

V&V Reference Report

L2 ASCDS Version : 10.7.1

Observation 22225 - L2 Version 1
Chandra X-Ray Center

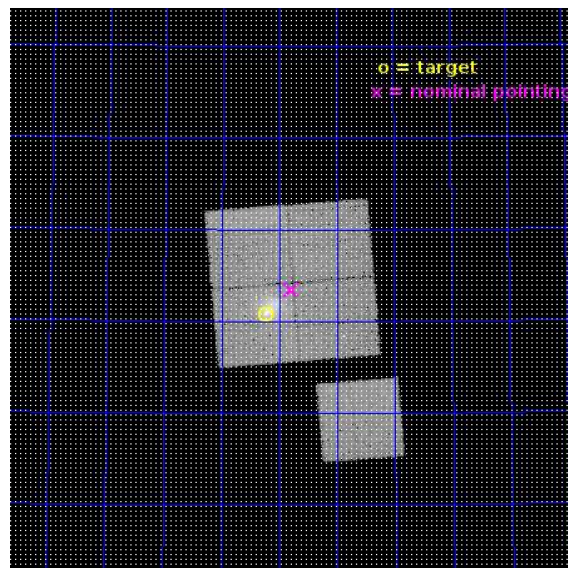
L2 Processing Date : May 20 2019

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1 Front

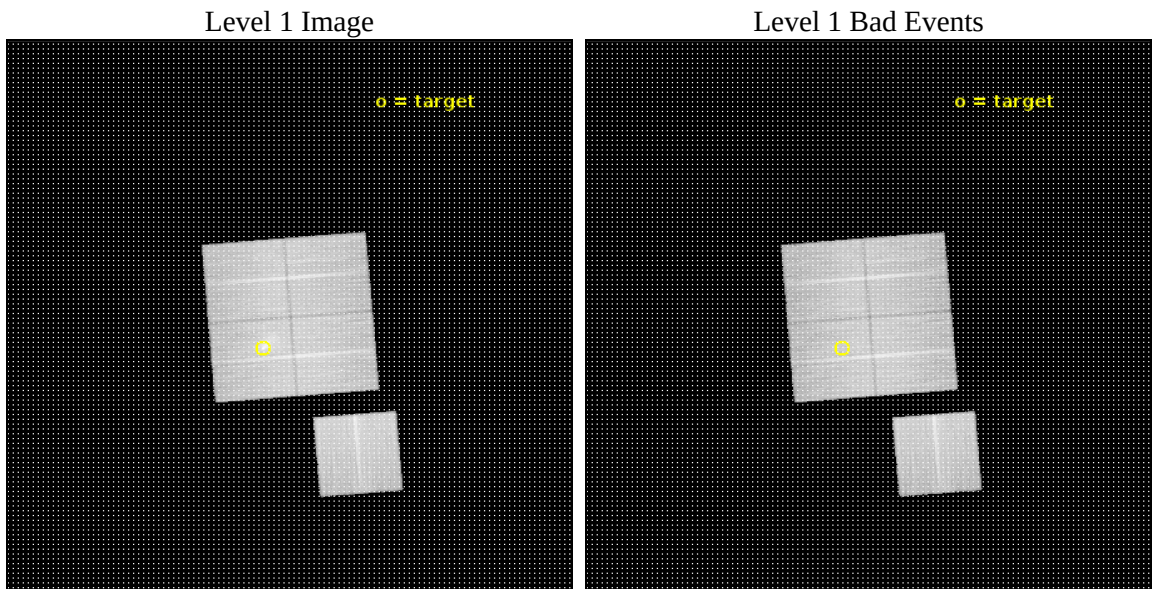
seq_num	801762	Sequence number
obs_id	22225	Observation id
title	Shock structure, the electron-ion equilibration timescale and the disintegrating cool core in A2146	Proposal title
observer	Helen Russell	Principal investigator
object	Abell 2146	Source name
dtcycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	239.06125	Observer's specified target RA [deg]
dec_targ	66.346917	Observer's specified target Dec [deg]
ra_nom	238.94751993437	Nominal RA [deg]
dec_nom	66.391109000617	Nominal Dec [deg]
roll_nom	175.31290884046	Nominal Roll [deg]
revision	1	Processing version of data
ontime	36843.459293246	Sum of GTIs [s]
livetime	36362.07237382	Livetime [s]
ontime0	36840.318273067	Sum of GTIs [s]
ontime1	36846.600283504	Sum of GTIs [s]
ontime2	36846.600283504	Sum of GTIs [s]
ontime3	36843.459293246	Sum of GTIs [s]
ontime6	36846.600283504	Sum of GTIs [s]
l2events	144488	Number of level 2 events



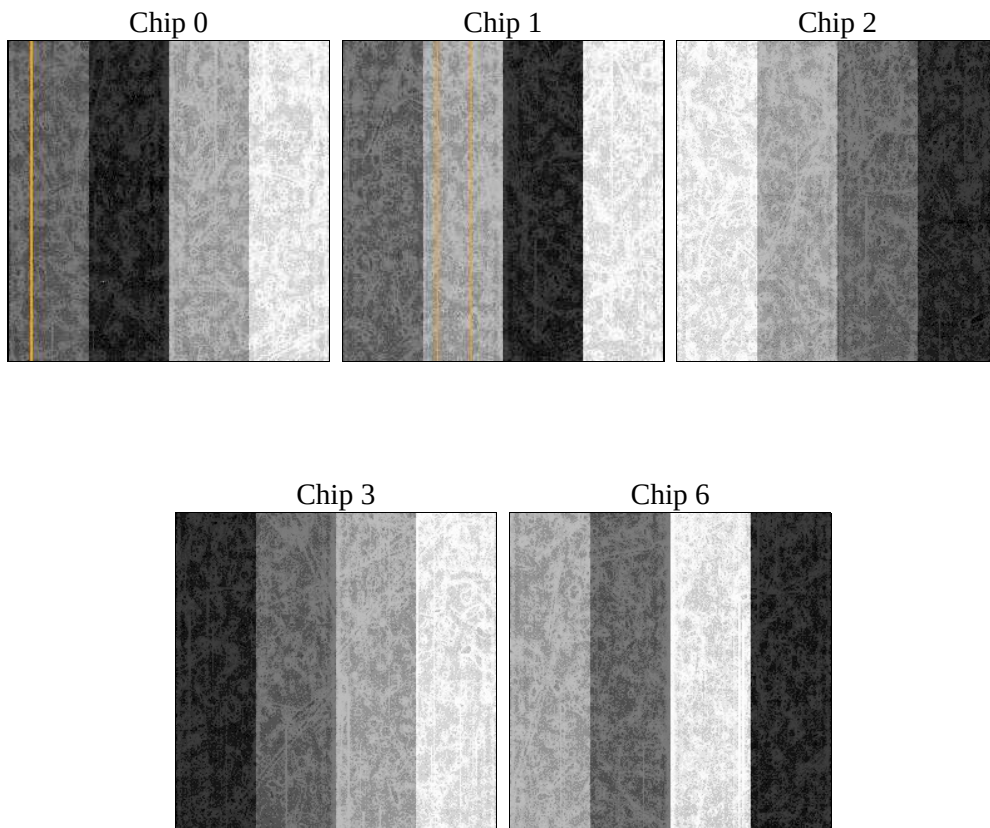
2 OBI

2.1 OBI

2.1.1 Images



2.1.2 Bias



2.1.3 Parameters

obi_num	0	Obi number	sched_exp_time	36781.631000	[s] Scheduled observation exposure time
ascdsver	10.7.1	Processing system revision	ontime	36843.459293246	Sum of GTIs [s]
caldsver	4.8.2	 	ontime0	36840.318273067	Sum of GTIs [s]
date	2019-05-20T03:46:33	Date and time of file creation	ontime1	36846.600283504	Sum of GTIs [s]
revision	1	Processing version of data	ontime2	36846.600283504	Sum of GTIs [s]
			ontime3	36843.459293246	Sum of GTIs [s]
			ontime6	36846.600283504	Sum of GTIs [s]
			l1events	1351728	Number of level 1 events

