EDGES MEMO #499

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To: EDGES group

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Subject:: Analysis of selected days 2023 151 to 305 vs GHA

The choices of the c-code parameters "selected days" studied in memo 489 covered GHA 06 to 18 hours. This is extended to cover

GHA (19 20 21 22 23 00 01 02 03 04 05) for "Galaxy UP"
GHA (07 08 09 10 11 12 13 14 15 16 17) for "Galaxy DOWN"

center MHz	SNR	amp K	width MHz	rms 1 mK	rms2 mK	freq range	limit K	GHA	nfit
78.9	9	0.50	20.9	48	39	58-104	0.40	19 - 05	6
79.3	26	0.45	20.9	67	23	58-106	0.32	07 - 17	5
77.7	10	0.49	20.9	41	31	60-98	0.32	19 - 05	6
78.1	12	0.36	20.9	24	18	60-98	0.32	07 - 17	6

Table 1. Results of the grid search for the Galaxy "Up" and "Down" using 1 hour blocks

The plots of a grid search for the 21-cm absorption are shown in the Figure 1 for a frequency range 58 to 104 MHz and a reduced range of 60 to 98 MHz in Figure 2. In both cases 6 loglog polynomial terms were needed for Galaxy "up" data. 6 loglog polynomial terms were used in Figure 1 Galaxy "down" to match the number of terms used for Galaxy "up" result.

RFI filtering of the selected days is accomplished by using the parameters listed in memo 489. A test was made for the effects of using 30 min to 12 hour blocks for gha 07 to 17 in the Table 2 below:

center MHz	SNR	amp K	width MHz	rms 1 mK	rms2 mK	block size	limit K
79.8	24	0.45	20.9	67	26	30 min	0.32
79.3	26	0.44	20.9	63	22	1 hour	0.32
79.3	21	0.38	20.9	57	24	2 hours	0.32
79.7	21	0.41	20.9	63	27	4 hours	0.32
80.1	23	0.38	20.9	57	23	12 hours	0.32

Table 2. Effects of block size grid search sun -20 degrees tau = 4 nfit = 5 frequency 58 -104 MHz

In general the best choice of block size of one hour is long enough to obtain sufficient SNR to filter out broad band RFI that is not filtered out in the initial filtering of the spectra by the c-coded acqplot function.

