

V&V Reference Report

L2 ASCDS Version : 8.4.5

Observation 1792 - L2 Version 12
Chandra X-Ray Center

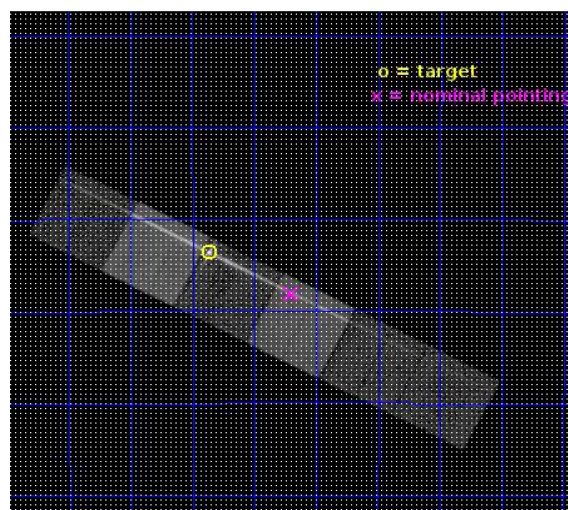
L2 Processing Date : Mar 30 2019

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1 Front

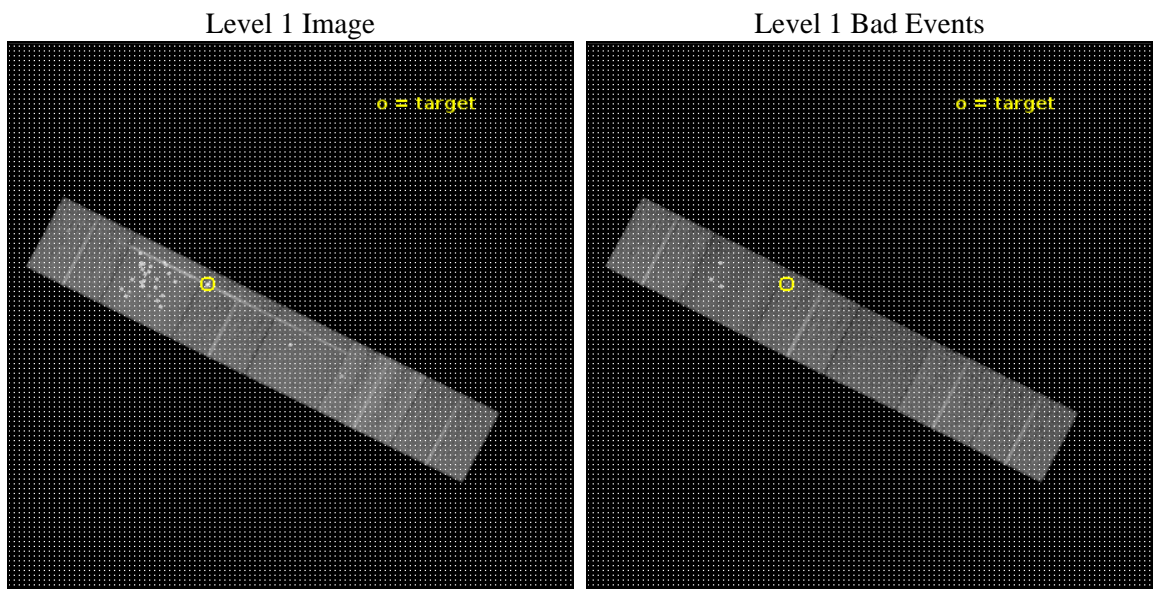
seq_num	390010	Sequence number
obs_id	1792	Observation id
title	GRATINGS CALIBRATION OBSERVATIONS OF PKS2155-304	Proposal title
observer	Dr. CXC Calibration	Principal investigator
object	PKS2155-304	Source name
dtcycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	329.716667	Observer's specified target RA [deg]
dec_targ	-30.225556	Observer's specified target Dec [deg]
ra_nom	329.55025172752	Nominal RA [deg]
dec_nom	-30.30116112742	Nominal Dec [deg]
roll_nom	27.225534305922	Nominal Roll [deg]
revision	12	Processing version of data
ontime	21158.211045042	Sum of GTIs [s]
livetime	20890.293036844	Livetime [s]
ontime4	21158.334165037	Sum of GTIs [s]
ontime5	21158.25208503	Sum of GTIs [s]
ontime6	21158.211045042	Sum of GTIs [s]
ontime7	21158.293125033	Sum of GTIs [s]
ontime8	21158.170024961	Sum of GTIs [s]
ontime9	21158.128965035	Sum of GTIs [s]
l2events	258430	Number of level 2 events



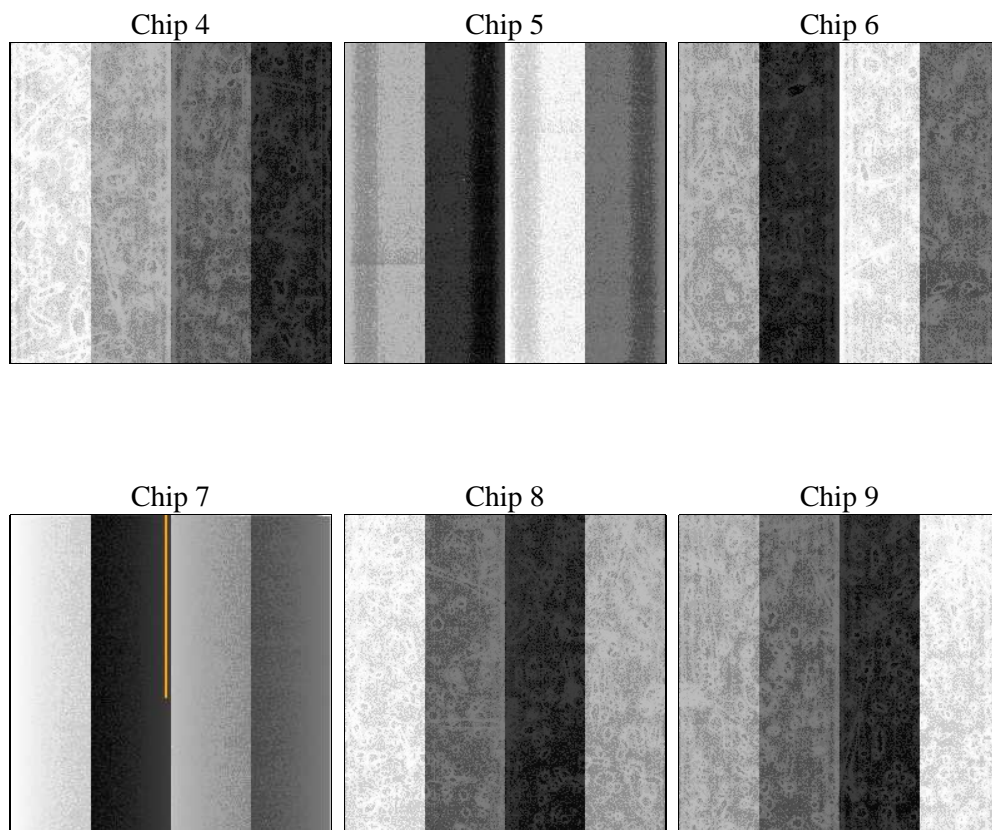
2 OBI

2.1 OBI

2.1.1 Images



2.1.2 Bias



2.1.3 Parameters

obi_num	0	Obi number	sched_exp_time	21400.000000	[s] Scheduled observation exposure time
ascdsver	10.7.1	Processing system revision	ontime	21158.211045042	Sum of GTIs [s]
caldsver	4.8.2	 	ontime4	21158.334165037	Sum of GTIs [s]
date	2019-03-30T17:34:07	Date and time of file creation	ontime5	21158.25208503	Sum of GTIs [s]
revision	6	Processing version of data	ontime6	21158.211045042	Sum of GTIs [s]
			ontime7	21158.293125033	Sum of GTIs [s]
			ontime8	21158.170024961	Sum of GTIs [s]
			ontime9	21158.128965035	Sum of GTIs [s]
			l1events	1218707	Number of level 1 events
			tgmethod	FINDZO	Method used to create src1a file
			ra_pos	(3046.01, 4648.64)	src1a sky pixel position

