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 May 8, 2017

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To: EDGES Group  
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 Subject: Galaxy calibration of low band data.

“Galaxy calibration” of lowband data was first reported in memo 202 using the original 10×10 m ground plane. The results show the absorption centered at about 80 MHz in Figures 1,2 and 3 but the depth is dependent on the soil parameters used in the beam correction and a search on the difference between the “Galaxy down” spectrum minus 0.3 times the “Galaxy up” fails to yield a definitive result. Galaxy calibration using data from the extended ground plane is discussed in memo 215. The broader structure seen clearly in Figure 1 of memo 215 was the first clear indication that the dips at 70 and 84 MHz were part of a broader structure. Figure 1 shows the “Galaxy up” and “Galaxy down” spectra along with the “corrected difference” given by  $D = (G_d - 0.3 G_u)/(1 - 0.3)$

Where  $G_d$  = spectrum from GHA = 6 to 18 hours

$G_u$  = spectrum from GHz = -1 to +1 hours

D = difference corrected on the assumption that the signature is global with equal amplitude in  $G_d$  and  $G_u$ .

Figure 2 shows the result of a search in center frequency and FWHP for the lowband1 data from 2016\_258 to 2017\_017. Figures 3 and 4 show the results for the lowband2 data from 2017\_082 to 2017\_120 using the 2016 calibration. Figures 5 and 6 show the results using the 2017 calibration. Owing to the greatly reduced sensitivity to systematic errors using Galaxy calibration the results for the 2 calibrations are quite similar.

