

V&V Reference Report

L2 ASCDS Version : 10.7.1

Observation 22235 - L2 Version 1
Chandra X-Ray Center

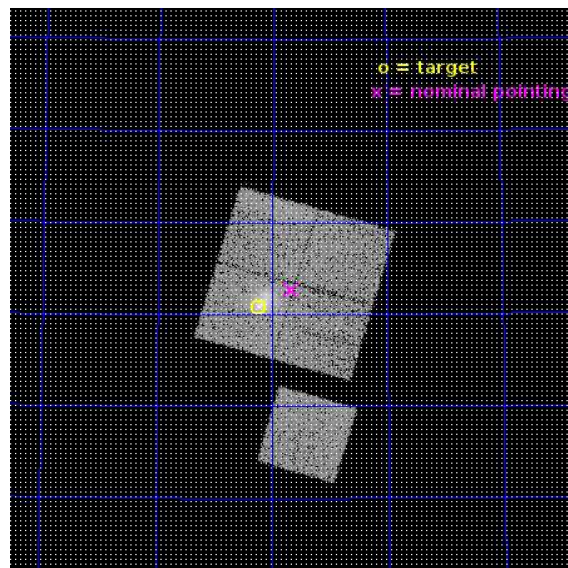
L2 Processing Date : May 27 2019

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1 Front

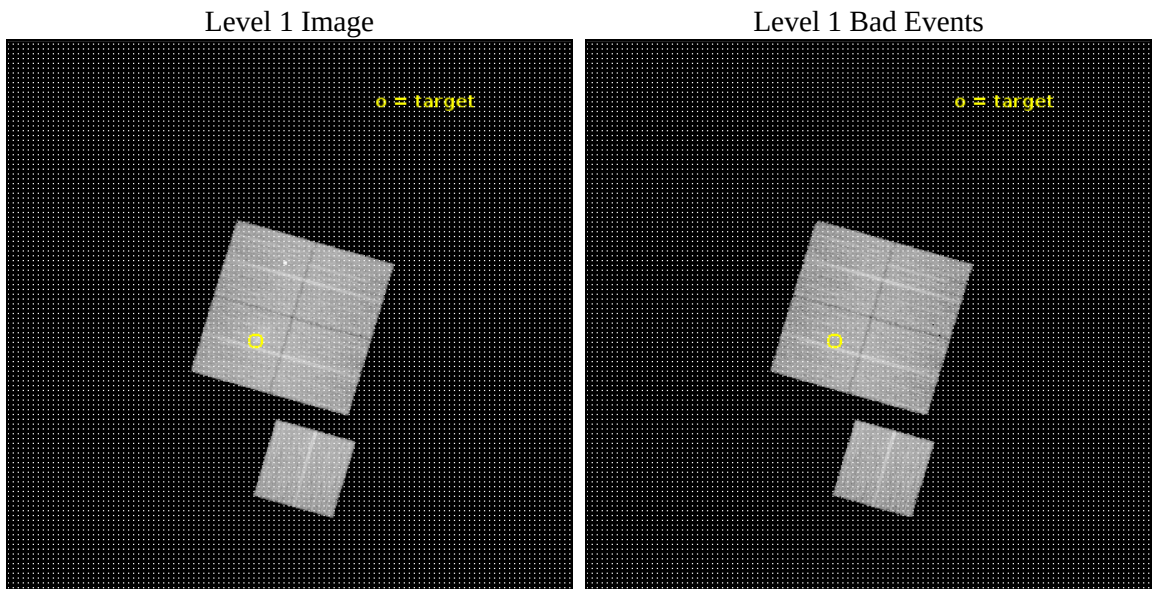
seq_num	801762	Sequence number
obs_id	22235	Observation id
title	Shock structure, the electron-ion equilibration timescale and the disintegrating cool core in A2146	Proposal title
observer	Helen Russell	Principal investigator
object	Abell 2146	Source name
dtcycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	239.06125	Observer's specified target RA [deg]
dec_targ	66.346917	Observer's specified target Dec [deg]
ra_nom	238.91769024633	Nominal RA [deg]
dec_nom	66.378712461355	Nominal Dec [deg]
roll_nom	196.34026089897	Nominal Roll [deg]
revision	1	Processing version of data
ontime	15645.700120449	Sum of GTIs [s]
livetime	15441.277530179	Livetime [s]
ontime0	15639.418059826	Sum of GTIs [s]
ontime1	15645.700120449	Sum of GTIs [s]
ontime2	15645.700120449	Sum of GTIs [s]
ontime3	15645.700120449	Sum of GTIs [s]
ontime6	15645.700120449	Sum of GTIs [s]
l2events	61777	Number of level 2 events



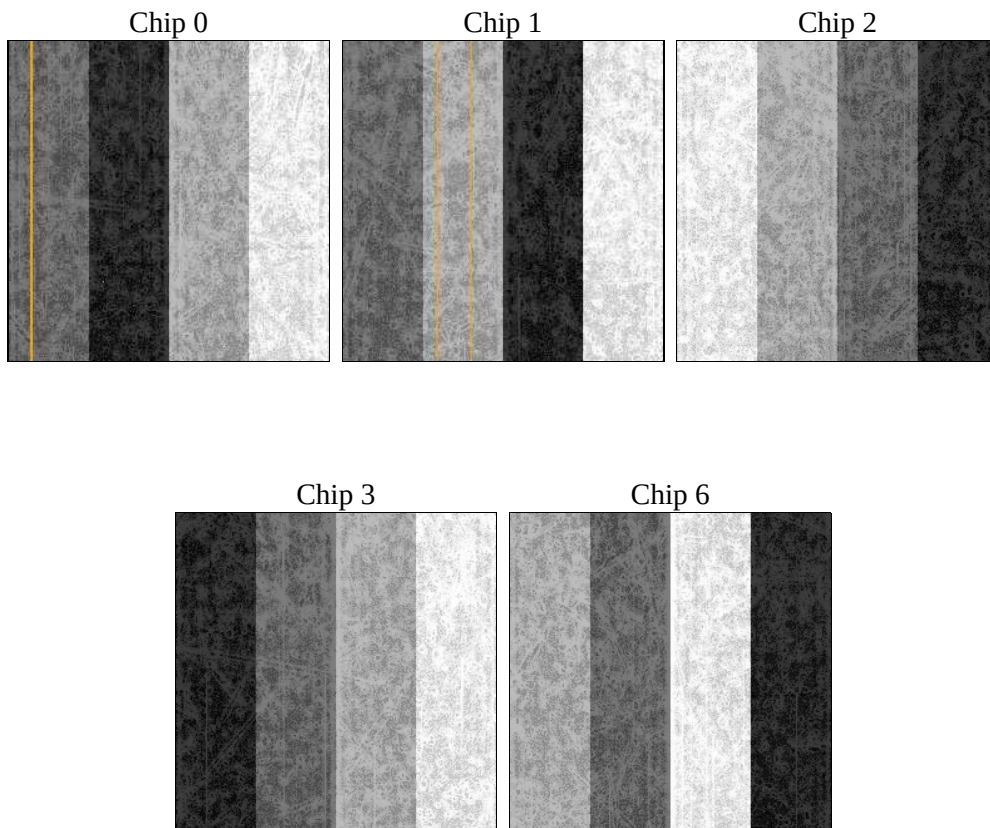
2 OBI

2.1 OBI

2.1.1 Images



2.1.2 Bias



2.1.3 Parameters

obi_num	0	Obi number	sched_exp_time	15580.512000	[s] Scheduled observation exposure time
ascdsver	10.7.1	Processing system revision	ontime	15645.700120449	Sum of GTIs [s]
caldbver	4.8.3	 	ontime0	15639.418059826	Sum of GTIs [s]
date	2019-05-28T02:27:58	Date and time of file creation	ontime1	15645.700120449	Sum of GTIs [s]
revision	1	Processing version of data	ontime2	15645.700120449	Sum of GTIs [s]
			ontime3	15645.700120449	Sum of GTIs [s]
			ontime6	15645.700120449	Sum of GTIs [s]
			l1events	603941	Number of level 1 events

