

# V&V Reference Report

## L2 ASCDS Version : 10.6

Observation 20719 - L2 Version 1  
Chandra X-Ray Center

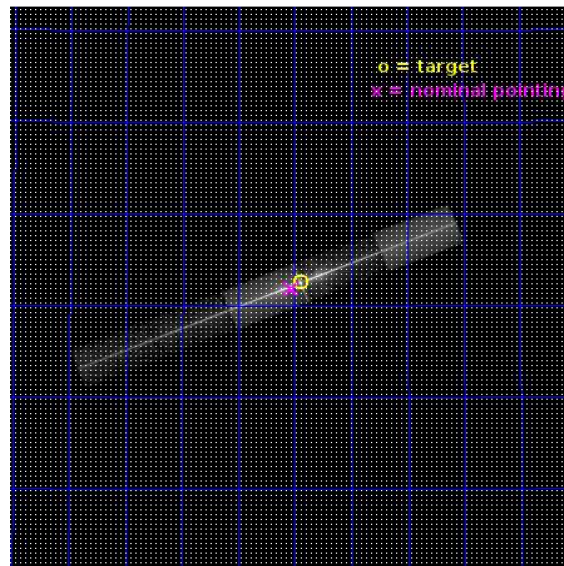
L2 Processing Date : Feb 25 2018

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# 1 Front

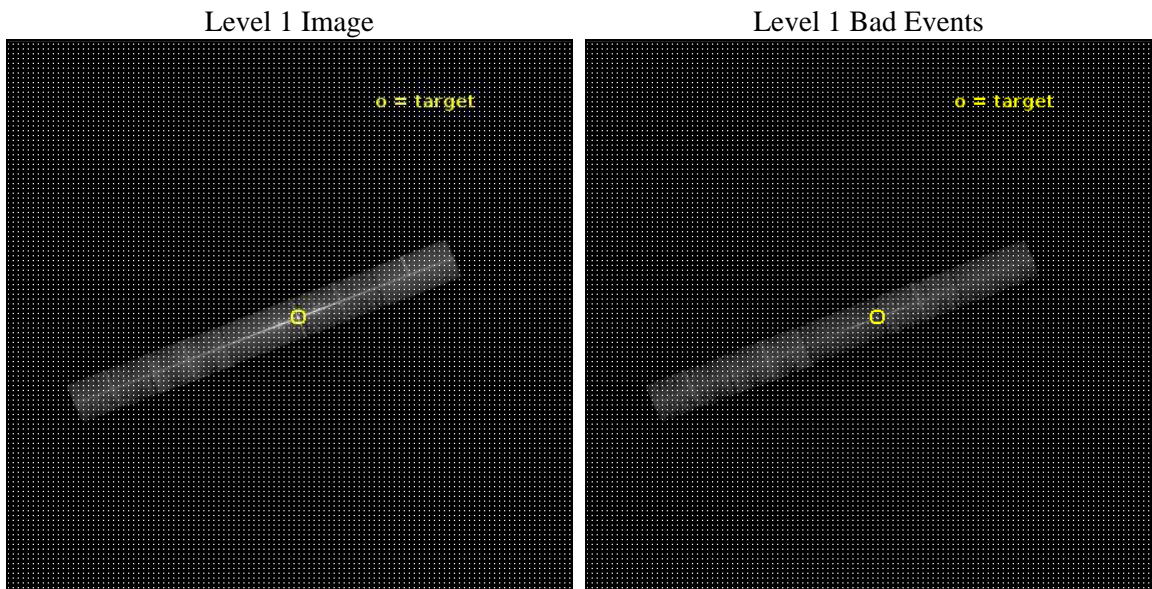
seq_num	790317	Sequence number
obs_id	20719	Observation id
title	AO-19 Big Dither Observation of Mkn421	Proposal title
observer	CXC Calibration	Principal investigator
object	MKN421	Source name
dtcycle	0	&#160
cycle	P	events from which exps? Prim/Second/Both
ra_targ	166.113333	Observer's specified target RA [deg]
dec_targ	38.208806	Observer's specified target Dec [deg]
ra_nom	166.13291815438	Nominal RA [deg]
dec_nom	38.197562003739	Nominal Dec [deg]
roll_nom	158.14453873959	Nominal Roll [deg]
revision	1	Processing version of data
ontime	22075.900478601	Sum of GTIs [s]
livetime	21281.892419601	Livetime [s]
ontime5	22075.900478601	Sum of GTIs [s]
ontime6	22075.900478601	Sum of GTIs [s]
ontime7	22075.900478601	Sum of GTIs [s]
ontime8	22075.900478601	Sum of GTIs [s]
ontime9	22074.759438634	Sum of GTIs [s]
l2events	468626	Number of level 2 events



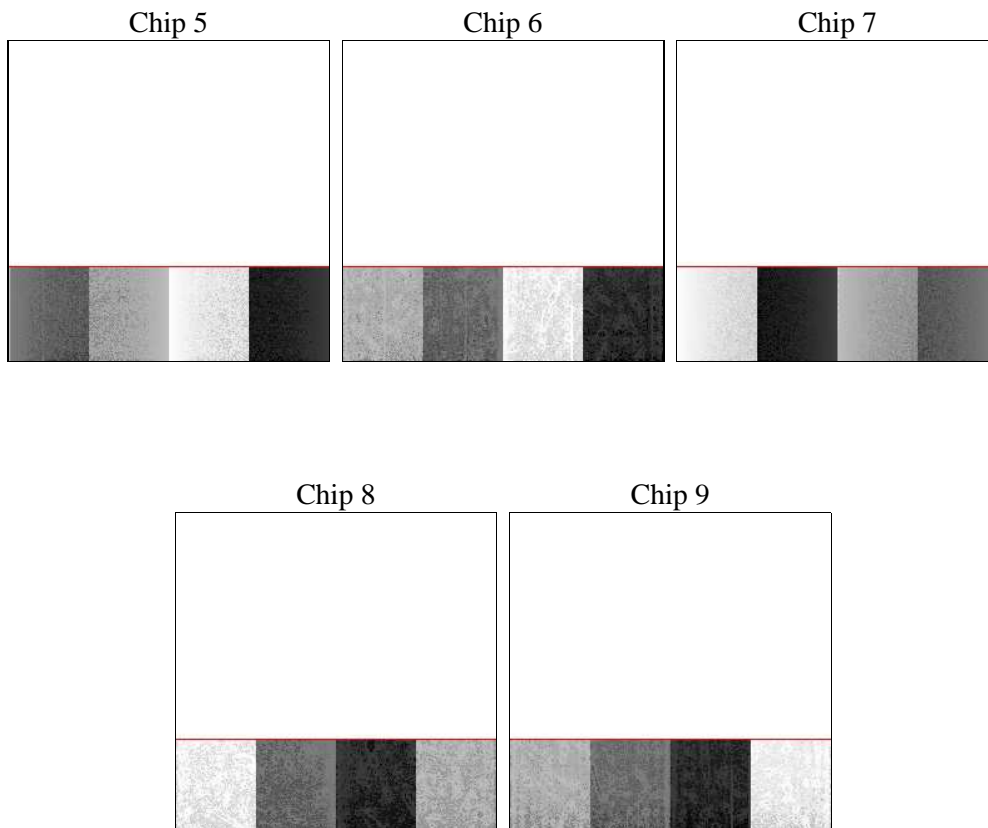
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

obi_num	0	Obi number	sched_exp_time	22000.000000	[s] Scheduled observation exposure time
ascdsver	10.6	Processing system revision	ontime	22075.900478601	Sum of GTIs [s]
caldbver	4.7.7	&#160	ontime5	22075.900478601	Sum of GTIs [s]
date	2018-02-25T21:58:10	Date and time of file creation	ontime6	22075.900478601	Sum of GTIs [s]
revision	1	Processing version of data	ontime7	22075.900478601	Sum of GTIs [s]
			ontime8	22075.900478601	Sum of GTIs [s]
			ontime9	22074.759438634	Sum of GTIs [s]
			l1events	738191	Number of level 1 events
			tgmethod	FINDZO	Method used to create src1a file
			zo_pos	(4204.66, 4179.84)	src1a sky pixel position
					src1a sky pixel position via

### 2.1.4 Events

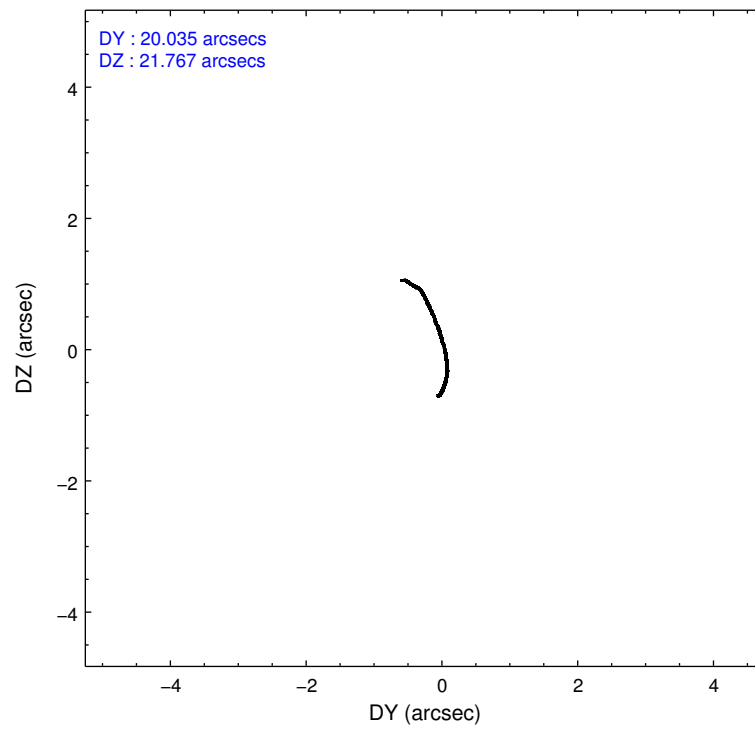
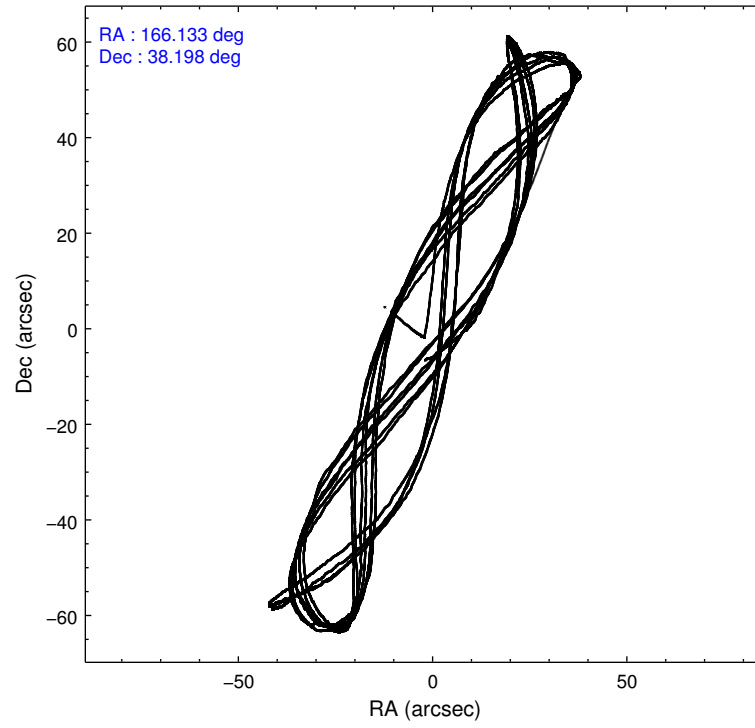
	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
level 1 events	97006	205485	301925	82102	51673
rejected events	38860	51012	55949	52205	41549
rejected %	40%	24%	18%	63%	80%

