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To: EDGES Group
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Subject: Simulations of the effect of the electronics hut on the low band data.

Figure 1 shows the spectrum from low band from 2015_285 to 2016_091 binned in 4 hour averages centered at GHA=0 to 22 (LST=-6.25 to 15.75) from 61 to 97 MHz with 4 physical terms (scale, spectral index, spectral curvature, ionospheric absorption) removed. No beam correction has been applied. Figure 2 shows the beam correction from a FEKO simulation of the blade ground plane of 9.8×9.8 m. A soil dielectric of 3.5 and conductivity of 10^{-2} S/m are assumed. Figure 3 shows the same simulations with the addition of the electronics hut located 50 m from the antenna. The hut is assumed to be a metal box 3.2×3.2×2 m (L×W×H) with the sides aligned with the direction between the antenna panels.

While the fine frequency structure introduced by the hut is not obviously present in the low band data of figure 2 some of the effects may be present along with other systematics and possibly effects from a 21-cm signature. The level of the effect from the hut, like the effects of the 9.8×9.8 m ground plane, are dependent on the ground conditions. Also reducing the height of the hut from 2 m to 1.6 m in the simulation reduce the effect by a factor of about 2. Since the effect from the hut change rapidly with LST and are dependent on its exact location simulations with a more accurate knowledge of the geometry should allow a better test of the level of those effects. It may be desirable to move future low band deployment to the location of the current high band antenna.

