V&V Reference Report
L2 ASCDS Version : 10.8

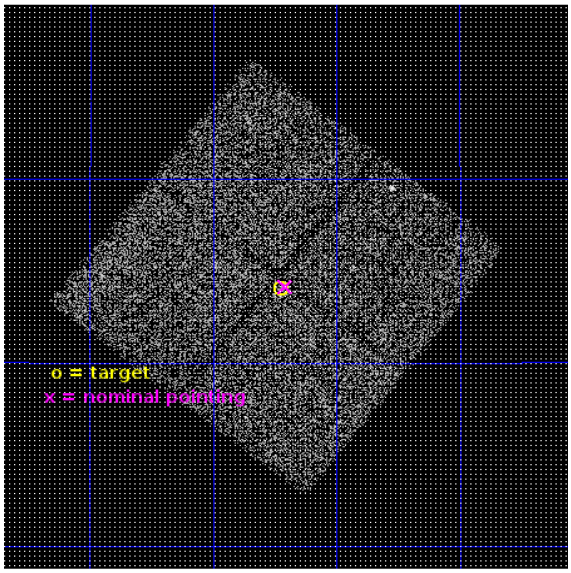
Observation 21380 - L2 Version 1
Chandra X-Ray Center

L2 Processing Date : Jul 14 2019

Contents

1 Front

seq_num	601432	Sequence number
obs_id	21380	Observation id
title	MISSING BARYONS AND THE WARM-HOT CIRCUMGALACTIC MEDIUM OF THE MILKY WAY	Proposal title
observer	Anjali Gupta	Principal investigator
object	Off-field3	Source name
dtycycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	339.556667	Observer's specified target RA [deg]
dec_targ	30.567361	Observer's specified target Dec [deg]
ra_nom	339.55176163041	Nominal RA [deg]
dec_nom	30.569045207081	Nominal Dec [deg]
roll_nom	128.21115548829	Nominal Roll [deg]
revision	1	Processing version of data
ontime	9574.7605499029	Sum of GTIs [s]
livetime	9449.6592544823	Livetime [s]
ontime0	9574.6374299526	Sum of GTIs [s]
ontime1	9574.6784698963	Sum of GTIs [s]
ontime2	9574.7195099592	Sum of GTIs [s]
ontime3	9574.7605499029	Sum of GTIs [s]
l2events	26467	Number of level 2 events

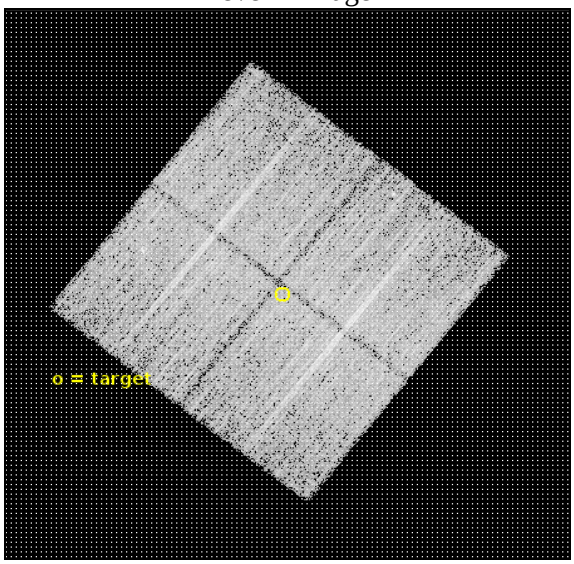


2 OBI

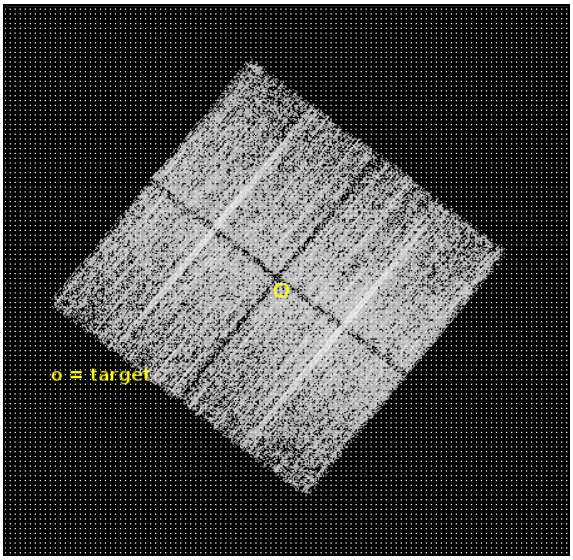
2.1 OBI

2.1.1 Images

Level 1 Image

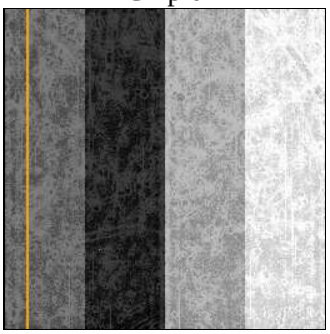


Level 1 Bad Events

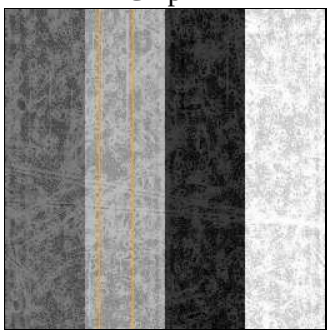


2.1.2 Bias

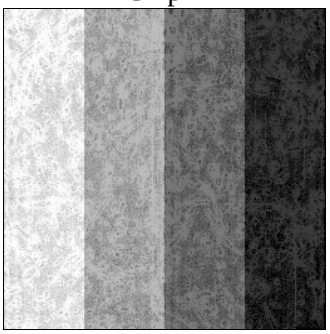
Chip 0



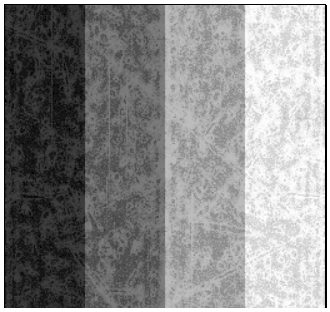
Chip 1



Chip 2



Chip 3



2.1.3 Parameters

obi_num	1	Obi number
ascdsver	10.8	Processing system revision
caldbver	4.8.3.1	
date	2019-07-14T13:16:44	Date and time of file creation
revision	1	Processing version of data

sched_exp_time	9500.000000	[s] Scheduled observation exposure time
ontime	9574.7605499029	Sum of GTIs [s]
ontime0	9574.6374299526	Sum of GTIs [s]
ontime1	9574.6784698963	Sum of GTIs [s]
ontime2	9574.7195099592	Sum of GTIs [s]
ontime3	9574.7605499029	Sum of GTIs [s]
l1events	295476	Number of level 1 events