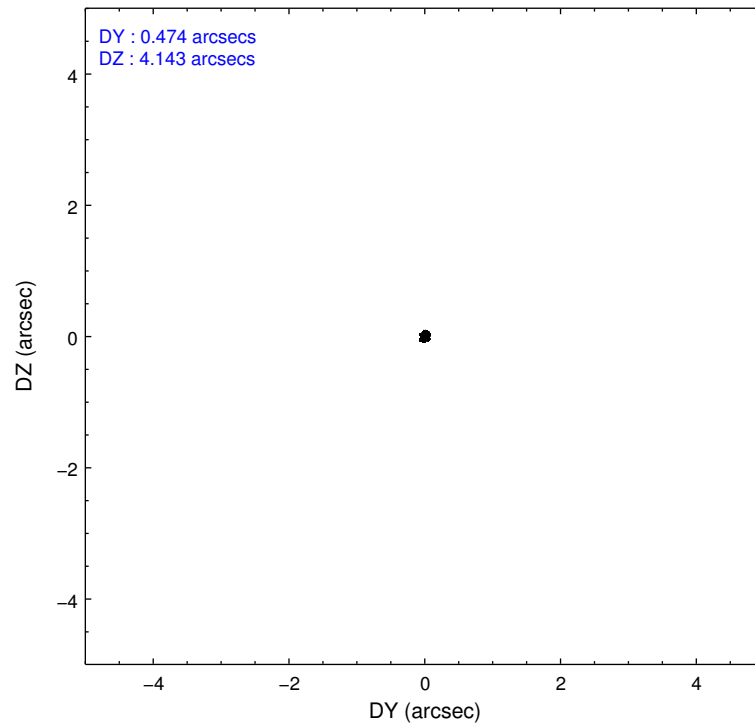
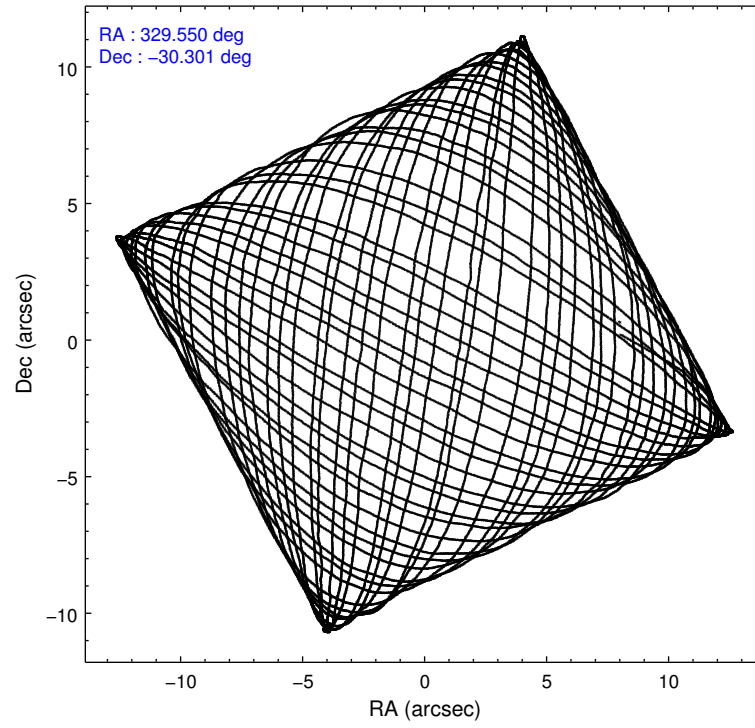
2.1.4 Events

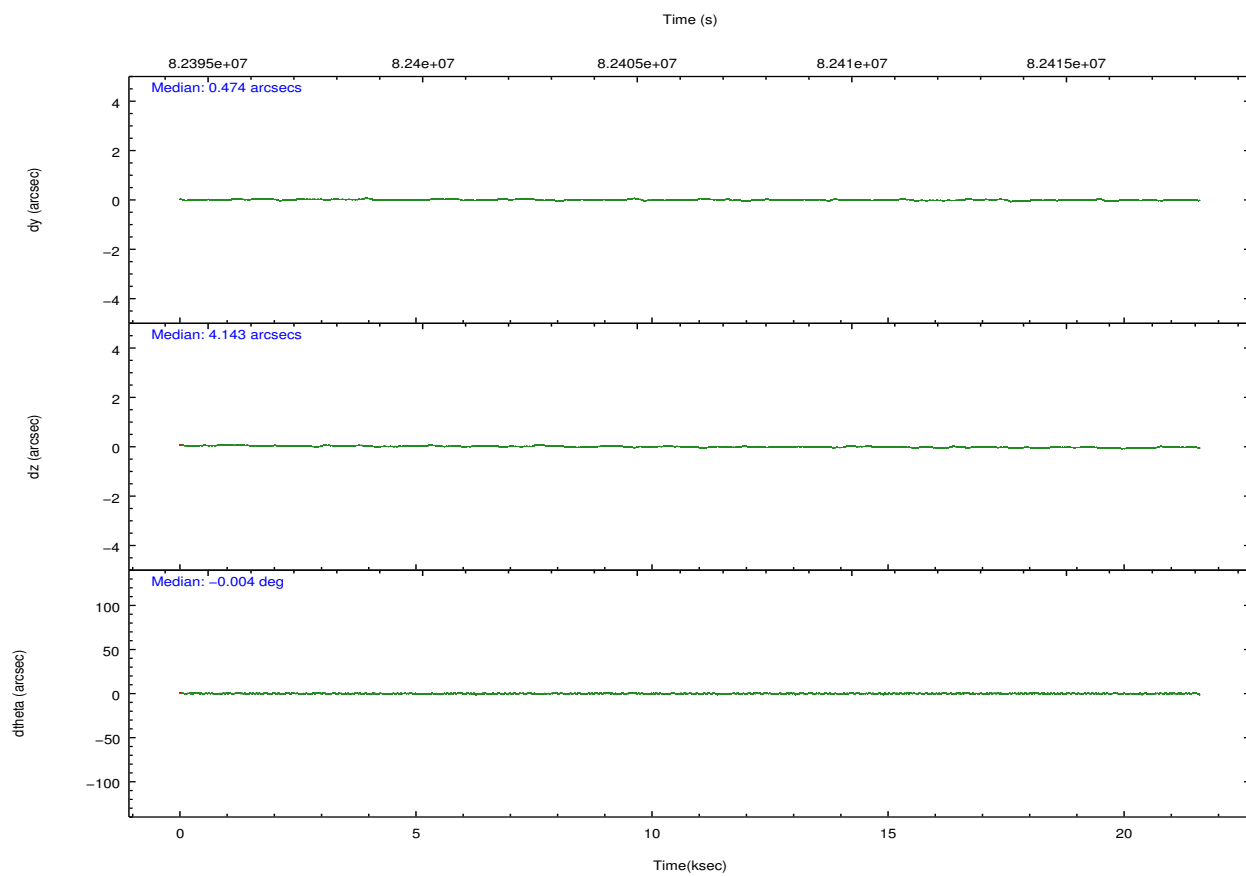
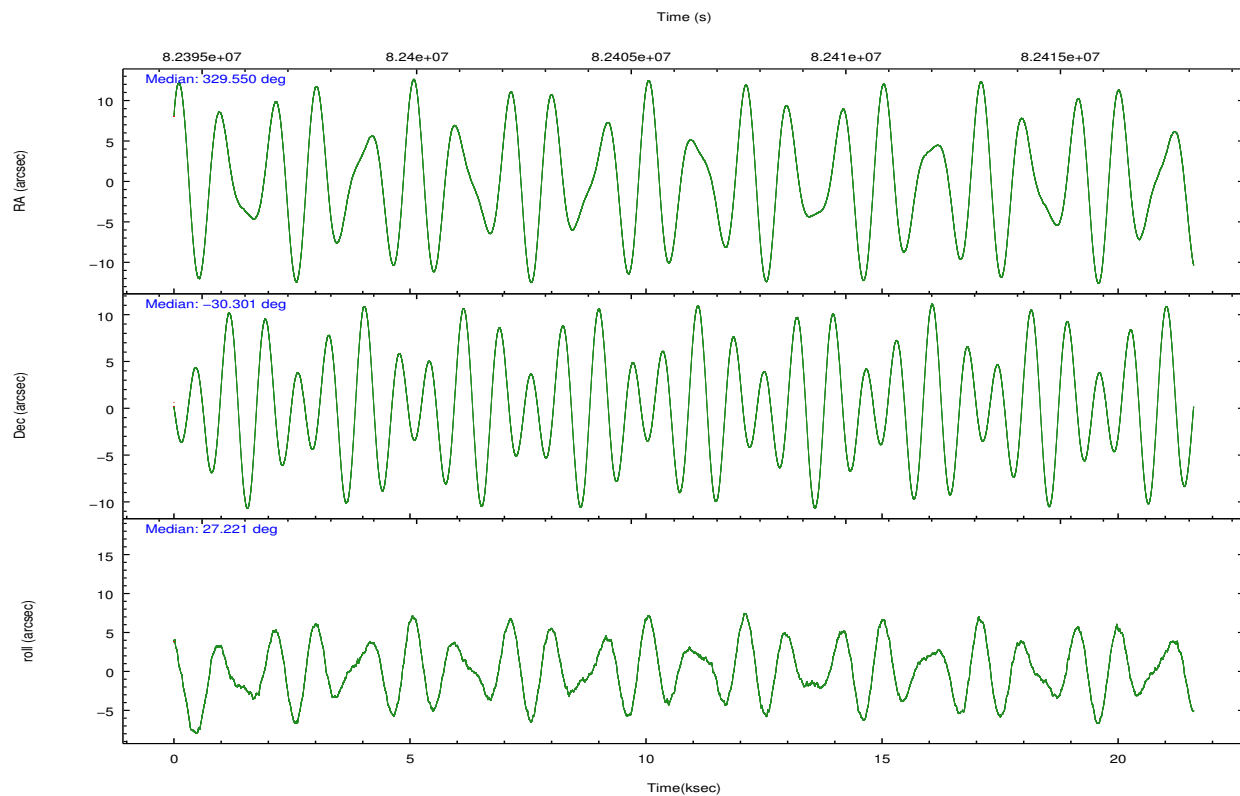
	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9		ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	157991	345789	188578	162465	226113	137771	grade 0 events	5409	134958	41493	15396	30947	3204
rejected events	137681	115061	126696	89932	137851	120219		3%	39%	22%	9%	13%	2%
rejected %	87%	33%	67%	55%	60%	87%	grade 1 events	75	160	301	83	206	32
								0%	0%	0%	0%	0%	0%
							grade 2 events	9327	30158	11623	14428	20283	8145
								5%	8%	6%	8%	8%	5%
							grade 3 events	761	8424	1936	4255	10421	824
								0%	2%	1%	2%	4%	0%
							grade 4 events	825	5222	1799	3843	9667	801
								0%	1%	0%	2%	4%	0%
							grade 5 events	2488	16891	3084	8779	4833	2924
								1%	4%	1%	5%	2%	2%
							grade 6 events	3996	52033	5052	34630	16948	4584
								2%	15%	2%	21%	7%	3%
							grade 7 events	135110	97943	123290	81051	132808	117257
								85%	28%	65%	49%	58%	85%