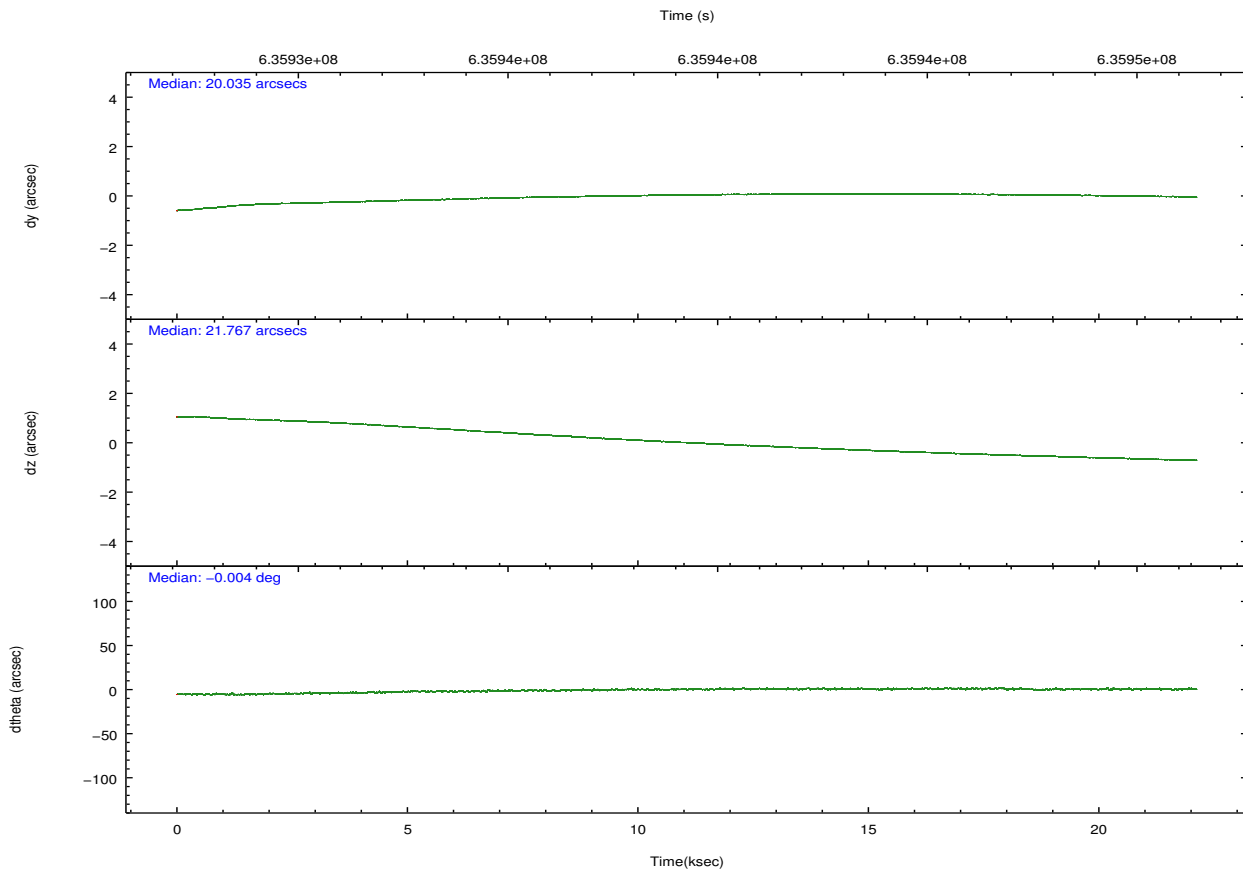
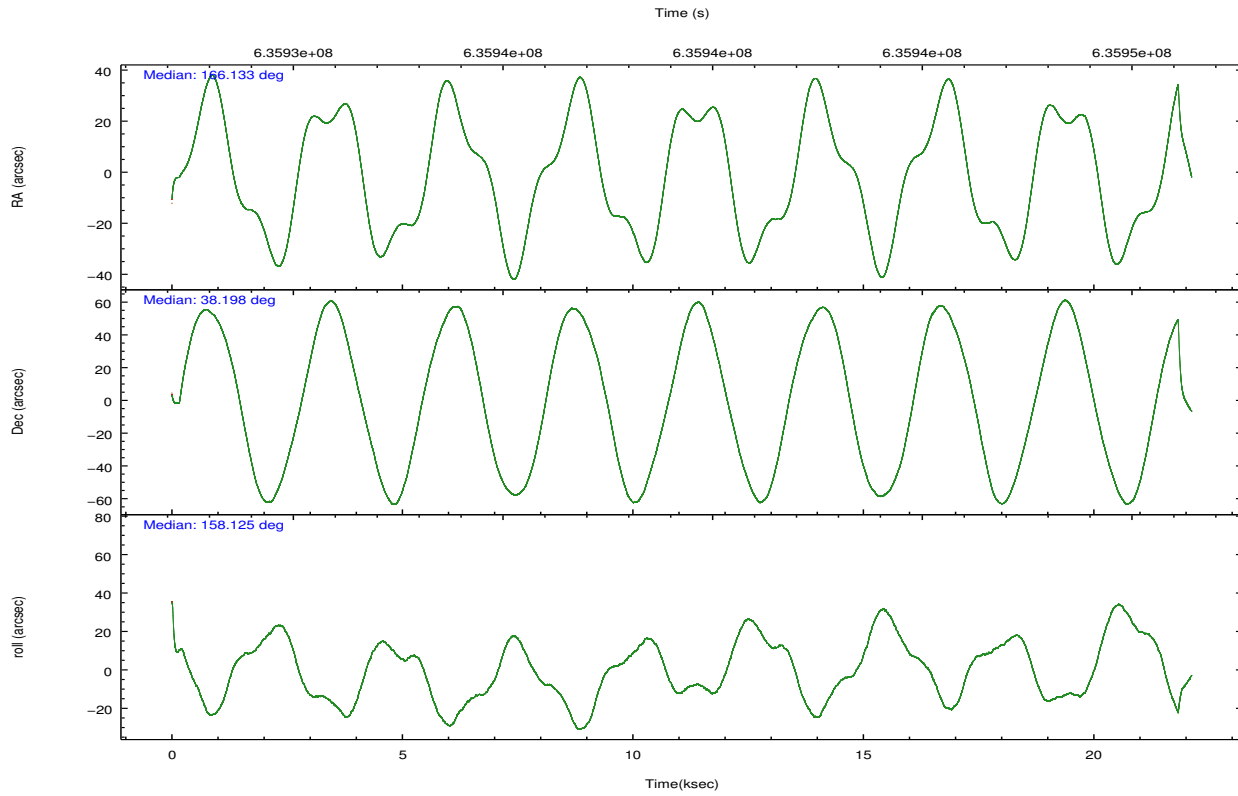
	ccd 5	ccd 6	ccd 7	ccd 8	ccd 9
grade 0 events	16093	117882	53808	13981	5109
	16%	57%	17%	17%	9%
grade 1 events	154	1043	1211	55	28
	0%	0%	0%	0%	0%
grade 2 events	14219	18223	60976	5431	1765
	14%	8%	20%	6%	3%
grade 3 events	3425	6323	27475	2472	988
	3%	3%	9%	3%	1%
grade 4 events	3459	6360	26905	2256	943
	3%	3%	8%	2%	1%
grade 5 events	6570	2949	11431	3286	2301
	6%	1%	3%	4%	4%
grade 6 events	20953	5696	76832	5759	1321
	21%	2%	25%	7%	2%
grade 7 events	32133	47009	43287	48862	39218
	33%	22%	14%	59%	75%

## 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	166.167330	166.132918154384	CCD I2 on	N	N
[deg] Pointing Dec	38.201605	38.19756200373916	CCD I3 on	N	N
[deg] Pointing Roll	157.966606	158.144538739587	CCD S0 on	N	N
[s] Window start time (MET)	635040069.184000	635040069.184000	CCD S1 on	Y	Y
[s] Window stop time (MET)	637459269.184000	637459269.184000	CCD S2 on	Y	Y
[mm] SIM focus pos	-0.684267	-0.6828225247311905	CCD S3 on	Y	Y
[mm] SIM defocus	0	0.001444936568705701	CCD S4 on	Y	Y
[mm] SIM translation stage pos	-181.282523	-181.2947048189838	CCD S5 on	O1	Y
[mm] SIM translation stage offset	-8.85	-8.83781776402401	Number of optional ACIS chips dropped	0	0
[s] Observation start time (MET)	635928320.184000	635927120.45818	On-chip summing requested	N	N
Observation start date	2018-02-25T06:44:11	2018-02-25T06:25:20	Subarray requested	CUSTOM	CUSTOM
[s] Observation end time (MET)	635950320.184000	635951341.7221	Subarray start row	1	1
Observation end date	2018-02-25T12:50:51	2018-02-25T13:09:01	Subarray row count	300	300
Read mode	TIMED	TIMED	Alternating exposures requested	N	N
			[s] Primary exposure time	0.000000	1.1

