EDGES MEMO #262

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To: EDGES Group

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Subject: Effect of errors in the assumed S11 of calibration SOL on signature amplitude via antenna S11 error.

Figure 1 shows simulations of the residual spectra with 4 polynomial terms removed. The data is simulated for lowband1 antenna S11 and assumed SOL offset of 38 ps and 50 ohm load. The data is processed with the changes listed in Table 1.

Case	Changes
1, 4	Load offset changed to 30 ps
2, 5	Short offset changed to 30 ps
3, 6	Load resistance changed to 50.1 ohms

Table 1.

Cases 1, 2 & 3 are for GHA = 12 and 4, 5, 6 for GHA = 0 hr.

An error of 0.1 Ω in the load resistance can easily occur unless great care is taken to eliminate the effects of contact resistance and offsets due to stray currents. This has typically been accomplished by comparing the load resistance with that of a short with the same setup.

The effects of the changes on an absorption signature search with no added signature are listed in Table 2.

Case	Center freq. MHz	Amp K	Width MHz	Amp2 K
1	77.0	0.02	16.4	0.52
2	81.1	0.07	16.5	0.41
3	82.0	0.25	29.9	0.44
4	77.0	0.05	16.5	0.57
5	87.1	0.21	16.5	0.24
6	70.7	0.28	11.6	0.42

Table 2.

The last column lists the amplitude when a signature of 0.5 K is added at 78 MHz with width 19 MHz and $\tau = 7$. In this case the amplitude is for a fixed signature at the same center frequency, width and $\tau = 7$.

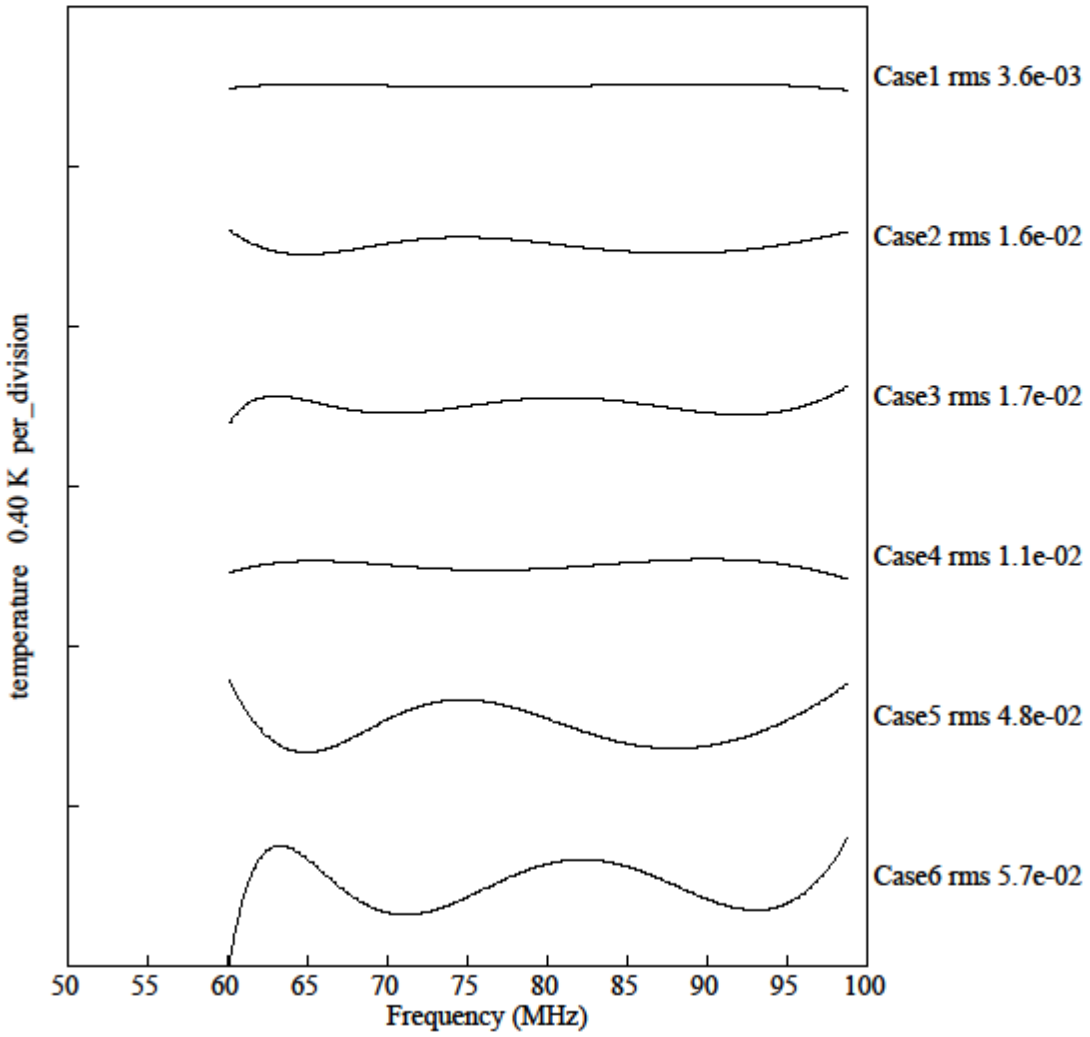

Figure 1. Residuals for 4 polynomial terms removed for changes in calibration standards listed in Table 1.