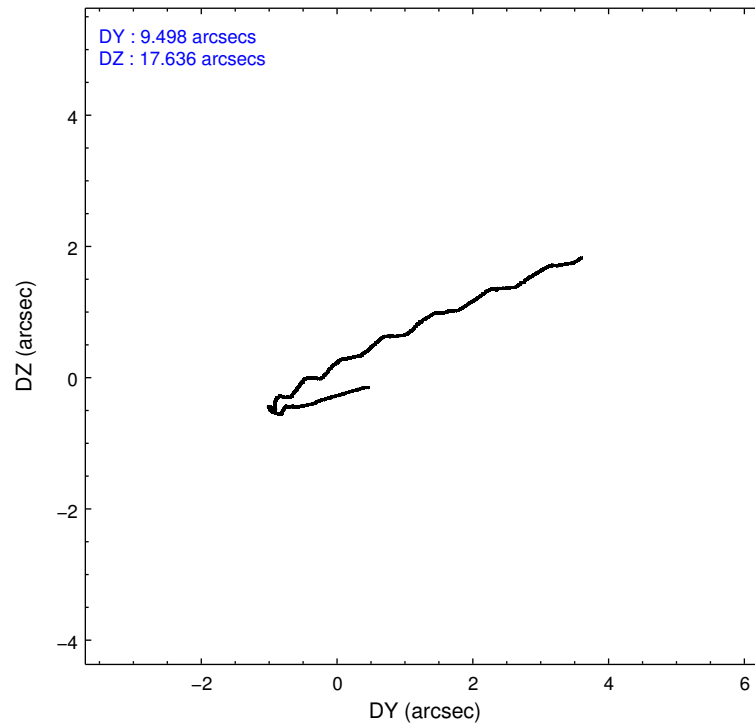
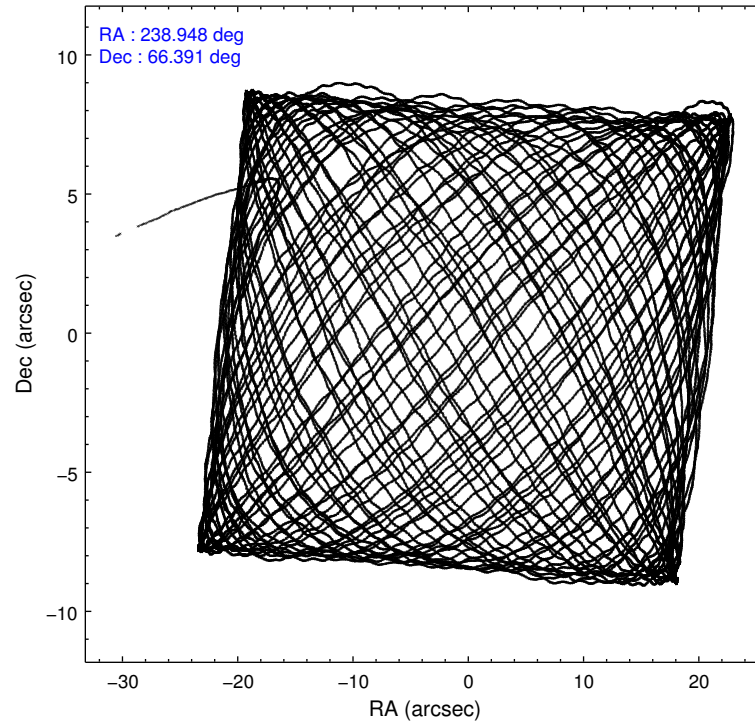
2.1.4 Events

