position switch indicates that during the day a temperature gradient exists in the receiver which reaches a maximum at 10 UT which is 6 pm local time and then cools to equal the control temperature by 22 UT which is 6 a.m. local time. The signature amplitude, which is obtained from an average of 2 hours data centered at the listed UT time, shows no obvious correlation with the receiver temperature in the table.

Antenna S11 was from 2015_342, calibration from 2015-09-16-12 and beam correction using FEKO_newground_simple_blade and Haslam map with CMB correction.

A test of the effect of humidity is made by only deriving a signature from data taken when the humidity was above 80%. Figure 1 shows the spectra with 5 physical terms removed for days and hours for which the humidity exceeds 80%. The acceptance threshold is set at 0.8 mK rms which eliminates a few days for which rain must have caused very large changes in the spectrum.

UT	%	UT	%
00	1.4	12	5.3
01	1.0	13	4.4
02	1.3	14	6.0
03	1.1	15	6.9
04	1.1	16	7.3
05	1.0	17	6.9
06	0.8	18	7.6
07	1.4	19	9.6
08	1.6	20	11.6
09	1.3	21	10.9
10	2.5	22	7.4
11	3.7	23	3.7

Table 2. Percentage of time that the humidity outside the electronics hut is over 80% vs UT time.

Table 2 shows that on humid days the relative humidity start to rise at 10 UT (6 p.m. local) and peaks at 20 UT (4 a.m. local) and returns at 00 UT (8 a.m. local). This pattern is known to result in a significant change in the high band S11 due to condensation (see memos 178 and 182). The condensation effects on the lowband antenna S11 are expected to be much smaller owing to the larger gap between panels.

In summary there is no indication that the absorption signature is strongly influenced by changes in temperature or humidity.

