

# V&V Reference Report

## L2 ASCDS Version : 10.2.2

Observation 16425 - L2 Version 2  
Chandra X-Ray Center

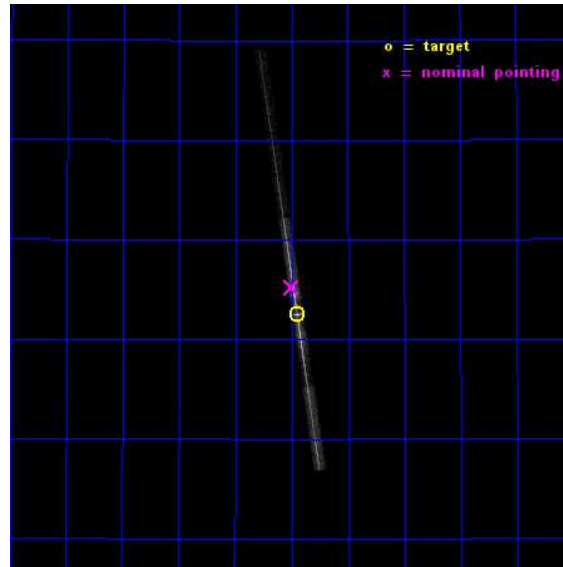
L2 Processing Date : Dec 12 2014

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# 1 Front

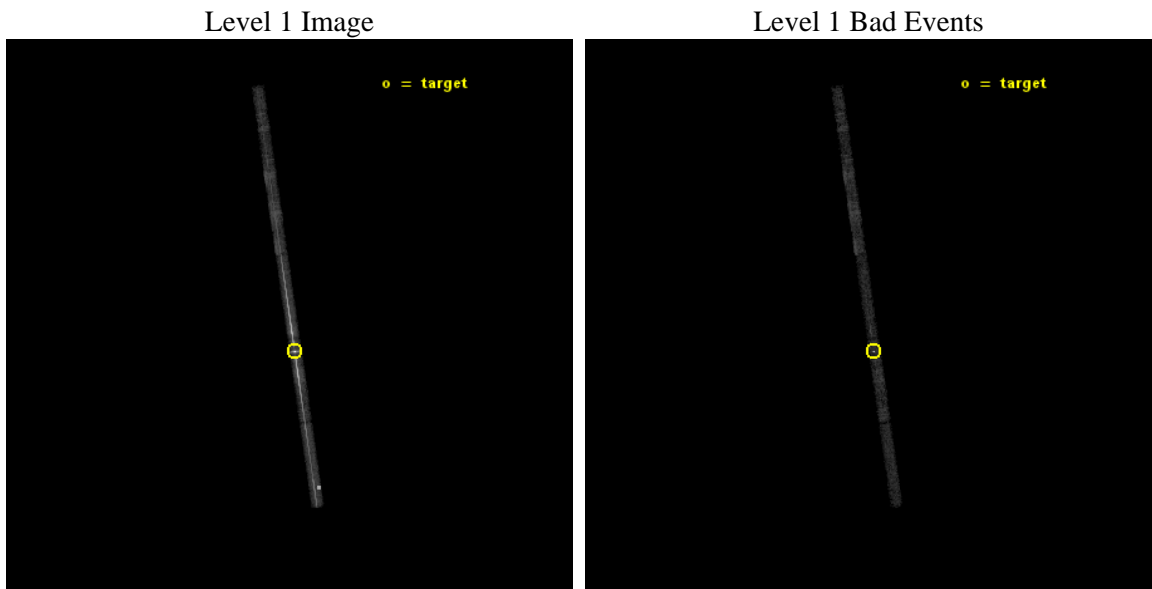
seq_num	790265	Sequence number
obs_id	16425	Observation id
title	AO-15 Calibration Observations of Mkn421	Proposal title
observer	Dr. CXC Calibration	Principal investigator
object	MKN421	Source name
dtcycle	0	&#160
cycle	P	events from which exps? Prim/Second/Both
ra_targ	166.113333	Observer's specified target RA [deg]
dec_targ	38.208806	Observer's specified target Dec [deg]
ra_nom	166.12539882817	Nominal RA [deg]
dec_nom	38.253812454275	Nominal Dec [deg]
roll_nom	261.49594630622	Nominal Roll [deg]
revision	2	Processing version of data
ontime	10079.003436148	Sum of GTIs [s]
livetime	9520.811839177	Livetime [s]
ontime5	10079.044476151	Sum of GTIs [s]
ontime6	10079.003436148	Sum of GTIs [s]
ontime7	10079.085516155	Sum of GTIs [s]
ontime8	10078.962396145	Sum of GTIs [s]
ontime9	10078.921356142	Sum of GTIs [s]
l2events	138398	Number of level 2 events



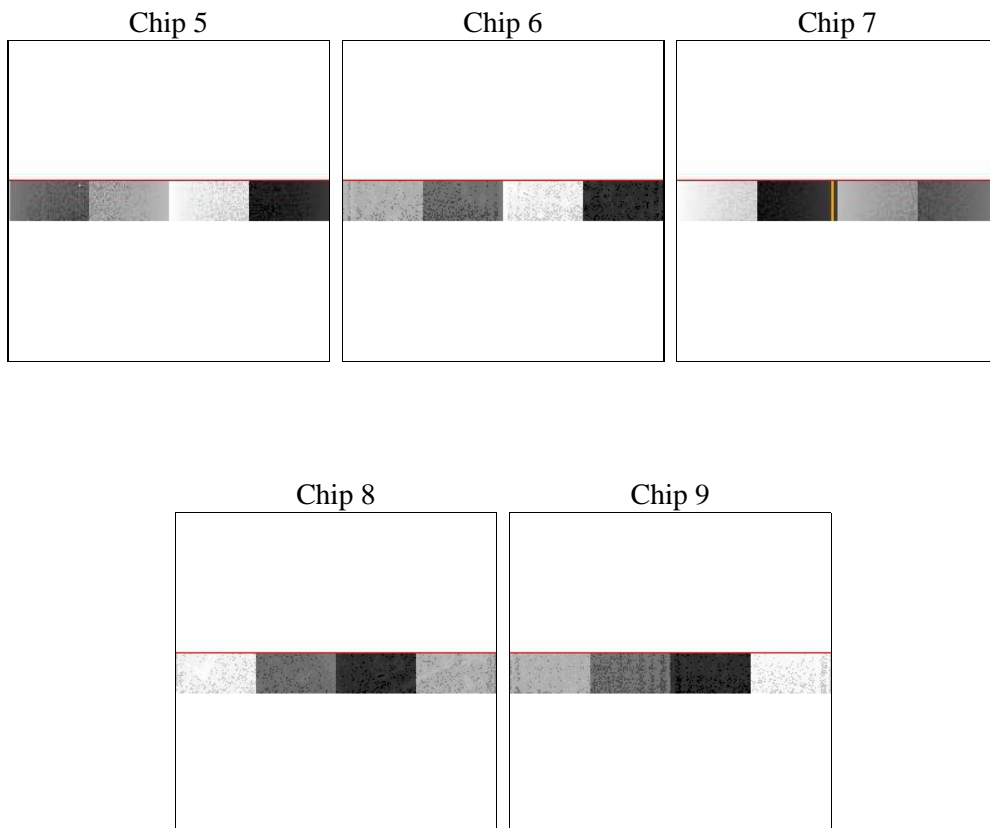
## 2 OBI

### 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	10079.003436148	Sum of GTIs [s]
caldsver	4.6.4	&#160	ontime5	10079.044476151	Sum of GTIs [s]
date	2014-12-12T06:34:48	Date and time of file creation	ontime6	10079.003436148	Sum of GTIs [s]
revision	2	Processing version of data	ontime7	10079.085516155	Sum of GTIs [s]
			ontime8	10078.962396145	Sum of GTIs [s]
			ontime9	10078.921356142	Sum of GTIs [s]
			l1events	195508	Number of level 1 events
			tgmethod	FINDZO	Method used to create src1a file
			zo_pos	(4162.46, 3767.63)	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	32061	85931	55408	14410	7698
rejected events	5406	12505	5232	9252	5921
rejected %	16%	14%	9%	64%	76%

	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
grade 0 events	17074	55578	14572	2732	1042
	53%	64%	26%	18%	13%
grade 1 events	43	3175	40	8	7
	0%	3%	0%	0%	0%
grade 2 events	4832	8918	13174	804	234
	15%	10%	23%	5%	3%
grade 3 events	907	3037	5801	345	181
	2%	3%	10%	2%	2%
grade 4 events	927	2942	5713	321	173
	2%	3%	10%	2%	2%
grade 5 events	988	2057	1235	485	303
	3%	2%	2%	3%	3%
grade 6 events	2917	2961	10921	957	147
	9%	3%	19%	6%	1%
grade 7 events	4373	7263	3952	8758	5611
	13%	8%	7%	60%	72%