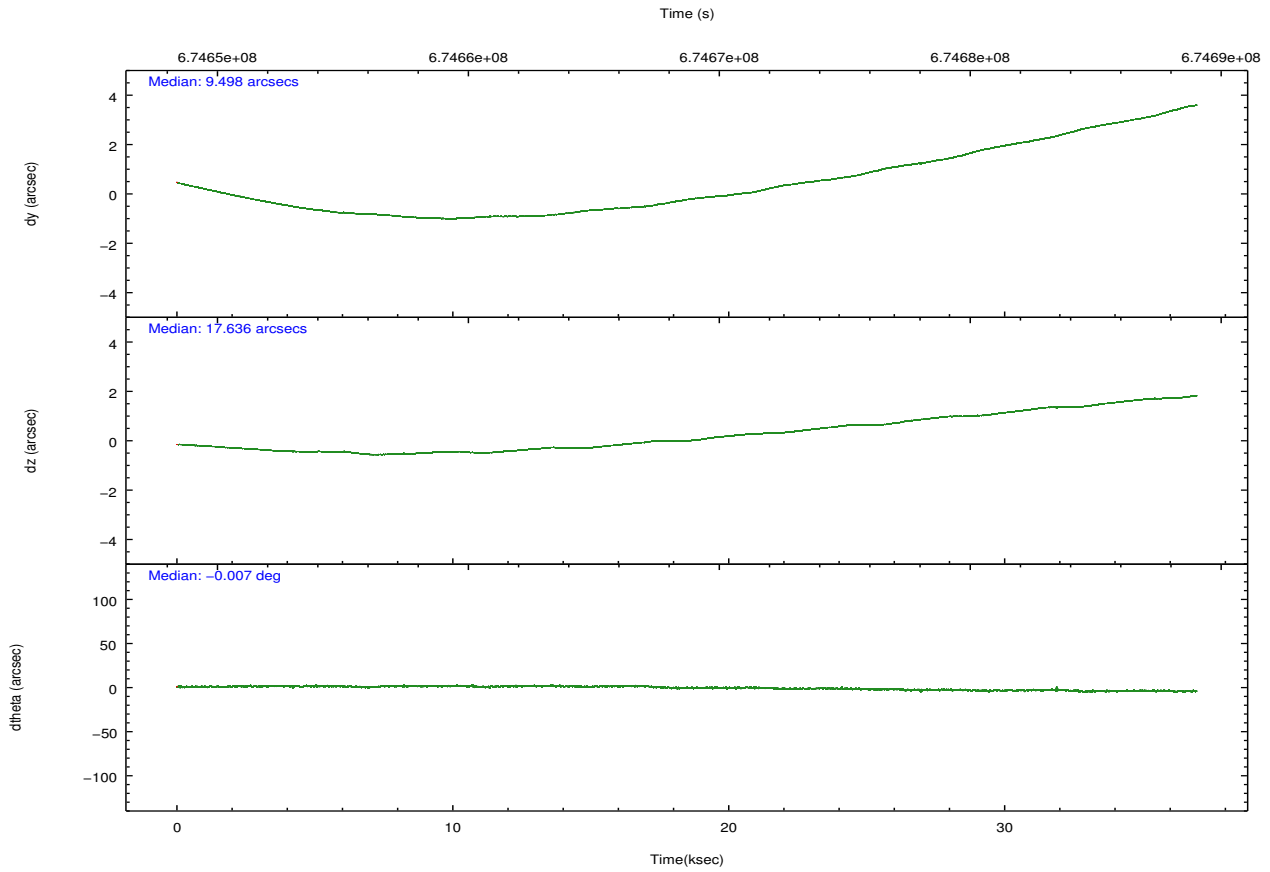
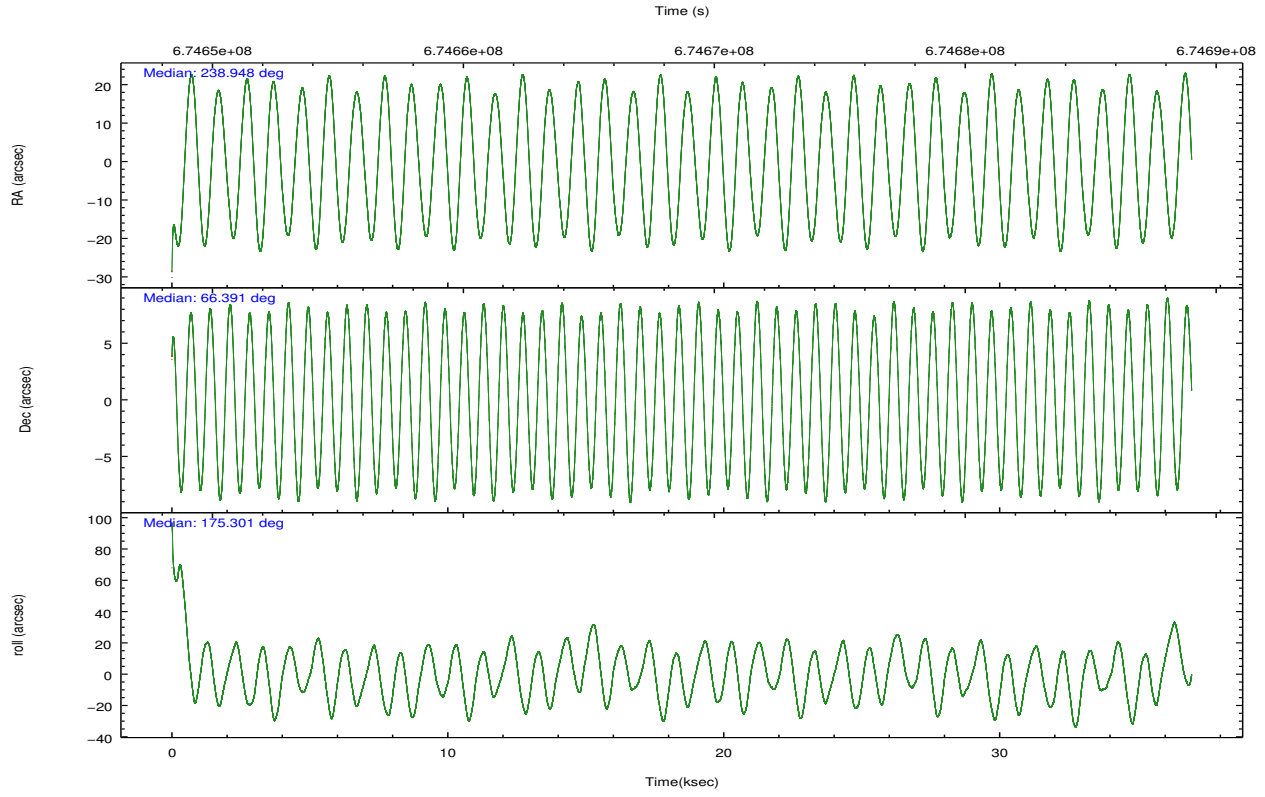
	ccd 0	ccd 1	ccd 2	ccd 3	ccd 6		ccd 0	ccd 1	ccd 2	ccd 3	ccd 6
level 1 events	248113	256543	282349	282927	281796	grade 0 events	9961	10526	10503	23454	9182
rejected events	218181	222812	253037	237510	251582		4%	4%	3%	8%	3%
rejected %	87%	86%	89%	83%	89%	grade 1 events	126	136	154	229	118
							0%	0%	0%	0%	0%
						grade 2 events	7718	9407	7050	8167	7725
							3%	3%	2%	2%	2%
						grade 3 events	2956	3035	2858	3547	2733
							1%	1%	1%	1%	0%
						grade 4 events	2758	2949	2910	3454	2861
							1%	1%	1%	1%	1%
						grade 5 events	11190	11409	10782	12597	11819
							4%	4%	3%	4%	4%
						grade 6 events	6541	7824	5996	6804	7717
							2%	3%	2%	2%	2%
						grade 7 events	206863	211257	242096	224675	239641
							83%	82%	85%	79%	85%

2.2 Compared Parameters

Parameter	Planned	Actual	Parameter	Planned	Actual
Instrument	ACIS	ACIS	Obspar format version number	7	7
Detector	ACIS-01236	ACIS-01236	Obspar file type	PREDICTED	ACTUAL
Grating	NONE	NONE	Obspar update status	NONE	UPDATED
Data mode	VFAINT	VFAINT	CCD I0 on	Y	Y
Observation mode	POINTING	POINTING	CCD I1 on	Y	Y
[deg] Pointing RA	239.009753	238.947519934369	CCD I2 on	Y	Y
[deg] Pointing Dec	66.402979	66.39110900061749	CCD I3 on	Y	Y
[deg] Pointing Roll	175.047189	175.3129088404558	CCD S0 on	N	N
[mm] SIM focus pos	-0.782348	-0.7809083437167272	CCD S1 on	N	N
[mm] SIM defocus	0	0.001439871863259334	CCD S2 on	O1	Y
[mm] SIM translation stage pos	-233.592463	-233.5874344608287	CCD S3 on	N	N
[mm] SIM translation stage offset	0	-0.005018542100998502	CCD S4 on	N	N
[s] Observation start time (MET)	674650419.184000	674649324.7899801	CCD S5 on	N	N
Observation start date	2019-05-19T10:52:30	2019-05-19T10:35:24	Number of optional ACIS chips dropped	0	0
[s] Observation end time (MET)	674687200.184000	674688066.2048	On-chip summing requested	N	N
Observation end date	2019-05-19T21:05:31	2019-05-19T21:21:06	Subarray requested	NONE	NONE
Read mode	TIMED	TIMED	Alternating exposures requested	N	N
			[s] Primary exposure time	0.000000	3.1