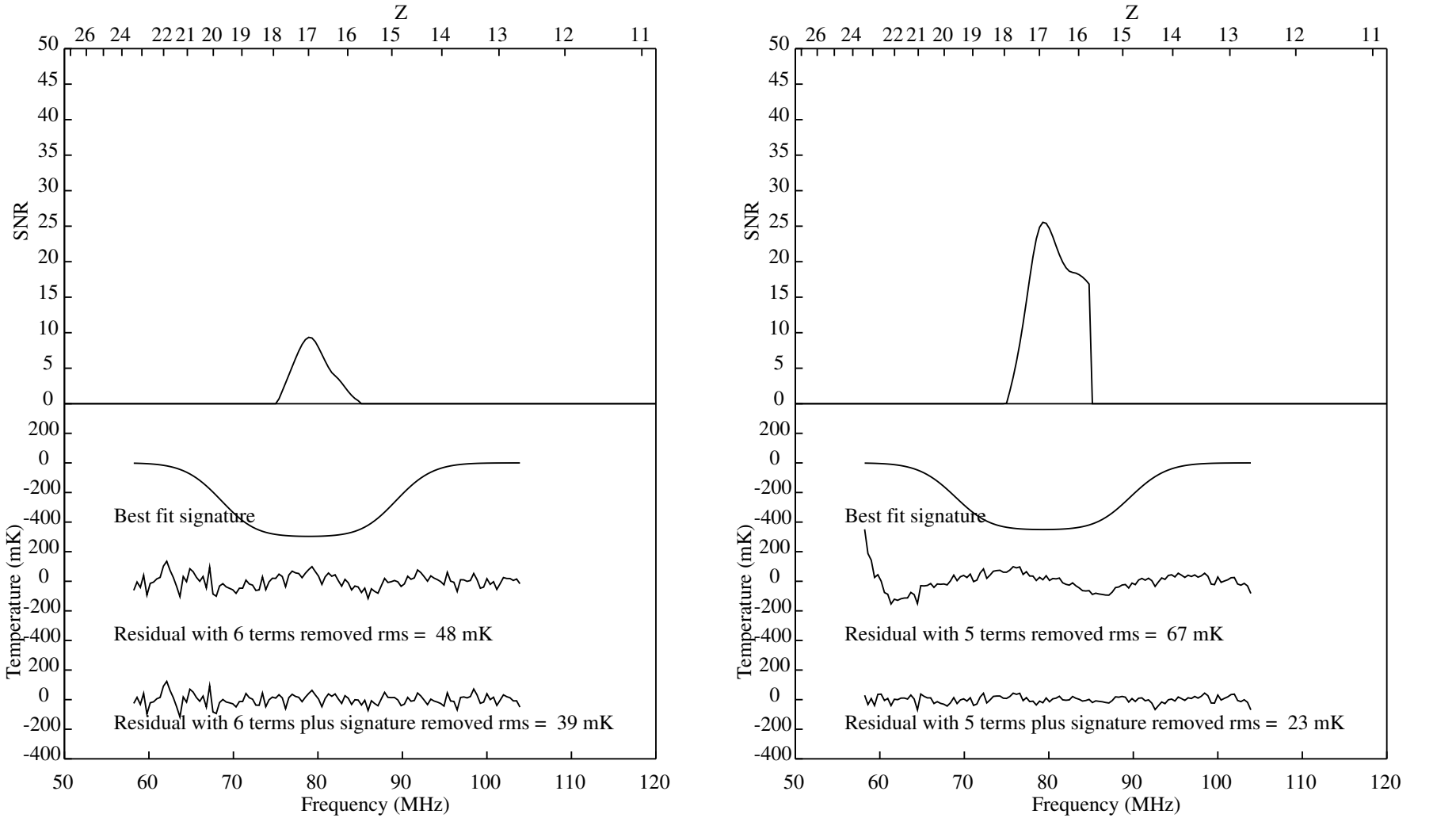
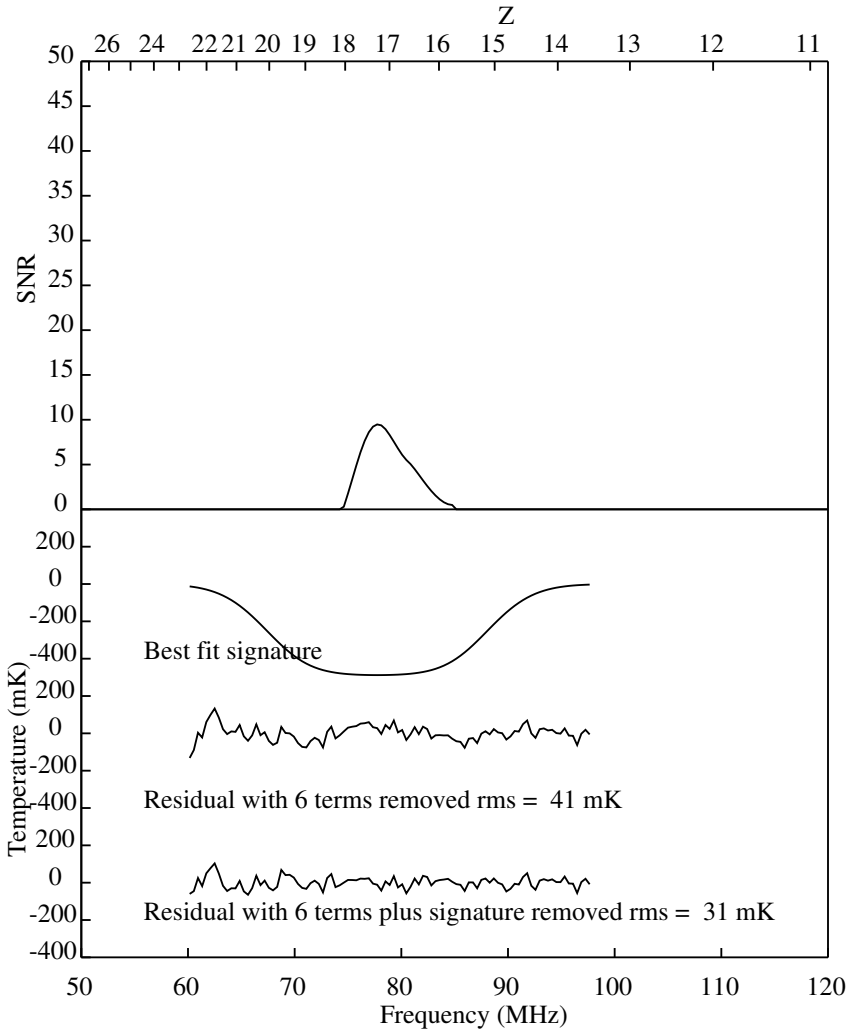


