

# V&V Reference Report

## L2 ASCDS Version : 10.2.2

Observation 16427 - L2 Version 2  
Chandra X-Ray Center

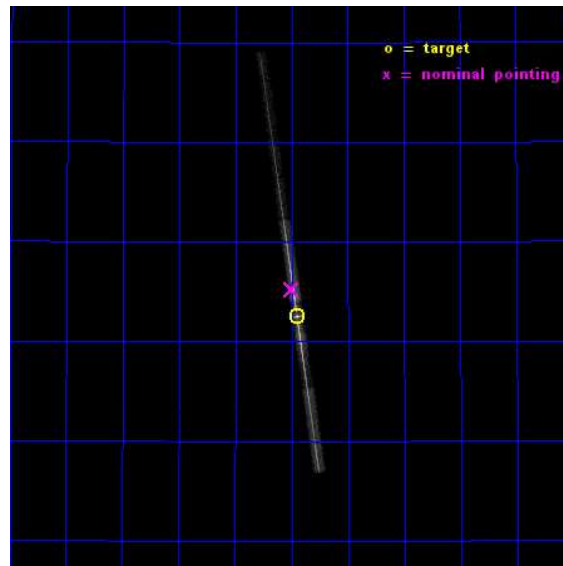
L2 Processing Date : Dec 12 2014

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# 1 Front

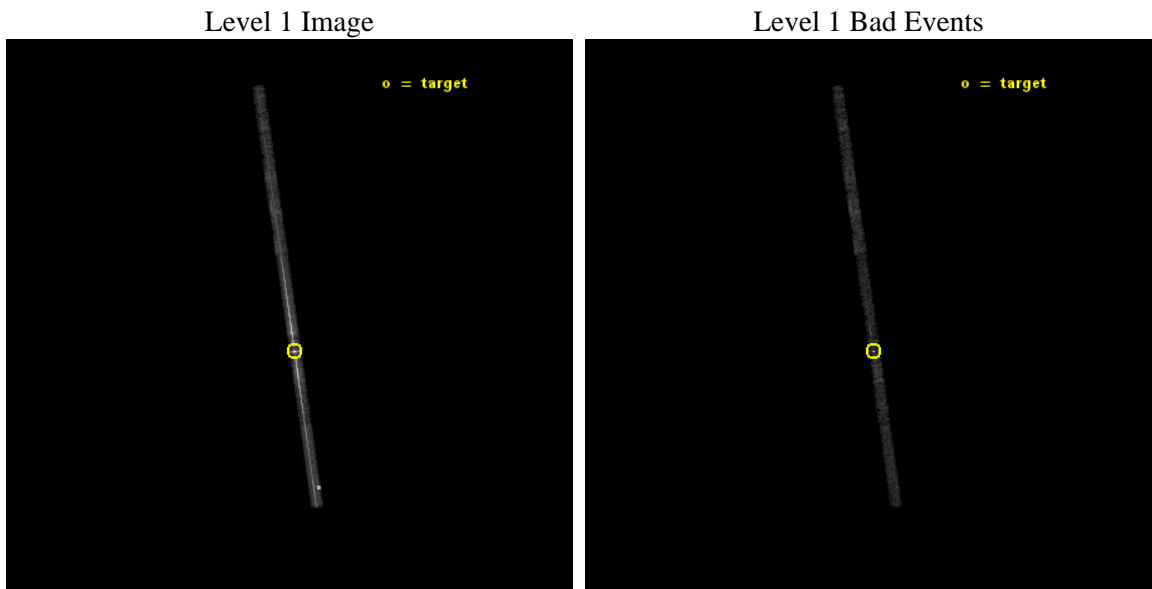
seq_num	790267	Sequence number
obs_id	16427	Observation id
title	AO-15 Calibration Observations of Mkn421	Proposal title
observer	Dr. CXC Calibration	Principal investigator
object	MKN421	Source name
dtcycle	0	&#160
cycle	P	events from which exps? Prim/Second/Both
ra_targ	166.113333	Observer's specified target RA [deg]
dec_targ	38.208806	Observer's specified target Dec [deg]
ra_nom	166.12518535047	Nominal RA [deg]
dec_nom	38.253831950593	Nominal Dec [deg]
roll_nom	261.65505695479	Nominal Roll [deg]
revision	2	Processing version of data
ontime	10077.199828327	Sum of GTIs [s]
livetime	9519.108118089	Livetime [s]
ontime5	10077.199828327	Sum of GTIs [s]
ontime6	10077.199828327	Sum of GTIs [s]
ontime7	10077.199828327	Sum of GTIs [s]
ontime8	10077.199828327	Sum of GTIs [s]
ontime9	10077.199828327	Sum of GTIs [s]
l2events	156664	Number of level 2 events



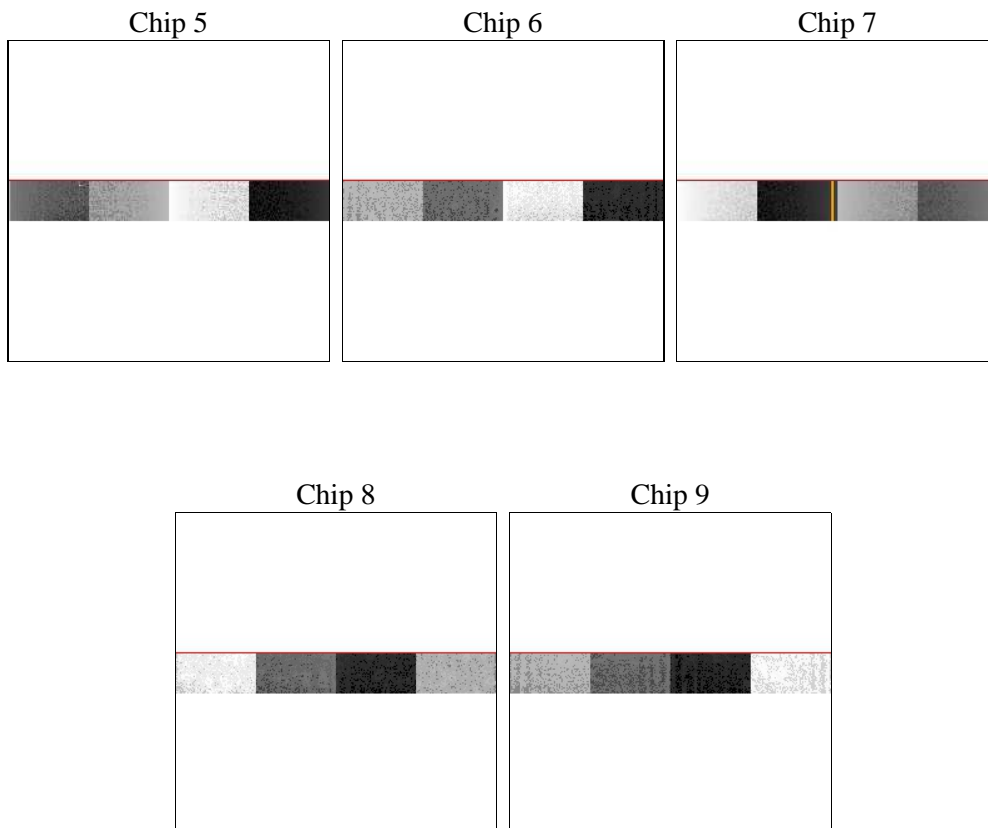
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

obi_num	0	Obi number	sched_exp_time	10000.000000	[s] Scheduled observation exposure time
ascdsver	10.3.1	Processing system revision	ontime	10077.199828327	Sum of GTIs [s]
caldbver	4.6.4	&#160	ontime5	10077.199828327	Sum of GTIs [s]
date	2014-12-12T06:35:43	Date and time of file creation	ontime6	10077.199828327	Sum of GTIs [s]
revision	2	Processing version of data	ontime7	10077.199828327	Sum of GTIs [s]
			ontime8	10077.199828327	Sum of GTIs [s]
			ontime9	10077.199828327	Sum of GTIs [s]
			l1events	214042	Number of level 1 events
			tgmethod	FINDZO	Method used to create src1a file
			zo_pos	(4161.28, 3767.53)	src1a sky pixel position
					src1a sky pixel position via

### 2.1.4 Events

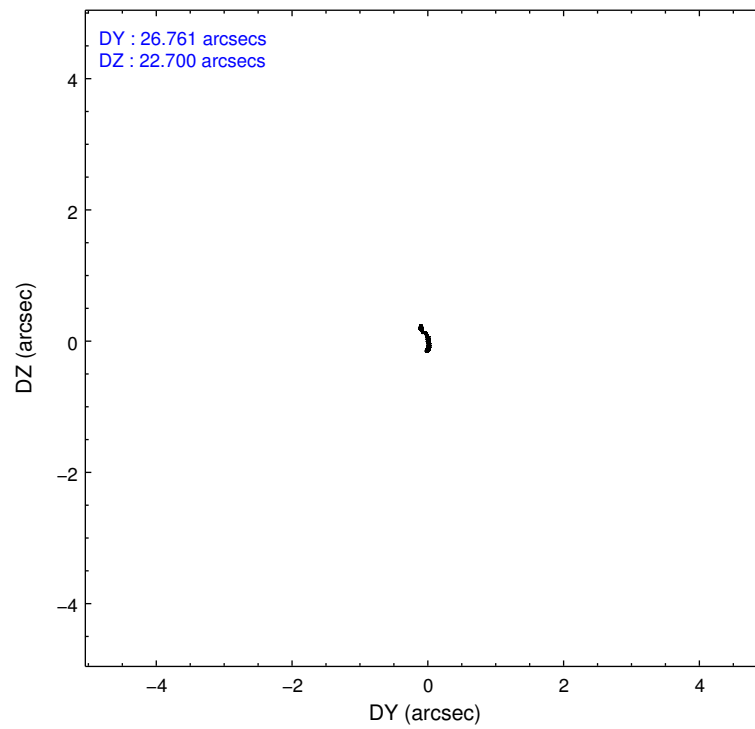
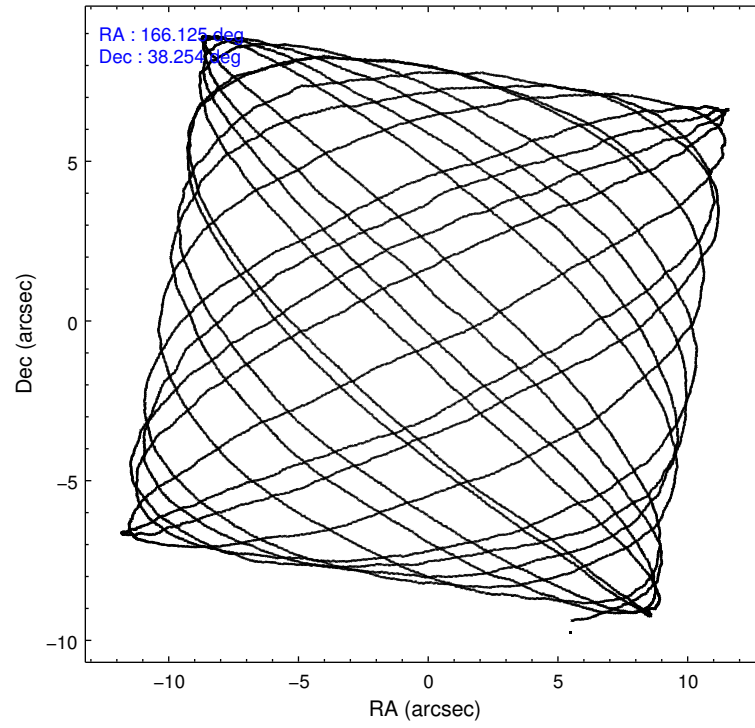
	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	33008	96823	62738	13453	8020
rejected events	5417	13740	5120	8166	6046
rejected %	16%	14%	8%	60%	75%

