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To: EDGES group

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Subject: Initial analysis of EDGES-3 data at the MRO from 2026 days 225 – 237

Following the repair of EDGES-3 at the MRO by John and Rigel in August 2026 an initial analysis of the data was made using the c-code pipeline.

The initial available data from 2026 days 225 to 229 to search for the global 21-cm spectrum using a script similar to the one used in memo 507. The results that were obtained are shown in table 1 below:

center MHZ	SNR	amp K	width MHZ	rms1 mK	rms2 mK	range MHz	Tsky K	comments
77.5	5.3	0.79	11.9	46.6	41.9	60-106	1769	Calibration used in memo 507
78.9	3.9	0.60	11.1	46.4	43.7	60-106	1801	Calibration from 2026 day 226
78.5	3.0	0.45	10.4	45.4	43.8	60-106	1756	Calibration from 2026 day 228

Table 1. Search for global 21 cm absorption

The SNRs are very low because it was found that we still need to exclude data with the sun above -30 degrees and so there is relatively very little data.

A comparison of the residuals using data from 2026 day 230 using one hour data blocks of GHA and 4 terms removed shows an average rms of 0.6192 K on the left of Figure 2 while the residuals using the data from 2025 day 230 using one hour data blocks of GHA and 4 terms removed has an rms of 0.5088 K on the right of Figure 2.

Figure 3 shows an rms of 5.866 K for the 2026 data compared with 3.5002 K for the 2025 data without the rfi filtering by using -rfi 0. This large difference is due to the higher level of FM RFI in 2026.

To test the performance of the ADC a comparison of the rms noise in the calibrated spectrum of the hot load is made in figure 4a using data from data from 2026 day 232 with data from 2023 day 210 in figure 4b. The rms noise in the hot load spectra are 96 mK for 2026 and 99 mK for 2023 respectively showing that there is a little difference in the ADC noise.

Given the higher level in the FM signals seen in Figure 3 for the 2026 data a check is made to see if there is significant occurrence of ADC saturation which might account for the higher noise in the 2026 data. The waterfall plot in Figure 5 has only three strong short duration “spikes” which could be the result of lightening similar to those discussed in memo 325. Adding the “-maxfm 2000” in the acqplot() function eliminates the 3 spikes by removing the data samples very strong signals but has little effect on the high noise level which is most likely due to “STEVE” events.

The results for a search for the best fit 21-cm absorption using 5-terms, and $\tau = 7$ was obtained for only 12 days of data is shown in table 2 below and plotted in Figure 6:

center	SNR	amp	width	rms1	rms2	range	Tsky	comments
MHZ		K	MHZ	mK	mK	MHz	K	
78.5	10	0.69	22.4	100.2	89.9	60-104	1769	Calibration 2026 day 228

Table 2. Search for global 21-cm absorption using data from 2026 day 225 to 237

The key parameters used in the search:

antenna beam: azelq_box_perf_48_2e-2.txt

acqplot7amoonc: -rfi 2.1
 -smooth 8
 -sunlim -30

longav: -lim 0.45
 -nfit 5
 -tau 7

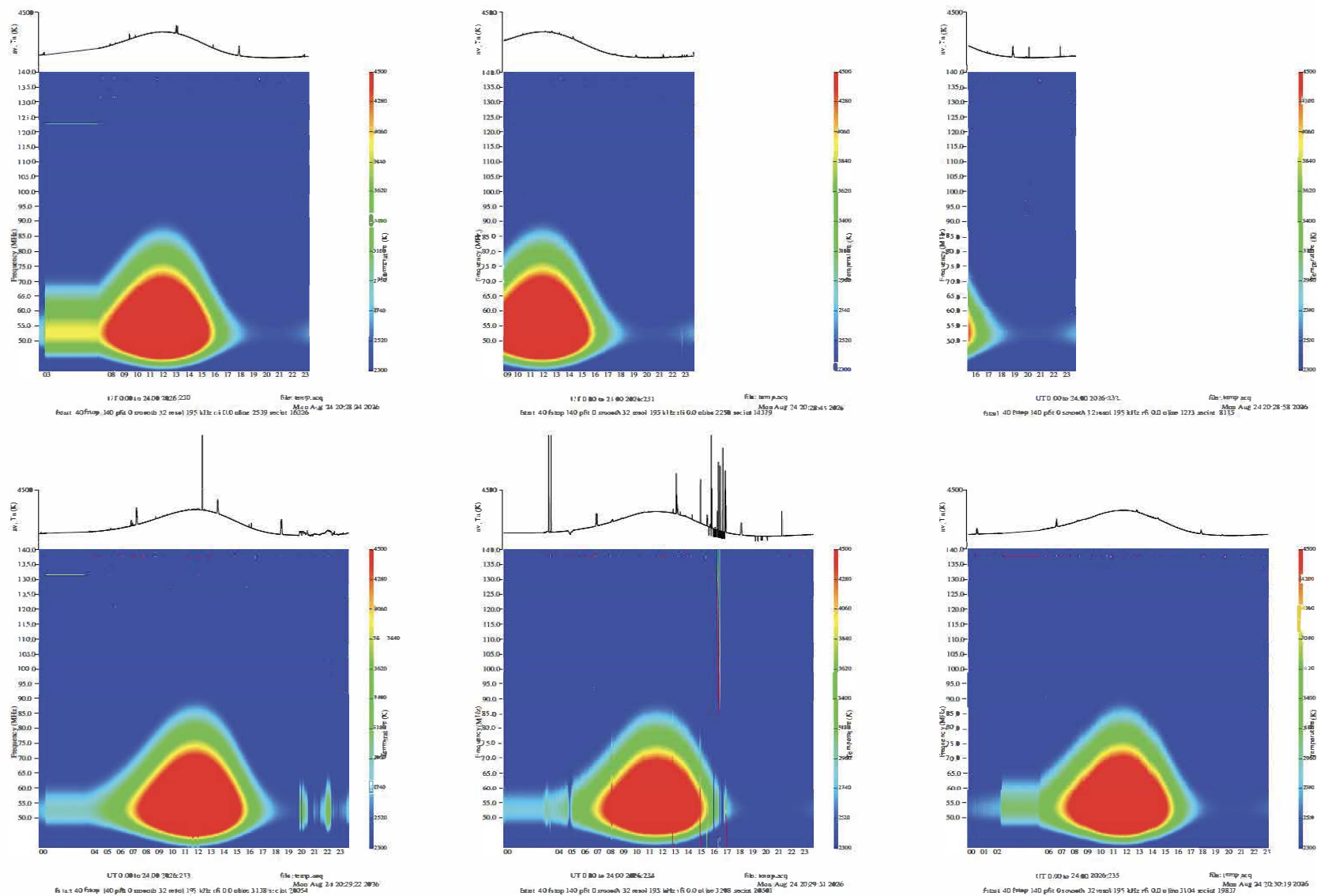


Figure 1. Waterfall plots for 2026 day 230 to 235

