

# Observing Galaxy Clusters with MUSTANG-2

Charles Romero, Ian Lowe

July 19, 2019

## 1 Introduction

While the SZ signal at 90 GHz is a decrement, and thus the strongest (maximal amplitude) of the SZ signal will be a trough, we refer to it as the peak. We often report the peak as a positive value in  $\mu\text{K}$ , which we take to be  $\mu\text{K}_{mainbeam}$ , which assumes a Rayleigh-Jeans scaling, i.e. the canonical surface brightness temperature used in radio astronomy. At 90 GHz, the conversion between our  $\mu\text{K}$  is given by  $\mu\text{K}_{CMB}/\mu\text{K}_{RJ} = 1.23$ . On average, our main beam subtends a solid angle (i.e. has a "beam volume of") 130 square arcseconds. This corresponds to  $(\mu\text{K}) / (\mu\text{Jy}/\text{beam}) \approx 0.75$ .

## 2 Executive Summary

Here, we aim to give the proposer some simplified guidelines with respect to the technical aspects of a proposal which concerns observing galaxy clusters. We address overall feasibility and which scan pattern(s) may be best for your project. Note that our memo primarily addresses spherical clusters (or structures that can be approximated as such), especially clusters with  $1.0' < \theta_{500} < 4.0'$ . There is certainly room for MUSTANG-2 to observe structures that are outside this characterization, and the information here may help the proposer formulate an initial assessment of feasibility. The MUSTANG-2 team is happy to entertain all potential science with MUSTANG-2 and can assess the technical feasibility of other projects that fall outside of the regime discussed here. We remind the proposer that any MUSTANG-2 proposal must be submitted in cooperation with the MUSTANG-2 team.

Our two most common scan patterns are in fact the same scan pattern with different scanning radii. These scans are Lissajous daisy scans which have radii of 2'.5 and 3'. The scan patterns have different mapping speeds; we usually quantify our mapping speed as the noise (RMS) achieved in the central 2' radially ( $(\sigma_{2'})$ ), as such, our 2'.5 scan performs better by this metric. However, of equal concern is how the signal of interest is filtered. A variety of metrics for signal filtering are tracked over a range of potential cluster observations. We take particular note of the peak SZ signal and an integrated SZ signal (of the filtered map), which we refer to as  $Y_{M2}$ . **On average, noise ( $\sigma_{2'}$ ) in our 2'.5 scan is 85 to 88% the noise in our 3' scan for the same scan duration. Across the clusters simulated here, the significance of the integrated SZ signal  $\chi_{Y_{M2}}$  in our 2'.5 scan is generally > 85% that in our 3' scan. This is very closely matched by the relative noise achieved by scan radius for the same integration time. If the science driver relies primarily on a detection based on the peak signal, we recommend observing with the 2'.5 scan; however, if the science driver relies on inferring pressure**

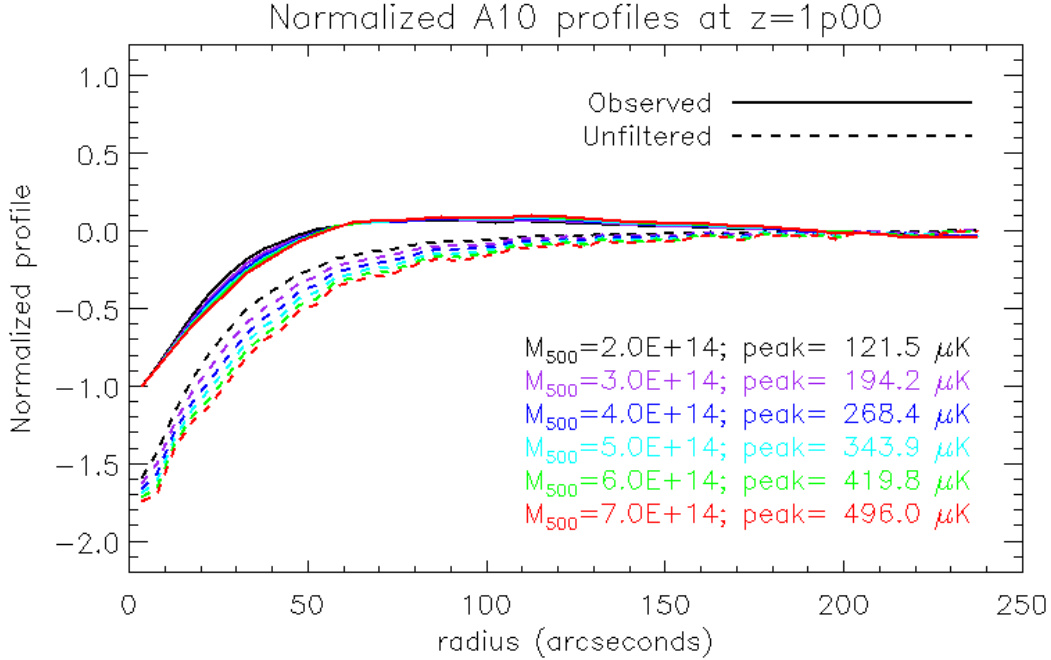


Figure 1: A selection of normalized surface brightness profiles of a range of masses taken at  $z = 1$ . The dashed lines show the profiles before filtering and the solid lines show the profiles after filtering; both profiles are normalized by the peaks of the filtered (observed) profiles. Note that the peaks of the unfiltered profiles are not reported in this figure; however, all unfiltered and filtered peaks are reported in Tables ?? and ??-??, respectively.

**profiles, we recommend observing with the 3' scan.** Of course, these recommendations are only that - recommendations.

Our average mapping speed roughly corresponds to observing at an elevation of  $45^\circ$  with a zenith opacity  $\tau_{z,90} = 0.1$ . For signal,  $S$ , we can scale it as  $S \propto \exp(-\tau_{z,90}/\sin(\text{elev.}))$  and for noise,  $N$ , we can scale as  $N \propto \exp(2 * \tau_{z,90}/\sin(\text{elev.}))$ , our  $S/N$  ratio then behaves as  $S/N \propto \exp(-3\tau_{z,90}/\sin(\text{elev.}))$ .

For PCA with 5 components and a highpass filter at 0.08 Hz, the average mapping speed (noise within 2'- root hour) for all usable scans within a 12-session project has been calculated as  $64.2 \mu\text{K}\cdot\sqrt{\text{hr}}$ . If we subdivide this based on scan radius, we find that the mapping speed of the 2'.5 scans is  $58.2 \mu\text{K}$  and the mapping speed of the 3' scans is  $68.6 \mu\text{K}$ . Thus, for the same integration time, the noise (within the inner 2') of the 2'.5 scans will be **85%** the noise of the 3' scans. The equivalent numbers for PCA with 6 components and a highpass filter at 0.06 Hz are  $56.6 \mu\text{K}$  and  $64.0 \mu\text{K}$  for the 2'.5 and 3' scans, respectively. Thus, their fractional difference is **88%**. **I think these noise numbers are still better-than-average.**

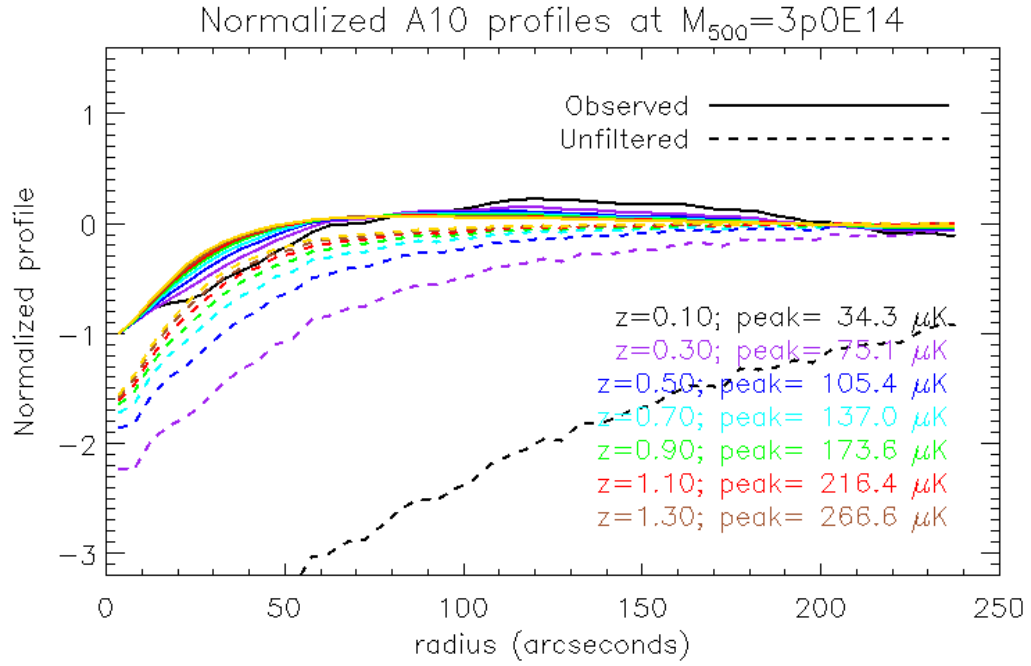


Figure 2: A selection of normalized surface brightness profiles across a range of redshifts for  $M_{500} = 3.0 \times 10^{14} M_{\odot}$ . The dashed lines show the profiles before filtering and the solid lines show the profiles after filtering; both profiles are normalized by the peaks of the filtered (observed) profiles. Note that the peaks of the unfiltered profiles are not reported in this figure; however, all unfiltered and filtered peaks are reported in Tables ?? and ??, respectively.

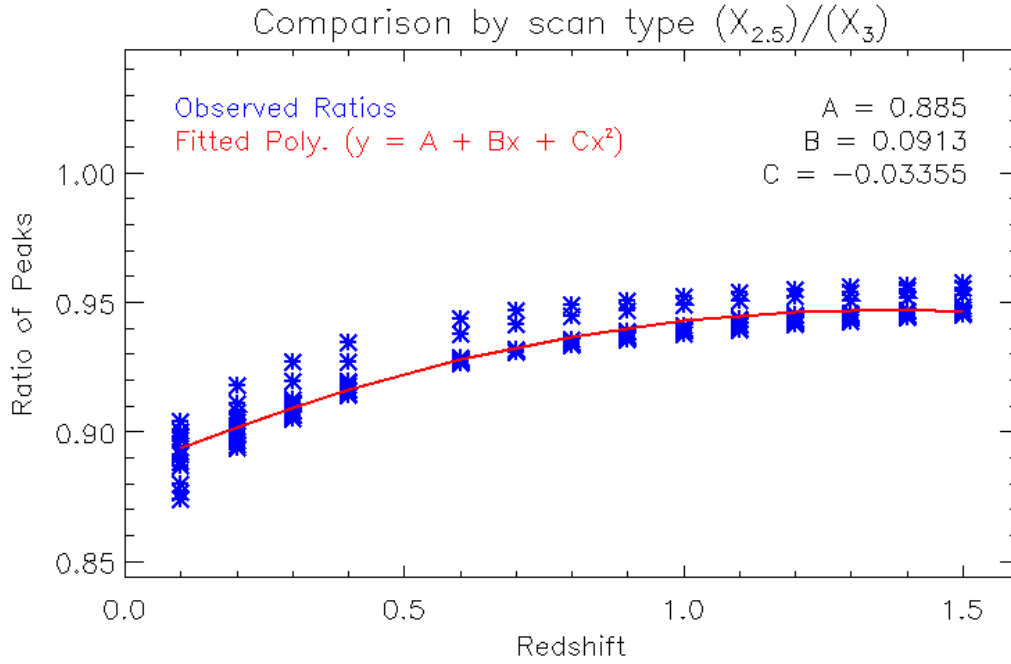


Figure 3: Where cluster detection is a primary concern, the expected peak signal weighs heavily on the overall detection of a cluster. Here, we compare the expected peaks given different scanning patterns (2' radius vs. 3' radius) across a range of redshifts. At each redshift, masses between  $2.0$  and  $7.5 \times 10^{14} M_{\odot}$  are plotted, where the lower mass has a higher ratio (see Figure 7. The specific peak values can be found in Tables ?? and ?? respectively.

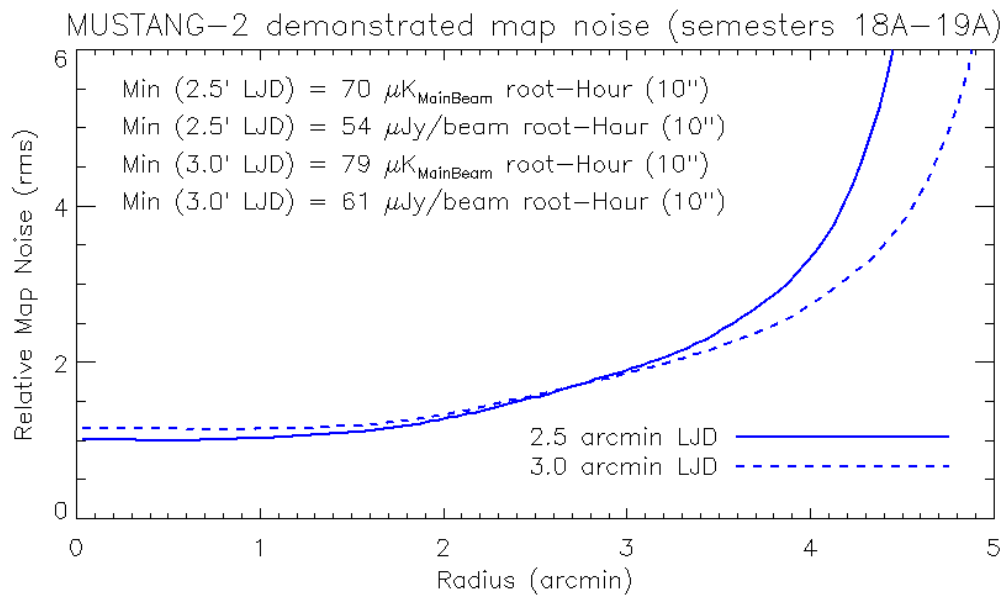


Figure 4: As expected, the 2'.5 radius scan produces lower noise in the central region relative to the 3'.0 radius scan, while the latter performs better at radii beyond 3', especially beyond 4'.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\theta_{500}(\text{arcminutes})$											
0.10	9.86	10.62	11.29	11.88	12.43	12.92	13.38	13.82	14.22	14.61	14.97	15.32
0.20	5.33	5.74	6.10	6.42	6.71	6.98	7.23	7.46	7.68	7.89	8.09	8.27
0.30	3.81	4.10	4.36	4.59	4.80	4.99	5.17	5.34	5.49	5.64	5.78	5.92
0.40	3.04	3.27	3.48	3.66	3.83	3.98	4.12	4.25	4.38	4.50	4.61	4.72
0.50	2.58	2.77	2.95	3.10	3.24	3.37	3.50	3.61	3.71	3.81	3.91	4.00
0.60	2.26	2.43	2.58	2.72	2.84	2.96	3.06	3.16	3.26	3.34	3.43	3.51
0.70	2.03	2.19	2.32	2.44	2.56	2.66	2.75	2.84	2.93	3.00	3.08	3.15
0.80	1.85	2.00	2.12	2.23	2.34	2.43	2.52	2.60	2.67	2.75	2.82	2.88
0.90	1.72	1.85	1.97	2.07	2.17	2.25	2.33	2.41	2.48	2.55	2.61	2.67
1.00	1.61	1.73	1.84	1.94	2.03	2.11	2.19	2.26	2.32	2.39	2.45	2.50
1.10	1.52	1.64	1.74	1.83	1.91	1.99	2.06	2.13	2.19	2.25	2.31	2.36
1.20	1.44	1.55	1.65	1.74	1.81	1.89	1.95	2.02	2.08	2.13	2.19	2.24
1.30	1.37	1.48	1.57	1.65	1.73	1.80	1.86	1.92	1.98	2.03	2.09	2.13
1.40	1.32	1.42	1.51	1.59	1.66	1.72	1.79	1.84	1.90	1.95	2.00	2.04
1.50	1.27	1.37	1.45	1.53	1.60	1.66	1.72	1.78	1.83	1.88	1.92	1.97

Table 1:  $\theta_{500}$ , the angular equivalent of the physical distance  $R_{500}$ .

### 3 Expected Signal

While ascertaining the nature of the intracluster medium (ICM) is a goal of many observing proposals of MUSTANG-2, it is useful to have some canonical starting point. To this end, we adopt that overall universal pressure profile found in [Arnaud et al. \(2010, , hereafter A10\)](#). An obvious caveat to this is that any individual cluster may not be well described by this pressure profile. Moreover, it is expected that at higher redshifts (the A10 sample was at  $z < 0.2$ ), the fraction of disturbed clusters is expected to be higher. This is relevant as the peak pressure is lower for the disturbed subsample ([Arnaud et al., 2010](#)) and hence, the peak SZ signal will be lower for disturbed clusters.

#### 3.1 Intrinsic Astronomical Signal

Before we include filtering effects due to data processing, we first review two fundamental and intrinsic features of clusters as a function of mass ( $M_{500}$ ) and redshift,  $z$ . The first is  $R_{500}$  expressed as an angle, for which we use the term  $\theta_{500}$ ; in Table 1 we express  $\theta_{500}$  in units of arcminutes. The second quantity is the peak SZ signal for MUSTANG-2. Here, we do account for the MUSTANG-2 spectral bandpass and Ruze efficiency of the telescope to determine the proper conversion from Compton  $y$  to  $\mu\text{K}$ . Furthermore, the native Compton  $y$  map is convolved by the canonical MUSTANG-2 beam. However, no filtering which corresponds to data processing is applied to the values presented in Table ??.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Beam-convolved peak( $\mu\text{K}$ )											
0.10	97.7	126.4	156.1	186.6	217.9	249.8	282.3	315.4	349.0	383.2	417.8	452.9
0.20	99.6	129.7	160.7	192.7	225.6	259.2	293.5	328.4	364.0	400.1	436.7	473.9
0.30	105.4	136.0	168.6	202.7	237.7	273.6	310.2	347.6	385.7	424.4	463.7	503.6
0.40	113.0	146.4	180.6	215.7	253.4	292.1	331.7	372.1	413.2	455.0	497.5	540.7
0.50	122.4	159.0	196.6	234.9	273.9	314.9	357.9	401.8	446.6	492.1	538.4	585.4
0.60	133.3	173.6	215.1	257.5	300.7	344.5	388.8	436.2	485.2	535.0	585.6	637.1
0.70	145.9	190.3	236.2	283.3	331.2	379.9	429.3	479.2	529.7	583.9	639.5	695.9
0.80	160.0	209.2	260.1	312.3	365.6	419.8	474.8	530.6	586.9	643.7	701.0	762.1
0.90	175.8	230.3	286.7	344.7	404.0	464.4	525.7	587.9	650.8	714.3	778.5	843.1
1.00	193.3	253.6	316.2	380.5	446.4	513.6	581.9	651.2	721.4	792.3	864.0	936.3
1.10	212.4	279.1	348.3	419.7	492.8	567.4	643.4	720.5	798.6	877.7	957.6	1038.3
1.20	233.2	306.8	383.4	462.3	543.3	626.1	710.3	796.0	882.8	970.8	1059.7	1149.5
1.30	255.8	337.0	421.5	508.7	598.2	689.8	783.2	878.1	974.4	1072.0	1170.7	1270.5
1.40	280.2	369.6	462.7	558.9	657.7	758.9	862.0	967.0	1073.6	1181.6	1291.0	1401.6
1.50	306.7	404.9	507.3	613.2	722.1	833.6	947.4	1063.3	1181.0	1300.4	1421.3	1543.6

Table 2: (Absolute) peak unfiltered value (but convolved with the beam of MUSTANG-2). These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Beam-convolved peak( $\mu\text{K}$ )											
0.10	71.7	92.7	114.4	136.7	159.6	183.0	206.8	231.2	255.9	281.1	306.7	332.6
0.20	75.0	97.3	120.3	144.1	168.5	193.4	218.9	244.8	271.2	298.1	325.4	353.1
0.30	79.8	103.7	128.6	154.2	180.5	207.4	235.0	263.0	291.6	320.6	350.1	380.1
0.40	85.7	111.8	138.8	166.7	195.3	224.6	254.6	285.2	316.3	347.9	380.1	412.7
0.50	93.8	121.4	151.0	181.5	212.9	245.0	277.9	311.4	345.5	380.3	415.5	451.3
0.60	103.3	133.5	164.9	198.5	233.0	268.4	304.6	341.5	379.0	417.3	456.1	495.5
0.70	114.1	147.7	182.2	217.8	255.9	295.0	334.9	375.6	417.0	459.2	502.1	545.5
0.80	126.2	163.7	202.3	241.6	281.6	324.7	368.8	413.8	459.7	506.3	553.6	601.7
0.90	139.7	181.6	224.6	268.6	313.3	358.7	406.7	456.4	507.2	558.7	611.1	664.3
1.00	154.6	201.3	249.3	298.5	348.5	399.3	450.7	503.5	559.6	616.6	674.6	733.4
1.10	171.0	222.9	276.4	331.2	387.0	443.8	501.3	559.5	618.2	679.9	744.0	809.0
1.20	188.8	246.4	305.9	366.8	429.0	492.3	556.5	621.5	687.1	753.4	820.2	891.4
1.30	208.1	272.0	337.9	405.6	474.8	545.1	616.6	689.0	762.2	836.1	910.7	985.9
1.40	229.1	299.7	372.7	447.7	524.3	602.4	681.8	762.2	843.6	925.8	1008.8	1092.6
1.50	251.8	329.7	410.3	493.2	578.0	664.5	752.4	841.5	931.8	1023.0	1115.2	1208.2

Table 3: (Absolute) peak unfiltered value (but convolved with the beam of MUSTANG-2). These values apply for the disturbed A10 pressure profile.



### 3.2 Simulated Observations, AKA Filtered Signal

Of more interest to the MUSTANG-2 observer is what signal we should expect to recover from a MUSTANG-2 observation of the proposed cluster. Again, we assume a spherical cluster with an A10 pressure profile, which may not correspond to the pressure profile of the proposed cluster. The following plots and tables in this section are all computed in a homogeneous manner. **A word of caution, the simulations performed with PCA6 and a high pass at 0.06 Hz have produced spurious results for most of the clusters run at  $z = 0.5$ . The remainder of the results are unaffected.**

#### 3.2.1 Transfer Functions

At scales less than an arcminute, the transfer function of both scans and both data processing parameter sets is close to unity. However, the primary differences in the transfer functions will occur beyond this arcminute, and should be more notable towards and even beyond the field of view ( $4'.2$ ). While the filtered maps are well produced in our simulations (with the exception of the scans at  $z = 0.5$  mentioned above), the lack of data points at low  $k$  mean that these values have some uncertainty due to low-N sampling. Yet, the numbers appear quite sufficient for use in comparing between scan type and data processing.

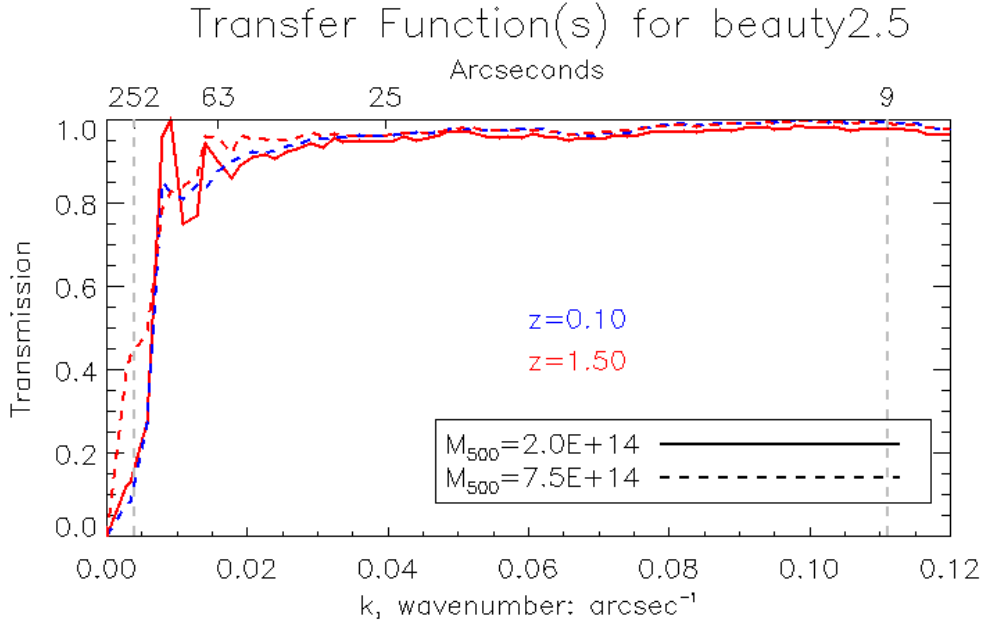


Figure 5: The transfer function for our  $2'.5$  scan reduced with fairly standard reduction parameters: 5 PCA components and a high-pass on our timestreams at a frequency of 0.08 Hz. Shown here are only the extreme cases of the mass and redshift:  $M_{500} = (2.0, 7.0) \times 10^{14} M_{\odot}$  and  $z = (0.5, 1.5)$ .