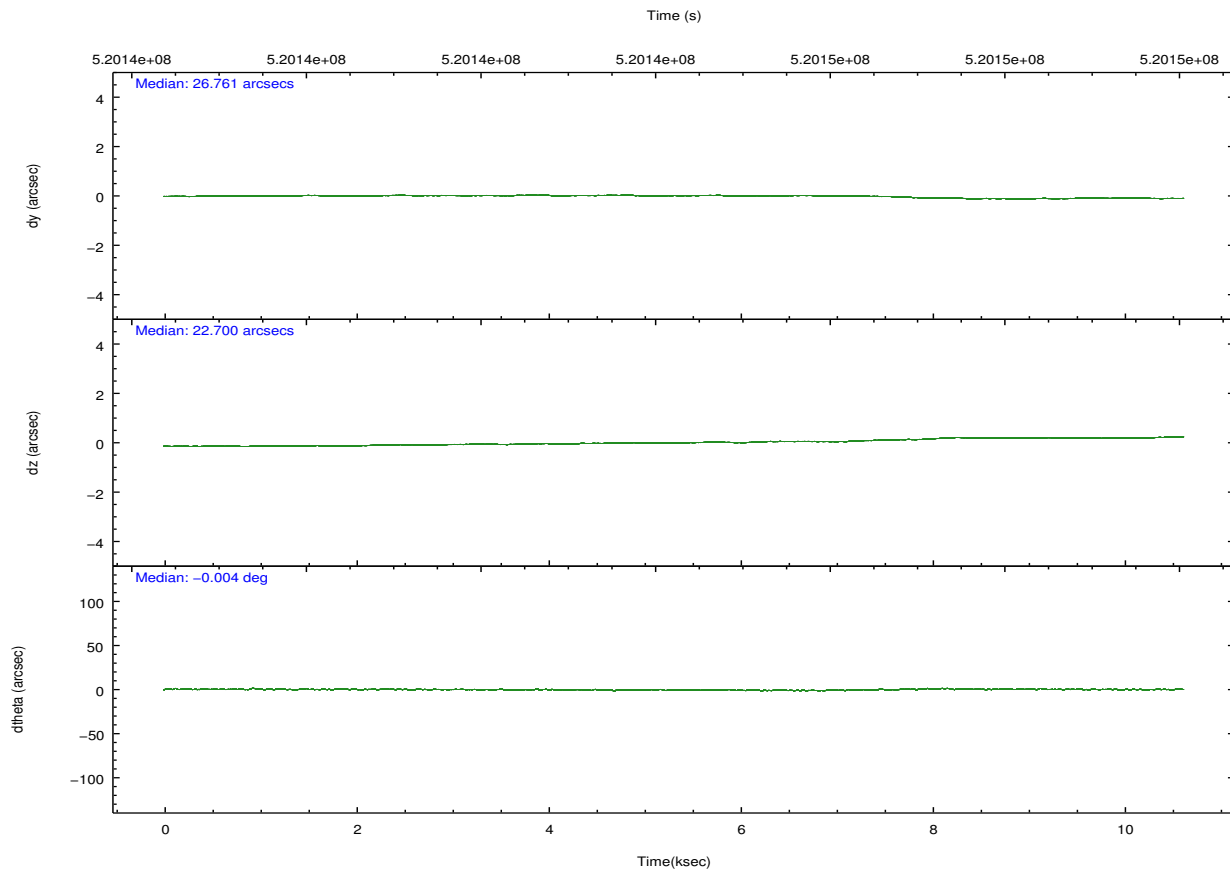
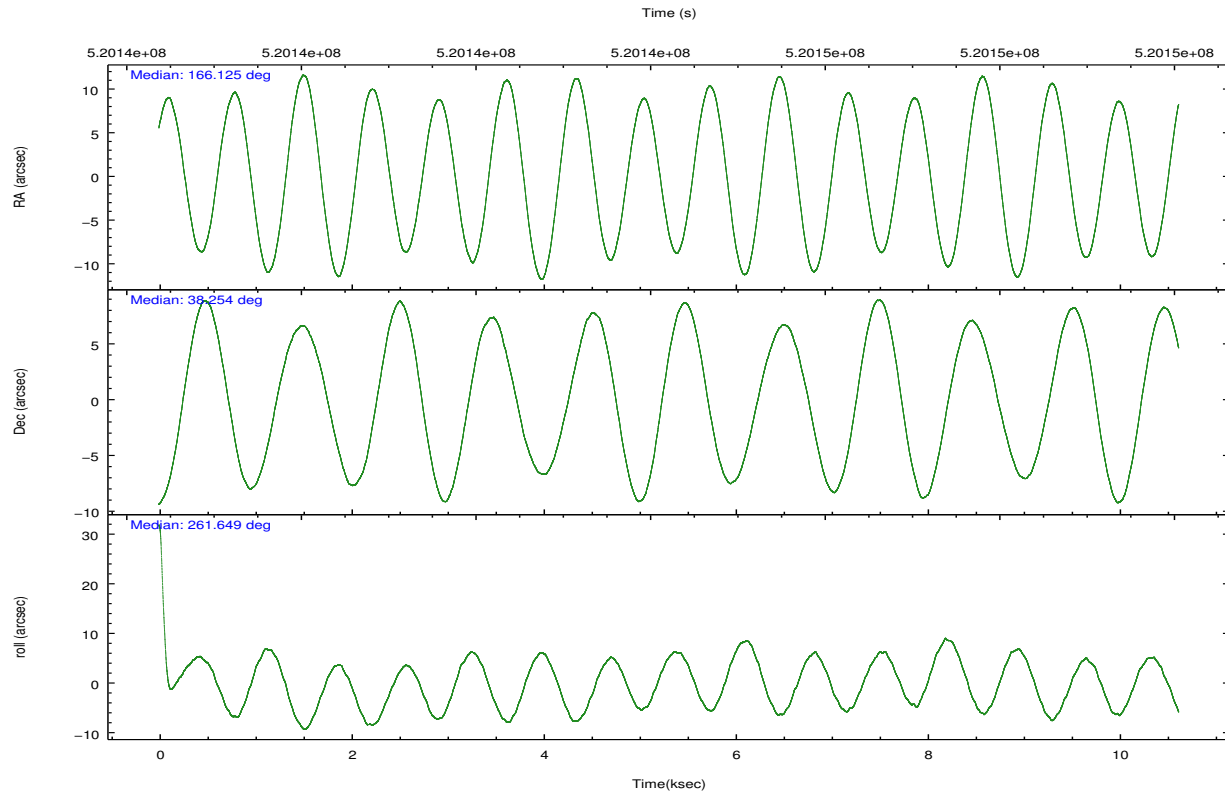
	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
grade 0 events	17010	62784	16553	3068	1211
	51%	64%	26%	22%	15%
grade 1 events	72	3885	61	5	2
	0%	4%	0%	0%	0%
grade 2 events	5287	9943	15067	770	263
	16%	10%	24%	5%	3%
grade 3 events	1021	3420	6664	357	164
	3%	3%	10%	2%	2%
grade 4 events	1136	3476	6668	314	150
	3%	3%	10%	2%	1%
grade 5 events	995	2453	1269	455	337
	3%	2%	2%	3%	4%
grade 6 events	3139	3469	12677	778	188
	9%	3%	20%	5%	2%
grade 7 events	4348	7393	3779	7706	5705
	13%	7%	6%	57%	71%

## 2.2 Compared Parameters

Parameter	Planned	Actual	Parameter	Planned	Actual
Instrument	ACIS	ACIS	Obspar format version number	7	7
Detector	ACIS-56789	ACIS-56789	Obspar file type	PREDICTED	ACTUAL
Grating	LETG	LETG	Obspar update status	NONE	UPDATED
Data mode	FAINT	FAINT	CCD I0 on	N	N
Observation mode	POINTING	POINTING	CCD I1 on	N	N
[deg] Pointing RA	166.111896	166.1251853504733	CCD I2 on	N	N
[deg] Pointing Dec	38.279081	38.25383195059256	CCD I3 on	N	N
[deg] Pointing Roll	261.506666	261.6550569547863	CCD S0 on	N	N
[mm] SIM focus pos	-0.684267	-0.6828225247311905	CCD S1 on	Y	Y
[mm] SIM defocus	0	0.001444936568705701	CCD S2 on	Y	Y
[mm] SIM translation stage pos	-190.132523	-190.1400660498719	CCD S3 on	Y	Y
[mm] SIM translation stage offset	0	0.00754346686406393	CCD S4 on	Y	Y
[s] Observation start time (MET)	520139518.184000	520138568.27043	CCD S5 on	O1	Y
Observation start date	2014-06-26T03:10:51	2014-06-26T02:56:08	Number of optional ACIS chips dropped	0	0
[s] Observation end time (MET)	520149518.184000	520149746.92104	On-chip summing requested	N	N
Observation end date	2014-06-26T05:57:31	2014-06-26T06:02:26	Subarray requested	CUSTOM	1/8
Read mode	TIMED	TIMED	Subarray start row	449	449
			Subarray row count	128	128
			Alternating exposures requested	N	N
			[s] Primary exposure time	0.000000	0.7