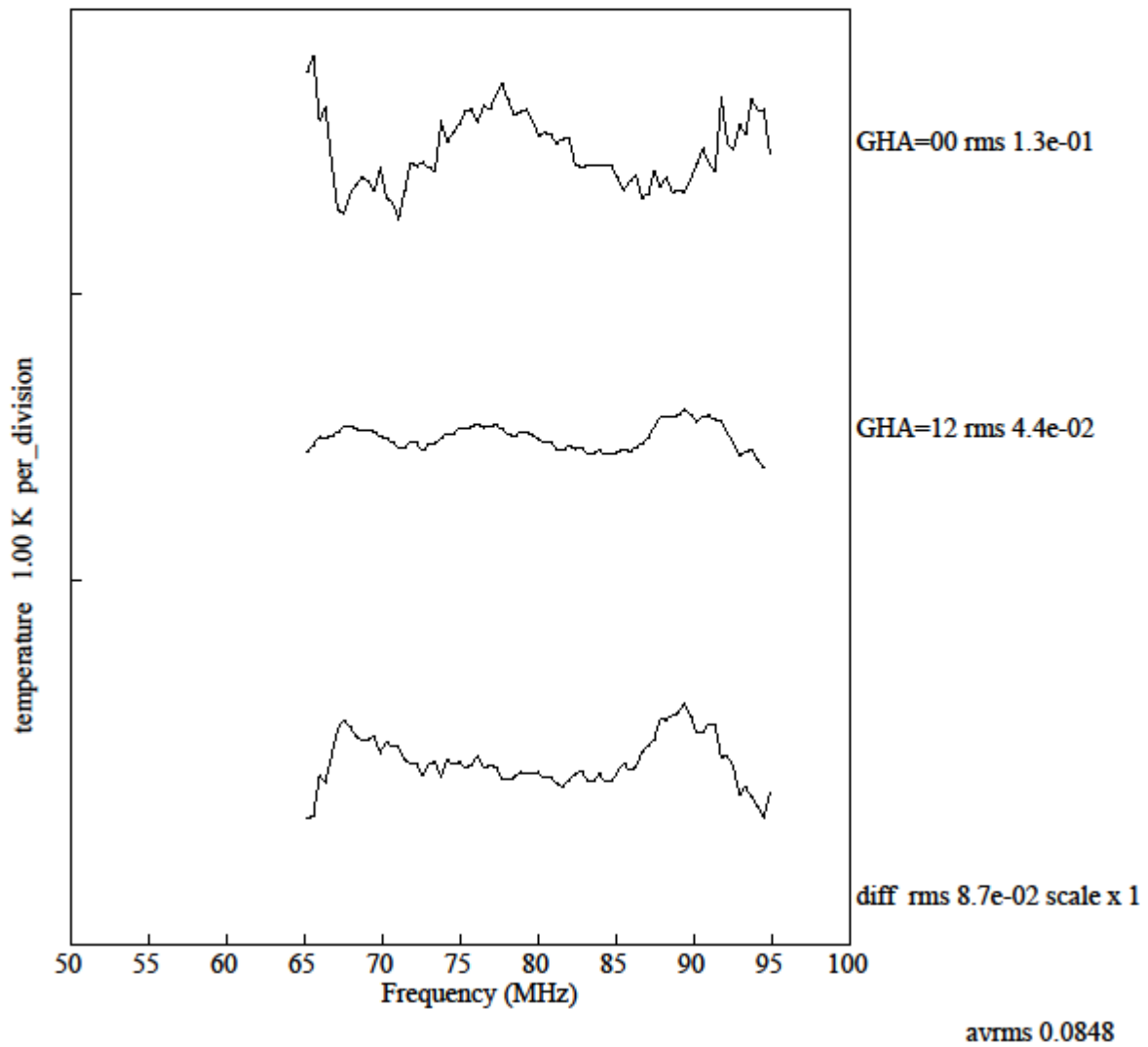


Figure 1. “Galaxy up” (GHA=0), “Galaxy down” (GHA=12) residual spectra with 4 polynomial terms removed along with corrected difference for lowband1.

