

# V&V Reference Report

## L2 ASCDS Version : 10

Observation 15480 - L2 Version 3  
Chandra X-Ray Center

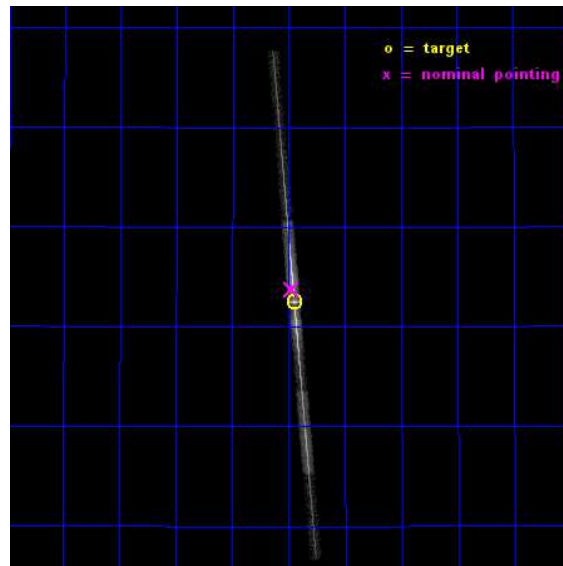
L2 Processing Date : Dec 3 2014

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# 1 Front

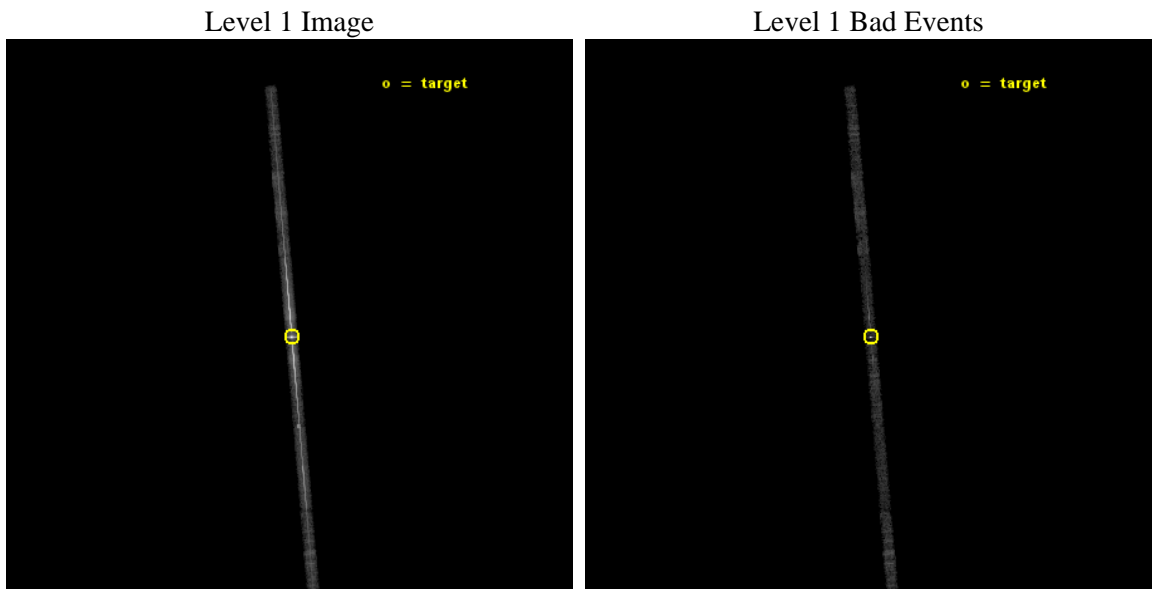
seq_num	790256	Sequence number
obs_id	15480	Observation id
title	AO-14 Calibration Observations of Mkn421	Proposal title
observer	Dr. CXC Calibration	Principal investigator
object	MKN421	Source name
dtcycle	0	&#160
cycle	P	events from which exps? Prim/Second/Both
ra_targ	166.113333	Observer's specified target RA [deg]
dec_targ	38.208806	Observer's specified target Dec [deg]
ra_nom	166.11902683496	Nominal RA [deg]
dec_nom	38.229329355355	Nominal Dec [deg]
roll_nom	264.96829814773	Nominal Roll [deg]
revision	3	Processing version of data
ontime	9764.9998336434	Sum of GTIs [s]
livetime	9224.1982666933	Livetime [s]
ontime4	9764.9998336434	Sum of GTIs [s]
ontime5	9764.9998336434	Sum of GTIs [s]
ontime6	9764.9998336434	Sum of GTIs [s]
ontime7	9764.9998336434	Sum of GTIs [s]
ontime8	9764.98050946	Sum of GTIs [s]
ontime9	9764.9394694567	Sum of GTIs [s]
l2events	222468	Number of level 2 events



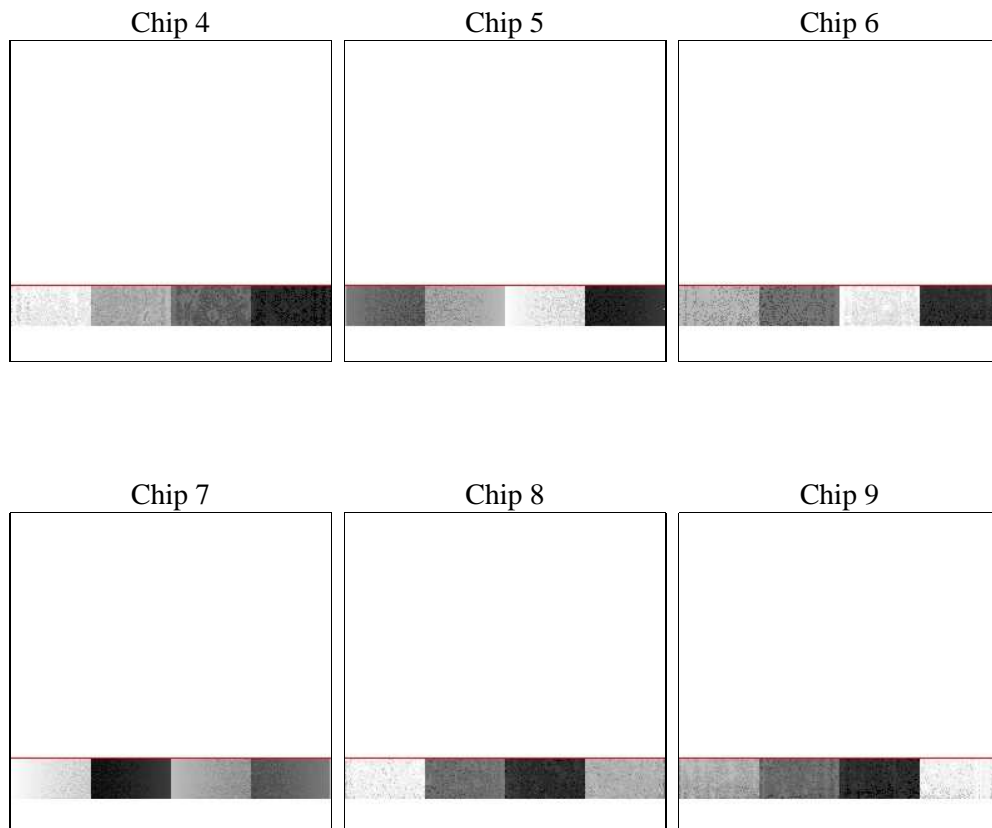
## 2 OBI

### 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	Processing system revision	ontime	9764.9998336434	Sum of GTIs [s]
caldsver	4.6.4	&#160	ontime4	9764.9998336434	Sum of GTIs [s]
date	2014-12-04T01:07:54	Date and time of file creation	ontime5	9764.9998336434	Sum of GTIs [s]
revision	2	Processing version of data	ontime6	9764.9998336434	Sum of GTIs [s]
			ontime7	9764.9998336434	Sum of GTIs [s]
			ontime8	9764.98050946	Sum of GTIs [s]
			ontime9	9764.9394694567	Sum of GTIs [s]
			l1events	285621	Number of level 1 events
			tgmetho	FINDZO	Method used to create src1a file
			ra_pos	(4126.64, 3046.07)	src1a sky pixel position

### 2.1.4 Events

	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	10694	26128	80209	142478	16903	9209
rejected events	7549	4848	7032	20144	8349	6164
rejected %	70%	18%	8%	14%	49%	66%