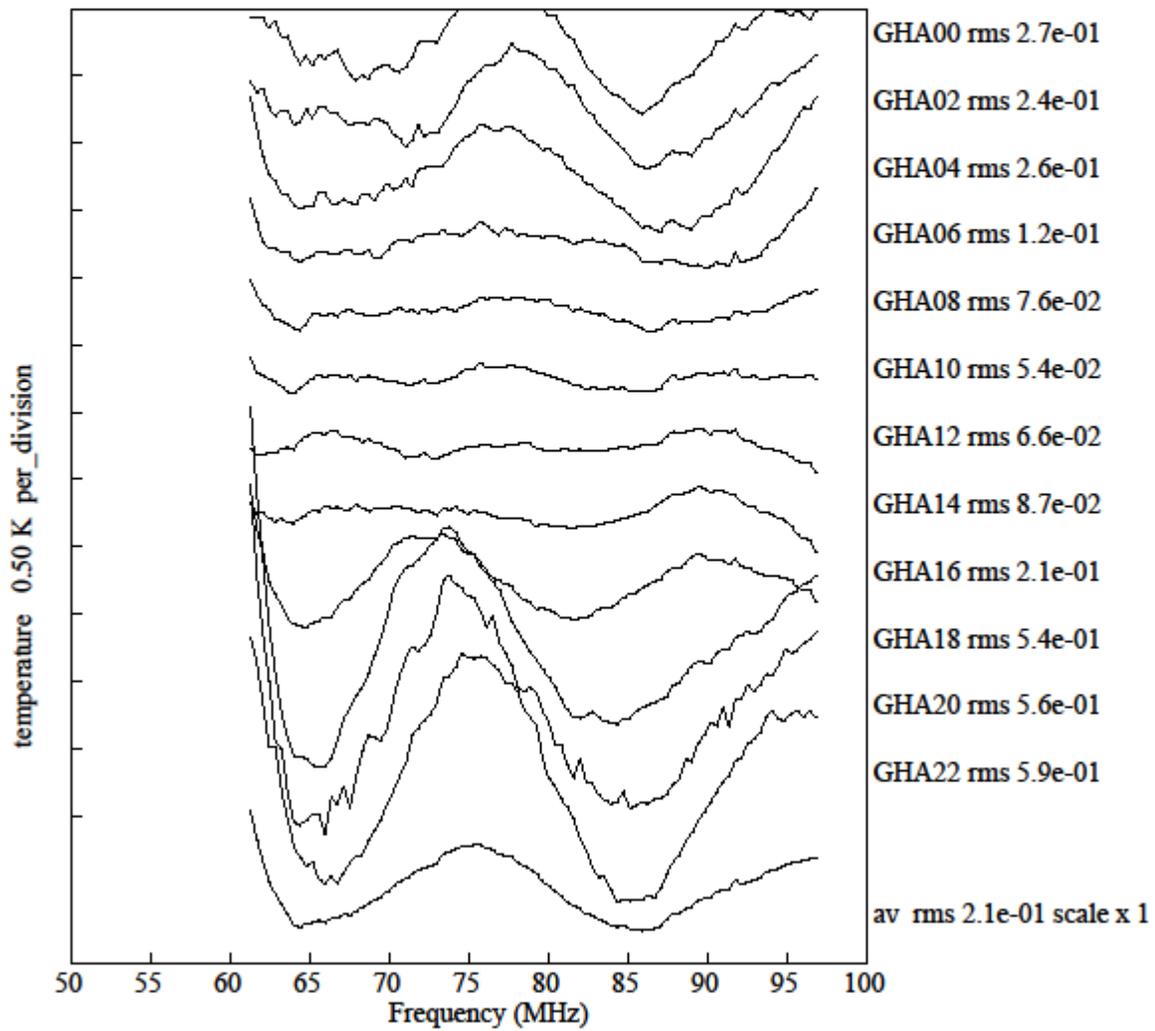


Figure 1. Low band spectra with 4-terms removed.

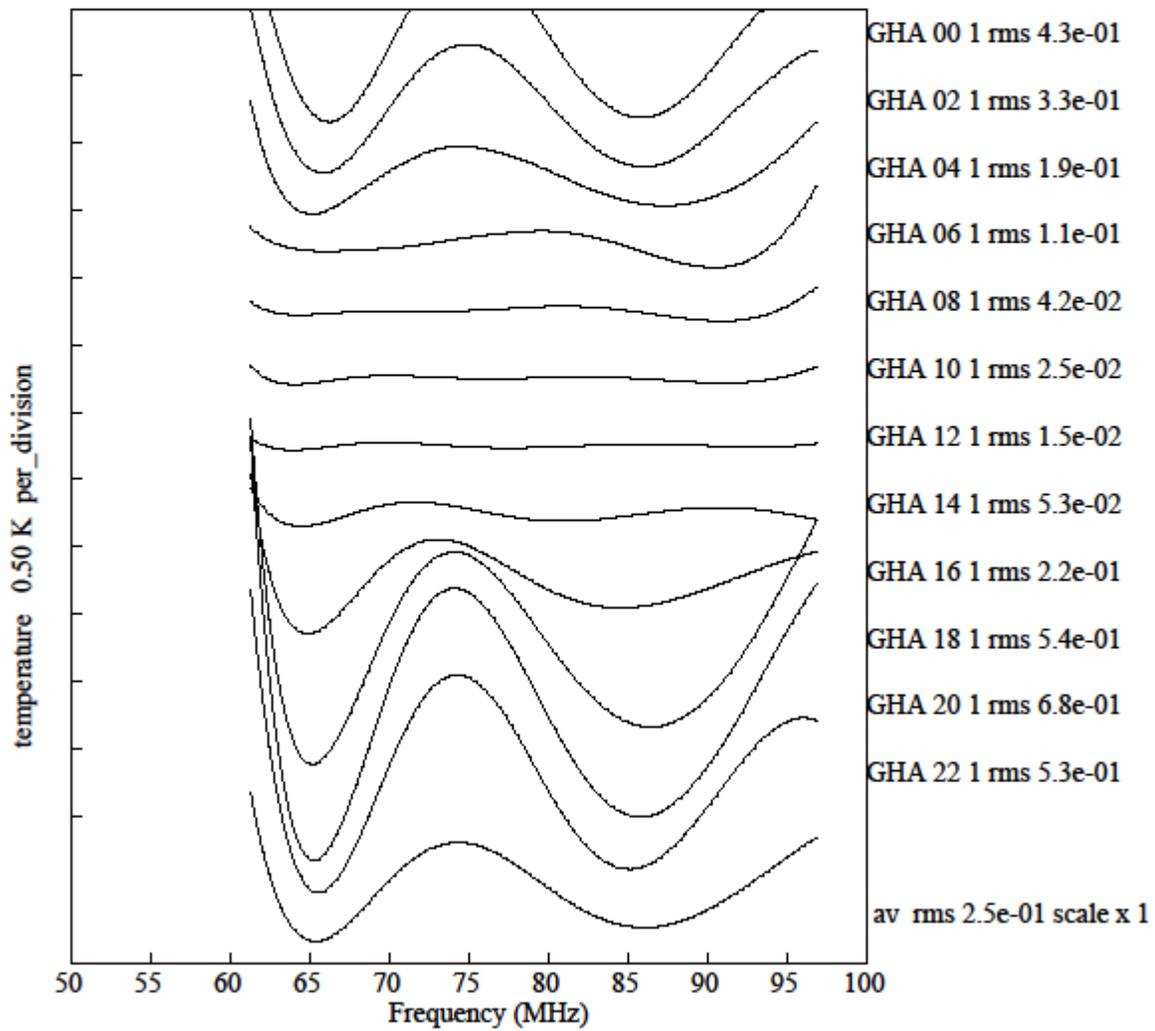


Figure 2. Beam correction based on ground plane 9.8×9.8 m with 4-terms removed. Ground dielectric constant 3.5 and conductivity 1e-2.