## 2.3 Aspect





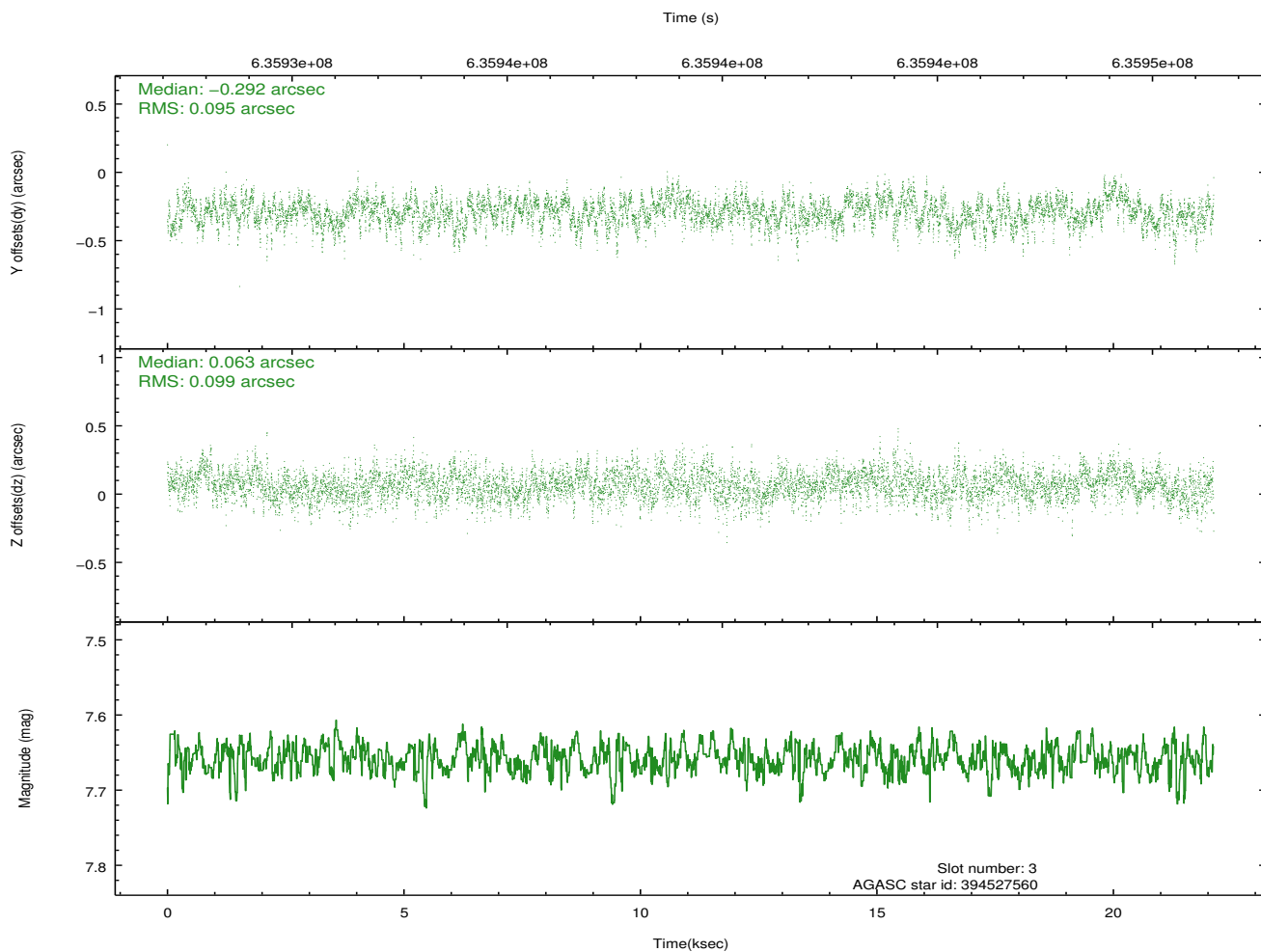
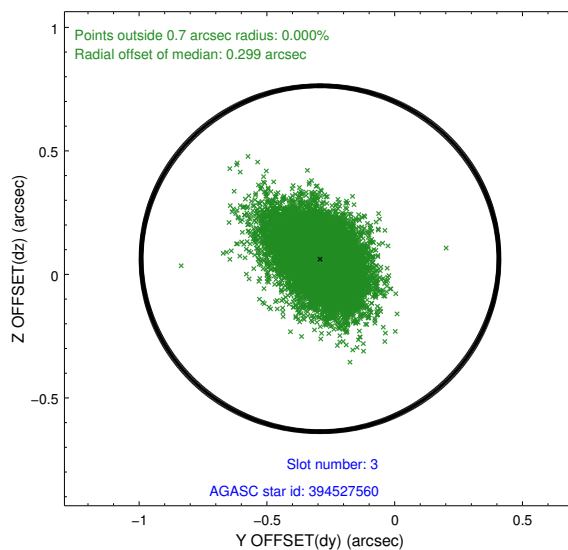
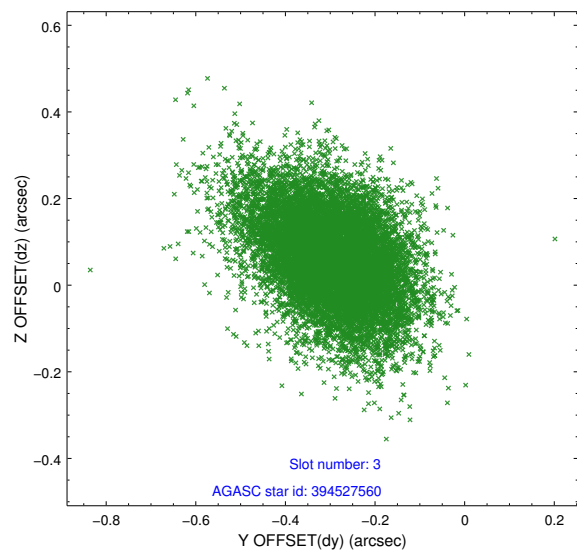
### Slot Statistics

slot	status	used	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID		ACIS-S-1	7.08	5396	0.244	0.223	0.010	0.018	0.000000	0.000000	923.82	-1920.87
1	FID		ACIS-S-2	6.96	5396	-0.396	-0.208	0.010	0.017	0.000000	0.000000	-772.64	-1926.02
2	FID		ACIS-S-6	7.28	5396	0.134	-0.012	0.010	0.021	0.000000	0.000000	389.33	620.04
3	GUIDE	used	394527560	7.66	10784	-0.292	0.063	0.141	0.245	165.970713	38.960939	1536.55	-2326.46
4	GUIDE	used	394533848	8.71	10780	-0.314	-0.122	0.147	0.245	166.382906	38.276007	-457.86	-475.70
5	GUIDE	used	394546712	6.59	10789	-0.350	-0.262	0.124	0.217	166.451462	38.394357	-481.19	-943.74
6	GUIDE	used	394546720	6.42	10791	0.650	0.215	0.157	0.259	166.130115	38.241361	151.95	-92.00
7	GUIDE	used	394530152	7.49	10786	0.313	0.114	0.134	0.224	166.075805	38.868252	1139.34	-2127.01

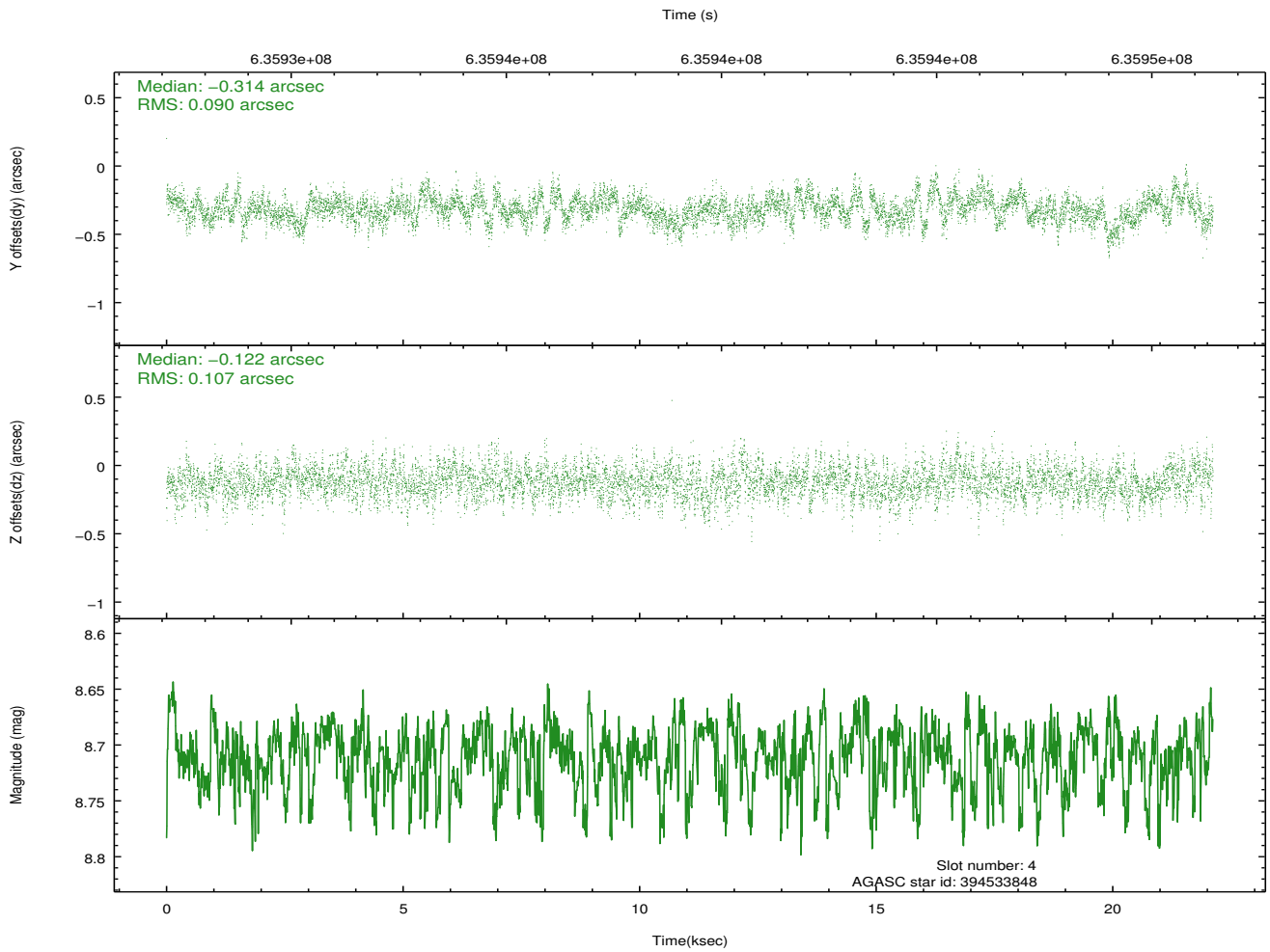
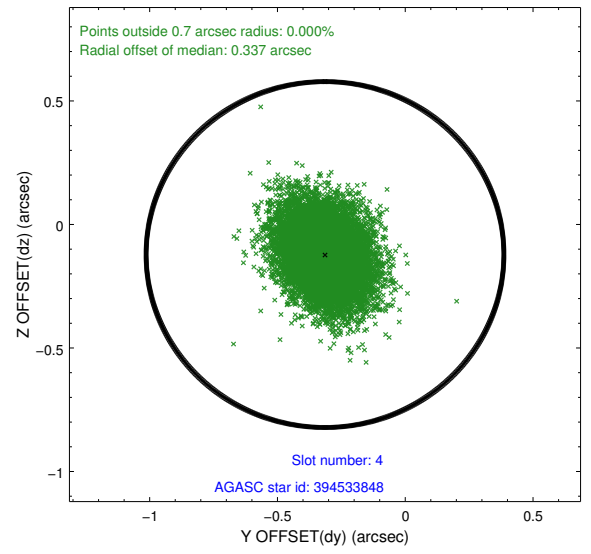
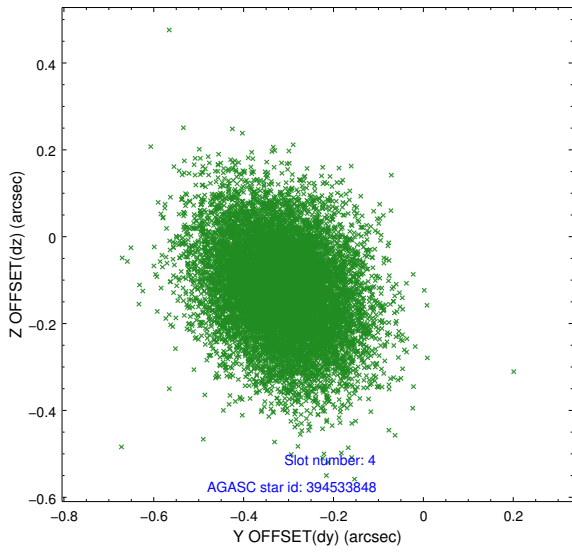
∞