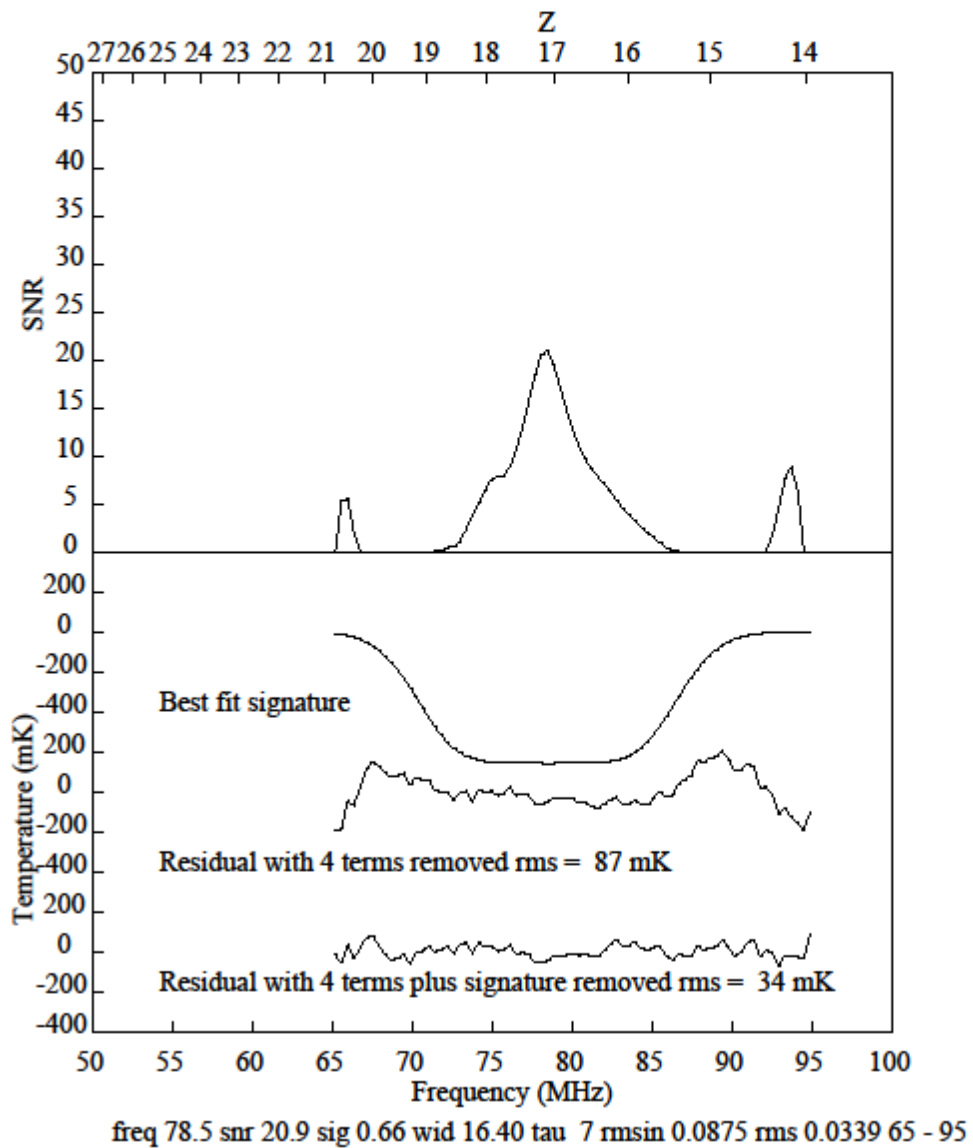


Figure 2. Signature search using difference spectrum shown in Figure 1.