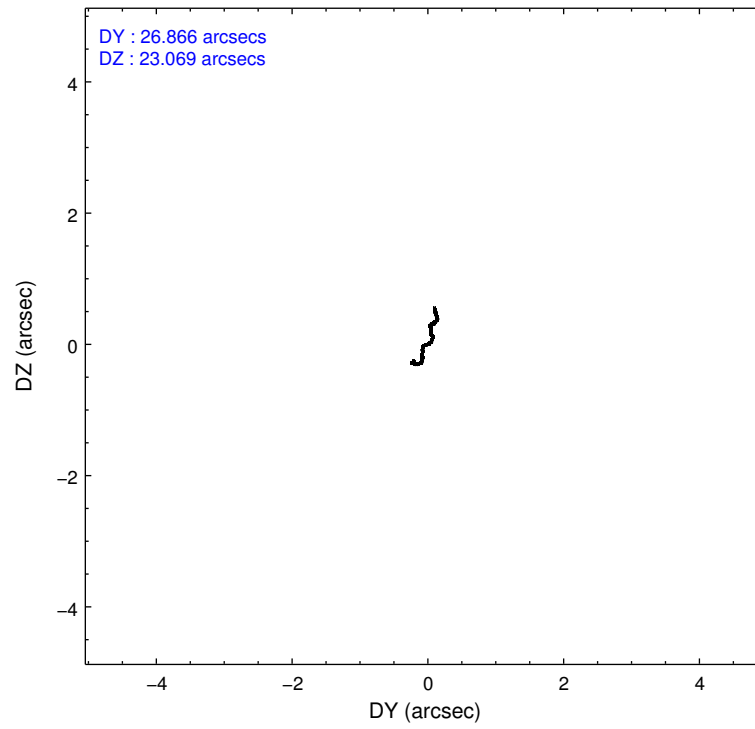
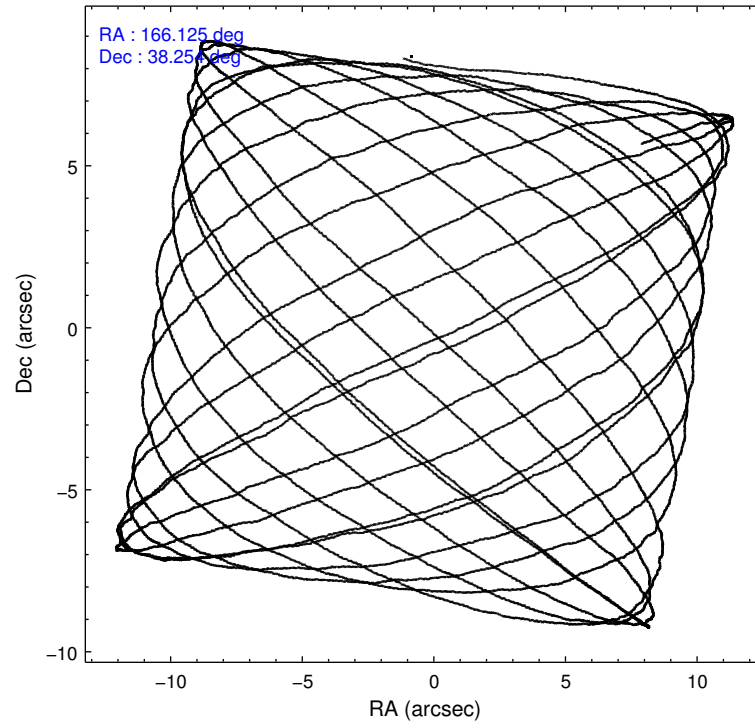


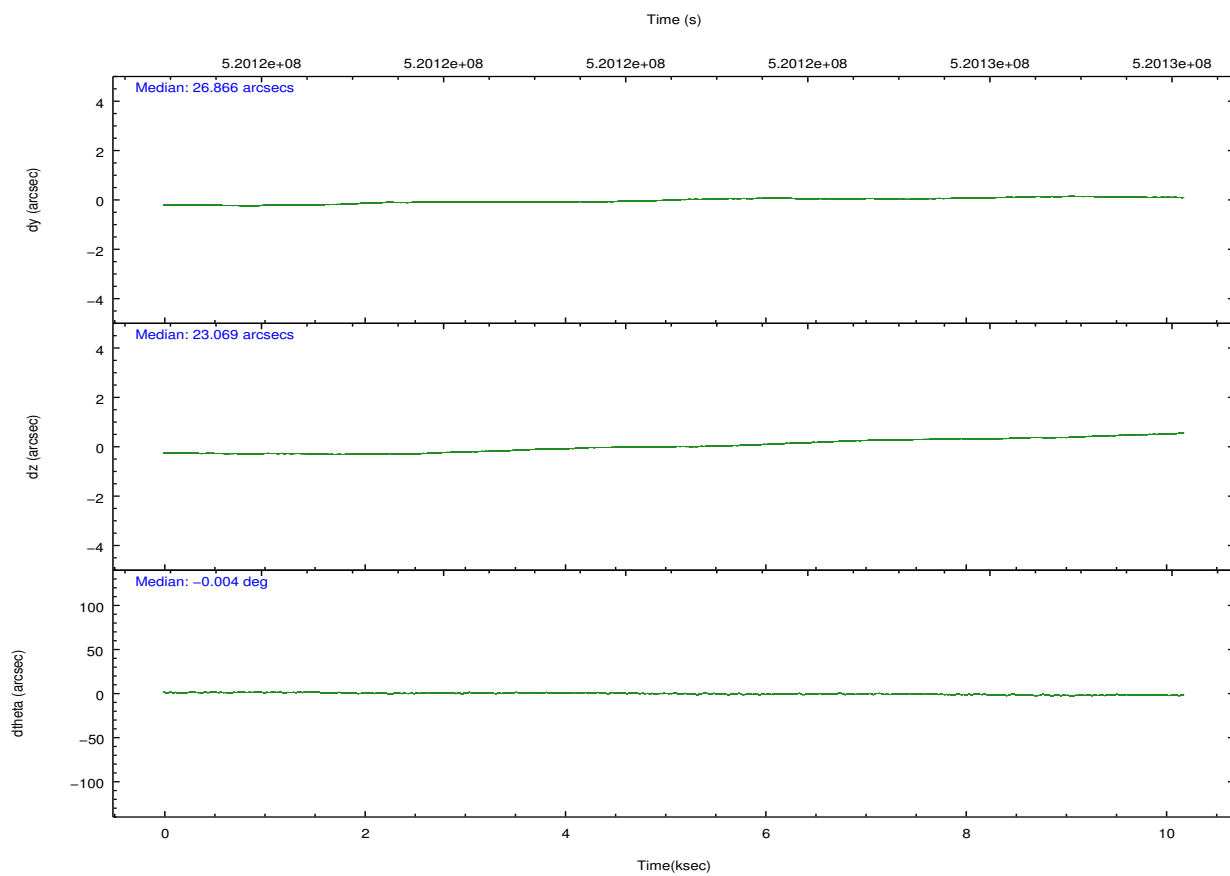
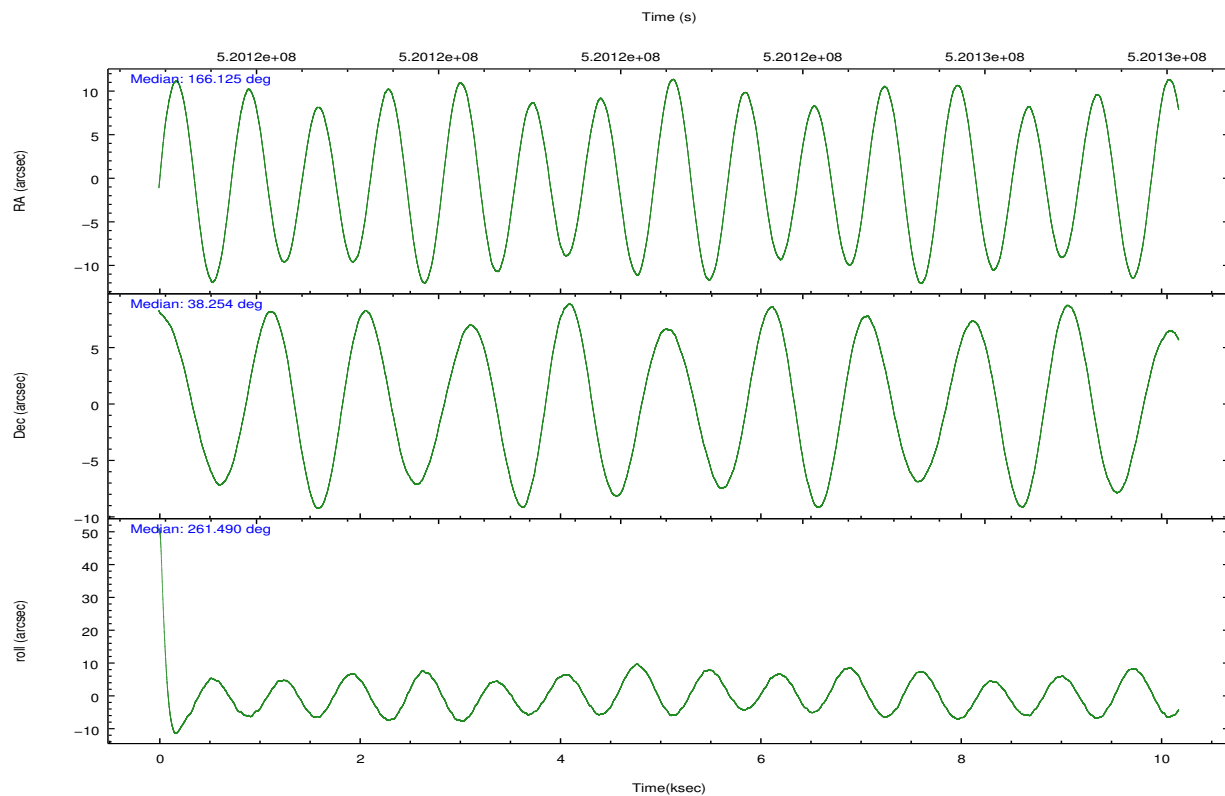
## 2.2 Compared Parameters