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $\theta_{500}$											
0.10	0.07	0.06	0.06	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03
0.20	0.22	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11
0.30	0.33	0.31	0.30	0.28	0.26	0.25	0.24	0.23	0.22	0.21	0.21	0.20
0.40	0.42	0.40	0.38	0.36	0.34	0.33	0.32	0.30	0.29	0.28	0.28	0.27
0.50	0.56	0.49	0.43	0.41	0.40	0.38	0.37	0.36	0.35	0.34	0.33	0.33
0.60	0.70	0.63	0.56	0.51	0.46	0.43	0.42	0.41	0.40	0.39	0.38	0.37
0.70	0.79	0.74	0.68	0.62	0.57	0.53	0.50	0.46	0.43	0.42	0.41	0.41
0.80	0.81	0.80	0.78	0.72	0.67	0.63	0.59	0.56	0.53	0.50	0.47	0.45
0.90	0.82	0.82	0.81	0.79	0.75	0.71	0.67	0.64	0.61	0.58	0.55	0.53
1.00	0.83	0.83	0.82	0.81	0.80	0.78	0.74	0.71	0.68	0.65	0.62	0.60
1.10	0.84	0.84	0.83	0.83	0.81	0.80	0.79	0.77	0.74	0.71	0.69	0.66
1.20	0.85	0.84	0.84	0.83	0.82	0.81	0.80	0.80	0.79	0.77	0.75	0.72
1.30	0.86	0.85	0.84	0.83	0.83	0.82	0.82	0.81	0.80	0.80	0.79	0.77
1.40	0.87	0.86	0.85	0.84	0.83	0.83	0.82	0.82	0.81	0.81	0.80	0.80
1.50	0.89	0.86	0.85	0.84	0.84	0.83	0.83	0.83	0.82	0.82	0.81	0.81

Table 4: Transmission at scales of  $\theta_{500}$ . These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $\theta_{500}$											
0.10	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03
0.20	0.21	0.21	0.19	0.18	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11
0.30	0.34	0.32	0.30	0.28	0.26	0.24	0.24	0.23	0.23	0.22	0.22	0.21
0.40	0.43	0.42	0.40	0.39	0.37	0.35	0.33	0.32	0.31	0.29	0.28	0.27
0.50	0.56	0.52	0.48	0.46	0.44	0.42	0.41	0.40	0.38	0.37	0.36	0.35
0.60	0.68	0.65	0.60	0.56	0.52	0.48	0.47	0.46	0.44	0.43	0.42	0.41
0.70	0.76	0.75	0.70	0.66	0.63	0.58	0.55	0.52	0.49	0.48	0.47	0.46
0.80	0.78	0.80	0.79	0.75	0.72	0.67	0.64	0.61	0.58	0.56	0.53	0.51
0.90	0.79	0.83	0.82	0.82	0.79	0.74	0.72	0.69	0.66	0.63	0.61	0.59
1.00	0.80	0.83	0.84	0.83	0.83	0.81	0.78	0.75	0.73	0.70	0.68	0.65
1.10	0.81	0.84	0.84	0.85	0.85	0.83	0.83	0.81	0.78	0.76	0.74	0.71
1.20	0.81	0.85	0.85	0.85	0.86	0.85	0.84	0.83	0.83	0.81	0.79	0.77
1.30	0.81	0.85	0.86	0.86	0.86	0.86	0.85	0.85	0.84	0.84	0.83	0.81
1.40	0.82	0.86	0.87	0.87	0.87	0.87	0.86	0.86	0.85	0.85	0.84	0.83
1.50	0.82	0.86	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.85	0.84

Table 5: Transmission at scales of  $\theta_{500}$ . These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $\theta_{500}$											
0.10	0.09	0.07	0.07	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04
0.20	0.27	0.26	0.24	0.22	0.20	0.19	0.17	0.16	0.15	0.15	0.14	0.13
0.30	0.42	0.39	0.36	0.34	0.32	0.30	0.30	0.29	0.28	0.28	0.27	0.26
0.40	0.54	0.50	0.47	0.45	0.43	0.41	0.39	0.38	0.36	0.35	0.34	0.33
0.50	0.68	0.61	0.55	0.53	0.51	0.49	0.47	0.46	0.44	0.43	0.42	0.41
0.60	0.81	0.74	0.68	0.63	0.58	0.55	0.53	0.52	0.51	0.49	0.48	0.47
0.70	0.89	0.84	0.79	0.74	0.69	0.65	0.62	0.58	0.56	0.54	0.53	0.52
0.80	0.90	0.89	0.87	0.82	0.78	0.74	0.71	0.68	0.65	0.62	0.59	0.57
0.90	0.89	0.90	0.89	0.89	0.85	0.82	0.78	0.75	0.72	0.69	0.67	0.65
1.00	0.89	0.89	0.90	0.89	0.89	0.88	0.85	0.82	0.79	0.76	0.74	0.71
1.10	0.89	0.89	0.89	0.90	0.89	0.89	0.89	0.87	0.84	0.82	0.79	0.77
1.20	0.89	0.89	0.89	0.89	0.90	0.90	0.89	0.89	0.89	0.87	0.85	0.82
1.30	0.89	0.89	0.89	0.89	0.89	0.90	0.90	0.89	0.89	0.89	0.88	0.87
1.40	0.90	0.89	0.89	0.89	0.89	0.89	0.90	0.90	0.90	0.89	0.89	0.89
1.50	0.91	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.90	0.90	0.89	0.89

Table 6: Transmission at scales of  $\theta_{500}$ . These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $\theta_{500}$											
0.10	0.08	0.07	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04
0.20	0.26	0.26	0.23	0.21	0.20	0.18	0.17	0.16	0.15	0.14	0.14	0.13
0.30	0.43	0.39	0.36	0.34	0.31	0.29	0.28	0.28	0.27	0.27	0.26	0.25
0.40	0.57	0.53	0.50	0.47	0.44	0.42	0.40	0.38	0.36	0.35	0.33	0.32
0.50	0.71	0.64	0.59	0.56	0.53	0.51	0.49	0.48	0.46	0.44	0.43	0.42
0.60	0.83	0.77	0.71	0.66	0.62	0.59	0.57	0.55	0.53	0.52	0.50	0.49
0.70	0.91	0.87	0.81	0.76	0.72	0.68	0.65	0.62	0.59	0.58	0.56	0.55
0.80	0.92	0.91	0.90	0.85	0.81	0.77	0.74	0.71	0.68	0.65	0.63	0.61
0.90	0.92	0.92	0.92	0.91	0.88	0.84	0.81	0.78	0.75	0.72	0.70	0.68
1.00	0.91	0.92	0.93	0.92	0.91	0.90	0.87	0.84	0.81	0.79	0.76	0.74
1.10	0.91	0.92	0.92	0.93	0.92	0.91	0.91	0.89	0.87	0.84	0.82	0.80
1.20	0.91	0.92	0.92	0.92	0.93	0.92	0.92	0.91	0.91	0.89	0.87	0.85
1.30	0.91	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.91	0.91	0.91	0.89
1.40	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.92	0.92	0.91	0.91
1.50	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92

Table 7: Transmission at scales of  $\theta_{500}$ . These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $2\theta_{500}$											
0.10	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
0.20	0.11	0.10	0.09	0.09	0.08	0.07	0.07	0.06	0.06	0.06	0.05	0.05
0.30	0.21	0.19	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.11	0.10	0.10
0.40	0.31	0.27	0.25	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.16	0.15
0.50	0.38	0.35	0.32	0.30	0.28	0.26	0.25	0.24	0.23	0.22	0.21	0.20
0.60	0.42	0.40	0.37	0.35	0.34	0.32	0.31	0.29	0.28	0.27	0.26	0.25
0.70	0.44	0.43	0.41	0.40	0.38	0.36	0.35	0.34	0.33	0.32	0.31	0.29
0.80	0.47	0.45	0.43	0.42	0.41	0.40	0.39	0.37	0.36	0.35	0.34	0.34
0.90	0.49	0.47	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36
1.00	0.50	0.48	0.47	0.46	0.44	0.44	0.43	0.42	0.41	0.40	0.40	0.39
1.10	0.51	0.50	0.48	0.47	0.46	0.45	0.44	0.43	0.43	0.42	0.41	0.40
1.20	0.53	0.51	0.50	0.48	0.47	0.46	0.46	0.45	0.44	0.43	0.43	0.42
1.30	0.57	0.52	0.51	0.49	0.48	0.47	0.47	0.46	0.45	0.45	0.44	0.43
1.40	0.60	0.55	0.52	0.50	0.49	0.48	0.48	0.47	0.46	0.46	0.45	0.44
1.50	0.63	0.57	0.53	0.51	0.50	0.49	0.49	0.48	0.47	0.46	0.46	0.45

Table 8: Transmission at scales of  $2\theta_{500}$ . This is more relevant to the actual recovery of signal at  $\theta = \theta_{500}$ . These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $2\theta_{500}$											
0.10	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
0.20	0.11	0.11	0.10	0.09	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05
0.30	0.21	0.19	0.18	0.16	0.15	0.14	0.13	0.13	0.12	0.11	0.11	0.10
0.40	0.30	0.28	0.26	0.24	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.16
0.50	0.35	0.35	0.33	0.31	0.29	0.27	0.26	0.25	0.24	0.23	0.22	0.21
0.60	0.39	0.39	0.37	0.36	0.35	0.34	0.32	0.31	0.29	0.28	0.27	0.26
0.70	0.43	0.43	0.41	0.40	0.39	0.37	0.36	0.36	0.35	0.34	0.32	0.31
0.80	0.45	0.46	0.44	0.43	0.42	0.40	0.39	0.38	0.38	0.37	0.36	0.36
0.90	0.48	0.48	0.47	0.46	0.44	0.43	0.42	0.41	0.40	0.39	0.39	0.38
1.00	0.50	0.50	0.49	0.48	0.47	0.45	0.44	0.43	0.42	0.41	0.41	0.40
1.10	0.52	0.52	0.51	0.50	0.49	0.47	0.46	0.45	0.44	0.44	0.43	0.42
1.20	0.54	0.54	0.53	0.52	0.51	0.50	0.48	0.47	0.46	0.45	0.45	0.44
1.30	0.57	0.55	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.46
1.40	0.59	0.58	0.56	0.55	0.54	0.53	0.51	0.50	0.49	0.49	0.48	0.47
1.50	0.62	0.60	0.57	0.56	0.55	0.54	0.52	0.51	0.51	0.50	0.49	0.48

Table 9: Transmission at scales of  $2\theta_{500}$ . This is more relevant to the actual recovery of signal at  $\theta = \theta_{500}$ . These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $2\theta_{500}$											
0.10	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
0.20	0.15	0.13	0.12	0.11	0.10	0.09	0.09	0.08	0.08	0.07	0.07	0.07
0.30	0.27	0.24	0.22	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.14	0.13
0.40	0.40	0.36	0.32	0.30	0.28	0.26	0.25	0.23	0.22	0.21	0.20	0.20
0.50	0.45	0.44	0.42	0.39	0.36	0.34	0.32	0.31	0.29	0.28	0.27	0.26
0.60	0.50	0.47	0.45	0.44	0.43	0.42	0.40	0.38	0.36	0.35	0.33	0.32
0.70	0.53	0.51	0.49	0.47	0.46	0.45	0.44	0.43	0.43	0.41	0.39	0.38
0.80	0.56	0.54	0.52	0.50	0.49	0.47	0.46	0.45	0.45	0.44	0.44	0.43
0.90	0.59	0.57	0.55	0.53	0.51	0.50	0.49	0.48	0.46	0.46	0.45	0.45
1.00	0.61	0.59	0.57	0.55	0.54	0.52	0.51	0.50	0.49	0.48	0.47	0.46
1.10	0.63	0.61	0.59	0.57	0.56	0.54	0.53	0.52	0.51	0.50	0.49	0.48
1.20	0.65	0.62	0.60	0.59	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50
1.30	0.68	0.64	0.62	0.60	0.59	0.58	0.57	0.55	0.54	0.54	0.53	0.52
1.40	0.71	0.66	0.63	0.62	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53
1.50	0.74	0.69	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.55

Table 10: Transmission at scales of  $2\theta_{500}$ . This is more relevant to the actual recovery of signal at  $\theta = \theta_{500}$ . These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.



$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $2\theta_{500}$											
0.10	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
0.20	0.15	0.13	0.12	0.11	0.10	0.09	0.09	0.08	0.08	0.07	0.07	0.07
0.30	0.27	0.24	0.22	0.20	0.19	0.17	0.16	0.16	0.15	0.14	0.13	0.13
0.40	0.39	0.35	0.32	0.30	0.28	0.26	0.24	0.23	0.22	0.21	0.20	0.19
0.50	0.45	0.43	0.42	0.39	0.36	0.34	0.32	0.30	0.29	0.28	0.27	0.26
0.60	0.50	0.47	0.45	0.44	0.43	0.42	0.39	0.38	0.36	0.34	0.33	0.32
0.70	0.55	0.52	0.49	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.39	0.38
0.80	0.58	0.55	0.53	0.51	0.49	0.47	0.46	0.45	0.45	0.44	0.44	0.43
0.90	0.61	0.58	0.56	0.54	0.52	0.51	0.49	0.48	0.46	0.46	0.45	0.45
1.00	0.63	0.61	0.59	0.57	0.55	0.53	0.52	0.50	0.49	0.48	0.47	0.46
1.10	0.66	0.63	0.61	0.59	0.57	0.56	0.54	0.53	0.52	0.51	0.50	0.49
1.20	0.68	0.65	0.63	0.61	0.59	0.58	0.56	0.55	0.54	0.53	0.52	0.51
1.30	0.71	0.67	0.65	0.63	0.61	0.60	0.58	0.57	0.56	0.55	0.54	0.53
1.40	0.74	0.69	0.66	0.65	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55
1.50	0.76	0.72	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56

Table 11: Transmission at scales of  $2\theta_{500}$ . This is more relevant to the actual recovery of signal at  $\theta = \theta_{500}$ . These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $\theta_{500}$											
0.10	0.05	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
0.20	0.17	0.15	0.14	0.12	0.11	0.10	0.09	0.09	0.08	0.08	0.07	0.07
0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.15
0.40	0.36	0.35	0.33	0.31	0.29	0.27	0.26	0.25	0.24	0.23	0.22	0.21
0.50	0.53	0.45	0.39	0.37	0.35	0.34	0.32	0.31	0.30	0.29	0.28	0.27
0.60	0.69	0.61	0.54	0.47	0.42	0.38	0.37	0.36	0.35	0.34	0.33	0.32
0.70	0.79	0.74	0.67	0.61	0.55	0.50	0.46	0.42	0.39	0.38	0.37	0.36
0.80	0.82	0.80	0.78	0.72	0.66	0.61	0.57	0.53	0.50	0.46	0.43	0.40
0.90	0.82	0.82	0.81	0.79	0.75	0.70	0.66	0.62	0.59	0.56	0.53	0.50
1.00	0.83	0.83	0.83	0.81	0.80	0.78	0.74	0.70	0.67	0.64	0.61	0.58
1.10	0.84	0.83	0.83	0.83	0.82	0.80	0.79	0.77	0.74	0.71	0.68	0.65
1.20	0.85	0.84	0.83	0.83	0.83	0.82	0.81	0.80	0.79	0.77	0.74	0.72
1.30	0.85	0.85	0.84	0.83	0.83	0.83	0.82	0.81	0.81	0.80	0.79	0.77
1.40	0.86	0.85	0.84	0.84	0.83	0.83	0.83	0.83	0.82	0.81	0.81	0.80
1.50	0.89	0.86	0.85	0.84	0.83	0.83	0.83	0.83	0.83	0.82	0.82	0.81

Table 12: Transmission at scales of  $\theta_{500}$ . These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $\theta_{500}$											
0.10	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
0.20	0.15	0.15	0.13	0.12	0.11	0.10	0.09	0.09	0.08	0.08	0.07	0.07
0.30	0.29	0.27	0.24	0.22	0.20	0.18	0.17	0.17	0.16	0.16	0.15	0.15
0.40	0.39	0.38	0.35	0.33	0.31	0.29	0.27	0.26	0.24	0.23	0.22	0.21
0.50	0.54	0.49	0.44	0.42	0.40	0.37	0.36	0.34	0.33	0.32	0.31	0.29
0.60	0.68	0.64	0.58	0.53	0.48	0.44	0.42	0.41	0.40	0.39	0.37	0.36
0.70	0.76	0.75	0.70	0.65	0.60	0.55	0.52	0.48	0.45	0.44	0.43	0.42
0.80	0.79	0.81	0.79	0.75	0.71	0.66	0.62	0.59	0.56	0.53	0.50	0.47
0.90	0.79	0.83	0.82	0.82	0.79	0.74	0.71	0.67	0.64	0.61	0.59	0.56
1.00	0.80	0.83	0.84	0.84	0.83	0.81	0.78	0.75	0.72	0.69	0.66	0.64
1.10	0.80	0.84	0.84	0.85	0.85	0.83	0.83	0.81	0.78	0.76	0.73	0.70
1.20	0.81	0.85	0.85	0.86	0.86	0.86	0.84	0.84	0.83	0.81	0.79	0.76
1.30	0.81	0.85	0.86	0.86	0.86	0.87	0.85	0.85	0.84	0.84	0.83	0.81
1.40	0.81	0.85	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.85	0.84	0.84
1.50	0.82	0.86	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.86	0.85	0.85

Table 13: Transmission at scales of  $\theta_{500}$ . These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $\theta_{500}$											
0.10	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03
0.20	0.20	0.19	0.17	0.15	0.14	0.13	0.12	0.11	0.11	0.10	0.10	0.09
0.30	0.36	0.33	0.30	0.27	0.24	0.22	0.22	0.21	0.20	0.20	0.20	0.19
0.40	0.48	0.44	0.42	0.40	0.37	0.35	0.33	0.31	0.30	0.28	0.27	0.26
0.50	0.66	0.57	0.50	0.48	0.46	0.44	0.42	0.40	0.39	0.37	0.36	0.35
0.60	0.82	0.73	0.66	0.60	0.54	0.51	0.49	0.47	0.46	0.44	0.43	0.42
0.70	0.90	0.85	0.78	0.73	0.67	0.63	0.58	0.55	0.51	0.50	0.49	0.47
0.80	0.91	0.90	0.88	0.83	0.78	0.73	0.69	0.65	0.62	0.59	0.56	0.53
0.90	0.89	0.91	0.90	0.90	0.86	0.82	0.78	0.74	0.71	0.68	0.65	0.62
1.00	0.88	0.90	0.91	0.90	0.90	0.89	0.85	0.82	0.78	0.75	0.73	0.70
1.10	0.88	0.89	0.90	0.91	0.90	0.90	0.90	0.88	0.85	0.82	0.79	0.76
1.20	0.88	0.88	0.89	0.90	0.91	0.91	0.90	0.90	0.90	0.88	0.85	0.82
1.30	0.89	0.88	0.88	0.89	0.90	0.90	0.91	0.90	0.90	0.90	0.89	0.88
1.40	0.89	0.89	0.88	0.88	0.89	0.90	0.90	0.91	0.91	0.90	0.90	0.90
1.50	0.91	0.89	0.88	0.88	0.88	0.89	0.90	0.90	0.91	0.91	0.90	0.90

Table 14: Transmission at scales of  $\theta_{500}$ . These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $\theta_{500}$											
0.10	0.06	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02
0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.10	0.09	0.09
0.30	0.37	0.33	0.29	0.26	0.23	0.21	0.21	0.20	0.20	0.20	0.19	0.19
0.40	0.51	0.48	0.44	0.41	0.38	0.36	0.34	0.31	0.30	0.28	0.26	0.25
0.50	0.68	0.61	0.55	0.51	0.49	0.46	0.44	0.42	0.40	0.39	0.37	0.36
0.60	0.83	0.76	0.69	0.63	0.58	0.54	0.52	0.50	0.49	0.47	0.45	0.44
0.70	0.91	0.87	0.81	0.75	0.70	0.66	0.62	0.58	0.55	0.54	0.52	0.51
0.80	0.93	0.92	0.90	0.85	0.80	0.76	0.72	0.68	0.65	0.62	0.59	0.57
0.90	0.92	0.93	0.92	0.92	0.88	0.84	0.80	0.77	0.74	0.71	0.68	0.65
1.00	0.91	0.93	0.94	0.93	0.92	0.91	0.87	0.84	0.81	0.78	0.75	0.73
1.10	0.91	0.92	0.93	0.94	0.93	0.92	0.92	0.90	0.87	0.84	0.82	0.79
1.20	0.91	0.91	0.92	0.93	0.93	0.93	0.92	0.92	0.91	0.90	0.87	0.85
1.30	0.91	0.91	0.92	0.92	0.93	0.93	0.93	0.93	0.92	0.92	0.91	0.90
1.40	0.91	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.92	0.92	0.92
1.50	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.92

Table 15: Transmission at scales of  $\theta_{500}$ . These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14}M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $2\theta_{500}$											
0.10	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.20	0.09	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04
0.30	0.18	0.16	0.14	0.12	0.11	0.10	0.10	0.09	0.09	0.08	0.08	0.07
0.40	0.26	0.24	0.21	0.19	0.18	0.17	0.15	0.15	0.14	0.13	0.12	0.12
0.50	0.33	0.31	0.29	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.17	0.16
0.60	0.38	0.36	0.34	0.32	0.30	0.29	0.27	0.25	0.24	0.23	0.22	0.21
0.70	0.41	0.39	0.37	0.36	0.34	0.33	0.31	0.30	0.29	0.28	0.27	0.26
0.80	0.44	0.42	0.40	0.38	0.37	0.36	0.35	0.33	0.32	0.31	0.31	0.30
0.90	0.46	0.44	0.42	0.41	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32
1.00	0.48	0.46	0.44	0.43	0.41	0.40	0.39	0.38	0.37	0.37	0.36	0.35
1.10	0.49	0.47	0.46	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.37
1.20	0.51	0.49	0.47	0.46	0.44	0.43	0.42	0.42	0.41	0.40	0.39	0.38
1.30	0.55	0.50	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.41	0.40
1.40	0.59	0.53	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.42	0.41
1.50	0.62	0.56	0.51	0.49	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.42

Table 16: Transmission at scales of  $2\theta_{500}$ . This is more relevant to the actual recovery of signal at  $\theta = \theta_{500}$ . These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $2\theta_{500}$											
0.10	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.20	0.09	0.08	0.07	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04
0.30	0.17	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.09	0.08	0.08	0.07
0.40	0.26	0.24	0.22	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.13	0.12
0.50	0.31	0.31	0.29	0.27	0.25	0.23	0.22	0.21	0.20	0.19	0.18	0.17
0.60	0.36	0.35	0.33	0.32	0.31	0.30	0.28	0.26	0.25	0.24	0.23	0.22
0.70	0.40	0.39	0.37	0.36	0.34	0.33	0.32	0.31	0.31	0.29	0.28	0.27
0.80	0.43	0.43	0.41	0.39	0.38	0.36	0.35	0.34	0.33	0.33	0.32	0.31
0.90	0.45	0.45	0.44	0.42	0.41	0.39	0.38	0.37	0.36	0.35	0.34	0.33
1.00	0.48	0.48	0.46	0.45	0.44	0.42	0.41	0.39	0.38	0.37	0.36	0.36
1.10	0.50	0.50	0.48	0.47	0.46	0.44	0.43	0.42	0.41	0.40	0.39	0.38
1.20	0.52	0.52	0.50	0.49	0.48	0.47	0.45	0.44	0.43	0.42	0.41	0.40
1.30	0.55	0.53	0.52	0.51	0.50	0.48	0.47	0.46	0.45	0.44	0.43	0.42
1.40	0.58	0.56	0.54	0.52	0.51	0.50	0.48	0.47	0.46	0.45	0.45	0.44
1.50	0.61	0.59	0.55	0.54	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45

Table 17: Transmission at scales of  $2\theta_{500}$ . This is more relevant to the actual recovery of signal at  $\theta = \theta_{500}$ . These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $2\theta_{500}$											
0.10	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
0.20	0.11	0.10	0.08	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05
0.30	0.22	0.20	0.18	0.16	0.15	0.13	0.12	0.12	0.11	0.10	0.10	0.09
0.40	0.34	0.30	0.28	0.26	0.23	0.22	0.20	0.19	0.18	0.17	0.16	0.15
0.50	0.41	0.39	0.37	0.34	0.32	0.29	0.28	0.26	0.25	0.23	0.22	0.21
0.60	0.46	0.43	0.41	0.40	0.39	0.37	0.35	0.33	0.31	0.30	0.28	0.27
0.70	0.50	0.47	0.45	0.43	0.41	0.40	0.40	0.39	0.38	0.36	0.35	0.33
0.80	0.54	0.51	0.48	0.47	0.45	0.43	0.42	0.41	0.40	0.40	0.39	0.38
0.90	0.57	0.54	0.52	0.50	0.48	0.46	0.45	0.43	0.42	0.41	0.41	0.40
1.00	0.59	0.56	0.54	0.52	0.50	0.49	0.47	0.46	0.45	0.44	0.43	0.42
1.10	0.61	0.58	0.56	0.54	0.53	0.51	0.50	0.49	0.47	0.46	0.45	0.44
1.20	0.63	0.60	0.58	0.56	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.46
1.30	0.67	0.62	0.60	0.58	0.56	0.55	0.54	0.53	0.51	0.50	0.49	0.48
1.40	0.70	0.64	0.61	0.59	0.58	0.57	0.55	0.54	0.53	0.52	0.51	0.50
1.50	0.73	0.67	0.63	0.61	0.59	0.58	0.57	0.56	0.54	0.54	0.53	0.52

Table 18: Transmission at scales of  $2\theta_{500}$ . This is more relevant to the actual recovery of signal at  $\theta = \theta_{500}$ . These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.