2.3 Aspect



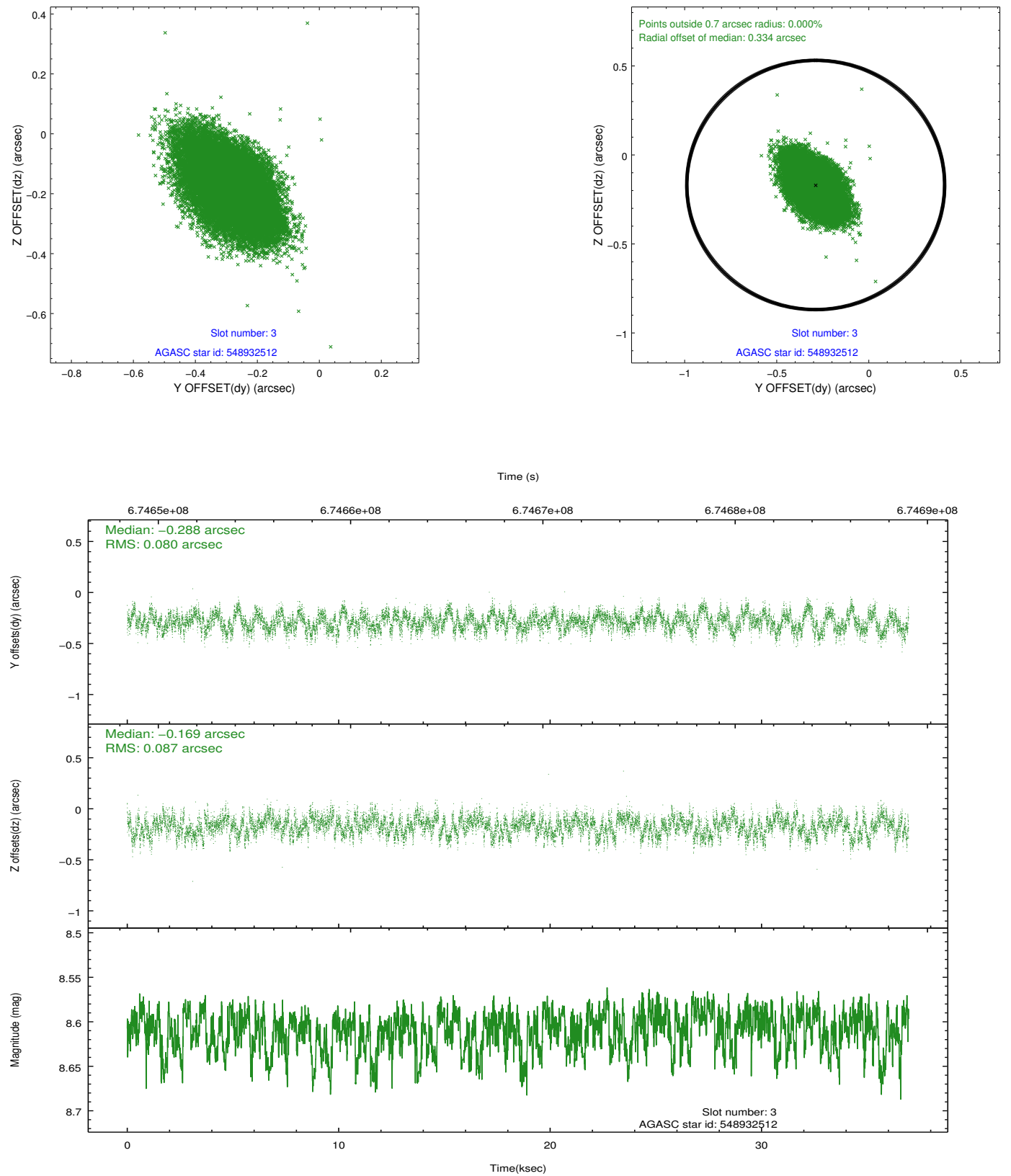


Slot Statistics

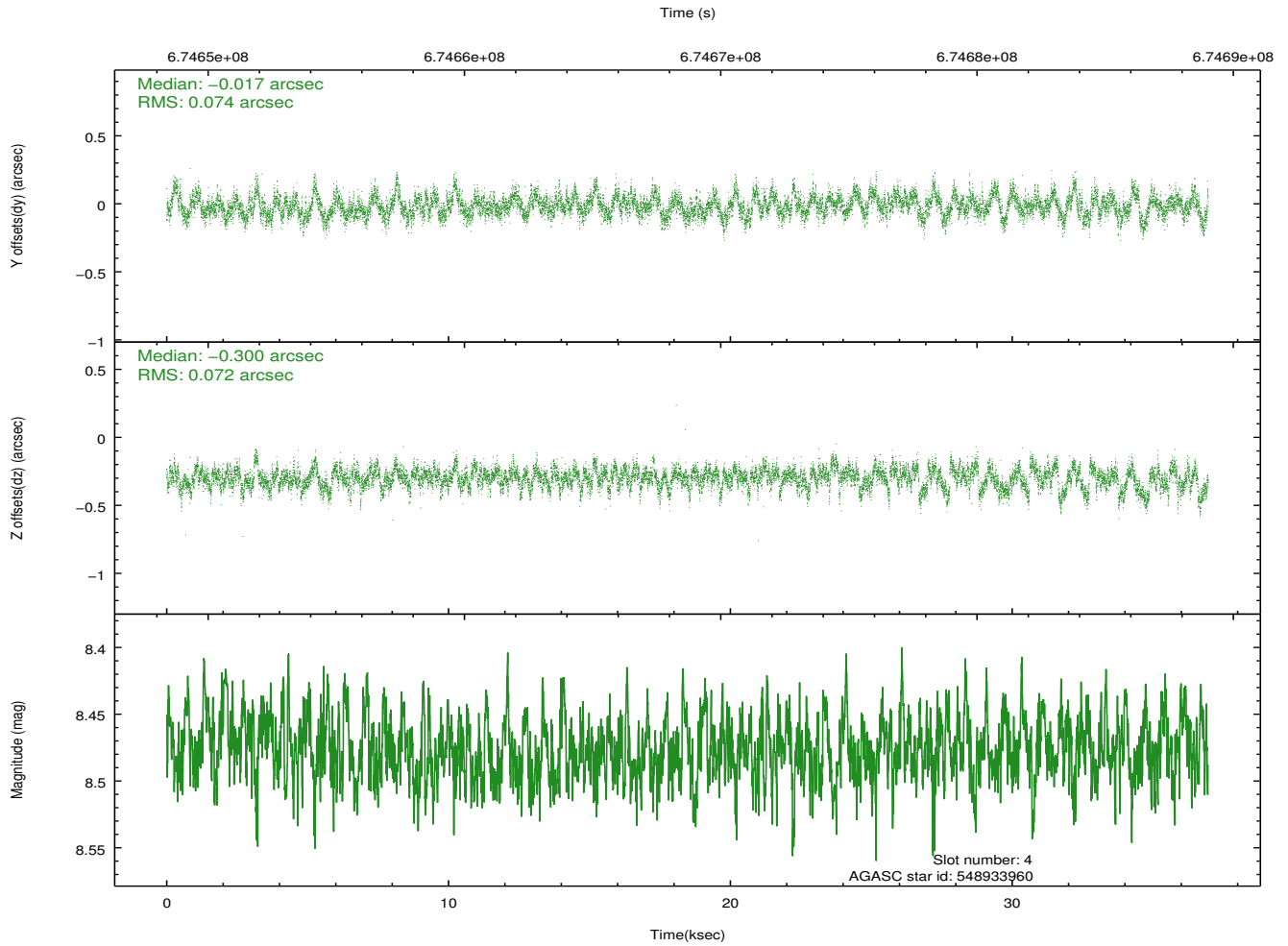
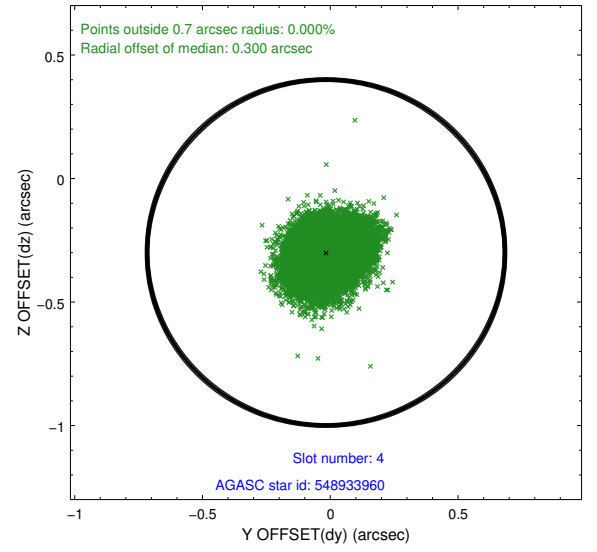
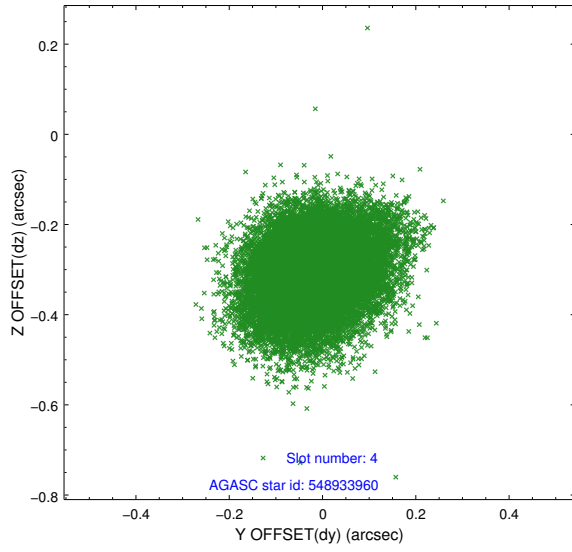
pt	status	used	id	mag	n_pts	frac_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mea
0	FID		ACIS-I-1	7.22	9015	1.000	0.100	-0.089	0.050	0.065	0.000000	0.000000	929.82	-841
1	FID		ACIS-I-5	7.20	9015	1.000	-0.465	0.022	0.015	0.025	0.000000	0.000000	-1819.00	1055
2	FID		ACIS-I-6	7.19	9014	1.000	0.270	0.139	0.042	0.054	0.000000	0.000000	395.29	1700
3	GUIDE	used	548932512	8.61	18020	1.000	-0.288	-0.169	0.125	0.210	239.727627	66.054972	-1152.63	1151
4	GUIDE	used	548933960	8.48	18016	1.000	-0.017	-0.300	0.109	0.181	237.671184	66.428675	1929.99	55
5	GUIDE	used	548937184	9.86	17940	1.000	-0.082	0.158	0.251	0.397	238.771821	66.565432	390.49	-553
6	OMITTED			0.00	0	0.000	0.000	0.000	0.000	0.000	0.000000	0.000000	0.00	0
7	GUIDE	used	549849072	9.13	18012	1.000	0.390	0.315	0.155	0.246	240.420863	66.802816	-1865.72	-1628