Parameter	Planned	Actual
Instrument	ACIS	ACIS
Detector	ACIS-56789	ACIS-56789
Grating	LETG	LETG
Data mode	FAINT	FAINT
Observation mode	POINTING	POINTING
[deg] Pointing RA	166.112138	166.1253988281684
[deg] Pointing Dec	38.279074	38.25381245427484
[deg] Pointing Roll	261.347465	261.4959463062155
[mm] SIM focus pos	-0.684267	-0.6828225247311905
[mm] SIM defocus	0	0.001444936568705701
[mm] SIM translation stage pos	-190.132523	-190.1400660498719
[mm] SIM translation stage offset	0	0.00754346686406393
[s] Observation start time (MET)	520117610.184000	520116325.2567
Observation start date	2014-06-25T21:05:43	2014-06-25T20:45:25
[s] Observation end time (MET)	520127610.184000	520127836.00733
Observation end date	2014-06-25T23:52:23	2014-06-25T23:57:16
Read mode	TIMED	TIMED

Parameter	Planned	Actual
Obspar format version number	7	7
Obspar file type	PREDICTED	ACTUAL
Obspar update status	NONE	UPDATED
CCD I0 on	N	N
CCD I1 on	N	N
CCD I2 on	N	N
CCD I3 on	N	N
CCD S0 on	N	N
CCD S1 on	Y	Y
CCD S2 on	Y	Y
CCD S3 on	Y	Y
CCD S4 on	Y	Y
CCD S5 on	O1	Y
Number of optional ACIS chips dropped	0	0
On-chip summing requested	N	N
Subarray requested	CUSTOM	1/8
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



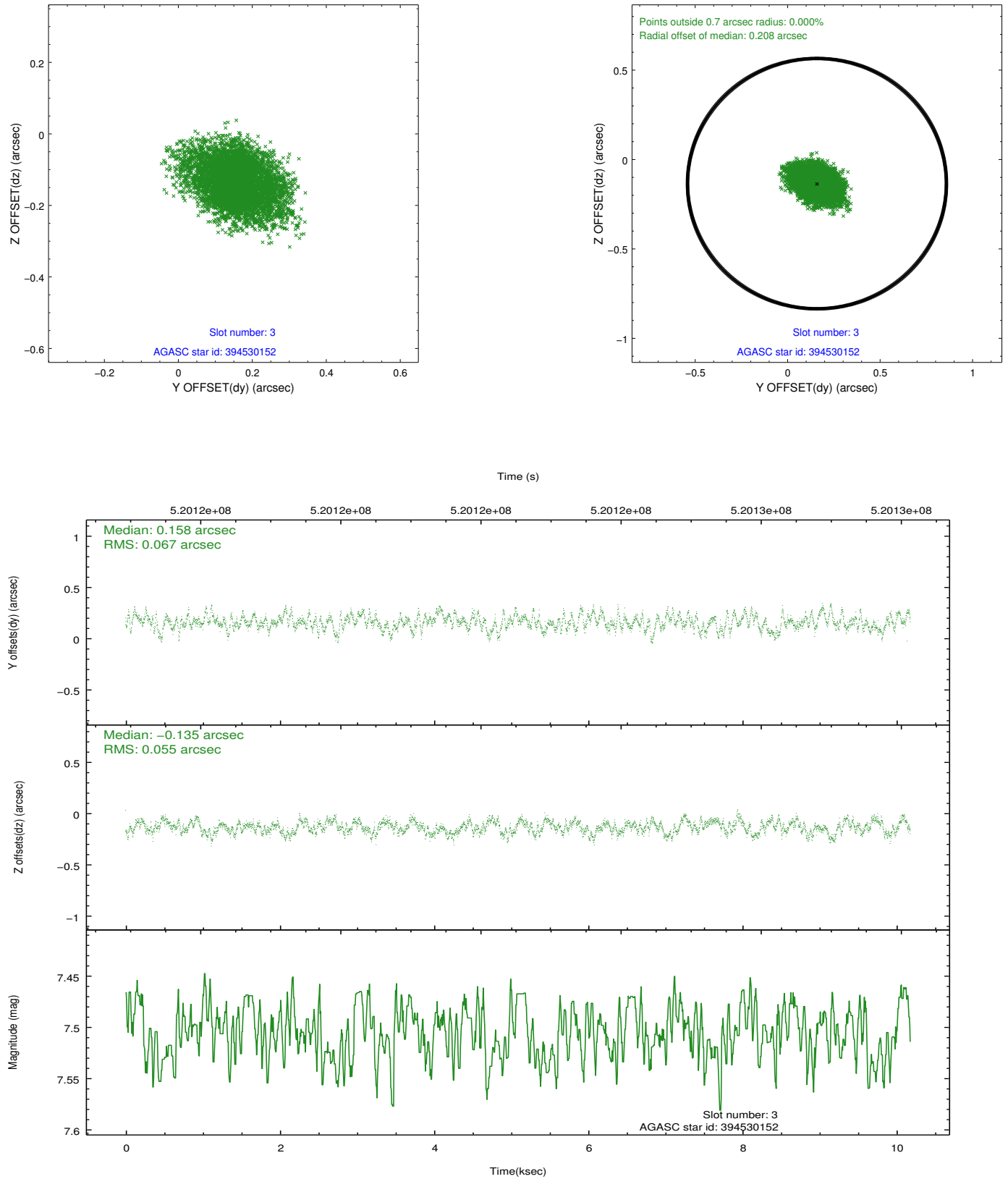


### Slot Statistics

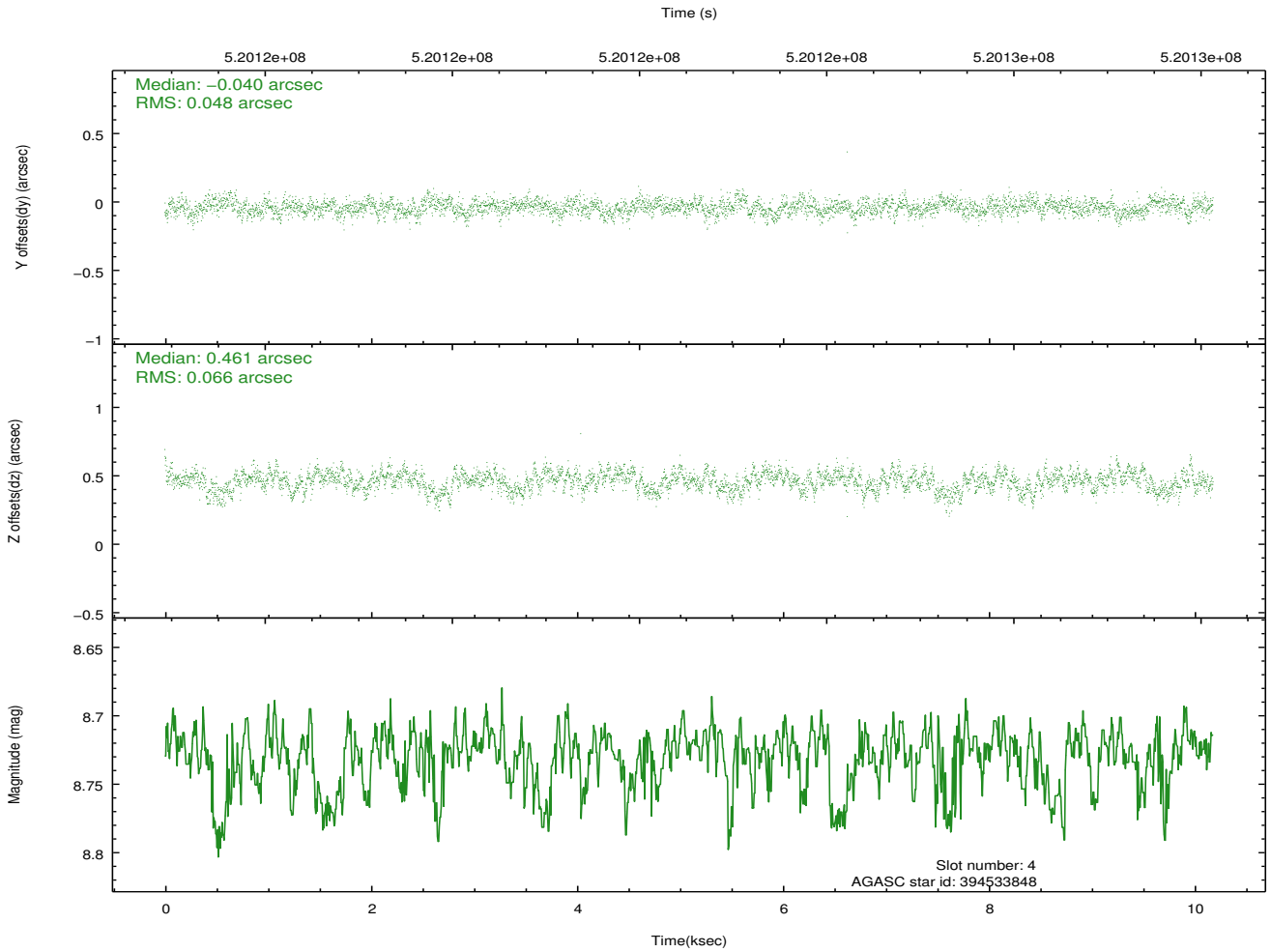
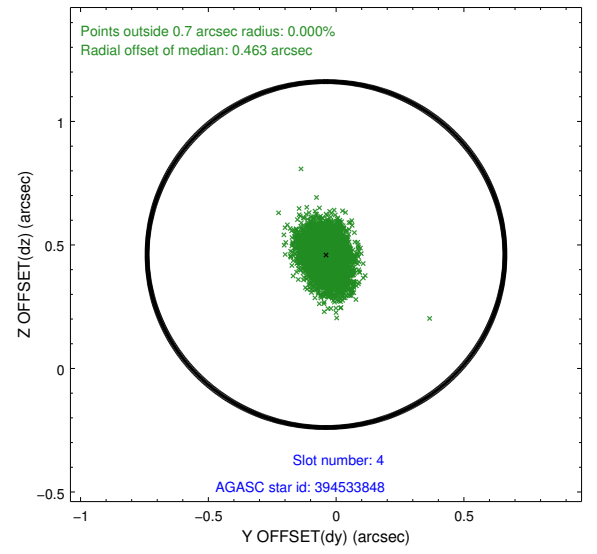
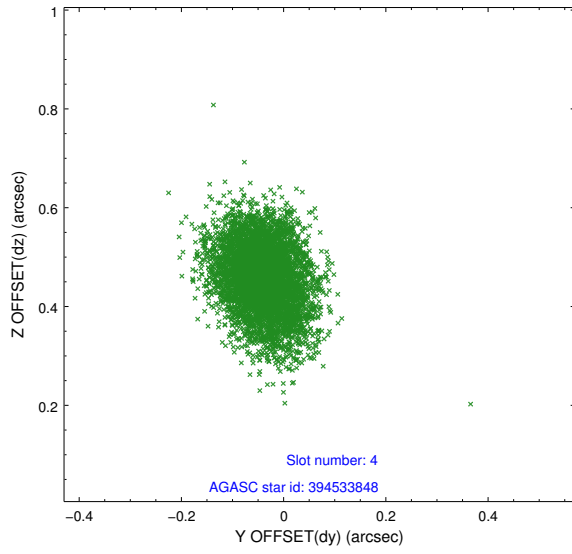
slot	status	used	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID		ACIS-S-2	6.94	2483	-0.157	-0.032	0.008	0.013	0.000000	0.000000	-780.30	-1744.73
1	FID		ACIS-S-4	7.03	2483	0.321	0.084	0.008	0.016	0.000000	0.000000	2133.22	163.31
2	FID		ACIS-S-5	7.07	2483	-0.196	-0.043	0.007	0.012	0.000000	0.000000	-1832.51	157.46
3	GUIDE	used	394530152	7.50	4967	0.158	-0.135	0.092	0.150	166.075805	38.868252	-2080.94	-420.00
4	GUIDE	used	394533848	8.73	4964	-0.040	0.461	0.087	0.141	166.382906	38.276007	-105.53	753.56
5	GUIDE	used	394546712	6.61	4967	-0.427	0.276	0.081	0.133	166.451462	38.394357	-555.73	883.27
6	GUIDE	used	394546720	6.43	4967	-0.015	-0.890	0.102	0.153	166.130115	38.241361	126.89	70.12
7	GUIDE	used	394527560	7.66	4964	0.324	0.290	0.075	0.111	165.970713	38.960939	-2366.64	-760.56