2.1.4 Events

	ccd 0	**ccd 1**	**ccd 2**	**ccd 3**
level 1 events	70226	73398	78869	72983
rejected events	62447	64615	71427	65589
rejected %	88%	88%	90%	89%

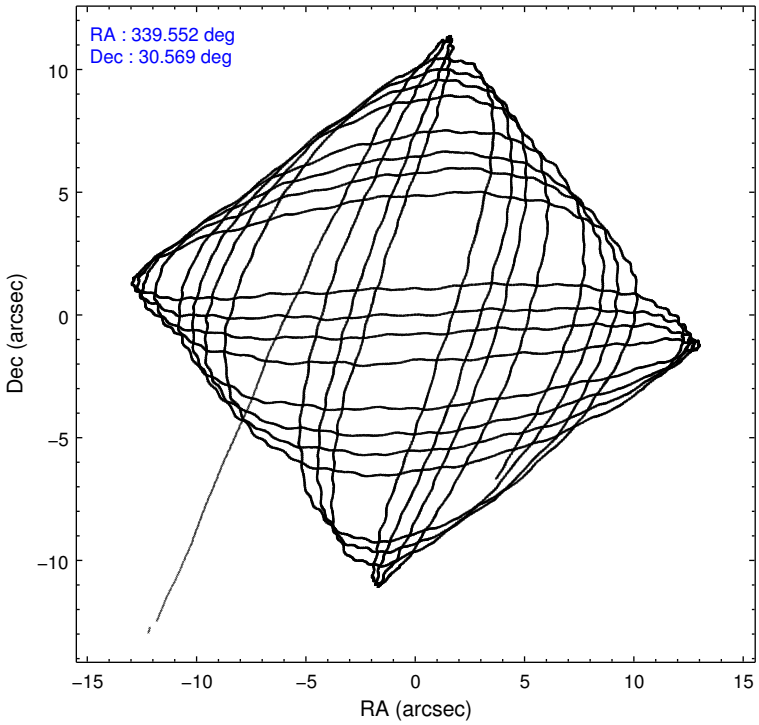
	ccd 0	**ccd 1**	**ccd 2**	**ccd 3**
grade 0 events	2426	2615	2668	2455
	3%	3%	3%	3%
grade 1 events	32	33	49	36
	0%	0%	0%	0%
grade 2 events	2079	2550	1746	1808
	2%	3%	2%	2%
grade 3 events	720	664	702	715
	1%	0%	0%	0%
grade 4 events	627	678	712	669
	0%	0%	0%	0%
grade 5 events	2781	2616	2558	3091
	3%	3%	3%	4%
grade 6 events	1931	2282	1620	1749
	2%	3%	2%	2%
grade 7 events	59630	61960	68814	62460
	84%	84%	87%	85%