$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Transmission at $2\theta_{500}$											
0.10	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
0.20	0.11	0.09	0.08	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04
0.30	0.22	0.20	0.17	0.16	0.14	0.13	0.12	0.12	0.11	0.10	0.10	0.09
0.40	0.34	0.30	0.28	0.25	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15
0.50	0.40	0.38	0.37	0.34	0.31	0.29	0.27	0.26	0.24	0.23	0.22	0.21
0.60	0.46	0.42	0.40	0.39	0.38	0.37	0.35	0.33	0.31	0.30	0.28	0.27
0.70	0.51	0.48	0.45	0.42	0.41	0.40	0.39	0.38	0.38	0.36	0.34	0.33
0.80	0.55	0.52	0.49	0.47	0.45	0.43	0.41	0.40	0.40	0.39	0.39	0.38
0.90	0.58	0.56	0.53	0.50	0.48	0.47	0.45	0.43	0.42	0.41	0.40	0.40
1.00	0.61	0.58	0.56	0.54	0.52	0.50	0.48	0.46	0.45	0.44	0.42	0.41
1.10	0.64	0.61	0.58	0.56	0.54	0.52	0.51	0.49	0.48	0.47	0.45	0.44
1.20	0.66	0.63	0.61	0.59	0.57	0.55	0.53	0.52	0.50	0.49	0.48	0.47
1.30	0.69	0.65	0.63	0.61	0.59	0.57	0.55	0.54	0.53	0.51	0.50	0.49
1.40	0.72	0.68	0.64	0.62	0.60	0.59	0.57	0.56	0.55	0.53	0.52	0.51
1.50	0.75	0.70	0.66	0.64	0.62	0.60	0.59	0.58	0.56	0.55	0.54	0.53

Table 19: Transmission at scales of  $2\theta_{500}$ . This is more relevant to the actual recovery of signal at  $\theta = \theta_{500}$ . These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Observed peak( $\mu\text{K}$ )											
0.10	24.4	29.5	34.3	38.7	42.7	46.7	50.4	53.9	57.3	60.8	64.3	67.1
0.20	39.5	48.7	57.6	66.1	74.1	82.0	89.9	97.2	104.5	111.9	118.9	125.5
0.30	50.3	62.8	75.1	86.9	98.5	109.9	121.2	132.0	142.8	153.7	164.1	174.3
0.40	59.6	75.1	90.5	105.5	120.3	135.0	149.4	163.7	177.9	191.8	205.9	219.4
0.50	68.5	86.9	105.4	123.5	141.5	159.4	177.1	194.7	212.2	229.4	247.0	263.7
0.60	77.7	99.1	120.7	142.2	163.5	184.7	205.9	227.0	248.0	268.9	289.8	310.4
0.70	87.4	112.1	137.0	161.9	186.8	211.6	236.6	261.3	286.2	310.6	335.3	359.9
0.80	97.9	126.1	154.6	183.1	211.9	240.4	269.5	298.3	327.1	355.9	384.6	413.0
0.90	109.2	141.1	173.6	206.1	239.0	271.8	305.1	338.3	371.6	405.0	438.1	471.1
1.00	121.5	157.5	194.2	231.1	268.4	305.8	343.9	381.8	419.8	457.8	496.0	534.0
1.10	134.8	175.1	216.4	258.1	300.4	342.8	385.9	428.9	472.1	515.4	559.0	602.3
1.20	149.2	194.2	240.6	287.4	334.9	382.7	431.2	480.0	528.8	577.7	627.1	676.3
1.30	164.7	214.8	266.6	318.9	372.1	425.6	480.3	535.1	589.9	645.1	700.8	756.2
1.40	181.3	236.9	294.6	352.9	412.1	472.2	533.1	594.5	656.0	718.0	780.5	842.7
1.50	199.3	260.8	324.7	389.5	455.3	522.2	589.9	658.4	727.1	796.3	866.3	936.0

Table 20: (Absolute) peak value of simulated observations (i.e. of the filtered map). These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

### 3.2.2 Filtered Peaks

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Observed peak( $\mu\text{K}$ )											
0.10	28.8	34.7	40.1	44.4	49.6	55.0	60.1	64.8	69.3	73.7	78.1	82.0
0.20	44.8	55.0	65.0	73.7	83.4	93.1	102.4	111.6	120.3	128.9	137.5	145.7
0.30	55.8	69.6	82.0	95.6	108.9	122.3	135.3	148.3	160.7	173.1	185.3	197.5
0.40	65.3	82.2	98.0	114.9	131.7	148.4	164.9	181.7	197.4	213.4	229.2	245.1
0.50	74.5	94.5	113.4	133.6	154.0	174.0	193.9	214.2	233.6	253.3	272.6	292.1
0.60	84.0	107.2	129.5	153.1	176.9	200.6	224.2	248.1	271.2	294.7	317.8	341.3
0.70	94.1	120.8	146.5	173.7	201.3	228.9	256.3	284.1	311.2	338.8	365.9	393.4
0.80	105.0	135.3	164.9	196.0	227.7	259.3	290.9	322.9	354.4	386.3	417.8	449.8
0.90	116.8	151.1	184.8	220.1	256.2	292.3	328.5	365.1	401.3	437.8	474.1	510.7
1.00	129.6	168.2	206.3	246.3	287.2	328.1	369.1	410.8	452.2	494.0	535.4	577.2
1.10	143.5	186.7	229.7	274.6	320.7	366.8	413.2	460.4	507.5	554.9	601.9	649.3
1.20	158.4	206.7	254.9	305.2	356.9	408.8	461.0	514.1	567.1	620.7	674.1	727.9
1.30	174.6	228.2	283.2	338.3	395.9	454.2	512.4	572.2	631.6	691.7	751.9	812.5
1.40	191.9	251.5	312.5	373.9	438.1	503.0	567.9	634.6	701.3	768.5	835.8	903.9
1.50	210.7	276.4	344.0	412.3	483.6	555.5	628.0	701.9	776.2	851.1	926.4	1002.3

Table 21: (Absolute) peak value of simulated observations (i.e. of the filtered map). These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Observed peak( $\mu\text{K}$ )											
0.10	29.4	35.1	40.7	46.0	51.0	56.0	60.3	64.6	69.0	72.9	76.8	80.4
0.20	46.0	56.4	66.7	76.7	86.4	95.9	104.9	113.7	122.7	131.3	139.4	147.1
0.30	57.3	71.4	85.4	99.1	112.8	126.1	139.1	151.8	164.7	177.3	189.5	201.3
0.40	66.9	84.3	101.7	118.8	136.0	153.0	169.6	185.9	202.4	218.8	234.7	250.2
0.50	76.1	96.7	117.3	137.9	158.5	179.0	199.2	219.2	239.3	259.5	279.1	298.2
0.60	85.7	109.5	133.5	157.6	181.7	205.9	229.9	253.7	277.7	301.8	325.3	348.3
0.70	95.9	123.1	150.6	178.5	206.4	234.5	262.5	290.3	318.4	346.7	374.3	401.6
0.80	106.9	137.7	169.2	201.0	233.0	265.3	297.5	329.8	362.1	394.9	427.0	459.0
0.90	118.8	153.7	189.3	225.5	261.9	298.6	335.5	372.4	409.8	447.2	484.2	521.3
1.00	131.8	171.0	211.1	252.0	293.2	334.9	376.8	418.8	461.3	504.1	546.5	588.8
1.10	145.8	189.6	234.7	280.7	327.1	374.2	421.5	469.0	517.2	565.7	614.0	662.2
1.20	160.9	209.8	260.2	311.6	363.8	416.7	469.8	523.4	577.8	632.4	687.1	741.6
1.30	177.1	231.5	287.6	345.0	403.3	462.6	522.1	582.2	643.3	704.6	766.1	827.6
1.40	194.7	255.0	317.2	381.0	445.9	511.9	578.4	645.6	713.8	782.4	851.2	920.3
1.50	213.6	280.2	349.1	419.8	491.8	565.0	639.1	713.9	789.8	866.4	942.9	1020.2

Table 22: (Absolute) peak value of simulated observations (i.e. of the filtered map). These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Observed peak( $\mu\text{K}$ )											
0.10	31.8	38.5	44.8	50.8	56.6	62.5	67.6	72.9	78.1	82.7	87.0	91.4
0.20	48.8	60.4	71.6	82.5	93.2	103.8	113.9	123.7	133.6	143.1	152.1	161.0
0.30	60.2	75.7	90.7	105.5	120.2	134.7	148.9	162.7	176.5	190.1	203.3	216.4
0.40	69.9	88.7	107.2	125.6	143.9	162.1	180.0	197.6	215.1	232.6	249.8	266.5
0.50	79.3	101.3	123.1	145.0	166.9	188.8	210.3	231.7	252.9	274.2	295.3	316.0
0.60	89.0	114.4	139.7	165.2	190.7	216.4	242.0	267.3	292.4	317.6	342.6	367.5
0.70	99.4	128.3	157.3	186.7	216.1	245.9	275.4	305.0	334.4	363.7	393.0	422.3
0.80	110.6	143.3	176.2	209.8	243.4	277.6	311.5	345.6	379.6	413.6	447.5	481.6
0.90	122.8	159.5	196.9	234.9	273.1	311.9	350.6	389.5	428.6	467.7	506.7	545.7
1.00	136.1	177.2	219.3	262.1	305.3	349.2	393.1	437.2	481.7	526.3	571.0	615.7
1.10	150.5	196.4	243.5	291.6	340.2	389.6	439.1	489.0	539.4	589.8	640.5	691.4
1.20	166.0	217.0	269.7	323.5	377.9	433.3	488.8	545.2	601.9	658.5	715.7	773.3
1.30	182.7	239.3	297.9	357.9	418.6	480.5	542.7	605.8	669.2	732.9	797.1	861.9
1.40	200.6	263.4	328.3	394.9	462.6	531.6	600.8	671.2	742.2	813.1	884.9	957.4
1.50	220.0	289.3	361.0	434.8	509.9	586.3	663.5	741.7	820.6	899.8	979.8	1060.6

Table 23: (Absolute) peak value of simulated observations (i.e. of the filtered map). These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Observed peak( $\mu\text{K}$ )											
0.10	12.0	14.2	16.3	18.1	19.6	21.0	22.4	23.8	24.8	26.4	28.8	31.0
0.20	22.2	26.7	31.1	35.0	38.7	42.2	45.5	48.6	51.6	54.7	57.8	60.1
0.30	30.8	37.7	44.4	50.5	56.2	62.0	67.5	72.5	77.6	82.8	87.6	92.1
0.40	38.8	48.0	56.9	65.2	73.2	81.1	88.9	96.2	103.5	110.8	117.6	124.3
0.50	46.6	58.0	69.2	79.9	90.2	100.5	110.4	120.2	129.7	139.2	148.4	157.3
0.60	54.7	68.4	82.1	95.2	108.0	120.8	133.3	145.4	157.4	169.3	181.4	192.6
0.70	63.1	79.5	95.7	111.5	127.1	142.4	157.6	172.5	187.2	201.7	216.3	230.2
0.80	72.2	91.3	110.4	129.1	147.6	165.8	183.9	201.8	219.5	236.8	254.4	271.4
0.90	82.0	104.1	126.2	148.0	169.7	191.0	212.4	233.5	254.4	275.1	295.5	316.0
1.00	92.6	117.9	143.4	168.6	193.7	218.4	243.4	268.1	292.6	316.8	340.8	364.6
1.10	104.0	132.9	162.1	190.9	219.8	248.4	277.3	305.7	334.1	362.2	390.1	417.8
1.20	116.4	149.2	182.3	215.1	248.2	280.9	314.0	346.7	379.2	411.6	443.8	475.9
1.30	129.8	166.7	204.1	241.4	278.8	316.0	353.7	391.2	428.2	465.1	502.2	538.7
1.40	144.3	185.6	227.7	269.7	311.7	353.9	396.6	439.1	481.1	522.9	565.4	606.7
1.50	159.8	206.0	253.1	300.2	347.3	394.8	442.7	490.6	537.9	585.5	633.3	680.1

Table 24: (Absolute) peak value of simulated observations (i.e. of the filtered map). These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Observed peak( $\mu\text{K}$ )											
0.10	14.7	17.4	18.7	20.9	23.3	25.6	27.9	30.1	32.1	34.9	38.0	41.4
0.20	25.9	31.3	35.1	39.8	44.6	49.3	53.9	58.1	62.1	65.9	69.9	73.5
0.30	35.2	43.0	49.2	56.4	63.6	70.7	77.6	84.3	90.6	96.6	102.7	108.3
0.40	43.6	53.7	62.4	72.2	81.8	91.3	100.6	109.7	118.2	126.6	135.3	143.3
0.50	51.7	64.3	75.5	87.8	99.9	111.9	123.6	135.2	146.3	157.3	168.1	178.9
0.60	60.1	75.3	89.1	104.1	118.9	133.5	147.9	162.3	175.9	189.8	203.3	216.8
0.70	69.0	86.9	103.6	121.3	139.1	156.5	173.7	191.2	207.8	224.5	240.8	257.4
0.80	78.5	99.5	119.1	139.9	160.8	181.4	201.7	222.3	242.0	262.1	281.6	301.5
0.90	88.8	112.9	135.9	160.0	184.3	208.2	231.9	256.1	279.4	302.7	325.8	348.9
1.00	100.0	127.5	154.1	181.8	209.9	237.5	264.8	292.8	320.0	347.3	374.0	401.0
1.10	112.1	143.4	173.8	205.5	237.7	269.3	300.8	332.9	364.3	395.8	426.6	457.9
1.20	125.1	160.6	195.2	231.1	267.7	303.9	339.8	376.4	412.4	448.3	484.0	519.6
1.30	139.1	179.1	219.4	258.9	300.3	341.3	382.0	423.6	464.5	505.4	546.0	586.8
1.40	154.2	199.0	244.3	288.8	335.3	381.6	427.6	474.5	520.9	567.1	613.3	659.5
1.50	170.6	220.5	271.1	321.1	373.1	425.1	476.7	529.3	581.5	633.6	685.6	737.9

Table 25: (Absolute) peak value of simulated observations (i.e. of the filtered map). These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Observed peak( $\mu\text{K}$ )											
0.10	14.7	17.2	19.5	21.7	23.7	25.8	27.3	28.6	30.2	31.7	34.6	37.3
0.20	26.7	31.8	36.9	41.7	46.2	50.6	54.5	58.3	62.2	65.6	69.1	72.1
0.30	36.3	44.2	51.8	59.2	66.4	73.3	79.7	85.9	92.1	98.2	103.7	109.1
0.40	44.9	55.3	65.6	75.5	85.2	94.7	103.6	112.4	121.3	129.8	137.9	145.6
0.50	53.2	66.2	79.0	91.4	103.8	115.9	127.6	138.9	150.5	161.7	172.5	182.9
0.60	61.7	77.4	92.9	108.1	123.2	138.2	152.6	166.7	181.0	195.2	208.7	221.9
0.70	70.7	89.2	107.6	125.8	143.8	161.7	179.3	196.3	213.6	230.9	247.5	263.6
0.80	80.4	101.8	123.3	144.7	165.8	187.0	207.9	228.2	248.9	269.5	289.4	309.0
0.90	90.8	115.5	140.4	165.2	189.7	214.4	238.7	262.8	287.0	311.2	334.8	357.7
1.00	102.1	130.3	158.8	187.3	215.7	244.2	272.4	300.3	328.4	356.6	384.2	411.1
1.10	114.3	146.4	178.8	211.4	244.0	276.5	308.9	341.1	373.7	405.9	437.9	469.5
1.20	127.5	163.7	200.5	237.5	274.5	311.7	348.7	385.5	422.7	459.6	496.2	532.7
1.30	141.7	182.4	223.8	265.6	307.6	349.6	391.6	433.5	475.8	517.9	559.6	601.3
1.40	157.1	202.6	249.0	296.0	343.2	390.6	438.0	485.3	533.3	580.7	628.3	675.5
1.50	173.5	224.3	276.2	328.6	381.4	434.7	488.0	541.3	595.1	648.7	702.0	755.6

Table 26: (Absolute) peak value of simulated observations (i.e. of the filtered map). These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.



$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	Observed peak( $\mu\text{K}$ )											
0.10	16.3	19.4	22.1	24.6	27.3	29.7	31.6	33.8	35.7	38.6	41.6	45.1
0.20	28.7	34.8	40.4	45.7	51.0	56.2	60.8	65.5	70.1	74.0	77.9	81.7
0.30	38.5	47.4	55.8	63.8	71.8	79.7	87.0	94.0	101.3	107.9	114.1	120.4
0.40	47.3	58.9	69.9	80.7	91.4	101.9	111.8	121.6	131.3	140.6	149.5	158.5
0.50	55.8	70.1	83.8	97.2	110.7	123.9	136.6	149.0	161.3	173.5	185.2	196.8
0.60	64.5	81.6	98.1	114.5	130.7	146.8	162.4	177.8	193.0	208.1	222.8	237.3
0.70	73.8	93.7	113.2	132.7	151.9	171.2	189.9	208.4	226.8	245.1	263.0	280.6
0.80	83.7	106.8	129.5	152.2	174.8	197.4	219.6	241.6	263.4	284.9	306.3	327.5
0.90	94.4	120.8	147.1	173.4	199.6	225.8	251.7	277.4	303.1	328.3	353.4	378.4
1.00	106.0	136.0	166.1	196.4	226.4	256.7	286.5	316.3	346.0	375.5	404.7	434.0
1.10	118.6	152.5	186.7	221.2	255.5	290.2	324.3	358.6	392.9	426.8	460.6	494.4
1.20	132.2	170.4	209.1	248.2	287.1	326.5	365.4	404.6	443.7	482.6	521.4	560.0
1.30	146.9	189.7	233.2	277.3	321.2	365.8	409.9	454.4	498.8	542.8	587.1	631.2
1.40	162.7	210.5	259.2	308.7	358.2	408.3	457.9	508.0	558.2	608.0	658.0	708.1
1.50	179.7	232.8	287.2	342.4	397.9	454.0	509.7	566.0	622.5	678.3	734.7	791.2

Table 27: (Absolute) peak value of simulated observations (i.e. of the filtered map). These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

### 3.2.3 Direct comparisons between scans and filtering

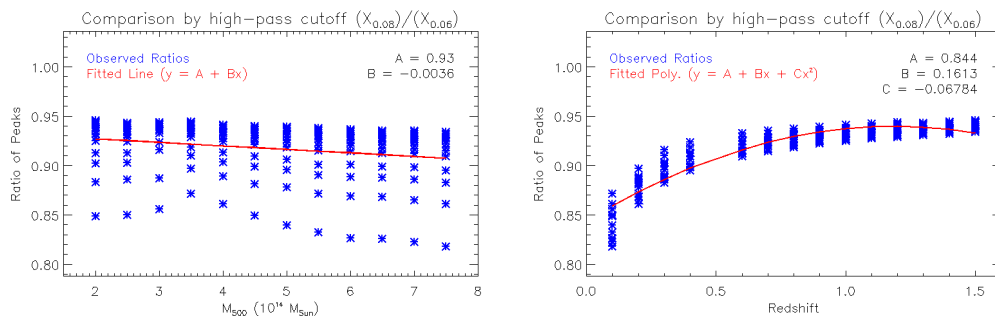


Figure 6: The ratio of peaks for scans with radius 2'.5, when high-pass filtered at 0.08 Hz versus the peaks when high-pass filtered at 0.06 Hz. This highlights the filtering difference within data processing. Left: plotted versus  $M_{500}$ , right: plotted versus redshift.

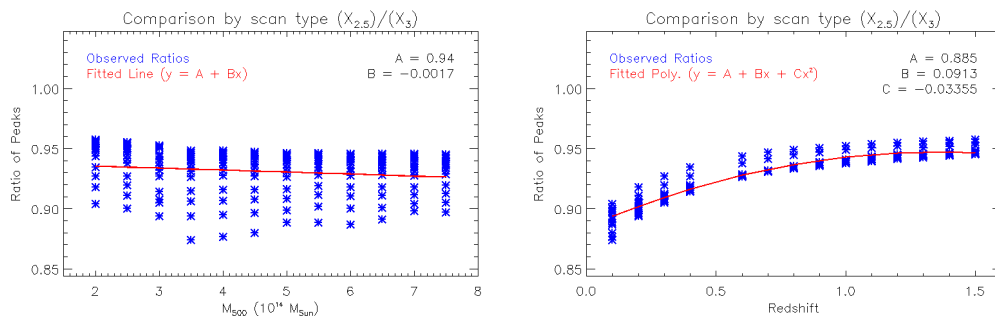


Figure 7: The ratio of peaks for scans when high-pass filtered at 0.06 Hz: 2'.5 vs. 3' scans. This highlights the filtering difference by the observing scan pattern used. Left: plotted versus  $M_{500}$ , right: plotted versus redshift.

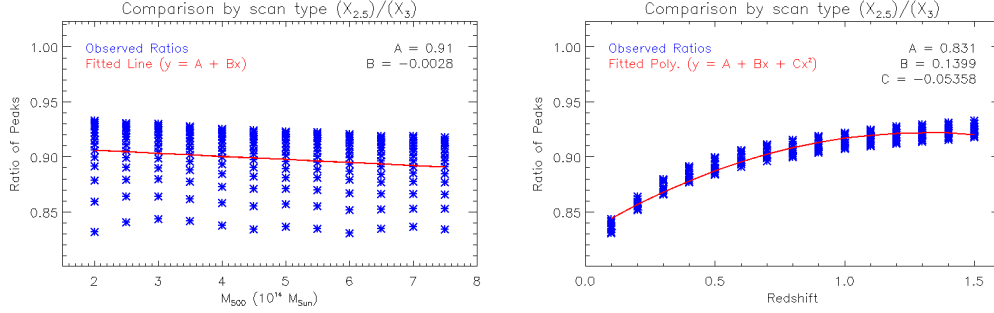


Figure 8: The ratio of peaks for scans when high-pass filtered at 0.06 Hz: 2'.5 vs. 3'scans. This highlights the filtering difference by the observing scan pattern used. Left: plotted versus  $M_{500}$ , right: plotted versus redshift.