## 2.4 Star Slots

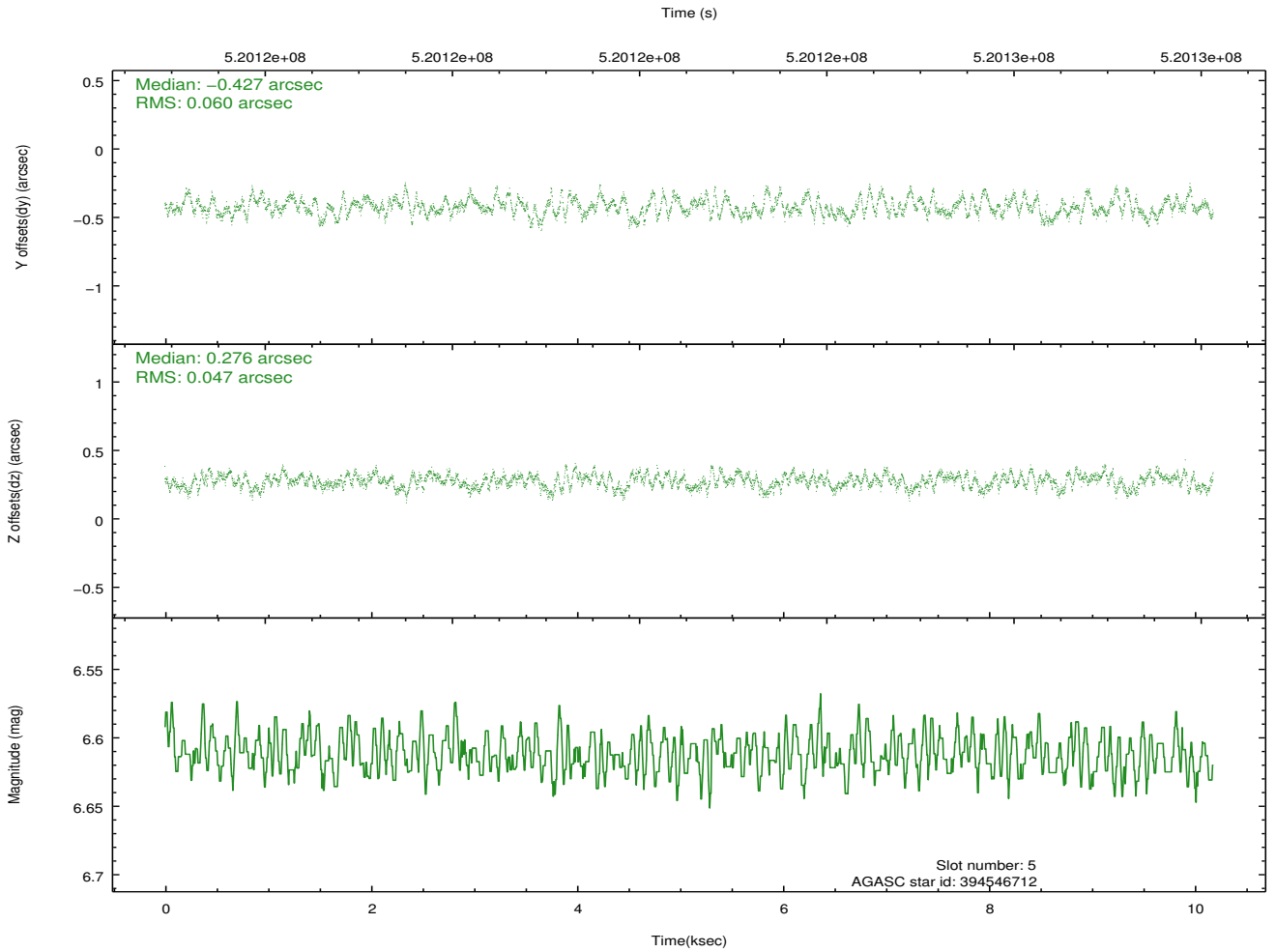
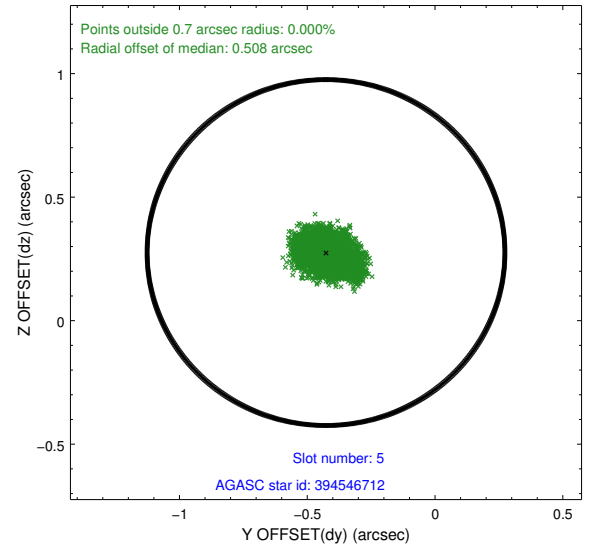
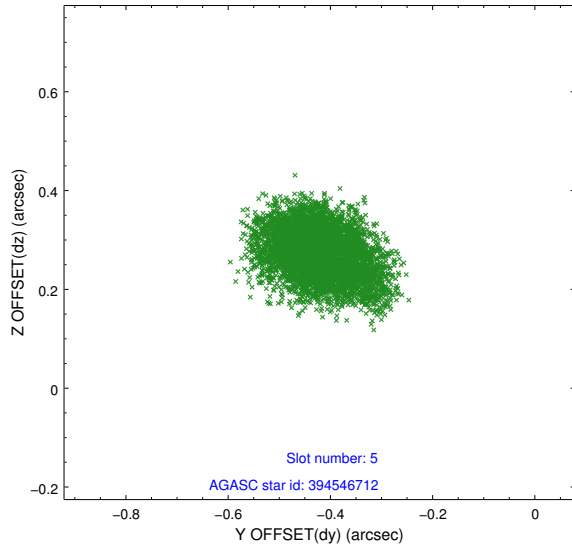
### 2.4.1 Slot 3