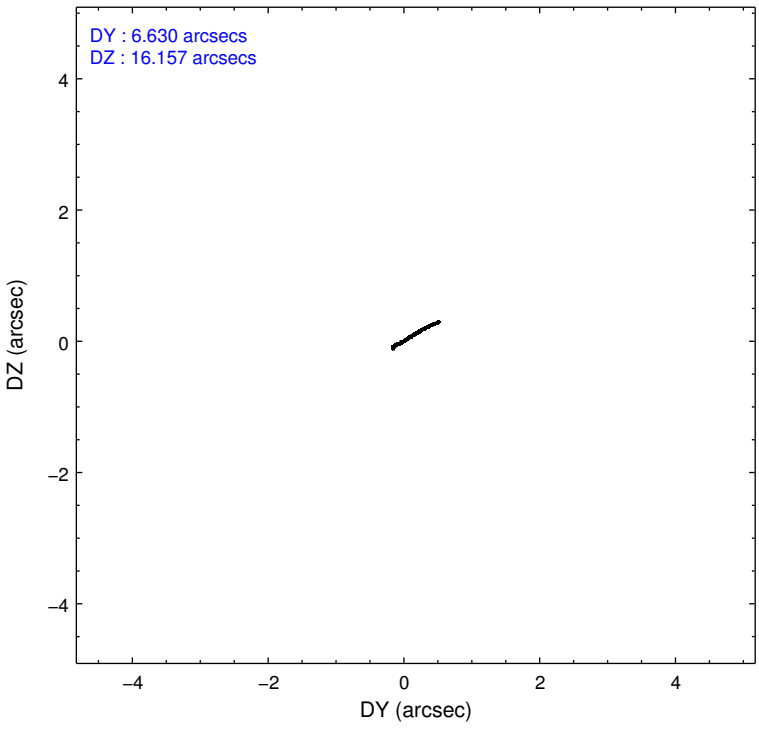
2.2 Compared Parameters

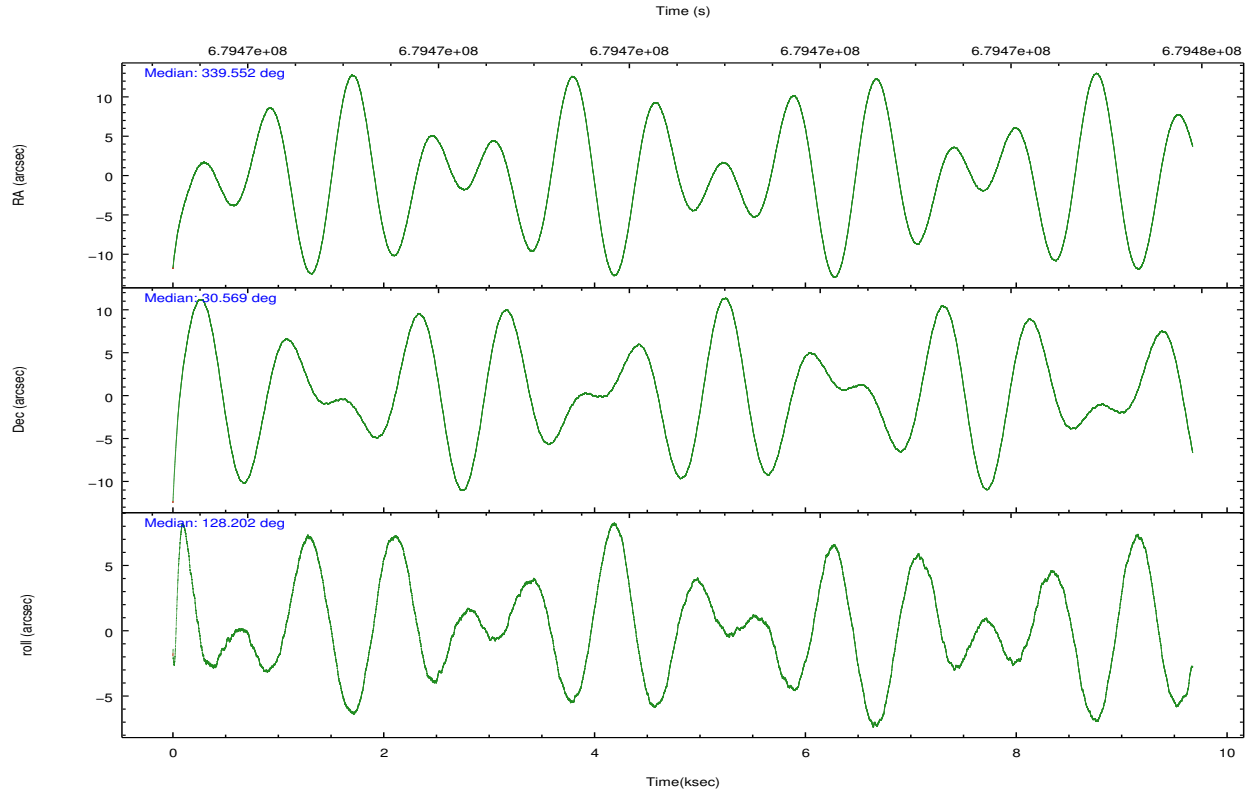
Parameter	Planned	Actual
Instrument	ACIS	ACIS
Detector	ACIS-0123	ACIS-0123
Grating	NONE	NONE
Data mode	FAINT	FAINT
Observation mode	POINTING	POINTING
[deg] Pointing RA	339.581579	339.5517616304077
[deg] Pointing Dec	30.558839	30.56904520708093
[deg] Pointing Roll	127.987327	128.2111554882934
[mm] SIM focus pos	-0.782348	-0.7809083437167272
[mm] SIM defocus	0	0.001439871863259334
[mm] SIM translation stage pos	-233.592463	-233.5874344608287
[mm] SIM translation stage offset	0	-0.005018542100998502
[s] Observation start time (MET)	679465901.184000	679464374.81637
Observation start date	2019-07-14T04:30:32	2019-07-14T04:06:14
[s] Observation end time (MET)	679475401.184000	679476244.31708
Observation end date	2019-07-14T07:08:52	2019-07-14T07:24:04
Read mode	TIMED	TIMED

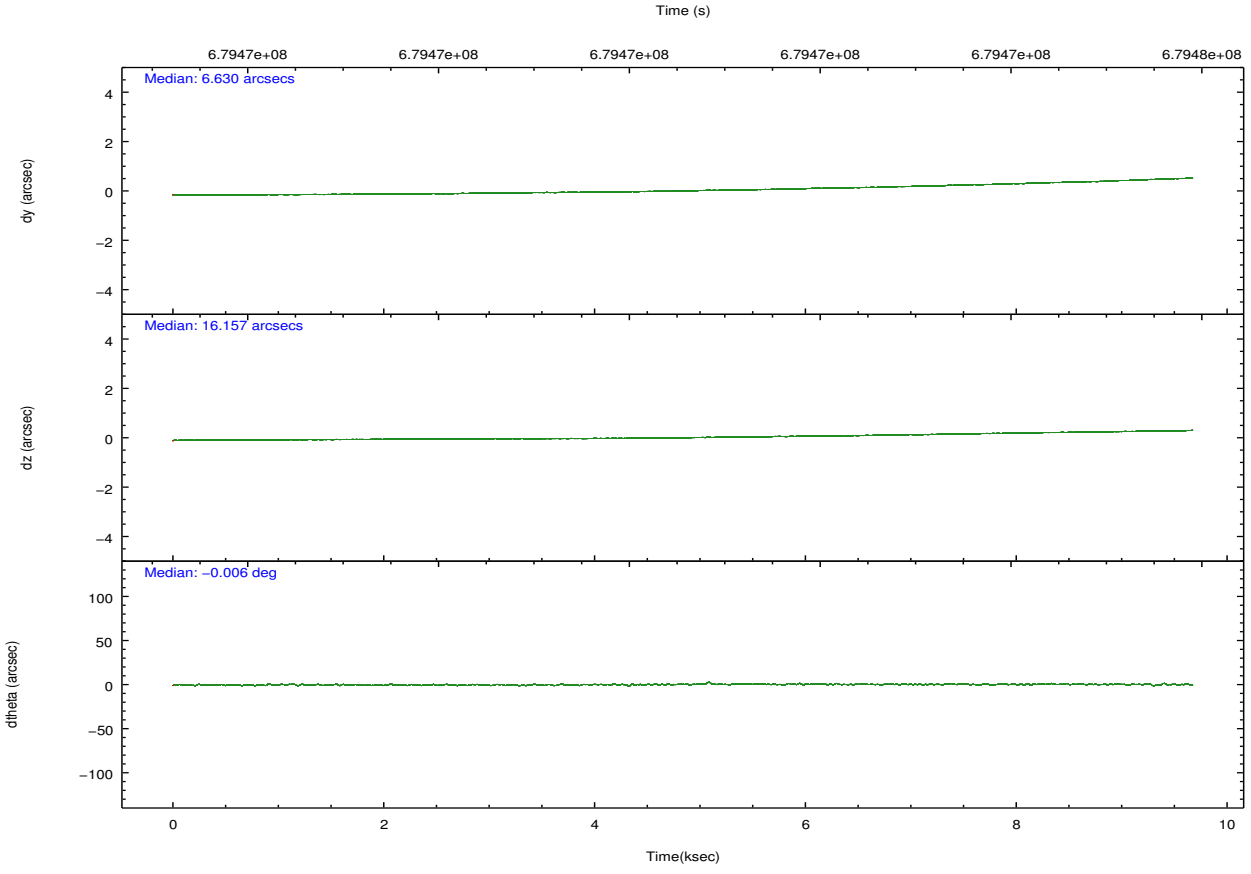
Parameter	Planned	Actual
Obspar format version number	7	7
Obspar file type	PREDICTED	ACTUAL
Obspar update status	NONE	UPDATED
Number of optional ACIS chips dropped	0	0
On-chip summing requested	N	N
Subarray requested	NONE	NONE
Alternating exposures requested	N	N
[s] Primary exposure time	0.000000	3.1

2.3 Aspect


RA : 339.552 deg
Dec : 30.569 deg
Dec (arcsec)
RA (arcsec)
10
5
0
−5
−10
−15
−10
−5
0
5
10
15