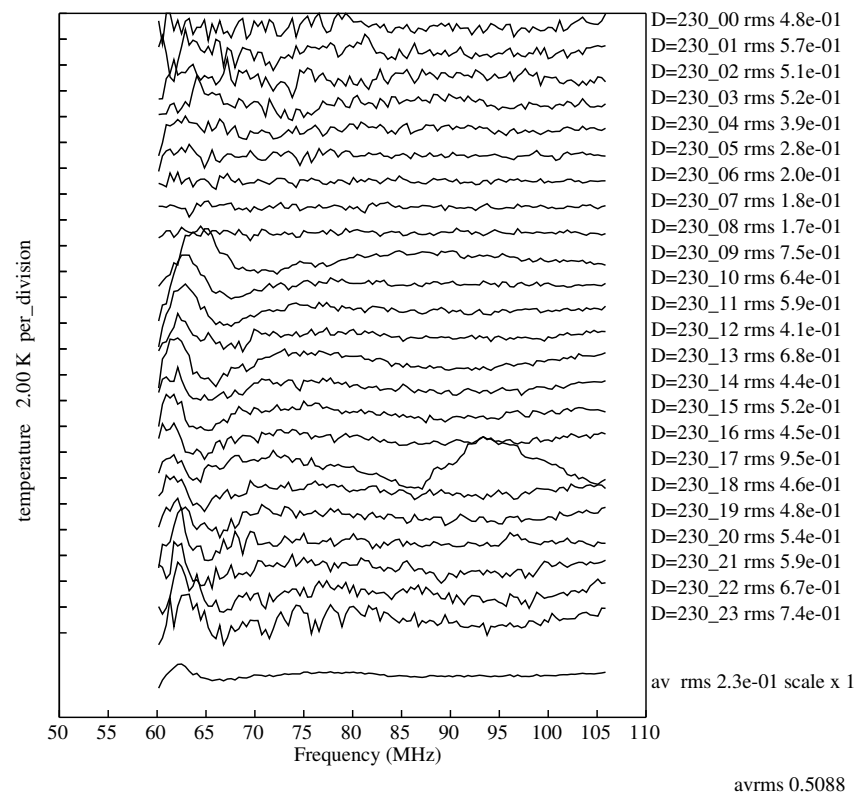
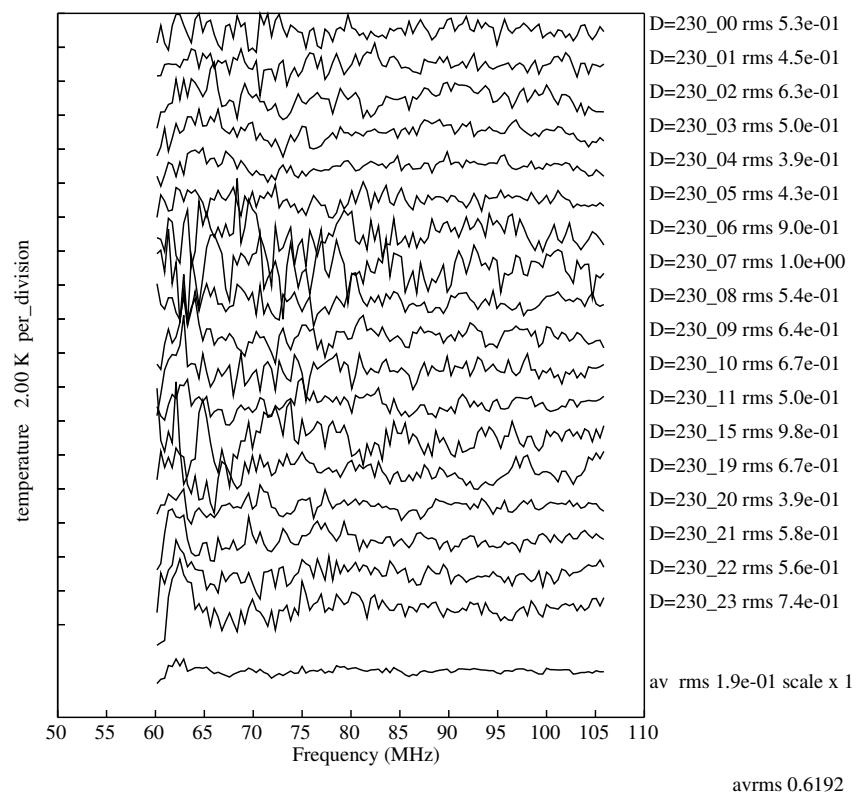


Figure 2. Comparison of residuals vs GHA for 2026 day 230 on the left and 2025 day 230 on the right