## 2.3 Aspect



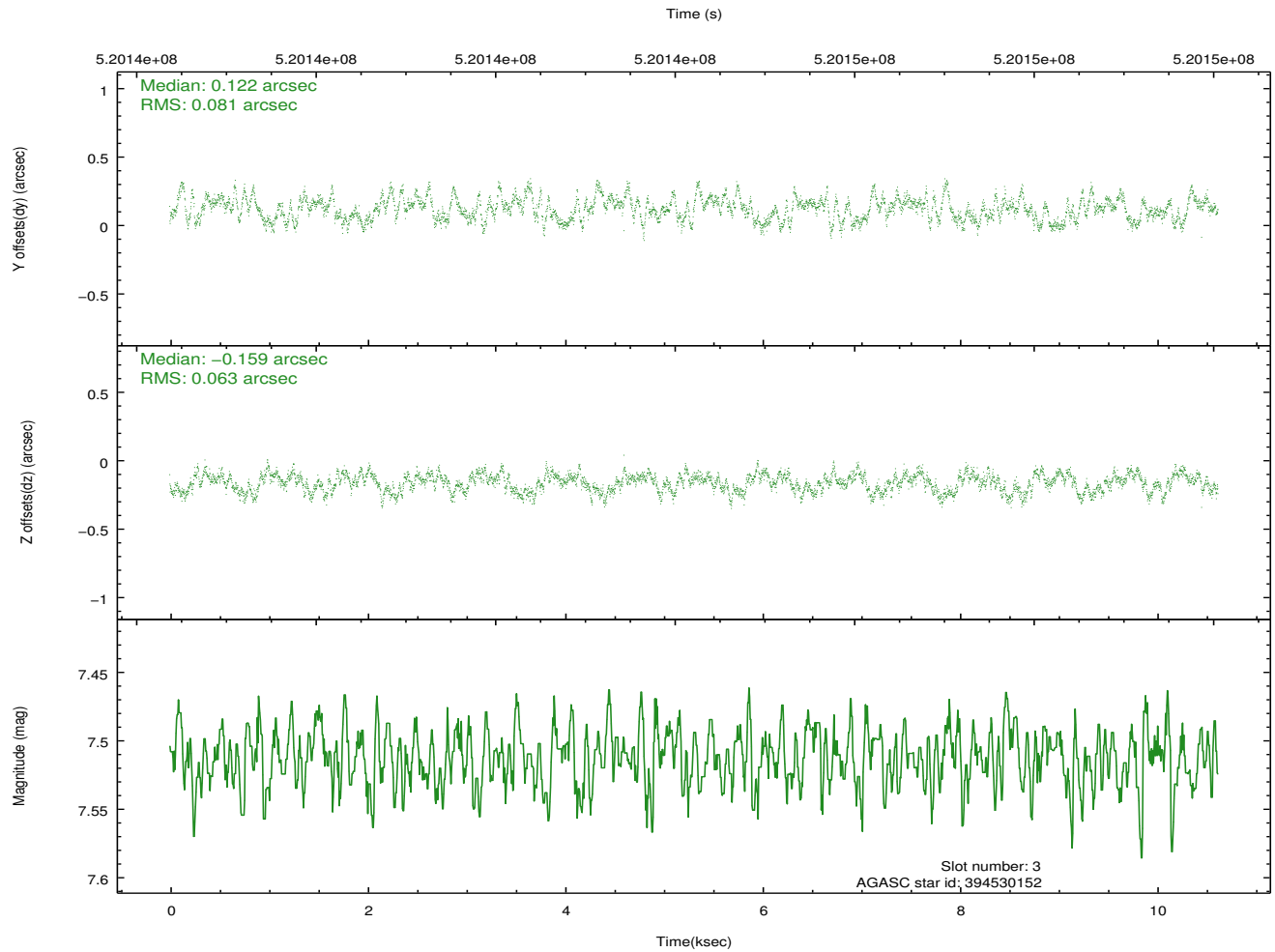
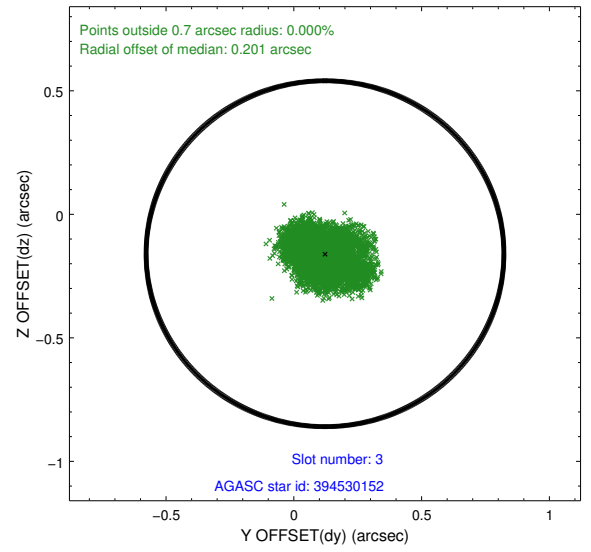
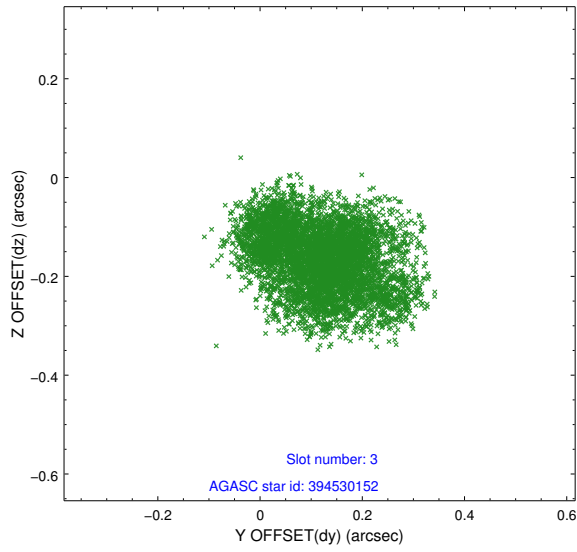