DY : 6.630 arcsecs
DZ : 16.157 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
−2
−4
−4
−2
0
2
4


Time (s)
6.7947e+08
6.7947e+08
6.7947e+08
6.7947e+08
6.7947e+08
6.7948e+08
Median: 339.552 deg
RA (arcsec)
Median: 30.569 deg
Dec (arcsec)
Median: 128.202 deg
roll (arcsec)
Time(ksec)

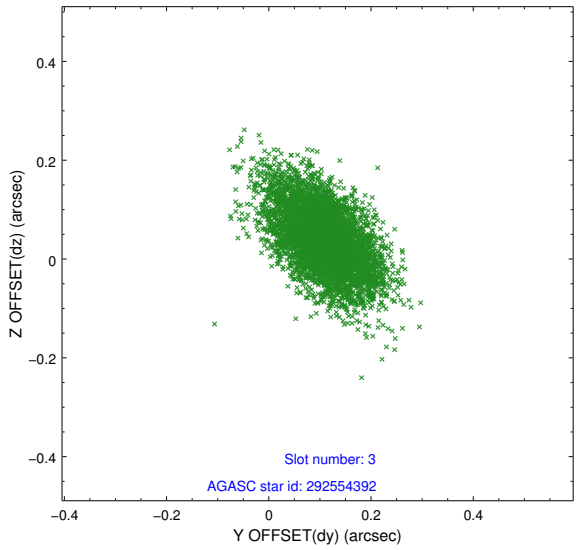

Time (s)
6.7947e+08
6.7947e+08
6.7947e+08
6.7947e+08
6.7947e+08
6.7948e+08
Median: 6.630 arcsecs
dy (arcsec)
Median: 16.157 arcsecs
dz (arcsec)
Median: −0.006 deg
dtheta (arcsec)
Time(ksec)

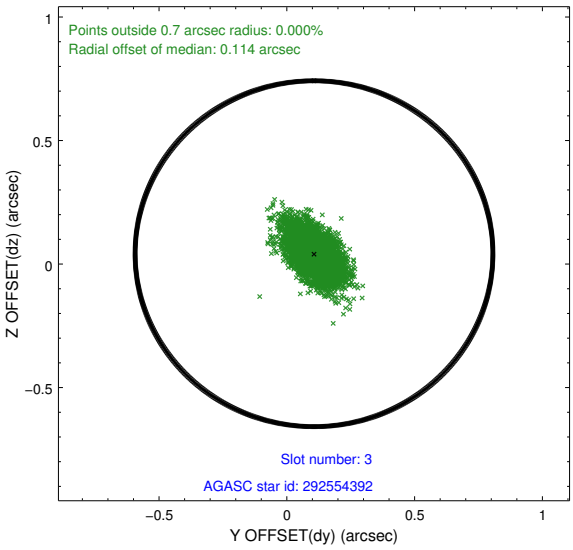
Slot Statistics

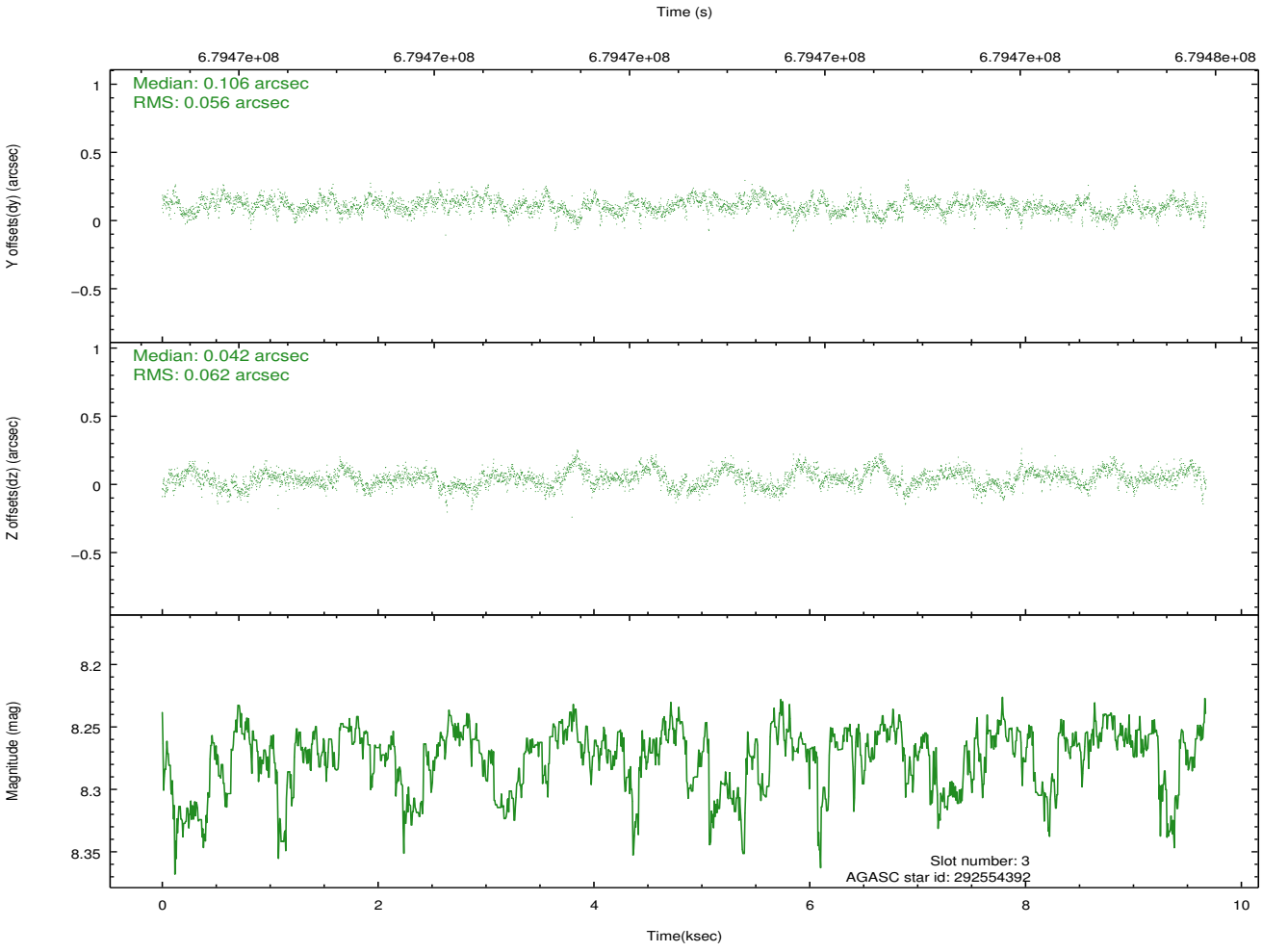
ot	status	used	id	mag	n_pts	frac_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mea
0	FID		ACIS-I-1	7.35	2360	1.000	0.161	-0.200	0.009	0.018	0.000000	0.000000	933.21	-839
1	FID		ACIS-I-5	7.31	2360	1.000	-0.487	0.057	0.009	0.016	0.000000	0.000000	-1815.36	1057
2	FID		ACIS-I-6	7.29	2359	1.000	0.235	0.212	0.008	0.013	0.000000	0.000000	398.06	1702
3	GUIDE	used	292554392	8.27	4717	1.000	0.106	0.042	0.086	0.150	339.682384	29.841774	-2228.24	1340
4	GUIDE	used	292554488	7.04	4720	1.000	-0.045	-0.160	0.095	0.170	339.482359	29.923765	-1613.22	1650
5	GUIDE	used	358494328	7.99	4715	1.000	-0.188	-0.384	0.096	0.164	339.187617	30.791412	1410.99	444
6	GUIDE	used	358622360	8.67	4716	1.000	0.282	0.237	0.097	0.156	340.041629	30.785016	-231.48	-1621
7	GUIDE	used	358623728	7.47	4718	1.000	-0.152	0.264	0.084	0.152	339.927813	31.145725	1010.27	-2141