2.4 Star Slots

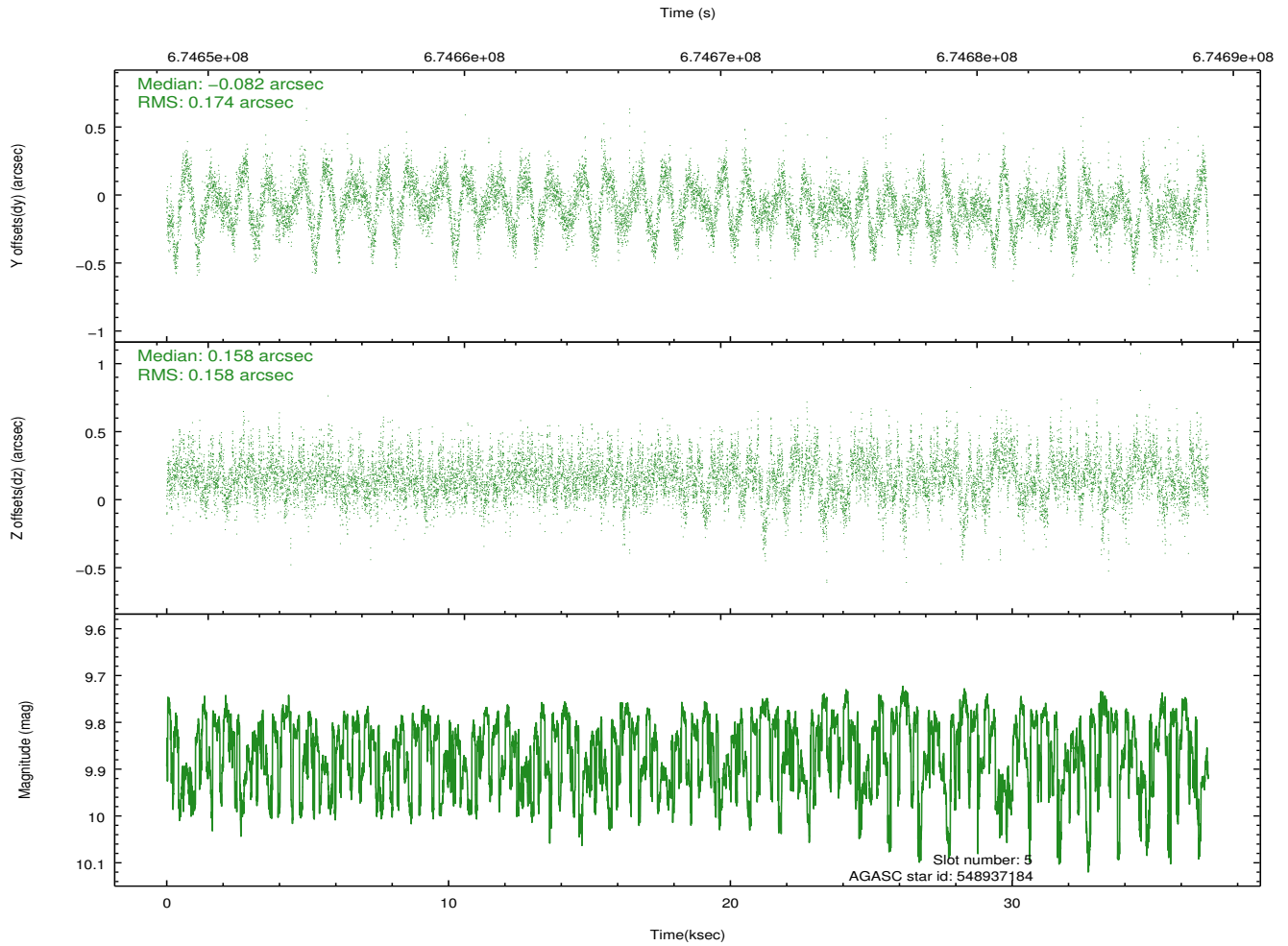
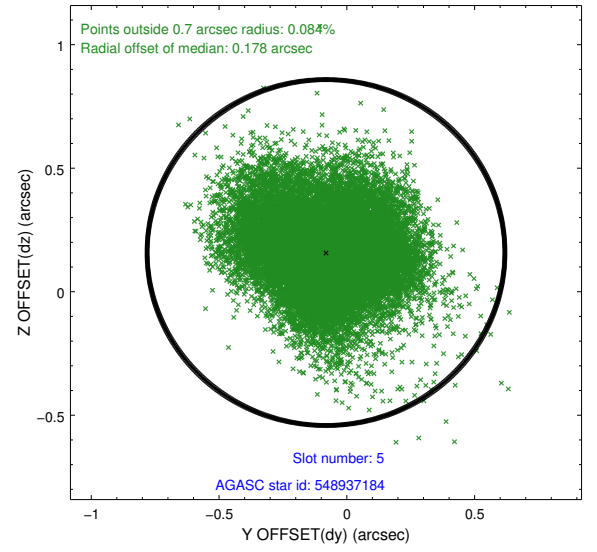
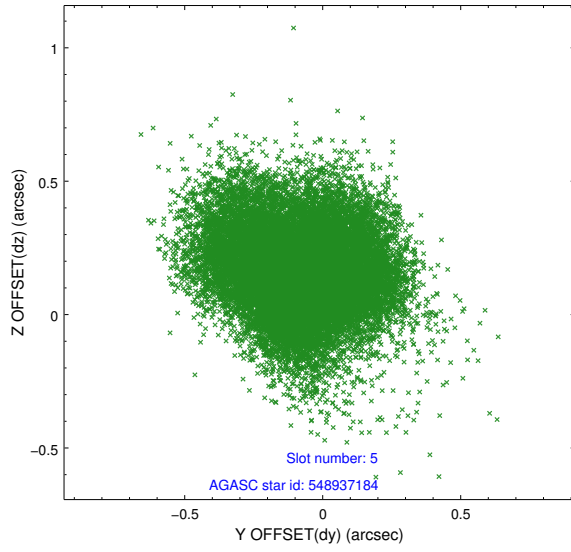
2.4.1 Slot 3