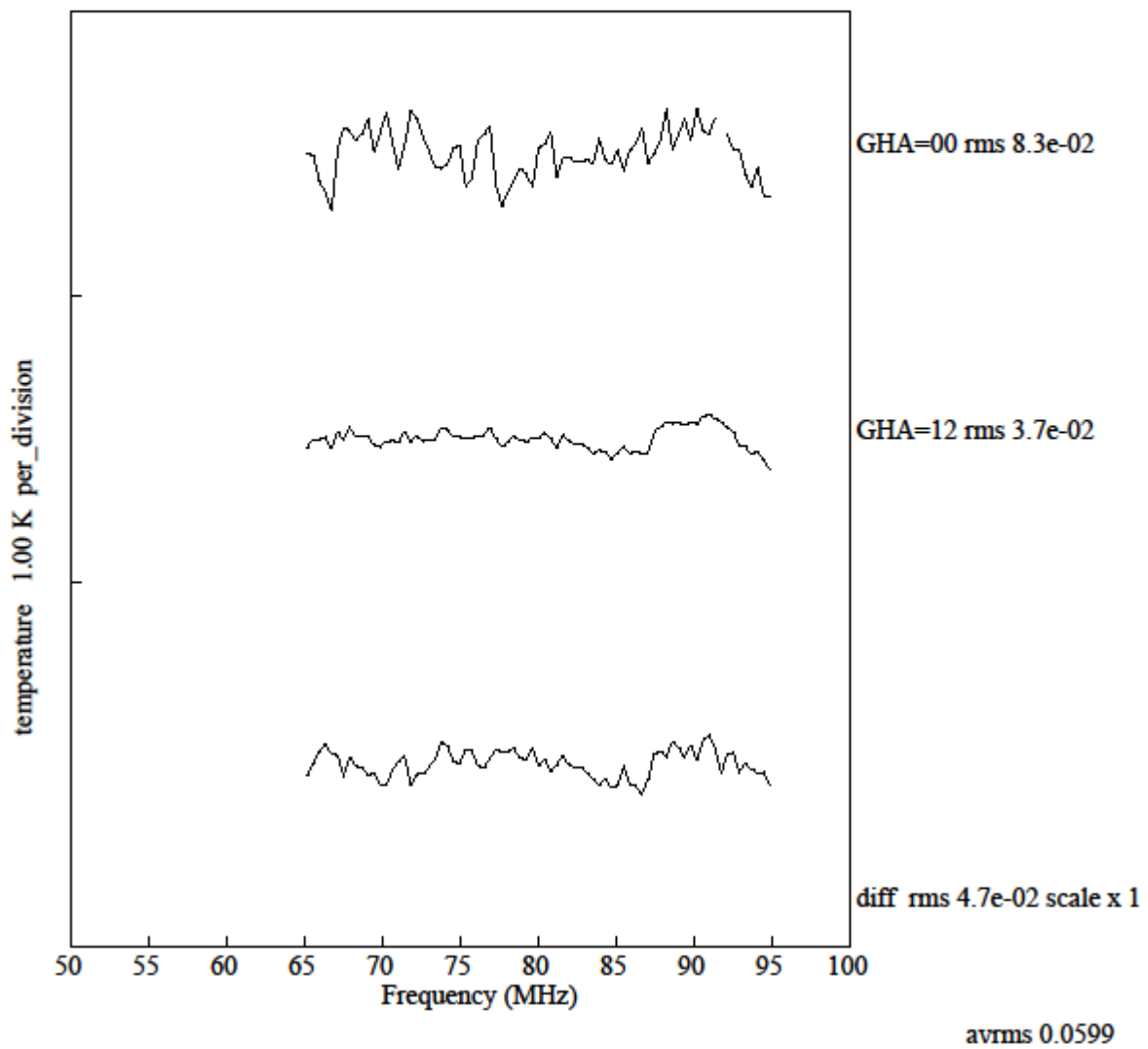


Figure 3. Lowband2 results using 2016 calibration.

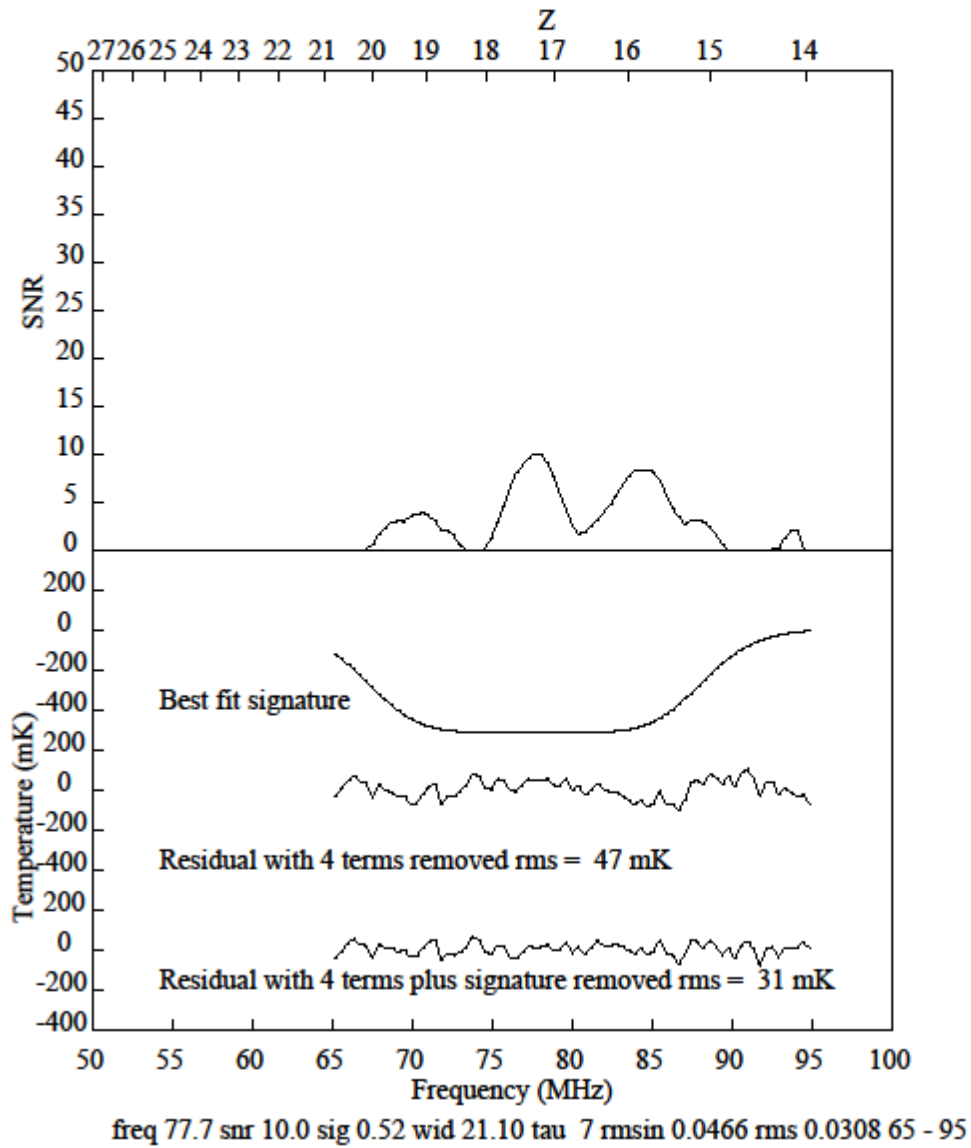


Figure 4. Signature search using lowband2 difference with 2016 calibration.