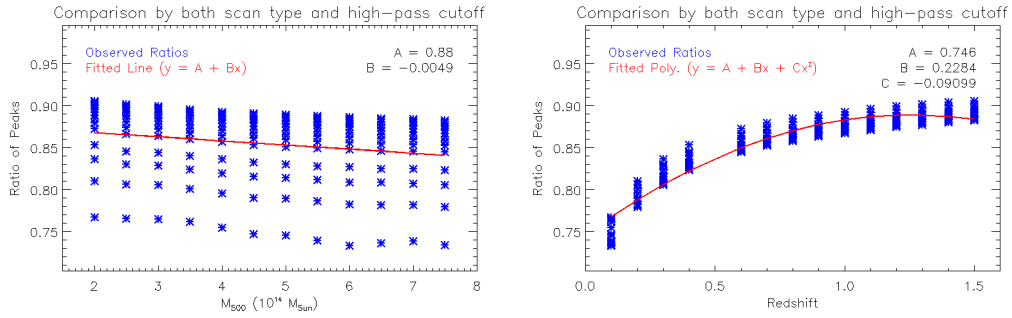


Figure 9: The ratio of peaks for scans 2'.5 when high-pass filtered at 0.08 Hz vs. 3'scans when high-pass filtered at 0.06 Hz. This simply shows the combined effect of different data processing and different scan type. Left: plotted versus  $M_{500}$ , right: plotted versus redshift.

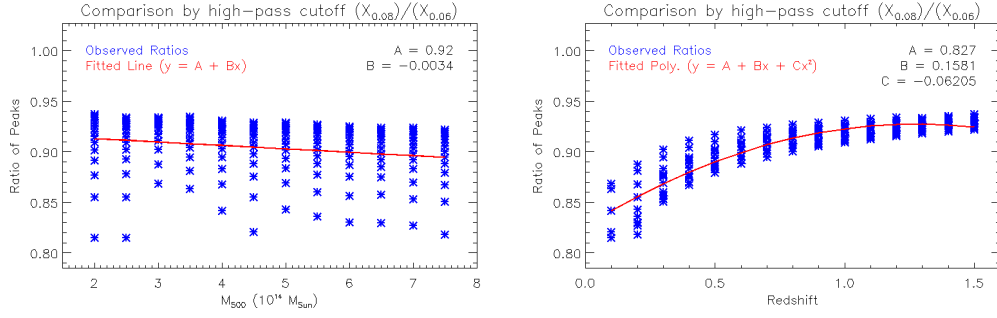


Figure 10: The ratio of peaks for scans with radius 2'.5, when high-pass filtered at 0.08 Hz versus the peaks when high-pass filtered at 0.06 Hz. This highlights the filtering difference within data processing. Left: plotted versus  $M_{500}$ , right: plotted versus redshift. This applies to morphologically disturbed clusters.

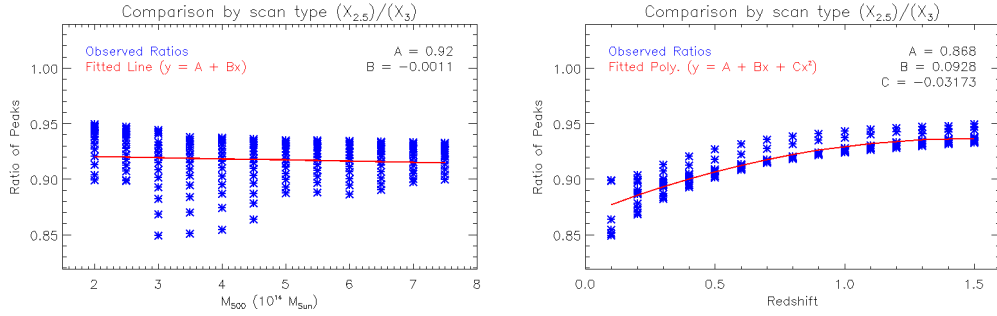


Figure 11: The ratio of peaks for scans when high-pass filtered at 0.06 Hz: 2'.5 vs. 3' scans. This highlights the filtering difference by the observing scan pattern used. Left: plotted versus  $M_{500}$ , right: plotted versus redshift. This applies to morphologically disturbed clusters.

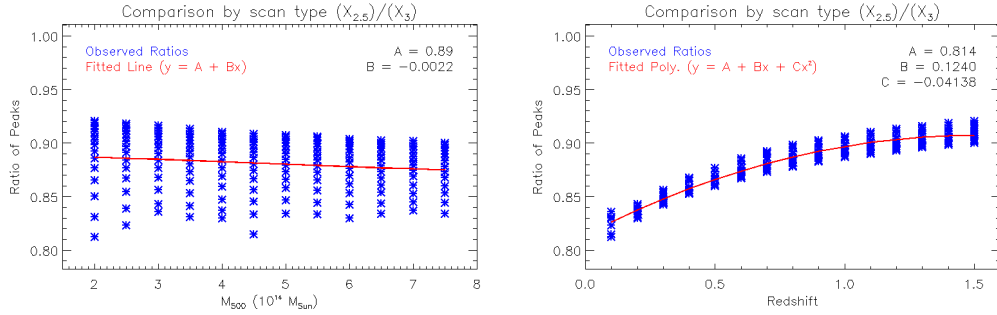


Figure 12: The ratio of peaks for scans when high-pass filtered at 0.06 Hz: 2'.5 vs. 3'scans. This highlights the filtering difference by the observing scan pattern used. Left: plotted versus  $M_{500}$ , right: plotted versus redshift. This applies to morphologically disturbed clusters.

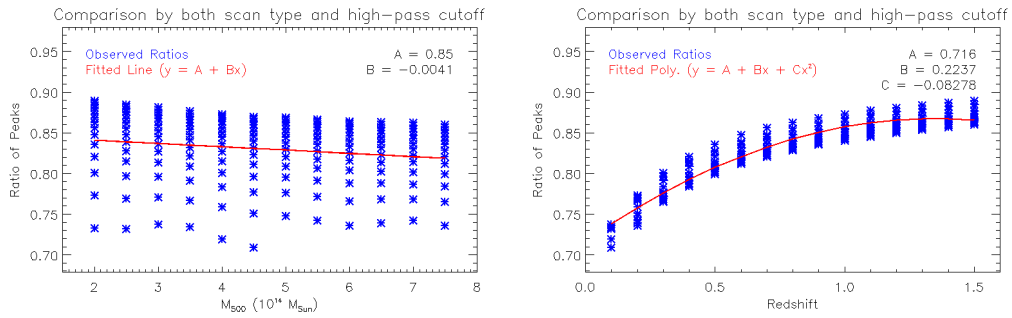


Figure 13: The ratio of peaks for scans 2'.5 when high-pass filtered at 0.08 Hz vs. 3'scans when high-pass filtered at 0.06 Hz. This simply shows the combined effect of different data processing and different scan type. Left: plotted versus  $M_{500}$ , right: plotted versus redshift. This applies to morphologically disturbed clusters.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_{1/2}(\text{arcseconds})$											
0.10	32.0	32.6	33.2	34.0	34.6	35.4	36.6	37.4	38.4	39.2	40.0	41.0
0.20	28.8	29.4	30.0	30.6	31.0	31.4	31.8	32.2	32.6	32.8	33.4	33.8
0.30	26.2	27.0	27.8	28.2	28.8	29.2	29.6	30.0	30.4	30.6	31.0	31.2
0.40	24.2	25.0	25.6	26.2	26.8	27.4	27.8	28.2	28.6	29.0	29.2	29.6
0.50	22.8	23.4	24.2	24.6	25.2	25.6	26.2	26.6	27.0	27.4	27.8	28.0
0.60	21.6	22.2	22.8	23.4	23.8	24.4	24.8	25.2	25.6	25.8	26.2	26.6
0.70	20.8	21.4	22.0	22.4	22.8	23.2	23.6	24.0	24.4	24.6	25.0	25.4
0.80	20.2	20.6	21.2	21.6	22.0	22.4	22.8	23.2	23.4	23.8	24.0	24.2
0.90	19.6	20.0	20.6	21.0	21.4	21.6	22.0	22.4	22.6	23.0	23.2	23.4
1.00	19.0	19.6	20.0	20.4	20.8	21.2	21.4	21.8	22.0	22.2	22.6	22.8
1.10	18.6	19.2	19.6	20.0	20.4	20.6	21.0	21.2	21.4	21.6	22.0	22.2
1.20	18.2	18.8	19.2	19.6	20.0	20.2	20.4	20.8	21.0	21.2	21.4	21.6
1.30	17.8	18.4	18.8	19.2	19.6	19.8	20.2	20.4	20.6	20.8	21.0	21.2
1.40	17.6	18.0	18.6	19.0	19.2	19.6	19.8	20.0	20.2	20.4	20.6	20.8
1.50	17.4	17.8	18.2	18.6	19.0	19.2	19.6	19.8	20.0	20.2	20.4	20.6

Table 28: Radii at which the filtered signal falls to half its (absolute) peak value. These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

### 3.2.4 Half Width Half Maximum (amplitude) for the filtered surface brightness profiles

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_{1/2}(\text{arcseconds})$											
0.10	35.8	36.8	37.6	39.6	40.4	41.2	42.2	42.8	43.2	43.8	44.2	44.6
0.20	30.8	31.6	32.2	33.4	34.0	34.6	35.0	35.6	36.2	36.6	37.2	37.8
0.30	28.0	28.8	29.8	30.4	30.8	31.2	31.6	32.0	32.4	32.6	33.0	33.6
0.40	25.6	26.6	27.6	28.2	28.8	29.2	29.6	30.0	30.4	30.6	31.0	31.2
0.50	24.0	24.8	25.8	26.4	27.0	27.6	28.0	28.4	28.8	29.0	29.4	29.6
0.60	22.6	23.4	24.4	25.0	25.4	26.0	26.4	26.8	27.2	27.6	28.0	28.4
0.70	21.8	22.4	23.2	23.8	24.2	24.8	25.2	25.6	26.0	26.2	26.6	27.0
0.80	21.0	21.6	22.4	22.8	23.2	23.8	24.2	24.4	24.8	25.2	25.4	25.8
0.90	20.2	20.8	21.6	22.0	22.4	23.0	23.2	23.6	24.0	24.2	24.6	24.8
1.00	19.8	20.4	21.0	21.4	21.8	22.2	22.6	22.8	23.2	23.6	23.8	24.0
1.10	19.2	19.8	20.4	21.0	21.2	21.6	22.0	22.2	22.6	22.8	23.2	23.4
1.20	18.8	19.4	20.0	20.4	20.8	21.2	21.4	21.8	22.0	22.2	22.6	22.8
1.30	18.4	19.0	19.6	20.0	20.4	20.8	21.0	21.4	21.6	21.8	22.0	22.2
1.40	18.2	18.8	19.2	19.6	20.0	20.4	20.6	21.0	21.2	21.4	21.6	21.8
1.50	17.8	18.4	18.8	19.4	19.8	20.0	20.4	20.6	20.8	21.0	21.2	21.4

Table 29: Radii at which the filtered signal falls to half its (absolute) peak value. These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_{1/2}(\text{arcseconds})$											
0.10	36.4	37.0	37.6	38.6	39.4	40.2	41.0	41.8	42.6	43.2	43.6	44.0
0.20	31.8	32.2	32.8	33.6	34.2	34.8	35.4	36.0	36.6	37.2	37.8	38.2
0.30	28.8	29.4	30.2	30.6	31.2	31.6	32.0	32.4	33.0	33.4	33.8	34.2
0.40	26.6	27.2	28.0	28.6	29.2	29.6	30.2	30.6	31.0	31.2	31.6	31.8
0.50	24.8	25.6	26.2	26.8	27.6	28.0	28.4	29.0	29.4	29.6	30.0	30.2
0.60	23.4	24.2	24.8	25.4	26.0	26.6	27.0	27.6	28.0	28.2	28.6	29.0
0.70	22.2	23.0	23.6	24.2	24.8	25.2	25.8	26.2	26.6	27.0	27.4	27.8
0.80	21.4	22.0	22.6	23.2	23.8	24.2	24.8	25.2	25.4	25.8	26.2	26.6
0.90	20.8	21.4	22.0	22.4	23.0	23.4	23.8	24.2	24.6	25.0	25.2	25.6
1.00	20.2	20.8	21.4	21.8	22.2	22.6	23.0	23.4	23.8	24.2	24.4	24.8
1.10	19.6	20.2	20.8	21.2	21.6	22.0	22.4	22.8	23.2	23.4	23.8	24.0
1.20	19.2	19.8	20.4	20.8	21.2	21.6	22.0	22.2	22.6	22.8	23.2	23.4
1.30	18.8	19.4	20.0	20.4	20.8	21.2	21.4	21.8	22.0	22.4	22.6	22.8
1.40	18.4	19.0	19.6	20.0	20.4	20.8	21.0	21.4	21.6	21.8	22.2	22.4
1.50	18.2	18.8	19.2	19.6	20.0	20.4	20.8	21.0	21.2	21.6	21.8	22.0

Table 30: Radii at which the filtered signal falls to half its (absolute) peak value. These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.



$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_{1/2}(\text{arcseconds})$											
0.10	39.0	40.0	41.0	42.0	42.6	43.4	43.8	44.4	45.0	45.4	45.8	46.2
0.20	33.0	33.8	34.8	35.4	36.2	36.8	37.6	38.2	39.0	39.6	40.2	40.8
0.30	29.6	30.6	31.2	31.8	32.4	32.8	33.4	34.0	34.6	35.0	35.6	36.0
0.40	27.2	28.2	29.0	29.6	30.0	30.6	31.0	31.4	31.8	32.2	32.4	32.8
0.50	25.4	26.4	27.0	27.8	28.4	28.8	29.2	29.8	30.2	30.4	30.8	31.2
0.60	24.0	24.8	25.6	26.2	26.8	27.4	27.8	28.2	28.6	29.0	29.4	29.8
0.70	22.8	23.6	24.4	25.0	25.4	26.0	26.4	27.0	27.4	27.8	28.2	28.4
0.80	21.8	22.6	23.4	24.0	24.4	25.0	25.4	25.8	26.2	26.6	27.0	27.4
0.90	21.2	21.8	22.4	23.0	23.6	24.0	24.4	24.8	25.2	25.6	26.0	26.4
1.00	20.6	21.2	21.8	22.4	22.8	23.2	23.6	24.2	24.4	24.8	25.2	25.4
1.10	20.0	20.8	21.2	21.8	22.2	22.6	23.0	23.4	23.8	24.0	24.4	24.6
1.20	19.6	20.2	20.8	21.2	21.6	22.0	22.4	22.8	23.2	23.4	23.8	24.0
1.30	19.2	19.8	20.4	20.8	21.2	21.6	22.0	22.2	22.6	22.8	23.2	23.4
1.40	18.8	19.4	20.0	20.4	20.8	21.2	21.6	21.8	22.2	22.4	22.6	23.0
1.50	18.4	19.2	19.6	20.0	20.4	20.8	21.2	21.4	21.8	22.0	22.2	22.6

Table 31: Radii at which the filtered signal falls to half its (absolute) peak value. These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_{1/2}(\text{arcseconds})$											
0.10	34.8	36.4	37.4	38.8	40.8	42.6	43.6	12.4	44.8	45.0	17.0	44.8
0.20	32.4	33.2	33.8	34.6	35.4	36.4	37.6	38.6	39.6	40.4	41.6	42.4
0.30	30.6	31.2	31.8	32.2	32.8	33.4	34.2	34.8	35.6	36.2	36.8	37.6
0.40	28.8	29.6	30.2	30.8	31.2	31.8	32.2	32.6	33.0	33.4	34.0	34.6
0.50	27.2	28.2	28.8	29.4	30.0	30.4	30.8	31.2	31.6	32.0	32.2	32.4
0.60	26.0	26.8	27.6	28.2	28.8	29.2	29.6	30.0	30.4	30.8	31.0	31.4
0.70	24.8	25.6	26.4	27.0	27.6	28.2	28.6	29.0	29.4	29.8	30.0	30.4
0.80	23.8	24.6	25.4	26.0	26.6	27.2	27.6	28.2	28.4	28.8	29.0	29.4
0.90	23.0	23.8	24.6	25.2	25.8	26.2	26.6	27.2	27.6	28.0	28.2	28.6
1.00	22.4	23.2	23.8	24.4	25.0	25.4	25.8	26.4	26.8	27.0	27.4	27.8
1.10	21.8	22.6	23.2	23.8	24.2	24.8	25.2	25.6	26.0	26.2	26.6	27.0
1.20	21.4	22.0	22.6	23.2	23.6	24.2	24.6	25.0	25.2	25.6	26.0	26.2
1.30	20.8	21.6	22.2	22.6	23.2	23.6	24.0	24.4	24.8	25.0	25.4	25.6
1.40	20.6	21.2	21.8	22.2	22.6	23.2	23.6	23.8	24.2	24.6	24.8	25.0
1.50	20.2	20.8	21.4	21.8	22.4	22.8	23.0	23.4	23.8	24.0	24.4	24.6

Table 32: Radii at which the filtered signal falls to half its (absolute) peak value. These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_{1/2}(\text{arcseconds})$											
0.10	41.0	42.2	44.2	44.8	45.4	46.0	46.4	46.8	47.2	47.0	11.6	10.0
0.20	36.0	37.0	39.2	40.0	41.0	41.8	42.8	43.2	43.8	44.2	44.6	45.2
0.30	32.8	33.6	35.4	36.2	36.8	37.6	38.4	39.0	39.8	40.6	41.2	42.0
0.40	30.6	31.4	32.6	33.4	34.0	34.6	35.2	35.8	36.4	37.0	37.6	38.2
0.50	28.8	29.8	31.0	31.4	32.0	32.4	33.0	33.4	34.0	34.4	35.0	35.6
0.60	27.4	28.4	29.4	30.0	30.6	31.0	31.6	31.8	32.2	32.6	33.0	33.4
0.70	26.0	27.0	28.2	28.8	29.4	29.8	30.4	30.6	31.0	31.4	31.8	32.0
0.80	25.0	26.0	27.0	27.6	28.2	28.8	29.2	29.6	30.0	30.4	30.6	31.0
0.90	24.2	25.0	26.0	26.6	27.2	27.8	28.4	28.6	29.0	29.4	29.8	30.0
1.00	23.4	24.2	25.2	25.8	26.4	27.0	27.4	27.8	28.2	28.6	29.0	29.2
1.10	22.6	23.6	24.4	25.0	25.6	26.2	26.6	27.0	27.4	27.8	28.2	28.4
1.20	22.2	23.0	23.8	24.4	25.0	25.4	25.8	26.2	26.6	27.0	27.4	27.8
1.30	21.6	22.4	23.0	23.8	24.4	24.8	25.2	25.6	26.0	26.4	26.8	27.0
1.40	21.2	22.0	22.6	23.2	23.8	24.2	24.8	25.0	25.4	25.8	26.2	26.4
1.50	20.8	21.6	22.2	22.8	23.4	23.8	24.2	24.6	25.0	25.2	25.6	26.0

Table 33: Radii at which the filtered signal falls to half its (absolute) peak value. These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_{1/2}(\text{arcseconds})$											
0.10	40.0	40.8	42.0	43.0	43.8	44.4	45.0	45.6	46.2	13.4	10.6	16.4
0.20	36.8	37.6	38.4	39.2	40.2	41.0	41.8	42.8	43.2	43.8	44.2	44.6
0.30	33.8	34.6	35.4	36.2	37.0	37.8	38.6	39.2	40.0	40.6	41.2	42.0
0.40	31.6	32.2	33.0	33.8	34.4	35.2	35.8	36.4	37.2	37.6	38.2	38.8
0.50	29.8	30.6	31.2	32.0	32.4	33.0	33.6	34.2	34.8	35.4	35.8	36.4
0.60	28.4	29.2	29.8	30.6	31.2	31.6	32.0	32.6	33.0	33.4	34.0	34.4
0.70	27.0	27.8	28.6	29.4	30.0	30.4	31.0	31.4	31.8	32.0	32.4	32.8
0.80	25.8	26.8	27.6	28.2	28.8	29.4	29.8	30.4	30.8	31.0	31.4	31.8
0.90	25.0	25.8	26.6	27.2	28.0	28.4	29.0	29.4	29.8	30.2	30.6	30.8
1.00	24.2	25.0	25.8	26.4	27.0	27.6	28.2	28.6	29.0	29.4	29.6	30.0
1.10	23.4	24.2	25.0	25.6	26.2	26.8	27.4	27.8	28.2	28.6	29.0	29.2
1.20	22.8	23.6	24.4	25.0	25.6	26.2	26.6	27.0	27.4	27.8	28.2	28.6
1.30	22.2	23.0	23.8	24.4	25.0	25.4	26.0	26.4	26.8	27.2	27.6	27.8
1.40	21.8	22.4	23.2	23.8	24.4	25.0	25.4	25.8	26.2	26.6	27.0	27.2
1.50	21.4	22.0	22.8	23.4	24.0	24.4	24.8	25.4	25.6	26.0	26.4	26.8

Table 34: Radii at which the filtered signal falls to half its (absolute) peak value. These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_{1/2}(\text{arcseconds})$											
0.10	43.6	44.6	45.4	46.2	46.6	47.0	47.6	48.0	48.4	48.6	48.4	11.6
0.20	39.0	40.2	41.4	42.4	43.0	43.8	44.2	44.8	45.4	45.8	46.2	46.6
0.30	35.4	36.4	37.4	38.4	39.2	40.0	40.8	41.8	42.6	43.0	43.6	44.0
0.40	32.6	33.6	34.6	35.4	36.2	36.8	37.6	38.4	39.0	39.8	40.4	41.0
0.50	30.6	31.6	32.4	33.0	33.8	34.4	35.2	35.8	36.4	37.0	37.6	38.2
0.60	29.0	30.0	30.8	31.4	32.0	32.6	33.2	33.8	34.4	34.8	35.4	36.0
0.70	27.6	28.6	29.4	30.2	30.8	31.2	31.8	32.2	32.6	33.2	33.6	34.0
0.80	26.4	27.4	28.2	29.0	29.6	30.2	30.6	31.2	31.6	31.8	32.2	32.6
0.90	25.4	26.4	27.2	28.0	28.6	29.2	29.6	30.2	30.6	31.0	31.2	31.6
1.00	24.6	25.6	26.4	27.0	27.8	28.2	28.8	29.2	29.6	30.0	30.4	30.8
1.10	23.8	24.8	25.6	26.2	27.0	27.4	28.0	28.4	28.8	29.2	29.6	30.0
1.20	23.2	24.2	25.0	25.6	26.2	26.8	27.2	27.8	28.2	28.6	28.8	29.2
1.30	22.6	23.6	24.2	25.0	25.6	26.0	26.6	27.0	27.4	27.8	28.2	28.6
1.40	22.2	23.0	23.8	24.4	25.0	25.6	26.0	26.4	26.8	27.2	27.6	28.0
1.50	21.8	22.6	23.2	24.0	24.4	25.0	25.4	25.8	26.2	26.6	27.0	27.4

Table 35: Radii at which the filtered signal falls to half its (absolute) peak value. These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_0(\text{arcseconds})$											
0.10	69.4	69.8	67.8	66.0	71.8	72.0	71.2	73.0	71.6	71.4	57.8	74.0
0.20	63.4	63.6	63.0	62.4	62.2	61.8	61.4	60.8	60.4	60.0	59.8	59.2
0.30	60.4	60.6	60.6	60.6	60.6	60.4	60.2	59.8	59.6	59.4	59.2	59.0
0.40	58.2	58.6	58.8	58.8	59.0	59.0	58.8	58.8	58.6	58.4	58.4	58.2
0.50	56.6	57.0	57.2	57.4	57.6	57.6	57.6	57.6	57.4	57.4	57.4	57.4
0.60	55.2	55.8	56.2	56.4	56.8	56.8	56.8	56.8	56.8	56.8	57.0	57.0
0.70	54.2	54.8	55.2	55.6	56.0	56.0	56.2	56.2	56.4	56.4	56.4	56.4
0.80	53.2	54.0	54.4	54.8	55.2	55.4	55.6	55.8	55.8	55.8	56.0	56.0
0.90	52.2	53.2	53.8	54.2	54.6	54.8	55.0	55.2	55.4	55.4	55.6	55.6
1.00	51.6	52.4	53.0	53.6	54.0	54.2	54.6	54.8	54.8	55.0	55.2	55.2
1.10	50.8	51.8	52.4	52.8	53.4	53.8	54.0	54.2	54.4	54.6	54.8	55.0
1.20	50.2	51.2	51.8	52.4	52.8	53.2	53.6	53.8	54.0	54.2	54.4	54.6
1.30	49.6	50.6	51.4	51.8	52.4	52.8	53.2	53.4	53.6	53.8	54.0	54.2
1.40	49.0	50.0	50.8	51.4	51.8	52.4	52.8	53.0	53.2	53.4	53.6	53.8
1.50	48.4	49.4	50.4	51.0	51.4	52.0	52.2	52.6	52.8	53.2	53.4	53.6