### Slot Statistics

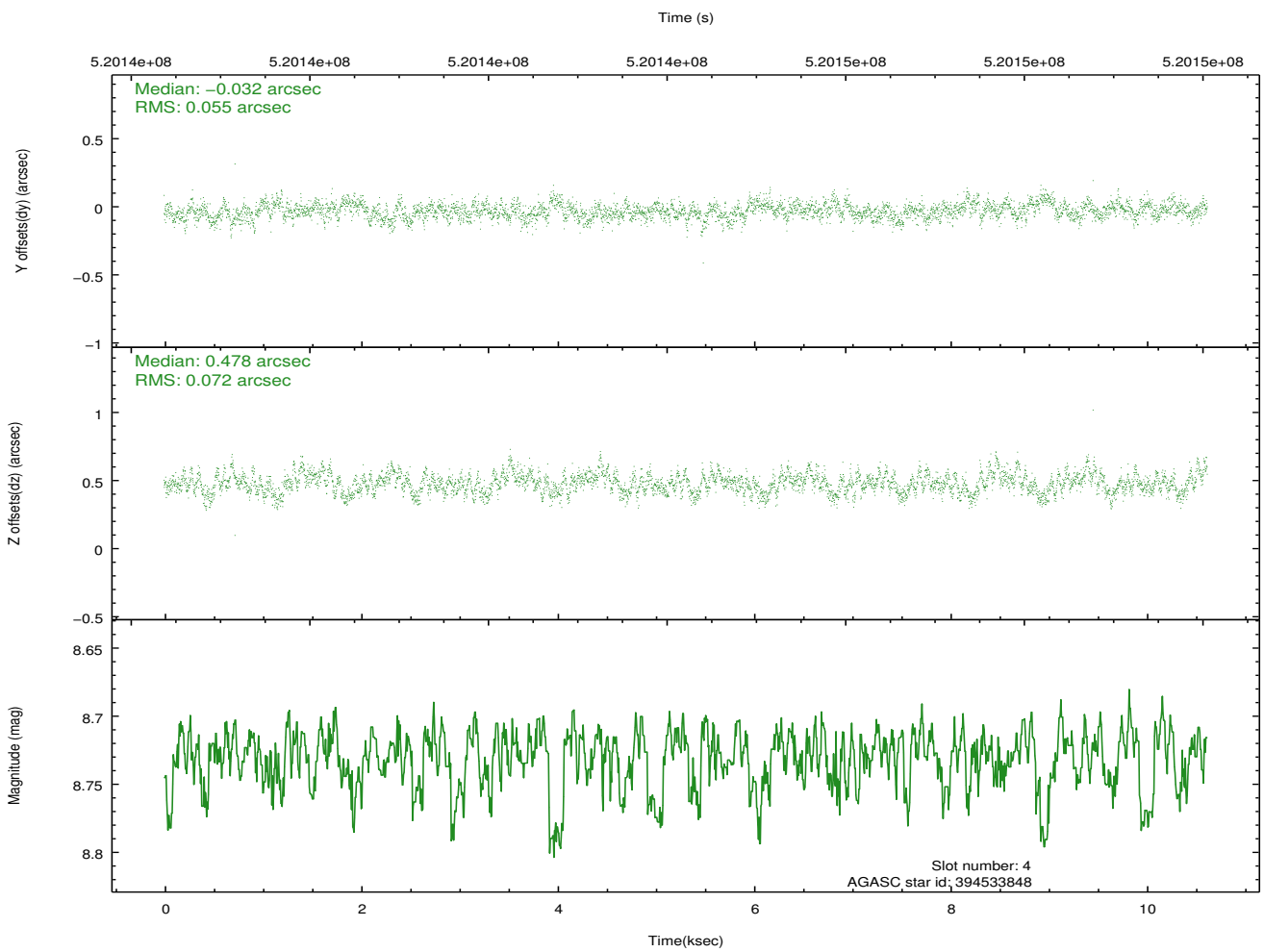
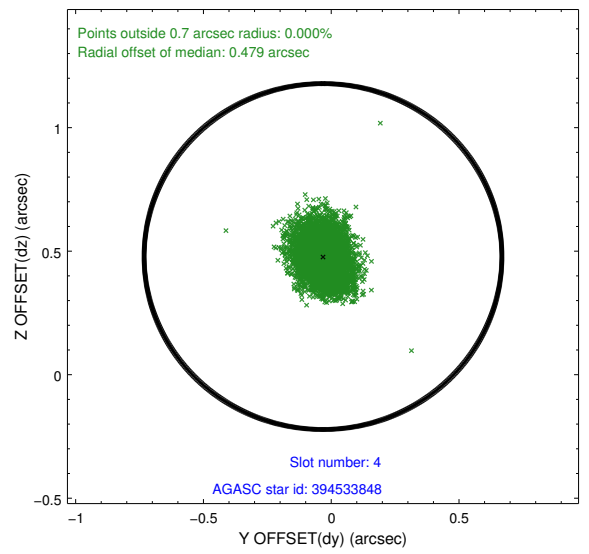
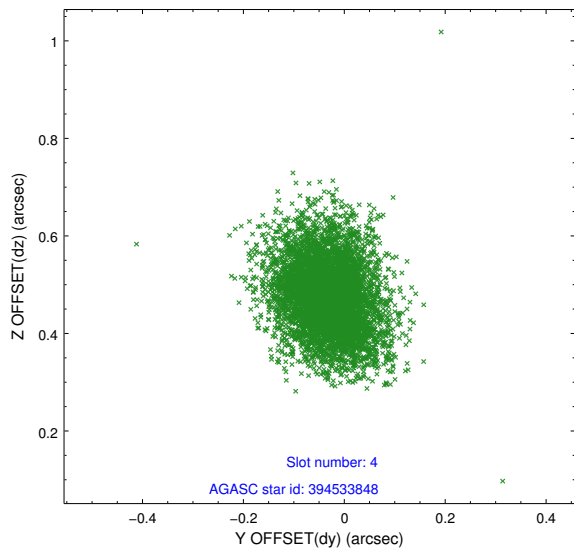
slot	status	used	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID		ACIS-S-2	6.89	2591	-0.158	-0.041	0.009	0.014	0.000000	0.000000	-780.20	-1744.34
1	FID		ACIS-S-4	6.99	2590	0.341	0.088	0.005	0.009	0.000000	0.000000	2133.36	163.74
2	FID		ACIS-S-5	7.02	2591	-0.214	-0.038	0.008	0.014	0.000000	0.000000	-1832.46	157.87
3	GUIDE	used	394530152	7.51	5181	0.122	-0.159	0.113	0.172	166.075805	38.868252	-2082.30	-413.39
4	GUIDE	used	394533848	8.73	5178	-0.032	0.478	0.095	0.159	166.382906	38.276007	-103.58	754.74
5	GUIDE	used	394546712	6.60	5182	-0.396	0.285	0.090	0.148	166.451462	38.394357	-553.42	885.66
6	GUIDE	used	394546720	6.43	5180	-0.005	-0.882	0.107	0.167	166.130115	38.241361	126.94	70.63
7	GUIDE	used	394527560	7.67	5180	0.315	0.291	0.071	0.116	165.970713	38.960939	-2368.92	-753.13

## 2.4 Star Slots

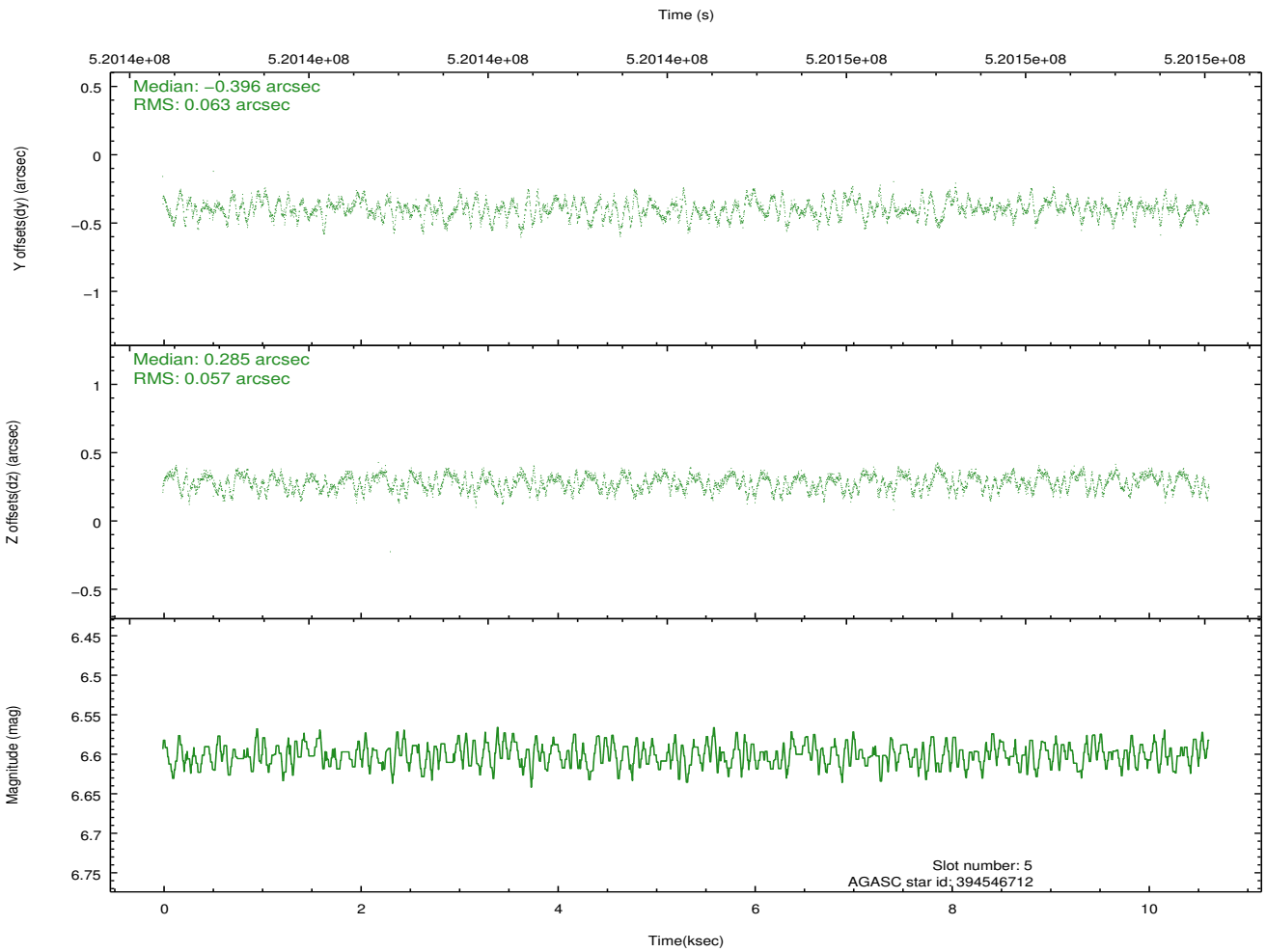
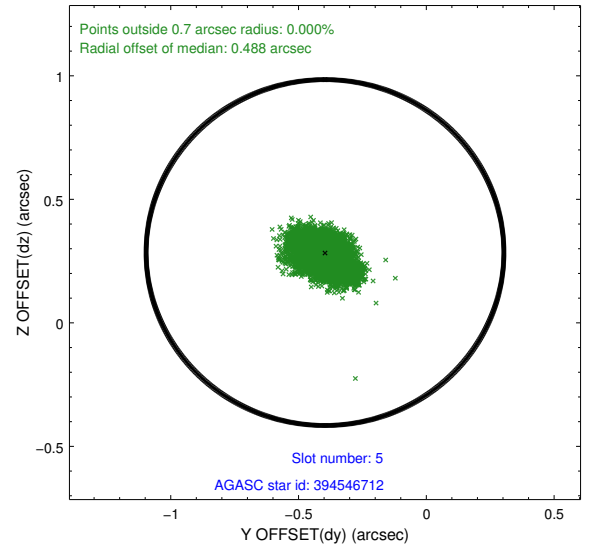
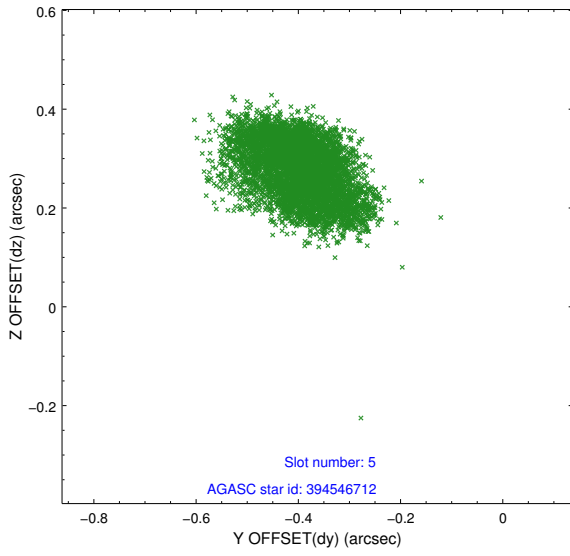
### 2.4.1 Slot 3