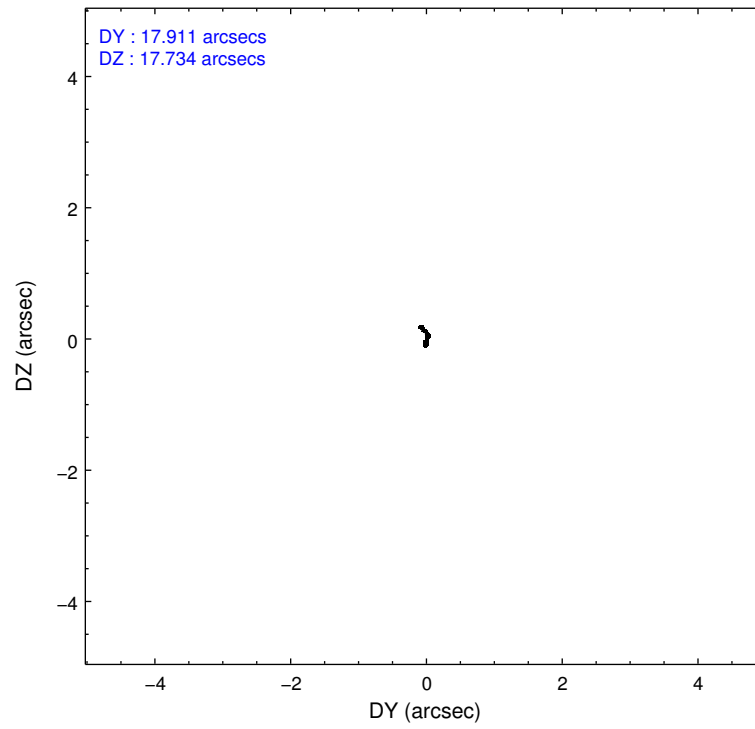
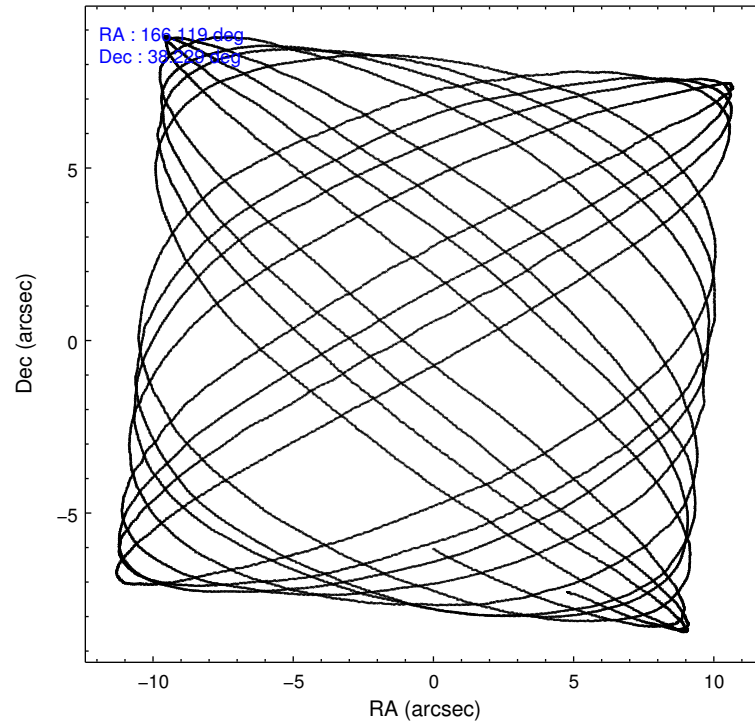
	ccd 4	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
grade 0 events	2193	10698	59016	34334	5832	2165
	20%	40%	73%	24%	34%	23%
grade 1 events	5	65	295	719	9	3
	0%	0%	0%	0%	0%	0%
grade 2 events	406	3898	7458	31000	1054	328
	3%	14%	9%	21%	6%	3%
grade 3 events	173	1638	2461	14095	423	182
	1%	6%	3%	9%	2%	1%
grade 4 events	185	1704	2518	13853	411	208
	1%	6%	3%	9%	2%	2%
grade 5 events	297	1026	455	3601	436	295
	2%	3%	0%	2%	2%	3%
grade 6 events	188	3343	1730	29059	835	162
	1%	12%	2%	20%	4%	1%
grade 7 events	7247	3756	6276	15817	7903	5866
	67%	14%	7%	11%	46%	63%

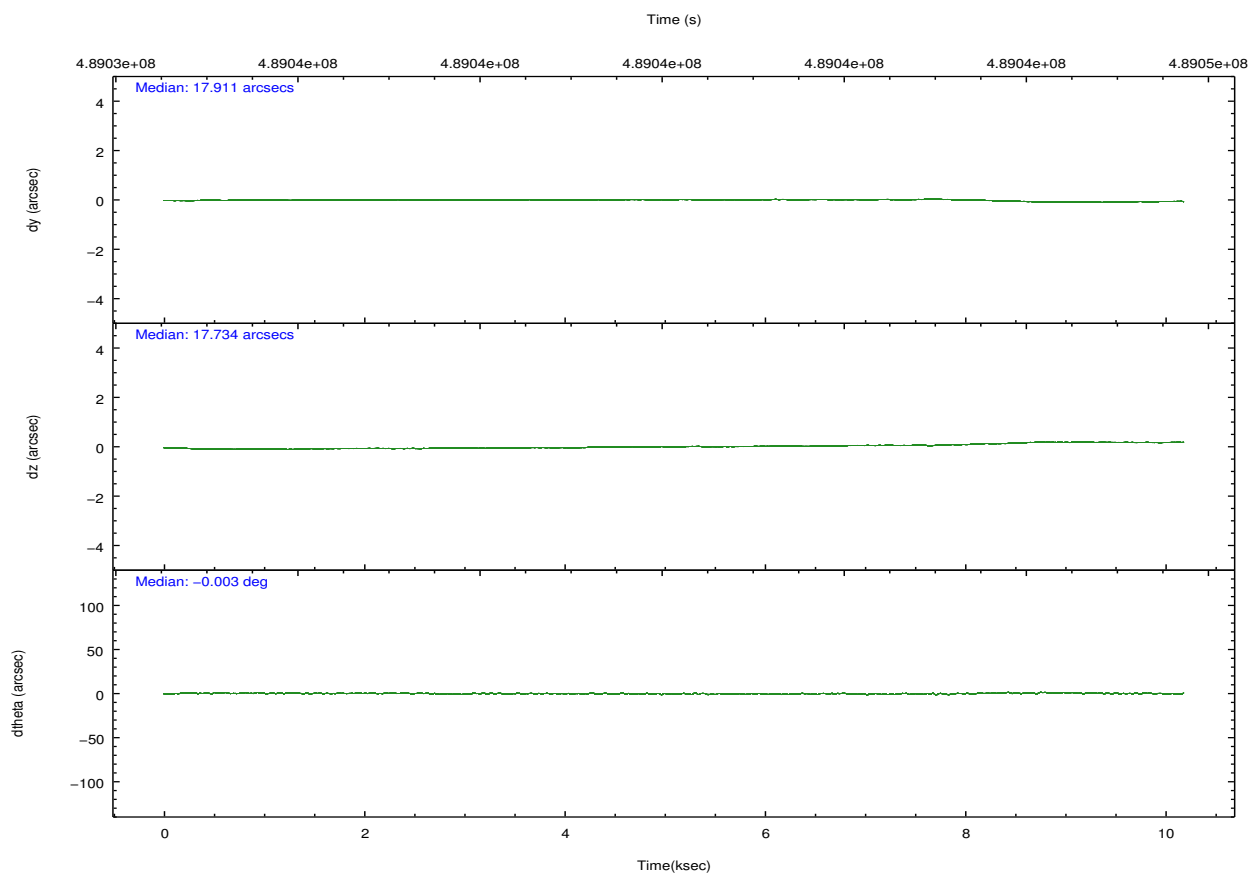
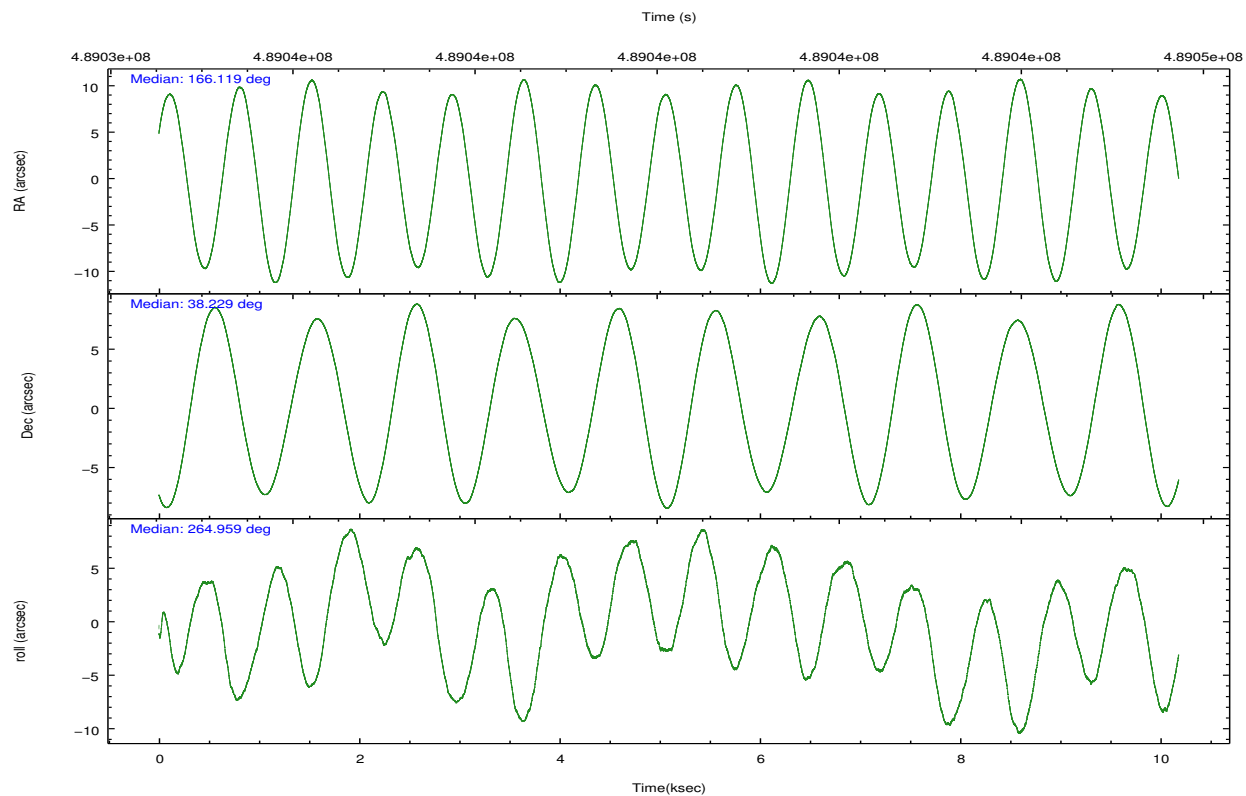