Table 36: Radii at which the filtered signal crosses zero. These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

### 3.2.5 Radius at which the filtered surface brightness profiles crosses zero

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_0(\text{arcseconds})$											
0.10	82.4	82.8	82.4	83.6	84.2	84.0	85.6	97.4	89.6	88.2	87.4	87.6
0.20	75.4	76.0	76.4	77.0	77.6	78.2	78.6	79.0	79.2	79.6	79.8	80.0
0.30	69.0	70.2	70.4	72.4	73.4	73.8	74.6	75.0	75.4	75.8	76.2	76.6
0.40	64.0	64.6	64.8	65.6	66.4	66.6	67.2	69.0	69.8	72.6	73.0	73.6
0.50	61.2	61.6	61.8	62.2	62.6	62.8	63.2	63.6	63.6	63.6	63.8	64.0
0.60	59.4	60.0	60.2	60.6	61.0	61.2	61.4	61.6	61.6	61.6	61.6	61.8
0.70	57.8	58.4	58.8	59.2	59.8	60.0	60.2	60.4	60.4	60.6	60.8	60.8
0.80	56.6	57.2	57.4	58.0	58.6	59.0	59.2	59.4	59.6	59.8	59.8	60.0
0.90	55.8	56.4	56.8	57.2	57.6	58.0	58.4	58.6	58.8	59.0	59.2	59.2
1.00	55.0	55.6	56.0	56.6	57.0	57.4	57.6	57.8	58.2	58.4	58.4	58.6
1.10	54.2	55.0	55.4	56.0	56.4	56.8	57.0	57.2	57.6	57.8	57.8	58.0
1.20	53.4	54.2	54.8	55.4	56.0	56.4	56.6	56.8	57.0	57.2	57.4	57.6
1.30	52.8	53.6	54.4	54.8	55.4	55.8	56.2	56.4	56.6	56.8	57.0	57.2
1.40	52.2	53.2	53.8	54.4	55.0	55.4	55.8	56.0	56.4	56.6	56.8	56.8
1.50	51.8	52.6	53.4	54.0	54.6	55.0	55.4	55.8	56.0	56.2	56.4	56.6

Table 37: Radii at which the filtered signal crosses zero. These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_0(\text{arcseconds})$											
0.10	77.6	77.8	77.8	77.8	78.2	78.2	78.2	78.2	78.6	78.6	78.8	78.8
0.20	73.2	73.6	74.2	74.2	74.6	75.0	75.2	75.4	75.8	76.0	76.0	76.0
0.30	68.4	69.0	69.4	69.6	70.6	71.0	71.8	72.6	73.0	73.4	73.6	73.8
0.40	65.0	65.4	65.6	65.8	66.2	66.2	66.4	66.4	66.6	66.6	66.6	66.4
0.50	62.4	62.6	63.0	63.2	63.6	63.8	63.8	63.8	63.8	64.0	63.8	63.4
0.60	60.8	61.2	61.4	61.6	61.8	62.0	62.0	62.0	62.2	62.2	62.2	62.0
0.70	59.6	60.0	60.4	60.6	61.0	61.0	61.2	61.2	61.4	61.4	61.4	61.4
0.80	58.4	59.0	59.4	59.8	60.0	60.4	60.4	60.6	60.6	60.8	60.8	60.8
0.90	57.4	58.0	58.6	59.0	59.4	59.6	59.8	60.0	60.2	60.2	60.4	60.4
1.00	56.8	57.4	57.8	58.2	58.6	59.0	59.2	59.4	59.6	59.8	60.0	60.0
1.10	56.2	56.8	57.2	57.6	58.0	58.4	58.6	58.8	59.2	59.2	59.4	59.6
1.20	55.6	56.2	56.8	57.2	57.4	57.8	58.2	58.4	58.6	58.8	59.0	59.2
1.30	55.0	55.8	56.4	56.8	57.2	57.4	57.6	58.0	58.2	58.4	58.6	58.8
1.40	54.6	55.2	55.8	56.4	56.8	57.0	57.4	57.6	57.8	58.0	58.4	58.4
1.50	54.0	54.8	55.6	56.0	56.4	56.8	57.0	57.2	57.6	57.8	58.0	58.2

Table 38: Radii at which the filtered signal crosses zero. These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.



$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_0(\text{arcseconds})$											
0.10	86.6	87.2	88.2	90.6	92.6	95.0	97.4	99.0	100.0	100.0	100.0	100.0
0.20	78.8	79.6	80.2	80.6	81.0	81.2	81.6	82.0	82.2	82.4	82.4	82.6
0.30	74.2	75.2	75.8	76.4	77.0	77.4	78.0	78.4	78.6	79.0	79.2	79.4
0.40	69.8	71.4	72.4	73.2	73.8	74.4	74.8	75.4	75.8	76.2	76.4	76.8
0.50	66.0	67.2	68.0	69.0	70.0	71.0	72.0	73.0	73.4	73.8	74.0	74.4
0.60	63.4	64.6	65.2	65.8	66.4	67.0	67.4	68.2	69.0	69.6	70.2	71.6
0.70	61.6	62.4	63.0	63.6	64.2	64.8	65.2	65.6	66.0	66.2	66.2	66.6
0.80	60.4	61.2	61.8	62.2	62.4	63.0	63.4	63.8	64.2	64.4	64.4	64.6
0.90	59.4	60.2	60.8	61.2	61.6	62.0	62.2	62.4	62.6	63.0	63.0	63.2
1.00	58.4	59.4	60.0	60.6	61.0	61.2	61.4	61.8	62.0	62.2	62.2	62.2
1.10	57.6	58.6	59.2	59.8	60.2	60.6	60.8	61.2	61.4	61.6	61.6	61.8
1.20	57.0	57.8	58.6	59.2	59.6	60.0	60.4	60.6	61.0	61.0	61.2	61.4
1.30	56.4	57.2	58.0	58.6	59.2	59.6	59.8	60.2	60.4	60.6	60.8	61.0
1.40	56.0	56.8	57.4	58.0	58.6	59.0	59.4	59.8	60.0	60.2	60.4	60.6
1.50	55.6	56.4	57.0	57.6	58.2	58.6	59.0	59.4	59.8	60.0	60.2	60.4

Table 39: Radii at which the filtered signal crosses zero. These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_0(\text{arcseconds})$											
0.10	74.0	74.8	69.2	74.8	58.2	75.2	76.0	76.2	76.2	96.0	94.0	93.0
0.20	68.8	68.6	67.4	71.4	62.2	73.2	70.6	71.2	71.0	71.0	74.8	57.0
0.30	64.6	64.8	64.6	63.6	62.4	62.0	61.6	60.8	60.4	59.8	59.4	58.8
0.40	61.8	62.0	62.0	62.0	61.8	61.6	61.4	60.8	60.6	60.2	59.8	59.4
0.50	60.2	60.6	60.8	61.0	61.0	60.8	60.6	60.4	60.2	60.0	59.8	59.6
0.60	58.6	59.2	59.6	59.8	60.0	60.0	60.0	59.8	59.6	59.6	59.6	59.4
0.70	57.2	58.0	58.4	58.8	59.2	59.2	59.2	59.2	59.2	59.0	59.2	59.0
0.80	56.4	57.0	57.4	57.8	58.2	58.4	58.6	58.6	58.6	58.6	58.6	58.6
0.90	55.6	56.2	56.8	57.2	57.6	57.8	58.0	58.0	58.0	58.2	58.2	58.2
1.00	54.8	55.6	56.2	56.6	57.0	57.2	57.4	57.4	57.6	57.8	57.8	58.0
1.10	54.0	54.8	55.6	56.0	56.4	56.8	57.0	57.2	57.2	57.4	57.4	57.6
1.20	53.2	54.2	55.0	55.4	56.0	56.4	56.6	56.8	56.8	57.0	57.2	57.2
1.30	52.4	53.6	54.4	55.0	55.4	55.8	56.2	56.4	56.6	56.8	56.8	57.0
1.40	52.0	53.0	53.8	54.4	55.0	55.4	55.8	56.0	56.2	56.4	56.6	56.8
1.50	51.4	52.4	53.4	54.0	54.6	55.0	55.4	55.8	56.0	56.2	56.4	56.6

Table 40: Radii at which the filtered signal crosses zero. These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_0(\text{arcseconds})$											
0.10	96.4	98.8	100.0	100.0	87.6	87.4	87.4	87.4	62.4	62.6	63.8	64.4
0.20	81.0	81.6	81.8	82.2	82.8	83.0	84.6	91.8	85.2	86.2	86.6	87.4
0.30	76.4	77.2	77.2	78.4	79.0	79.4	80.2	80.4	80.8	81.0	81.2	81.2
0.40	72.4	73.4	73.8	75.0	75.8	76.4	77.2	77.8	78.0	78.4	78.8	79.2
0.50	67.2	68.6	69.2	71.6	73.2	73.8	74.6	75.2	75.6	76.0	76.4	77.0
0.60	64.2	65.2	65.6	66.8	67.8	69.0	71.4	73.0	73.4	74.0	74.4	75.0
0.70	61.8	62.6	63.2	64.2	65.2	65.6	66.2	67.0	67.4	69.2	71.6	73.0
0.80	60.4	61.2	61.6	62.2	62.8	63.4	64.0	64.6	65.0	65.6	66.0	66.6
0.90	59.2	60.0	60.6	61.2	61.8	62.0	62.4	62.8	63.2	63.6	64.0	64.4
1.00	58.2	59.0	59.8	60.4	61.0	61.4	61.6	62.0	62.2	62.4	62.6	62.8
1.10	57.2	58.0	58.8	59.6	60.2	60.6	61.0	61.2	61.6	61.8	62.0	62.0
1.20	56.4	57.2	57.8	58.8	59.4	60.0	60.2	60.6	61.0	61.2	61.4	61.6
1.30	55.8	56.6	57.2	58.0	58.8	59.4	59.6	60.2	60.4	60.8	61.0	61.2
1.40	55.2	56.2	56.8	57.4	58.0	58.8	59.2	59.6	60.0	60.2	60.4	60.8
1.50	54.6	55.6	56.4	57.0	57.4	58.2	58.6	59.0	59.6	59.8	60.0	60.4

Table 41: Radii at which the filtered signal crosses zero. These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_0(\text{arcseconds})$											
0.10	79.8	79.8	79.4	79.4	79.2	62.8	66.0	67.8	94.6	100.0	91.2	79.6
0.20	77.4	77.6	77.8	78.0	78.2	78.4	78.4	78.4	78.8	79.0	79.0	79.0
0.30	74.2	74.8	75.2	75.6	76.2	76.4	76.6	76.8	77.2	77.4	77.6	77.6
0.40	70.8	71.8	72.8	73.2	73.8	74.2	74.6	74.8	75.4	75.6	75.8	75.8
0.50	67.4	68.2	69.2	69.8	70.8	71.8	72.6	73.0	73.6	74.0	74.2	74.4
0.60	65.2	65.8	66.4	66.8	67.4	68.0	68.2	68.8	70.0	71.2	72.6	72.8
0.70	63.2	64.0	64.6	65.0	65.6	66.0	66.2	66.4	66.8	67.2	67.2	67.2
0.80	61.8	62.4	63.0	63.6	64.0	64.4	64.8	65.0	65.4	65.6	65.8	66.0
0.90	60.8	61.4	62.0	62.4	62.8	63.2	63.6	63.8	64.2	64.6	64.8	64.8
1.00	60.0	60.6	61.2	61.6	62.0	62.4	62.6	62.8	63.2	63.6	63.8	63.8
1.10	59.0	60.0	60.6	61.0	61.4	61.8	62.0	62.2	62.4	62.6	63.0	63.0
1.20	58.2	59.2	60.0	60.4	60.8	61.2	61.6	61.8	62.0	62.2	62.4	62.4
1.30	57.6	58.4	59.2	59.8	60.4	60.8	61.0	61.4	61.6	61.8	62.0	62.0
1.40	57.0	57.8	58.6	59.4	60.0	60.4	60.6	61.0	61.2	61.4	61.6	61.8
1.50	56.6	57.2	58.2	58.8	59.4	60.0	60.4	60.6	61.0	61.2	61.4	61.6

Table 42: Radii at which the filtered signal crosses zero. These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$R_0(\text{arcseconds})$											
0.10	97.6	100.0	100.0	100.0	100.0	100.0	87.6	87.4	87.4	62.4	62.4	62.4
0.20	84.2	85.6	86.2	87.2	88.2	93.2	96.2	98.8	100.0	100.0	100.0	87.6
0.30	79.4	80.4	81.0	81.6	82.0	82.4	83.0	83.6	84.2	84.6	84.6	85.2
0.40	75.8	77.0	77.8	78.4	79.2	79.6	80.0	80.6	80.8	81.0	81.2	81.6
0.50	72.8	74.2	75.0	75.8	76.6	77.2	77.8	78.2	78.6	79.0	79.4	79.6
0.60	69.4	71.2	72.8	73.6	74.2	75.0	75.6	76.2	76.6	77.0	77.4	77.8
0.70	66.6	68.2	69.6	70.8	72.2	73.0	73.6	74.2	74.8	75.2	75.6	76.0
0.80	64.6	66.0	67.0	68.0	69.0	70.4	71.4	72.6	73.2	73.6	74.0	74.4
0.90	63.0	64.4	65.4	66.2	67.0	67.8	68.8	69.8	71.0	71.8	72.6	73.0
1.00	61.8	63.0	64.0	65.0	65.6	66.4	67.0	67.6	68.4	69.2	69.8	70.8
1.10	61.0	62.0	62.8	63.8	64.4	65.2	65.8	66.4	66.8	67.2	67.6	68.4
1.20	60.2	61.2	62.0	62.6	63.4	64.2	64.6	65.4	65.8	66.2	66.6	67.0
1.30	59.4	60.4	61.2	62.0	62.6	63.2	63.8	64.4	65.0	65.4	65.6	66.0
1.40	58.6	59.8	60.6	61.4	62.0	62.4	63.0	63.6	64.2	64.6	64.8	65.2
1.50	58.0	59.2	60.2	61.0	61.6	62.0	62.4	63.0	63.6	64.0	64.2	64.6

Table 43: Radii at which the filtered signal crosses zero. These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$Y_{M2} \text{ (mK square arcseconds)}$											
0.10	53.69	68.31	81.50	94.54	109.95	124.10	142.56	159.83	178.08	195.95	215.29	236.96
0.20	71.07	90.03	110.90	133.80	151.31	173.19	194.24	213.82	239.72	258.03	282.68	302.15
0.30	75.20	98.87	122.97	146.66	174.52	199.49	223.32	250.95	279.12	308.78	331.13	358.04
0.40	76.38	100.86	126.35	155.98	182.92	215.30	242.07	273.38	306.13	340.31	370.34	399.85
0.50	77.15	103.23	133.90	162.00	191.50	220.71	259.45	290.12	328.03	363.17	396.63	430.49
0.60	79.27	106.33	135.57	167.66	196.72	236.91	272.07	305.37	340.93	375.37	422.27	459.16
0.70	83.29	111.72	142.82	178.37	208.74	244.66	282.45	314.63	365.72	403.29	442.29	487.76
0.80	88.63	119.60	150.58	185.55	220.47	264.09	299.71	343.34	383.16	423.86	460.86	518.60
0.90	90.65	123.68	164.11	199.62	237.01	275.51	316.82	370.77	408.93	463.70	503.27	550.51
1.00	99.66	130.80	169.92	213.97	254.65	296.83	341.15	392.90	435.40	485.66	543.83	592.00
1.10	105.09	143.94	179.74	225.29	277.38	324.04	372.90	416.56	468.23	521.07	578.41	637.48
1.20	110.42	151.90	197.93	238.45	291.84	346.47	399.28	454.65	511.43	560.72	621.25	683.09
1.30	114.31	159.69	208.97	262.47	308.56	364.57	433.79	494.37	556.95	611.38	677.79	733.88
1.40	124.89	170.12	229.14	288.23	339.21	391.32	456.02	519.39	594.35	664.51	737.70	799.28
1.50	136.29	180.84	240.61	303.72	372.29	429.96	488.69	562.78	634.41	720.09	800.23	882.69

Table 44: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ). These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

### 3.2.6 MUSTANG-2 Integrated SZ signal

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$Y_{M2} \text{ (mK square arcseconds)}$											
0.10	79.62	101.53	121.82	151.43	176.42	202.41	233.10	258.46	283.19	306.92	338.17	363.67
0.20	92.24	118.00	144.37	179.09	207.14	243.13	273.79	303.75	340.00	370.64	408.52	444.88
0.30	93.59	124.73	157.85	190.52	224.10	256.40	290.08	324.85	364.65	400.65	437.53	478.38
0.40	91.84	124.53	160.07	195.57	235.56	272.18	307.18	348.19	388.92	432.76	467.34	508.61
0.50	91.04	126.68	161.97	201.98	242.01	281.10	322.33	367.13	413.80	455.01	496.63	539.60
0.60	93.65	127.30	168.44	205.70	245.21	287.15	336.69	378.20	425.55	473.13	523.91	580.48
0.70	97.49	133.61	171.27	210.35	256.96	305.10	347.97	394.37	442.63	499.41	547.67	610.81
0.80	101.85	137.47	182.51	220.41	265.41	312.66	369.12	416.86	471.21	522.09	573.68	631.71
0.90	106.09	144.05	188.27	230.62	283.79	337.87	381.90	438.06	485.35	554.89	618.78	677.60
1.00	110.86	155.64	200.81	245.91	298.08	350.71	408.72	460.44	524.08	590.73	642.72	697.77
1.10	118.22	160.09	213.57	266.42	313.58	373.00	431.06	491.82	561.06	620.82	695.61	763.66
1.20	124.12	170.95	223.31	283.35	339.68	398.39	459.52	531.53	591.31	662.71	744.10	812.73
1.30	129.91	187.04	234.78	296.30	366.96	431.42	497.82	568.12	640.26	715.66	783.90	866.84
1.40	141.66	196.40	256.94	311.47	383.49	465.71	538.27	614.73	682.94	764.39	848.14	935.49
1.50	146.06	205.51	269.88	340.86	413.66	486.34	580.88	664.07	738.31	826.93	904.02	998.49

Table 45: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ). These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$Y_{M2} \text{ (mK square arcseconds)}$											
0.10	84.11	104.07	123.29	147.38	169.72	194.07	216.94	241.84	271.56	295.63	316.62	341.07
0.20	100.68	125.74	155.77	186.52	219.09	249.69	282.02	313.98	351.81	388.30	423.52	456.45
0.30	103.26	132.36	167.53	202.60	235.61	269.81	304.85	344.98	387.90	425.25	460.33	508.37
0.40	101.72	134.10	170.05	207.96	249.04	284.97	330.50	376.58	412.92	453.82	497.62	542.03
0.50	102.35	135.41	174.61	211.79	255.99	298.02	342.86	393.98	436.74	480.33	532.08	579.88
0.60	101.92	139.68	178.68	218.21	260.41	310.03	359.87	407.87	459.07	507.55	563.32	623.21
0.70	103.09	142.95	181.77	227.61	275.65	319.27	370.71	428.58	477.91	540.10	598.28	651.55
0.80	106.82	144.44	188.29	234.12	281.35	337.69	395.74	446.62	498.85	556.66	628.78	686.64
0.90	113.09	153.18	197.71	249.50	303.04	353.00	404.71	472.92	536.58	595.52	655.76	722.07
1.00	119.53	162.71	210.04	261.32	313.72	371.86	436.48	494.91	555.41	638.32	704.28	781.25
1.10	121.38	172.31	223.30	274.23	332.97	391.26	465.61	525.26	599.15	667.54	737.91	801.93
1.20	132.49	179.83	240.68	296.26	354.78	422.89	489.46	559.15	639.23	708.19	795.34	874.21
1.30	138.80	191.53	251.05	319.40	383.24	450.43	520.21	602.49	671.87	775.97	847.80	926.84
1.40	144.95	209.07	263.29	333.15	413.02	486.16	562.33	642.04	725.20	811.47	907.46	1014.71
1.50	157.81	219.11	287.62	349.46	430.72	523.61	606.76	693.37	771.45	878.28	975.78	1064.32

Table 46: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ). These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$Y_{M2}$ (mK square arcseconds)											
0.10	105.20	132.59	162.32	192.09	223.49	255.27	281.22	316.73	350.74	379.83	410.85	444.65
0.20	115.91	148.43	187.25	223.31	263.83	304.30	346.03	386.55	438.70	480.91	529.33	579.89
0.30	113.44	154.98	190.25	230.67	273.58	314.26	359.25	401.73	458.43	505.90	551.86	599.36
0.40	111.67	151.38	194.74	234.82	277.86	330.55	369.86	421.03	468.75	515.35	569.06	621.06
0.50	110.58	153.35	194.70	238.92	288.08	337.86	386.01	440.28	493.97	543.11	602.93	656.76
0.60	108.95	153.78	195.78	246.03	292.74	349.13	397.10	452.77	510.77	573.26	627.71	695.28
0.70	112.12	155.19	204.03	250.81	299.95	352.92	414.98	477.94	538.33	594.65	661.94	725.36
0.80	115.32	159.67	208.91	255.48	315.78	372.00	430.44	489.63	562.62	623.02	699.75	772.68
0.90	120.09	166.06	218.55	273.07	329.02	379.97	454.20	520.97	583.67	651.83	724.11	816.81
1.00	129.00	173.41	227.90	289.97	343.25	407.05	474.02	555.50	623.54	702.05	775.00	849.38
1.10	131.82	186.57	238.25	302.46	364.15	432.80	508.99	578.65	650.80	717.65	827.62	908.84
1.20	137.89	197.00	256.62	316.33	385.00	453.66	540.75	611.71	698.89	779.38	862.91	939.61
1.30	150.24	205.12	275.88	340.79	408.98	488.63	566.52	648.86	742.49	823.60	926.17	1019.98
1.40	157.13	218.03	286.95	366.33	440.60	518.86	609.77	696.77	792.77	899.15	983.57	1107.77
1.50	163.89	237.57	300.32	381.09	473.73	558.56	647.25	740.34	850.35	940.94	1049.53	1175.30

Table 47: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ). These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$Y_{M2}$ (mK square arcseconds)											
0.10	30.79	39.71	47.66	56.49	68.01	79.91	90.12	7.57	111.29	119.10	11.45	133.71
0.20	50.42	63.50	75.38	89.91	102.57	117.92	134.98	153.03	169.39	187.49	208.98	227.28
0.30	63.08	78.92	96.45	111.51	130.01	148.21	169.28	186.82	207.96	230.08	250.70	273.55
0.40	69.93	89.74	111.57	132.99	152.24	175.24	195.70	221.07	242.80	264.49	286.26	317.70
0.50	74.45	98.71	124.08	146.89	172.81	198.06	224.57	249.18	275.09	301.46	325.67	354.50
0.60	79.13	105.60	133.39	161.29	192.46	220.59	247.19	278.26	309.72	342.55	369.00	405.15
0.70	85.29	112.00	144.86	175.72	206.00	240.27	274.25	310.81	342.02	379.92	411.98	450.72
0.80	88.36	121.40	153.70	185.93	223.49	261.51	297.12	339.59	376.56	419.49	457.03	494.41
0.90	96.20	127.20	167.20	202.60	241.20	284.20	321.35	367.90	410.34	455.29	497.13	547.34
1.00	103.43	138.48	174.99	219.73	260.95	303.42	346.28	403.23	446.92	496.50	547.61	594.50
1.10	109.09	148.90	190.27	232.30	282.19	333.30	378.82	427.83	479.18	538.11	588.24	653.37
1.20	117.03	157.57	204.40	252.25	301.58	359.70	414.82	466.51	518.90	575.69	635.88	706.30
1.30	125.04	171.09	220.27	270.73	326.86	383.45	433.21	509.08	574.06	626.33	695.37	753.68
1.40	137.67	182.88	238.22	291.46	349.88	414.58	480.30	535.19	616.73	690.35	758.90	817.81
1.50	146.21	198.10	254.71	314.85	386.93	446.49	518.36	585.96	654.43	718.01	823.94	899.63

Table 48: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ). These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.