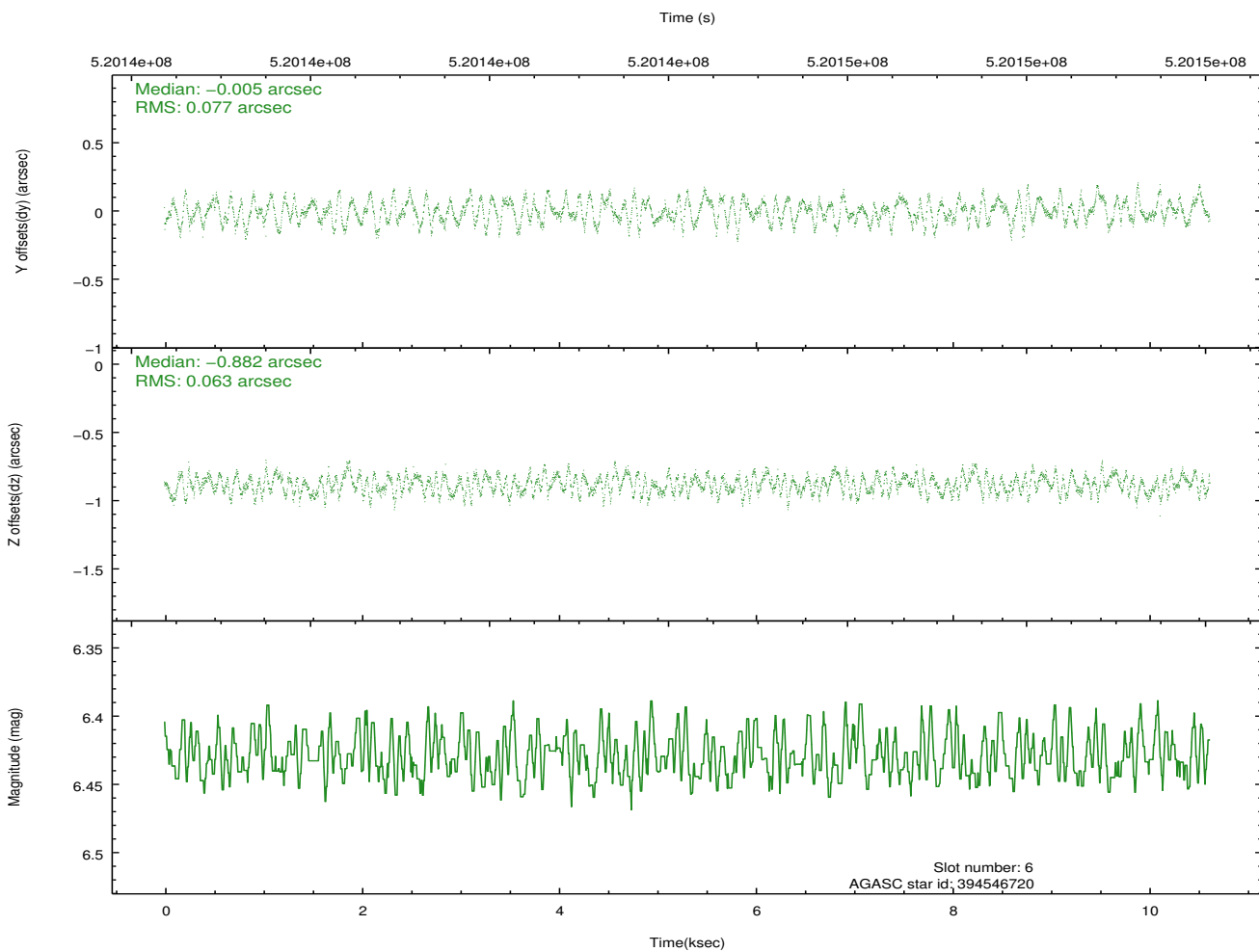
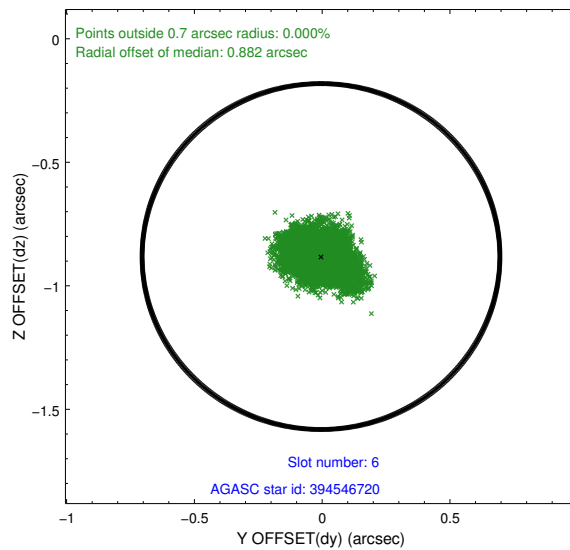
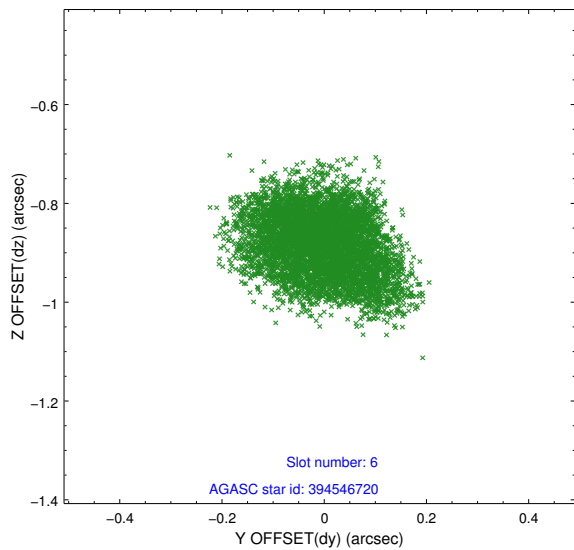
## 2.4.2 Slot 4



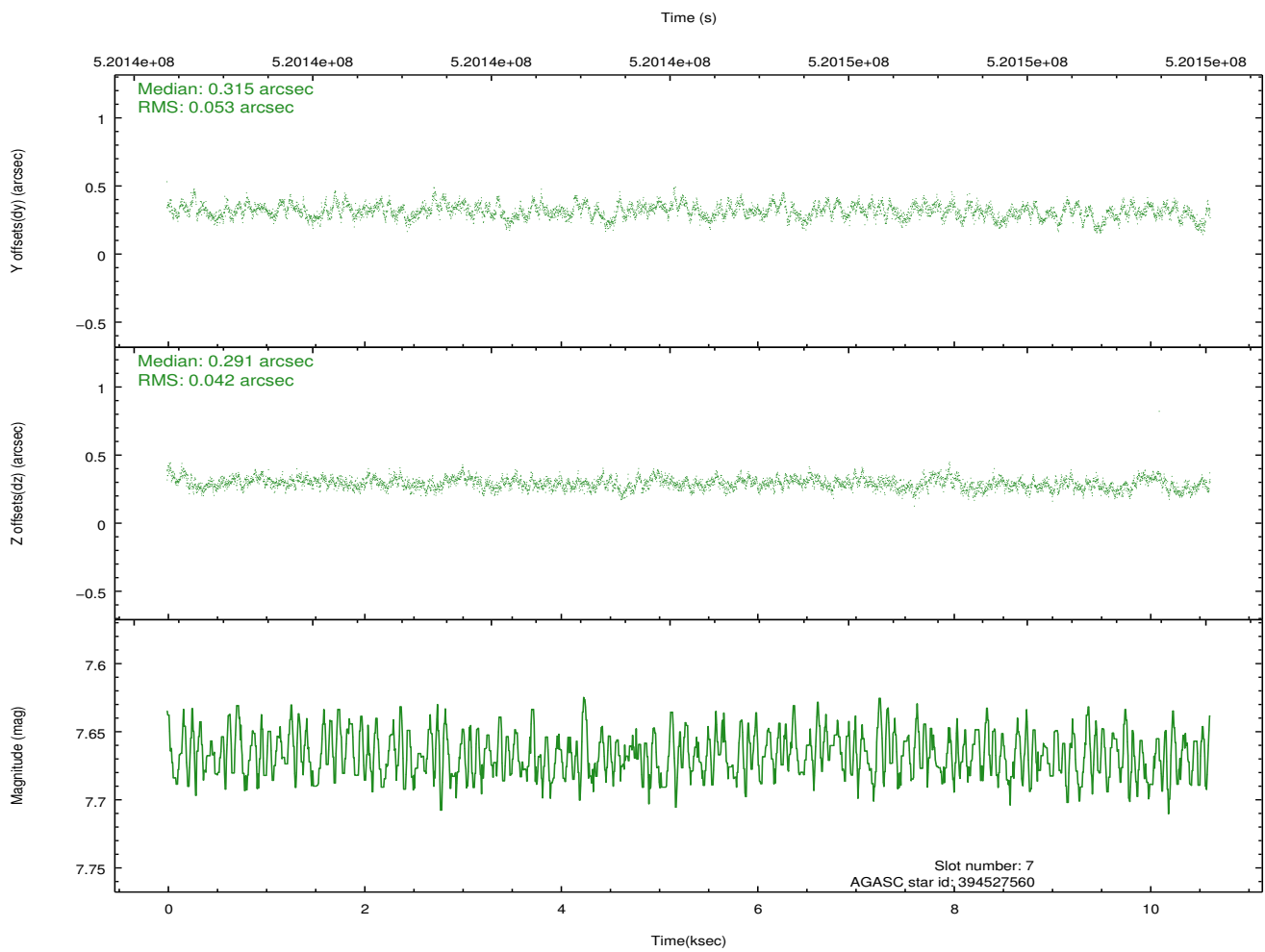
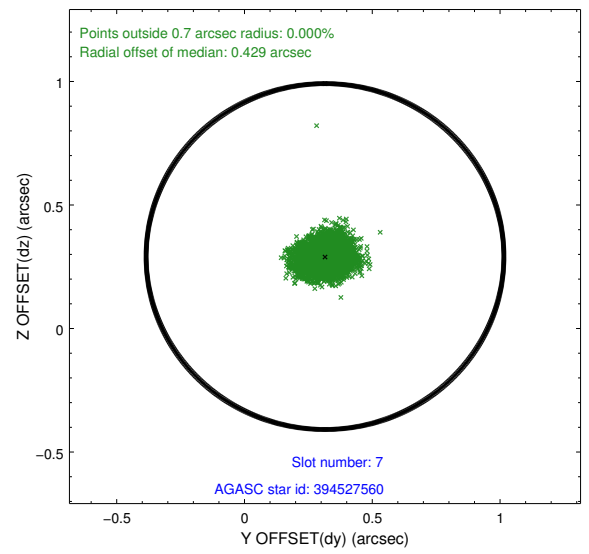
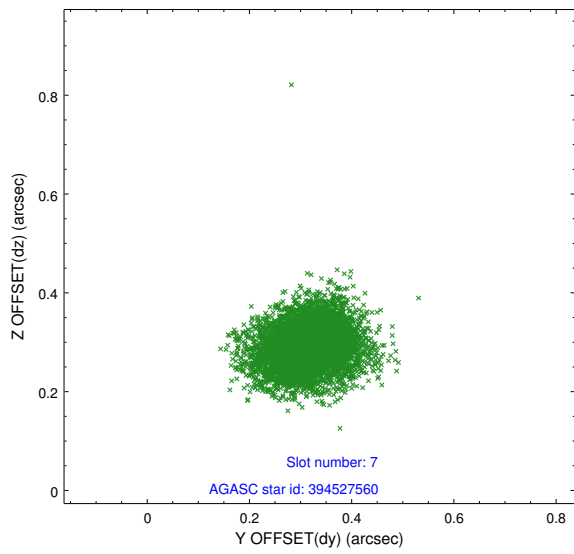
### 2.4.3 Slot 5