2.2 Compared Parameters

Parameter	Planned	Actual	Parameter	Planned	Actual
Instrument	ACIS	ACIS	Obspar format version number	7	7
Detector	ACIS-456789	ACIS-456789	Obspar file type	PREDICTED	ACTUAL
Grating	LETG	LETG	Obspar update status	NONE	UPDATED
Data mode	FAINT	FAINT	Number of optional ACIS chips dropped	0	0
Observation mode	POINTING	POINTING	On-chip summing requested	N	N
[deg] Pointing RA	329.533220	329.5502517275161	Subarray requested	NONE	NONE
[deg] Pointing Dec	-30.324247	-30.30116112741973	Alternating exposures requested	N	N
[deg] Pointing Roll	27.060313	27.22553430592197	[s] Primary exposure time	0.000000	3.2
[mm] SIM focus pos	-0.684267	-0.6828225247311905			
[mm] SIM defocus	0	0.001444936568705701			
[mm] SIM translation stage pos	-182.131972	-182.1344861297048			
[mm] SIM translation stage offset	-8.000551	-7.998036453302973			
[s] Observation start time (MET)	82395625.184000	82395186.948172			
Observation start date	2000-08-11T15:39:21	2000-08-11T15:33:06			
[s] Observation end time (MET)	82417025.184000	82417161.92399301			
Observation end date	2000-08-11T21:36:01	2000-08-11T21:39:21			
Read mode	TIMED	TIMED			

2.3 Aspect



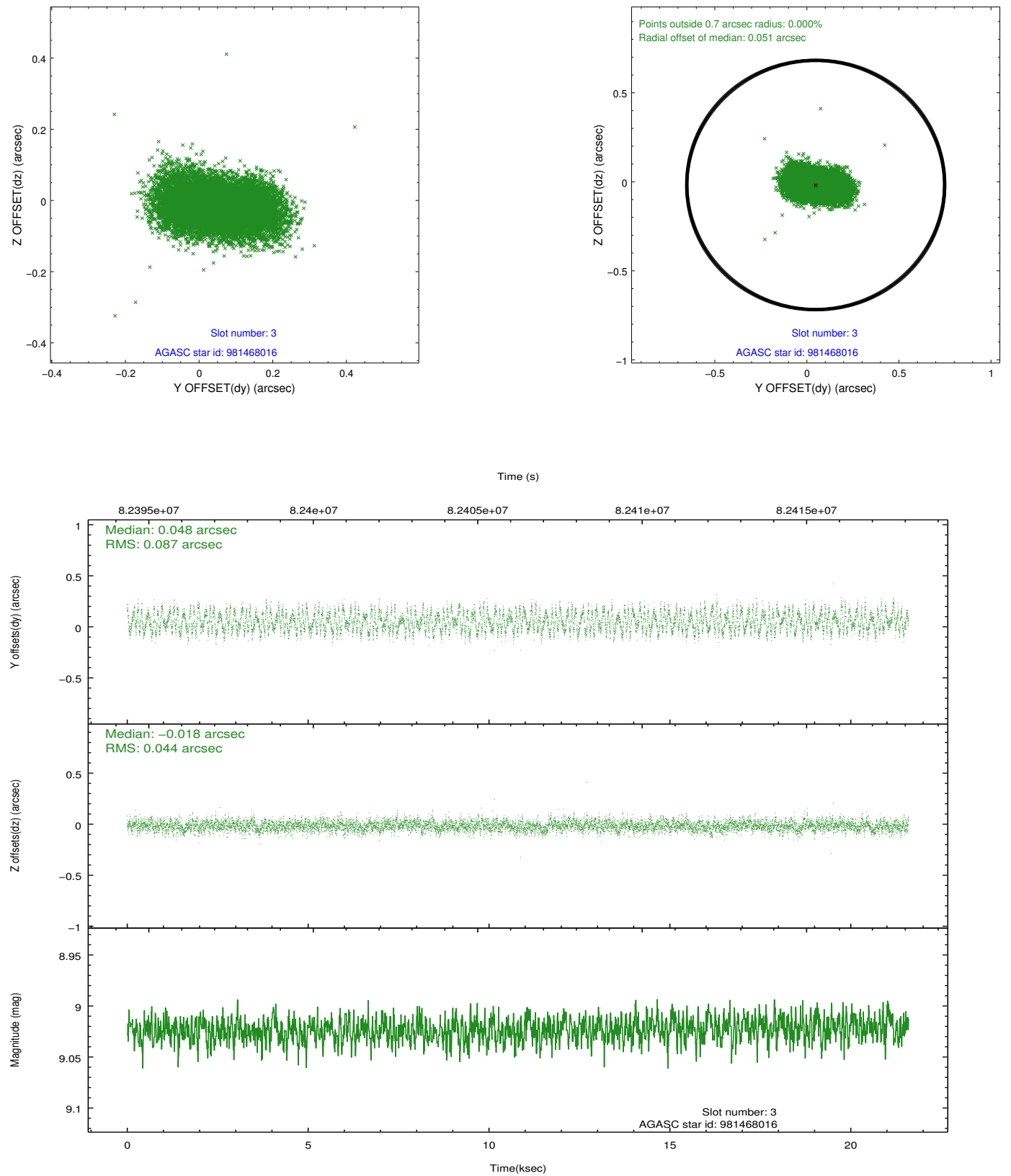


Slot Statistics

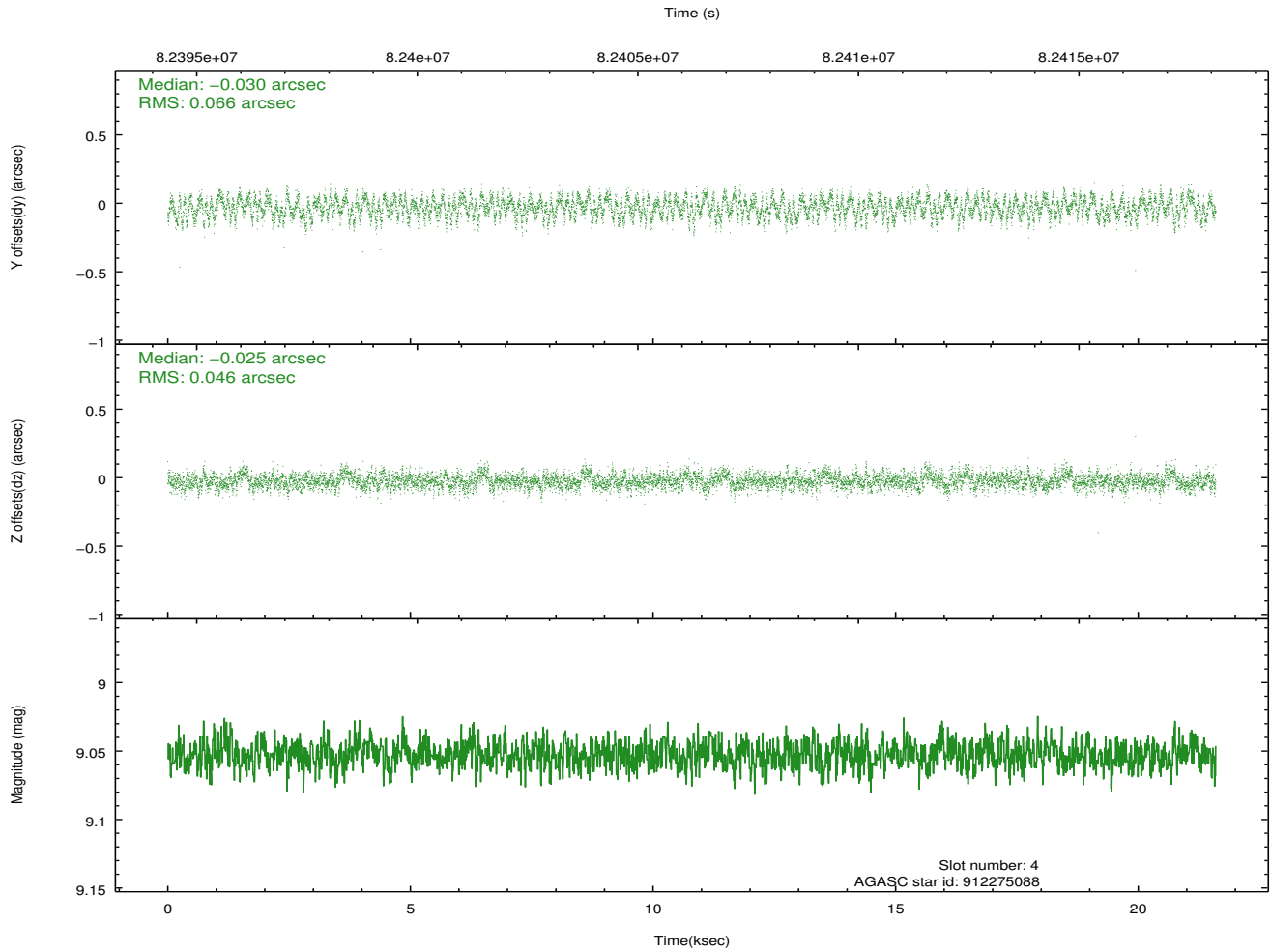
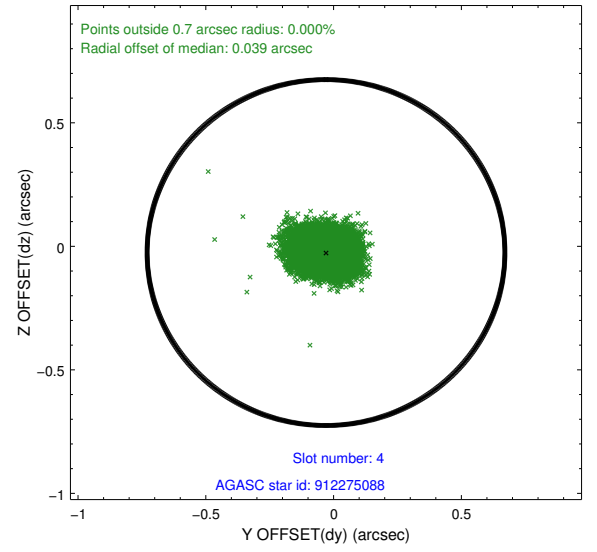
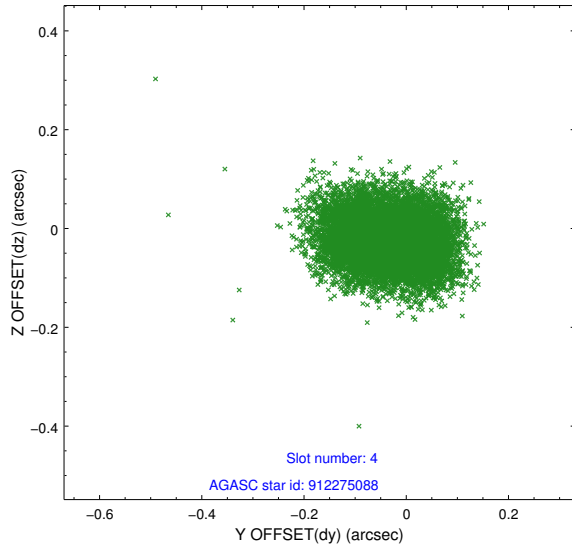
pt	status	used	id	mag	n_pts	frac_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mea
0	FID		ACIS-S-2	7.10	5269	1.000	-0.101	-0.082	0.005	0.010	0.000000	0.000000	-752.58	-1890
1	FID		ACIS-S-4	7.19	5268	1.000	0.075	0.054	0.006	0.010	0.000000	0.000000	2160.81	18
2	FID		ACIS-S-6	7.43	5268	1.000	-0.002	0.035	0.007	0.011	0.000000	0.000000	409.72	655
3	GUIDE	used	981468016	9.02	10533	1.000	0.048	-0.018	0.106	0.166	328.842457	-30.034984	-1446.13	1900
4	GUIDE	used	912275088	9.05	10532	1.000	-0.030	-0.025	0.086	0.137	329.619228	-29.738698	1198.46	1754
5	GUIDE	used	981478152	9.40	10534	1.000	-0.084	0.039	0.080	0.132	329.415589	-30.057192	111.21	1022
6	GUIDE	used	981468128	9.36	10532	1.000	0.072	-0.034	0.079	0.131	329.756350	-30.158334	890.37	215
7	GUIDE	used	981469488	9.60	10533	1.000	-0.008	0.036	0.086	0.142	329.261199	-30.045155	-297.92	1279