2.4 Star Slots

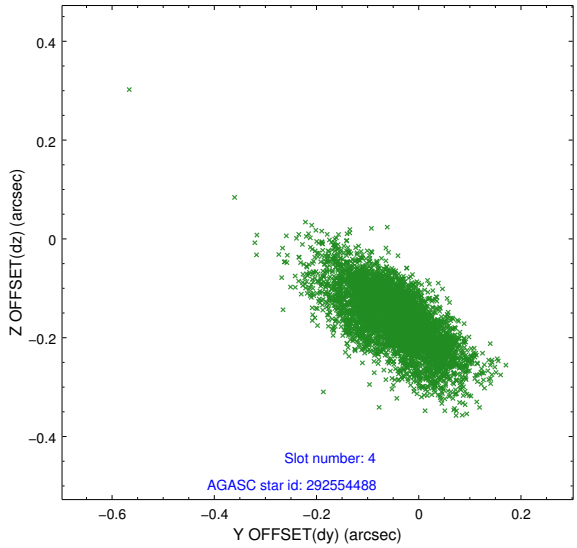
2.4.1 Slot 3

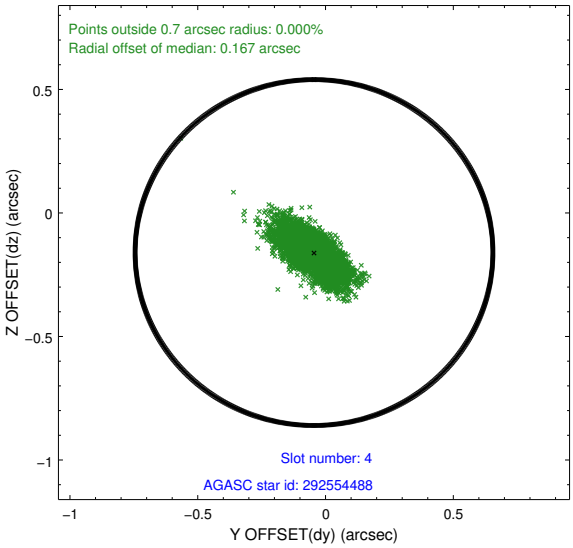


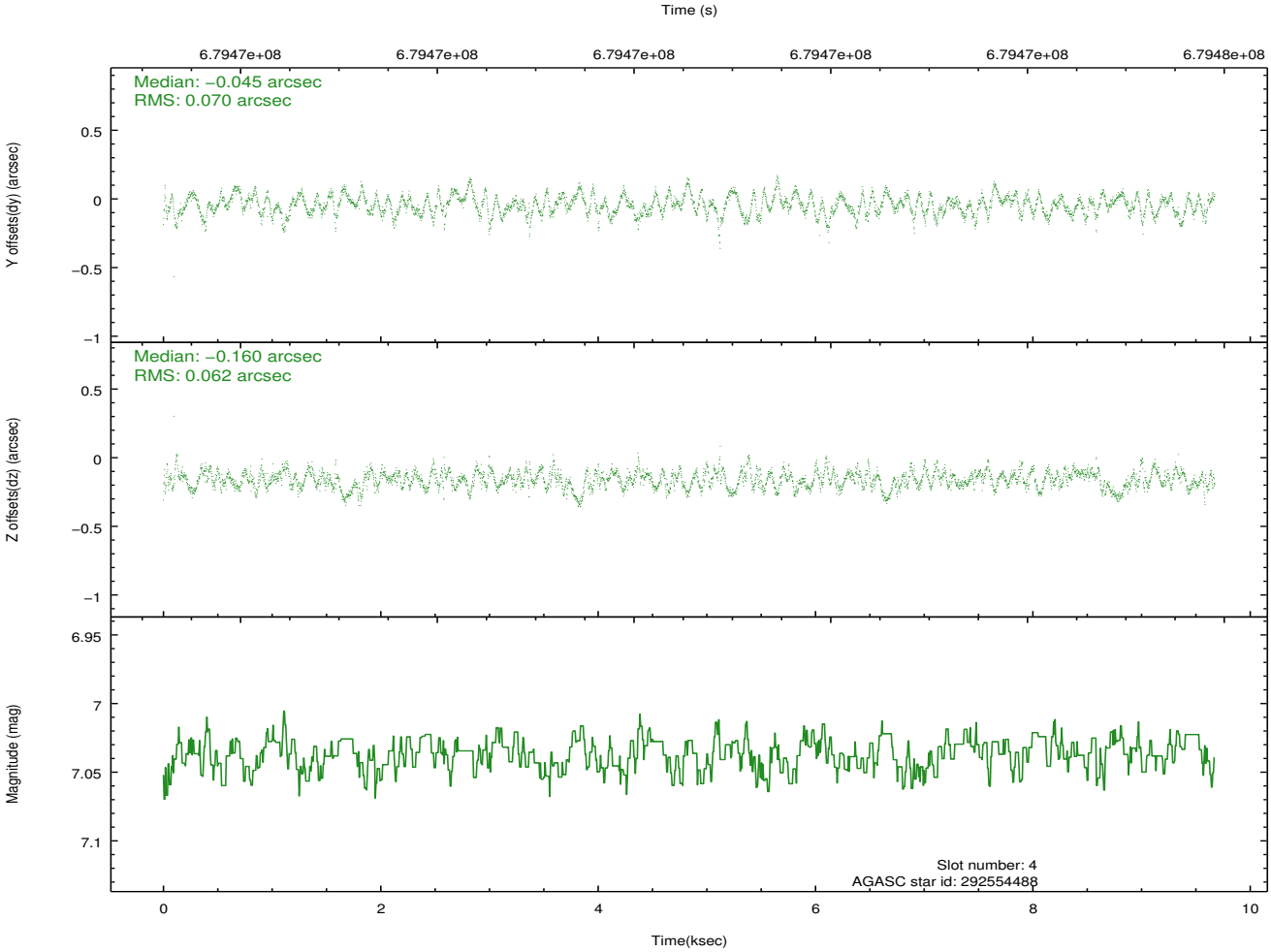




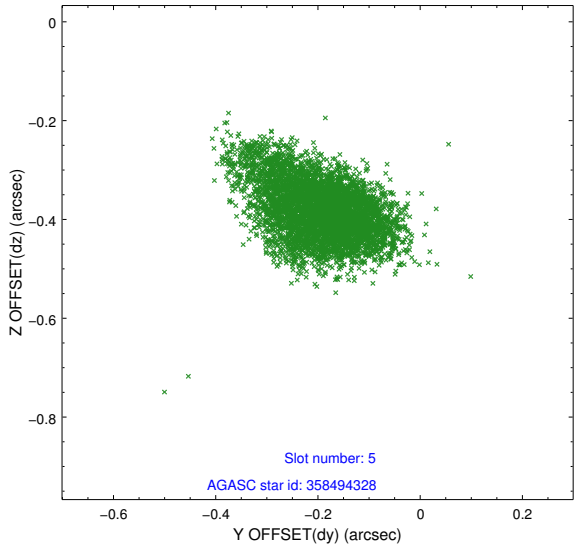
2.4.2 Slot 4

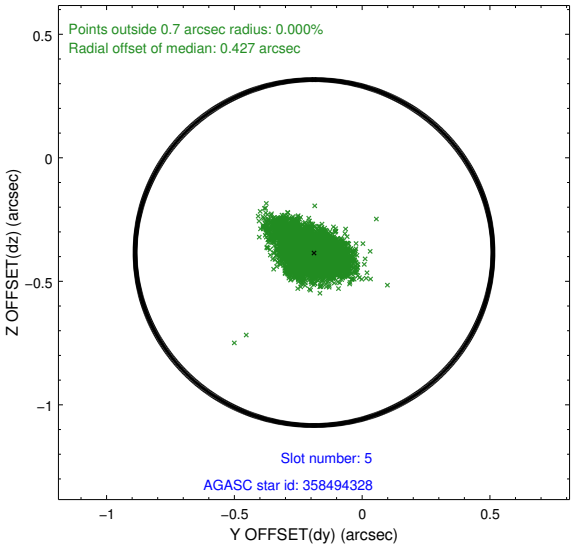