## 2.2 Compared Parameters

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	CCD I0 on	N	N
Observation mode	POINTING	POINTING	CCD I1 on	N	N
[deg] Pointing RA	166.103850	166.1190268349596	CCD I2 on	N	N
[deg] Pointing Dec	38.253989	38.2293293553545	CCD I3 on	N	N
[deg] Pointing Roll	264.821064	264.9682981477252	CCD S0 on	O1	Y
[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	-182.132523	-182.1344861297048	CCD S3 on	Y	Y
[mm] SIM translation stage offset	-8	-7.998036453302973	CCD S4 on	Y	Y
[s] Observation start time (MET)	489035216.184000	489034711.4507	CCD S5 on	Y	Y
Observation start date	2013-07-01T03:05:49	2013-07-01T02:58:31	Number of optional ACIS chips dropped	0	0
[s] Observation end time (MET)	489045216.184000	489045440.12628	On-chip summing requested	N	N
Observation end date	2013-07-01T05:52:29	2013-07-01T05:57:20	Subarray requested	CUSTOM	1/8
Read mode	TIMED	TIMED	Subarray start row	113	113
			Subarray row count	128	128
			Alternating exposures requested	N	N
			[s] Primary exposure time	0.000000	0.7

## 2.3 Aspect



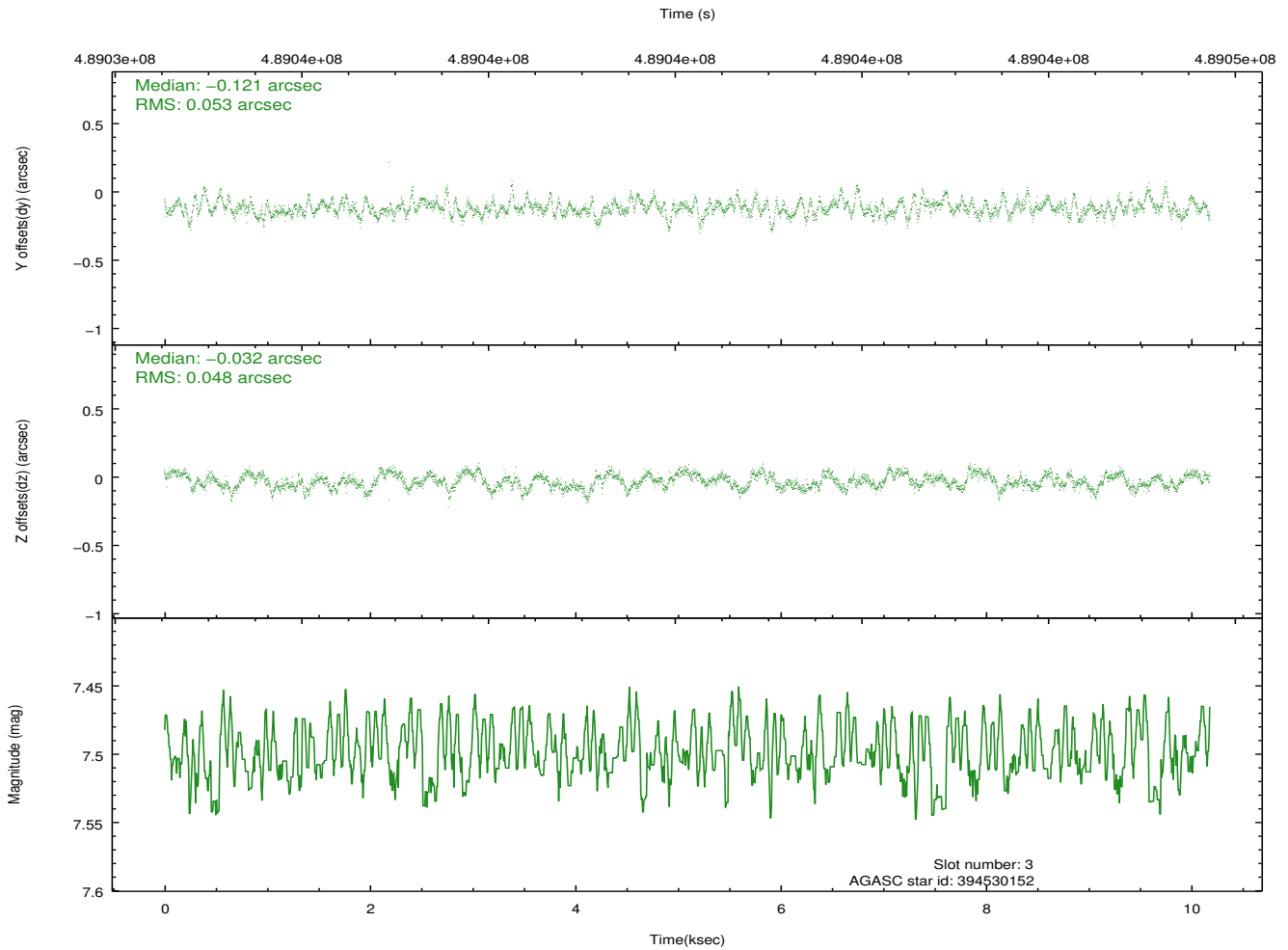
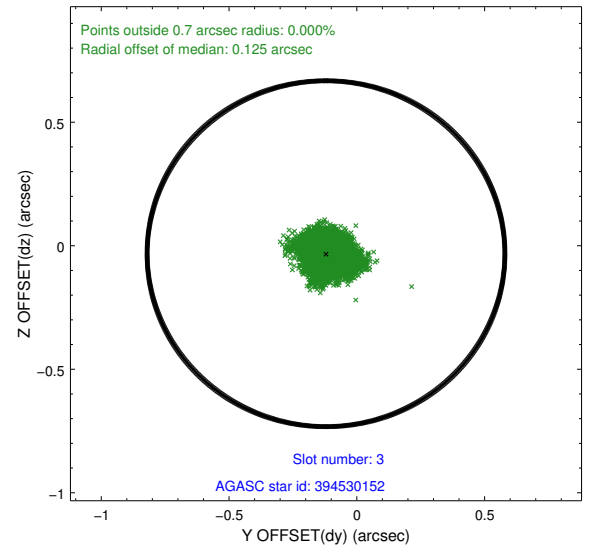
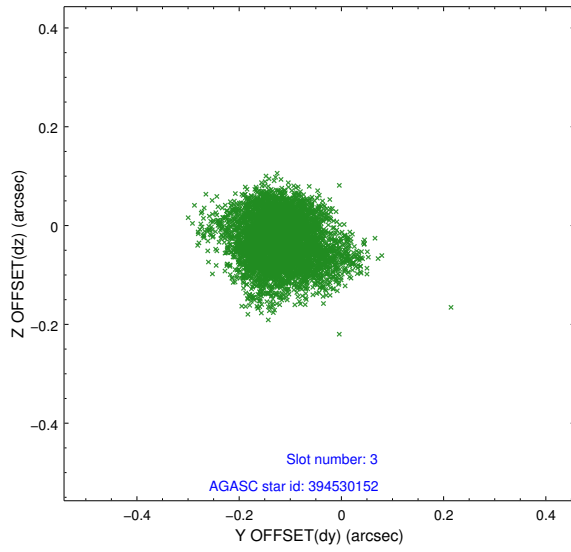