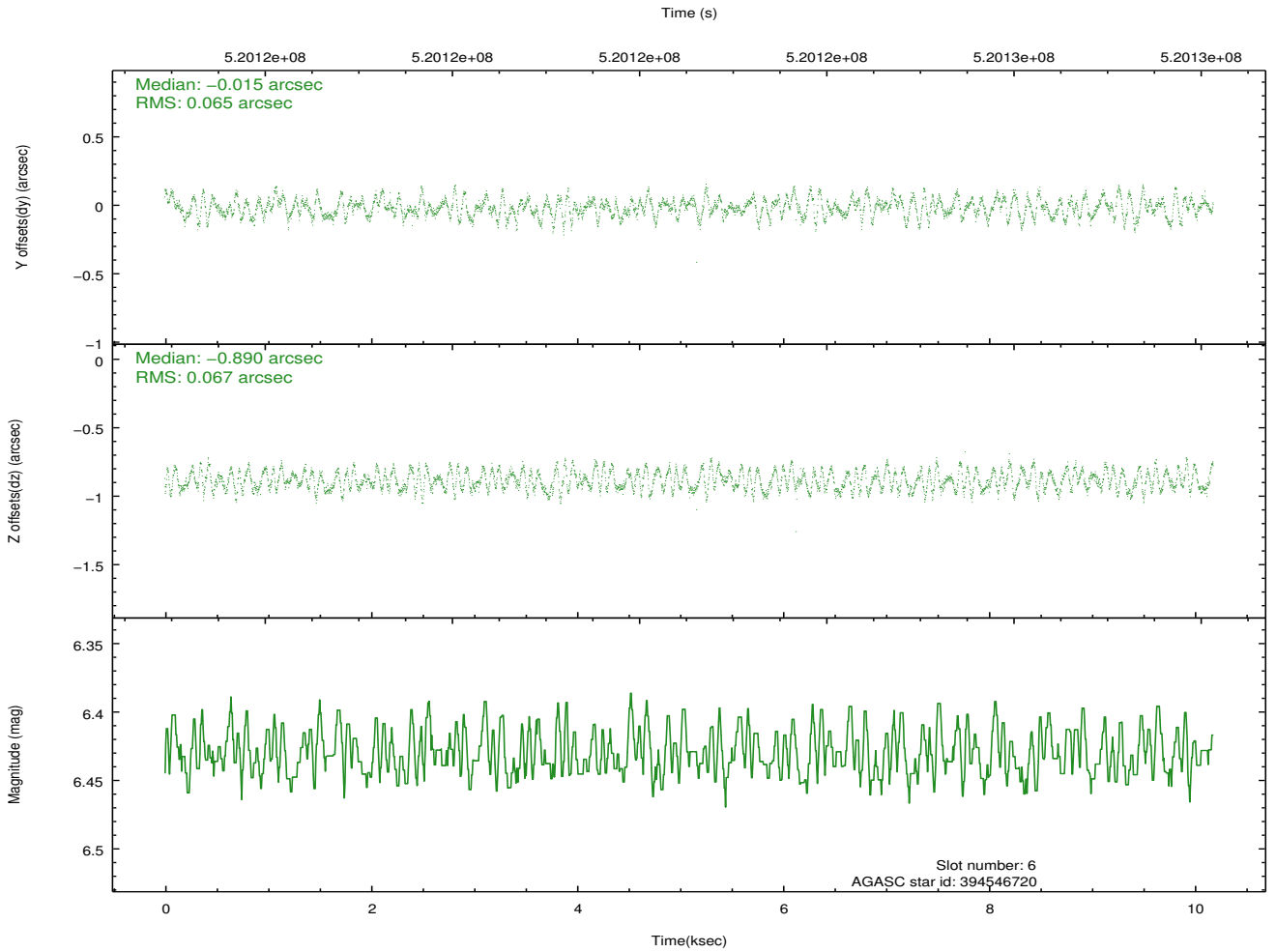
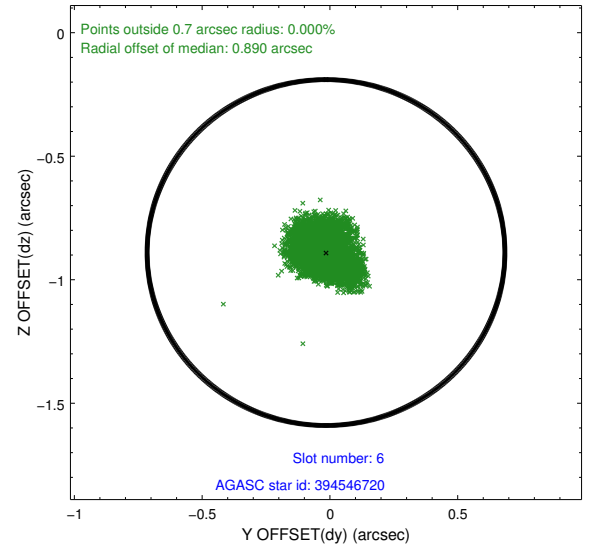
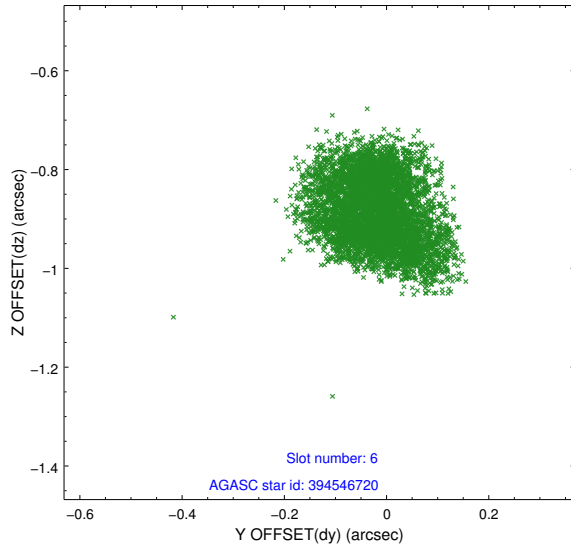
## 2.4.2 Slot 4



### 2.4.3 Slot 5

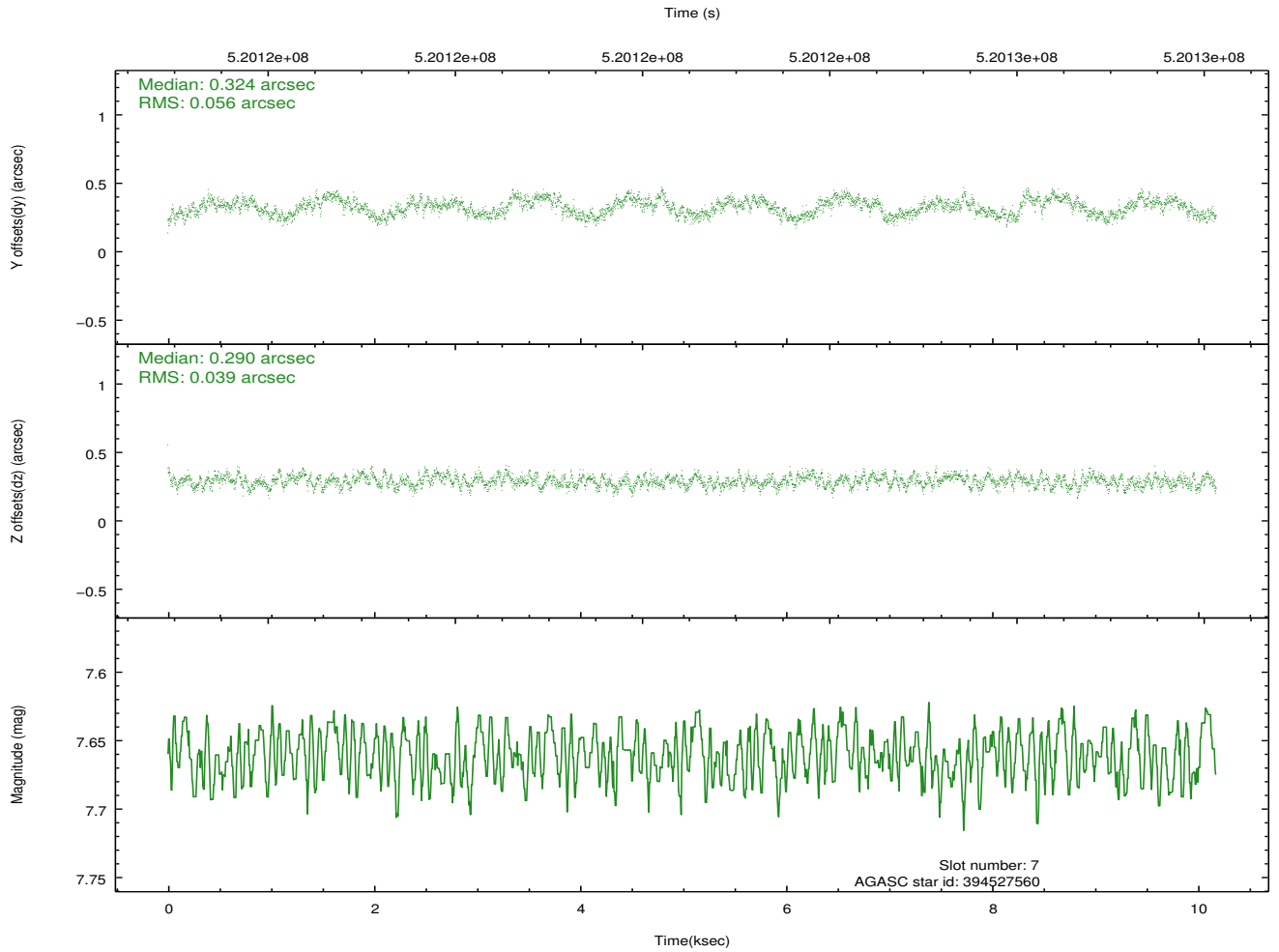
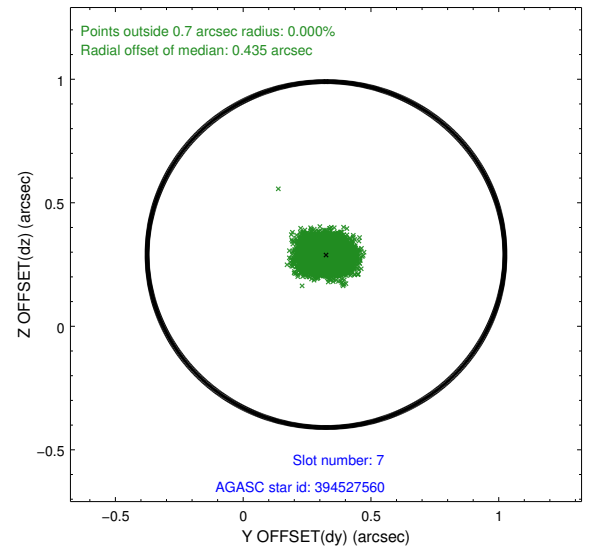
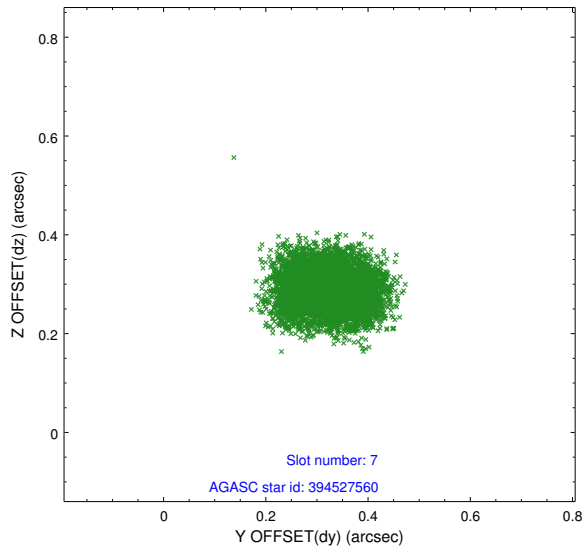


