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July 25, 2025**

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To: EDGES group

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Subject: Analysis of selected days from day 151 to 305 2023 with c-code pipeline

In order to test the new analysis pipeline analysis on EDGES-3 data the following data has been selected for comparison with the c-code pipeline. While EDGES-3 data from 2023 has already been analyzed using the c-coded pipeline with results reported in memos 432 437 438 440 441 442 444 and 445 the choice of days selected for the new analysis pipeline test was only recently made.

Selected days from 2023 EDGES-3 at the WA: 151 154 165 168 171 178 182 188 195 199 205 210 212 218 229 232 235 242 253 256 259 266 270 282 285 288 291 299 302 305

Antenna s11: calibrated each day

c-code: reads1pl

ps = 33

rs = 49.962 before day 277 for temperature 30C

rs = 49.930 after 2023_277 for temperature 35C

edges3 calibration file: specal_316test.txt (cfits 7 wfits 7) 35C 50 – 190 MHz

specals_210opt.txt (cfits 7 wfits 9) 25C 50 – 190 MHz

c-code: reads1pl acqplot edges3

cable corrections for LNA s11: corrcsv s11.csv -cablen 4.26 -cabdiel -1.24 -cabloss -91.5

data processing:

c-code acqplot: 50 – 120 MHz

key parameters: -dgha 0.5 -rfi 2.1 -smooth 8 -sunlim -20 -nrft 2

c-code edges3: 54 – 104 MHz

key parameters: -antaz 269 -nfits 12 -lmode -1 -aloss 0.01 -bfit -12

antenna beam correction file: azelq_box_perf_48_2e-2.txt using Haslam map

GHA range: 06 – 18 hours in one hour blocks

c-code: longav:

key parameters: -lim 0.32 -nfits 5 -fstart 58 -fstop 104 -sig 30 -tau 4

The results are for one hour data blocks without using the -maxrmsf 50 and -maxfm 2000, which exclude 3 position switch cycles, only exclude the frequencies which exceed the -rfi threshold. This allows more of the data to be used which meets the threshold limit applied to each one hour block in the spesum.txt file which contains the one hour blocks from all selected days processed by longav. This filtering is more efficient for a limited number of days. A single limit using -lim 0.32 was applied for each GHA of all days in the results listed in Table 1.

center MHz	SNR	amp K	width MHz	rms1 mK	rms2 mK	Range MHz	calibration file
79.3	26	0.44	20.9	63	22	58 - 104	specal_316test.txt 35C
79.3	23	0.36	20.9	47	20	58 - 104	specals_210opt.txt 25C
78.9	22	0.41	20.9	43	20	60 - 102	specal_316test.txt 35C
79.7	25	0.41	20.9	62	23	58 - 104	max rms 200 2000
79.7	25	0.42	20.9	63	23	58 - 104	sunlim -25
79.7	28	0.47	20.9	77	23	58 - 104	specal_316_6_5.txt
79.7	27	0.48	20.9	83	24	58 - 104	specal_319_6_5.txt

Table 1. 21-cm absorption results with some changes to test the effects of calibration and filtering

The fourth entry is for -maxrmsf 200 and -maxfm 2000 for the first entry which has some effect but only raises the noise a little by reducing the amount of accepted data. Lowering the sun limit from -20 to -25 degrees has a similar effect. The sixth entry in Table 1 is the result of reprocessing the specal_316, which uses 2022 316 for the spectral data and day 319 for the s11 data, replacing cfit = 7 and wfit = 7 with cfit = 6 and wfit = 5. The last entry is using day 319 for both s11 and spectral data. A loss correction using aloss = 0.01 was made for all cases but has a relatively small effect on the results.

Figure 1 shows a plot of the 21-cm absorption for the first entry in table 1.