## 2.4 Star Slots

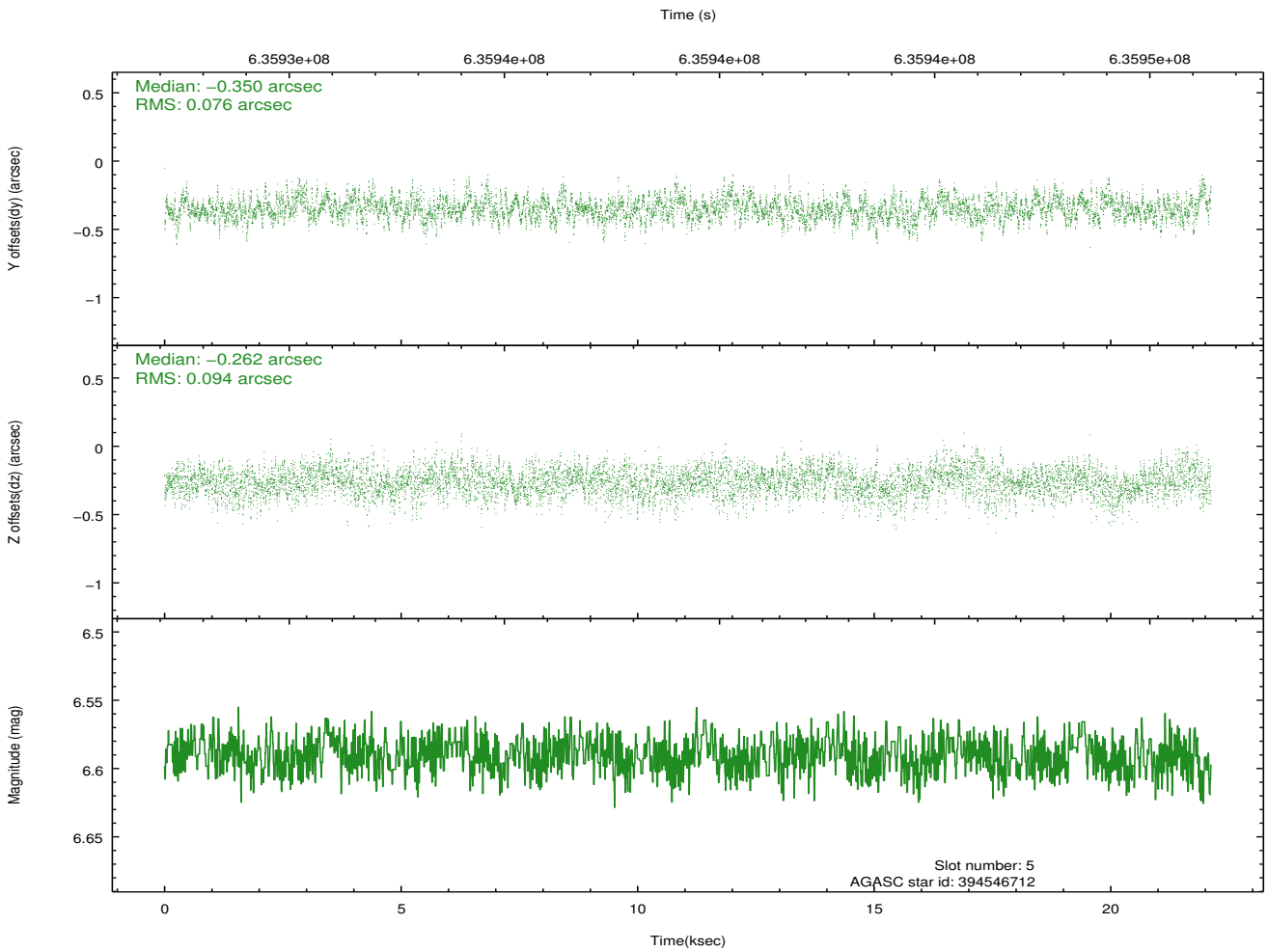
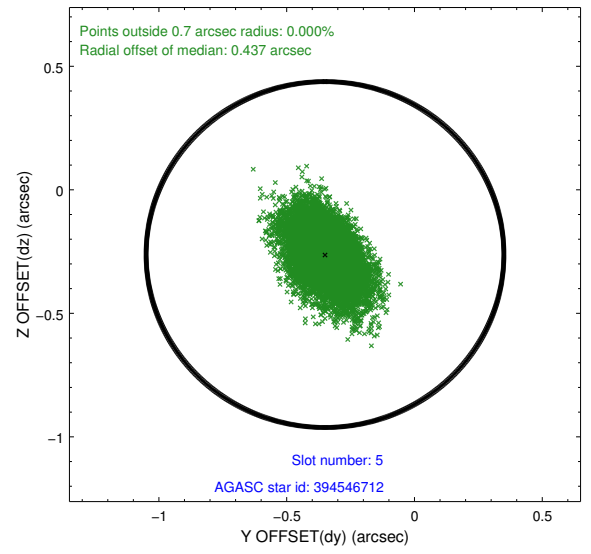
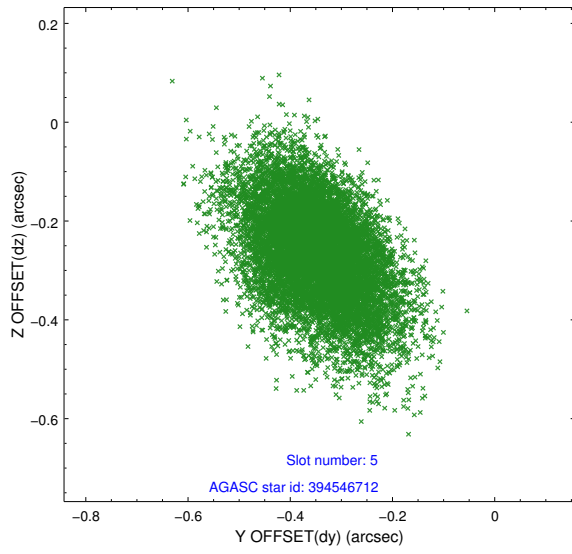
### 2.4.1 Slot 3