### Slot Statistics

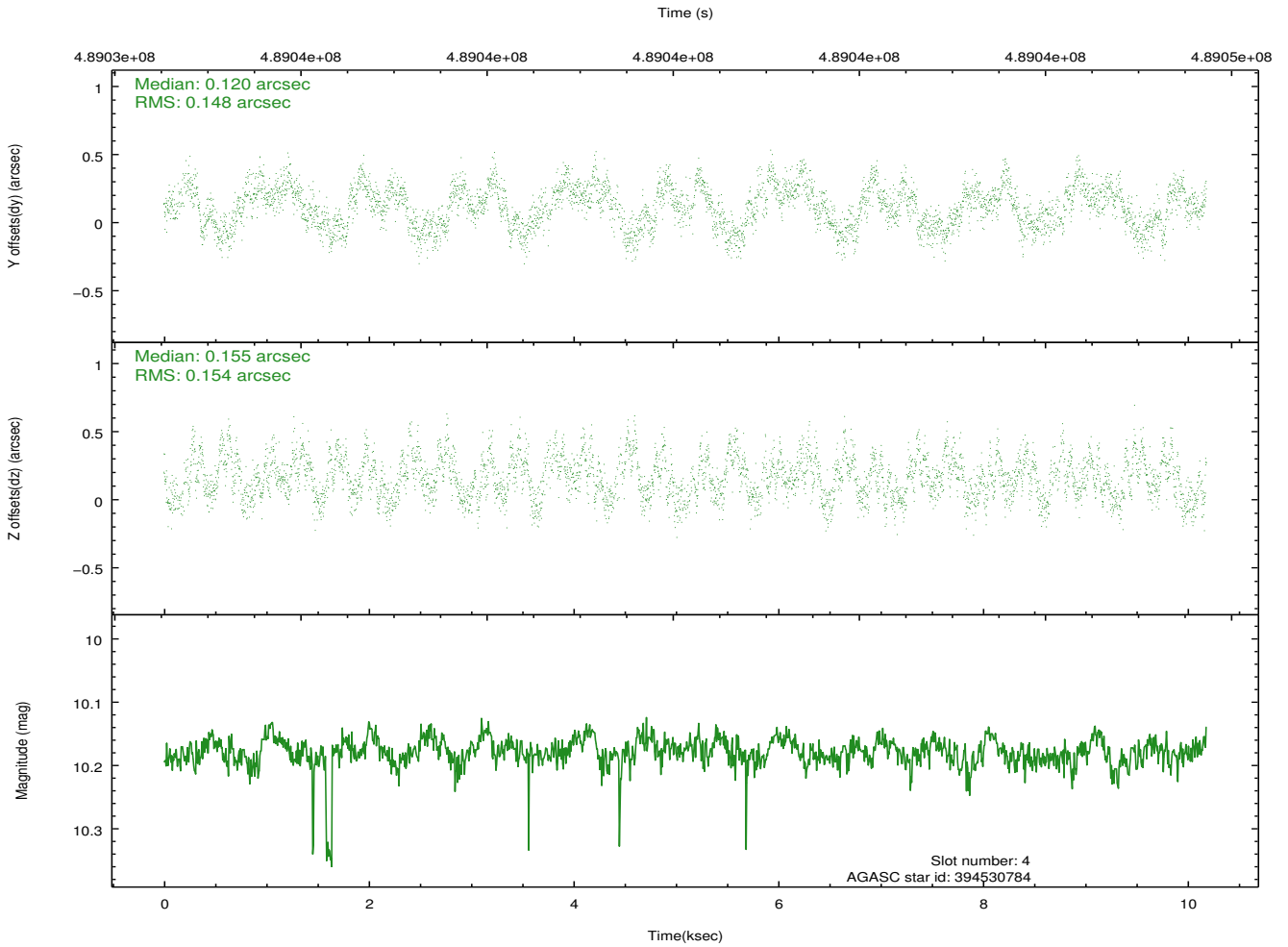
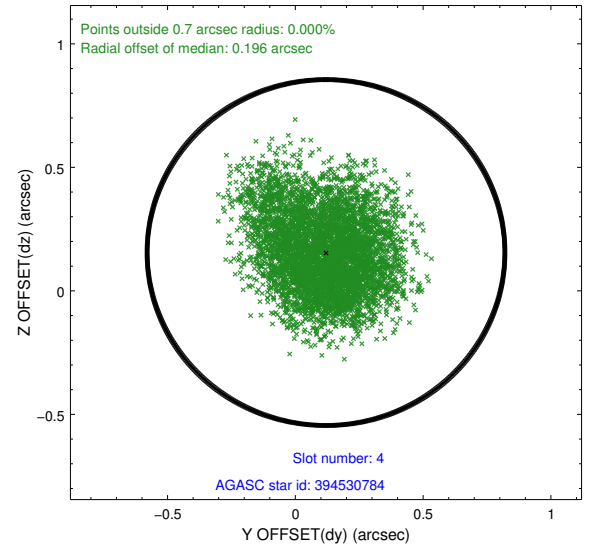
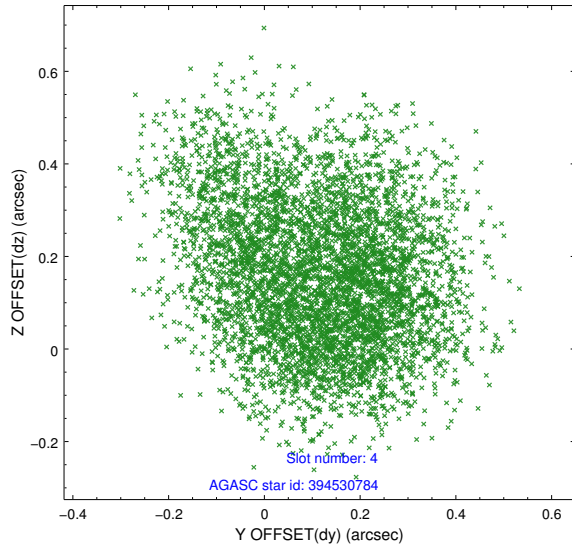
slot	status	used	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID		ACIS-S-2	6.89	2484	-0.157	-0.113	0.006	0.010	0.000000	0.000000	-770.57	-1904.06
1	FID		ACIS-S-4	6.97	2484	0.145	0.089	0.006	0.011	0.000000	0.000000	2142.81	3.94
2	FID		ACIS-S-6	7.18	2484	-0.016	0.031	0.008	0.013	0.000000	0.000000	392.27	641.91
3	GUIDE	used	394530152	7.50	4968	-0.121	-0.032	0.076	0.125	166.075805	38.868252	-2195.05	-277.99
4	GUIDE	used	394530784	10.18	4815	0.120	0.155	0.231	0.359	165.569172	38.418674	-458.48	-1555.35
5	GUIDE	used	394533848	8.73	4965	0.116	0.043	0.115	0.189	166.382906	38.276007	-151.56	773.59
6	GUIDE	used	394543960	9.81	4951	0.088	-0.175	0.146	0.237	165.802757	37.787371	1749.37	-701.05
7	GUIDE	used	394546712	6.60	4967	-0.206	0.004	0.094	0.151	166.451462	38.394357	-593.06	930.09

## 2.4 Star Slots

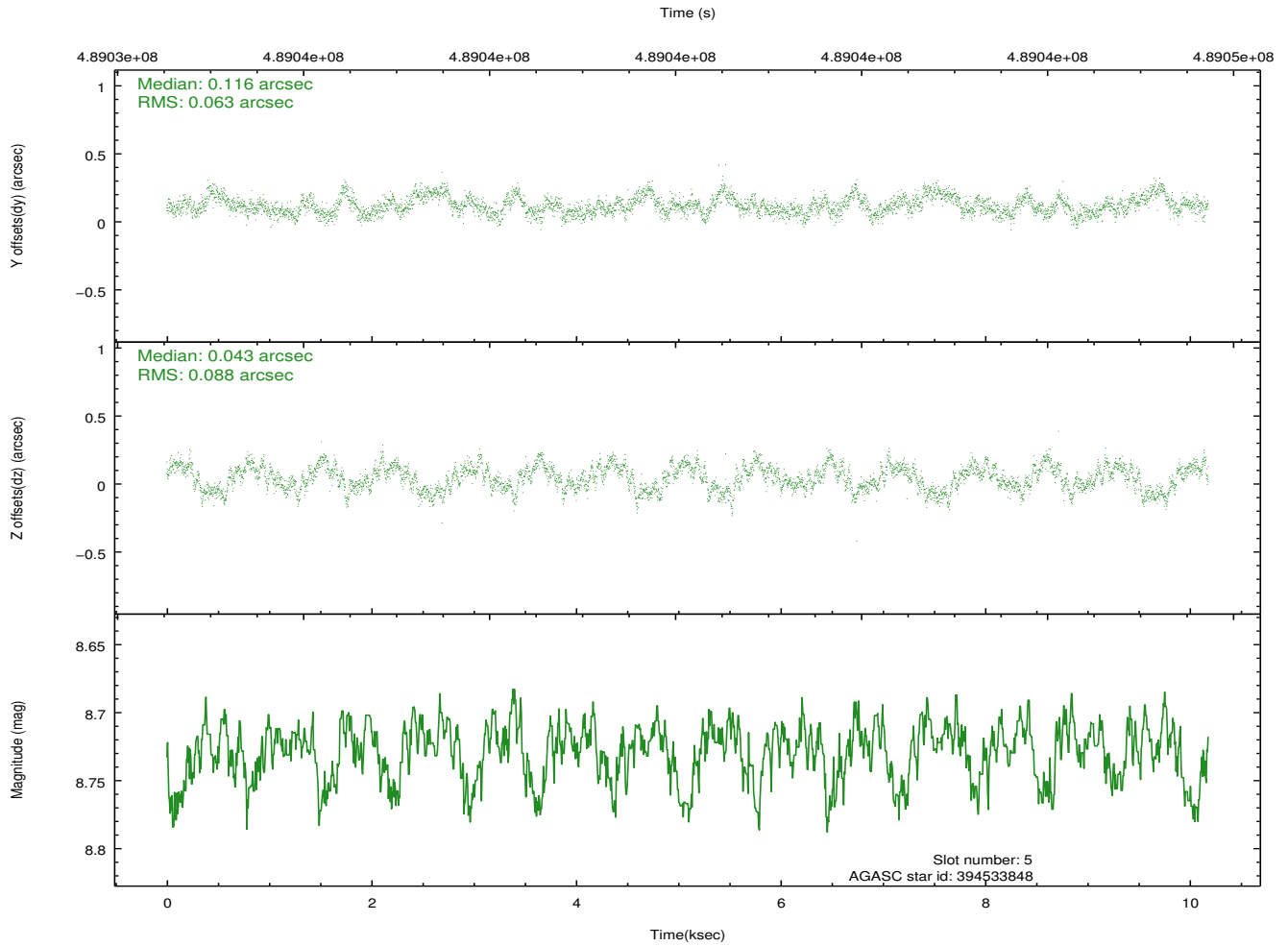
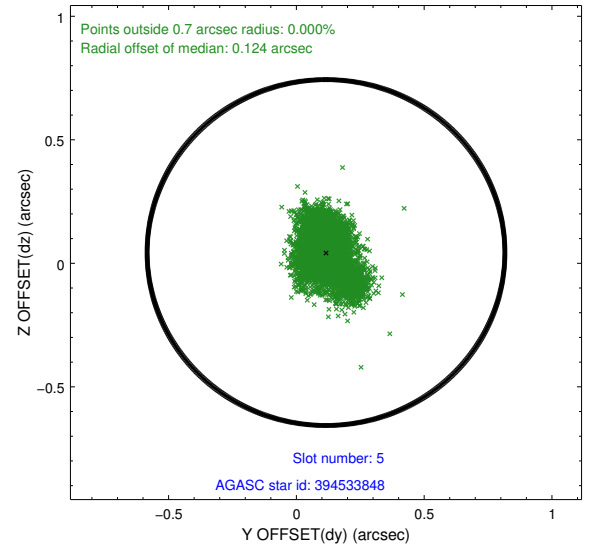
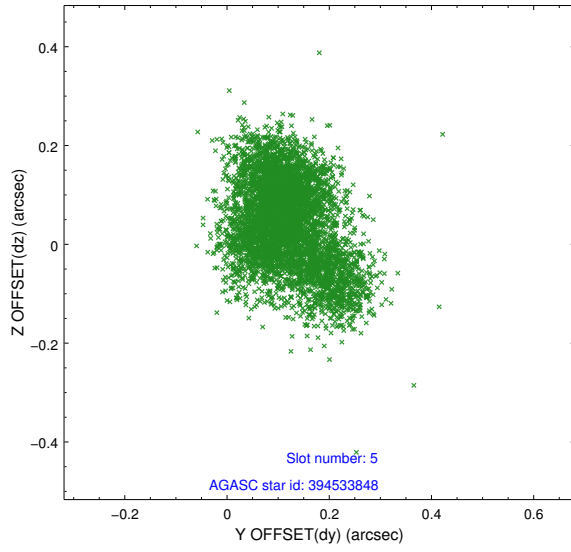
### 2.4.1 Slot 3