2.4 Star Slots

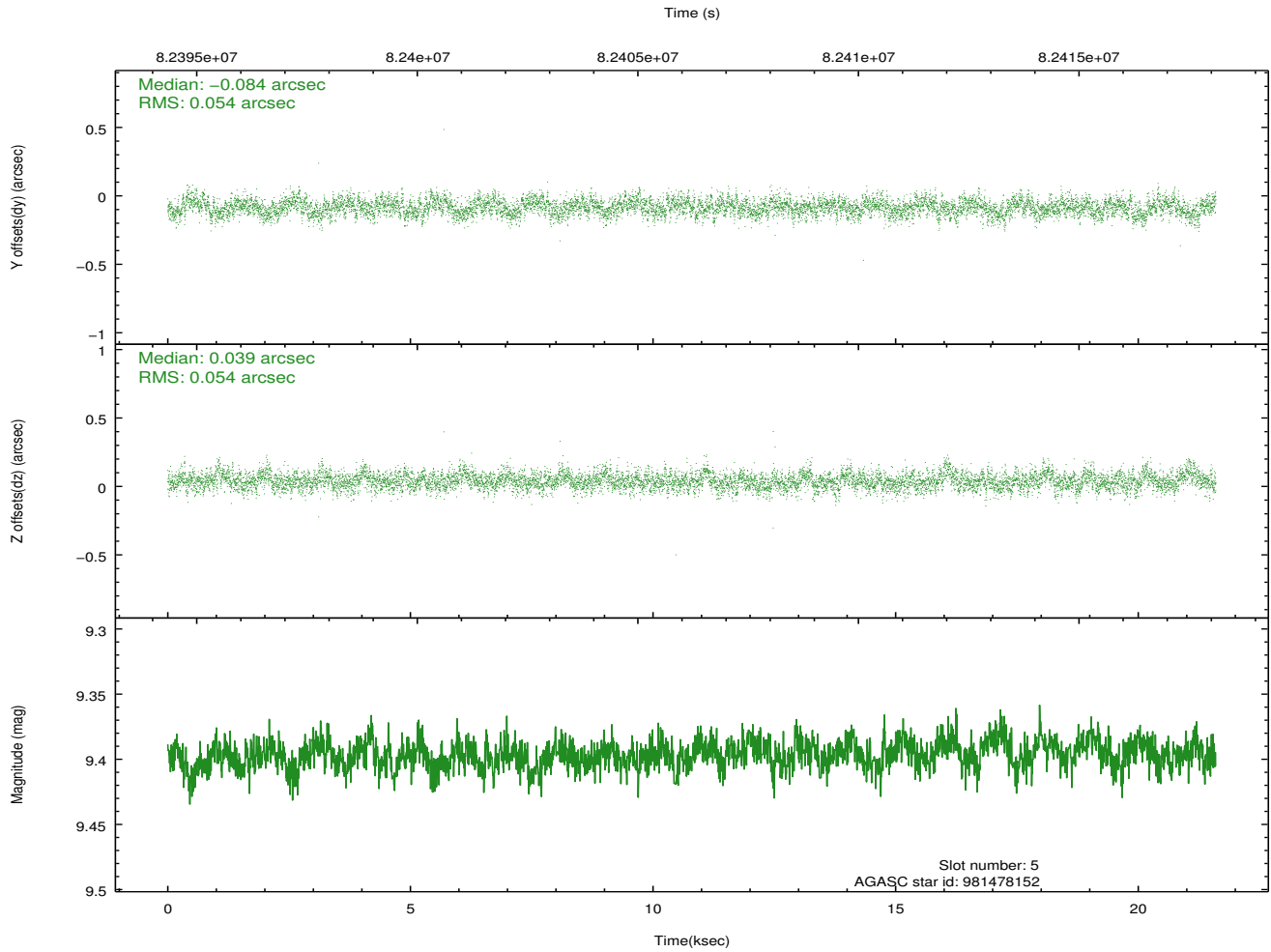
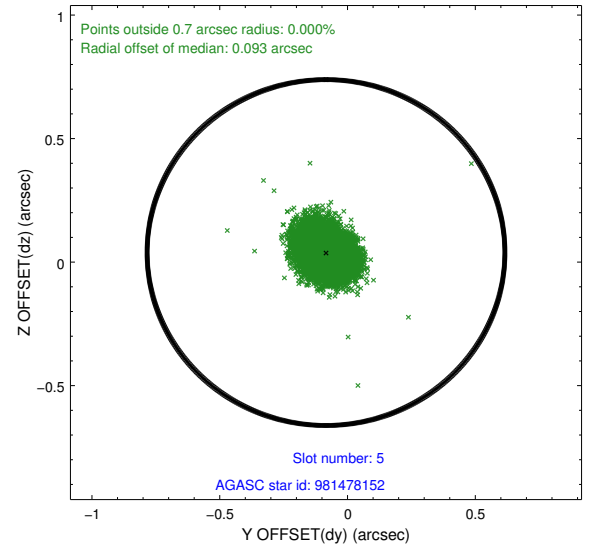
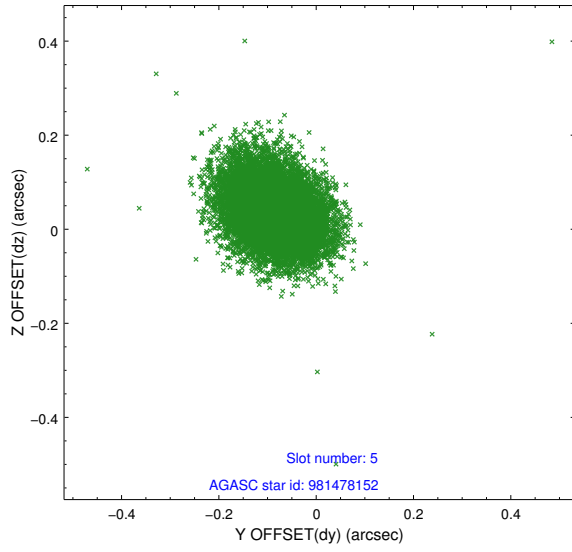
2.4.1 Slot 3