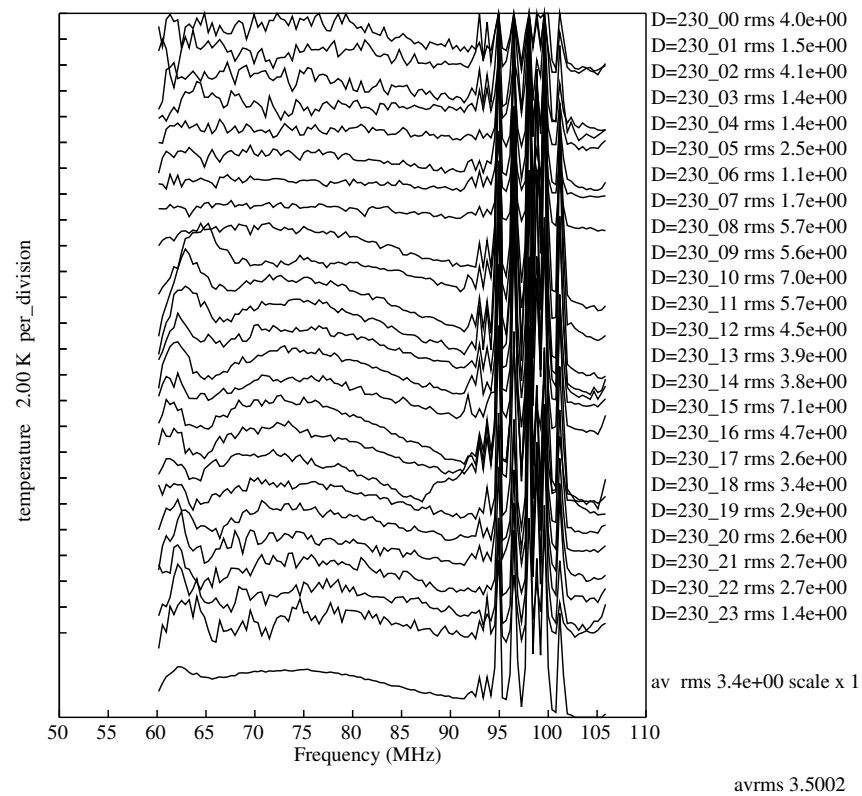
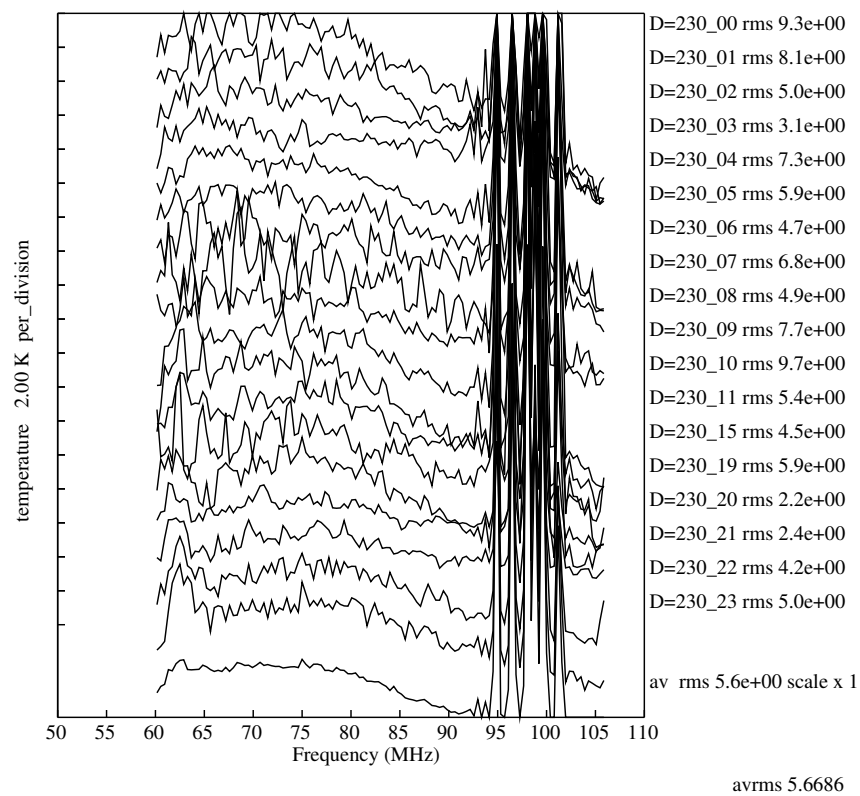