Figure 1. Grid search for 21-cm spectrum for Galaxy “UP” on the left and Galaxy “DOWN” on the right



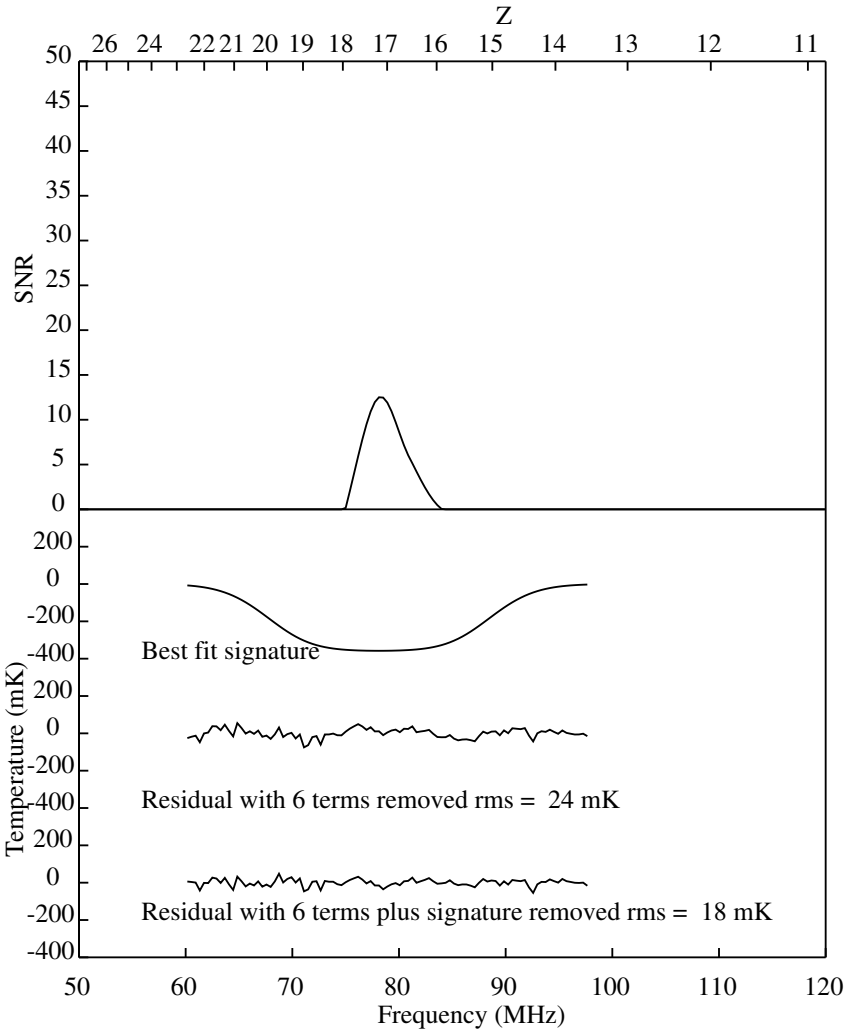


Figure 2. Same as Figure 1 over a reduced frequency range.