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To: EDGES group

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Subject: Tests EDGES-3 data from 2026 to determine if the effects of solar activity are declining

The peak of the solar cycle 25 was in late 2024 and it is expected that effects of the solar emissions on the propagation of FM and solar bursts via sporadic E and trans-equatorial should only continue for about 2 years after the peak.

If this is the case there should be a larger fraction of the EDGES-3 data which should provide a reliable measurement of the global 21-cm spectrum as we move further into 2026.

A test of the ability to get global 21-cm absorption was made using the earliest and latest available data from 2026. The results obtained are listed in Table 1 below:

Center MHz	SNR	amp K	Width MHz	rms1 mk	rms2 mK	day start	day stop	fstart MHz	fstop MHz	other parameters
77.3	21	0.53	22.4	75	34	78	133	60	106	-lim 0.35 -nfit 4 -sig 0 figure 1 right
78.1	10	0.61	29.9	40	29	1	55	60	100	-lim 0.32 -nfit 4 -sig 0 figure 1 left
77.7	6	0.56	22.0	88	75	128	133	60	100	-lim 0.32 -nfit 4 -sig 0 figures 2&3

Table 1. global 21-cm absorption test results from EDGES-3 in the WA

acqplot parameters: -maxrmsf 50 -sunlim -30 -sunmin -90 -site 1 -rfi 2.1

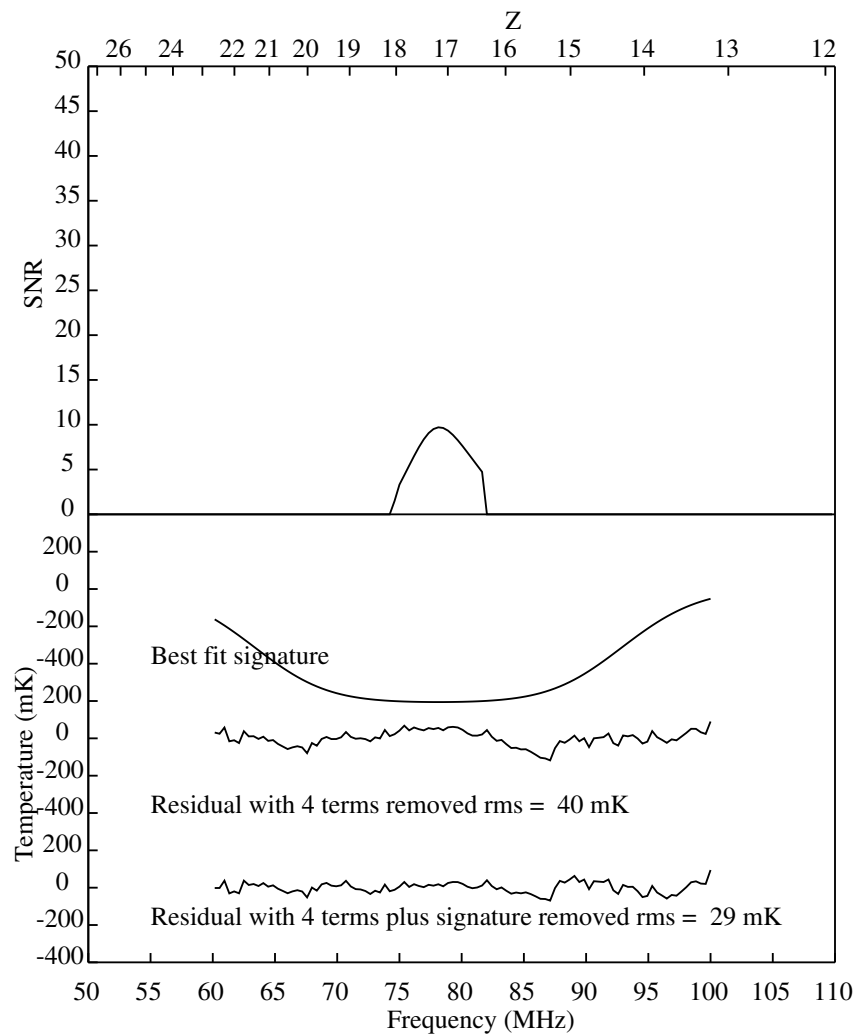
beam file: azelq\_box\_perf\_48\_2e-2.txt