## 2.4.4 Slot 6



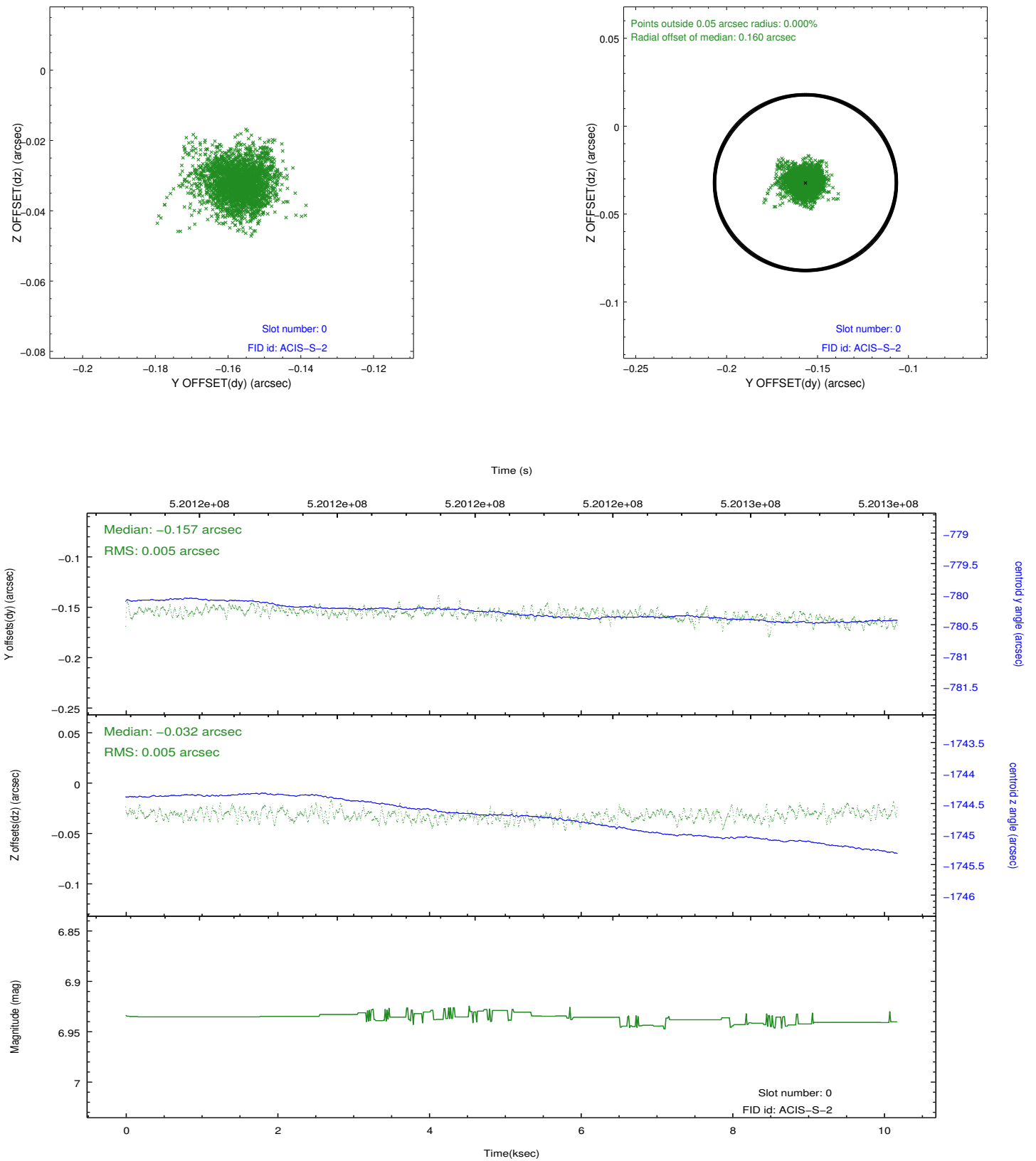


## 2.4.5 Slot 7

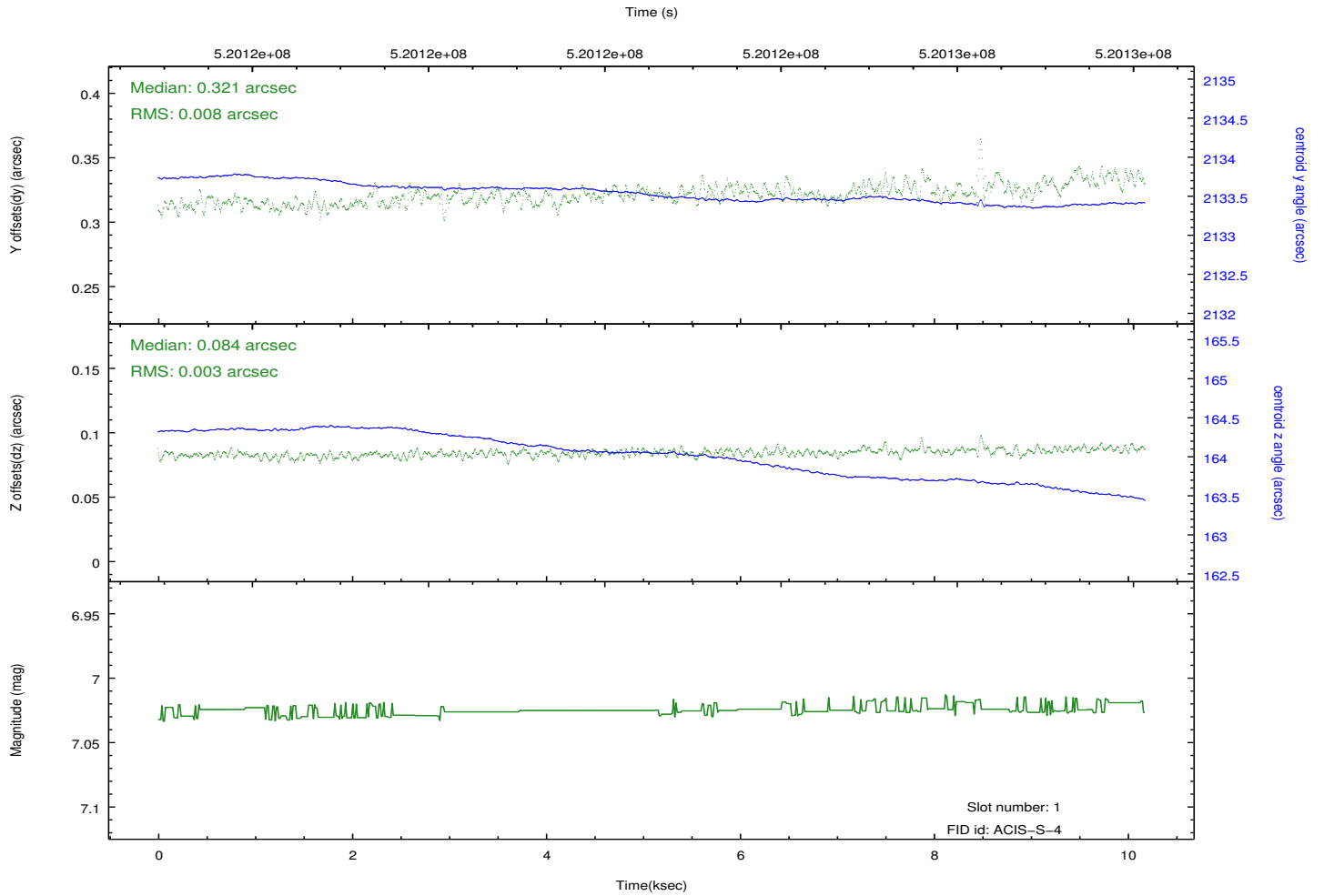
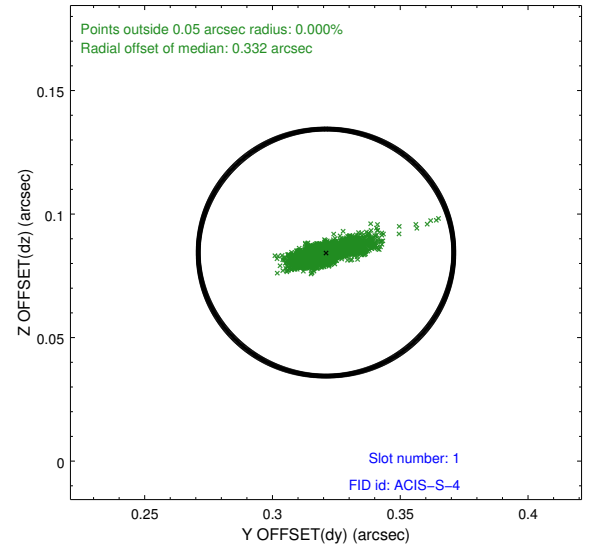
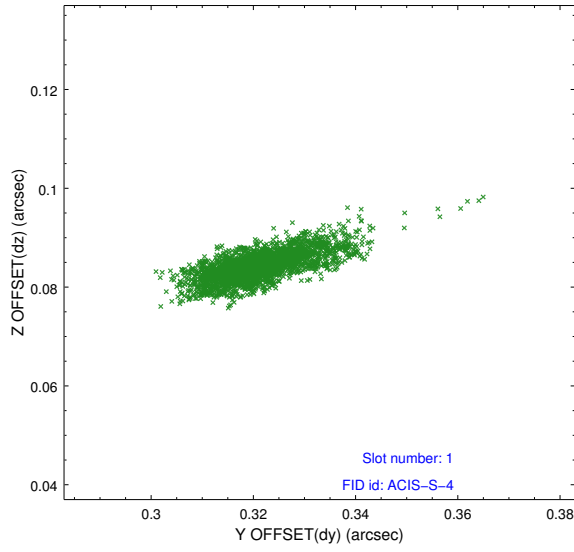