2.1.4 Events

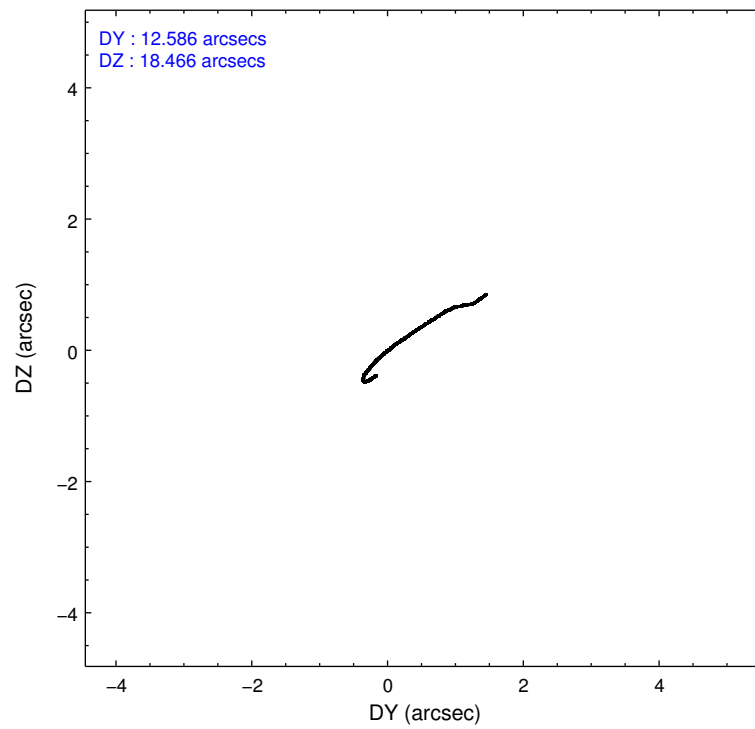
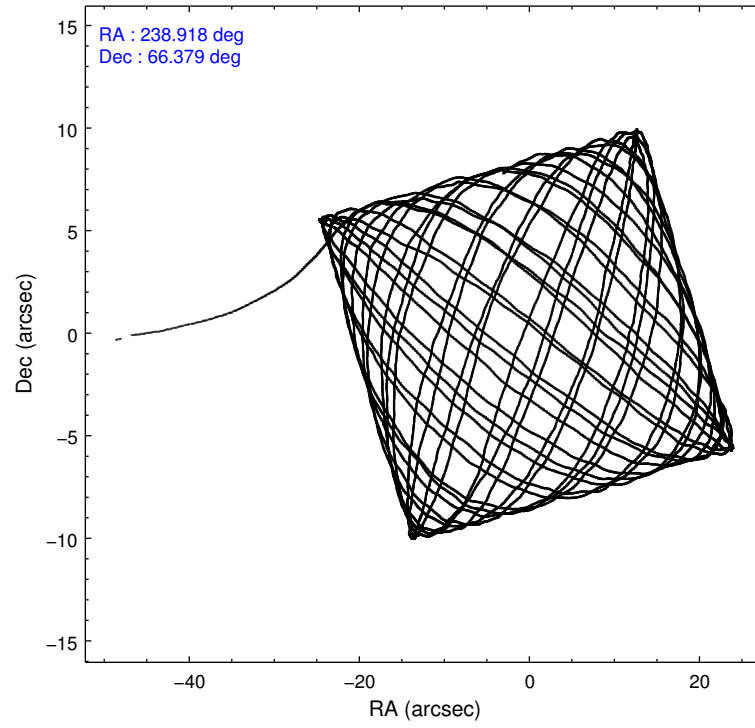
	ccd 0	ccd 1	ccd 2	ccd 3	ccd 6
level 1 events	112079	117201	124584	126591	123486
rejected events	99097	99980	112164	107397	110139
rejected %	88%	85%	90%	84%	89%