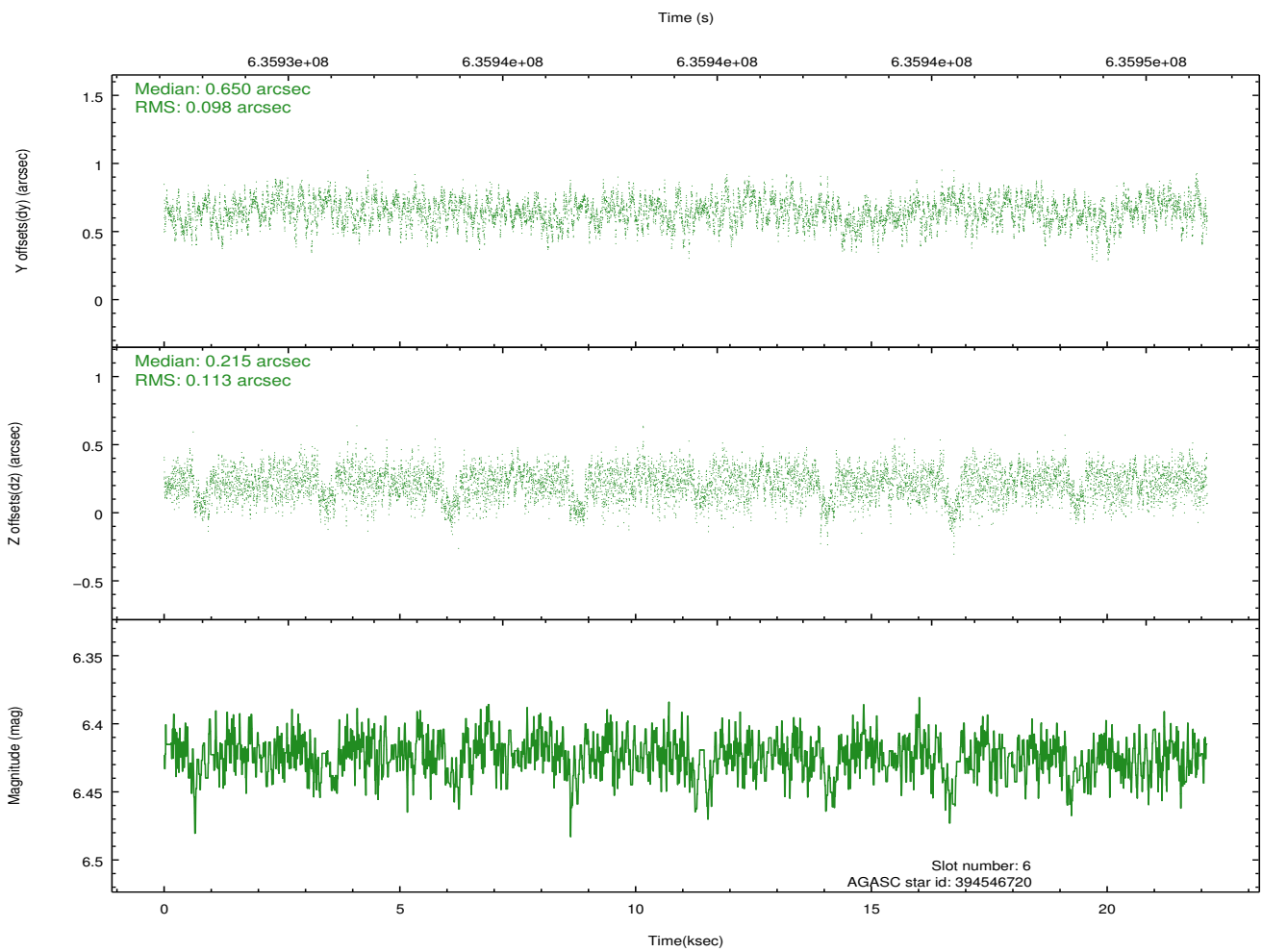
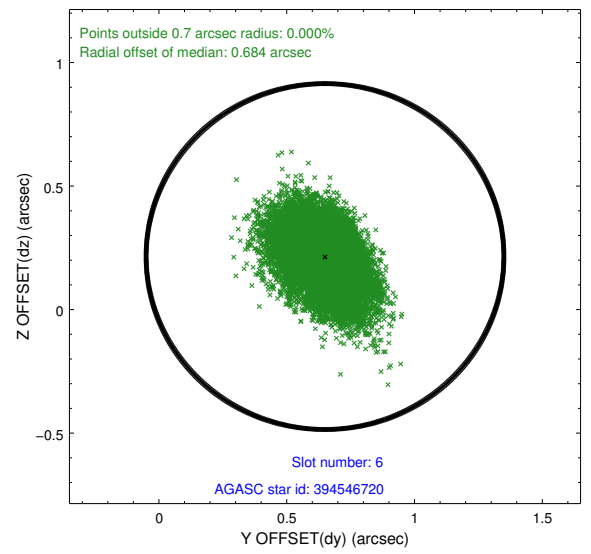
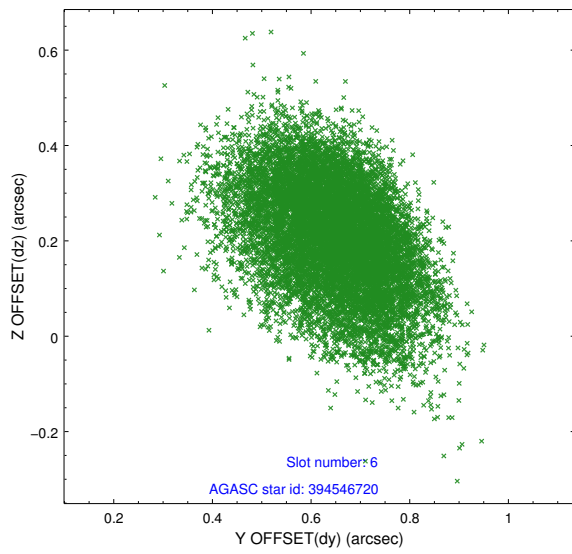
### 2.4.2 Slot 4



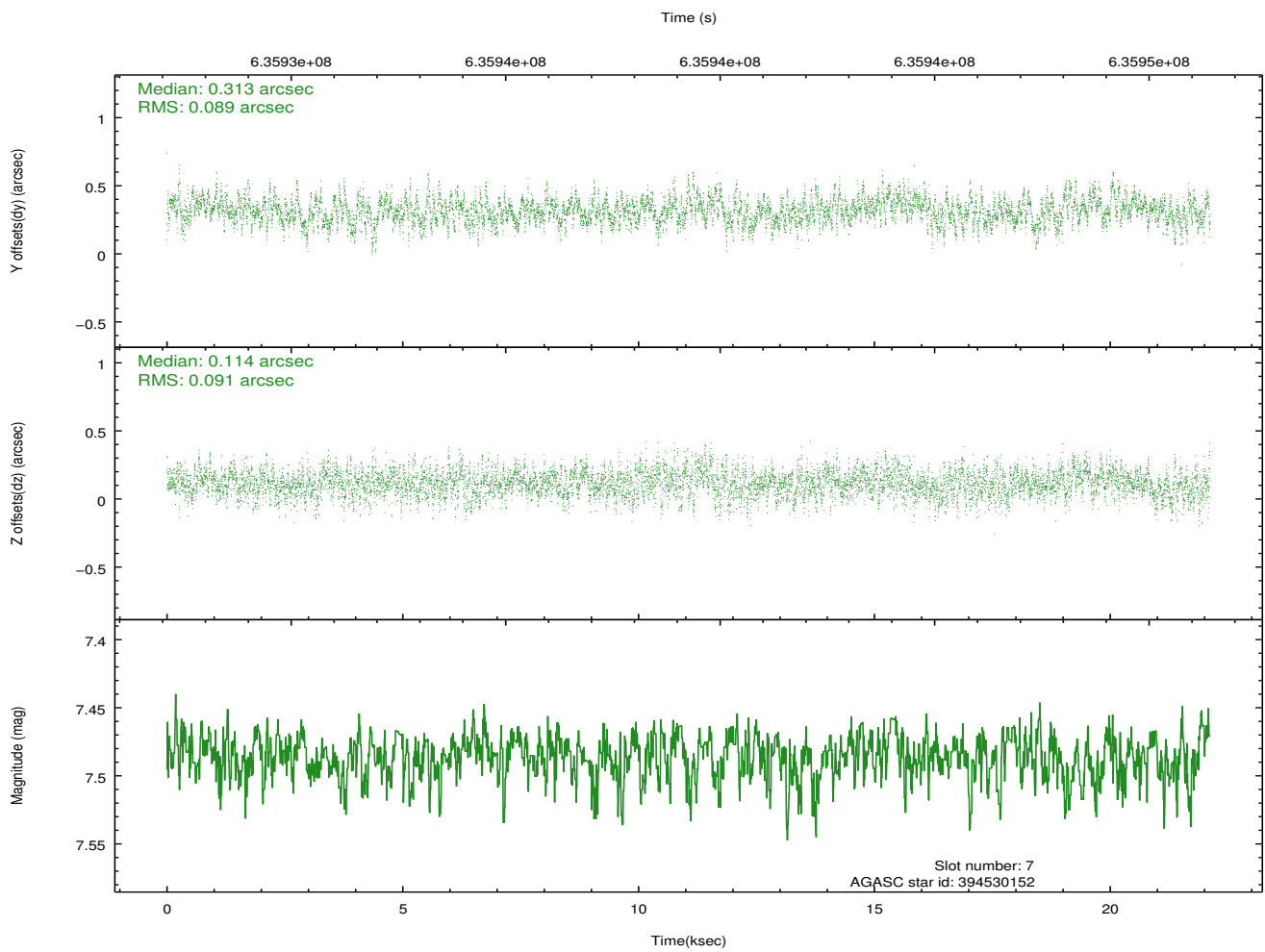
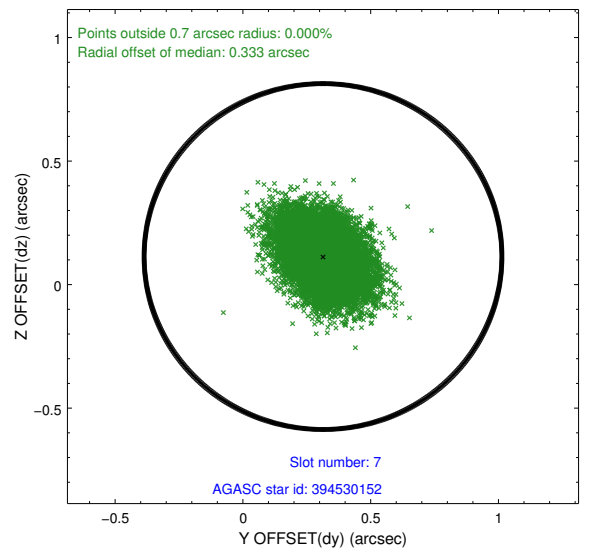
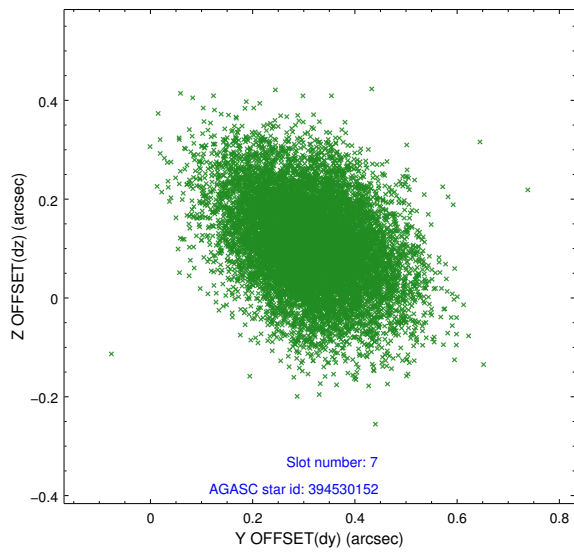
### 2.4.3 Slot 5