calibration file: specals\_210opt.txt

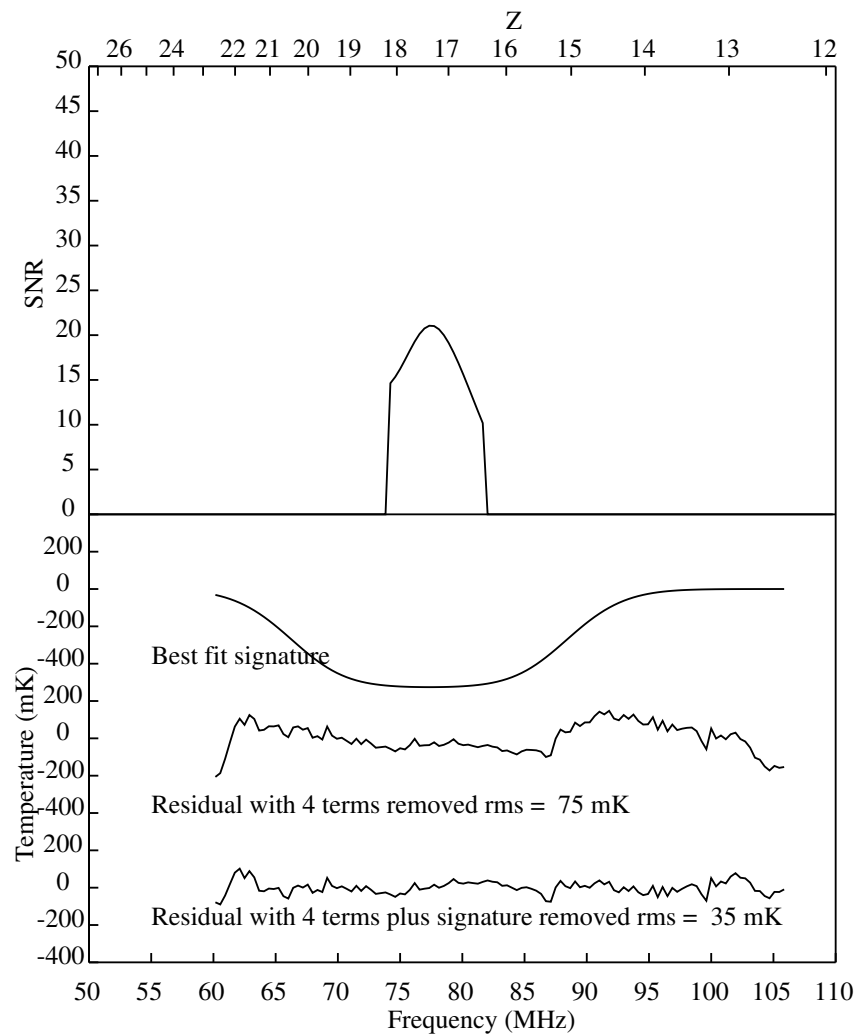
The tests made on the most recent data indicate that the level of RFI from the large number of different sources is now on the decline as we move further into 2026 and hopefully the accuracy of the global 21-cm absorption will be even better in 2027. Figure 1 shows that a more significant detection is made over a wider bandwidth using the most recent 55 days of data. Figure 2 shows that a global 21-cm detection can be made using only the 6 most recent days. The plot on the right shows the individual residuals prior to fitting an absorption for each accepted day and GHA. Figure 3 shows all the one hour data blocks. This shows that there are still 1 hour blocks that have too much noise as a large fraction of the 3-positions switch cycles are primarily dropped by the RFI filtering threshold of rfi 2.1 sigma along with a few cycles dropped by the adcov 0.4 and maxrmsf 50 mK filters.

For example the residual for GHA = 2 has an rms of 1.3 K on day 128, which is the third from the top of figure 3, has only 14 accepted 3-position switch cycles compared with an rms of 0.59 K for GHA = 0 at the top of figure 3 which has 153 accepted 3-position switch cycles. This example shows that the increased rms is primarily due to large fraction RFI events which are primarily in the FM band as shown in memo 506. A study of the origins of the FM signals in memo 501 shows that reflected FM comes from micrometeorites, meteors, and satellites in addition to the moon.

All the data for all these tests are limited to a sun elevation of 30 degrees below the horizon.



freq 78.1 snr 9.7 sig 0.61 wid 29.90 tau 4 rmsin 0.0403 rms 0.0291 60 - 100



freq 77.3 snr 21.0 sig 0.53 wid 22.40 tau 4 rmsin 0.0752 rms 0.0345 60 - 106

Figure 1. The best fit 21-cm absorption using EDGES-3 data at the WA from 2026 day 1 to 55 on the left and day 78 to 133 on the right.