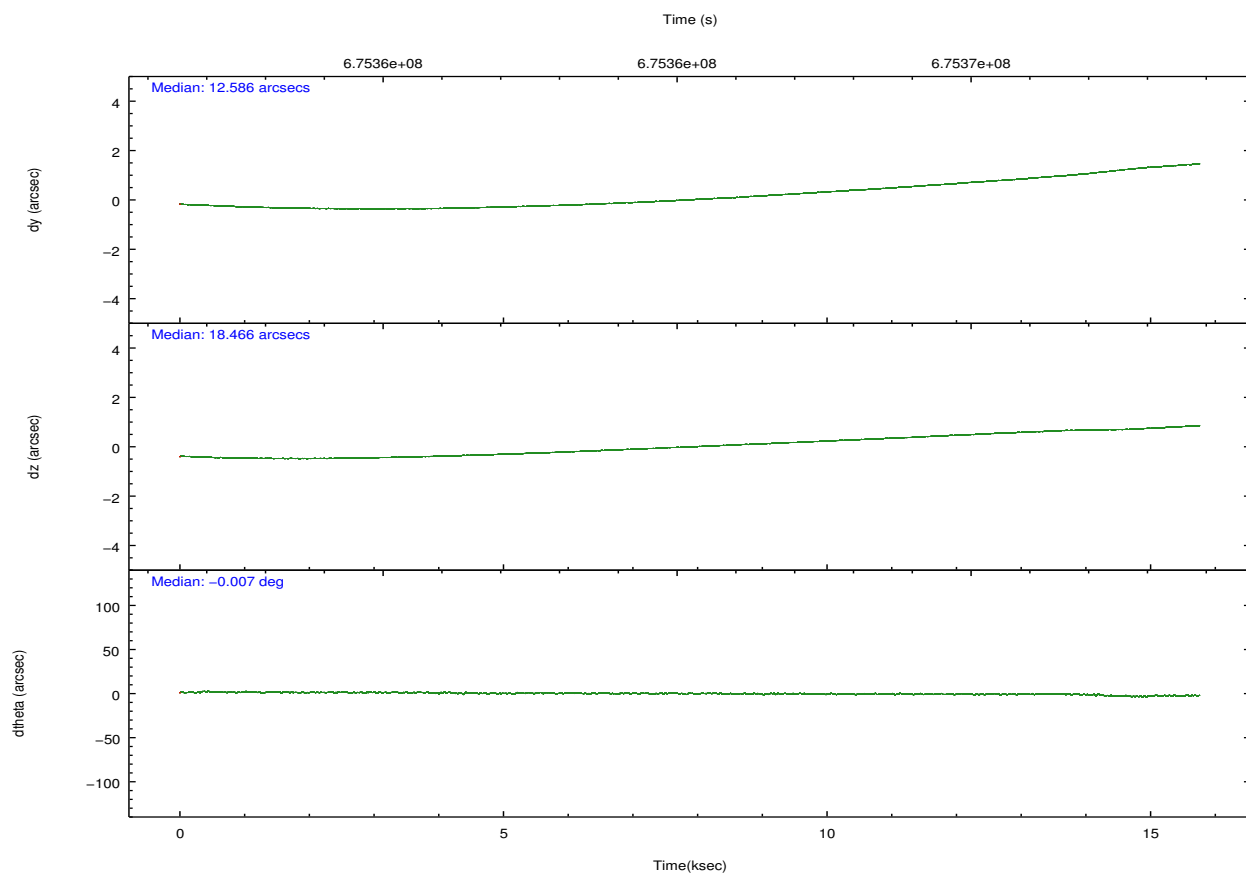
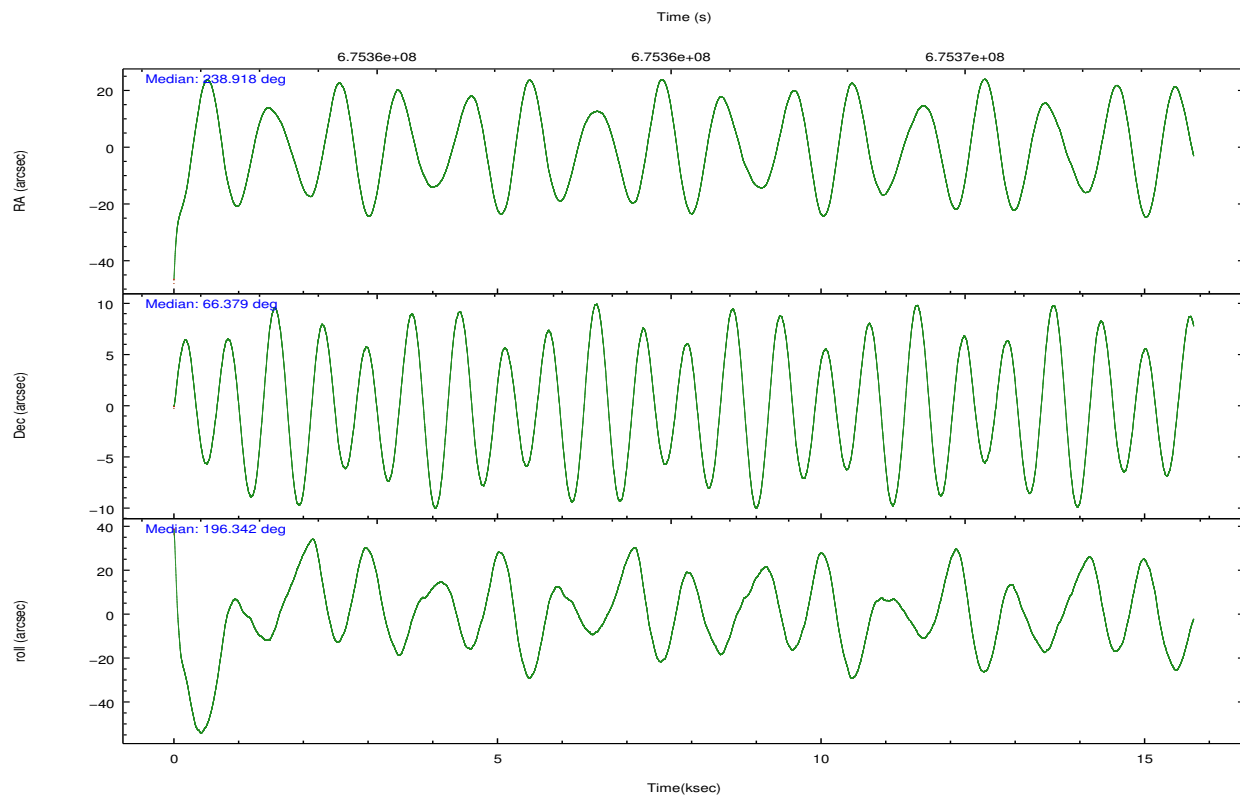
	ccd 0	ccd 1	ccd 2	ccd 3	ccd 6
grade 0 events	4229	4221	4338	9818	3971
	3%	3%	3%	7%	3%
grade 1 events	40	47	58	78	71
	0%	0%	0%	0%	0%
grade 2 events	3350	7108	3061	3457	3439
	2%	6%	2%	2%	2%
grade 3 events	1278	1228	1181	1519	1165
	1%	1%	0%	1%	0%
grade 4 events	1149	1245	1265	1504	1131
	1%	1%	1%	1%	0%
grade 5 events	4795	4953	4521	5473	4959
	4%	4%	3%	4%	4%
grade 6 events	2976	3423	2585	2900	3645
	2%	2%	2%	2%	2%
grade 7 events	94262	94976	107575	101842	105105
	84%	81%	86%	80%	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	238.965089	238.9176902463314	CCD I2 on	Y	Y
[deg] Pointing Dec	66.398712	66.37871246135481	CCD I3 on	Y	Y
[deg] Pointing Roll	196.088100	196.340260898967	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)	675357541.184000	675356588.15737	CCD S5 on	N	N
Observation start date	2019-05-27T15:17:52	2019-05-27T15:03:08	Number of optional ACIS chips dropped	0	0
[s] Observation end time (MET)	675373121.184000	675373983.43341	On-chip summing requested	N	N
Observation end date	2019-05-27T19:37:32	2019-05-27T19:53:03	Subarray requested	NONE	NONE
Read mode	TIMED	TIMED	Alternating exposures requested	N	N
			[s] Primary exposure time	0.000000	3.1