$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$Y_{M2} \text{ (mK square arcseconds)}$											
0.10	52.39	66.29	83.22	96.00	110.06	124.39	140.64	155.87	169.96	181.31	9.77	8.11
0.20	71.93	92.71	117.74	138.62	162.60	187.22	215.69	237.56	258.58	285.75	309.80	335.88
0.30	82.20	105.03	134.53	161.36	188.06	216.59	246.78	277.57	307.46	344.10	374.34	407.46
0.40	89.47	114.99	146.73	175.73	203.73	239.19	270.12	303.36	337.49	374.91	410.02	446.00
0.50	93.46	123.16	157.03	189.22	220.70	256.77	293.88	327.55	361.62	403.13	446.90	484.91
0.60	98.08	130.73	166.39	202.58	244.21	276.58	317.28	355.45	391.38	440.09	480.87	523.06
0.70	100.30	137.95	177.76	219.12	258.08	300.51	345.72	391.77	428.33	478.39	523.85	564.34
0.80	106.61	144.00	189.74	229.62	275.27	326.41	372.31	416.06	466.69	519.62	574.94	619.45
0.90	114.31	153.15	197.85	245.08	294.61	345.07	401.98	450.59	508.21	558.50	620.28	672.48
1.00	119.63	164.34	212.90	261.22	319.35	376.08	431.03	483.96	544.70	608.96	677.25	736.42
1.10	126.01	174.42	228.33	279.55	335.83	403.40	458.64	526.65	591.62	652.81	724.22	792.69
1.20	135.01	187.90	239.23	302.98	362.96	425.29	487.49	564.28	628.48	709.03	785.06	855.51
1.30	143.03	200.19	257.41	317.11	393.03	461.49	526.61	597.80	672.09	766.41	840.77	927.50
1.40	152.13	210.12	274.12	341.09	410.49	492.70	576.86	644.10	728.08	811.20	916.01	1000.59
1.50	164.11	226.41	293.12	365.51	446.80	520.35	614.69	703.98	787.57	873.13	966.17	1065.61

Table 49: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ). These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$Y_{M2} \text{ (mK square arcseconds)}$											
0.10	50.28	61.17	72.17	86.17	97.30	111.80	123.24	133.73	149.50	10.92	7.97	15.00
0.20	78.28	96.46	116.02	136.66	160.02	181.61	204.01	229.95	252.50	271.65	298.01	319.32
0.30	89.19	115.01	139.59	167.22	196.77	223.57	255.44	281.75	314.50	349.19	377.44	410.42
0.40	96.69	123.38	155.34	184.37	218.43	252.71	285.49	320.31	359.89	392.79	428.49	470.47
0.50	102.43	135.80	165.98	200.76	237.32	275.02	311.06	352.63	392.29	434.21	474.79	519.93
0.60	107.65	143.05	178.35	221.17	257.87	296.49	335.48	386.08	428.27	470.56	514.11	567.06
0.70	112.57	148.30	189.85	232.74	277.68	322.30	368.86	418.40	465.55	507.06	563.14	613.49
0.80	115.69	157.76	201.63	247.47	298.75	346.21	398.12	453.13	509.39	555.17	616.41	672.30
0.90	123.29	165.81	214.31	263.93	318.65	372.91	434.27	485.85	548.37	610.50	681.83	732.85
1.00	131.53	176.90	227.50	285.03	342.36	399.10	464.02	527.75	596.77	657.66	719.03	792.35
1.10	137.01	188.91	242.68	298.82	366.33	427.95	502.21	564.14	636.84	712.53	794.38	864.26
1.20	144.75	199.52	262.24	322.15	387.44	466.61	531.88	611.32	688.38	760.30	845.22	934.53
1.30	153.40	214.02	273.54	347.77	417.06	489.73	567.10	658.92	735.61	824.39	912.00	995.06
1.40	164.51	227.16	293.34	362.55	449.67	529.34	612.45	695.61	799.57	885.02	993.72	1076.92
1.50	174.60	237.64	313.58	393.84	469.53	569.96	660.99	755.85	841.58	940.84	1066.82	1166.61

Table 50: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ). These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$Y_{M2}$ (mK square arcseconds)											
0.10	66.82	84.06	100.37	117.55	133.11	149.94	166.00	182.43	202.12	218.15	231.10	11.43
0.20	94.86	121.38	150.03	177.89	205.11	232.28	261.78	291.39	321.11	348.05	378.52	405.92
0.30	104.61	136.08	169.35	202.93	237.18	274.43	313.77	353.78	399.14	434.96	470.46	509.45
0.40	110.44	144.28	182.69	218.59	259.37	299.43	340.77	385.51	432.88	477.84	526.60	574.26
0.50	115.15	150.96	191.72	231.69	271.59	318.89	365.51	412.29	461.79	516.13	564.17	615.53
0.60	118.51	158.62	202.57	245.97	288.29	341.55	389.01	435.83	495.53	544.65	602.12	658.17
0.70	121.47	166.15	211.00	262.08	312.95	360.18	415.56	465.06	528.48	586.83	642.81	695.69
0.80	128.08	175.00	222.61	278.59	328.88	389.48	450.88	506.45	565.40	624.61	683.53	761.74
0.90	132.75	184.63	235.88	292.85	352.76	417.59	473.50	546.73	621.07	677.29	742.76	812.85
1.00	141.59	192.62	253.41	312.96	375.75	440.33	516.59	585.46	650.86	727.98	807.44	891.98
1.10	145.63	206.72	264.45	333.38	405.68	474.43	546.56	625.19	709.39	789.59	865.17	956.08
1.20	155.95	219.70	283.90	351.22	431.60	505.86	584.26	670.61	758.31	850.18	941.25	1034.93
1.30	165.31	231.18	301.69	376.75	454.29	532.35	626.50	722.41	814.92	901.53	1004.59	1112.15
1.40	175.95	247.13	317.32	405.05	487.00	576.80	665.07	774.68	866.33	972.19	1077.59	1191.58
1.50	188.19	261.50	339.17	421.95	523.17	617.35	715.31	814.67	937.38	1039.24	1168.33	1290.87

Table 51: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ). These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\chi_{Y_{M2}} \text{ (assuming } 100 \mu\text{K RMS)}$											
0.10	0.83	1.03	1.21	1.39	1.57	1.74	1.93	2.11	2.30	2.48	2.67	2.87
0.20	1.22	1.52	1.83	2.14	2.42	2.72	3.02	3.30	3.62	3.89	4.19	4.45
0.30	1.41	1.81	2.20	2.58	2.99	3.37	3.75	4.15	4.55	4.95	5.31	5.69
0.40	1.55	2.00	2.46	2.93	3.39	3.88	4.33	4.81	5.30	5.79	6.26	6.72
0.50	1.68	2.19	2.72	3.24	3.77	4.29	4.87	5.41	5.99	6.54	7.09	7.64
0.60	1.82	2.38	2.95	3.55	4.13	4.78	5.40	6.01	6.63	7.24	7.93	8.56
0.70	1.98	2.59	3.23	3.91	4.55	5.23	5.93	6.59	7.37	8.06	8.77	9.52
0.80	2.16	2.84	3.53	4.26	4.99	5.78	6.53	7.34	8.11	8.89	9.65	10.55
0.90	2.32	3.08	3.90	4.69	5.50	6.32	7.17	8.12	8.96	9.91	10.76	11.66
1.00	2.55	3.35	4.23	5.14	6.05	6.97	7.92	8.92	9.86	10.85	11.91	12.90
1.10	2.77	3.69	4.60	5.60	6.67	7.70	8.75	9.78	10.87	11.96	13.10	14.25
1.20	3.00	4.00	5.07	6.11	7.26	8.43	9.60	10.80	12.01	13.16	14.42	15.68
1.30	3.23	4.33	5.51	6.72	7.91	9.17	10.55	11.88	13.23	14.52	15.91	17.23
1.40	3.53	4.71	6.04	7.38	8.69	10.03	11.47	12.92	14.46	15.97	17.52	18.98
1.50	3.85	5.11	6.53	8.00	9.54	11.02	12.52	14.15	15.78	17.52	19.23	20.96

Table 52: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ) times square root of  $N_{beam}$  within  $R_{half}$  divided by  $100\mu\text{K}$  and beam volume. Therefore, this is an estimate of the detection significance (in  $\sigma$ ) for an assumed RMS of  $100\mu\text{K}$ . However, these values should be understood to be optimistic, in so far as the cluster has **exactly** an A10 profile and is **exactly** spherical. These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\chi_{Y_{M2}} \text{ (assuming } 100 \mu\text{K RMS)}$											
0.10	1.10	1.36	1.60	1.89	2.16	2.43	2.73	2.98	3.24	3.49	3.78	4.03
0.20	1.48	1.86	2.23	2.65	3.04	3.46	3.85	4.24	4.64	5.02	5.43	5.84
0.30	1.66	2.13	2.62	3.10	3.59	4.08	4.56	5.05	5.55	6.04	6.54	7.05
0.40	1.79	2.32	2.88	3.44	4.03	4.60	5.16	5.76	6.33	6.93	7.49	8.09
0.50	1.91	2.51	3.12	3.77	4.42	5.06	5.72	6.40	7.08	7.74	8.40	9.07
0.60	2.05	2.70	3.40	4.08	4.79	5.51	6.28	7.00	7.76	8.52	9.29	10.12
0.70	2.21	2.93	3.66	4.41	5.23	6.05	6.84	7.67	8.49	9.38	10.21	11.15
0.80	2.39	3.16	4.00	4.80	5.67	6.56	7.51	8.41	9.34	10.27	11.19	12.18
0.90	2.58	3.42	4.32	5.22	6.21	7.22	8.16	9.19	10.16	11.28	12.37	13.44
1.00	2.79	3.74	4.71	5.71	6.77	7.84	8.95	10.03	11.20	12.39	13.48	14.60
1.10	3.03	4.03	5.13	6.25	7.36	8.56	9.76	10.99	12.29	13.53	14.87	16.17
1.20	3.27	4.38	5.55	6.81	8.07	9.35	10.67	12.07	13.39	14.81	16.30	17.71
1.30	3.53	4.79	6.01	7.37	8.82	10.25	11.69	13.19	14.70	16.25	17.75	19.37
1.40	3.85	5.17	6.58	7.98	9.54	11.19	12.78	14.43	16.03	17.74	19.47	21.24
1.50	4.13	5.58	7.11	8.73	10.40	12.09	13.96	15.77	17.53	19.41	21.22	23.17

Table 53: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ) times square root of  $N_{beam}$  within  $R_{half}$  divided by  $100\mu\text{K}$  and beam volume. Therefore, this is an estimate of the detection significance (in  $\sigma$ ) for an assumed RMS of  $100\mu\text{K}$ . However, these values should be understood to be optimistic, in so far as the cluster has **exactly** an A10 profile and is **exactly** spherical. These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\chi Y_{M2}$ (assuming 100 $\mu$ K RMS)											
0.10	1.14	1.39	1.62	1.88	2.13	2.39	2.63	2.87	3.15	3.38	3.61	3.84
0.20	1.57	1.94	2.35	2.75	3.16	3.55	3.95	4.34	4.76	5.16	5.56	5.94
0.30	1.77	2.24	2.74	3.25	3.75	4.24	4.74	5.25	5.80	6.30	6.79	7.33
0.40	1.90	2.44	3.02	3.60	4.21	4.79	5.41	6.03	6.62	7.21	7.83	8.44
0.50	2.03	2.63	3.28	3.92	4.61	5.29	5.98	6.70	7.38	8.07	8.80	9.50
0.60	2.16	2.84	3.54	4.26	4.99	5.78	6.57	7.34	8.14	8.93	9.76	10.60
0.70	2.30	3.06	3.81	4.63	5.47	6.28	7.15	8.05	8.91	9.86	10.77	11.65
0.80	2.48	3.27	4.12	5.00	5.90	6.87	7.85	8.79	9.73	10.74	11.81	12.80
0.90	2.69	3.56	4.48	5.46	6.48	7.47	8.49	9.62	10.73	11.81	12.90	14.04
1.00	2.91	3.86	4.87	5.93	7.01	8.14	9.33	10.48	11.65	12.98	14.20	15.49
1.10	3.11	4.19	5.30	6.44	7.64	8.86	10.20	11.45	12.81	14.13	15.48	16.78
1.20	3.39	4.52	5.78	7.04	8.33	9.71	11.08	12.50	14.00	15.43	17.00	18.51
1.30	3.66	4.91	6.24	7.68	9.10	10.57	12.07	13.68	15.21	16.99	18.57	20.20
1.40	3.93	5.36	6.75	8.28	9.93	11.55	13.20	14.90	16.65	18.43	20.28	22.22
1.50	4.28	5.77	7.37	8.95	10.71	12.58	14.41	16.28	18.11	20.16	22.16	24.10

Table 54: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ) times square root of  $N_{beam}$  within  $R_{half}$  divided by  $100\mu$ K and beam volume. Therefore, this is an estimate of the detection significance (in  $\sigma$ ) for an assumed RMS of  $100\mu$ K. However, these values should be understood to be optimistic, in so far as the cluster has **exactly** an A10 profile and is **exactly** spherical. These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\chi_{Y_{M2}} \text{ (assuming } 100 \mu\text{K RMS)}$											
0.10	1.33	1.64	1.96	2.27	2.59	2.91	3.20	3.53	3.85	4.14	4.44	4.75
0.20	1.73	2.19	2.67	3.13	3.60	4.08	4.56	5.03	5.55	6.02	6.52	7.02
0.30	1.91	2.48	3.02	3.59	4.17	4.74	5.32	5.89	6.53	7.11	7.70	8.28
0.40	2.04	2.66	3.31	3.95	4.60	5.30	5.93	6.62	7.30	7.97	8.67	9.36
0.50	2.16	2.86	3.55	4.27	5.02	5.78	6.53	7.31	8.09	8.85	9.66	10.44
0.60	2.28	3.05	3.81	4.62	5.42	6.29	7.10	7.97	8.85	9.75	10.61	11.55
0.70	2.44	3.26	4.11	4.97	5.85	6.77	7.74	8.73	9.69	10.64	11.65	12.64
0.80	2.62	3.50	4.42	5.35	6.37	7.38	8.40	9.44	10.57	11.62	12.77	13.91
0.90	2.82	3.77	4.79	5.84	6.90	7.95	9.16	10.33	11.48	12.67	13.89	15.23
1.00	3.06	4.07	5.17	6.35	7.48	8.70	9.94	11.30	12.57	13.92	15.24	16.57
1.10	3.28	4.43	5.59	6.87	8.14	9.48	10.88	12.25	13.65	15.02	16.69	18.17
1.20	3.53	4.79	6.09	7.43	8.84	10.27	11.84	13.33	14.94	16.50	18.10	19.67
1.30	3.85	5.16	6.63	8.09	9.60	11.22	12.83	14.50	16.26	17.95	19.79	21.60
1.40	4.14	5.59	7.14	8.80	10.46	12.18	14.00	15.82	17.72	19.69	21.54	23.68
1.50	4.45	6.09	7.69	9.48	11.38	13.26	15.19	17.18	19.31	21.31	23.46	25.74

Table 55: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ) times square root of  $N_{beam}$  within  $R_{half}$  divided by  $100\mu\text{K}$  and beam volume. Therefore, this is an estimate of the detection significance (in  $\sigma$ ) for an assumed RMS of  $100\mu\text{K}$ . However, these values should be understood to be optimistic, in so far as the cluster has **exactly** an A10 profile and is **exactly** spherical. These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500}$ ( $10^{14}M_{\odot}$ )											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\chi_{Y_{M2}}$ (assuming $100 \mu\text{K}$ RMS)											
0.10	0.44	0.54	0.63	0.72	0.82	0.93	1.03	0.30	1.23	1.31	0.33	1.47
0.20	0.77	0.94	1.11	1.28	1.44	1.60	1.78	1.96	2.12	2.30	2.49	2.65
0.30	1.01	1.25	1.50	1.72	1.96	2.19	2.44	2.66	2.90	3.14	3.36	3.60
0.40	1.20	1.51	1.83	2.13	2.42	2.73	3.02	3.34	3.63	3.92	4.20	4.52
0.50	1.36	1.74	2.12	2.48	2.86	3.23	3.60	3.96	4.33	4.69	5.03	5.40
0.60	1.52	1.96	2.40	2.84	3.29	3.73	4.15	4.60	5.04	5.49	5.91	6.37
0.70	1.69	2.18	2.70	3.21	3.71	4.23	4.75	5.29	5.78	6.31	6.81	7.34
0.80	1.85	2.43	3.00	3.57	4.17	4.77	5.35	5.98	6.56	7.18	7.77	8.36
0.90	2.06	2.67	3.34	3.99	4.65	5.34	5.99	6.70	7.39	8.08	8.75	9.48
1.00	2.27	2.96	3.67	4.43	5.17	5.92	6.68	7.52	8.27	9.06	9.86	10.63
1.10	2.48	3.26	4.07	4.87	5.74	6.61	7.45	8.32	9.19	10.11	10.97	11.93
1.20	2.72	3.57	4.48	5.39	6.33	7.32	8.29	9.25	10.21	11.19	12.19	13.27
1.30	2.97	3.93	4.92	5.93	6.99	8.04	9.07	10.26	11.38	12.42	13.57	14.65
1.40	3.27	4.29	5.41	6.51	7.66	8.86	10.08	11.23	12.54	13.80	15.05	16.22
1.50	3.56	4.70	5.91	7.15	8.47	9.73	11.08	12.41	13.73	15.03	16.61	17.99

Table 56: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ) times square root of  $N_{beam}$  within  $R_{half}$  divided by  $100\mu\text{K}$  and beam volume. Therefore, this is an estimate of the detection significance (in  $\sigma$ ) for an assumed RMS of  $100\mu\text{K}$ . However, these values should be understood to be optimistic, in so far as the cluster has **exactly** an A10 profile and is **exactly** spherical. These values apply to the scan pattern beauty2.5 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\chi_{Y_{M2}} \text{ (assuming } 100 \mu\text{K RMS)}$											
0.10	0.63	0.78	0.93	1.06	1.20	1.34	1.50	1.65	1.78	1.91	0.43	0.41
0.20	0.99	1.23	1.49	1.72	1.97	2.22	2.49	2.71	2.94	3.19	3.43	3.68
0.30	1.24	1.55	1.88	2.20	2.52	2.85	3.19	3.51	3.83	4.18	4.50	4.83
0.40	1.43	1.81	2.21	2.60	2.99	3.40	3.80	4.20	4.59	4.99	5.40	5.80
0.50	1.60	2.05	2.52	2.98	3.43	3.91	4.39	4.85	5.30	5.79	6.28	6.76
0.60	1.77	2.28	2.81	3.35	3.91	4.43	4.99	5.54	6.05	6.64	7.19	7.75
0.70	1.92	2.52	3.13	3.75	4.36	4.99	5.63	6.28	6.86	7.53	8.16	8.78
0.80	2.11	2.76	3.46	4.14	4.84	5.58	6.29	6.99	7.72	8.46	9.21	9.93
0.90	2.32	3.04	3.79	4.57	5.37	6.17	7.01	7.80	8.64	9.44	10.30	11.12
1.00	2.53	3.34	4.19	5.04	5.96	6.87	7.76	8.66	9.59	10.55	11.52	12.45
1.10	2.76	3.66	4.60	5.54	6.53	7.58	8.55	9.61	10.65	11.68	12.74	13.82
1.20	3.02	4.02	5.02	6.11	7.20	8.30	9.40	10.60	11.72	12.94	14.14	15.30
1.30	3.28	4.38	5.50	6.65	7.92	9.15	10.36	11.62	12.89	14.29	15.57	16.93
1.40	3.57	4.76	6.00	7.29	8.61	10.02	11.44	12.77	14.21	15.65	17.21	18.66
1.50	3.90	5.20	6.55	7.96	9.46	10.92	12.50	14.08	15.62	17.18	18.78	20.43

Table 57: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ) times square root of  $N_{beam}$  within  $R_{half}$  divided by  $100\mu\text{K}$  and beam volume. Therefore, this is an estimate of the detection significance (in  $\sigma$ ) for an assumed RMS of  $100\mu\text{K}$ . However, these values should be understood to be optimistic, in so far as the cluster has **exactly** an A10 profile and is **exactly** spherical. These values apply to the scan pattern beauty2.5 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.



$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\chi_{Y_{M2}} \text{ (assuming } 100 \mu\text{K RMS)}$											
0.10	0.62	0.74	0.85	0.99	1.11	1.25	1.35	1.46	1.60	0.41	0.37	0.45
0.20	1.05	1.27	1.50	1.73	1.97	2.20	2.42	2.65	2.89	3.09	3.33	3.54
0.30	1.31	1.64	1.95	2.28	2.62	2.93	3.27	3.57	3.90	4.24	4.54	4.86
0.40	1.52	1.91	2.32	2.72	3.14	3.55	3.95	4.35	4.79	5.17	5.57	5.99
0.50	1.70	2.18	2.64	3.12	3.61	4.11	4.59	5.08	5.58	6.08	6.57	7.07
0.60	1.88	2.42	2.96	3.54	4.10	4.66	5.22	5.82	6.40	6.97	7.54	8.14
0.70	2.06	2.65	3.29	3.93	4.59	5.25	5.91	6.58	7.25	7.89	8.58	9.24
0.80	2.23	2.92	3.63	4.35	5.11	5.85	6.61	7.38	8.16	8.90	9.70	10.47
0.90	2.44	3.20	4.00	4.81	5.65	6.50	7.39	8.21	9.11	10.00	10.93	11.74
1.00	2.67	3.51	4.39	5.32	6.25	7.19	8.17	9.14	10.15	11.12	12.08	13.11
1.10	2.90	3.84	4.81	5.81	6.88	7.92	9.04	10.09	11.21	12.34	13.51	14.61
1.20	3.15	4.19	5.29	6.39	7.53	8.76	9.92	11.16	12.40	13.60	14.87	16.19
1.30	3.43	4.57	5.74	7.01	8.27	9.56	10.87	12.29	13.62	15.02	16.42	17.80
1.40	3.74	4.97	6.27	7.61	9.07	10.50	11.95	13.42	15.02	16.50	18.14	19.63
1.50	4.05	5.38	6.83	8.34	9.83	11.49	13.11	14.75	16.36	18.04	19.89	21.60

Table 58: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ) times square root of  $N_{beam}$  within  $R_{half}$  divided by  $100\mu\text{K}$  and beam volume. Therefore, this is an estimate of the detection significance (in  $\sigma$ ) for an assumed RMS of  $100\mu\text{K}$ . However, these values should be understood to be optimistic, in so far as the cluster has **exactly** an A10 profile and is **exactly** spherical. These values apply to the scan pattern beauty3 reduced with 5 PCA components and a high pass at 0.08 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

$z$	$M_{500} (10^{14} M_{\odot})$											
	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50
	$\chi_{Y_{M2}} \text{ (assuming } 100 \mu\text{K RMS)}$											
0.10	0.76	0.93	1.09	1.26	1.42	1.58	1.72	1.89	2.06	2.22	2.35	0.50
0.20	1.20	1.49	1.79	2.08	2.36	2.64	2.92	3.21	3.50	3.76	4.04	4.32
0.30	1.46	1.85	2.24	2.62	3.00	3.40	3.80	4.19	4.62	5.00	5.36	5.74
0.40	1.67	2.13	2.60	3.06	3.54	4.02	4.49	4.98	5.48	5.96	6.45	6.95
0.50	1.85	2.37	2.92	3.46	4.00	4.58	5.14	5.70	6.28	6.87	7.43	8.01
0.60	2.02	2.62	3.25	3.87	4.48	5.15	5.79	6.42	7.11	7.75	8.43	9.10
0.70	2.19	2.88	3.57	4.29	5.01	5.73	6.47	7.19	7.97	8.73	9.48	10.20
0.80	2.39	3.15	3.92	4.74	5.53	6.38	7.22	8.05	8.90	9.73	10.56	11.49
0.90	2.59	3.44	4.30	5.20	6.11	7.06	7.96	8.95	9.95	10.85	11.81	12.79
1.00	2.83	3.74	4.73	5.71	6.72	7.75	8.84	9.90	10.94	12.04	13.15	14.29
1.10	3.05	4.10	5.14	6.26	7.41	8.54	9.70	10.90	12.14	13.35	14.54	15.81
1.20	3.33	4.47	5.63	6.83	8.11	9.37	10.65	12.00	13.34	14.73	16.10	17.49
1.30	3.62	4.85	6.14	7.47	8.83	10.21	11.68	13.19	14.68	16.13	17.68	19.26
1.40	3.93	5.28	6.66	8.17	9.66	11.21	12.75	14.45	16.04	17.72	19.41	21.14
1.50	4.27	5.73	7.25	8.83	10.55	12.24	13.96	15.71	17.61	19.38	21.33	23.25

Table 59: MUSTANG-2 integrated SZ signal ( $Y_{M2}$ ) times square root of  $N_{beam}$  within  $R_{half}$  divided by  $100\mu\text{K}$  and beam volume. Therefore, this is an estimate of the detection significance (in  $\sigma$ ) for an assumed RMS of  $100\mu\text{K}$ . However, these values should be understood to be optimistic, in so far as the cluster has **exactly** an A10 profile and is **exactly** spherical. These values apply to the scan pattern beauty3 reduced with 6 PCA components and a high pass at 0.06 Hz and a low pass at 40 Hz. These values apply for the overall A10 pressure profile.