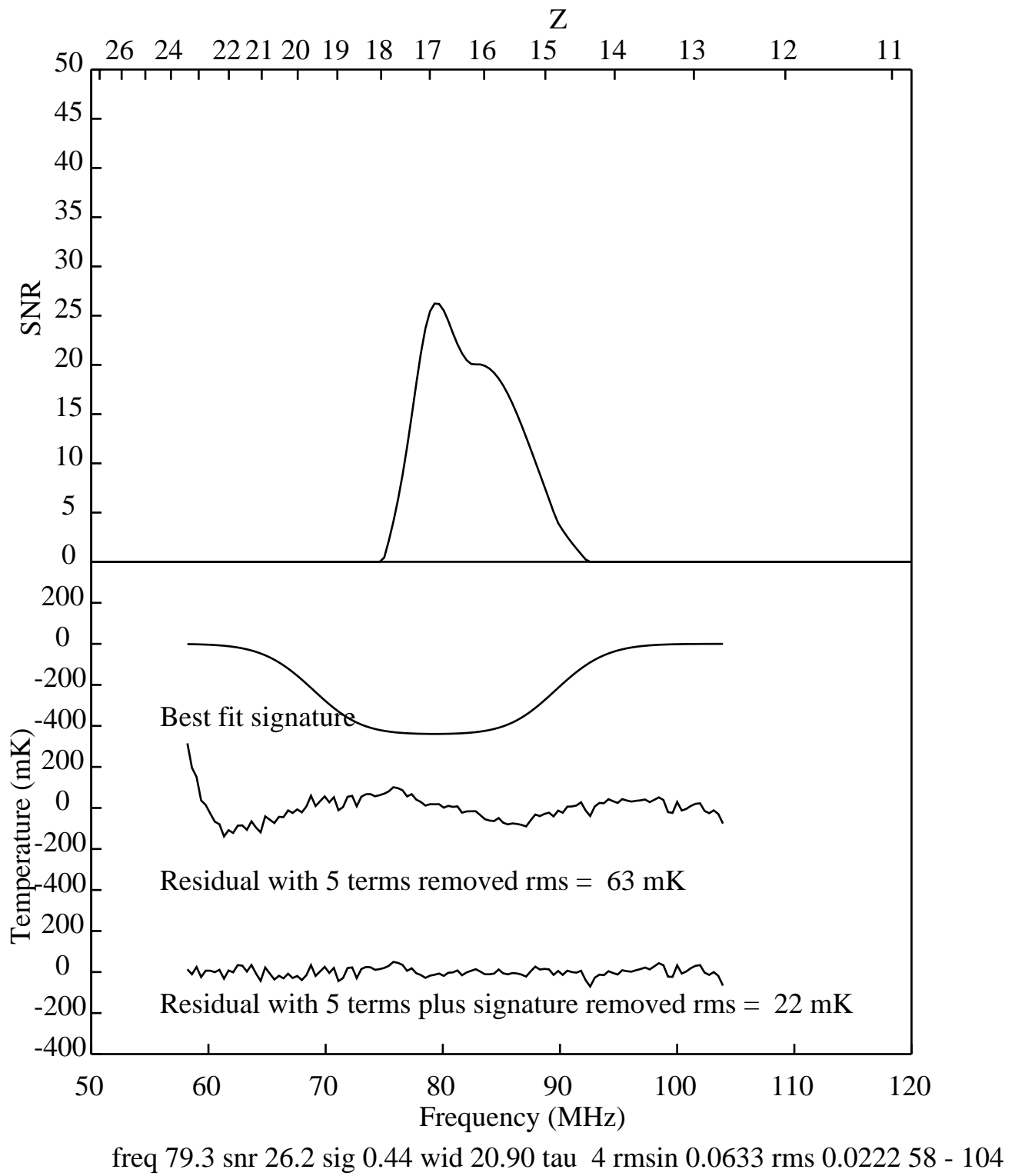


Figure 1 Grid search for global 21-cm spectrum from WA using selected days in 2023.