2.3 Aspect



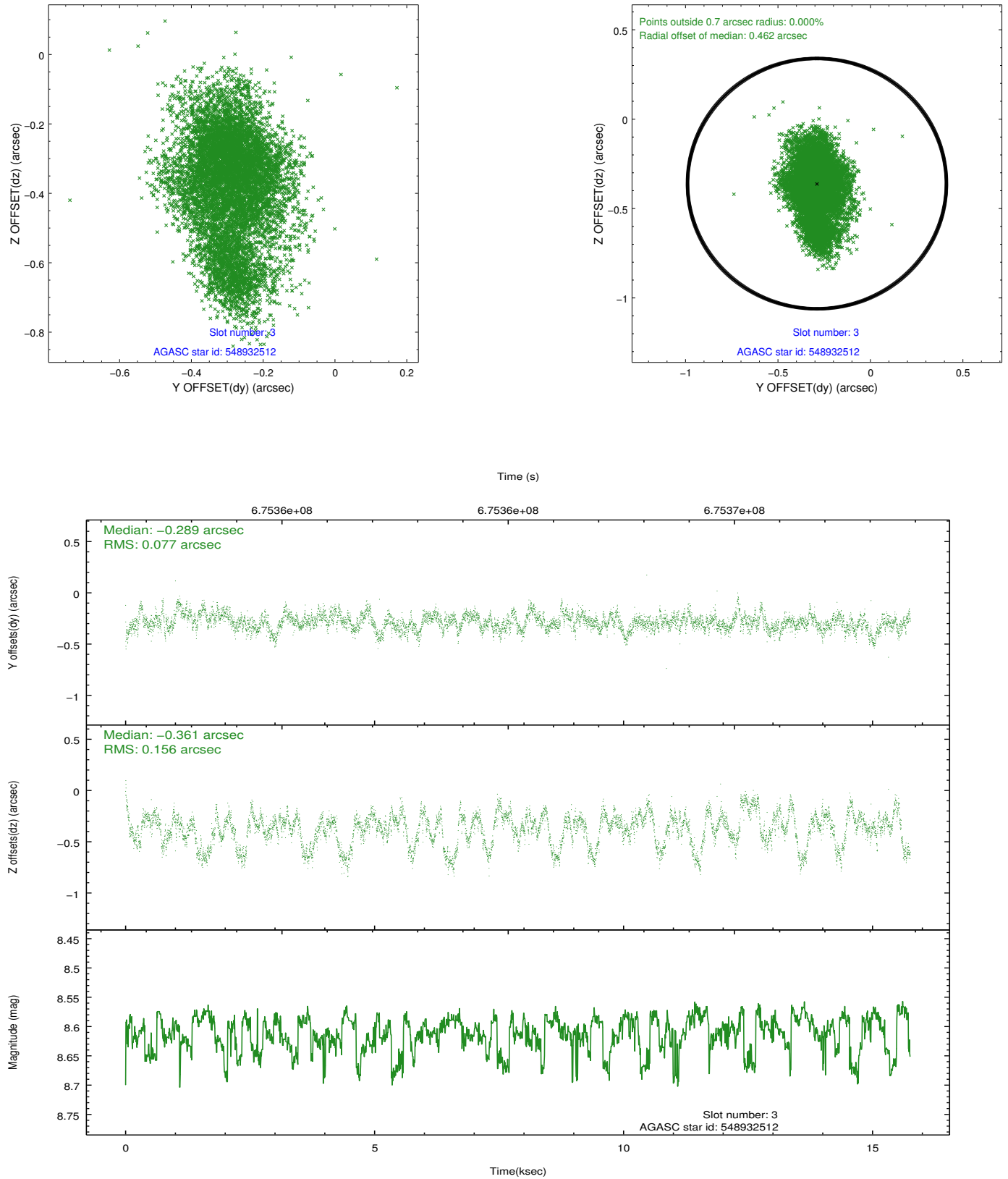


Slot Statistics

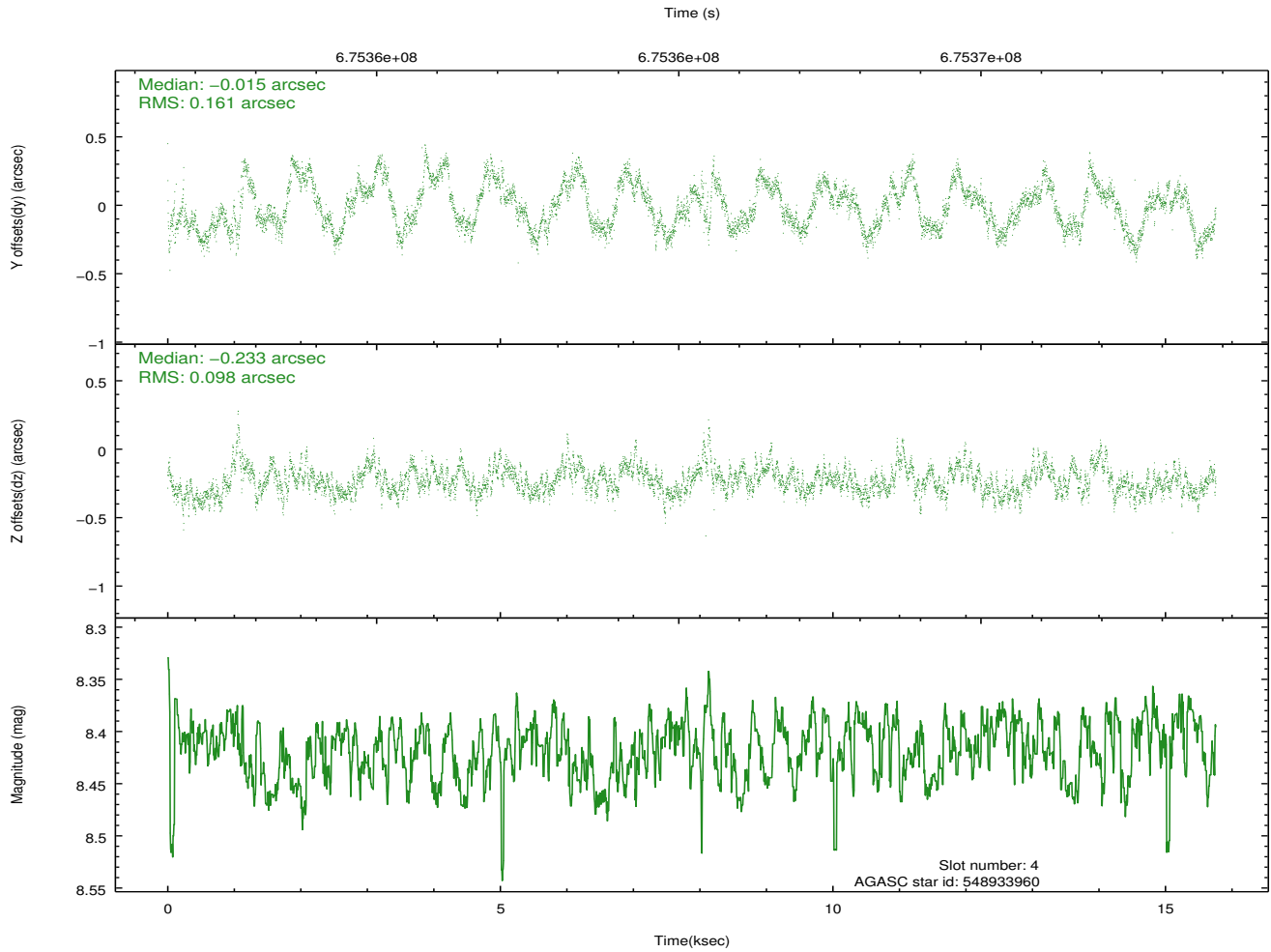
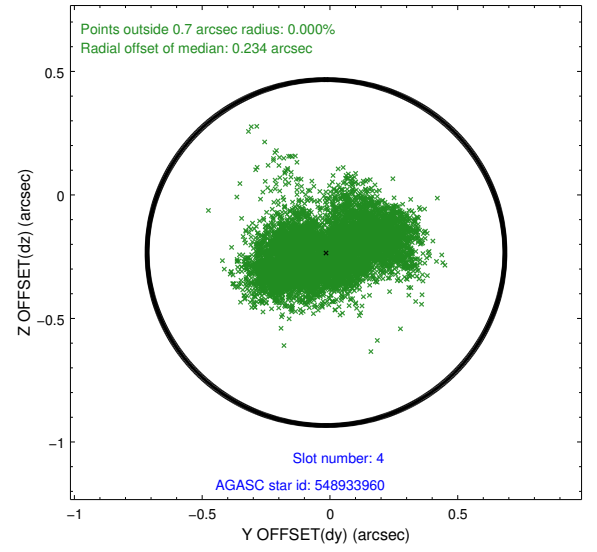
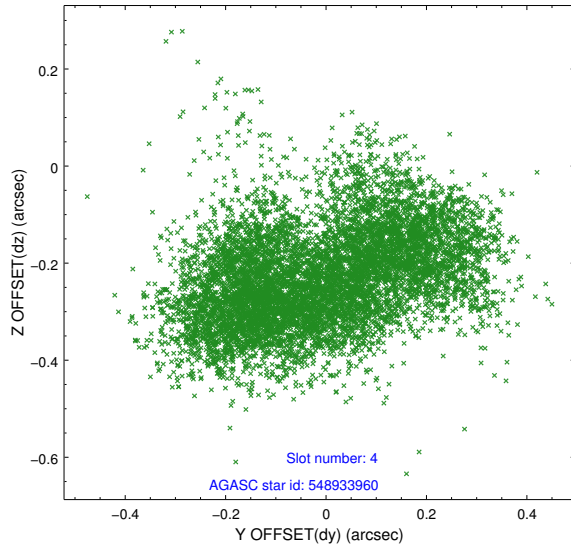
pt	status	used	id	mag	n_pts	frac_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mea
0	FID		ACIS-I-1	7.24	3844	1.000	0.093	-0.058	0.012	0.020	0.000000	0.000000	926.90	-842
1	FID		ACIS-I-5	7.24	3844	1.000	-0.487	0.014	0.008	0.016	0.000000	0.000000	-1821.81	1054
2	FID		ACIS-I-6	7.23	3842	1.000	0.301	0.115	0.011	0.021	0.000000	0.000000	392.11	1700
3	GUIDE	used	548932512	8.61	7681	1.000	-0.289	-0.361	0.177	0.314	239.727627	66.054972	-729.17	1491
4	GUIDE	used	548933960	8.42	7679	1.000	-0.015	-0.233	0.205	0.317	237.671184	66.428675	1755.57	-636
5	GUIDE	used	548937184	9.87	7661	1.000	-0.109	0.184	0.276	0.443	238.771821	66.565432	100.14	-652
6	GUIDE	used	548939872	10.27	7533	1.000	0.287	0.083	0.340	0.561	238.964867	66.978384	-577.26	-2004
7	GUIDE	used	549849072	9.12	7683	1.000	0.139	0.359	0.158	0.247	240.420863	66.802816	-2392.15	-847