Figure 3. Same as figure 2 but without RFI filter showing the higher residuals in the the 2026 data

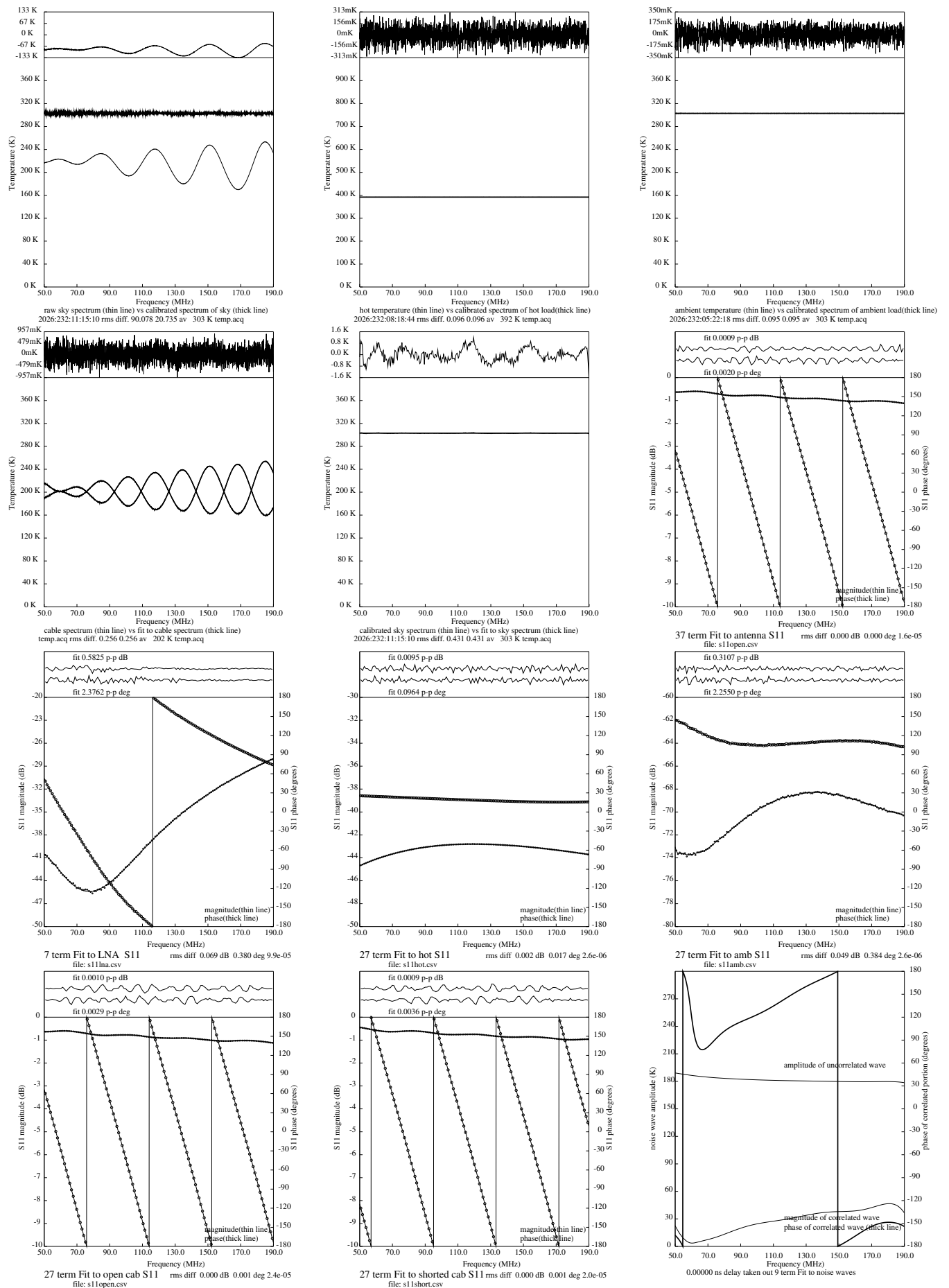