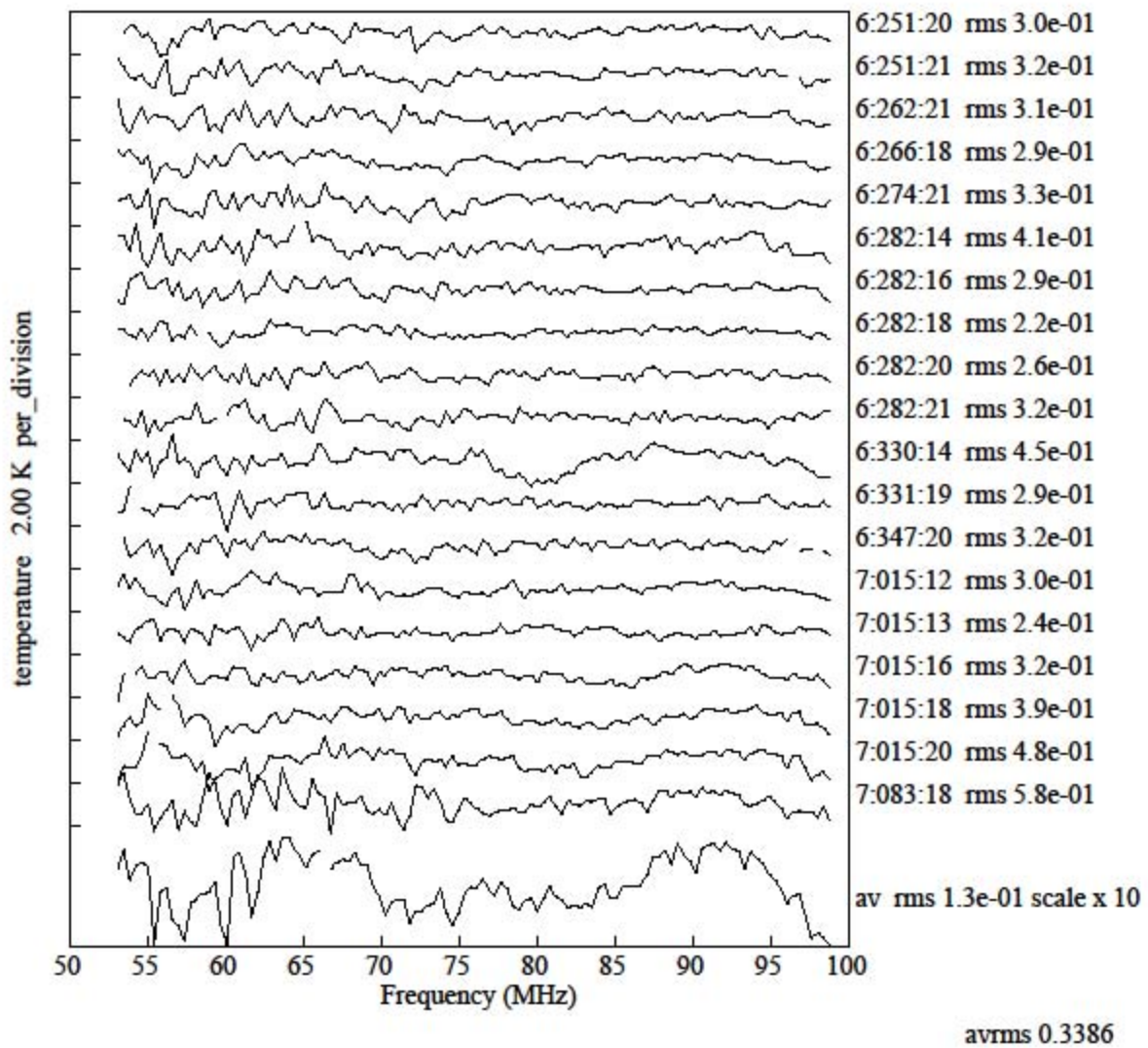


Figure 1. Spectra for 2 hour blocks with average humidity over 80%. 5 physical terms removed.