Finally, a better metric of the total significance of a MUSTANG-2 detection will be approximated by some kind of integrated SZ signal. However, it should be clear that the filtering of MUSTANG-2 observations is non-trivial, as such, the detection significance of a cluster cannot be established from some unfiltered integrated SZ (the so-called integrated Compton  $Y$ ). Rather, let us take an integrated SZ signal to be the SZ signal that MUSTANG sees within  $R_{half}$  (see Section 3.2.4). We do not report the integrated values here, but rather we show the ratios of the integrated quantities (referred to as  $Y_{M2}$  between different scan patterns and filtering values. Should you want to calculate the integrated quantities, one can approximate the SZ signal as a Gaussian, using the peaks tabulated in Section 3.2.2 and the  $R_{half}$  tabulated in Section 3.2.4.

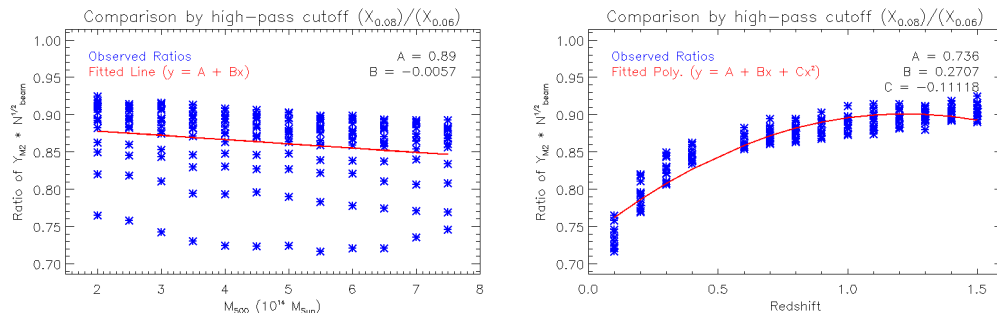


Figure 14: The ratio of integrated SZ significance (within  $R_{half}$ ) for scans with radius  $2'.5$ , when high-pass filtered at  $0.08$  Hz versus the peaks when high-pass filtered at  $0.06$  Hz. This highlights the filtering difference within data processing. Left: plotted versus  $M_{500}$ , right: plotted versus redshift.

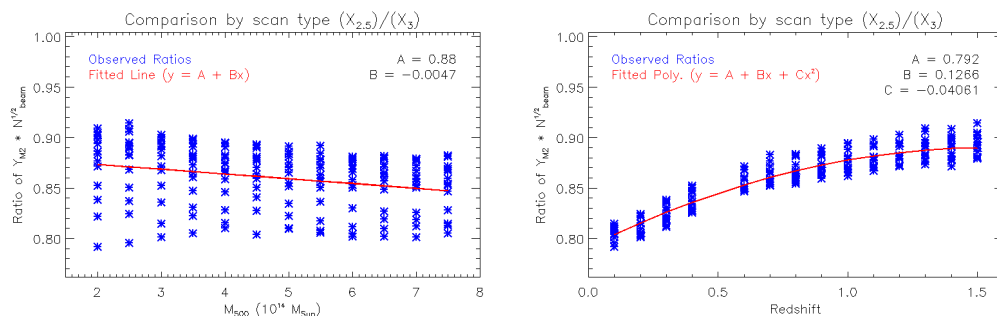


Figure 15: The ratio of integrated SZ significance (within  $R_{half}$ ) for scans when high-pass filtered at  $0.06$  Hz:  $2'.5$  vs.  $3'$ scans. This highlights the filtering difference by the observing scan pattern used. Left: plotted versus  $M_{500}$ , right: plotted versus redshift.

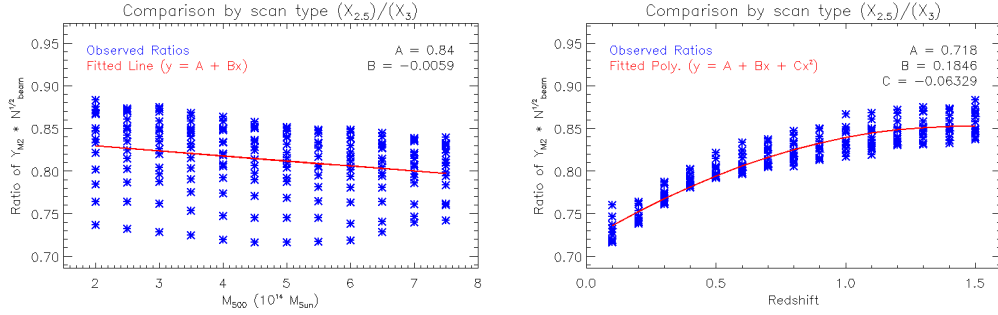


Figure 16: The ratio of integrated SZ significance (within  $R_{half}$ ) for scans when high-pass filtered at 0.08 Hz: 2'.5 vs. 3'scans. This highlights the filtering difference by the observing scan pattern used. Left: plotted versus  $M_{500}$ , right: plotted versus redshift.

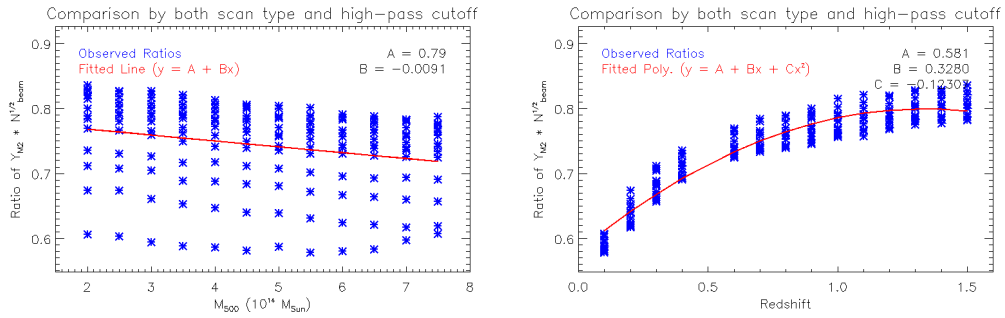


Figure 17: The ratio of integrated SZ significance (within  $R_{half}$ ) for scans 2'.5 when high-pass filtered at 0.08 Hz vs. 3'scans when high-pass filtered at 0.06 Hz. This simply shows the combined effect of different data processing and different scan type. Left: plotted versus  $M_{500}$ , right: plotted versus redshift.

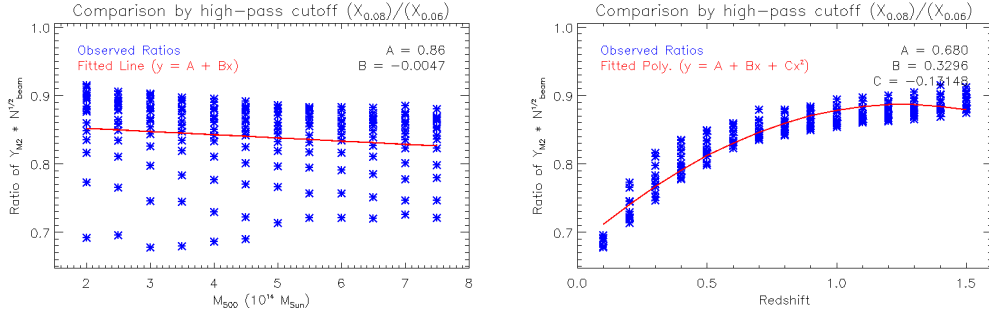


Figure 18: The ratio of integrated SZ significance (within  $R_{\text{half}}$ ) for scans with radius  $2'.5$ , when high-pass filtered at 0.08 Hz versus the peaks when high-pass filtered at 0.06 Hz. This highlights the filtering difference within data processing. Left: plotted versus  $M_{500}$ , right: plotted versus redshift. This applies to morphologically disturbed clusters.

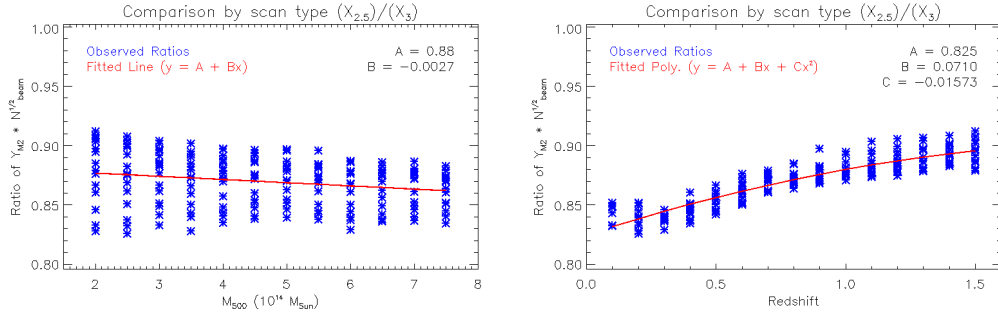


Figure 19: The ratio of integrated SZ significance (within  $R_{\text{half}}$ ) for scans when high-pass filtered at 0.06 Hz:  $2'.5$  vs.  $3'$ scans. This highlights the filtering difference by the observing scan pattern used. Left: plotted versus  $M_{500}$ , right: plotted versus redshift. This applies to morphologically disturbed clusters.

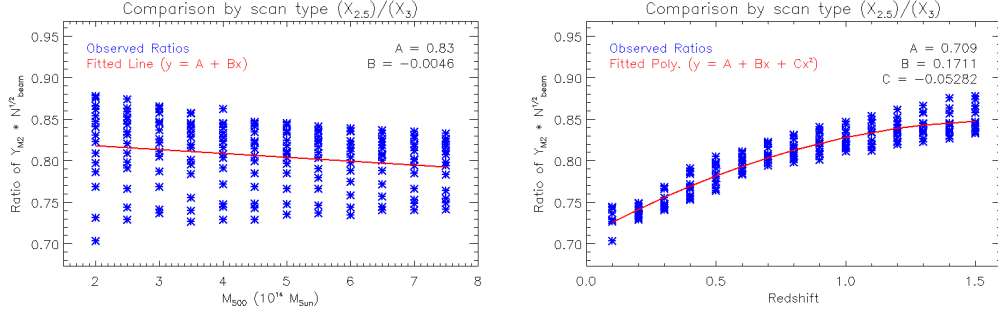


Figure 20: The ratio of integrated SZ significance (within  $R_{half}$ ) for scans when high-pass filtered at 0.08 Hz: 2'.5 vs. 3'scans. This highlights the filtering difference by the observing scan pattern used. Left: plotted versus  $M_{500}$ , right: plotted versus redshift. This applies to morphologically disturbed clusters.

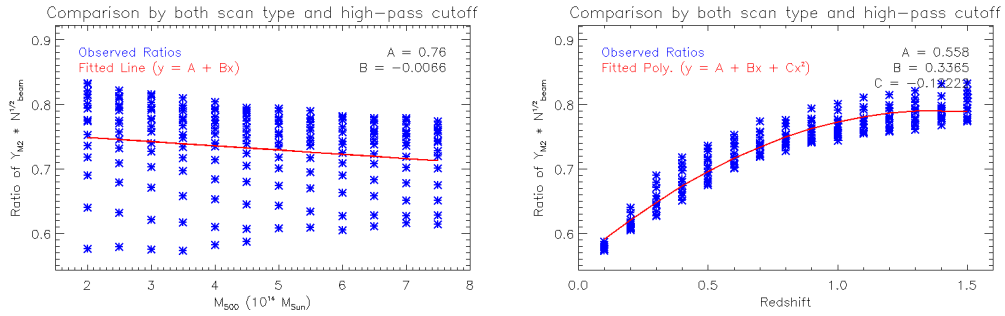


Figure 21: The ratio of integrated SZ significance (within  $R_{half}$ ) for scans 2'.5 when high-pass filtered at 0.08 Hz vs. 3'scans when high-pass filtered at 0.06 Hz. This simply shows the combined effect of different data processing and different scan type. Left: plotted versus  $M_{500}$ , right: plotted versus redshift. This applies to morphologically disturbed clusters.

Project	$\tau_{z,90}$	elev <sub>3'</sub> (deg.)	elev <sub>2'.5</sub> (deg.)	$N_{3'}$	$N_{2'.5}$	$S_{3',0.08}$ ( $\mu\text{K hr}^{1/2}$ )	$S_{2'.5,0.08}$ ( $\mu\text{K hr}^{1/2}$ )	$S_{3',0.06}$ ( $\mu\text{K hr}^{1/2}$ )	$S_{2'.5,0.06}$ ( $\mu\text{K hr}^{1/2}$ )
AGBT18B_215_01	0.06	49.0	–	123.9	–	57.8	–	–	–
AGBT18B_215_02	0.06	53.1	–	83.3	–	81.0	–	–	–
AGBT18B_215_03	–	–	–	–	–	–	–	–	–
AGBT18B_215_04	0.12	40.4	43.0	46	20	129.3	103.7	63.9	53.2
AGBT18B_215_05	0.21	57.0	48.9	19	9	65.8	63.5	68.0	69.8
AGBT18B_215_06	0.16	57.8	54.6	29	17	112.7	74.9	114.5	77.7
AGBT18B_215_07	0.17	57.9	57.9	2	1	167.3	236.0	214.6	247.6
AGBT18B_215_08	0.08	52.4	52.3	16	17	54.4	47.7	54.4	46.9
AGBT18B_215_09	0.09	69.3	68.8	9	10	83.5	77.2	90.3	79.6
AGBT18B_215_10	0.06	64.6	65.3	21	19	56.0	50.0	57.4	51.1
AGBT18B_215_11	0.17	59.4	59.5	10	5	316.5	271.2	288.3	287.8
AGBT18B_215_12	0.12	59.7	61.9	9	6	108.9	76.9	64.2	59.0

Table 60: Overview of the mapping speeds and some associated values.

### 3.3 Concluding Remarks about cluster signal

In this test, we’ve used the overall A10 pressure profile. As mentioned previously, at higher redshift, there is an expectation for there to be more disturbed clusters. The disturbed cluster pressure profile is shallower in the core; i.e. it is less peaky, and will have a shallower slope of the surface brightness profile. This means that (a) the peak will be reduced, and (b) gentler filtering will be more important. This would advocate for the 3’ scan.

## 4 Expected Noise

The noise in our maps is very dependant on the weather, and it does not necessarily scale with opacity (see, for example, Table 60). Here, we do not investigate the causes of noise, but focus primarily on the performance difference between our scans of 2’.5 radius and 3’ radius. These scans have been dubbed "Beauty2.5" and "Beauty3" respectively. While there may be proposals which depend keenly on the noise profile, given the general agreement, we focus on the noise within 2’, quantified as  $\sigma_{2'}$ . We often scale this by the square root of the integration time so as to give a heuristic mapping speed.

Our overall finding is that the Beauty2.5 scans have **85-88%** the noise as the Beauty3 scans for the same integration time (as measured within 2’), and as seen in Figures 22 and 23. The mapping speeds presented in these figures is a weighted average. The unweighted average mapping speeds are 76.5 and 86.1  $\mu\text{K hr}^{1/2}$  for the Beauty2.5 and Beauty3 scans, respectively, when filtered by PCA 6 and 0.06 Hz high-pass cutoff. When filtering by PCA 5 and 0.08 Hz, the respective unweighted average mapping speeds are 84.7 and 109.1  $\mu\text{K hr}^{1/2}$ . Here, we wish to highlight that while we have a great weighted average noise, the weighted average is more indicative of an achievable noise over *many* nights (on the same target). However, for targets requiring small integration time, a single bad night can obviously be very disruptive to achieving the desired map noise.

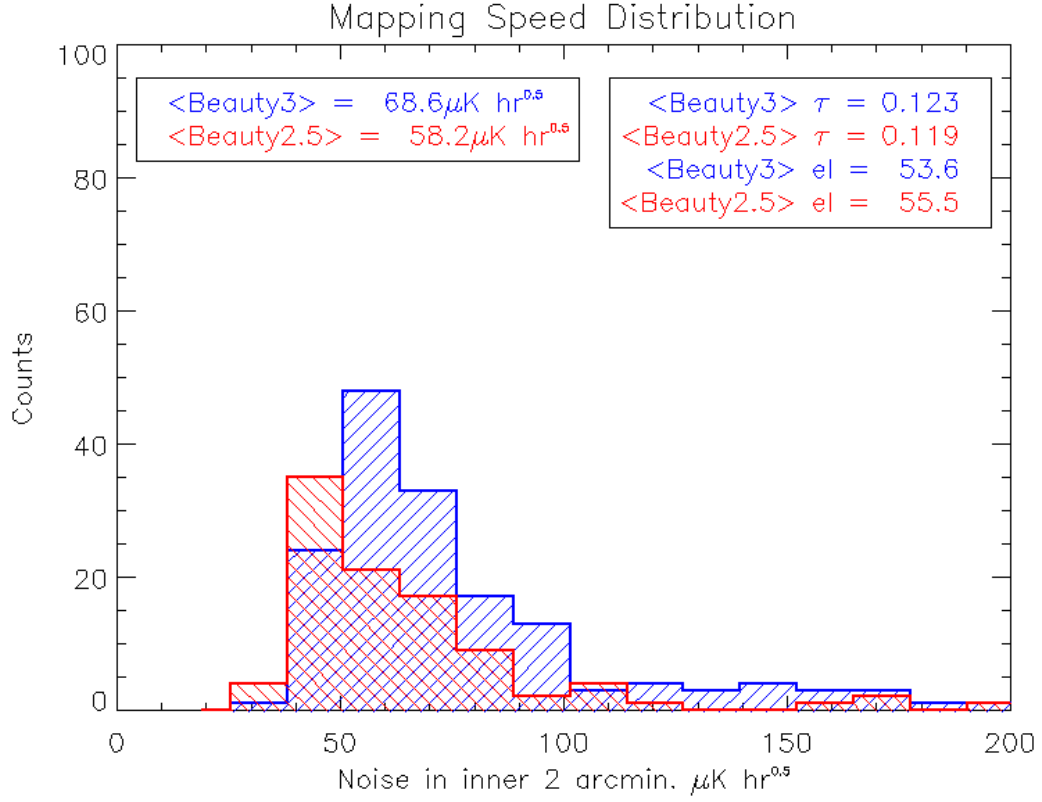


Figure 22: Mapping speeds across the AGBT18B\_215 project with data processing parameters of PCA 5 and 0.08 Hz high-pass cutoff

#### 4.1 Highlights from individual sessions (nights)

For posterity, here are some RMS profiles, on a per-project basis. One can also ascertain the overall noise levels per project.



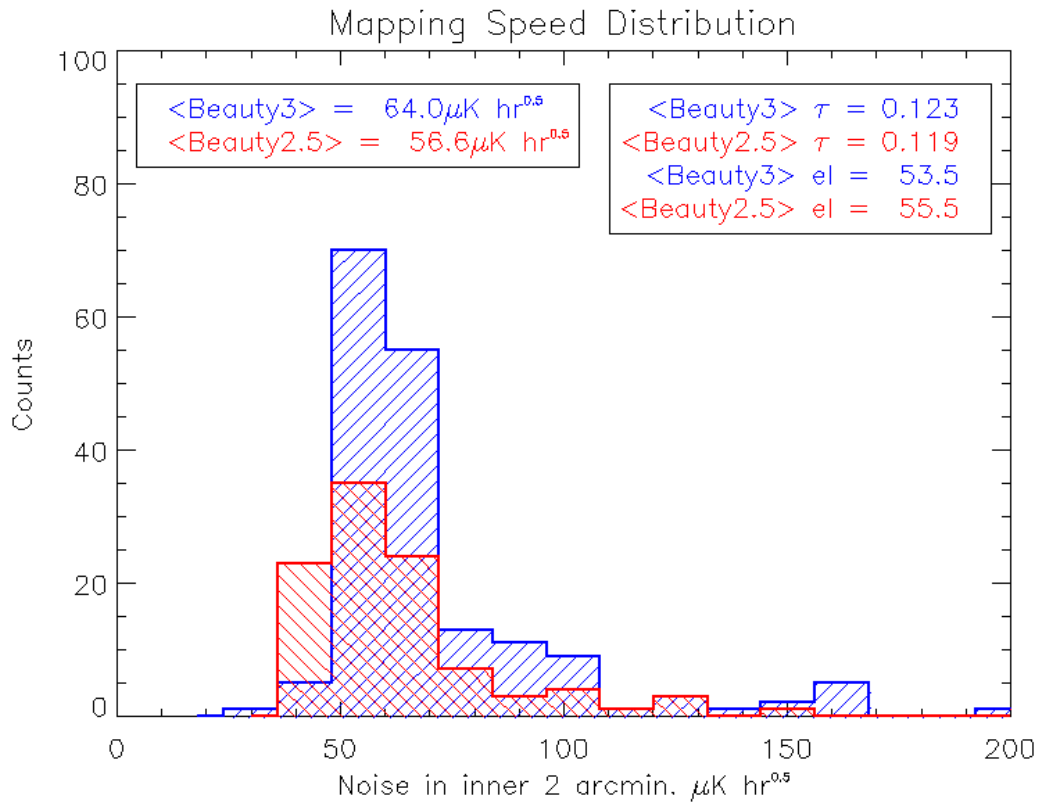


Figure 23: Mapping speeds across the AGBT18B-215 project with data processing parameters of PCA 6 and 0.06 Hz high-pass cutoff

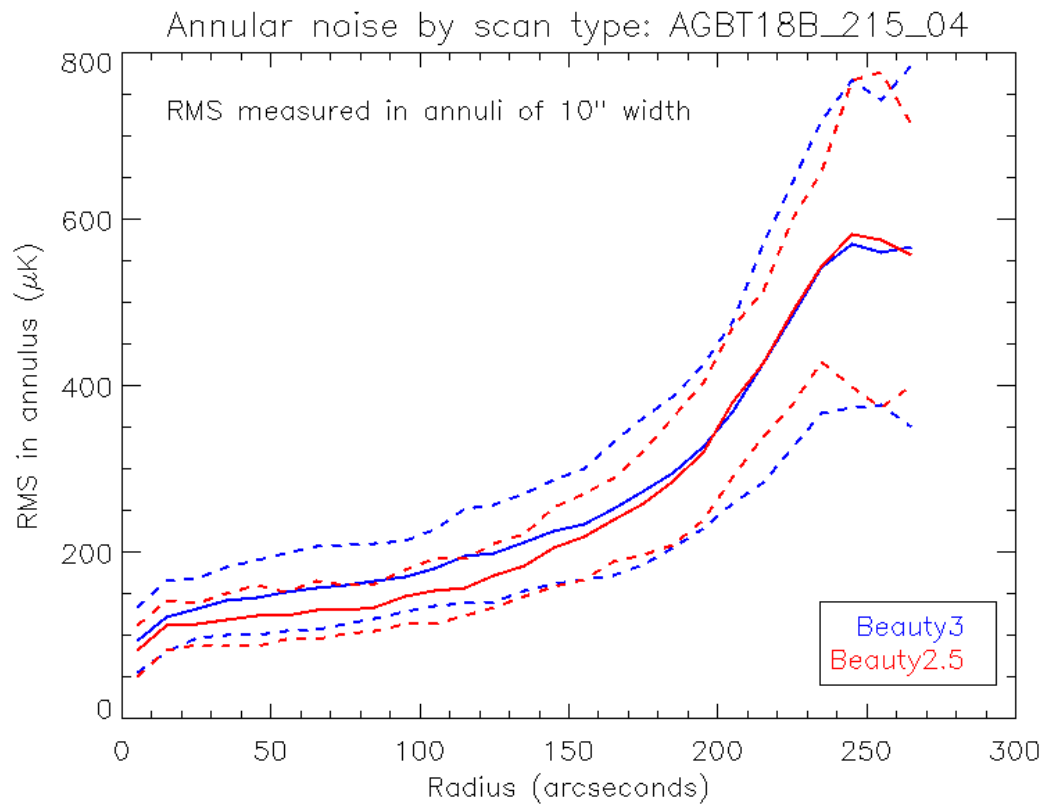


Figure 24: Noise profiles for our two scan types (2'.5 and 3' radius scans) for the fourth night in the project AGBT18B.215. There is overall agreement in the profile shape.