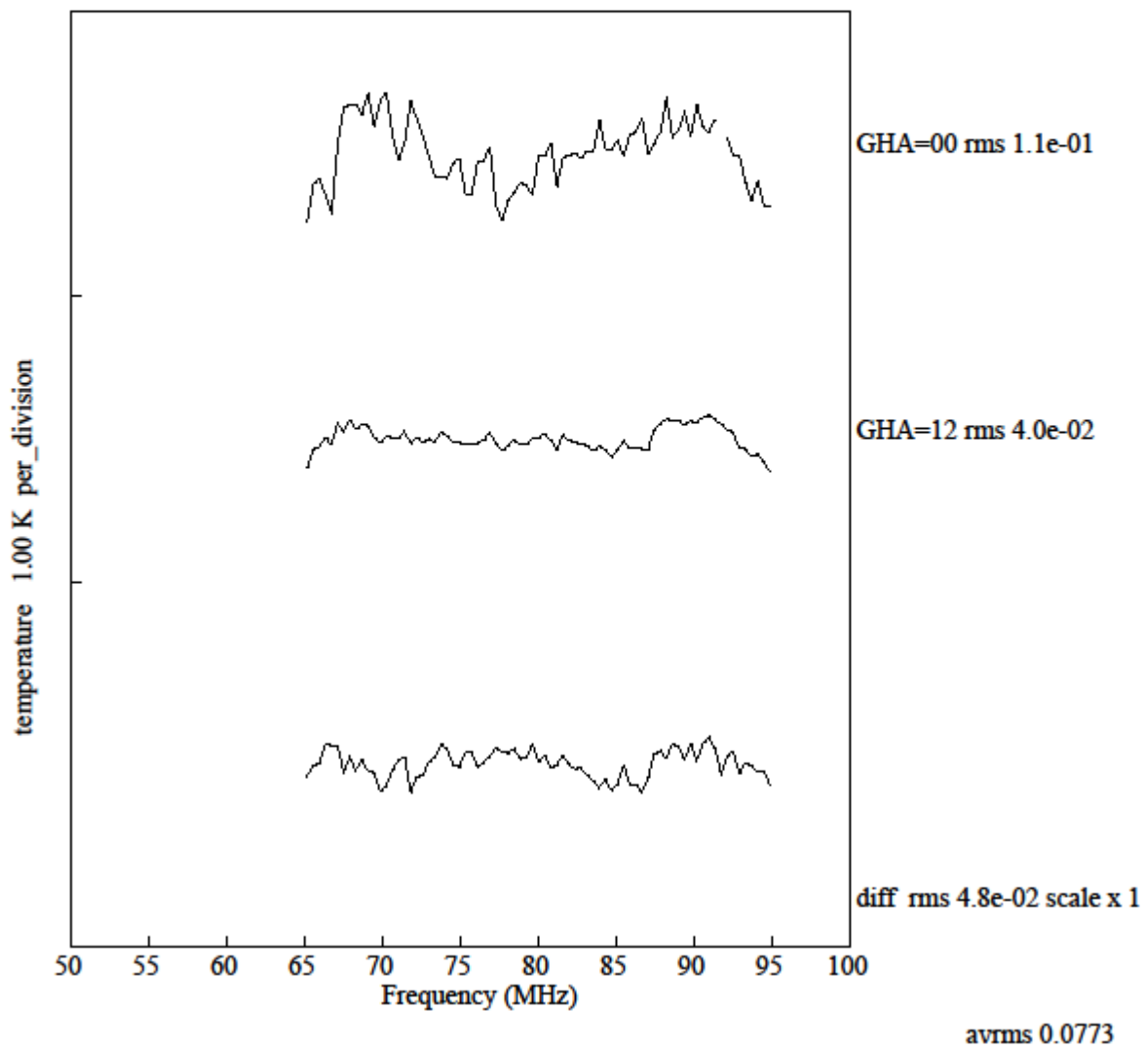


Figure 5. Same as in Figure 3 using 2017 calibration.