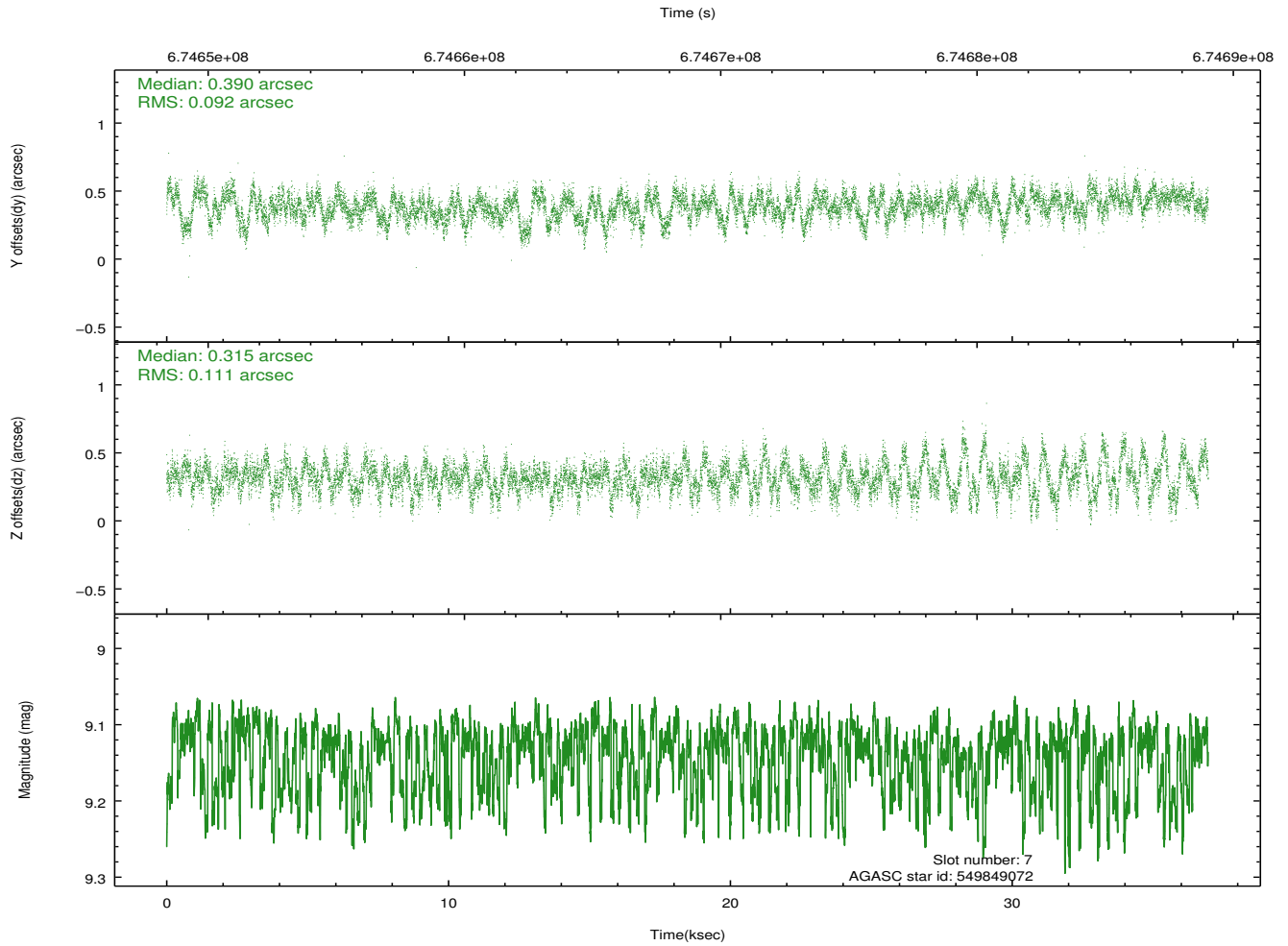
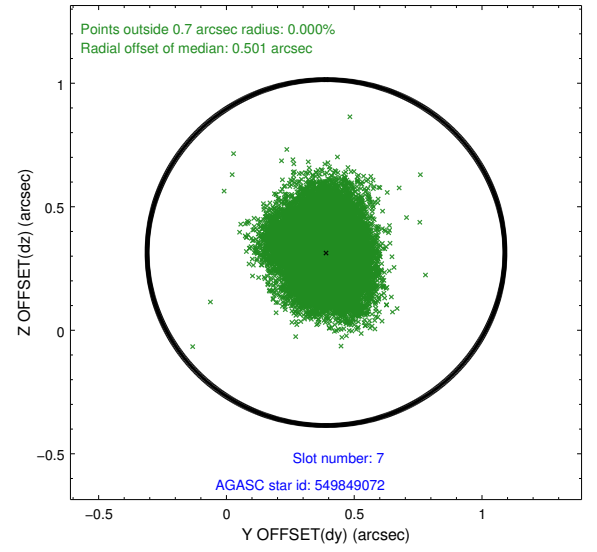
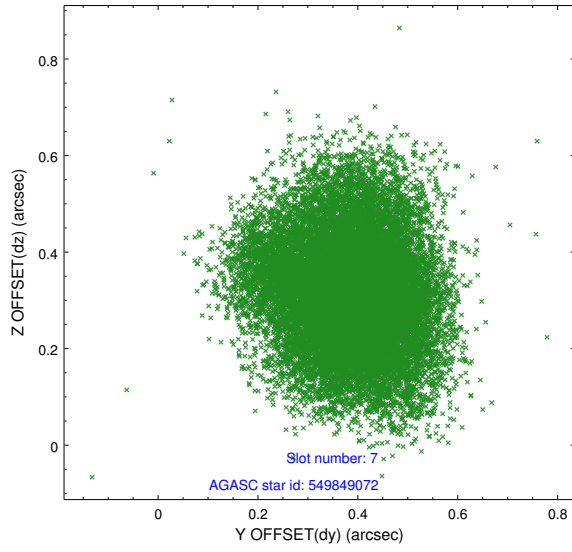
2.4.2 Slot 4