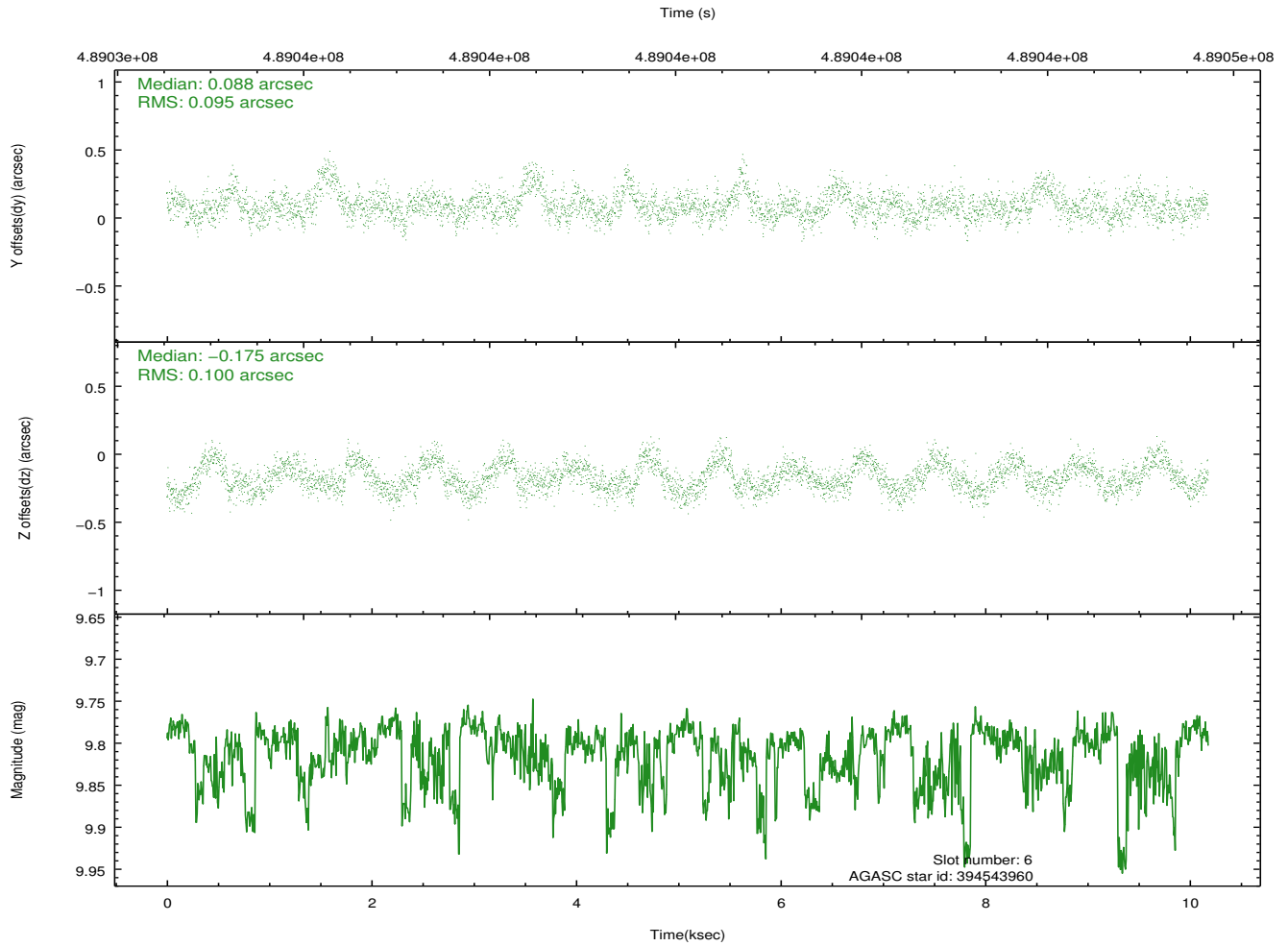
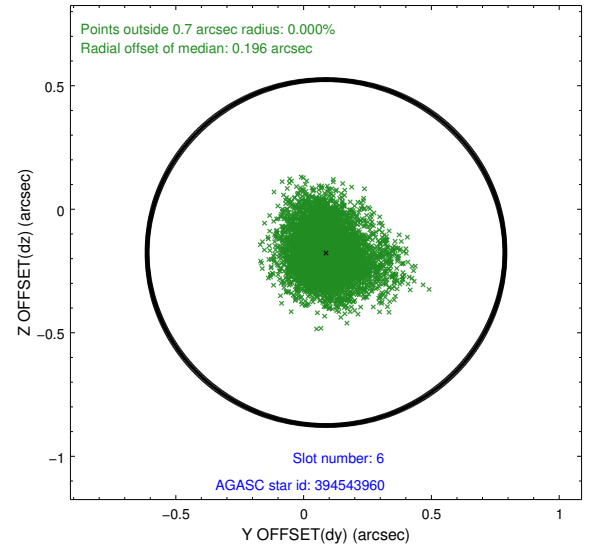
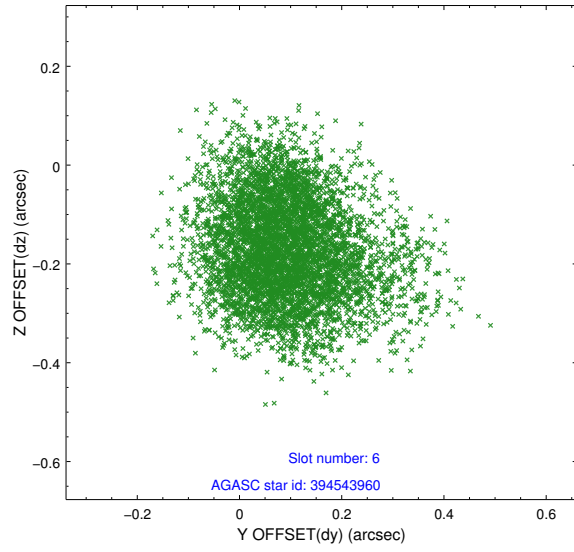
## 2.4.2 Slot 4