Figure 4a. Calibration plots for data from 2026 day 232

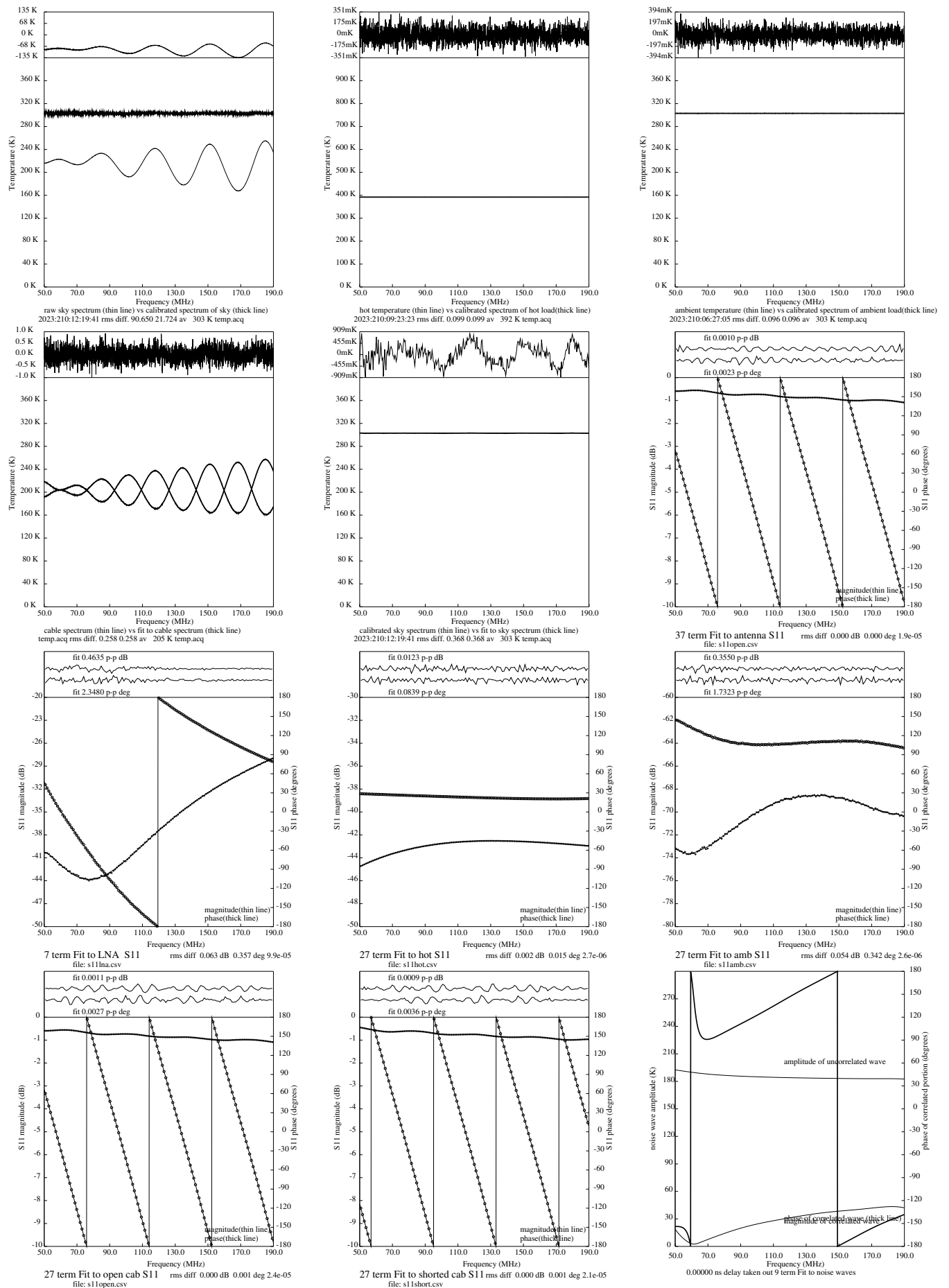


Figure 4b. Calibration