## 2.4.4 Slot 6

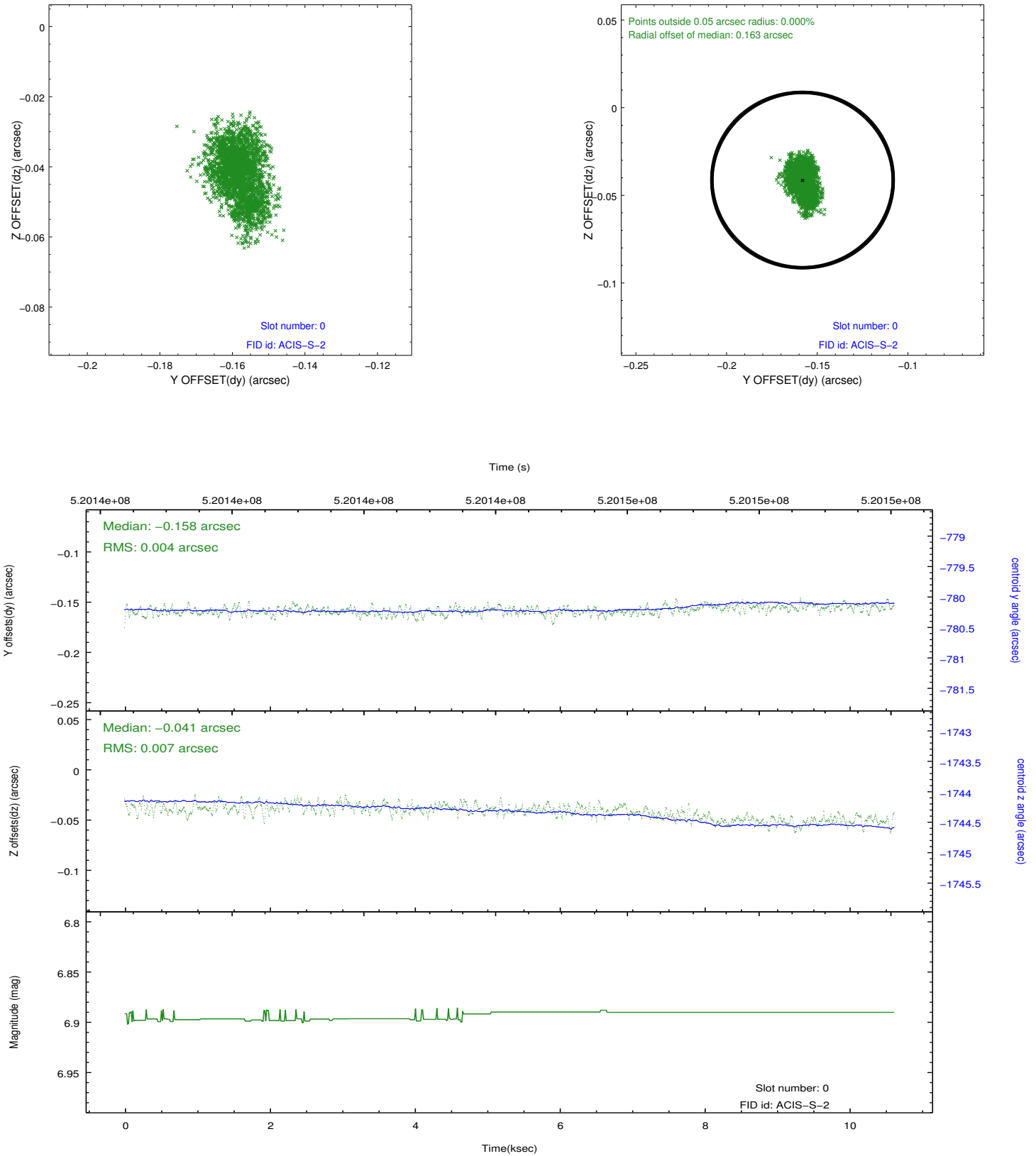


## 2.4.5 Slot 7

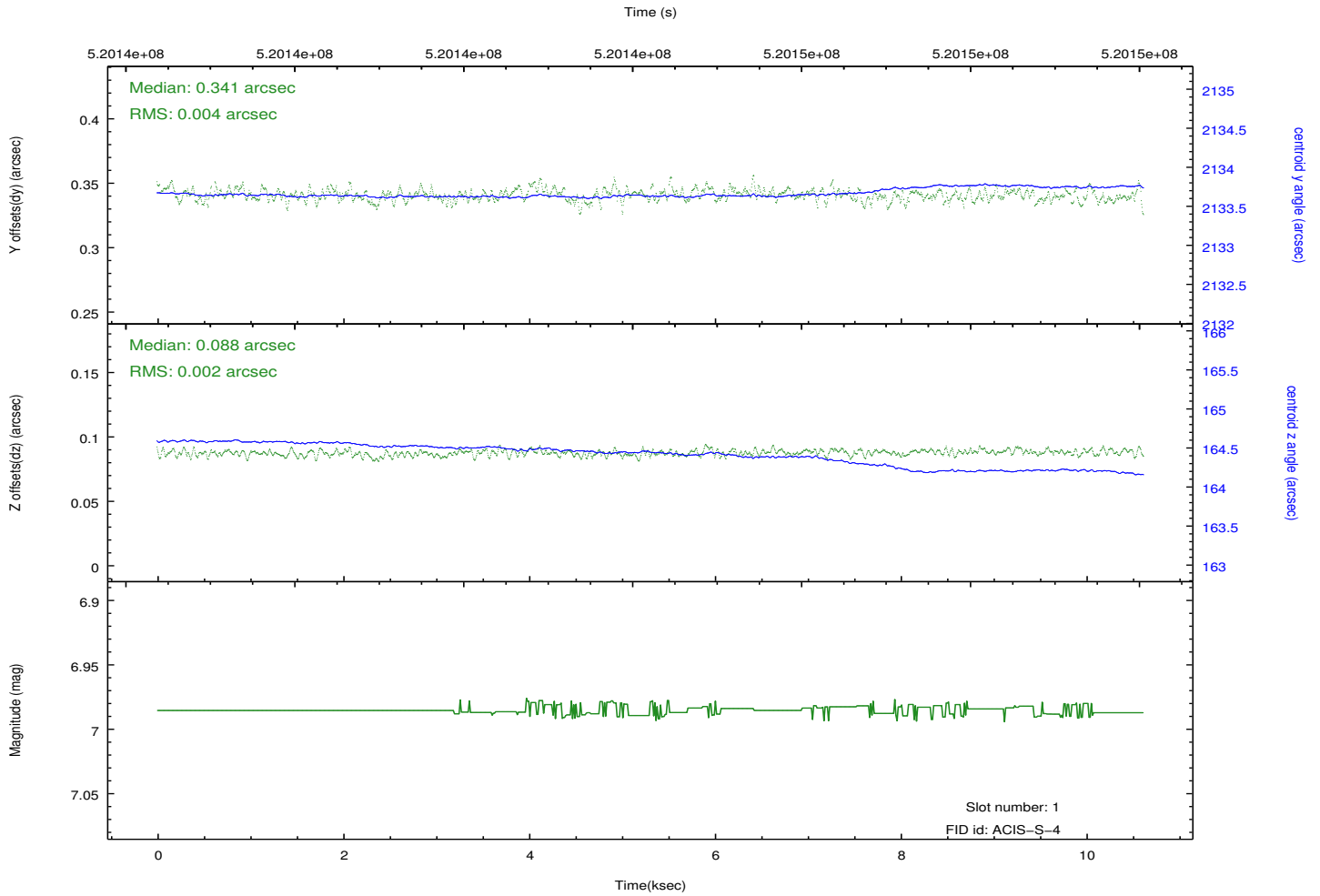
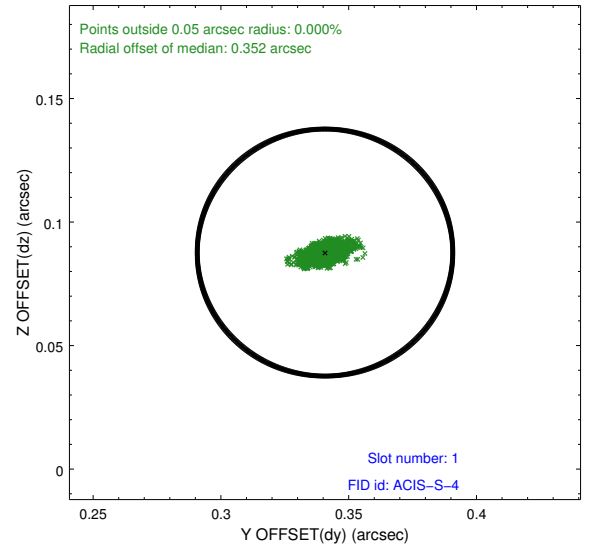
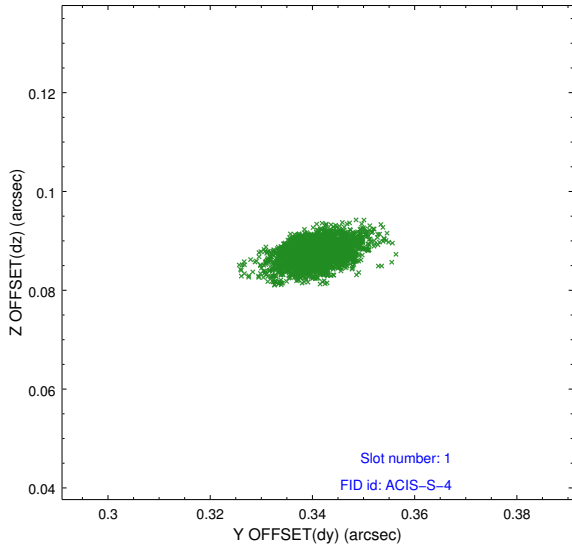