### 2.4.3 Slot 5

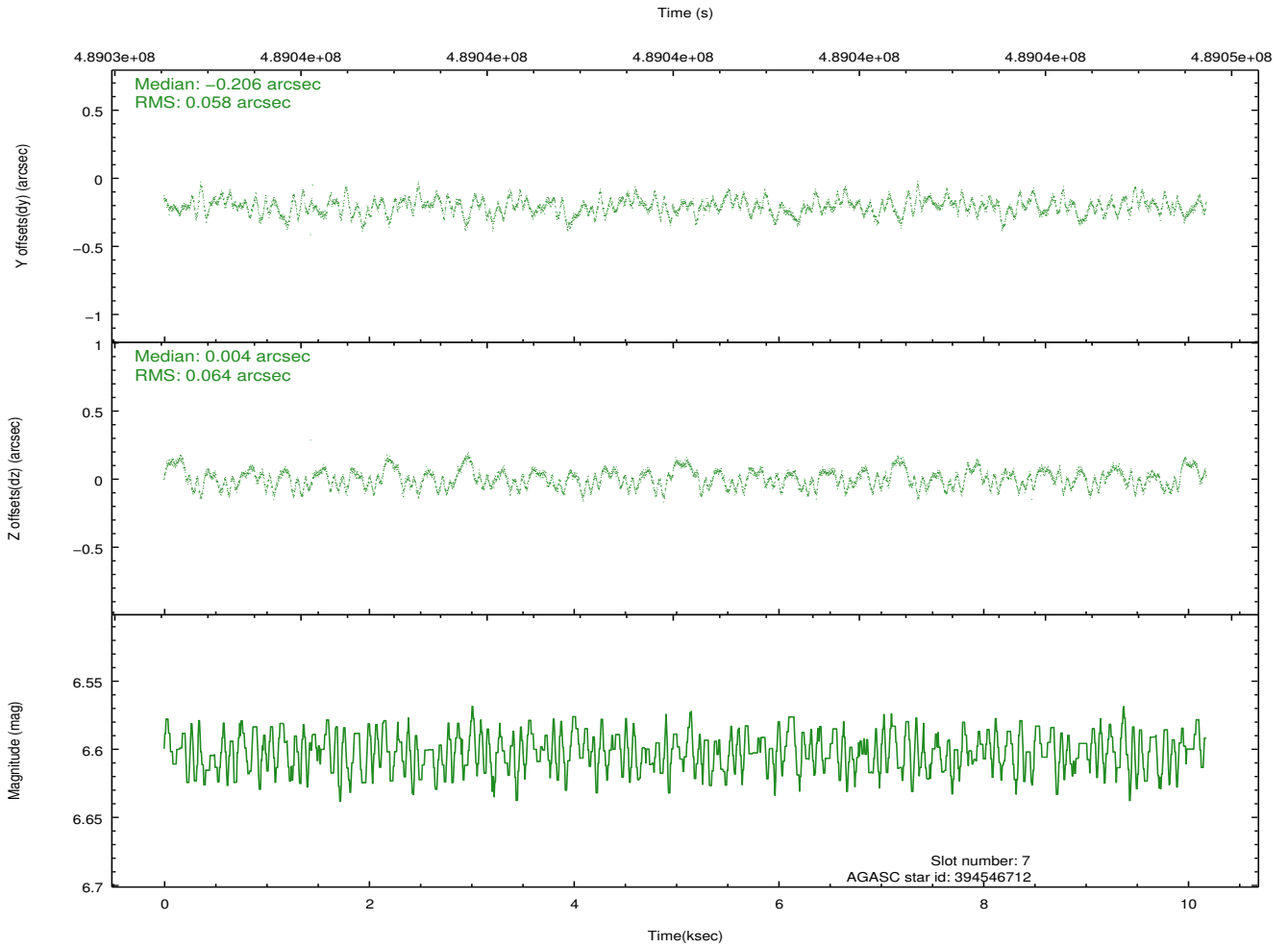
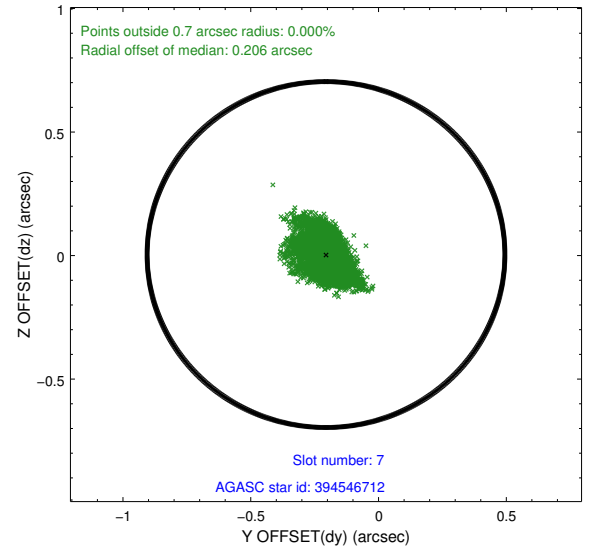
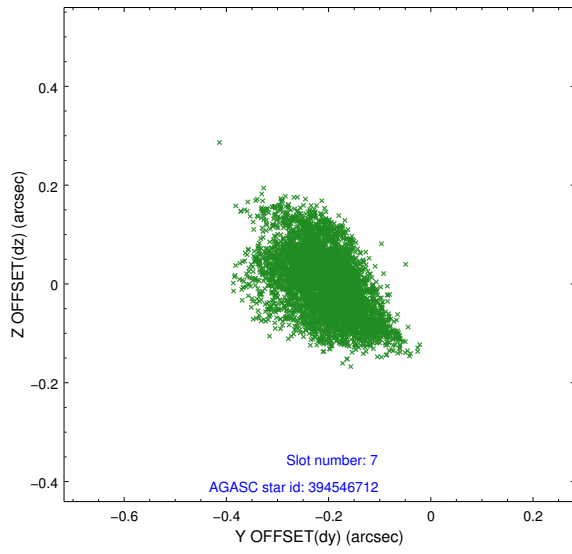