plots for data from 2023 day 210

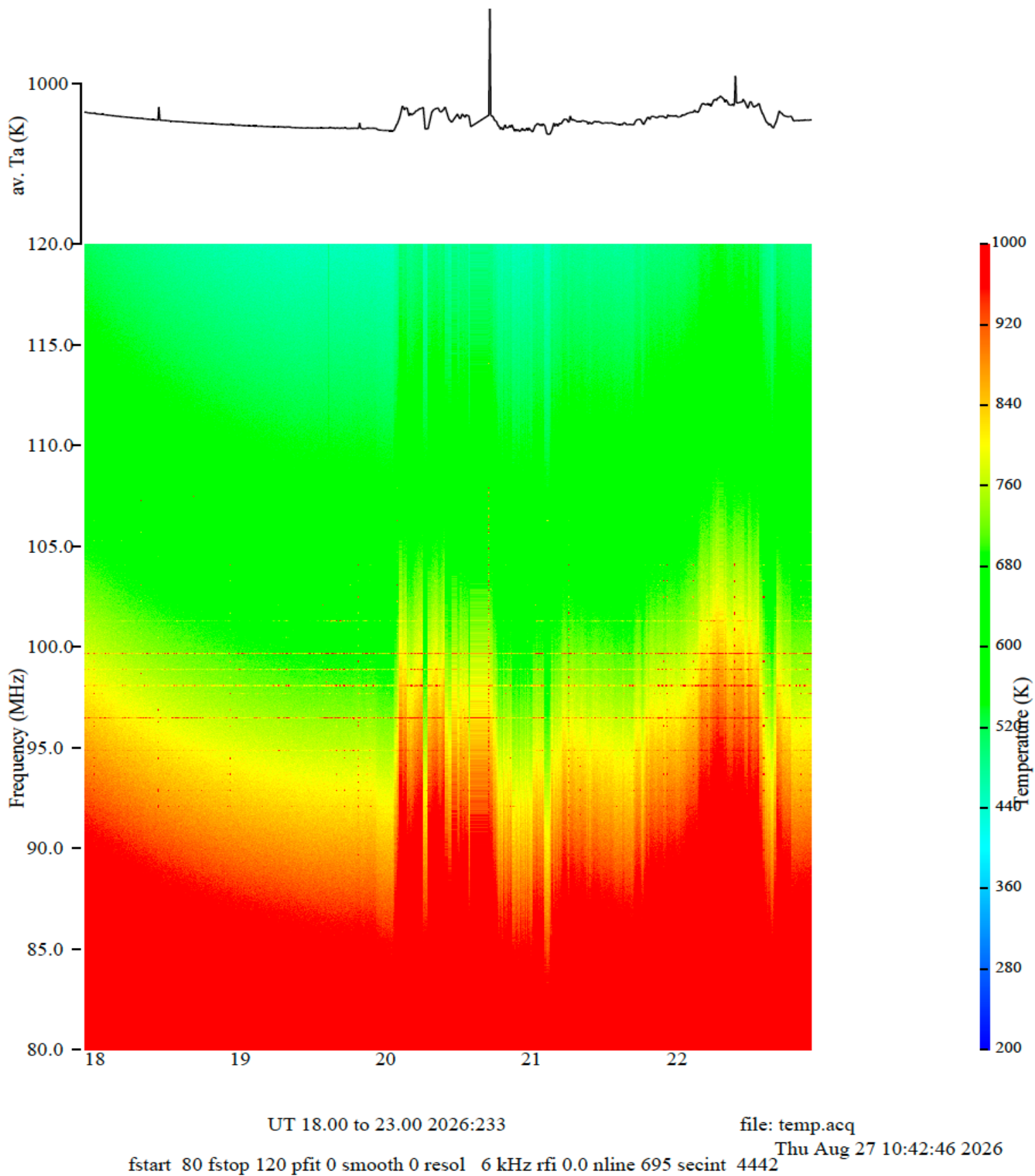


Figure 5. Waterfall plot for 2026 day 233 vs UT without any RFI filtering