## 2.5 FID Slots

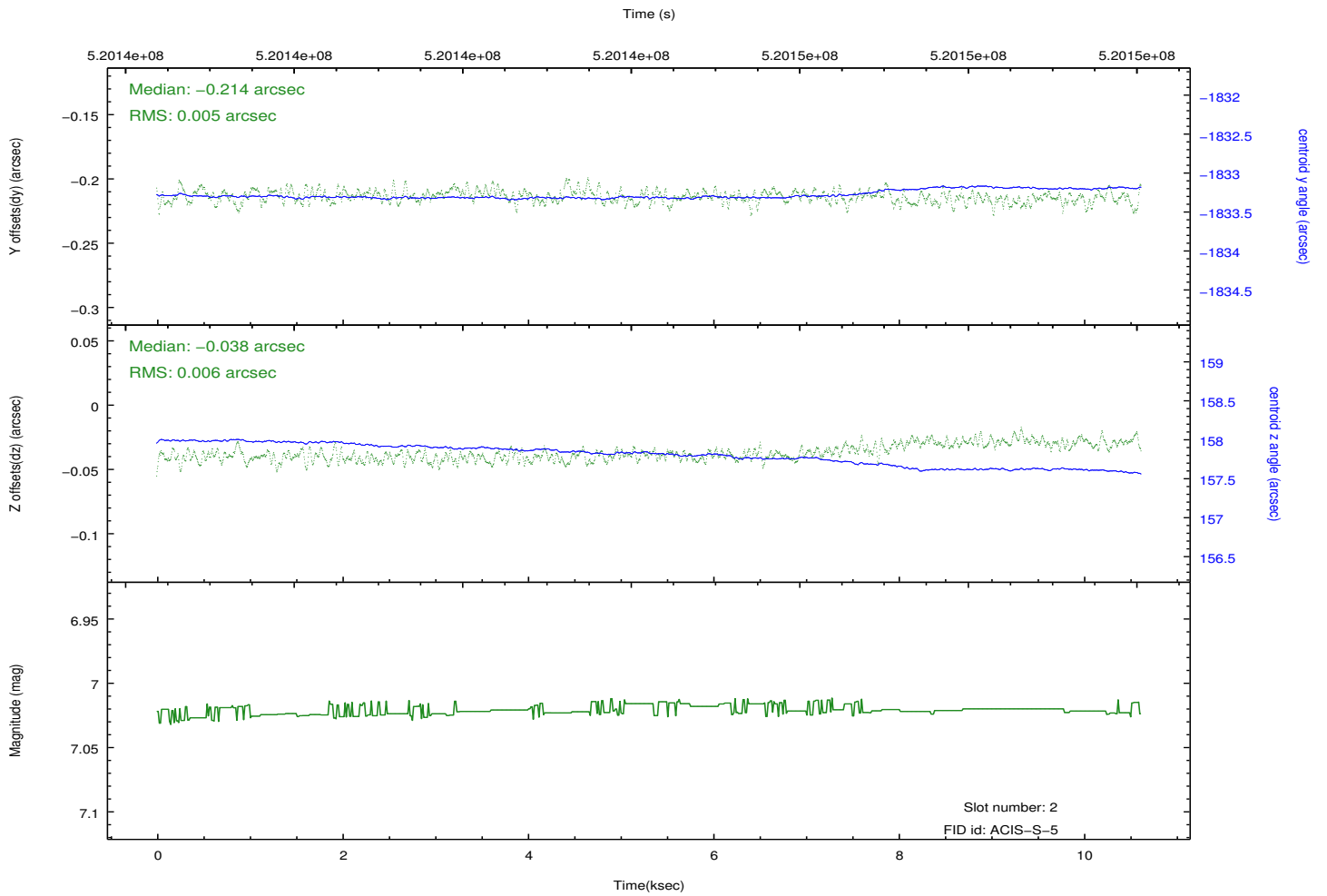
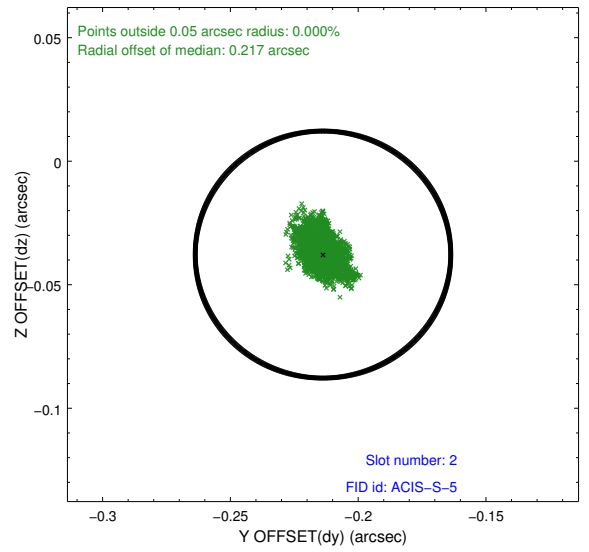
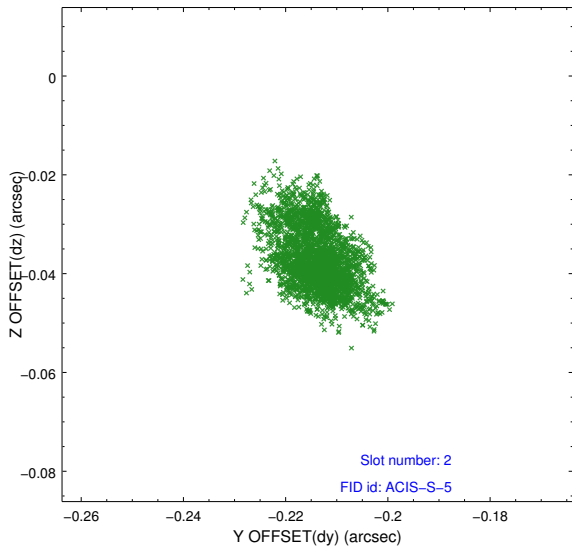
### 2.5.1 Slot 0