2.4 Star Slots

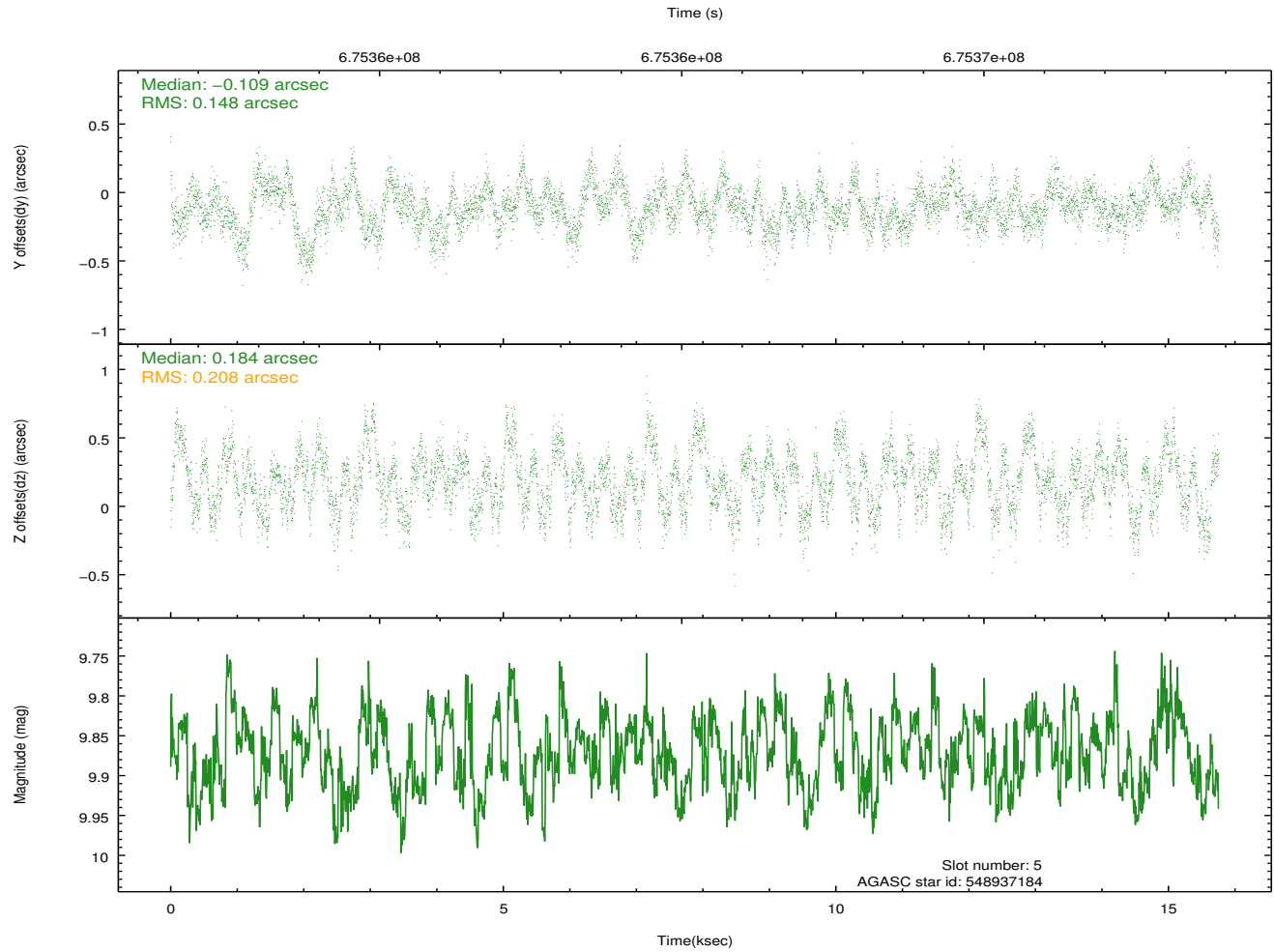
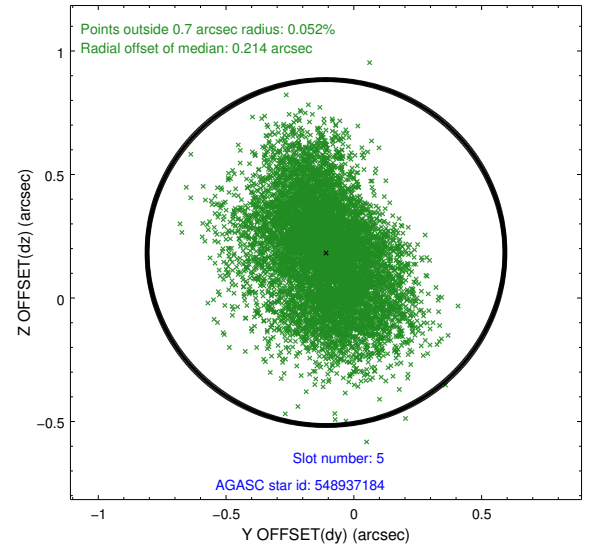
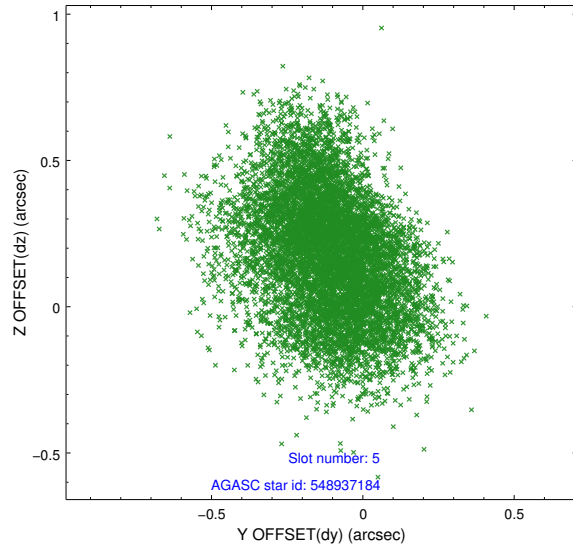
2.4.1 Slot 3



