EDGES MEMO #339

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Subject: Results of absorption search vs GHA for low1 and low2-45

Signature searches for 4 hour blocks of GHA using Midband data from 2018_146 to 2018_218 and lowband2 from 2017_181 to 2018_036 for a fixed flatness of tau=7 were made in memo 287. In this memo this type of analysis is extended to cover data from lowband2 with antenna oriented at 45 degrees to the ground plane from 2020_055 to 2020_196.

GHA	Center MHz	SNR	Amp K	Width MHz	rms1 mK	rms2 mK	T75 K
00	77.4	15.8	0.63	16.4	97.4	51.6	4128
04	75.0	25.8	0.59	15.7	88.2	31.5	2782
08	76.2	16.7	0.46	17.4	62.4	31.7	1534
12	78.9	14.5	0.40	18.4	40.2	22.6	1723
16	78.5	21.5	0.63	19.9	48.7	20.3	2079
20	76.6	11.9	0.76	21.3	65.8	42.0	3192

Table 1. Signature grid search results for low2-45 5-physical terms removed 56 to 94 MHz.

Data from lowband1 2016_251 to 2017_095 is also analyzed in 4 hour blocks for comparison.

GHA	Center MHz	SNR	Amp K	Width MHz	rms1 mK	rmr2 mK	T75 K
00	79.3	9.7	0.92	22.6	81.1	57.1	4532
04	78.9	16.0	1.05	22.4	76.2	39.4	3086
08	78.1	20.0	0.54	19.4	41.3	17.9	1641
12	78.5	18.2	0.70	19.7	52.4	24.5	1648
16	77.4	16.2	0.78	19.4	65.8	33.7	1999
20	77.7	9.3	0.88	20.2	82.7	59.4	3382

Table 2. Signature grid search results for low1 5-physical terms removed 57 to 93 MHz.

The low2-45 data was processed with Receiver 02_2019_12_10_040_to_200_25C which may have a scale error as the calibration from 2017 gives a T75 ~ 4360 K. Some of the individual results have best fit values differ from the Nature paper by more than errors which cover the center from 77 to 79 width from 17 to 23 MHz and amplitude 0.3 to 1. For example, at GHA = 04 hours low2-45 the best fit is below 77 MHz and the width is below 17 MHz. However, the 4 hour blocks at GHA 00, 04, and 20 have much higher noise and larger contributions from systematic errors than for other GHA.

In summary the results look to be reasonably consistent with the absorption being “global” and coming equally from all the sky seen from the MRO. However, it does not eliminate the possibility that the absorption spectrum comes from a “dip” in a source of broadband RFI at the site or RFI from a synchronous satellite. Figures 1 and 2 show the spectral plots for the grid search results for low2-45 and low1. All results are for fixed flatness of tau = 7 but are not very sensitive to changes in tau over the range from 4 to 12.