## 2.5.2 Slot 1



### 2.5.3 Slot 2

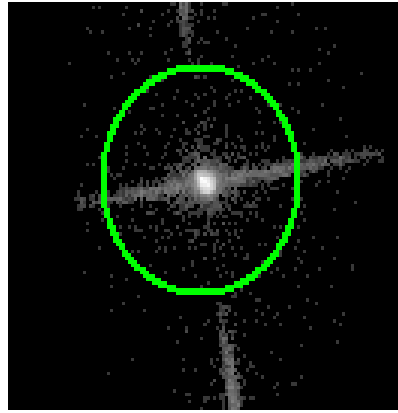


# 3 Gratings

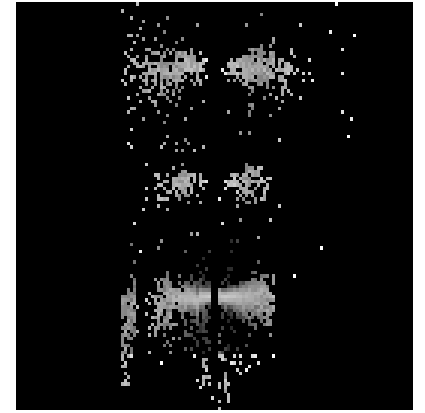
## 3.1 LETG Arm



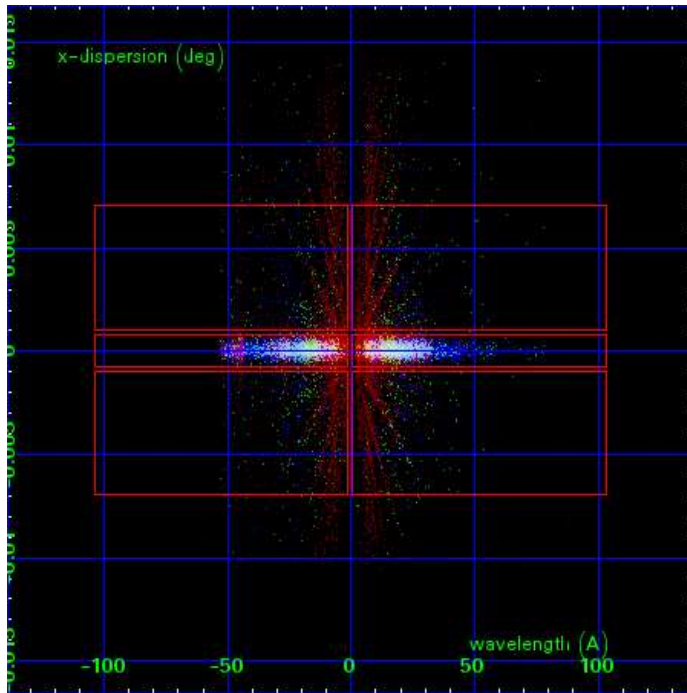
LETG Order Sort 123



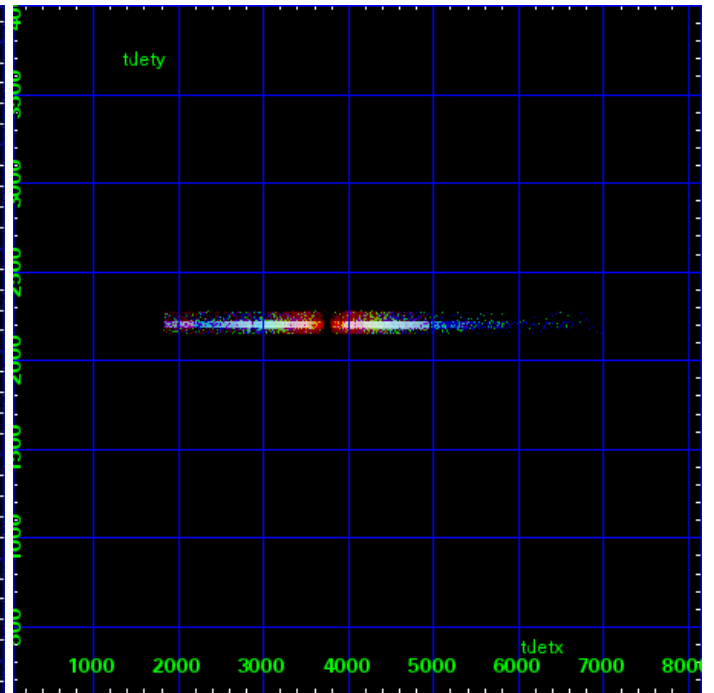
LETG Zero Order



LETG Order Sort ALL

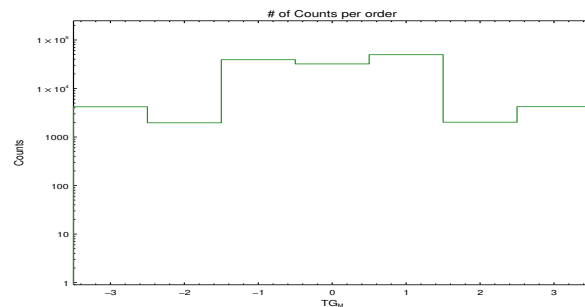


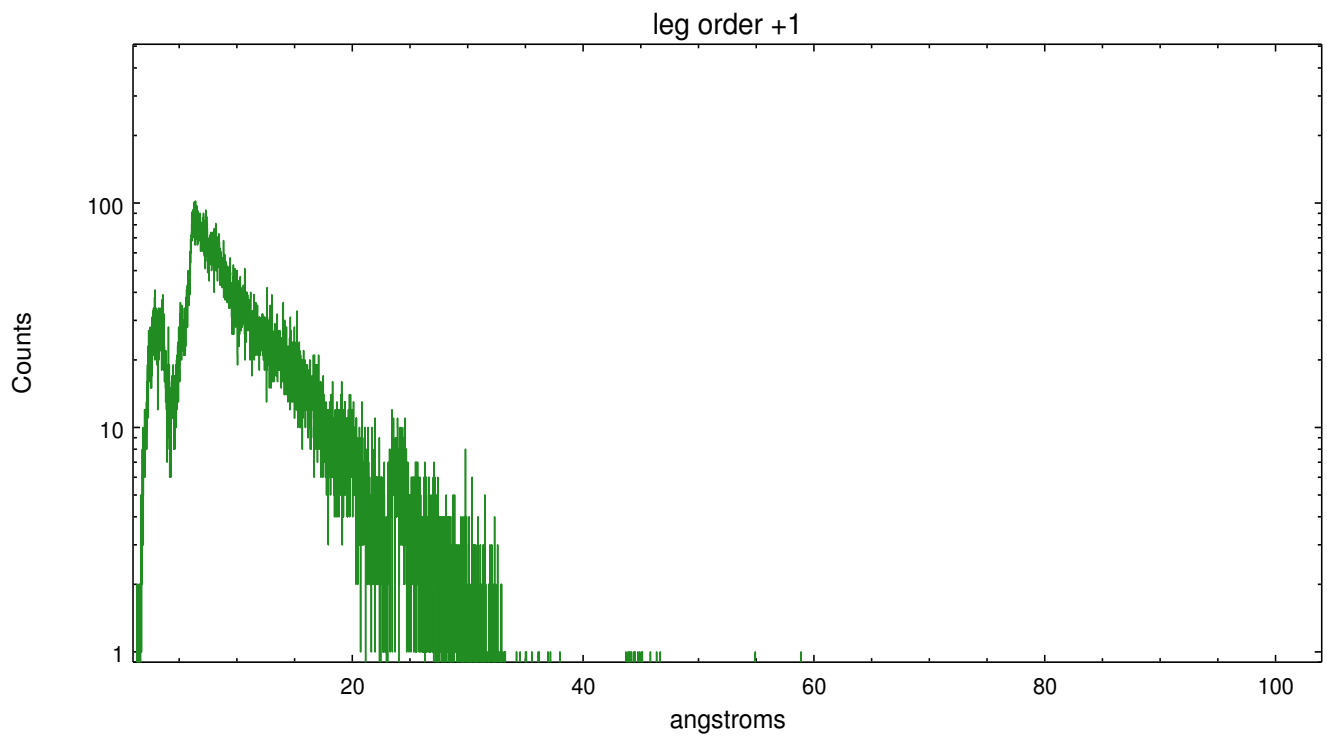
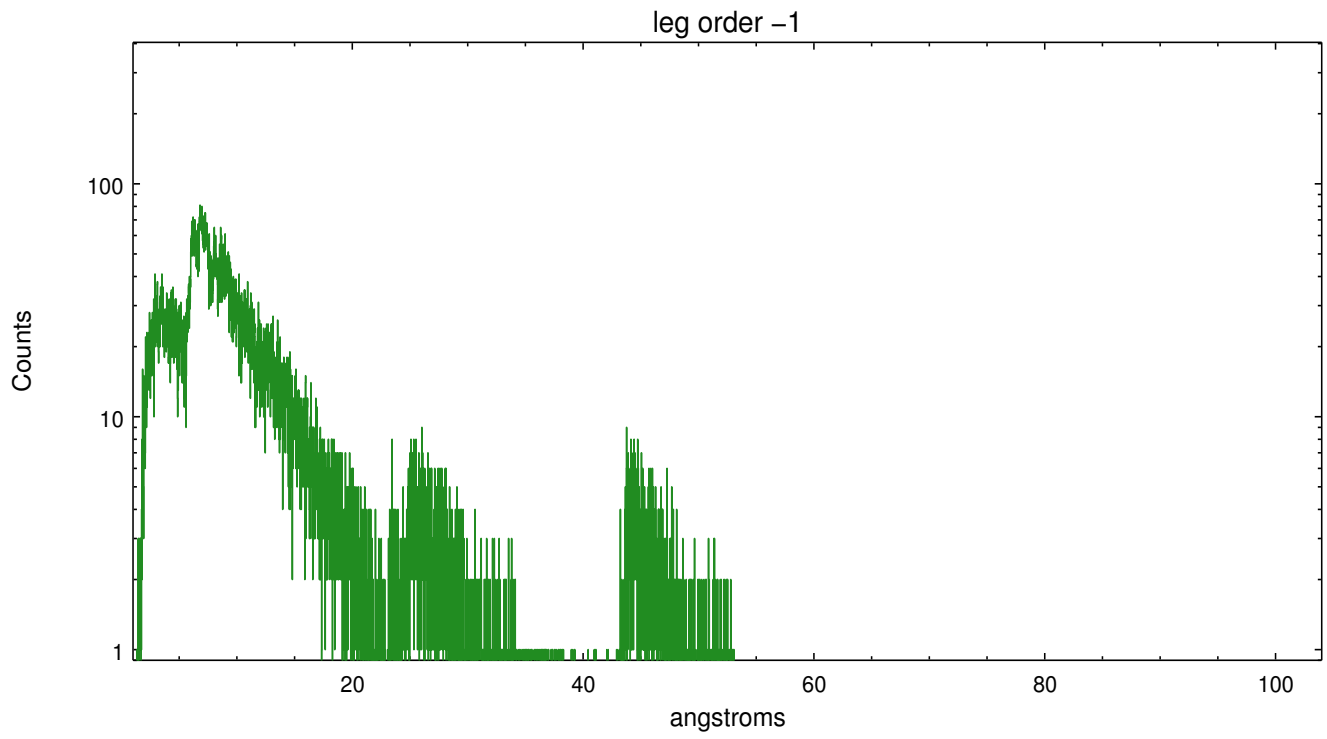
Spot Image LETG



Full Detector LETG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	4200	1963	39225	32114	49723	2019	4217





# A Summary

## A.1 Status

V&V Scientist	Jen Lauer
V&V Date (YYYY-MM-DD)	2015.11.05
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	10.077199828327

## A.2 Comments

These data have been reprocessed with new aspect alignment calibration files that correct small mean offsets (up to 0.4 arcsecs) and improve overall astrometric accuracy. The new calibration was determined using data from the time period being reprocessed and was performed using cross-correlation of X-ray sources with radio and optical counterparts.

=====

Note: offset 3 arcmin from nominal aim point; psf, lsf will be degraded, grating rmfs are uncalibrated for off-axis sources.

=====

Gain and CTI correction are not well calibrated on CCD\_ID 5 (ACIS-S1). Default order sorting can clip some regions, particularly longward of 30A (first order). User-specified custom processing parameters may be required in `tg_resolve_events` (`osipfile=none`, `osort_lo`, `osort_hi ~0.5`) though this can allow more zeroth order background at short wavelengths.

=====

Zeroth order moderately piled up. 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 LEG dispersed spectral arm, rather than using a centroid position of the source. The `findzero` results are more accurate than source centroid in this case.

=====

Faint grating spectra can be seen in an image of bad events. This is probably due to pileup in the spectrum, causing migration to bad grades. This should be considered in analysis.