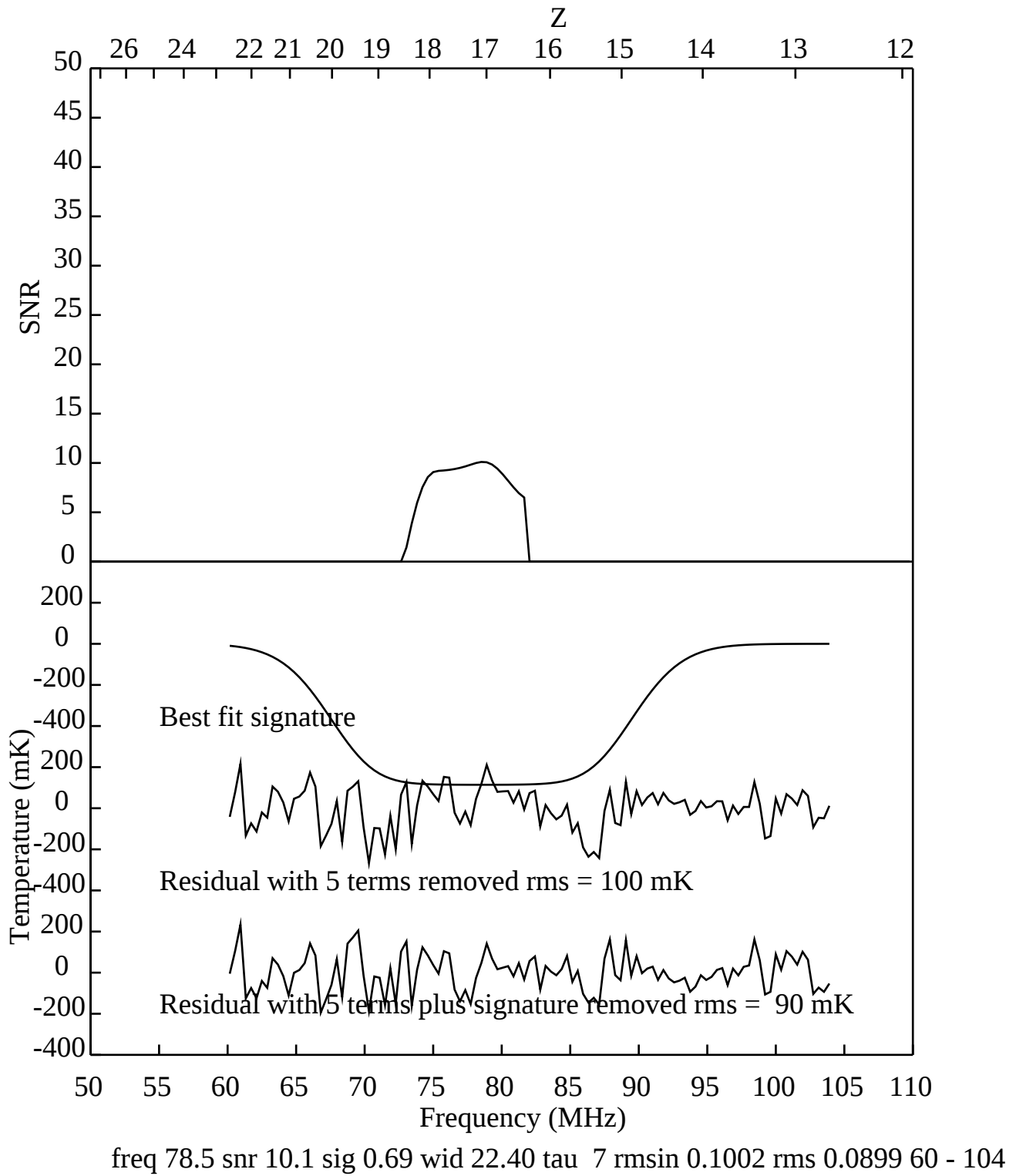


Figure 6. Grid search for global 21-cm spectrum from 2026 days 225 to 237