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 292554488

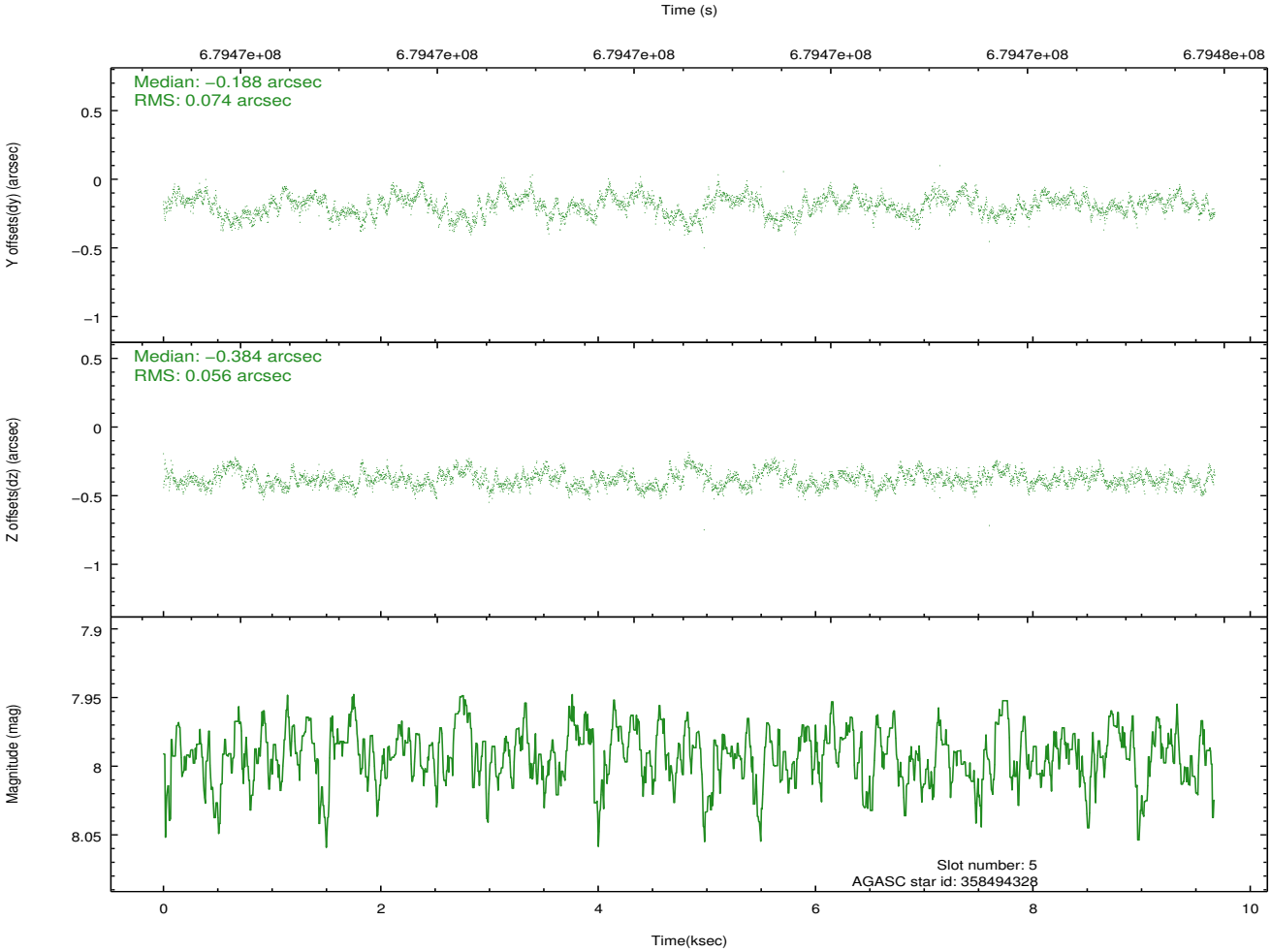

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.167 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 292554488