## 2.4.4 Slot 6



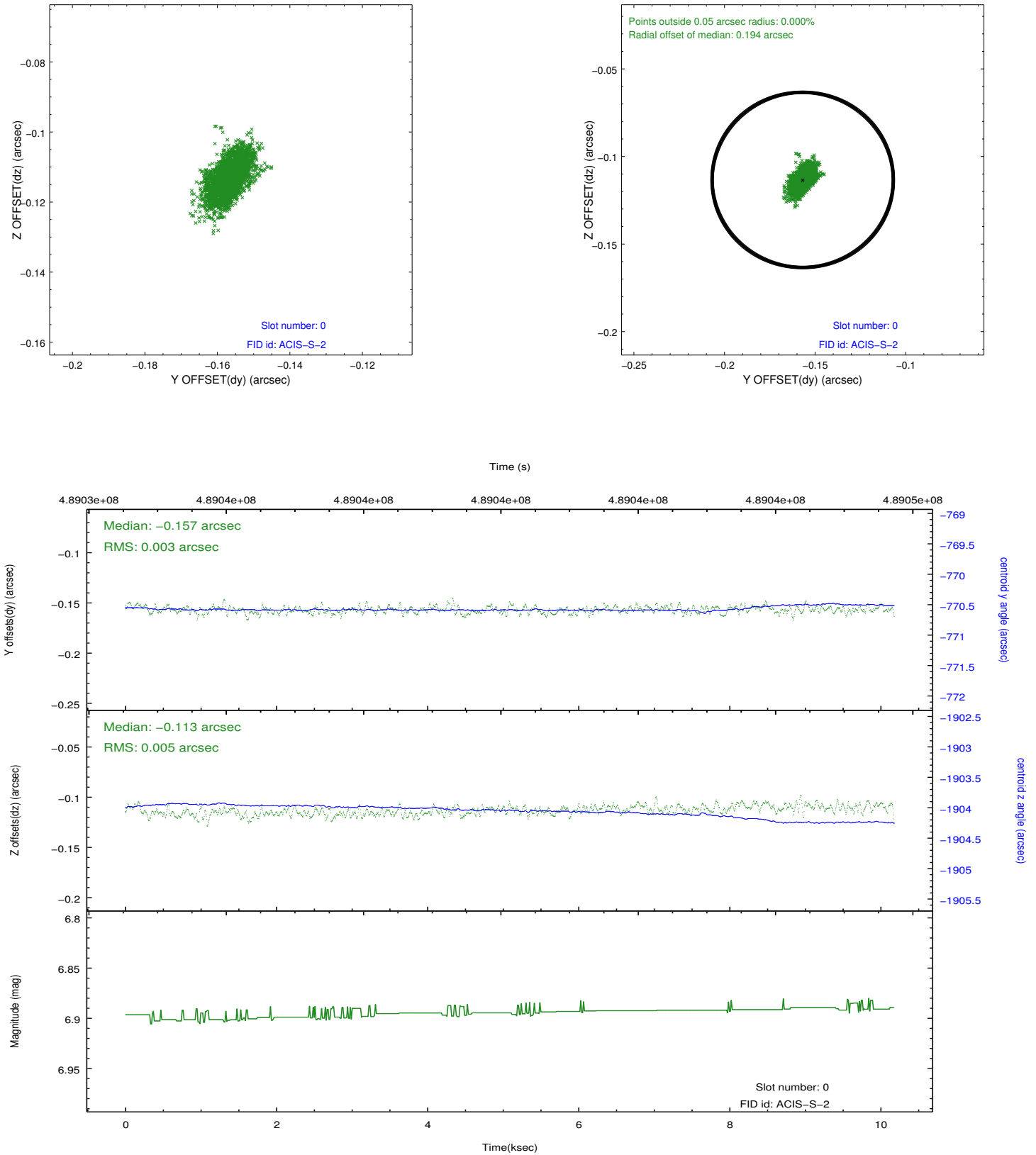


## 2.4.5 Slot 7

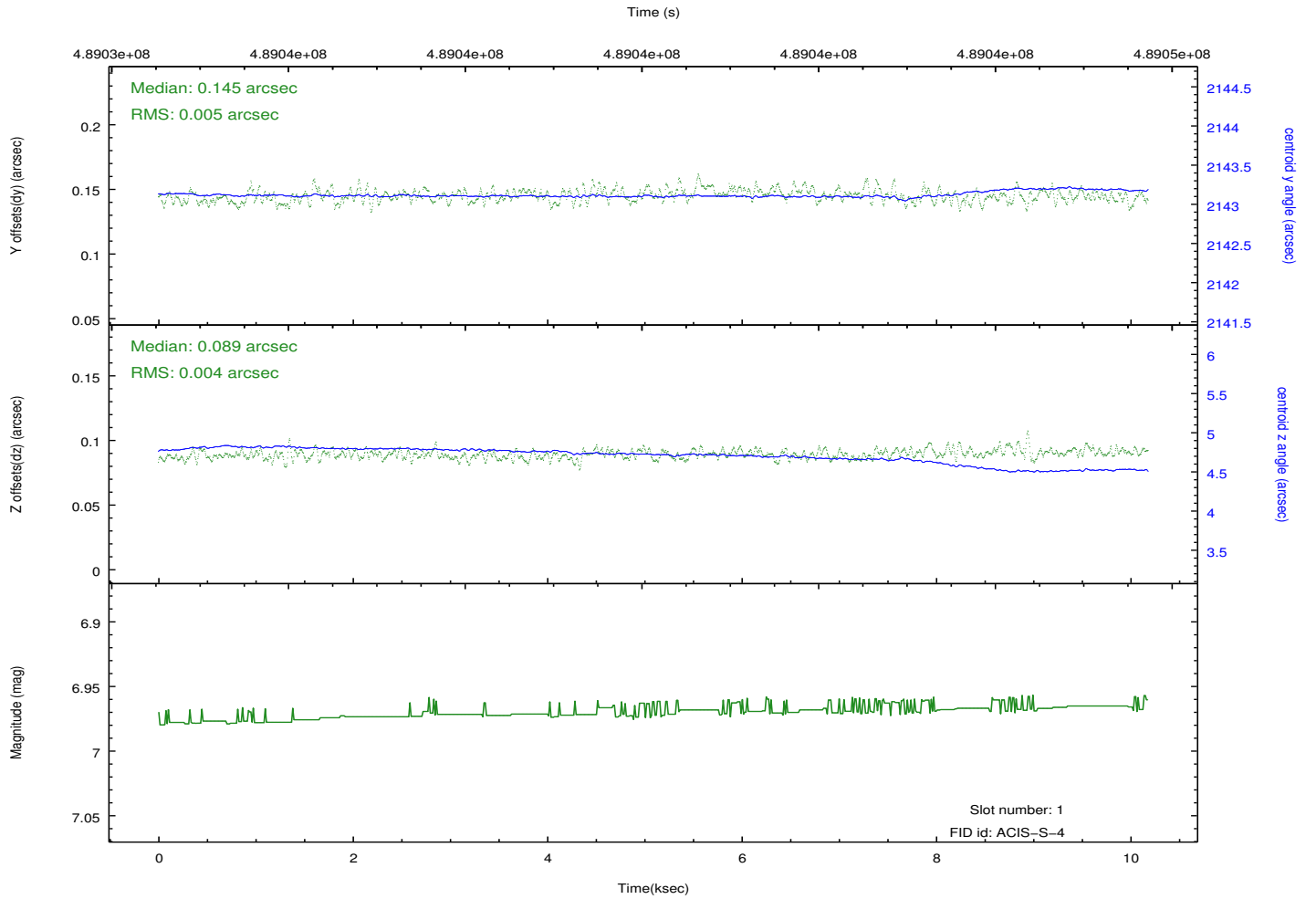
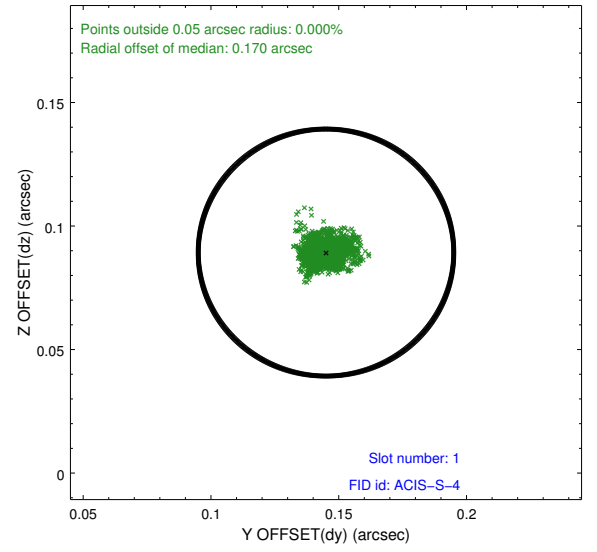
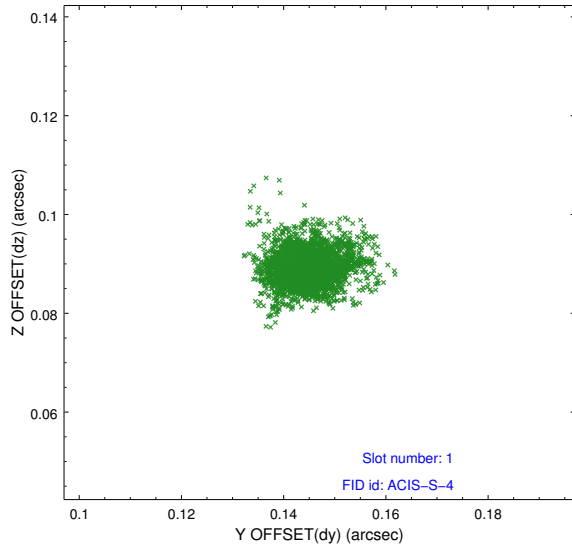