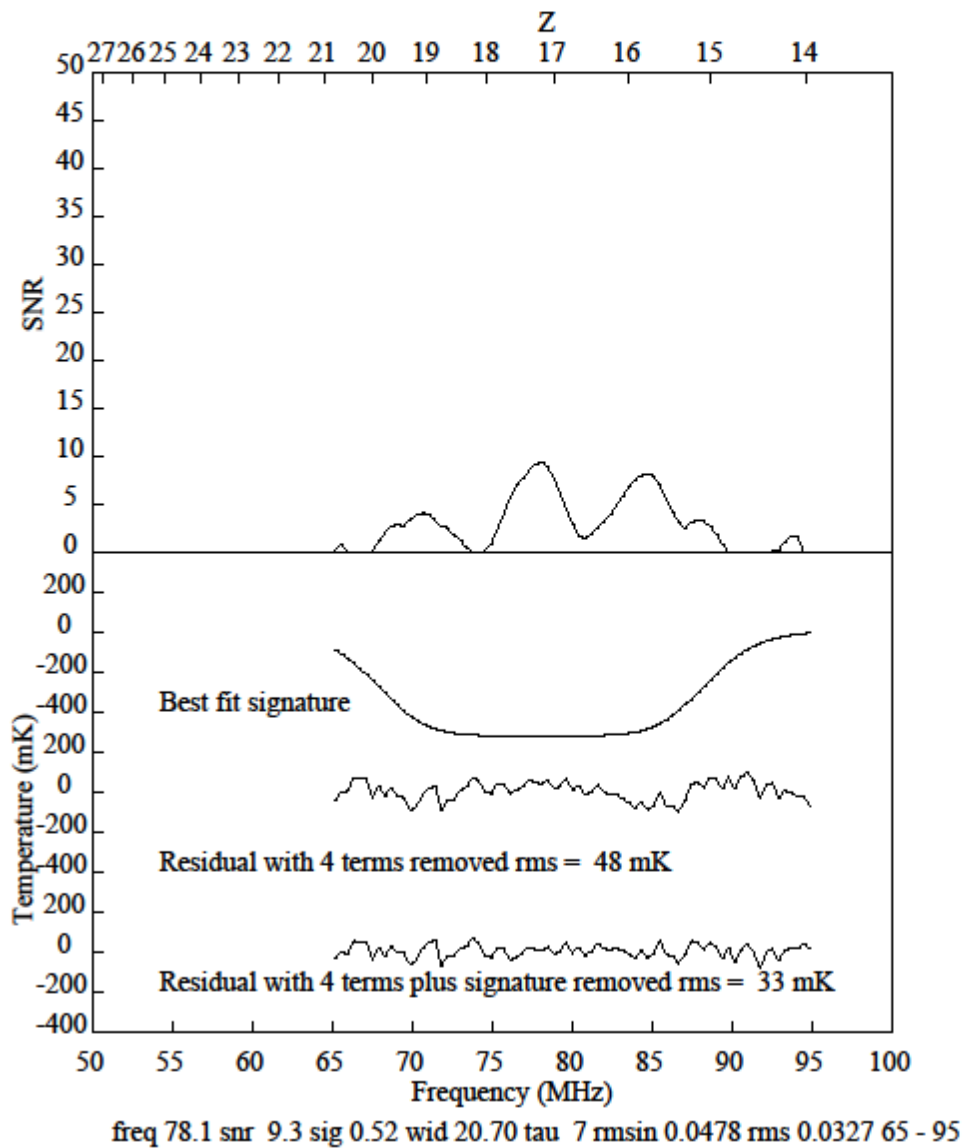


Figure 6. Lowband2 using 2017 calibration.