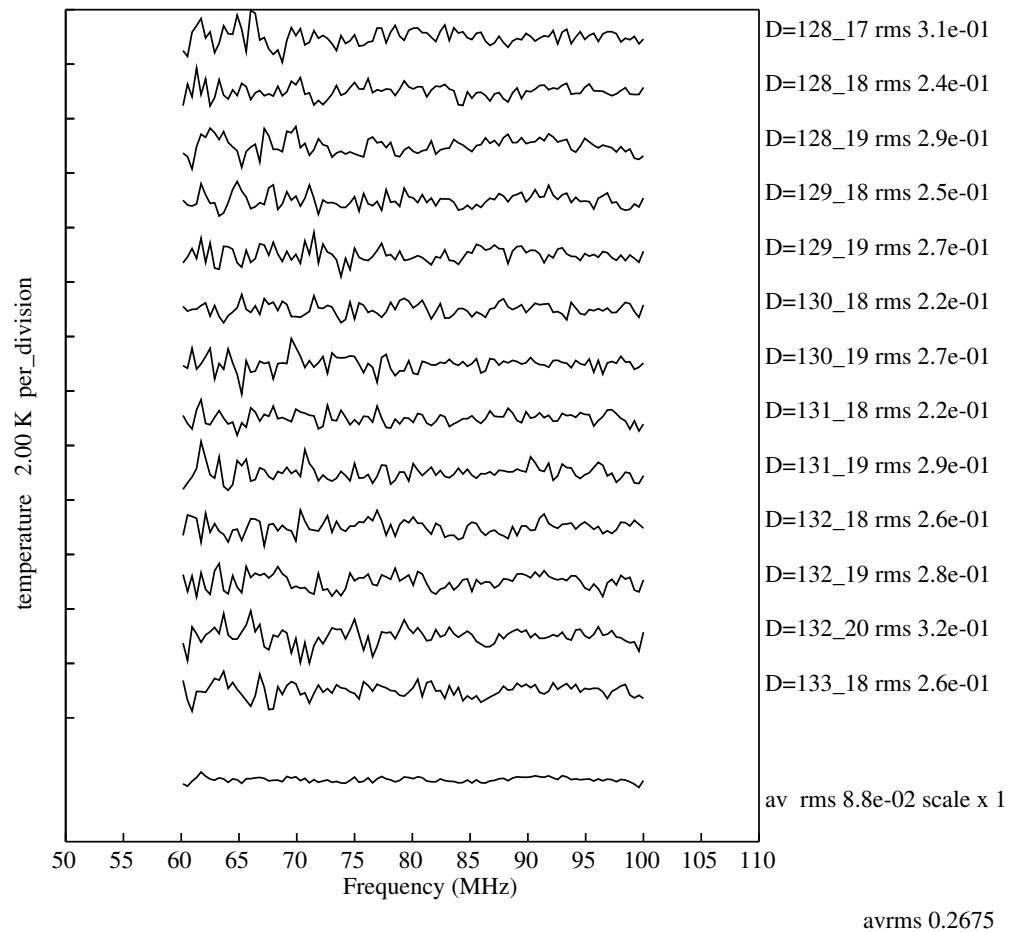
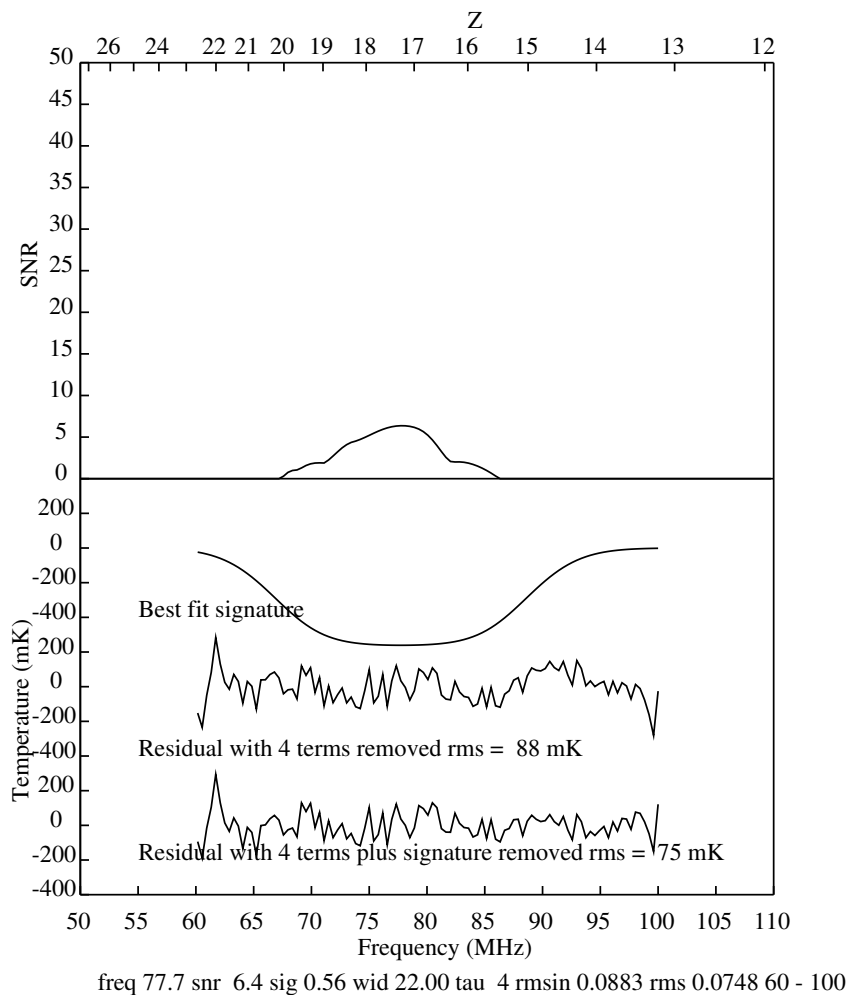
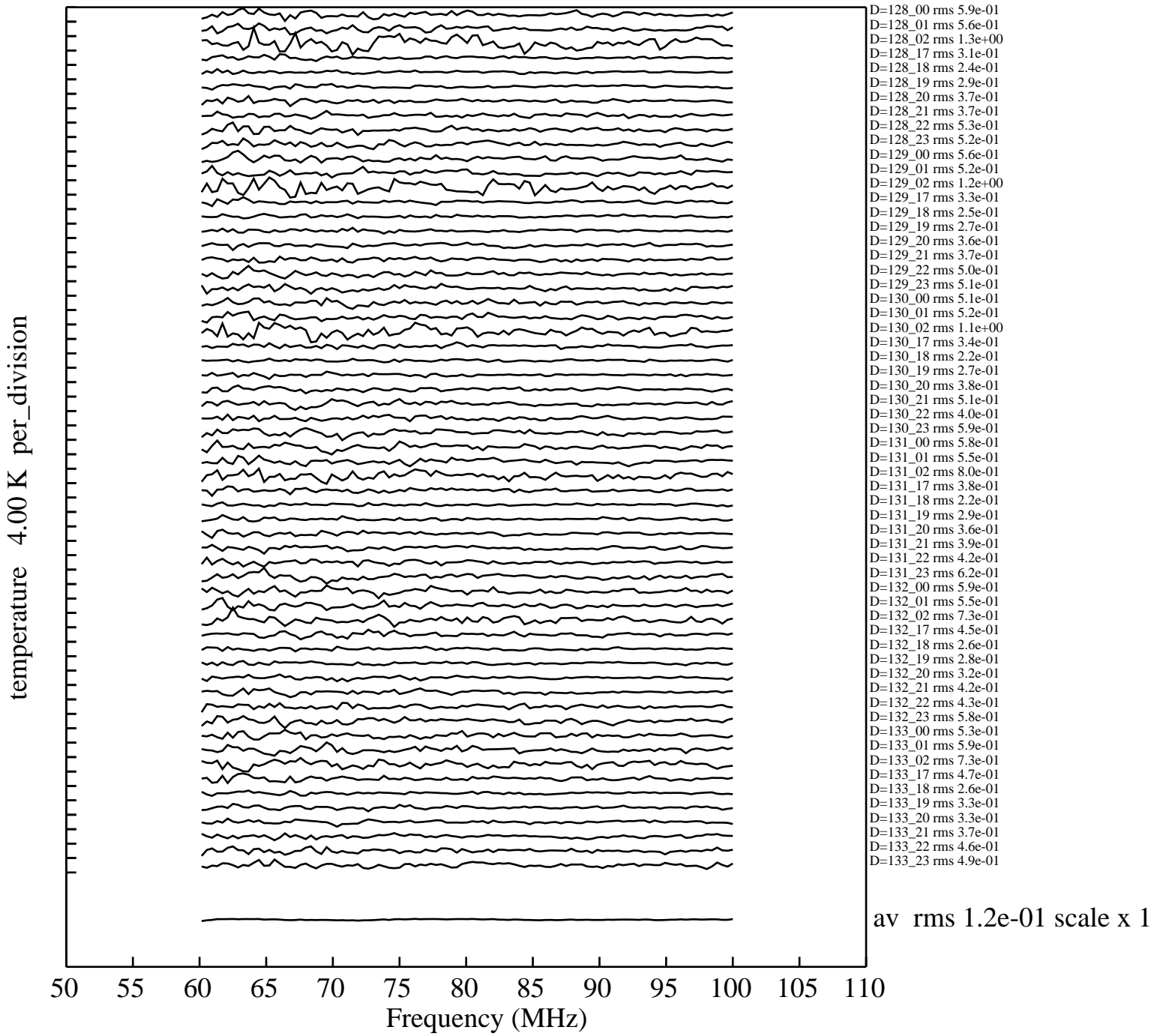


Figure 2. EDGES-3 data at the WA from 2026 day 128 to 133 best fit spectrum on the left and residuals for each accepted one hour block of GHA on the right



avrms 0.4741

Figure 3. Residuals for all one hour blocks of GHA for day 128 to 133 including those above the threshold of 0.32 K.