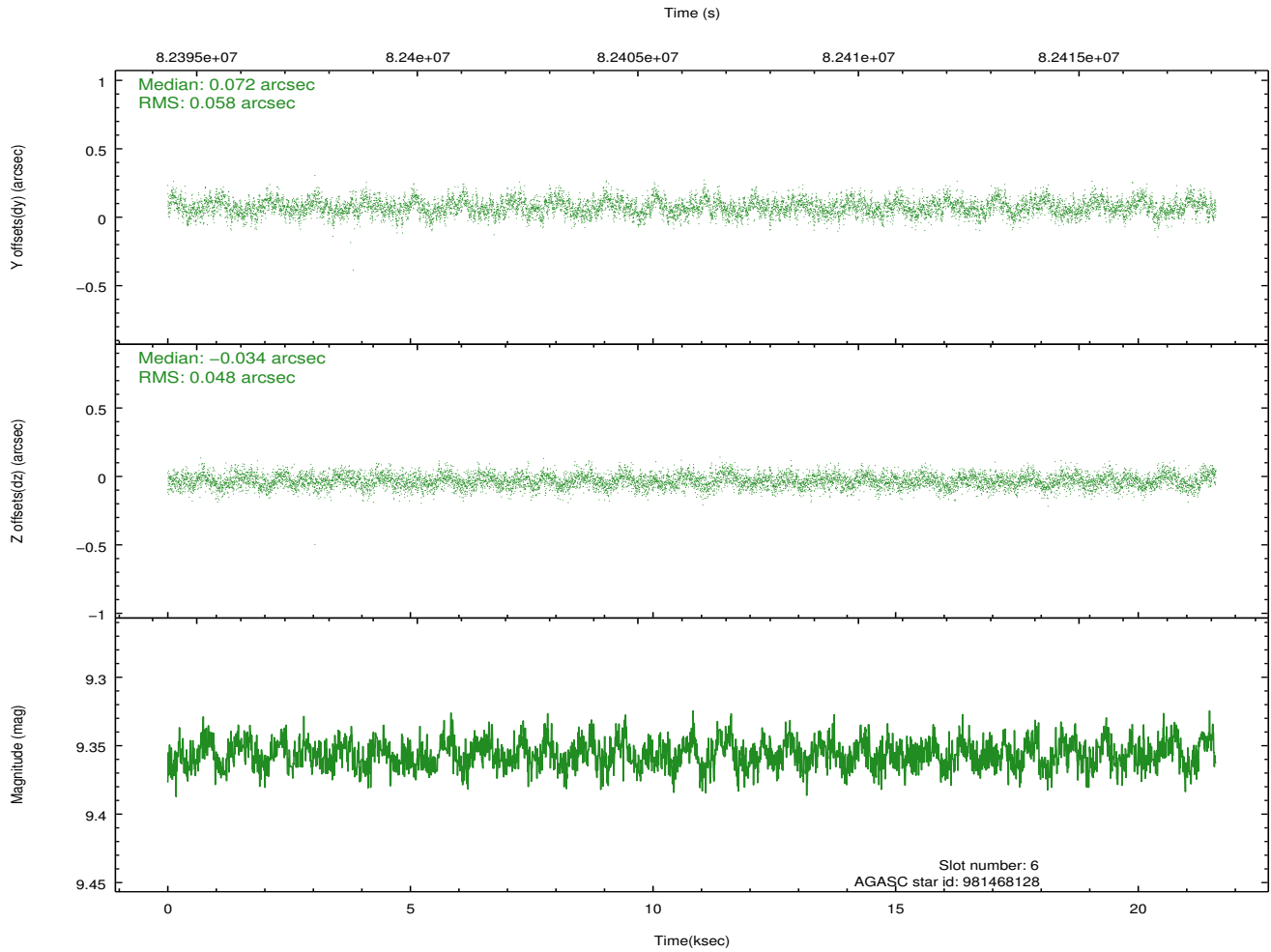
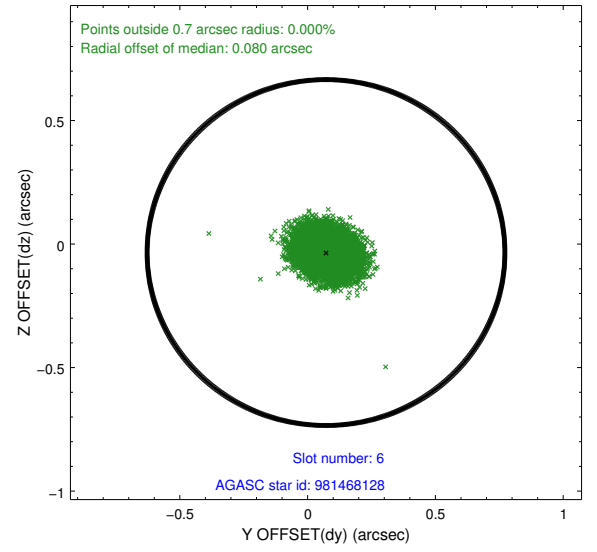
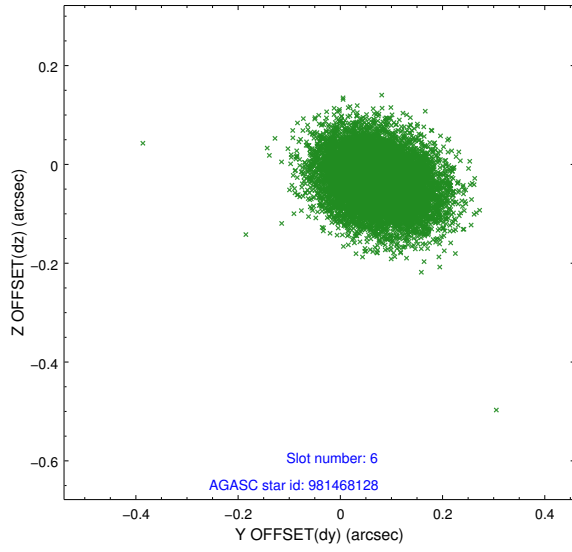
2.4.2 Slot 4



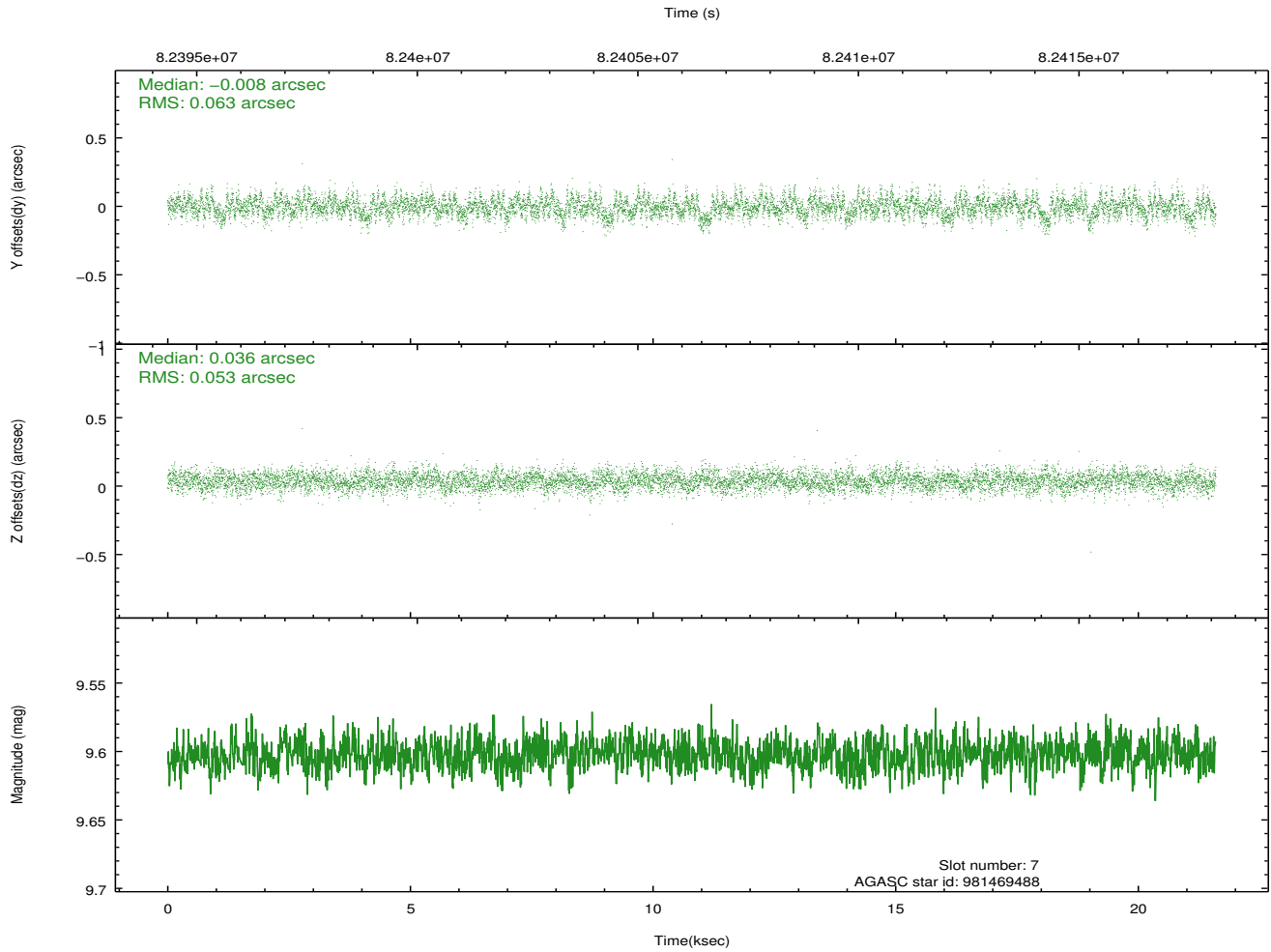
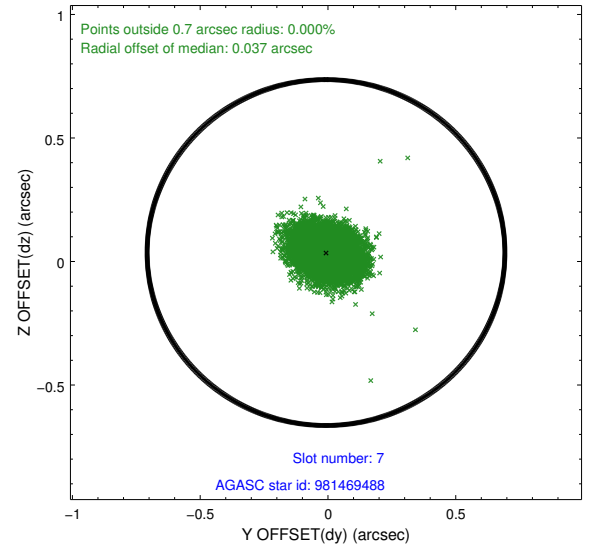
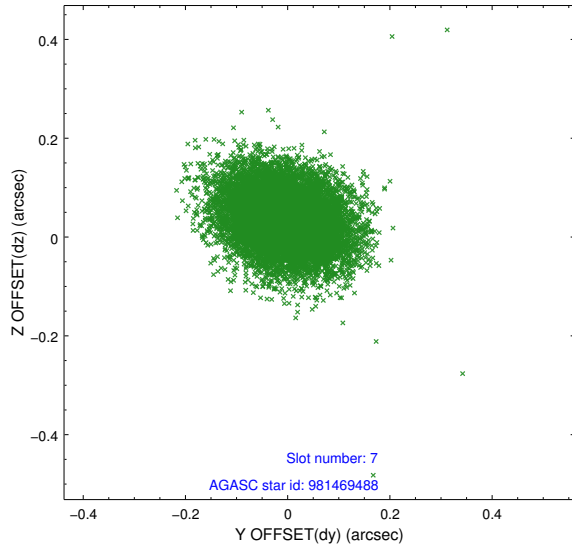
2.4.3 Slot 5



