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To: EDGES Group

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Subject: Test of EDGES-3 using antenna simulator

The cable model given in memo 303 can be revised by simultaneously finding the adjustments to the model dielectric constant and loss which give the best 1-term fit to the calibrated spectrum from antenna simulator consisting of a 10ft mox cable box terminated with a 6 dB attenuator. In a test in which the receiver was controlled to 30°C the best fit was obtained with a -3% change to the dielectric constant and a change of the outer and inner conductivity to $6.77e6$ S/m and $8.46e6$ S/m respectively. Since the path lengths using the method given in memo 303 depend on the cable dielectric and to a small amount on the loss the adjustments for best fit can be obtained from a 2-D search for dielectric and loss. It also has been verified that best S11 path offsets obtained from the lowest rms fit to antenna simulator are consistent with those from the path lengths from the S11 data these values were 3.2" and 5.9" inches for the offset from the antenna input reference plane and the path to correct LNA S11 measured respectively.

Figure 1 and 2 show the calibration results and the calibrated antenna simulator spectrum for 50-130 and 50-198 MHz respectively. The conductor conductivities which produce the best fit to the antenna simulator are lower than expected from a separate measurement the loss of a 6" length hand flex cable for which the best fit conductivities were close to 50% of copper. The reason for the differences could be the result of added loss in the connectors. The difference at 100 MHz is only about 0.02 dB in 6". The best for loss is most sensitive to the antenna and LNA S11. Further tests and checks of repeatability are needed.