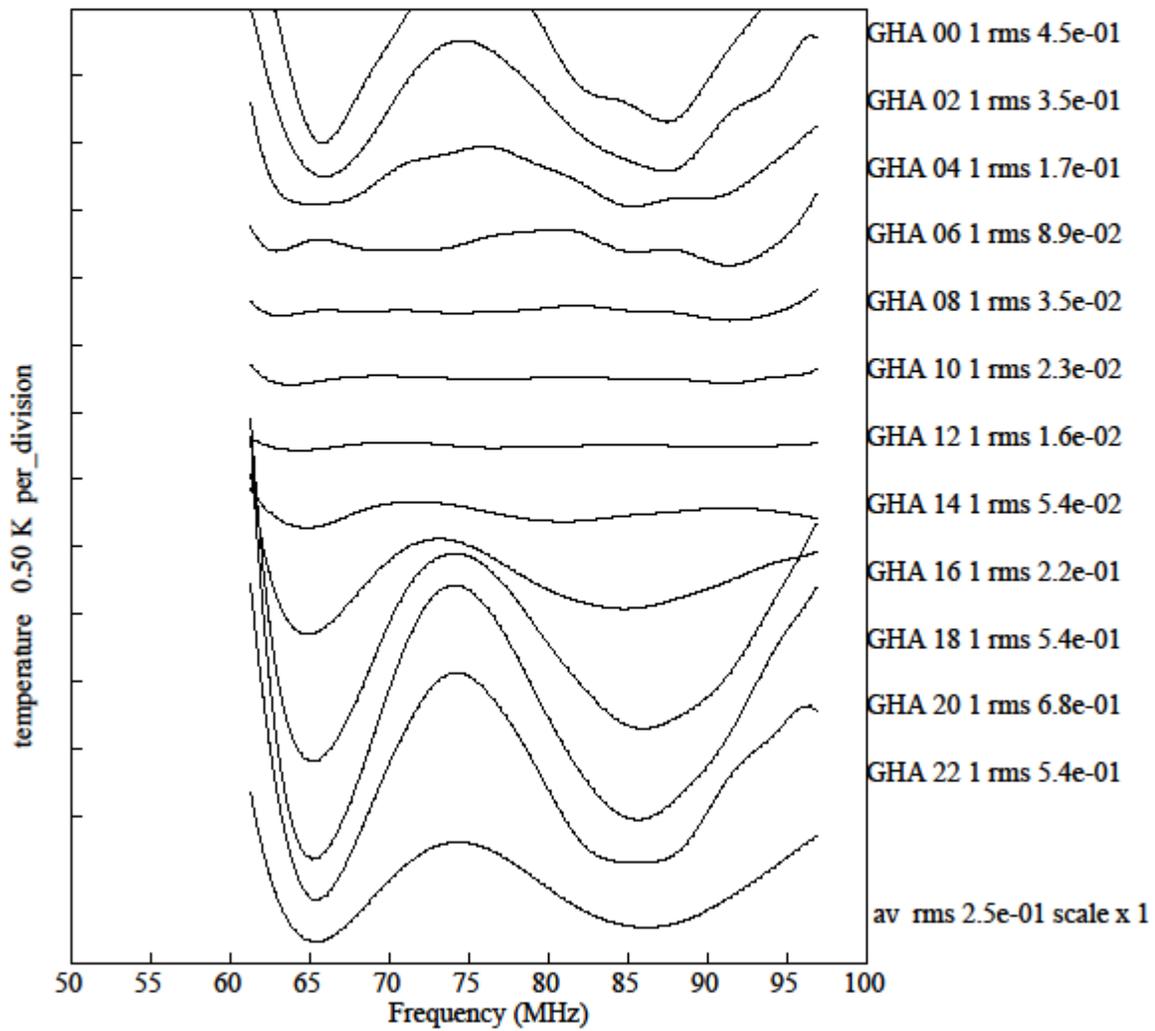


Figure 3. Same as figure 2 but with electronics hut included.