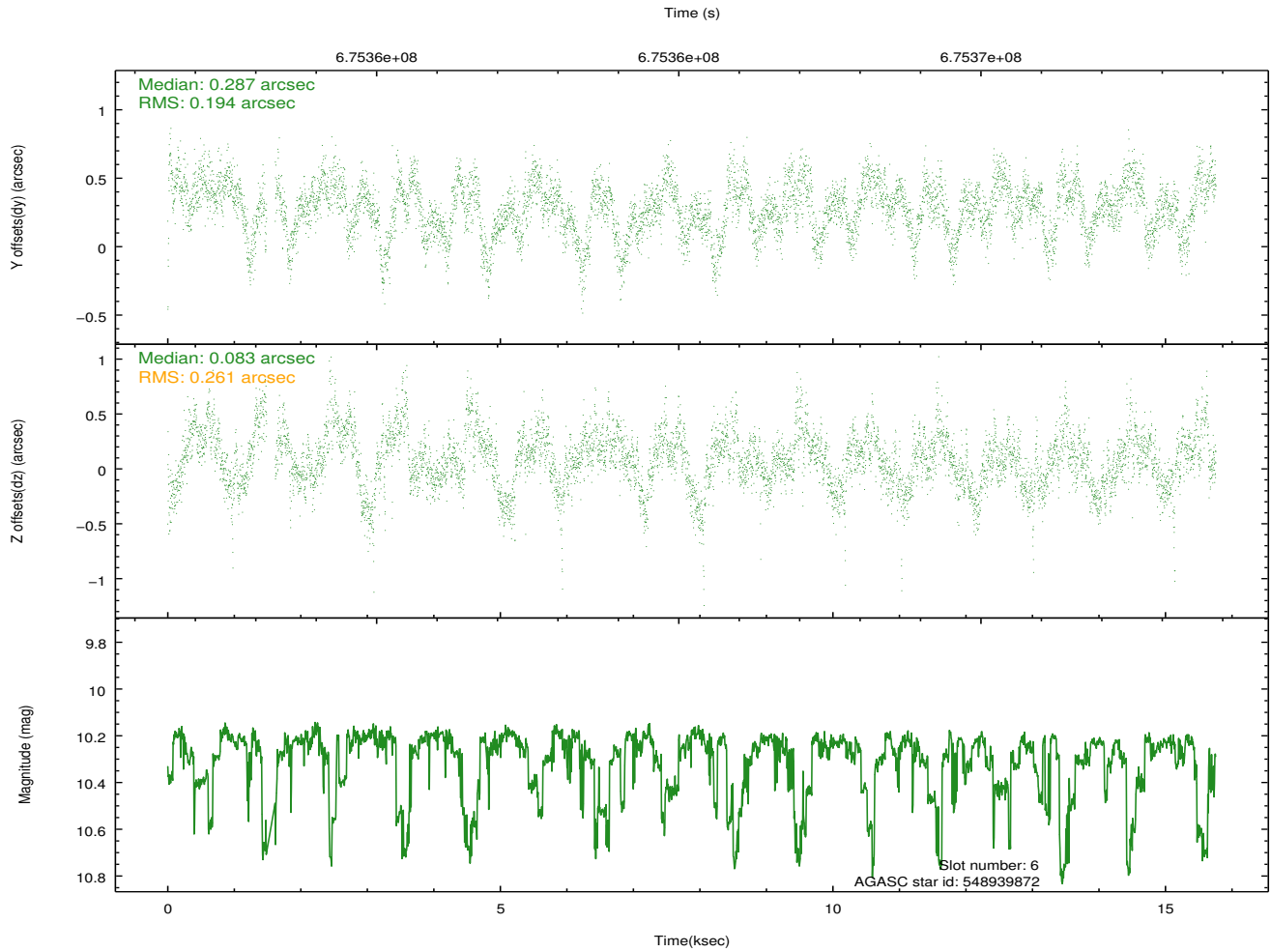
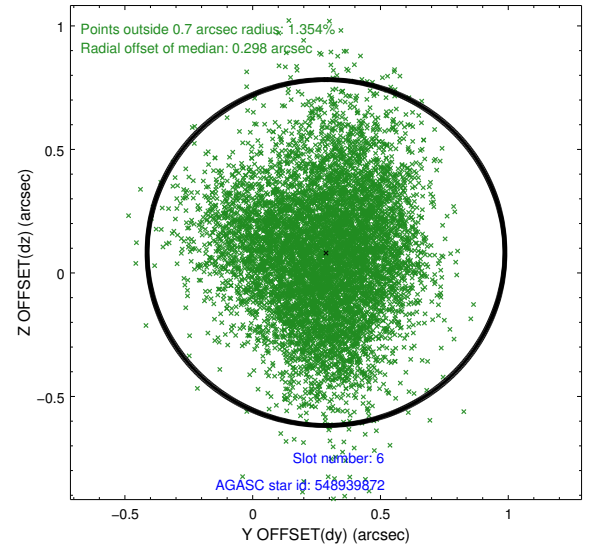
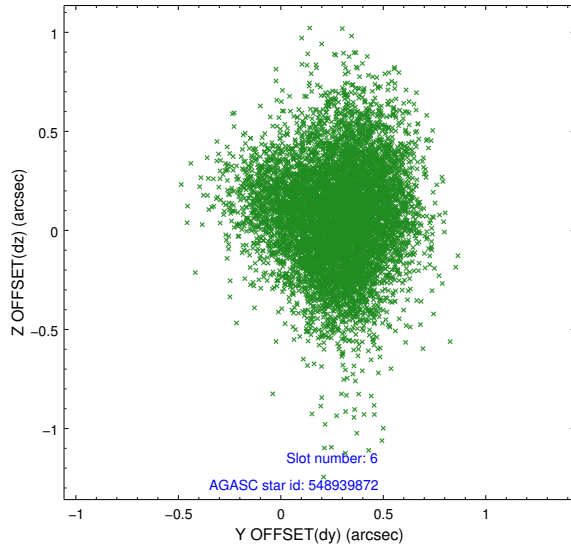
2.4.2 Slot 4



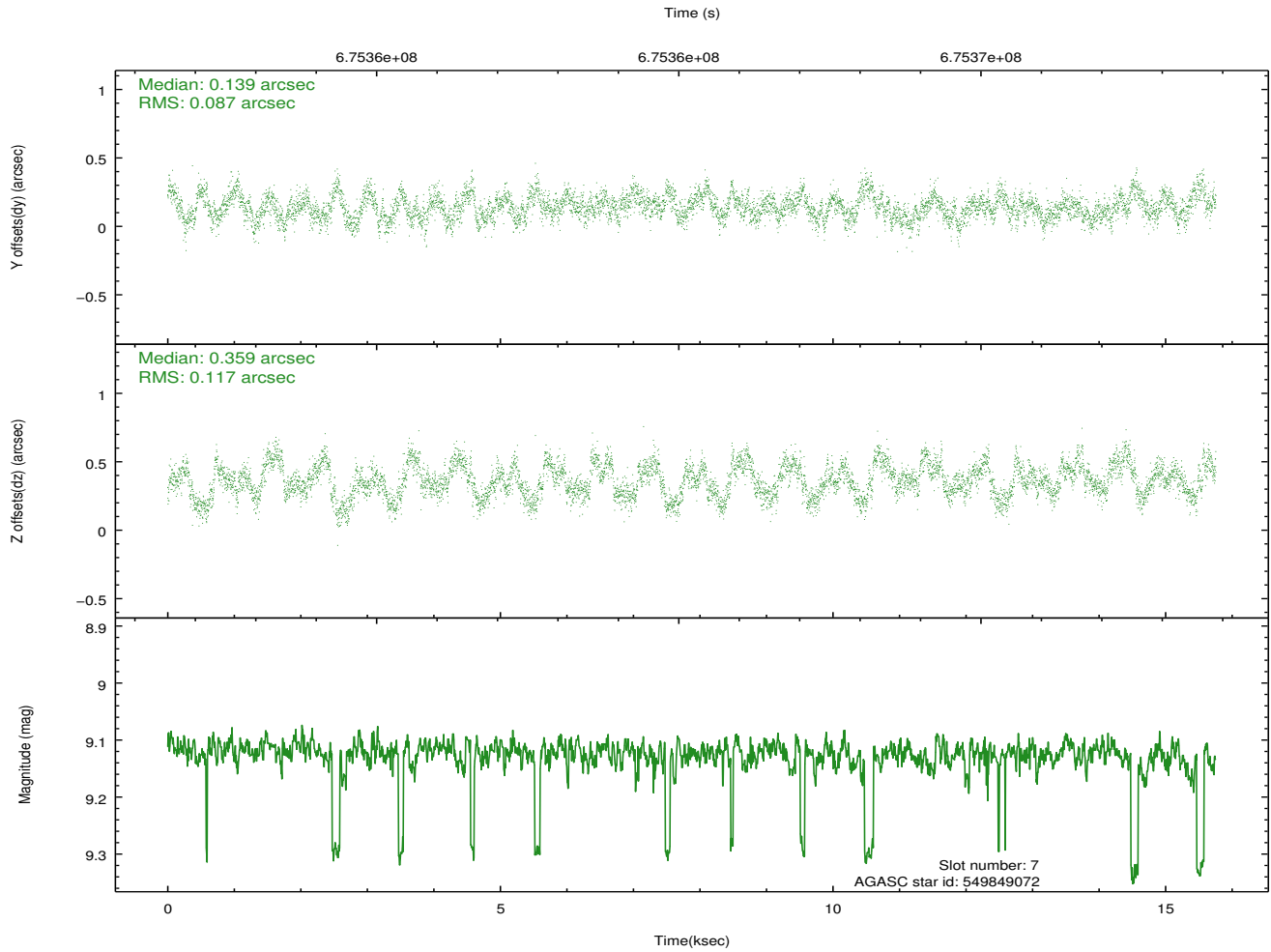
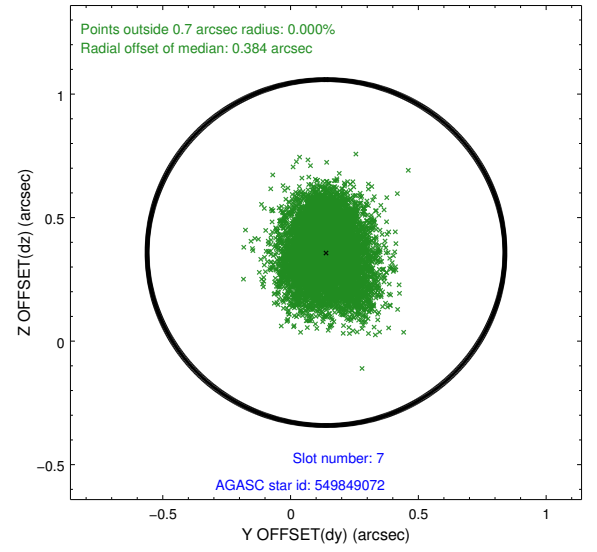
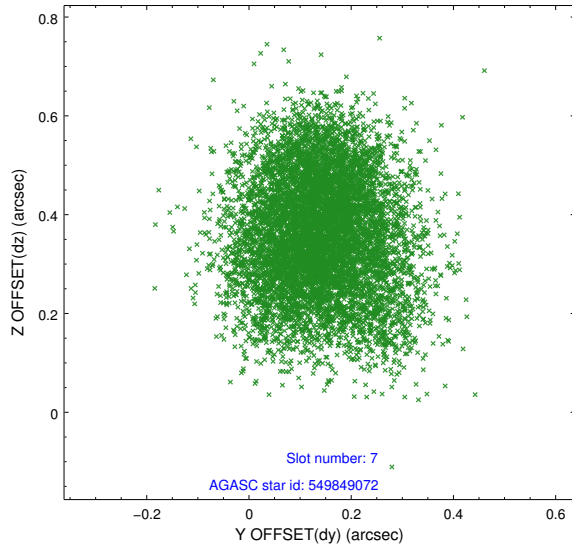
2.4.3 Slot 5