## 2.4.4 Slot 6

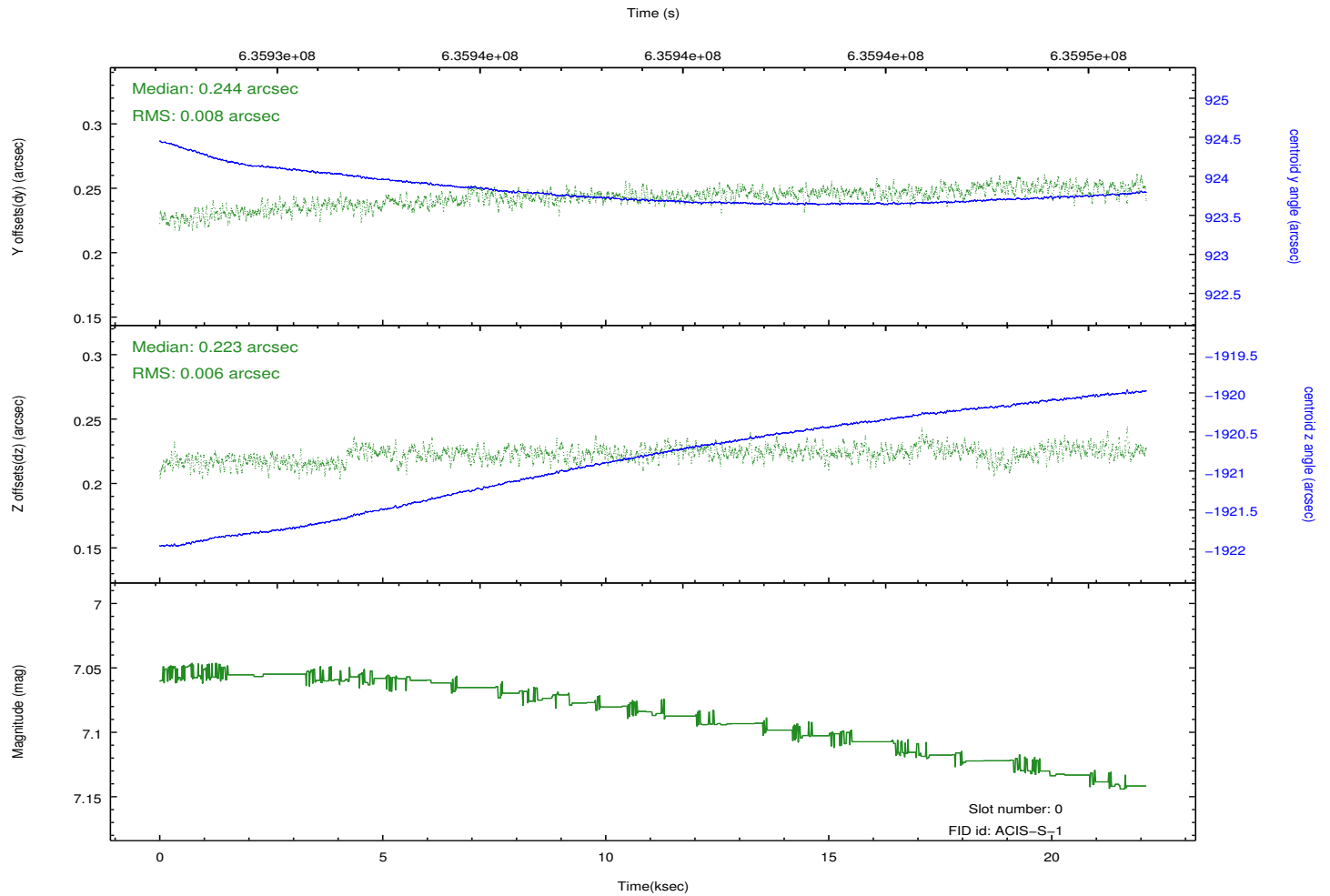
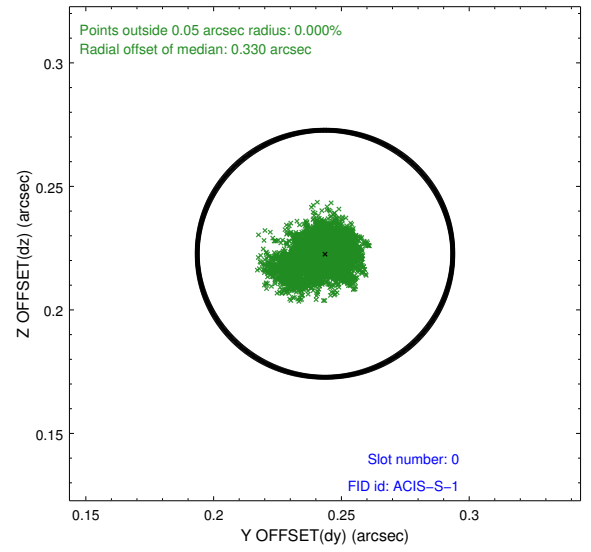
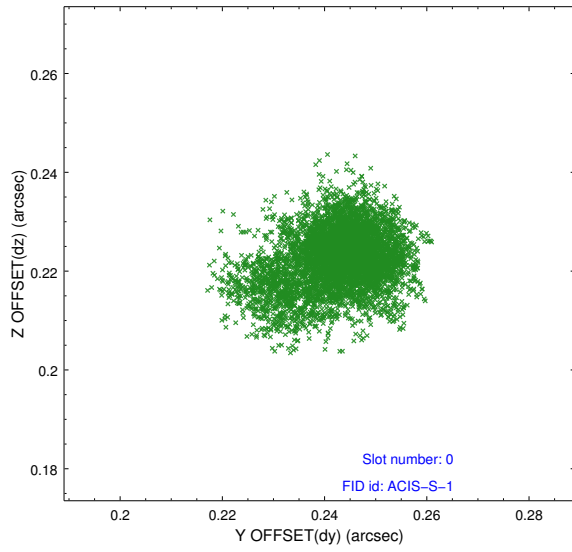


## 2.4.5 Slot 7

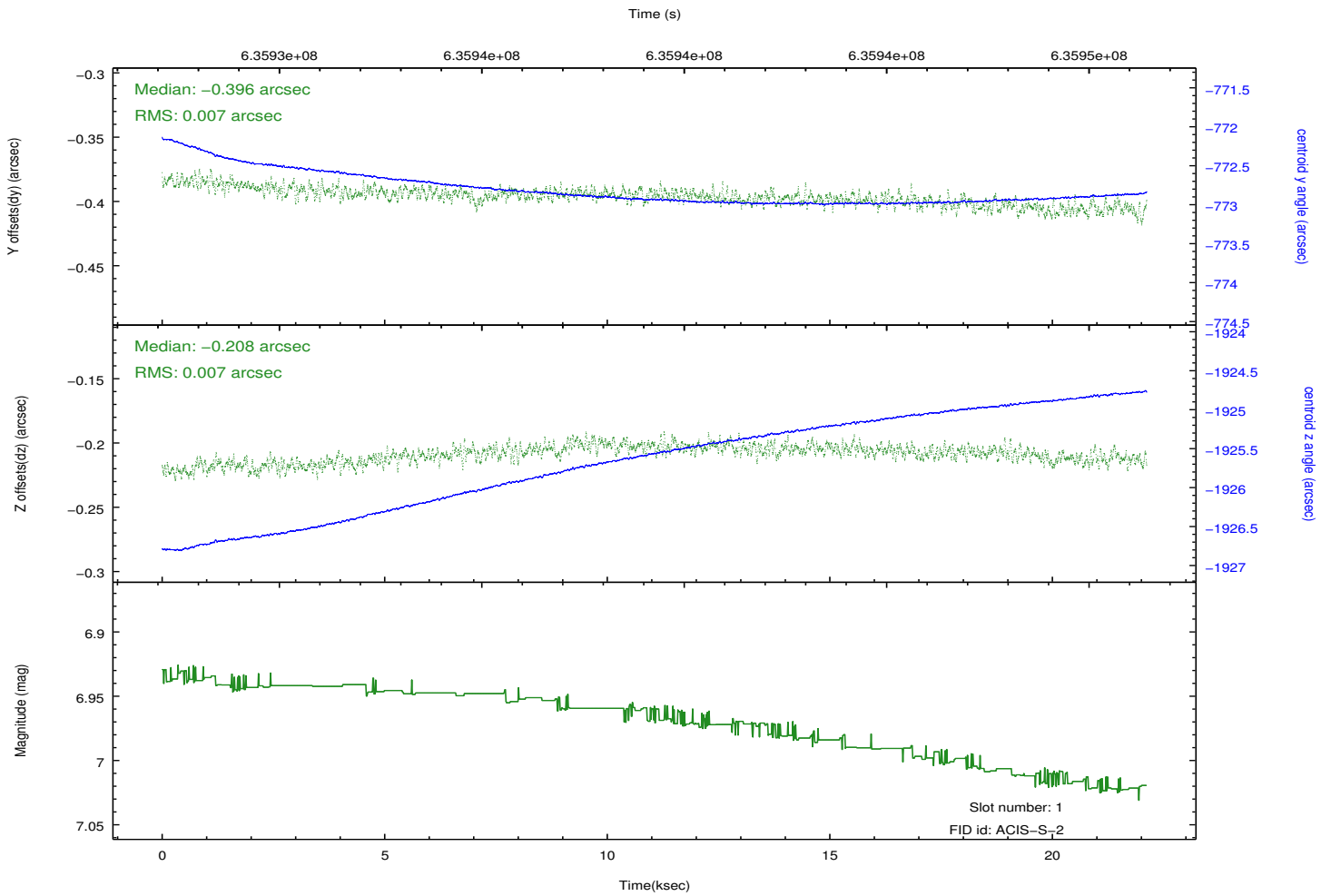
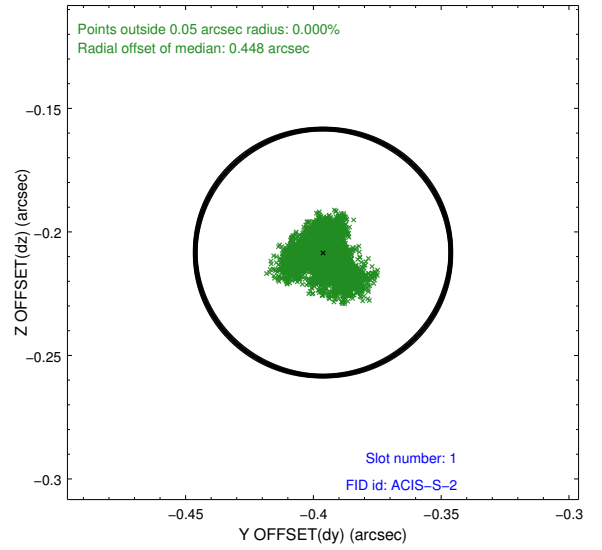
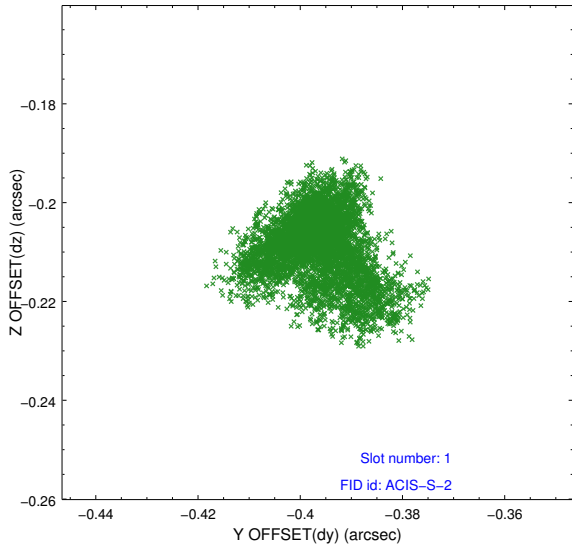