Time (s)
Median: −0.045 arcsec
RMS: 0.070 arcsec
Y offsets(dy) (arcsec)
Median: −0.160 arcsec
RMS: 0.062 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 292554488
Time(ksec)

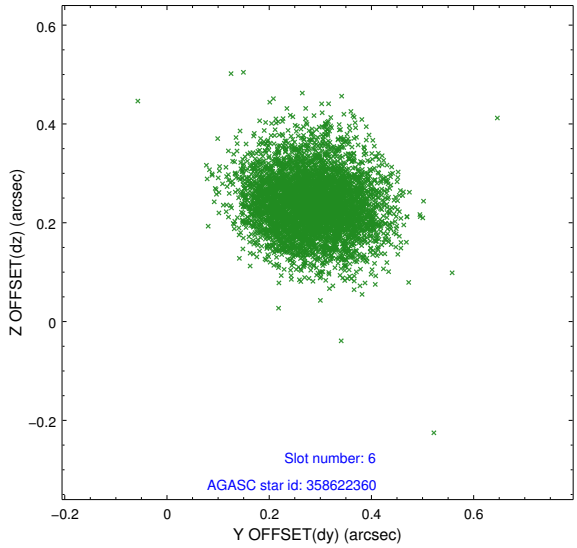
2.4.3 Slot 5

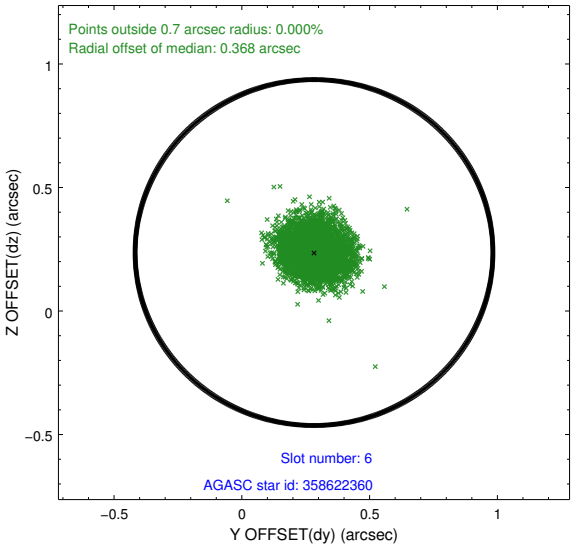

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 358494328

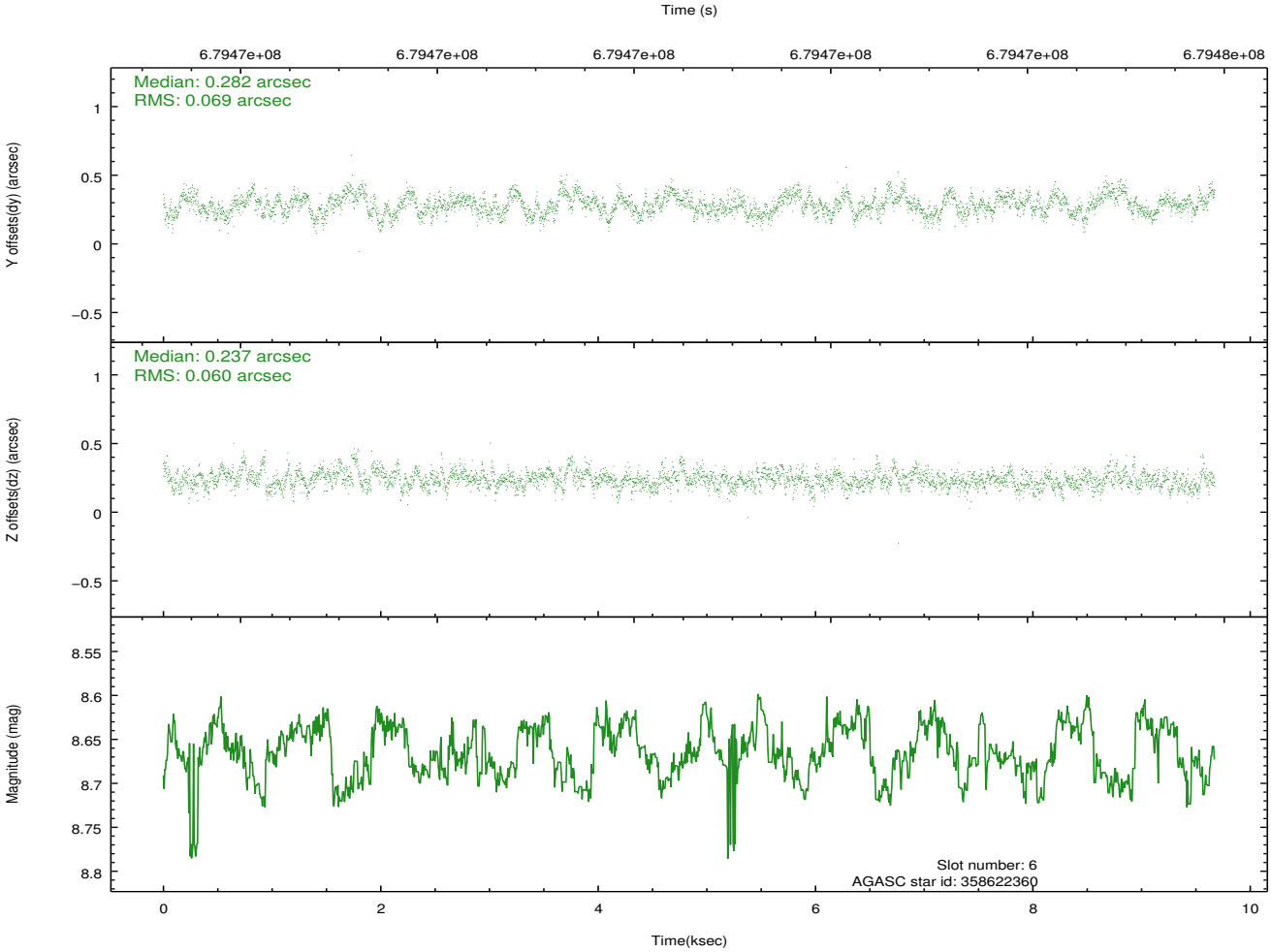

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.427 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 358494328