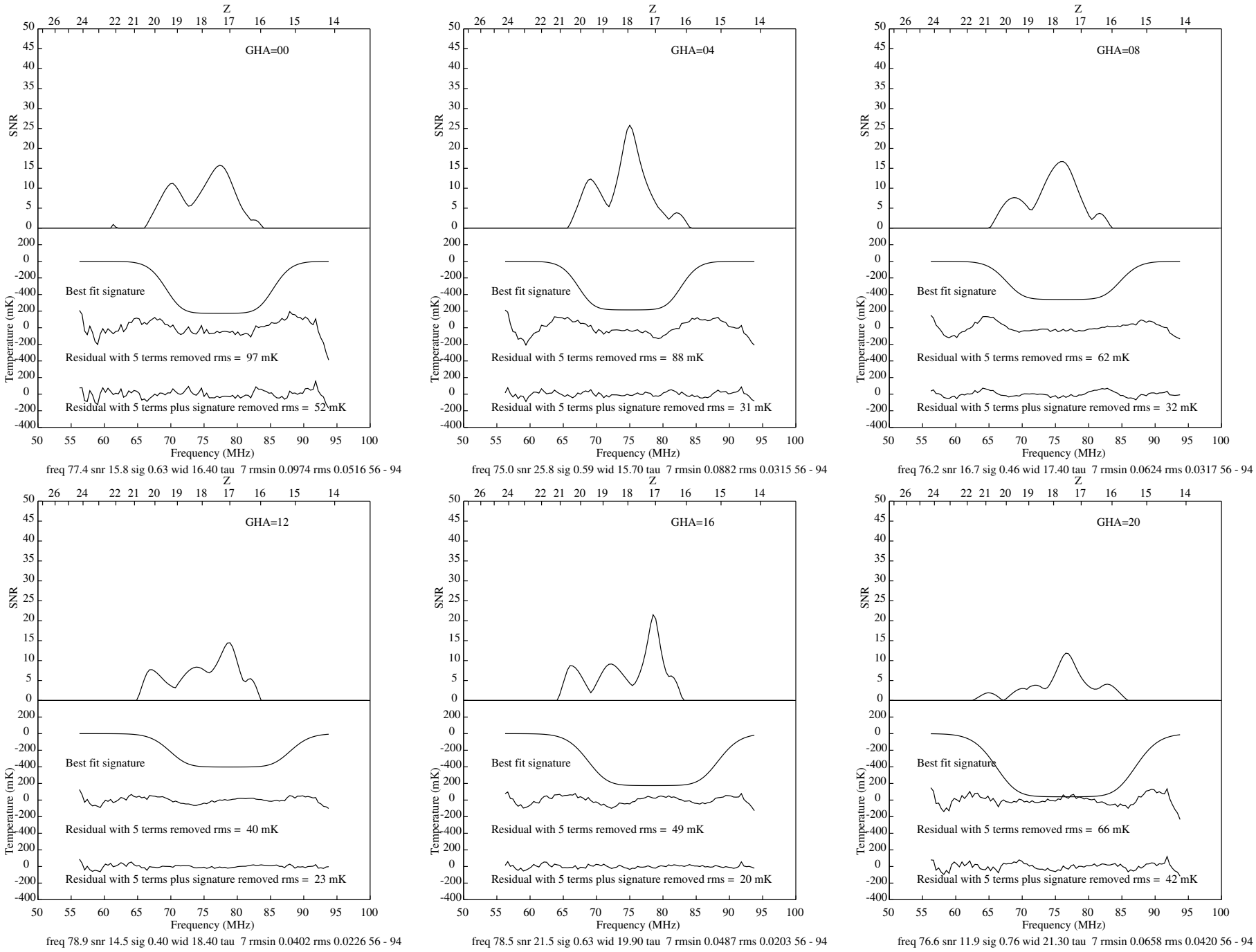

Figure 1. Absorption grid search results for low2-45 for days 2020_055 to 2020_196.

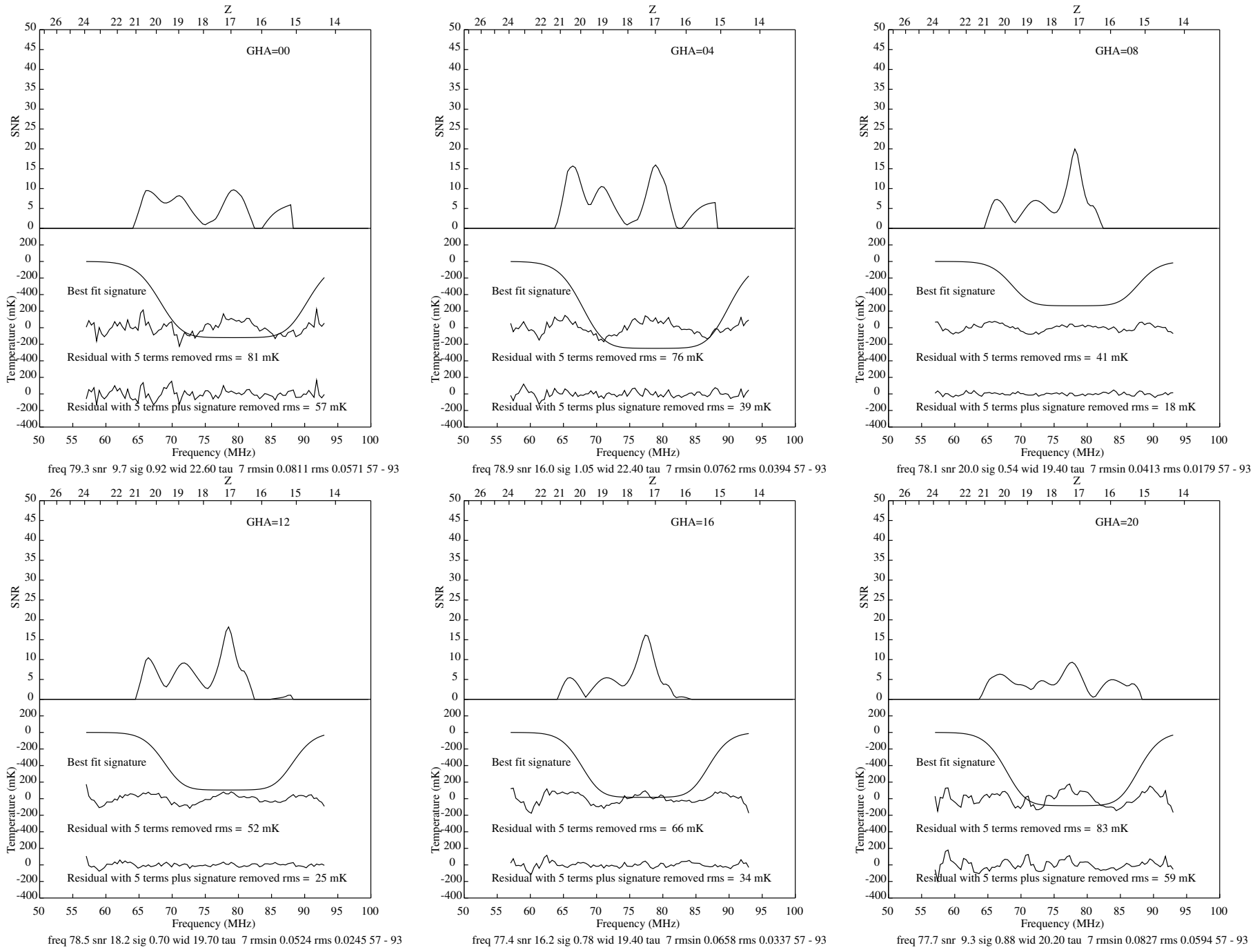

Figure 2. Absorption grid search results for low1 for days 2016_251 to 2017_095.