## 2.5 FID Slots

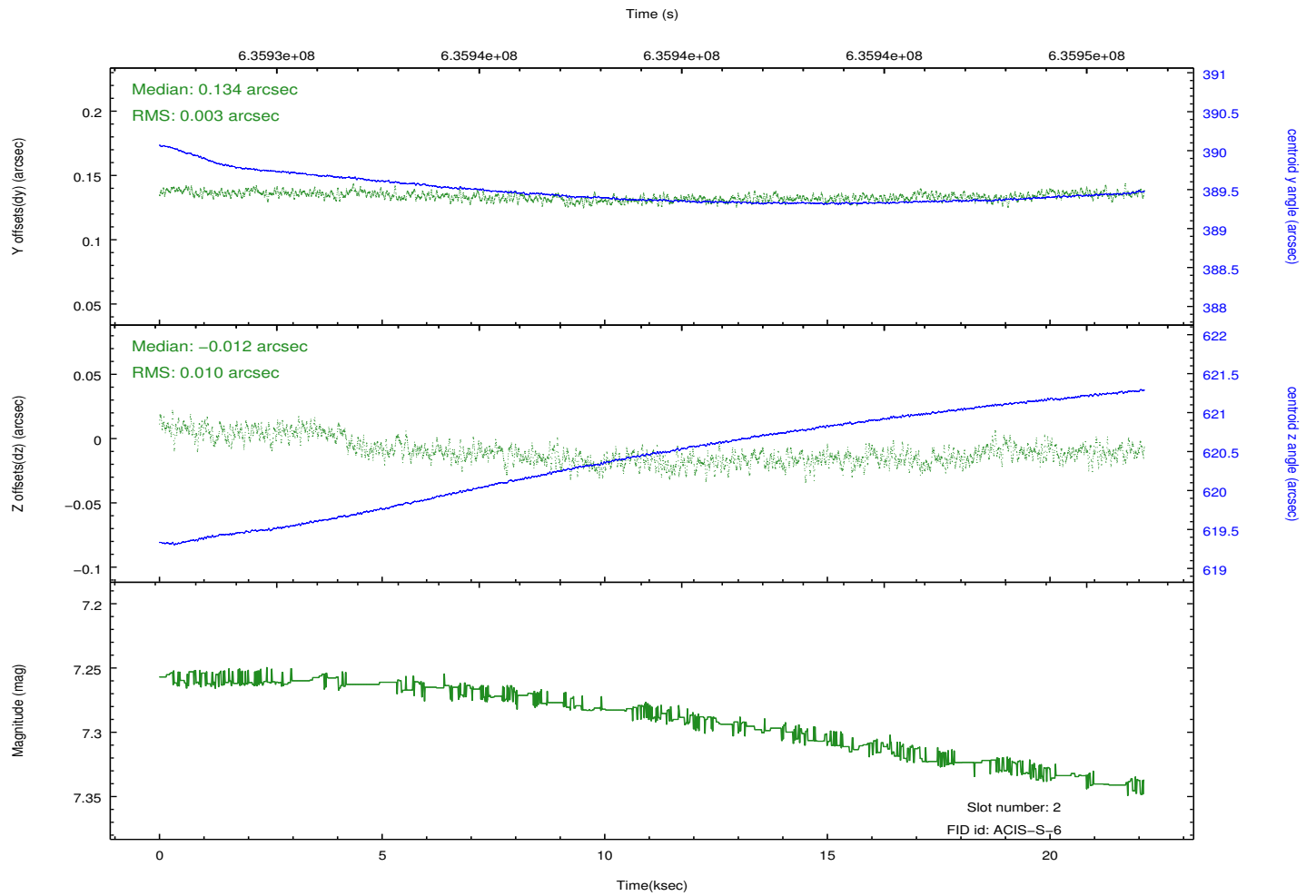
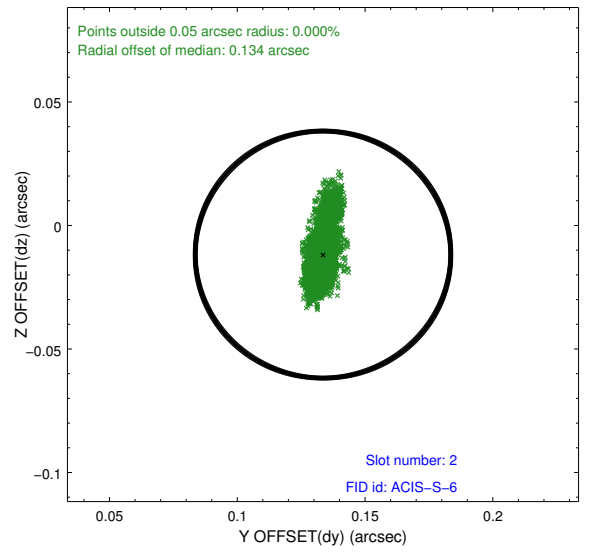
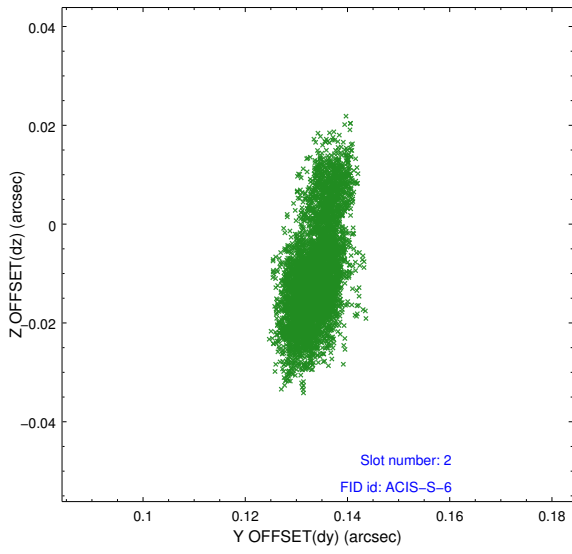
### 2.5.1 Slot 0