2.4.4 Slot 6

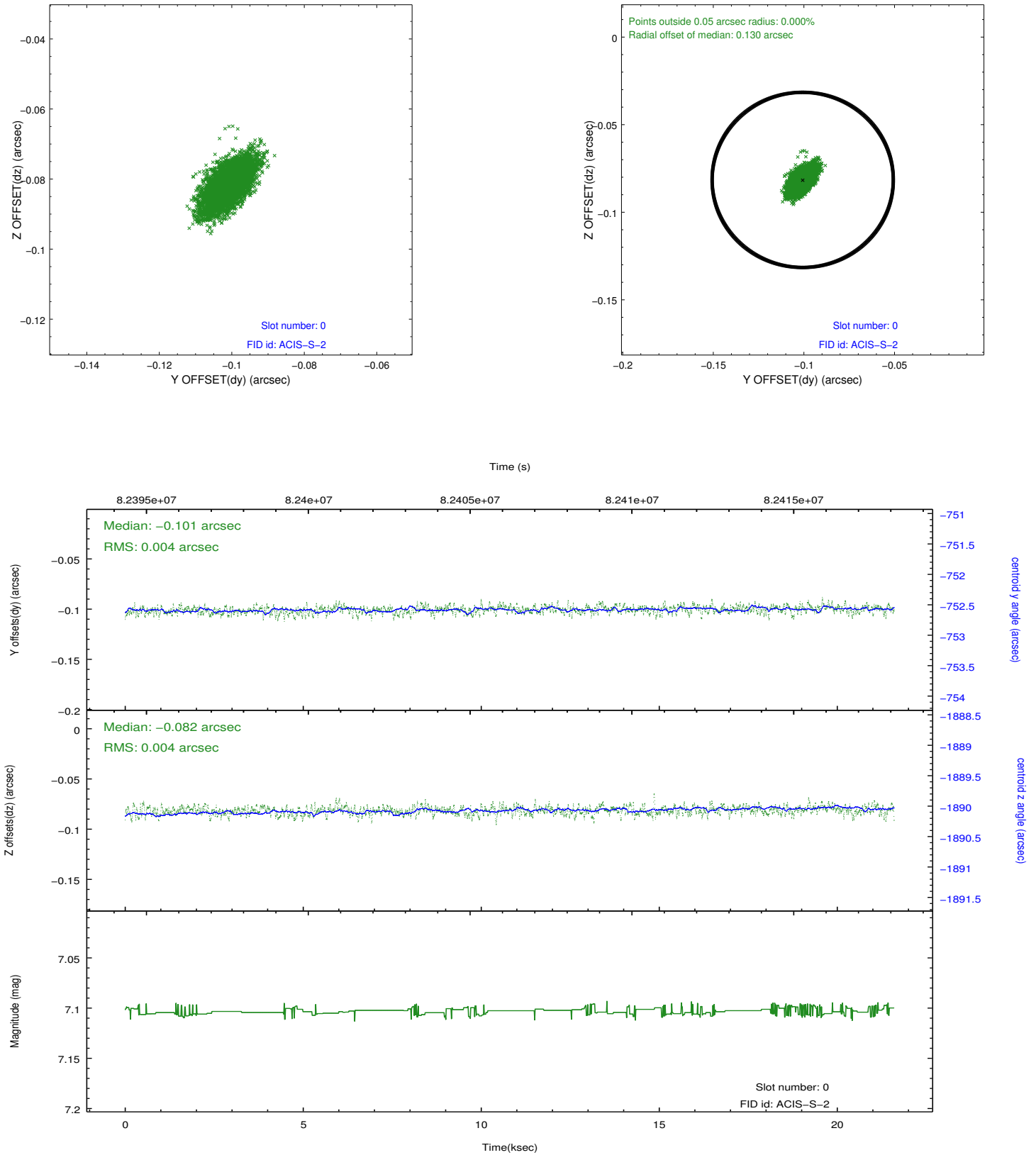


2.4.5 Slot 7

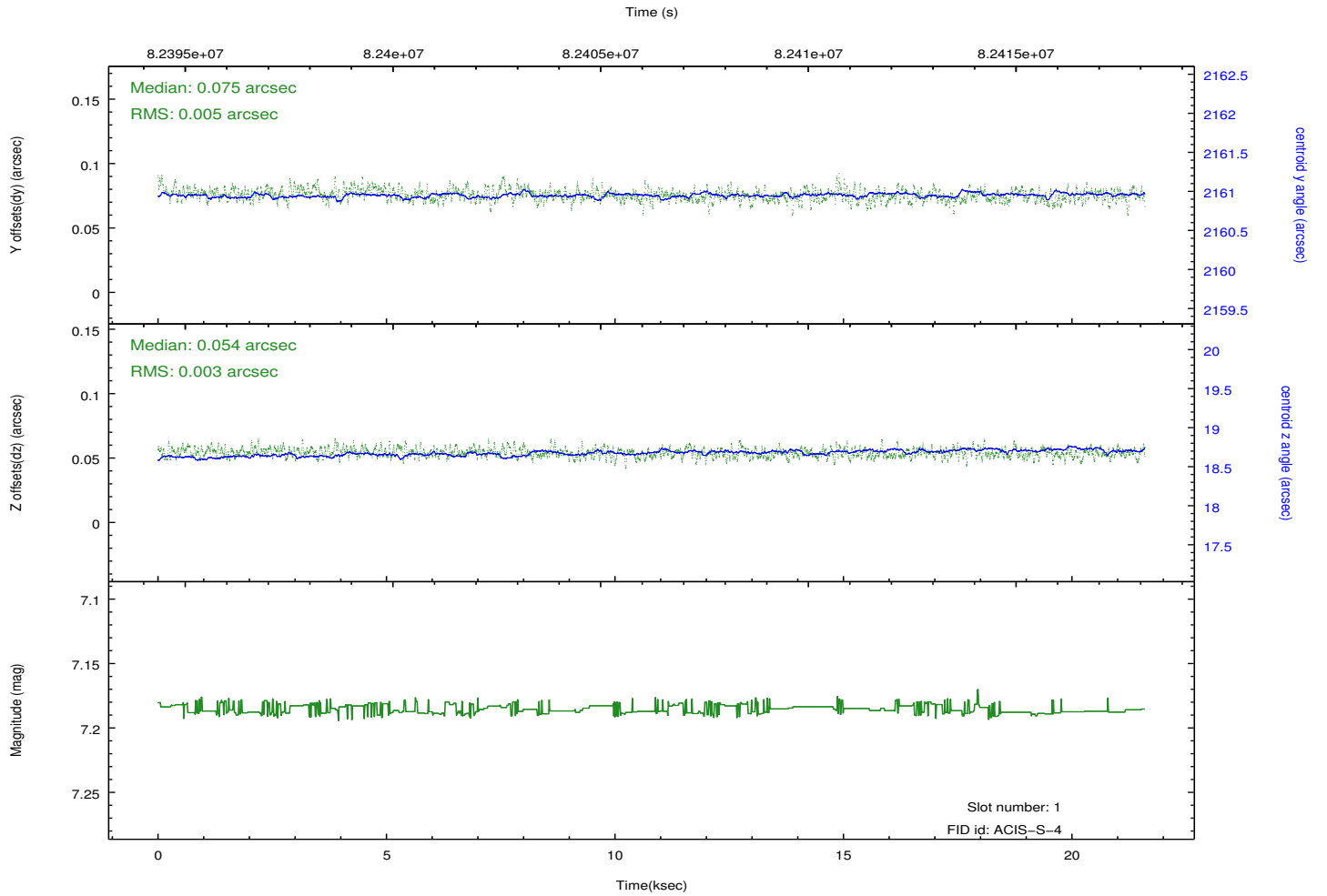
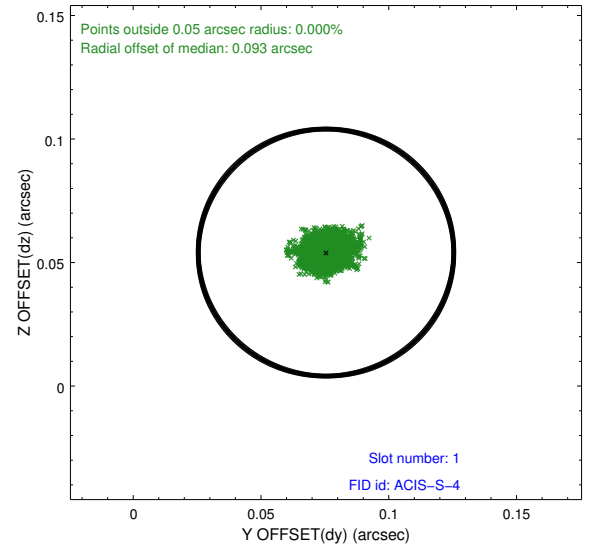
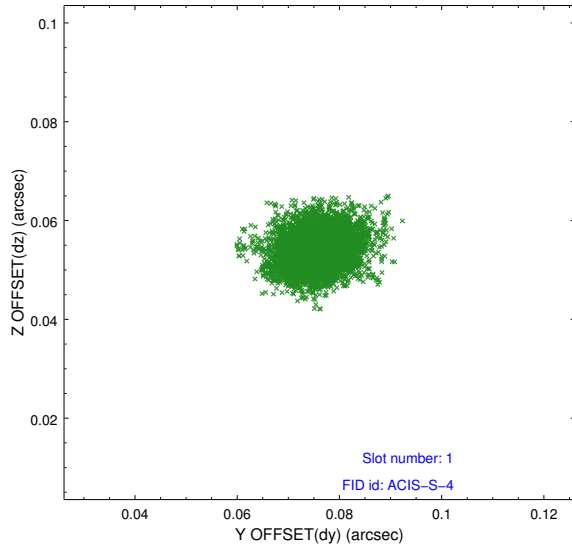