2.4.4 Slot 6

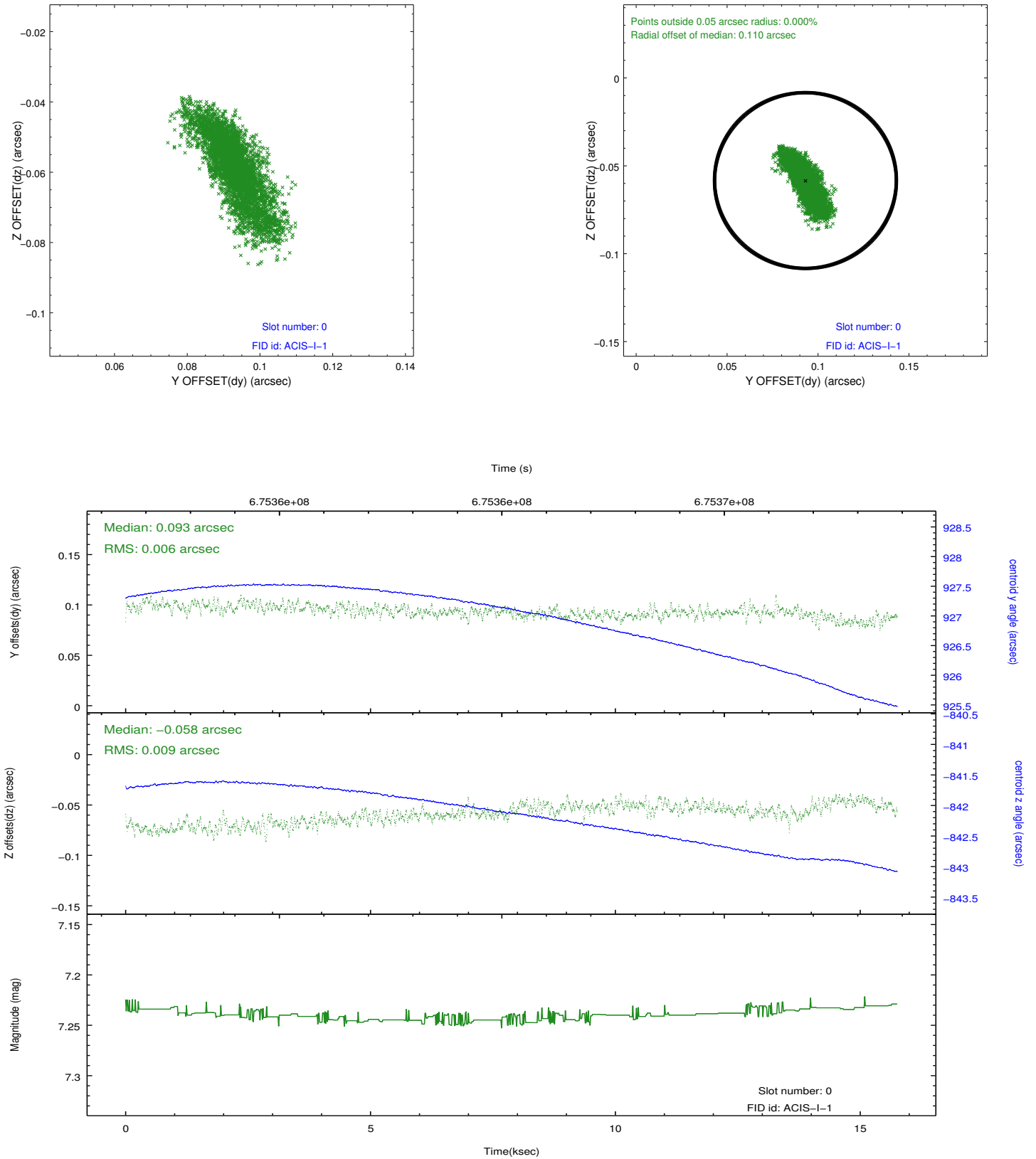


2.4.5 Slot 7

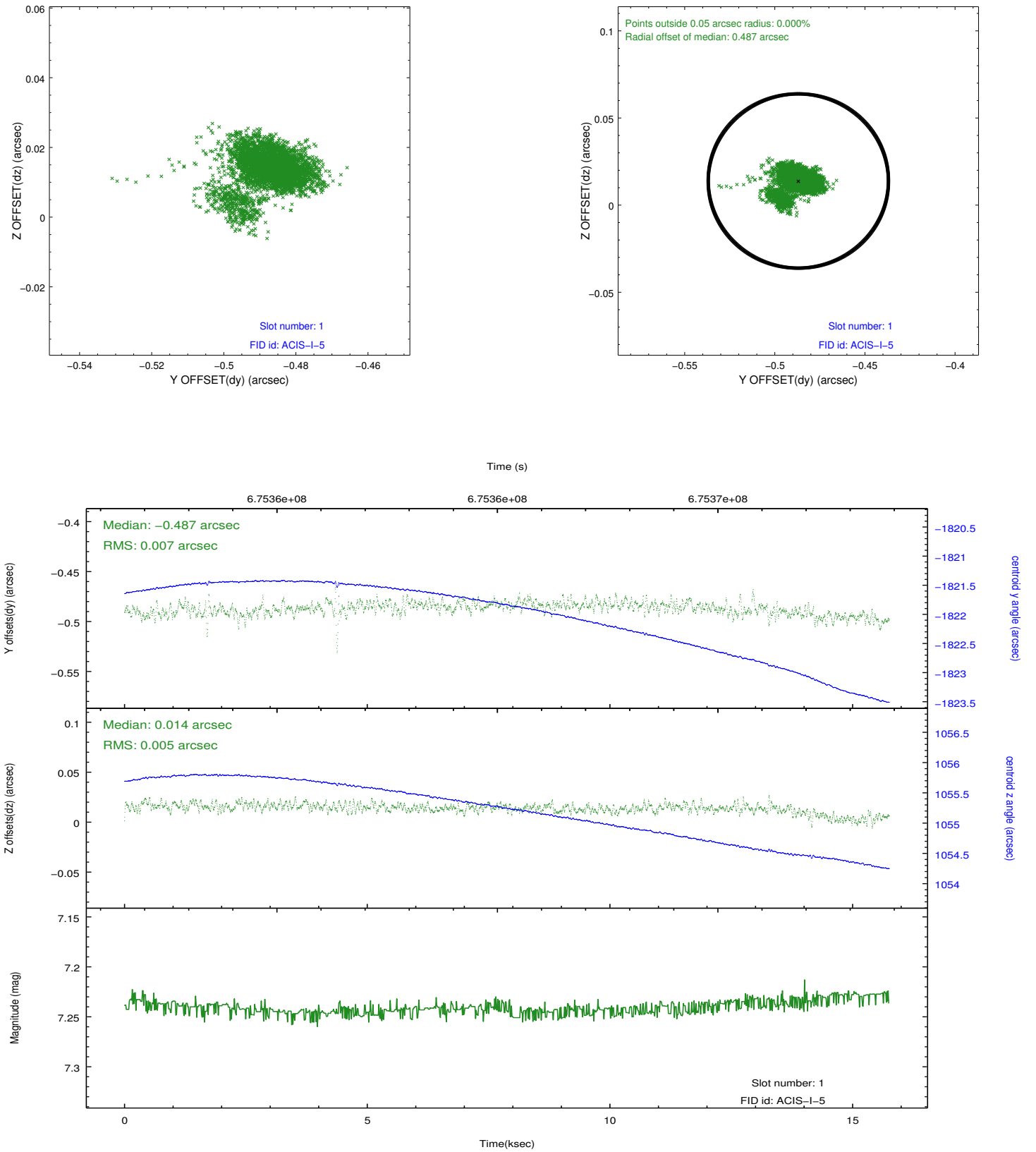


2.5 FID Slots

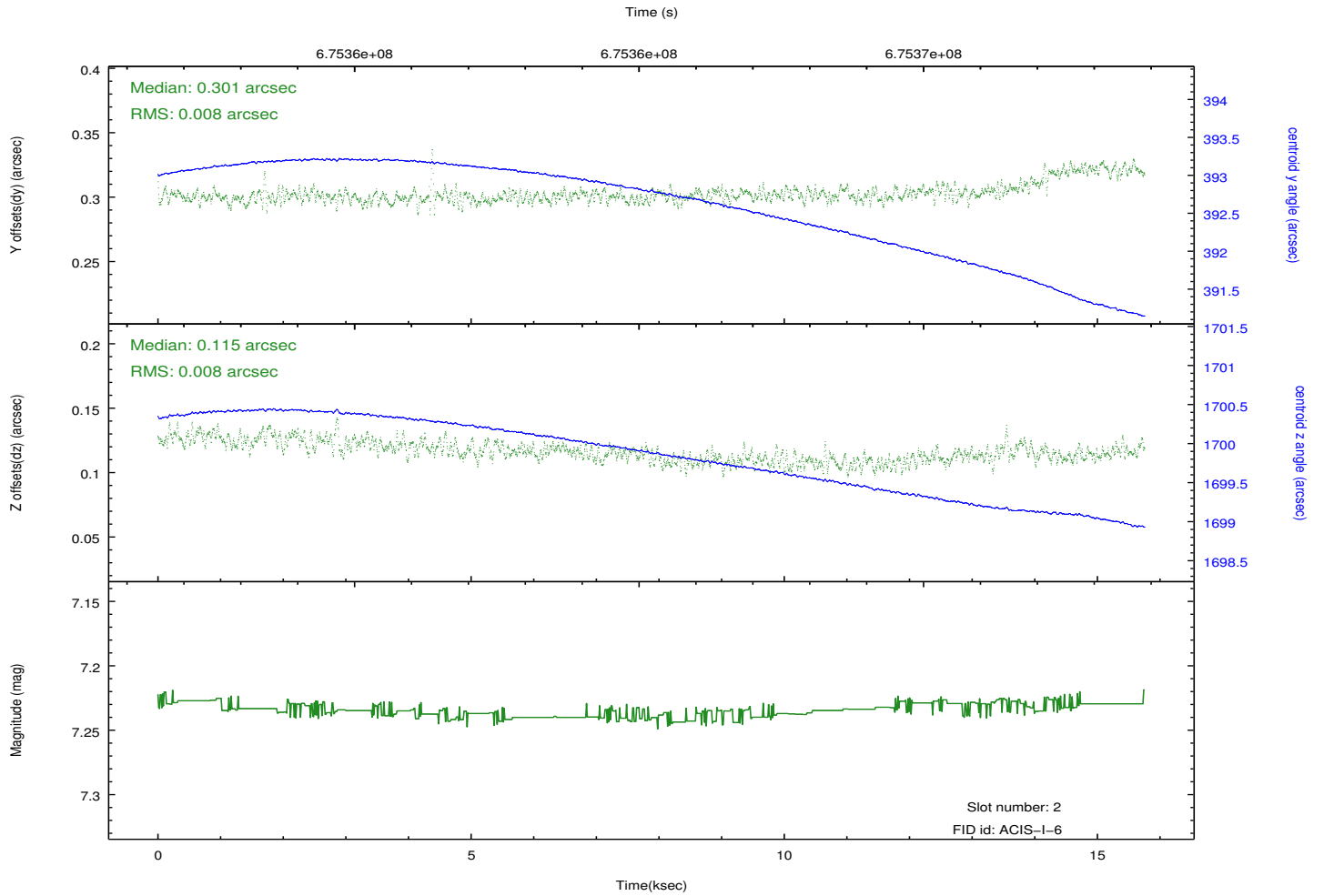
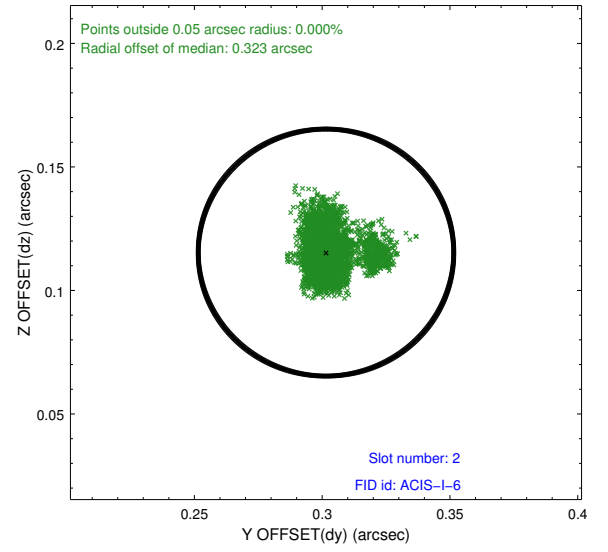
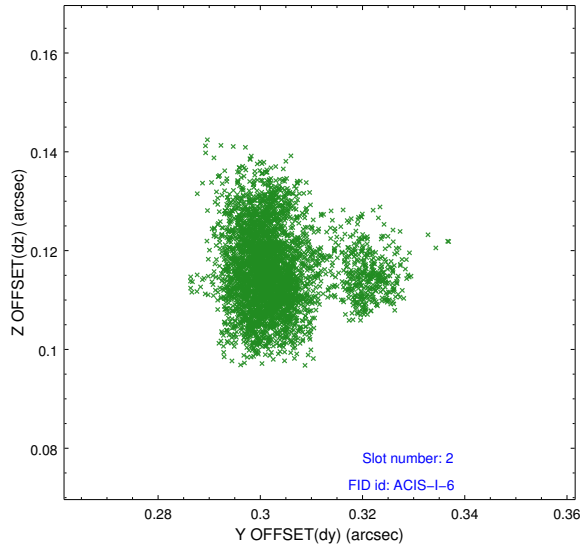
2.5.1 Slot 0



2.5.2 Slot 1



2.5.3 Slot 2



A Summary

A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2019.05.28
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	15.645700120449

A.2 Comments

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.