## 2.5 FID Slots

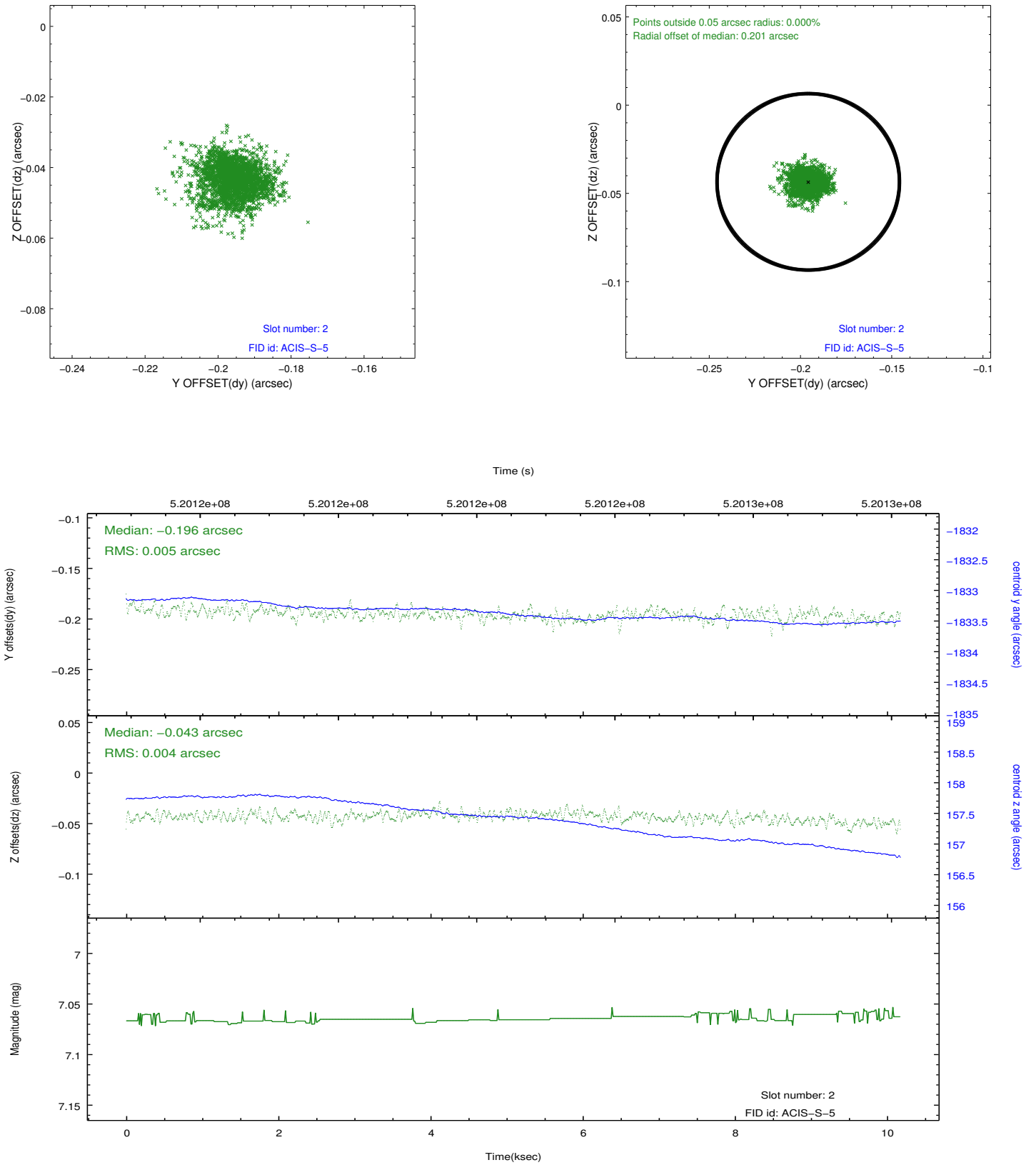
### 2.5.1 Slot 0



## 2.5.2 Slot 1

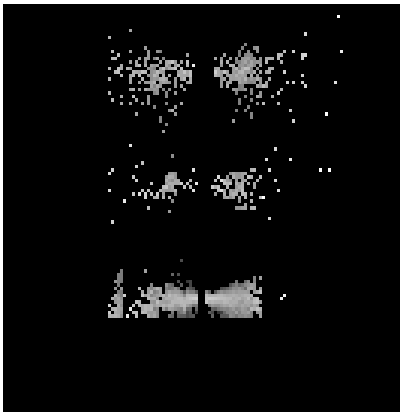


### 2.5.3 Slot 2

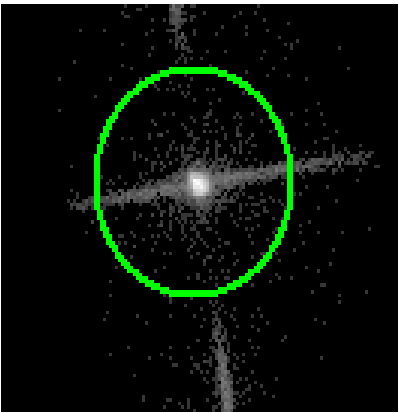


# 3 Gratings

## 3.1 LETG Arm



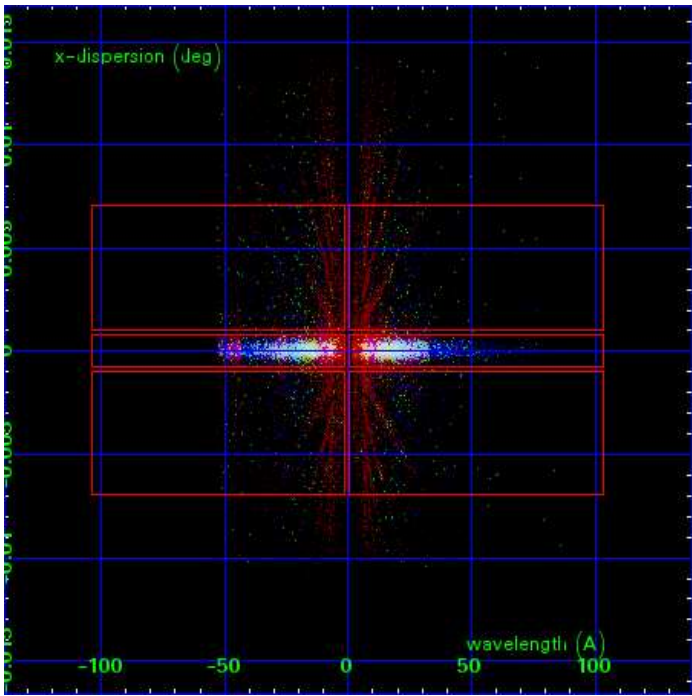
LETG Order Sort 123



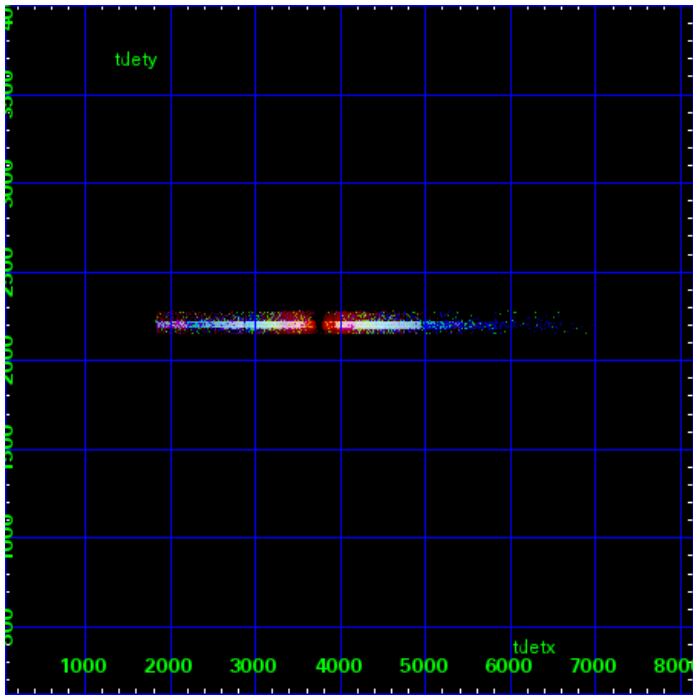
LETG Zero Order



LETG Order Sort ALL

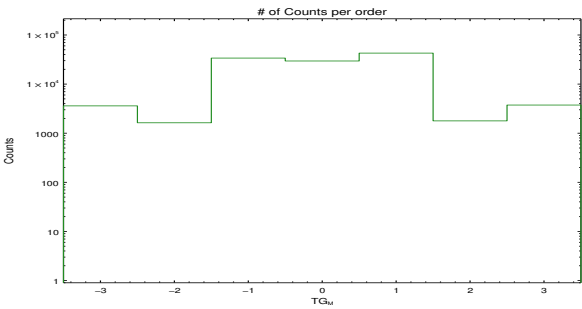


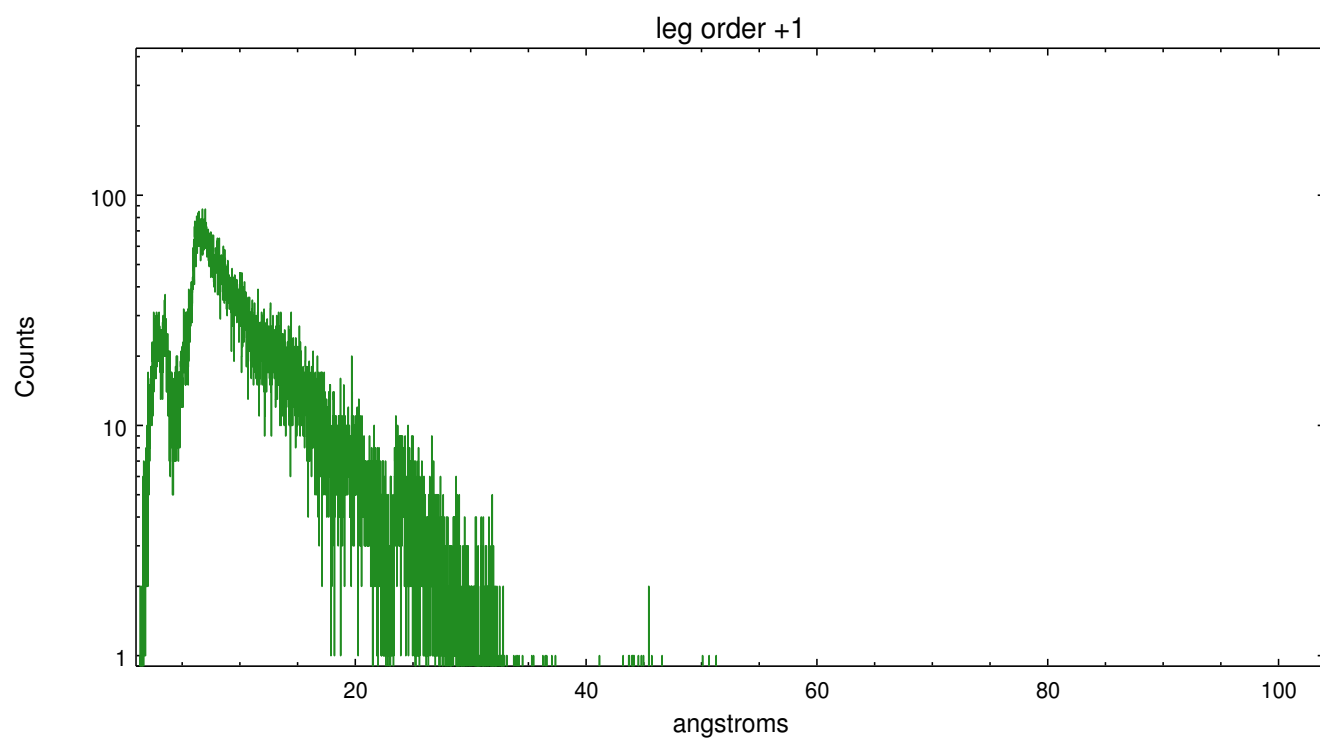
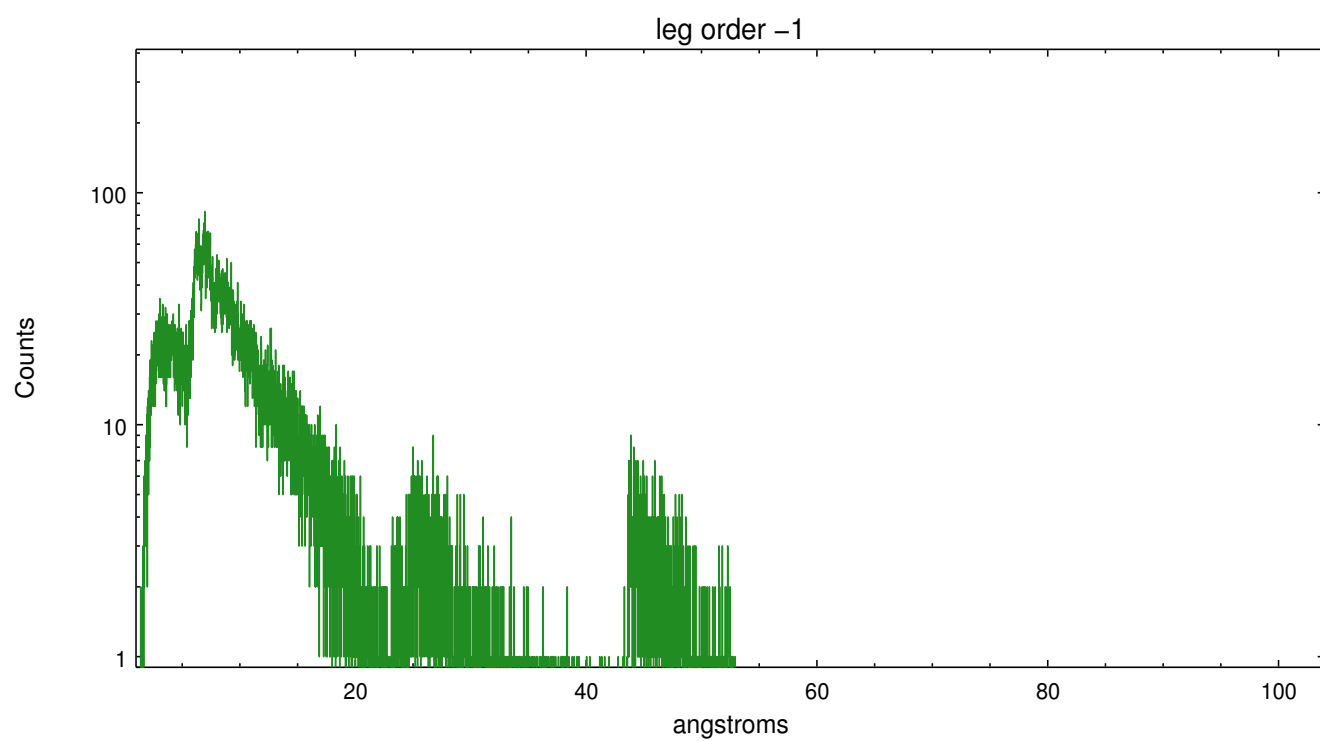
Spot Image LETG



Full Detector LETG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	3603	1631	33854	29551	42744	1783	3744





# 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	10.079003436148

## 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.

=====

Zeroth order 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.

=====

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.

=====

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.