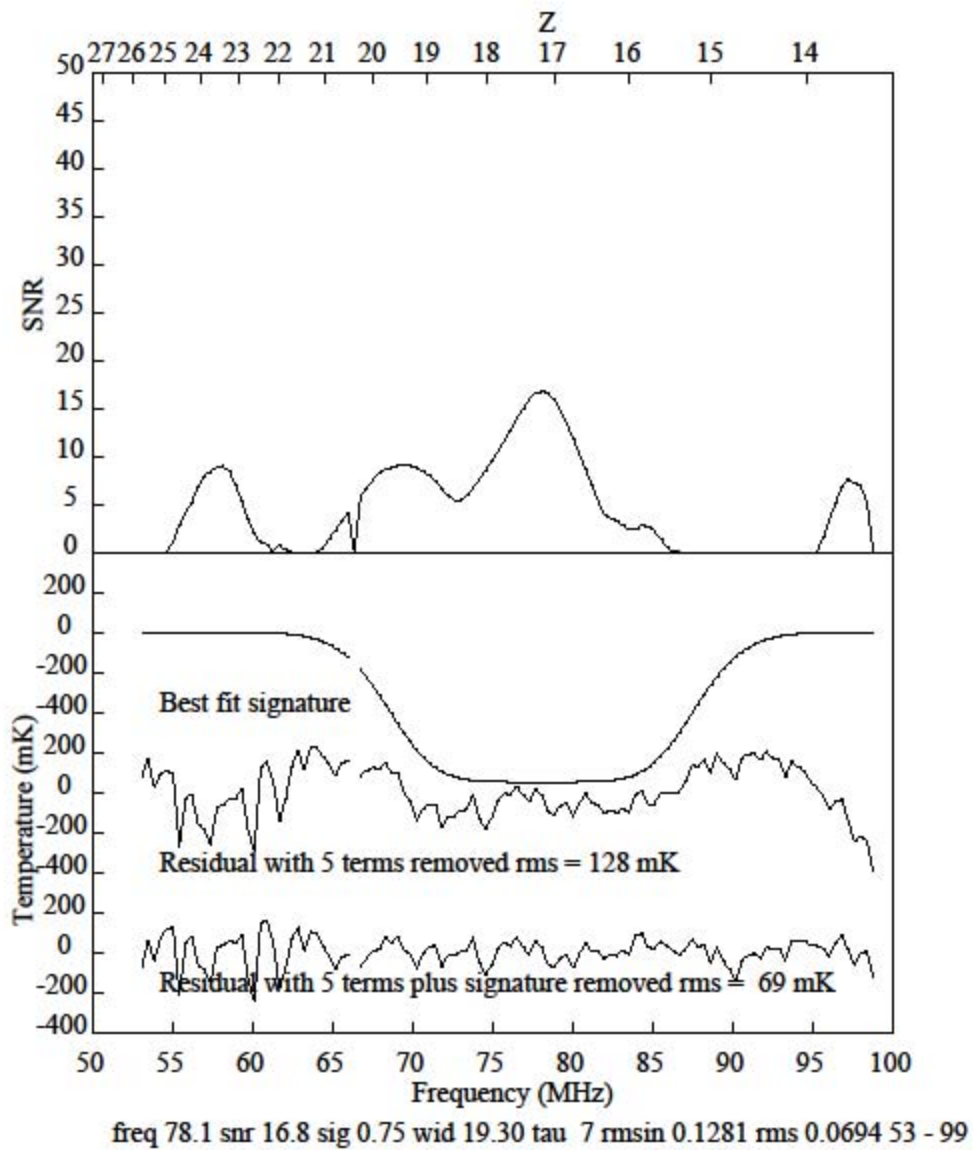


Figure 2. Corresponding signature search for average spectrum of Figure 1.

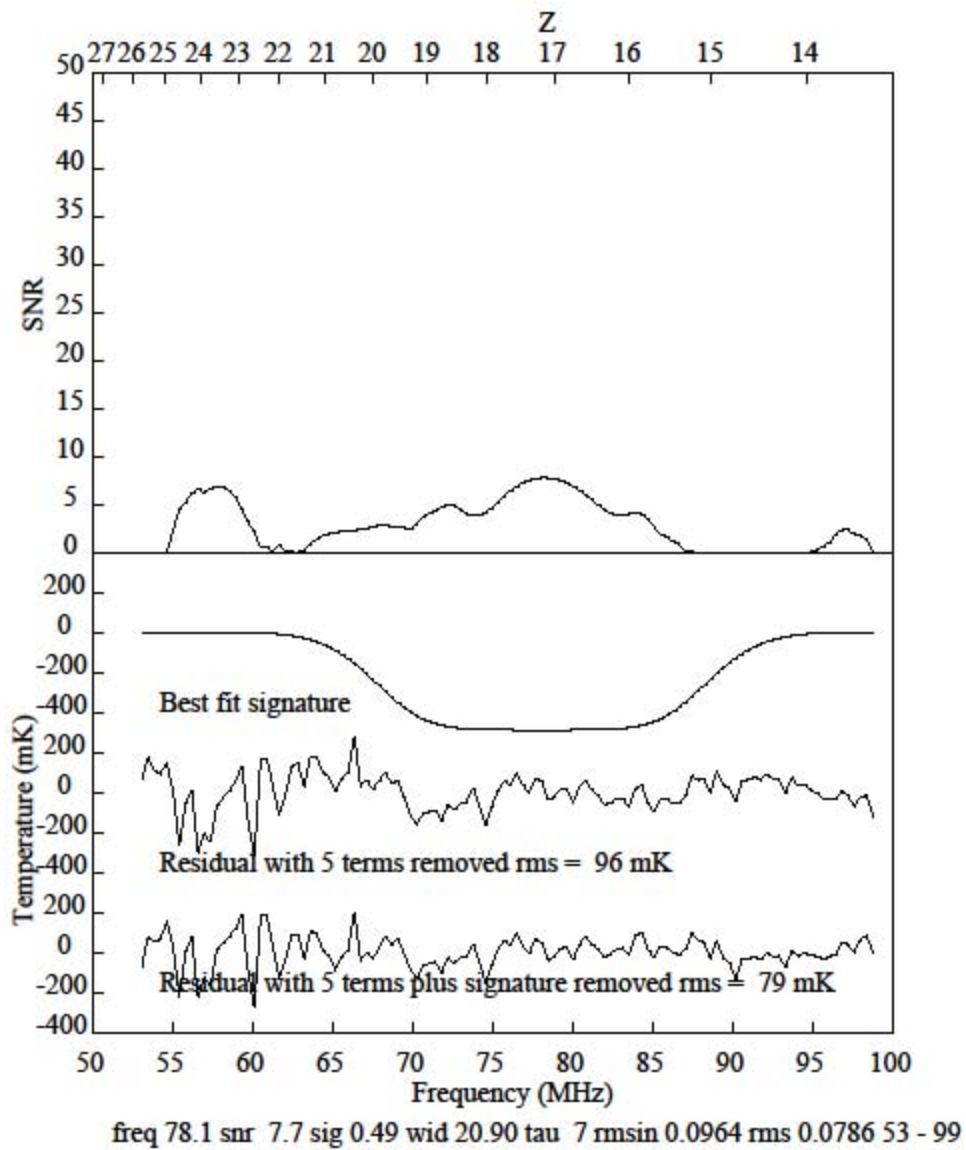


Figure 3. Signature search on same data with 5 polynomial terms removed.