## 2.5 FID Slots

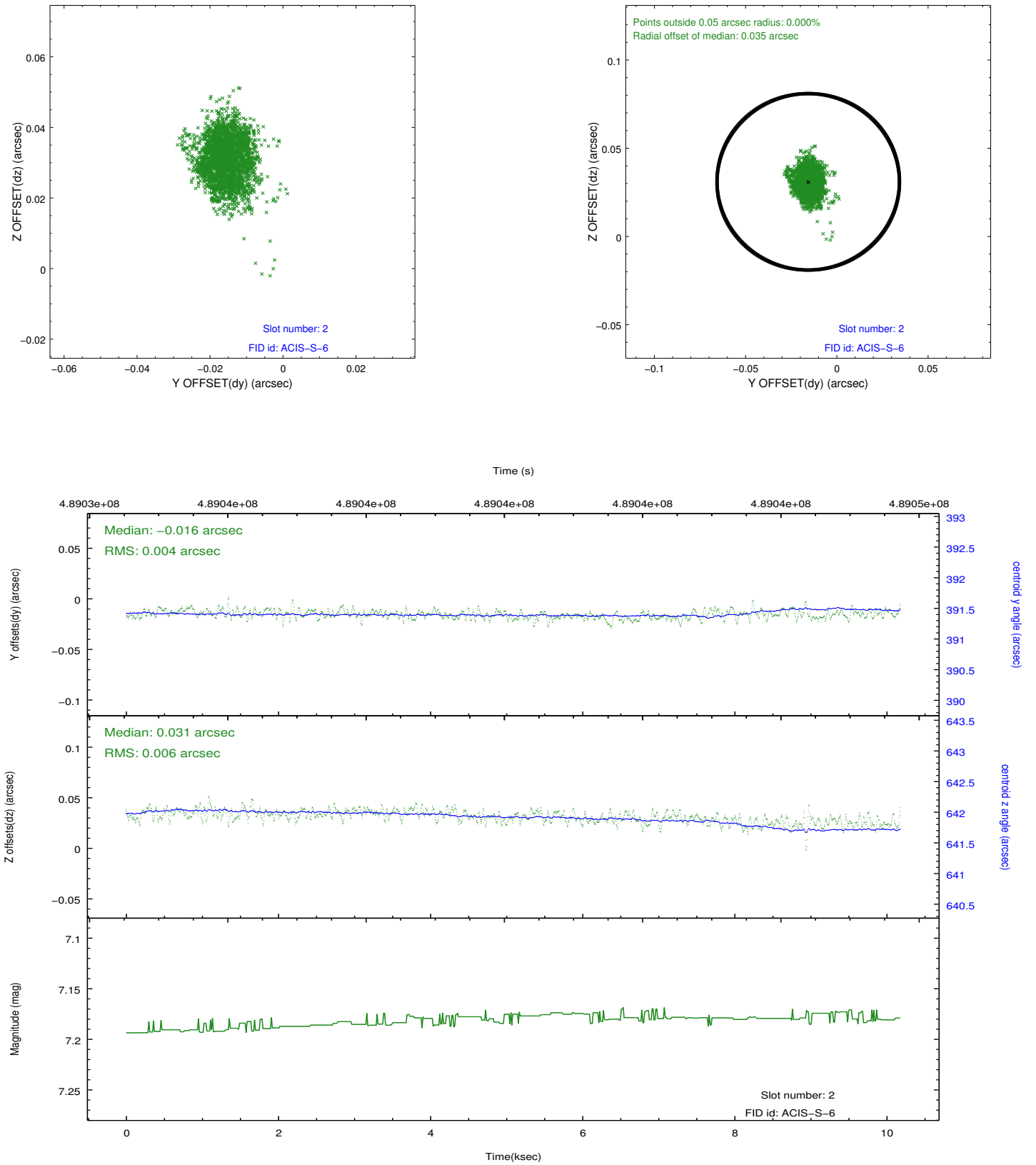
### 2.5.1 Slot 0



## 2.5.2 Slot 1



### 2.5.3 Slot 2

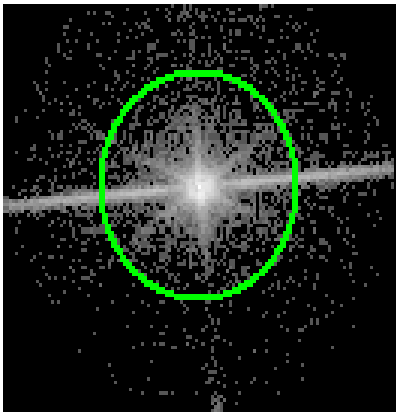


# 3 Gratings

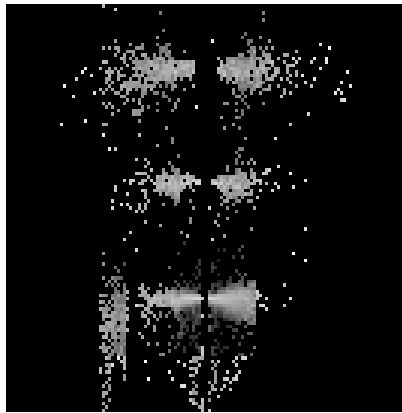
## 3.1 LETG Arm



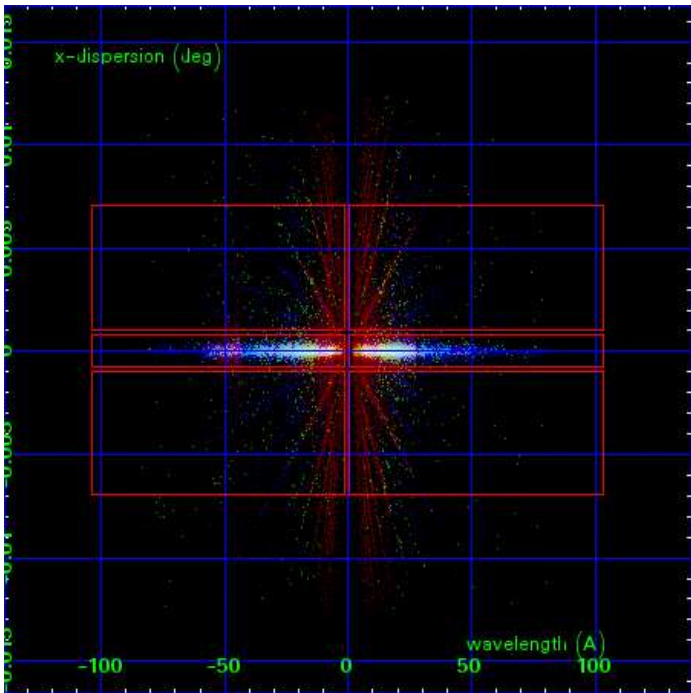
LETG Order Sort 123



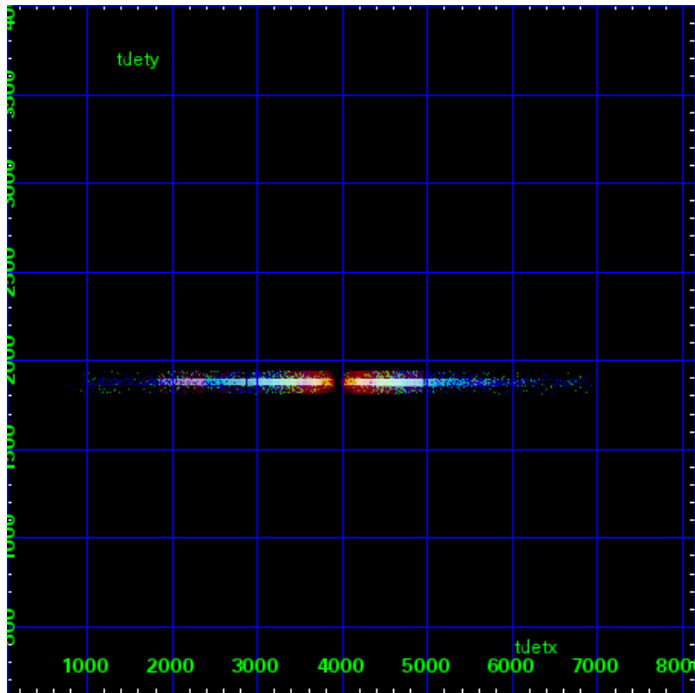
LETG Zero Order



LETG Order Sort ALL

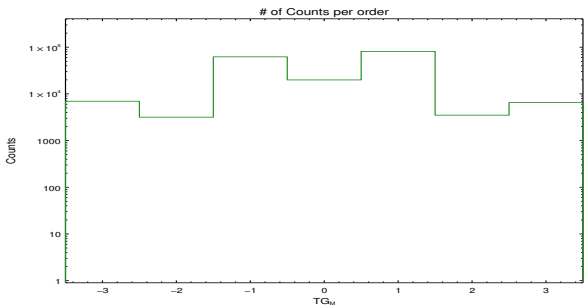


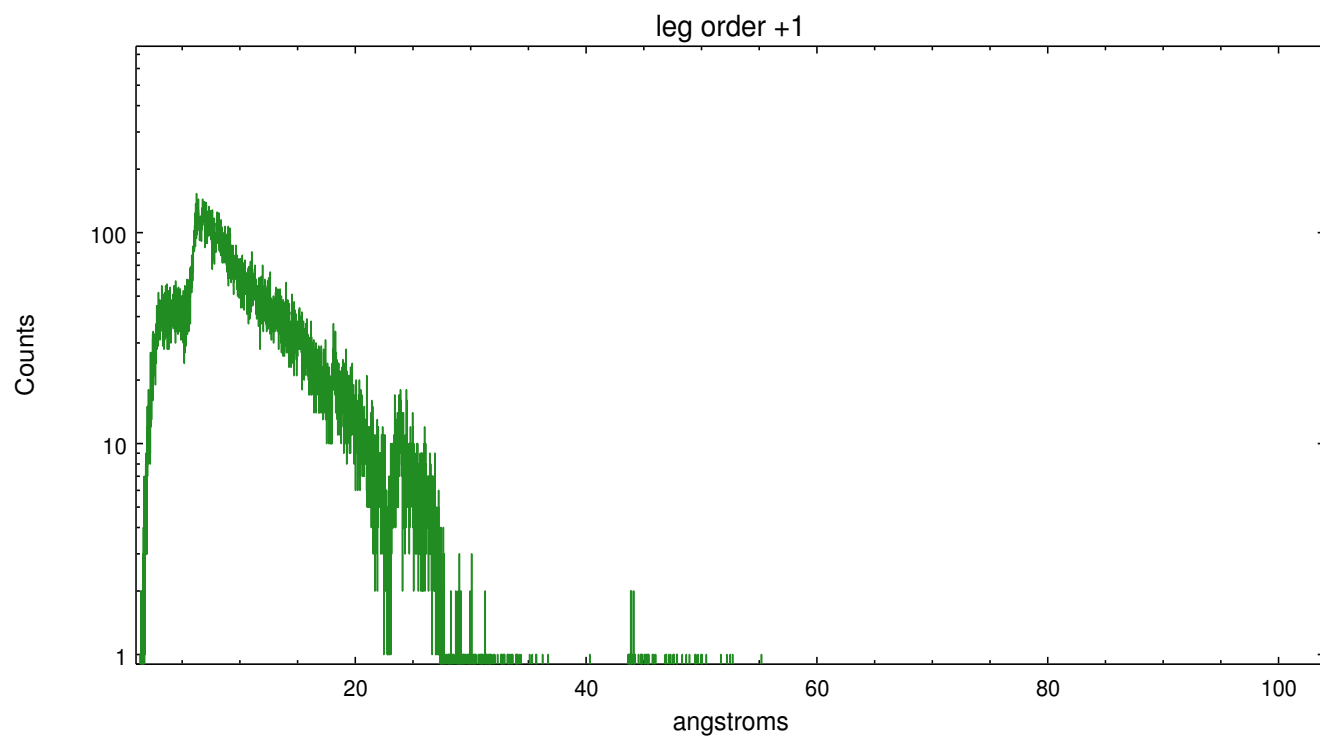
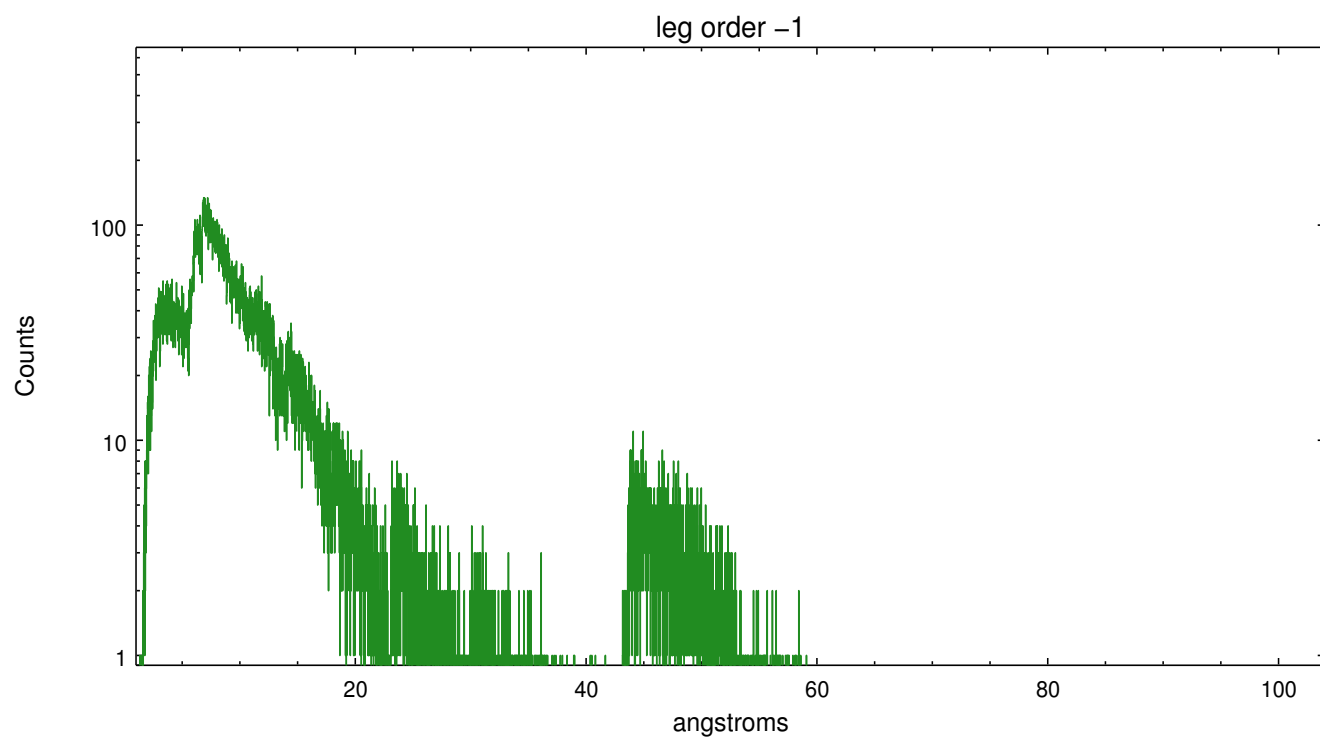
Spot Image LETG



Full Detector LETG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	6963	3171	62238	19917	81244	3505	6508





# A Summary

## A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2015.11.03
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	9.7649998336434

## 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 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.

===

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.