## 2.5.2 Slot 1

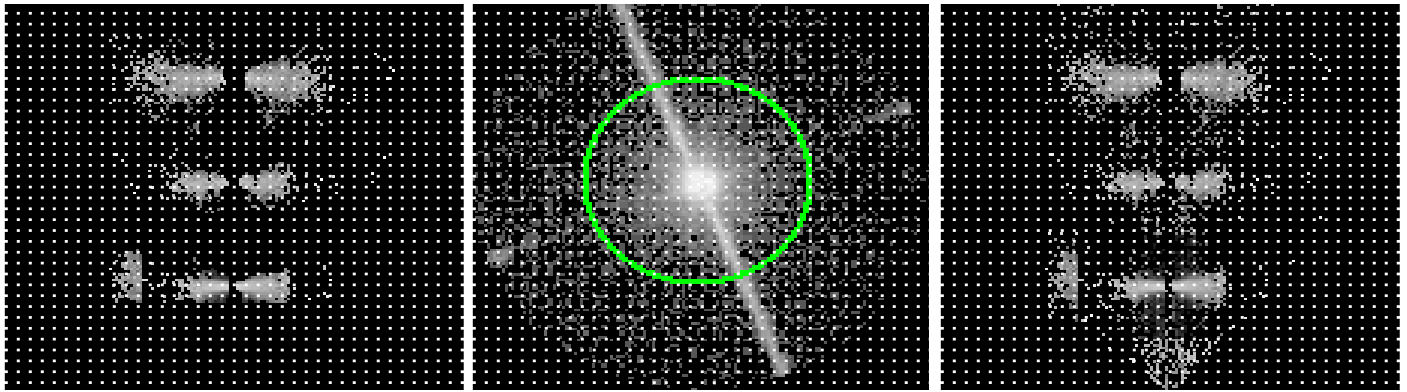


### 2.5.3 Slot 2



### 3 Gratings

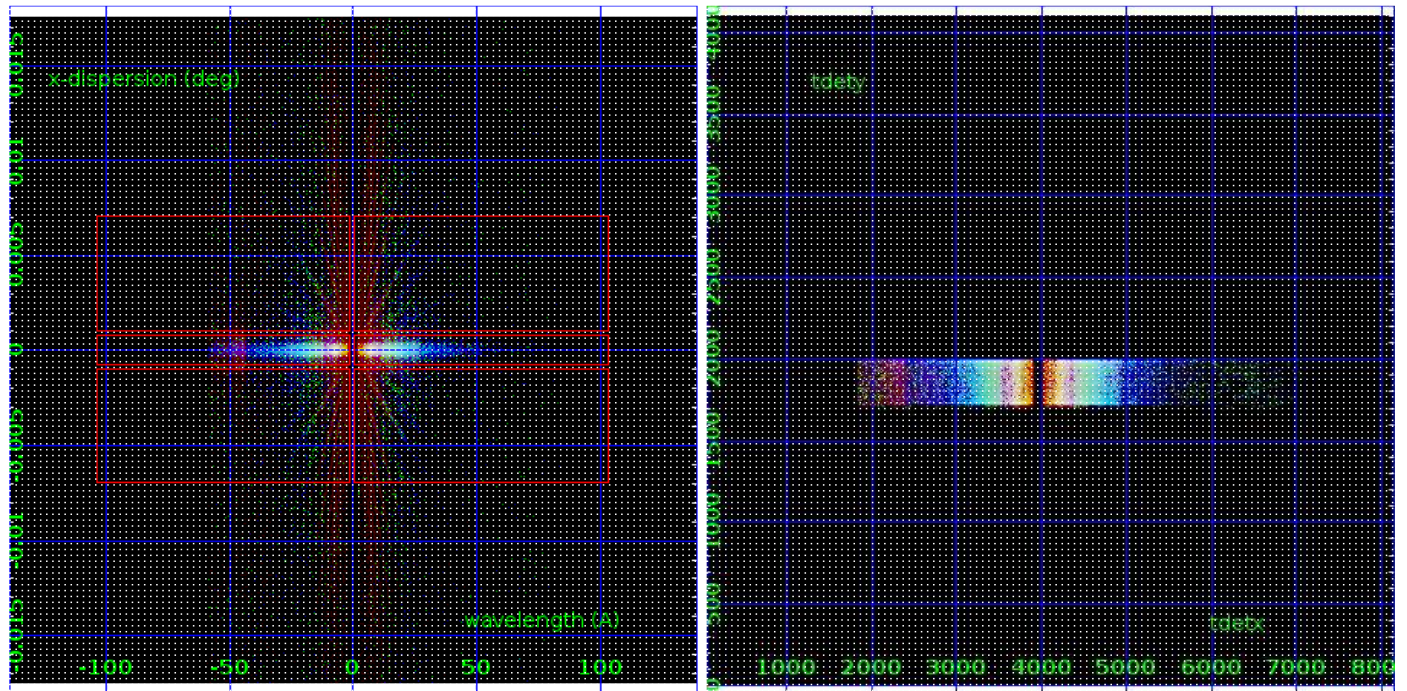
#### 3.1 LETG Arm



LETG Order Sort 123

LETG Zero Order

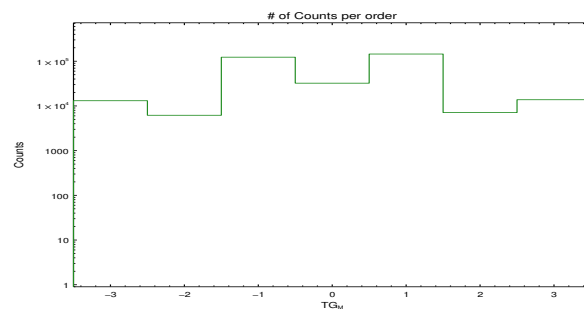
LETG Order Sort ALL

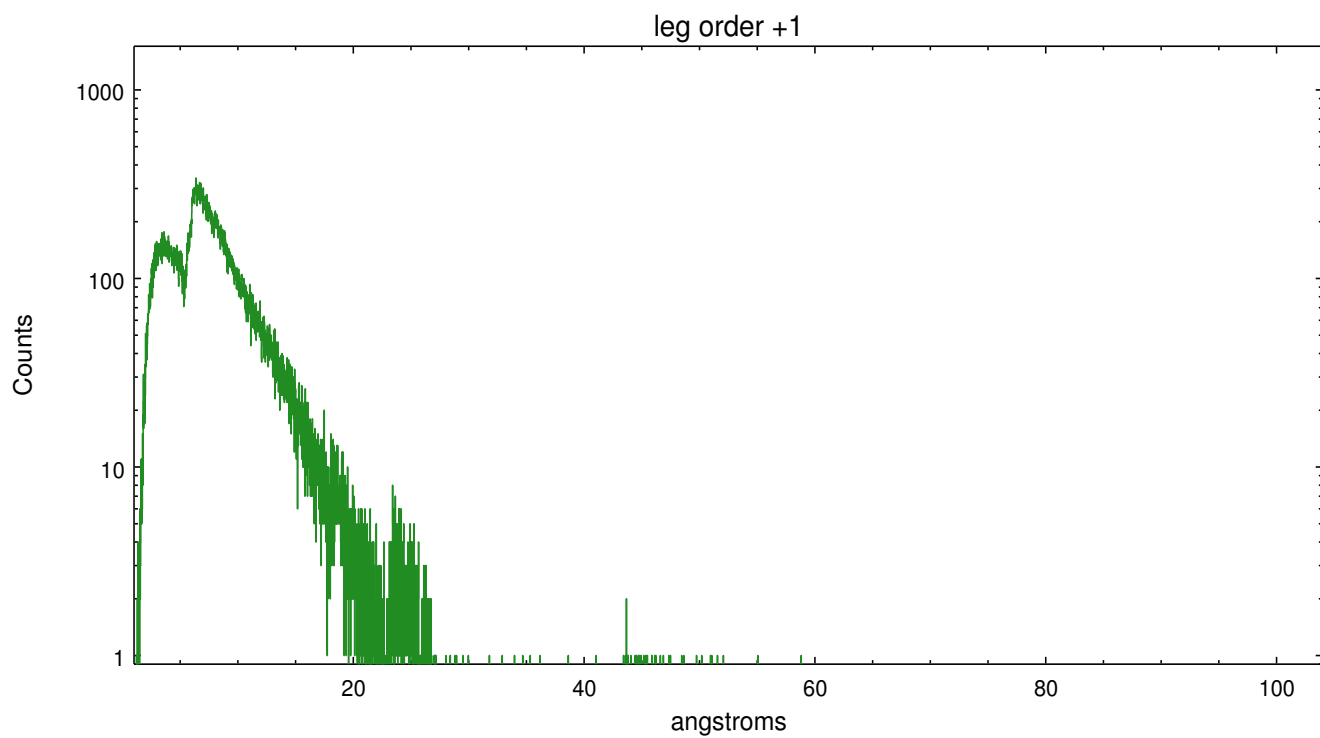
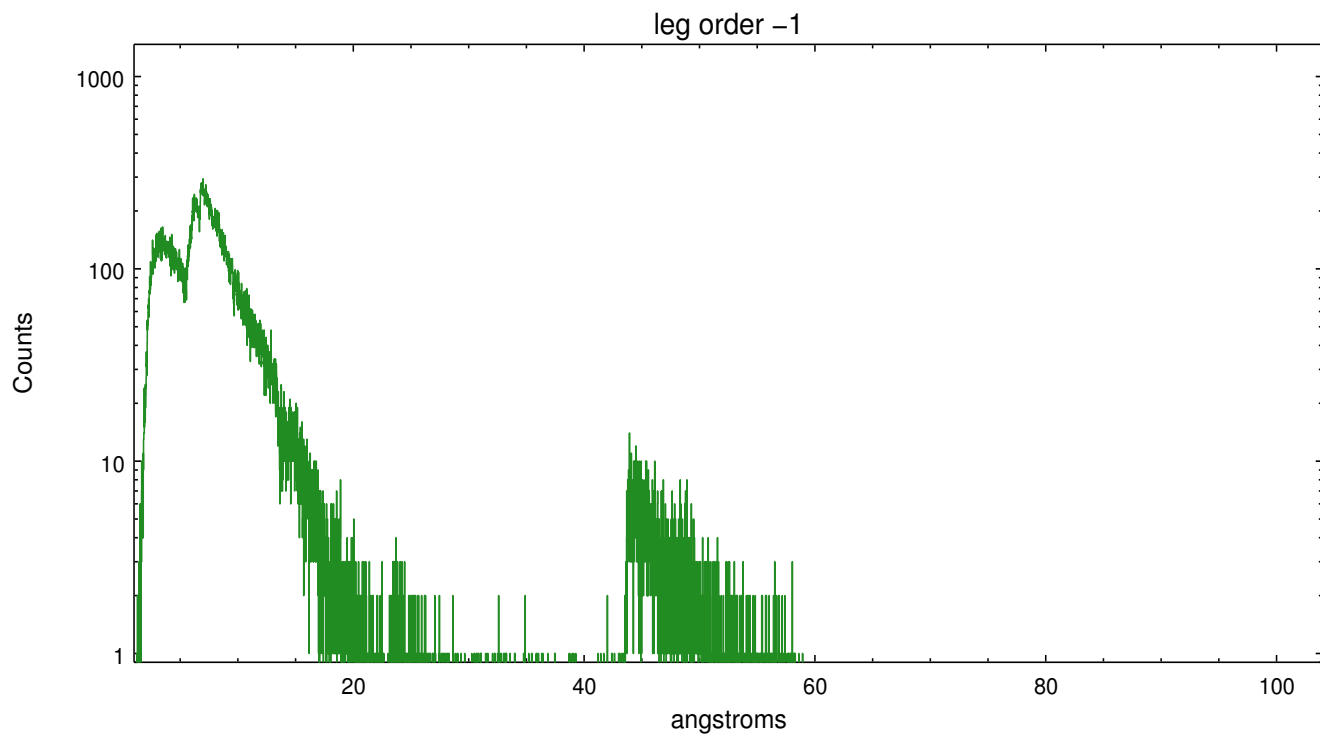


Spot Image LETG

Full Detector LETG

	order -3	order -2	order -1	order 0	order 1	order 2	order 3
Events	13090	6178	123137	32270	144907	7106	13771





# A Summary

## A.1 Status

V&V Scientist	Joy Nichols
V&V Date (YYYY-MM-DD)	2018.02.26
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	22.075900478601

## A.2 Comments

Big dither pattern used. z amplitude approximately 9 times y amplitude, with modified frequency. See archive metadata for details.

===

Zeroth order is extended and 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.

===

WARNING: there are no standard ciao tools for analysis of grating spectra from extended sources. The shape of an emission 'line' will be the shape of the zero order spatial structure convolved with the instrumental LSF. Grating extractions can be used, but need to be combined with custom spatial-spectral analysis, since wavelength is multi-valued at any particular diffraction angle.

====

WARNING: Zeroth order selected by pipeline tools is well-centered in the extended source but is not at the position(s) of brightest emission. The user may want to select a region or source of interest, then use software tools such as CIAO to specify the coordinates of the zeroth order source of interest before running the tools to resolve the dispersed events.

===

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.