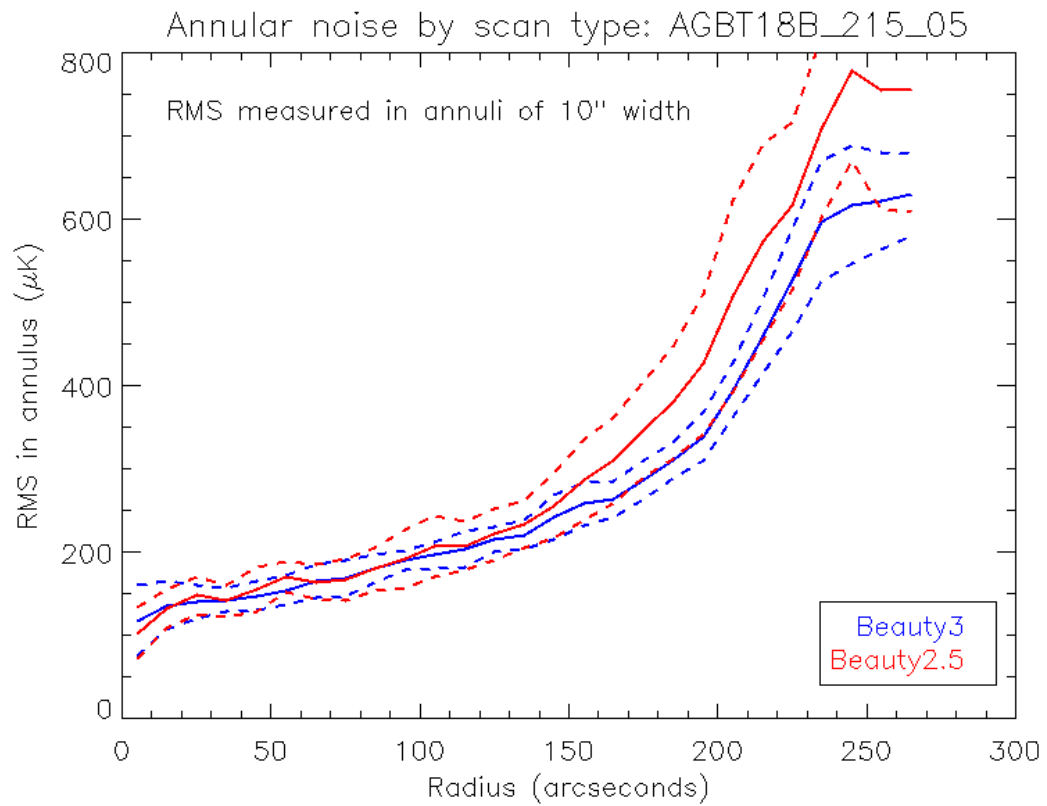


Figure 25: Noise profiles for our two scan types (2'.5 and 3' radius scans) for the fifth night in the project AGBT18B.215. There is overall agreement in the profile shape.

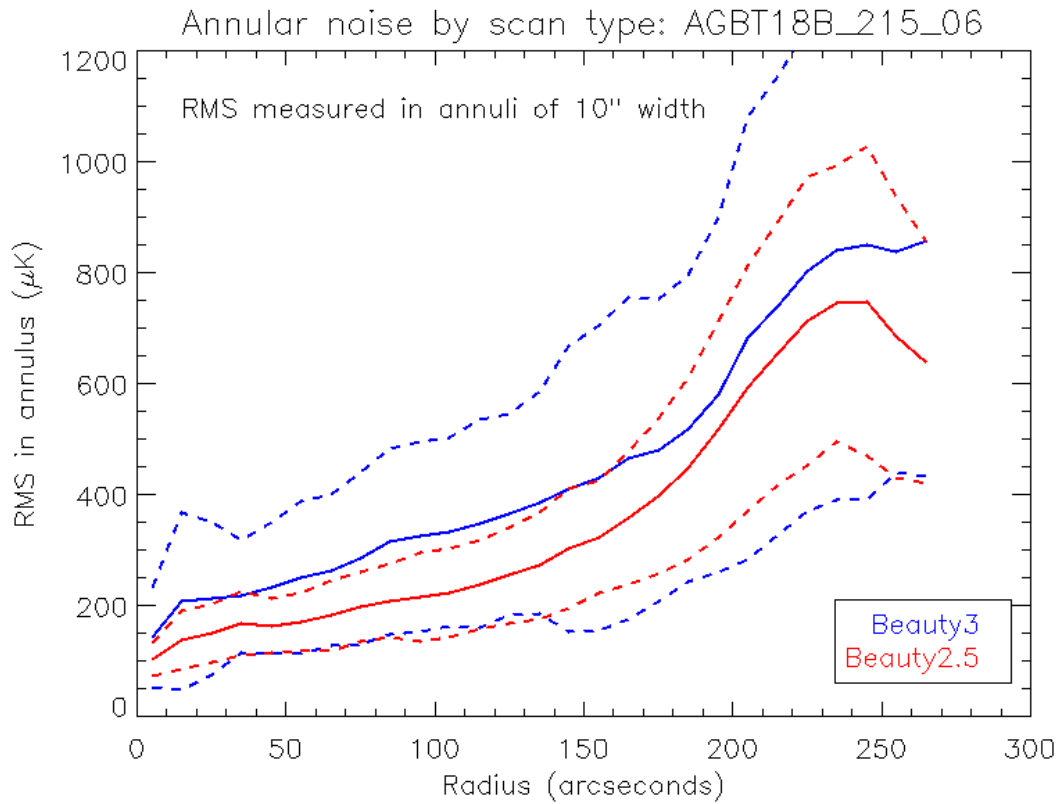


Figure 26: Noise profiles for our two scan types ( $2'.5$  and  $3'$  radius scans) for the sixth night in the project AGBT18B.215. There is overall agreement in the profile shape.

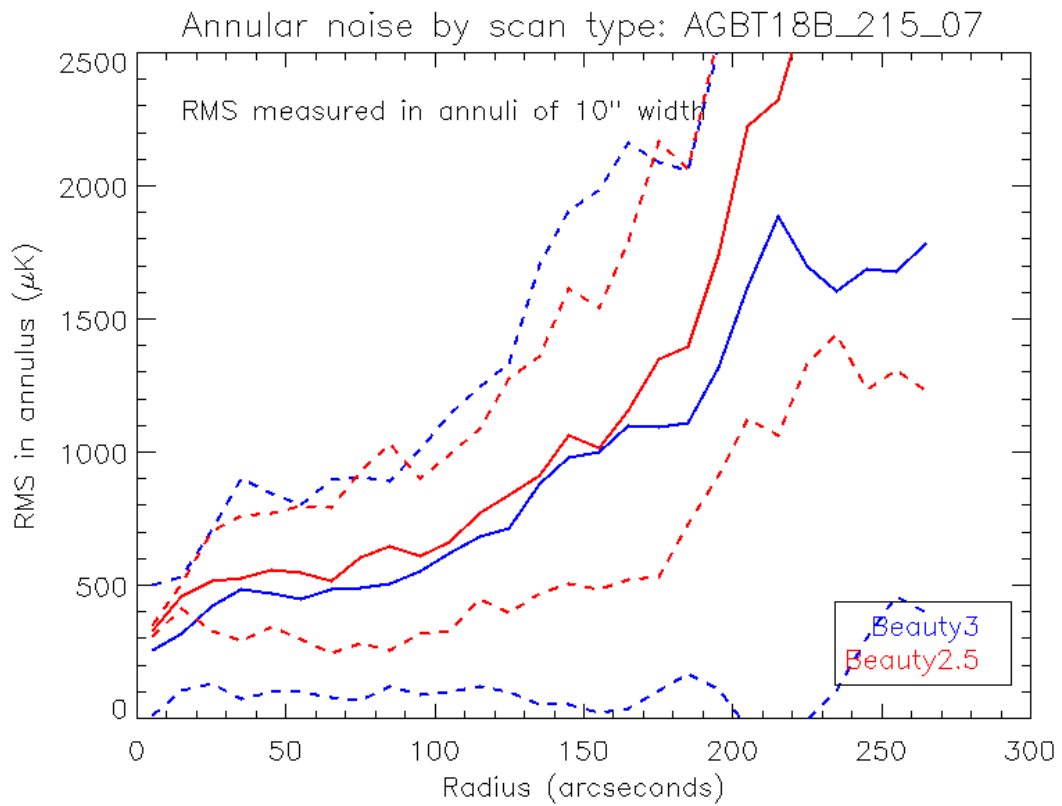


Figure 27: Noise profiles for our two scan types (2'.5 and 3' radius scans) for the seventh night in the project AGBT18B.215. There is overall agreement in the profile shape.

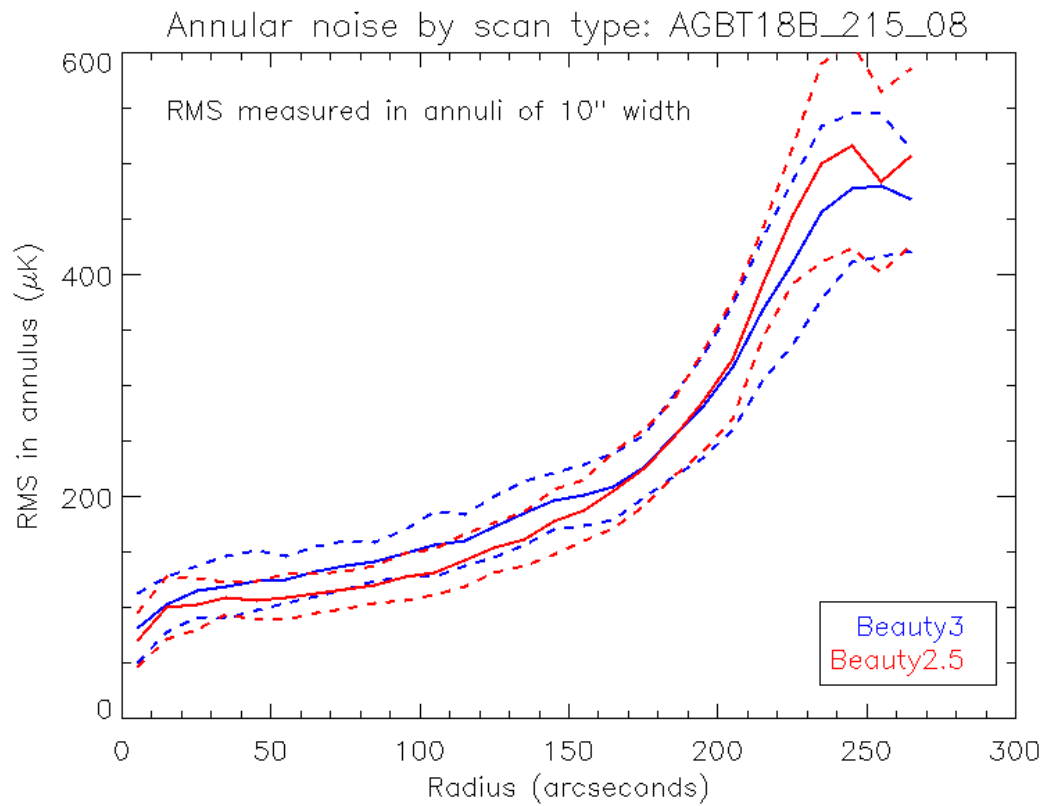


Figure 28: Noise profiles for our two scan types (2'.5 and 3' radius scans) for the eighth night in the project AGBT18B.215. There is overall agreement in the profile shape.

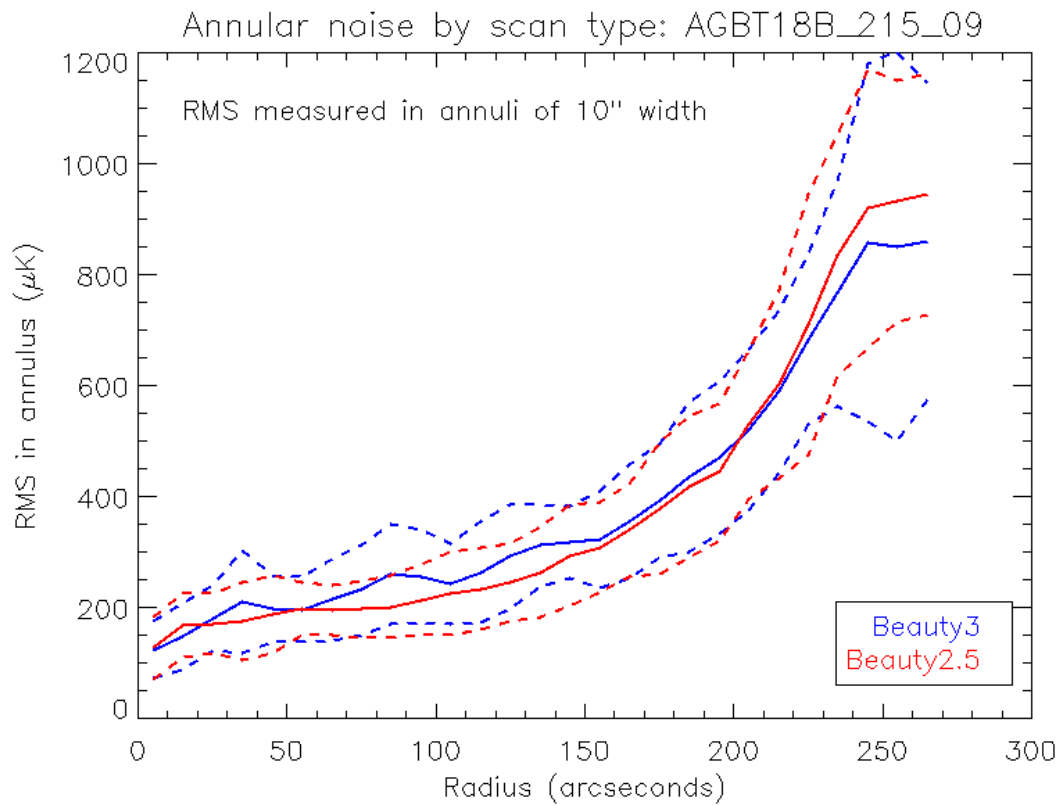


Figure 29: Noise profiles for our two scan types ( $2.5'$  and  $3'$  radius scans) for the ninth night in the project AGBT18B.215. There is overall agreement in the profile shape.

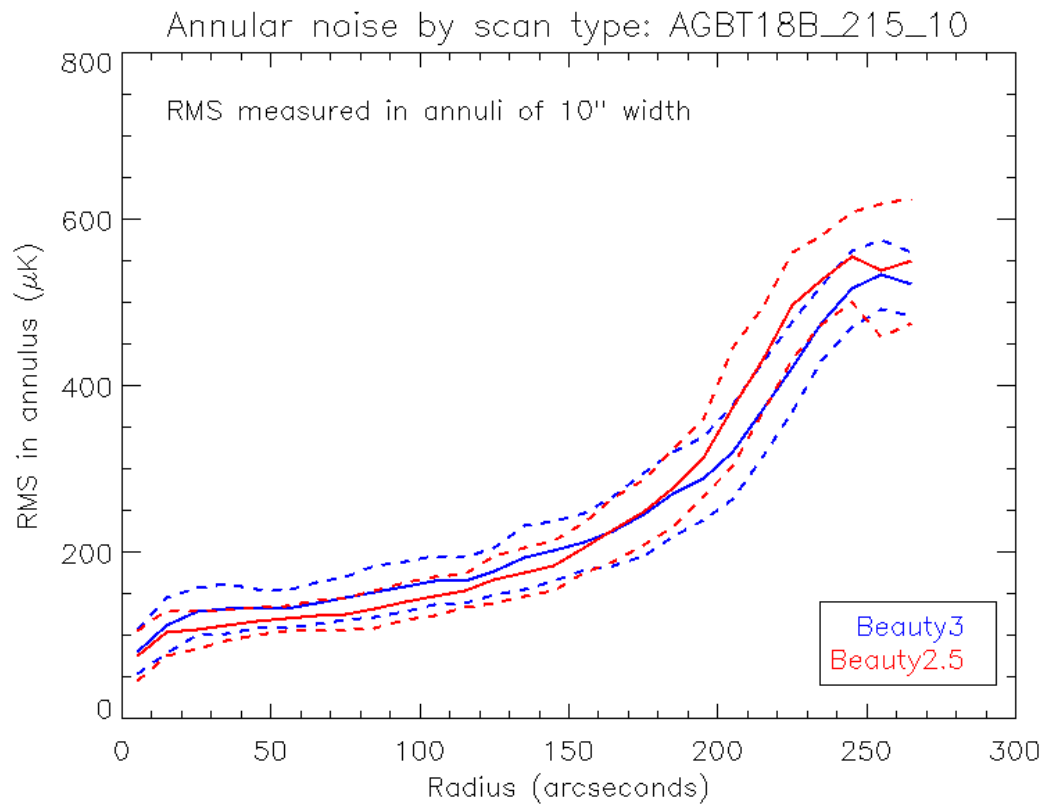


Figure 30: Noise profiles for our two scan types (2'.5 and 3' radius scans) for the tenth night in the project AGBT18B.215. There is overall agreement in the profile shape.



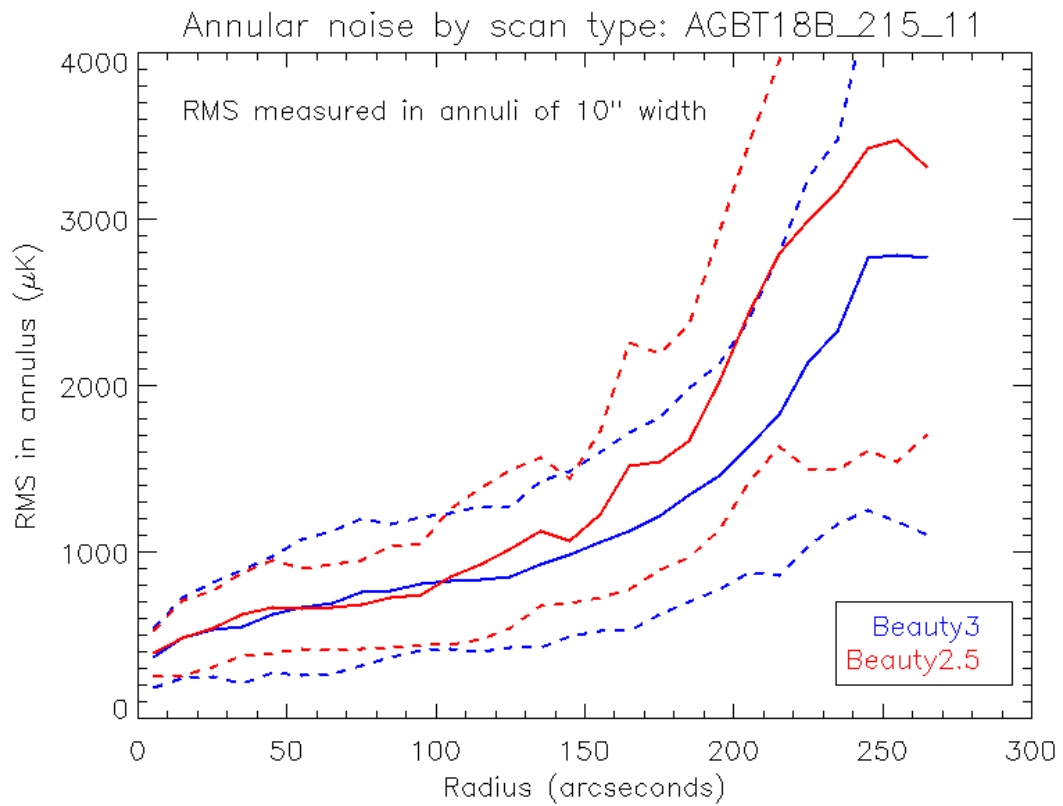


Figure 31: Noise profiles for our two scan types (2'.5 and 3' radius scans) for the eleventh night in the project AGBT18B.215. There is overall agreement in the profile shape.

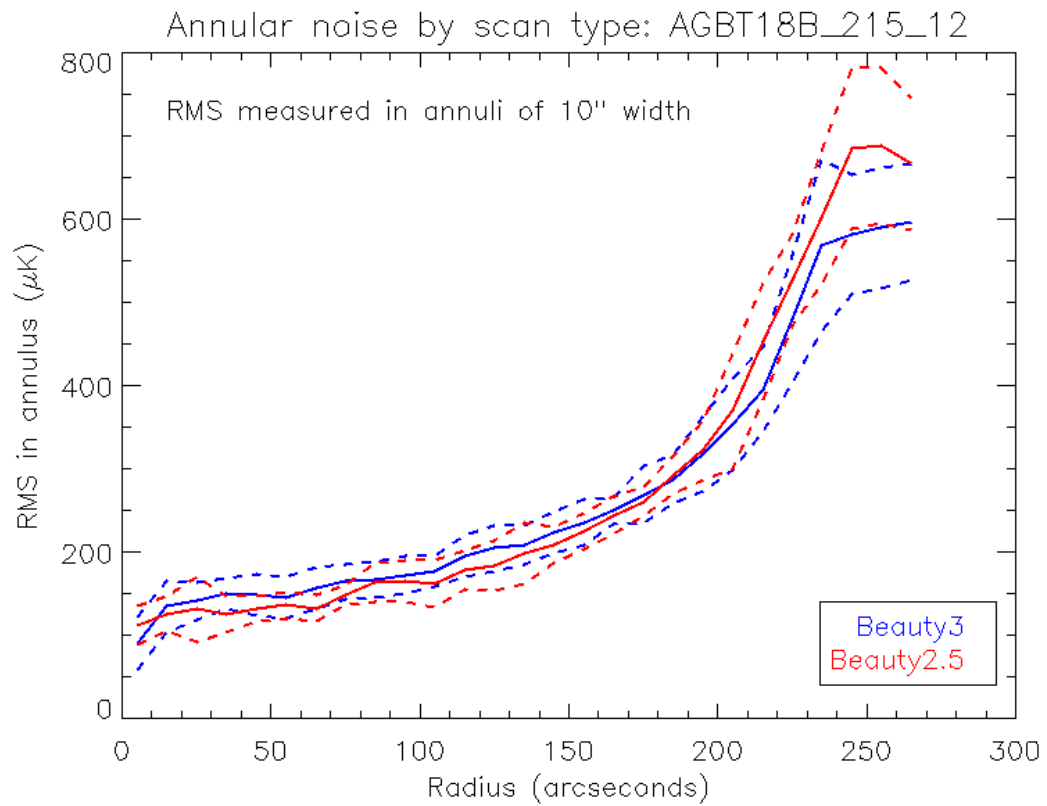


Figure 32: Noise profiles for our two scan types (2'.5 and 3' radius scans) for the twelfth night in the project AGBT18B.215. There is overall agreement in the profile shape.

## References

Arnaud, M., Pratt, G. W., Piffaretti, R., et al. 2010, , 517, A92