2.5 FID Slots

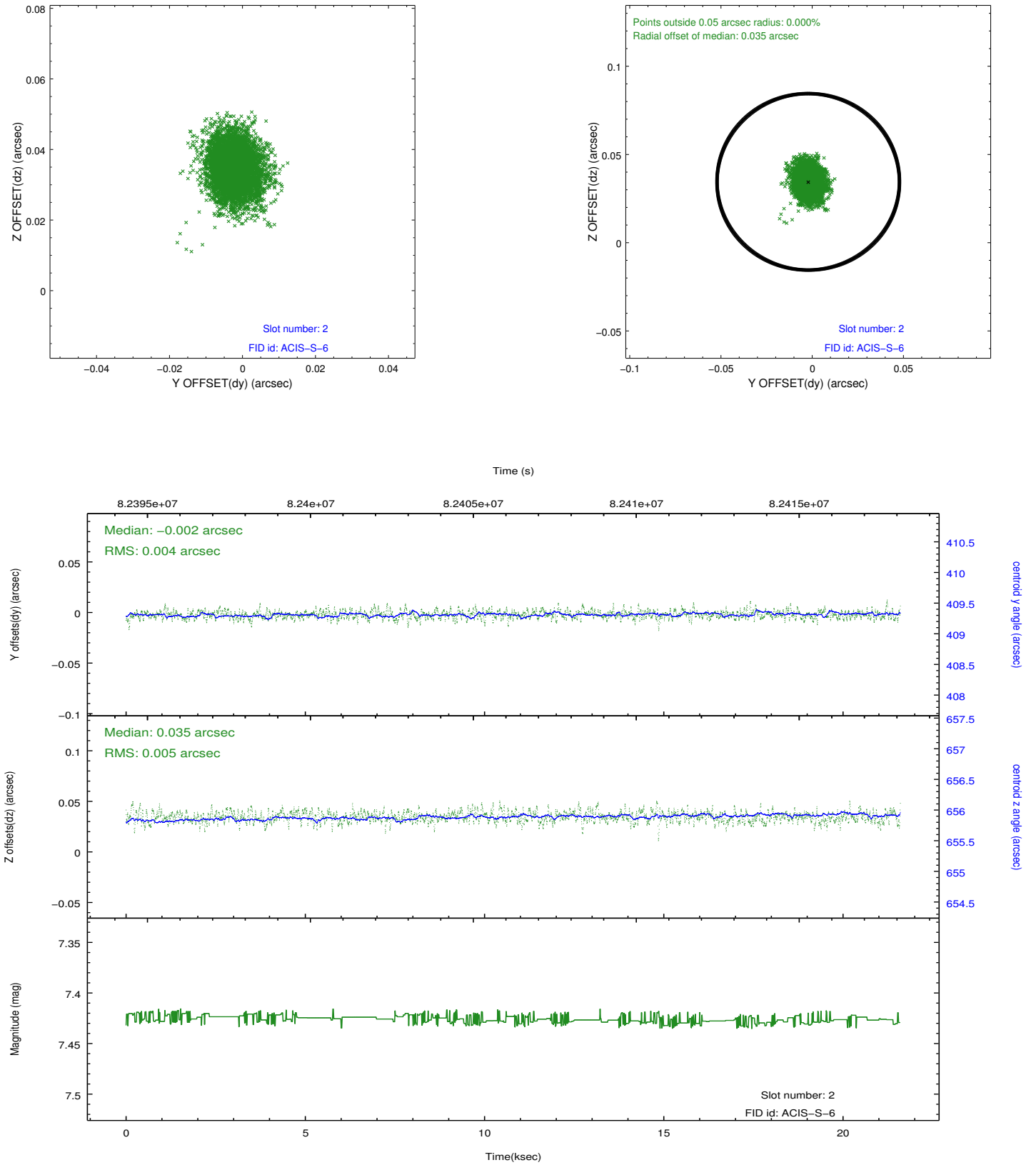
2.5.1 Slot 0



2.5.2 Slot 1

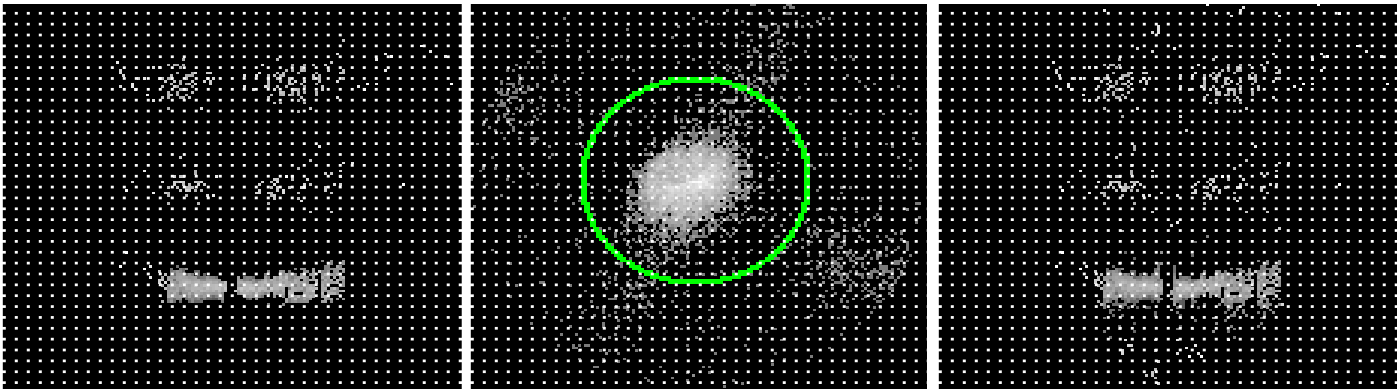


2.5.3 Slot 2



3 Gratings

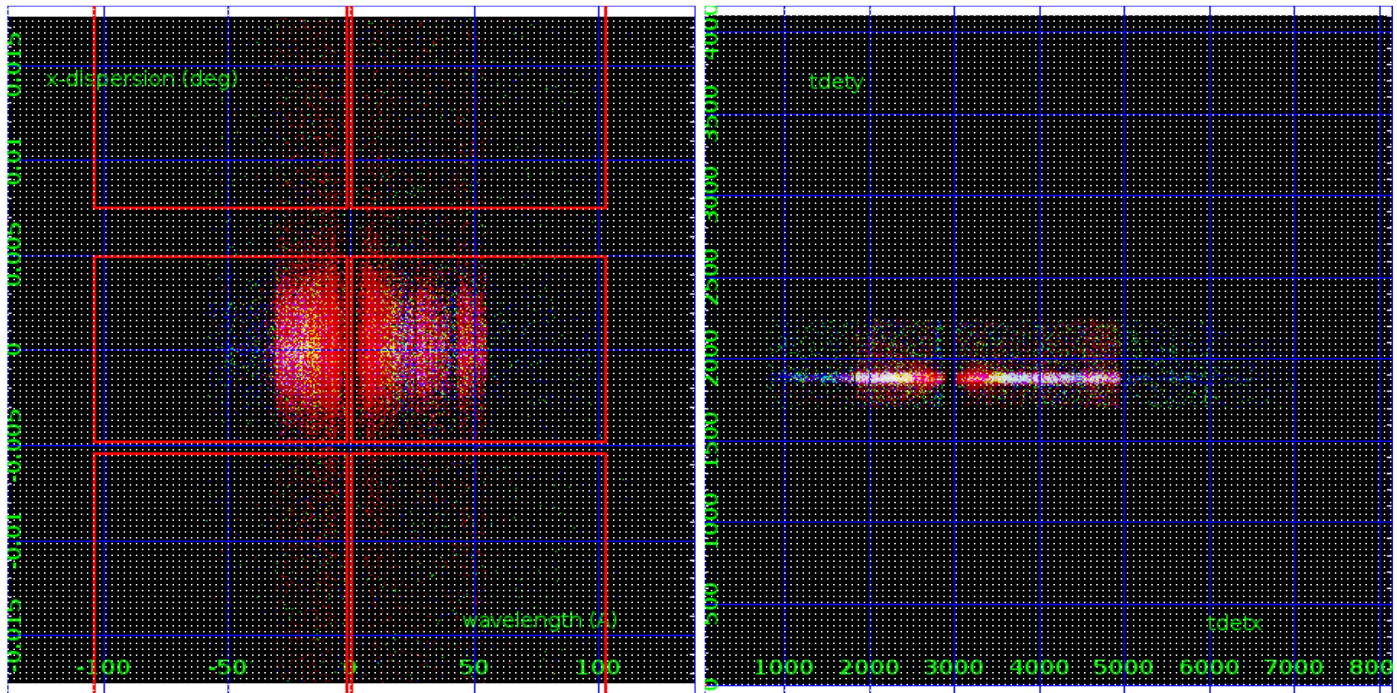
3.1 LETG Arm



LETG Order Sort 123

LETG Zero Order

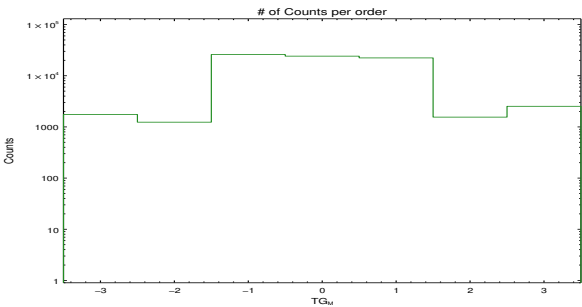
LETG Order Sort ALL

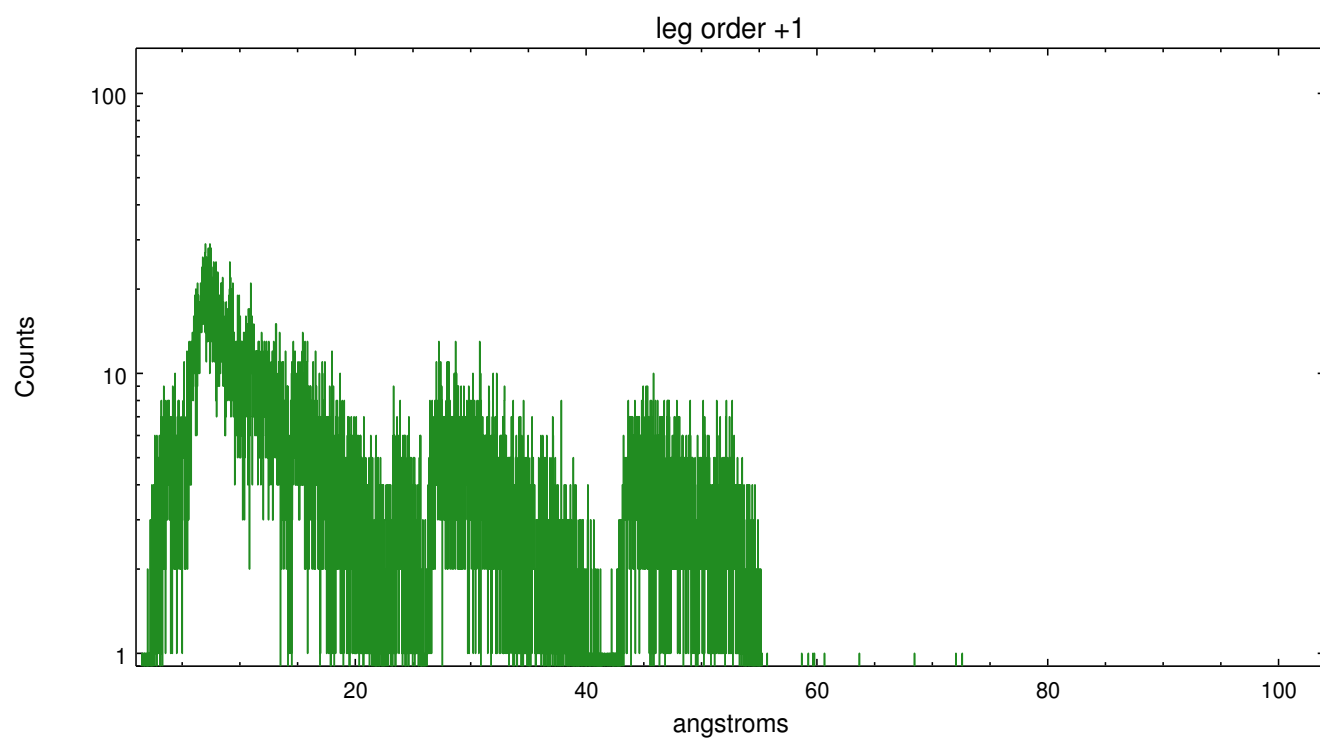
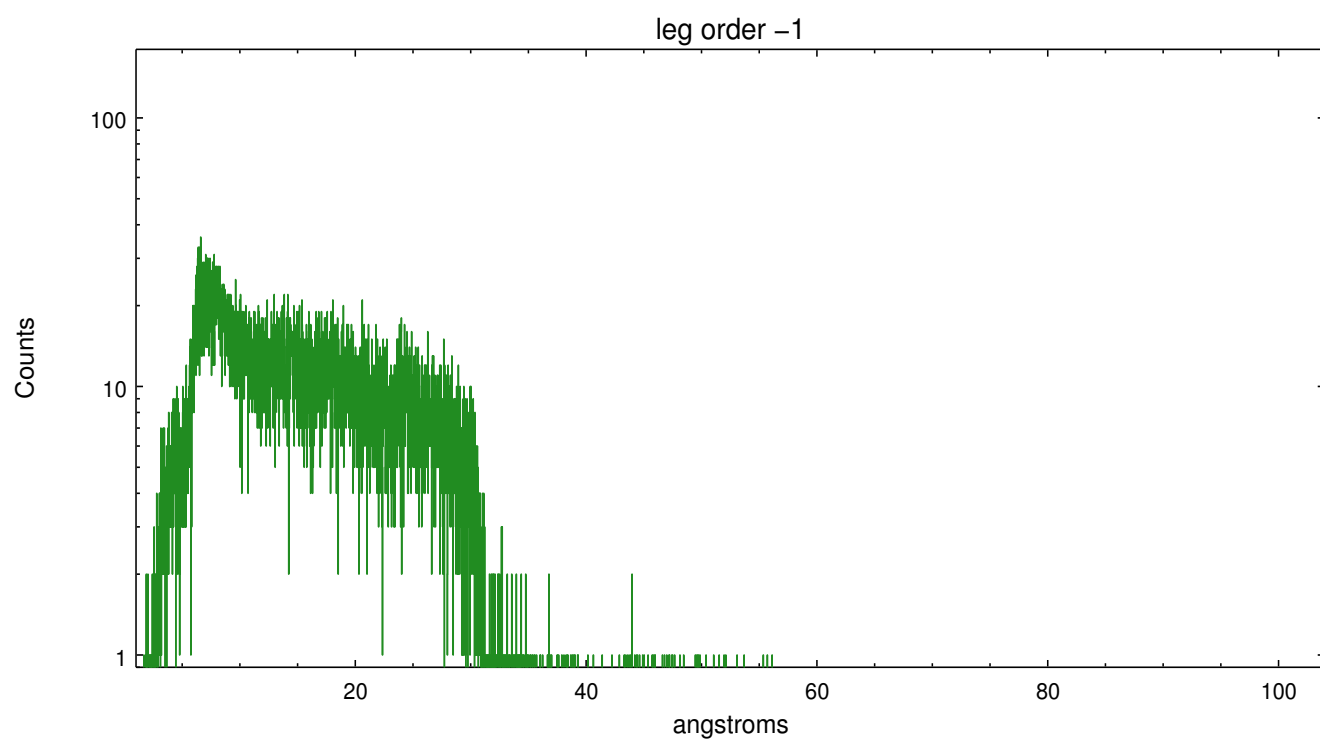


Spot Image LETG

Full Detector LETG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	1747	1237	25934	24136	22308	1553	2527





A Summary

A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2019.04.10
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	21.158

A.2 Comments

The focal plane temperature is warmer than -112.0 C during the interval 82395860.55 - 82417015.75 (MET s) of this observation. This temperature is the upper limit of the verified ACIS calibration for the back-illuminated chips. The focal plane temperature during part of this observation was warmer than the upper limit for optimum calibration of the ACIS gain and spectral resolution (i.e., -114.0 C for ACIS-I and -112.0 C for ACIS-S).

The Chandra calibration team calibrates the ACIS gain and spectral resolution using data from the external calibration source (ECS). ECS data show that the frontside-illuminated (FI) CCDs are more temperature sensitive than the backside-illuminated (BI) CCDs.

A summary of the current calibration status of the ACIS gain and spectral resolution can be found at:

http://asc.harvard.edu/cal/Acis/Cal_prods/Gain_and_Spectral_Resolution/A_CIS_response_summary.html

The main points are:

- 1) The gain on BI chips remains within 0.3% (i.e., the systematic uncertainty in the ACIS gain quoted on the Chandra Calibration Status Summary web page) at all measured temperatures.
- 2) The gain on FI chips remains within 0.3% below row 600 at all measured temperatures.
- 3) The gain on FI chips above row 600 can be underestimated by as much as 1% for focal plane temperatures exceeding -116 C.
- 4) The spectral resolution (i.e., FWHM) on BI chips is insensitive to the focal plane temperature.
- 5) Warmer focal plane temperatures increase the FWHM on FI chips by up to 30 eV near row 512 and by up to 70 eV near the top of the chips.