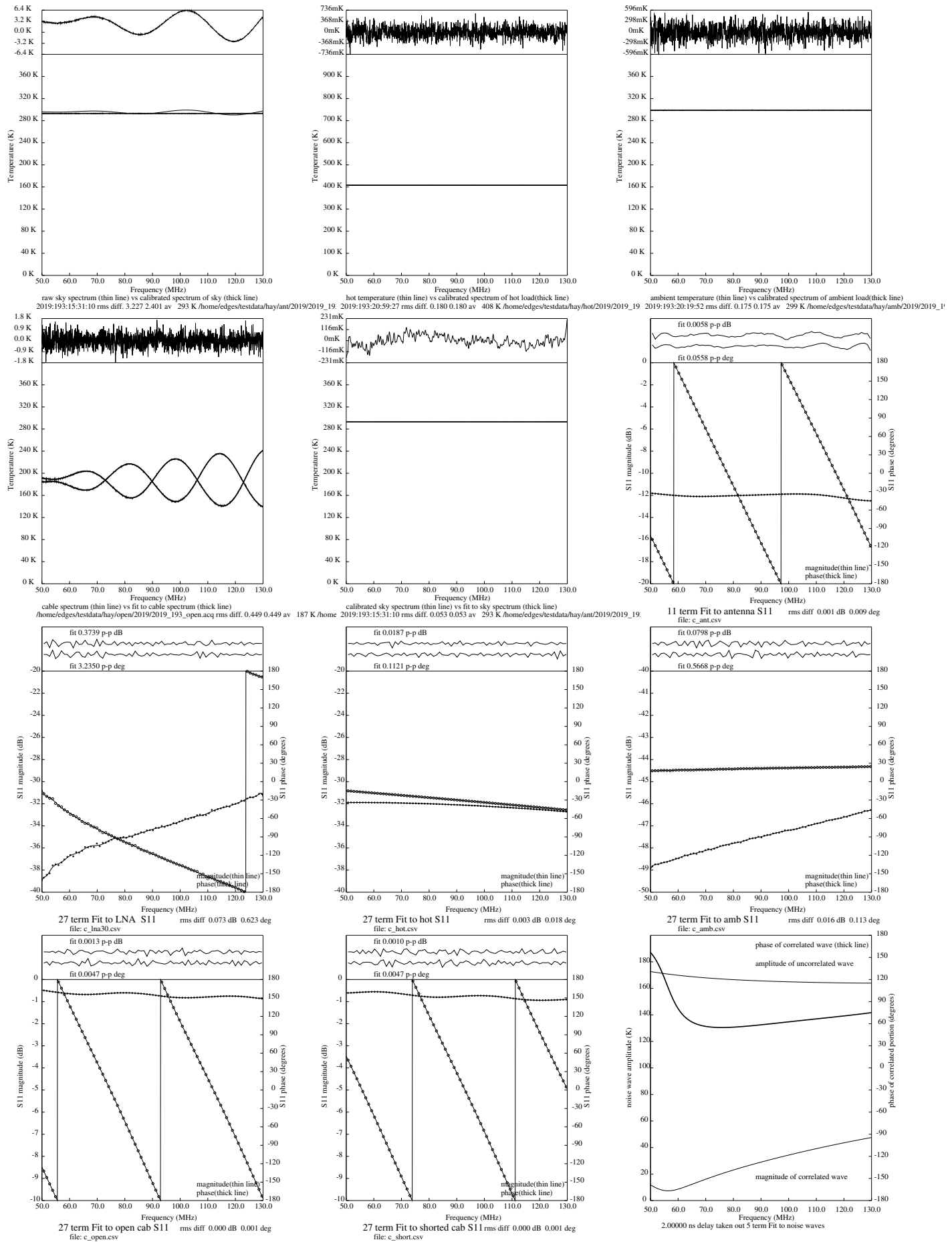


Figure 1. Calibration results and calibrated spectrum of antenna simulator for 50 to 130 MHz.

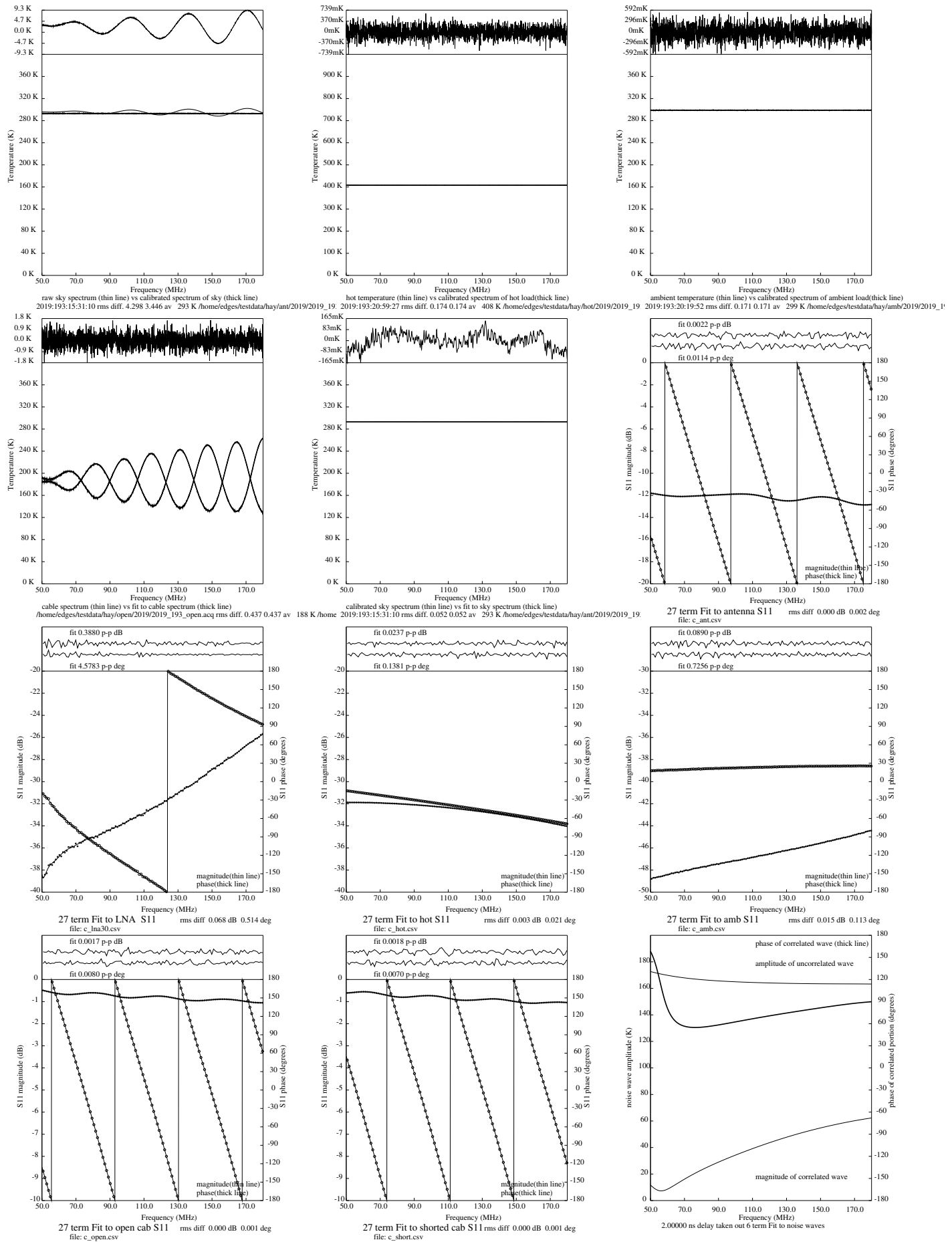


Figure 2. Calibration results and calibrated spectrum of antenna simulator for 50-198 MHz.