2.4.3 Slot 5

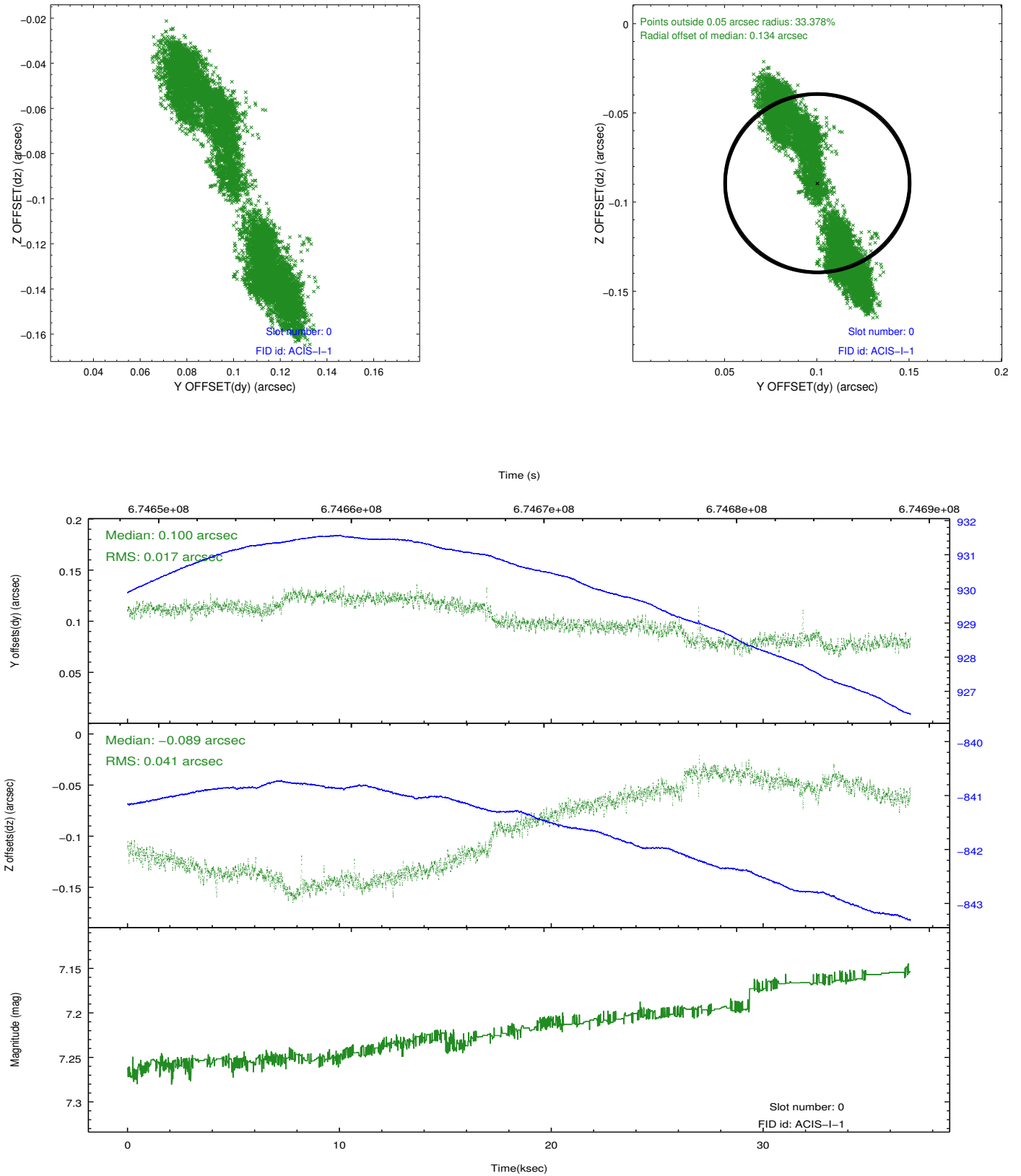


2.4.4 Slot 7

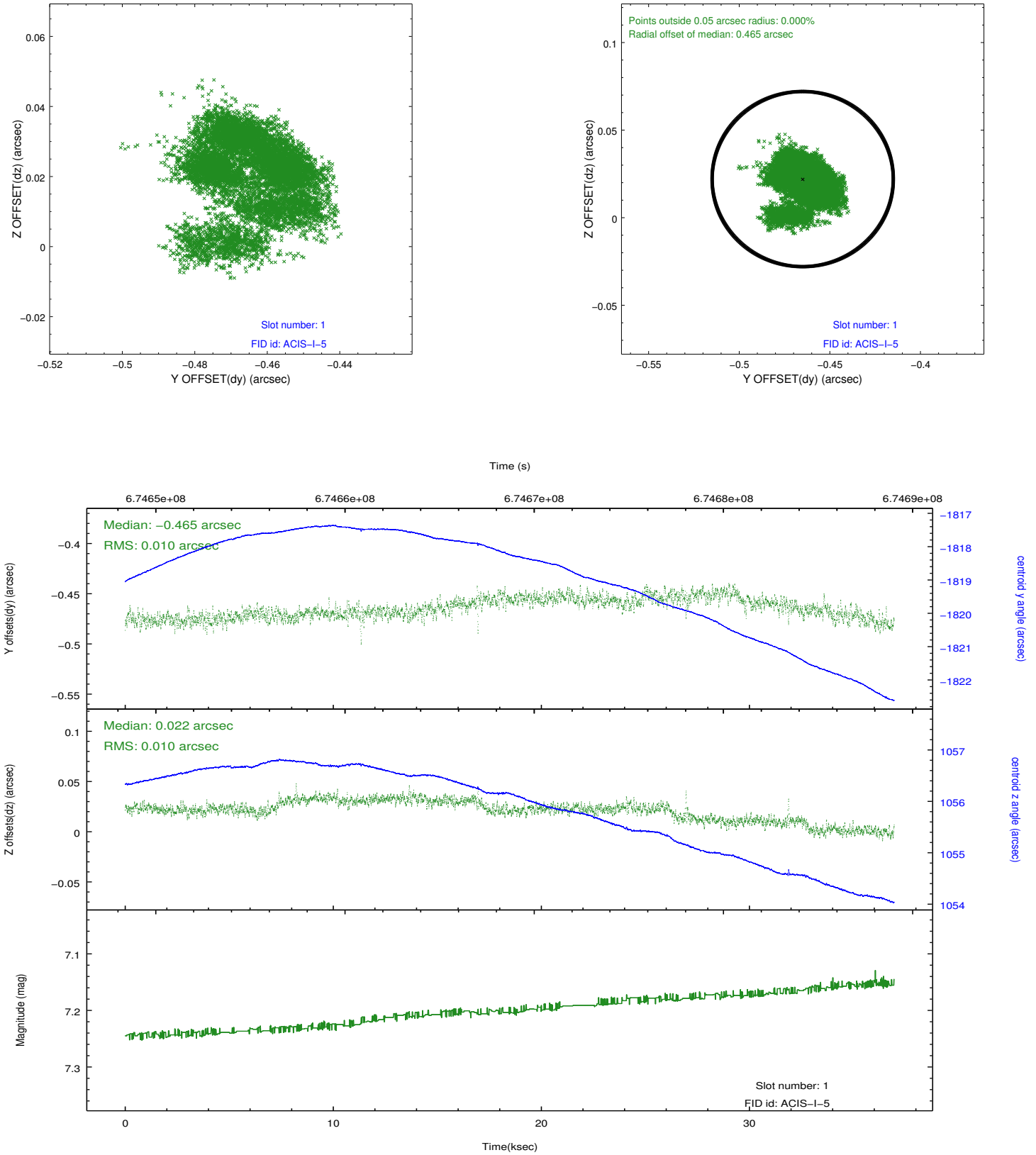


2.5 FID Slots

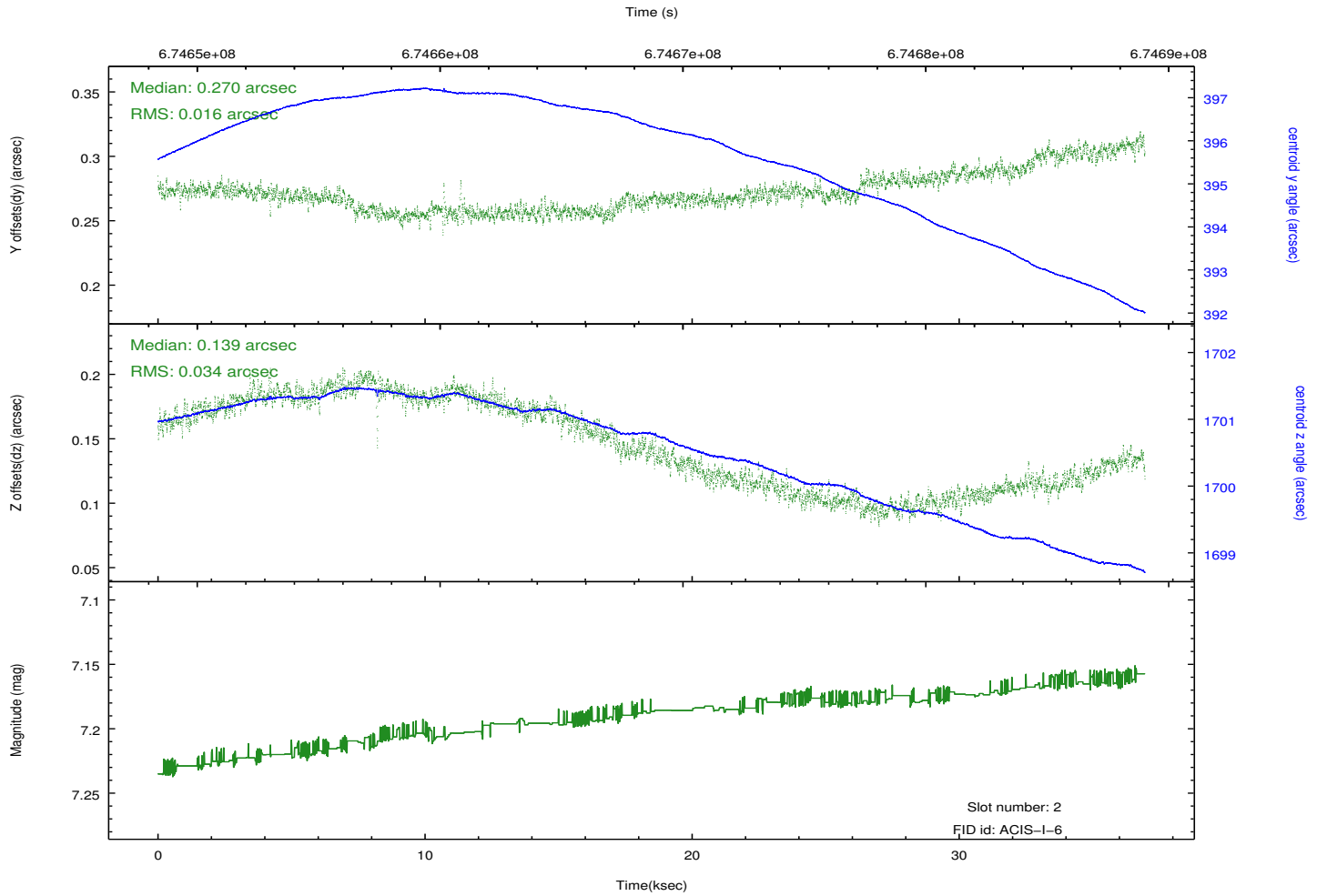
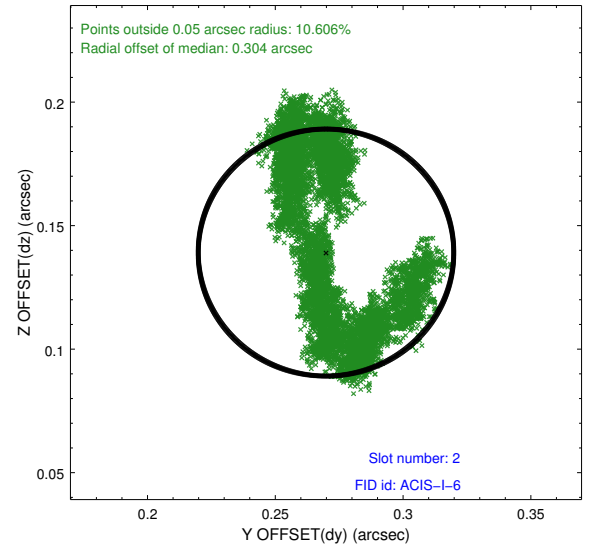
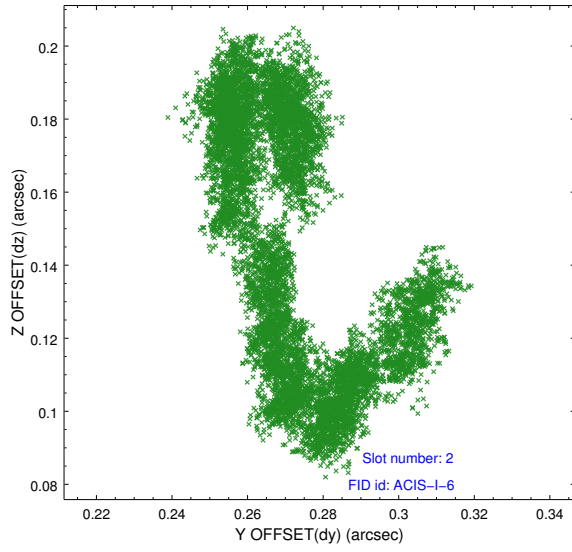
2.5.1 Slot 0



2.5.2 Slot 1



2.5.3 Slot 2



A Summary

A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2019.05.20
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	36.843459293246

A.2 Comments

The ACIS focal plane temperature is warmer than -114.0 C degrees during the interval 674650343.14 - 674658936.34 (MET s) of this observation. The ACIS spectral response calibration for the front-illuminated chips is less accurate at these warmer temperatures than it is at -115.0 C. 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/ACIS_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.

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The guide star in slot 6 was removed from the aspect solution due to poor data quality. The aspect solution is improved by the removal of this guide star from the solution.