In summary, the user should be cautious in the spectral analysis of high S/N emission lines detected on the top half of FI chips in this observation. Default processing with the current version of the CALDB will underestimate photon energies by up to 1% and broaden emission lines by up to 70 eV.

===

To compensate for a few bad pixels not marked as bad that were not

removed in the Level 2 processing, a custom bad pixel file with additional bad pixels at (chipx, chipy) = (232:234,322:339) in S1 was added in this processing. As a result, the user will NOT find a relatively bright square of pixels on the S1 chip for level 2 data caused by the application of the dither algorithm to the bad pixels in question, as opposed to previous processing(s).

===

Zeroth order is extended. The zeroth order sky position was determined using a software tool developed by CXC called findzero, which is available in CIAO as part of the tgdetect2 tool. The tool calculates the point of intersection of the readout streak on the ACIS CCD and the meg dispersed spectral arm, rather than using a centroid position of the source. The findzero results are more accurate than source centroid in this case. =====

Target very off-axis. In tg_create_mask, the zeroth order region needs to be decreased; off-axis, the default size is too large and causes short wavelengths to be omitted from grating region. In tgextract, the off-axis source extent requires the tg_d range to be increased. ===

Reprocessed using the following method: Columns x, y, r, w give parameters for tg_create_mask Columns s1, s2, d1, d2, u1, u2 give parameters for tgextract. Customized parts of the usage are as follows:
tg_create_mask use_user_pars = yes sA_zero_x = \$x sA_zero_y = \$y
sA_zero_rad = \$r sA_width_hcg = \$w sA_width_meg = \$w sA_width_leg
= \$w tgextract min_tg_d = \$s1 max_tg_d = \$s2 min_downbkg_tg_d =
\$d1 max_downbkg_tg_d = \$d2 min_upbkg_tg_d = \$u1 max_upbkg_tg_d =
\$u2 PKS 2155 series (LETG/ACIS): # obsid x y r w s1 s2 d1 d2 u1 u2 1791
3242.07 4497.14 47.96 598.78 -3.401e-03 3.401e-03 -2.592e-02 -3.887e-03
3.887e-03 2.592e-02.