Time (s)
Median: −0.188 arcsec
RMS: 0.074 arcsec
Y offsets(dy) (arcsec)
Median: −0.384 arcsec
RMS: 0.056 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 358494328
Time(ksec)

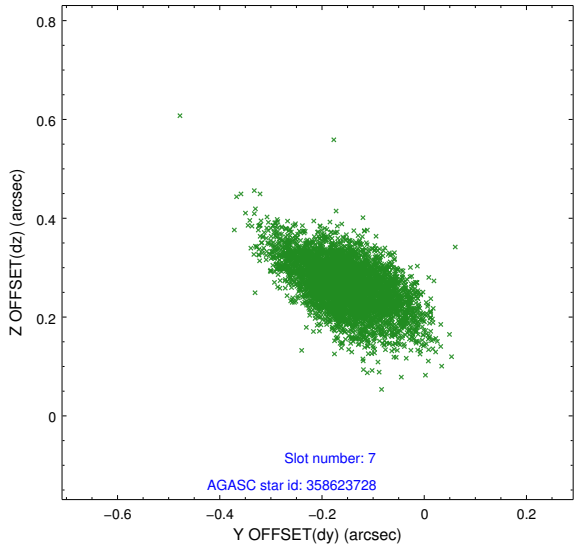
2.4.4 Slot 6

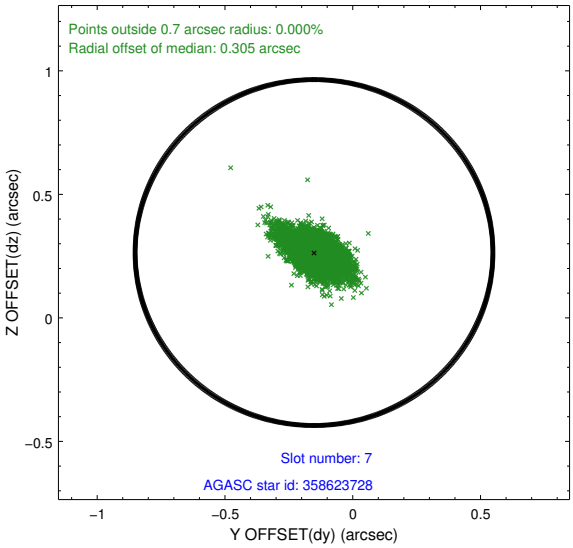

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 358622360

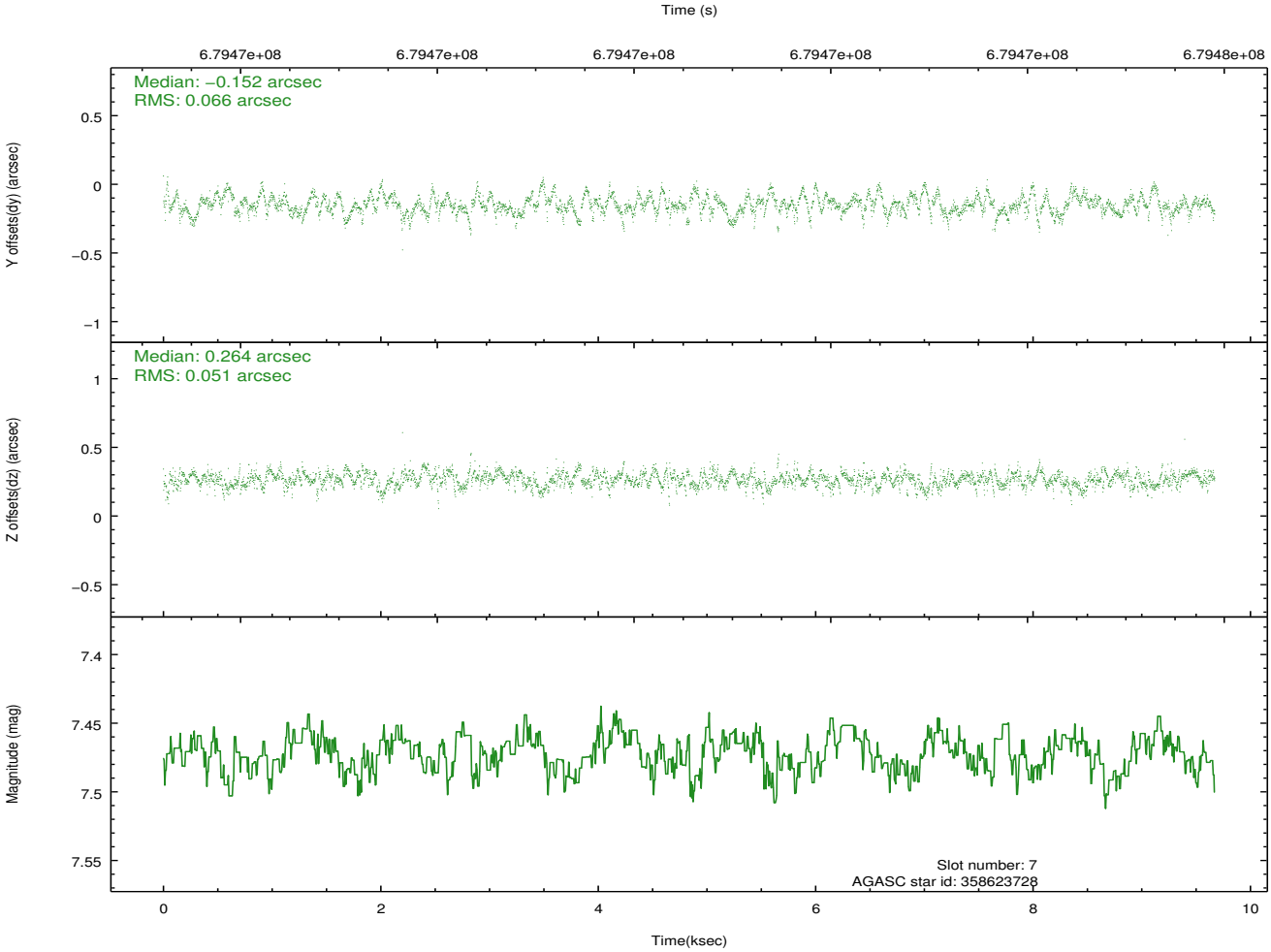

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.368 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 358622360


Time (s)
Median: 0.282 arcsec
RMS: 0.069 arcsec
Y offsets(dy) (arcsec)
Median: 0.237 arcsec
RMS: 0.060 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 358622360
Time(ksec)

2.4.5 Slot 7

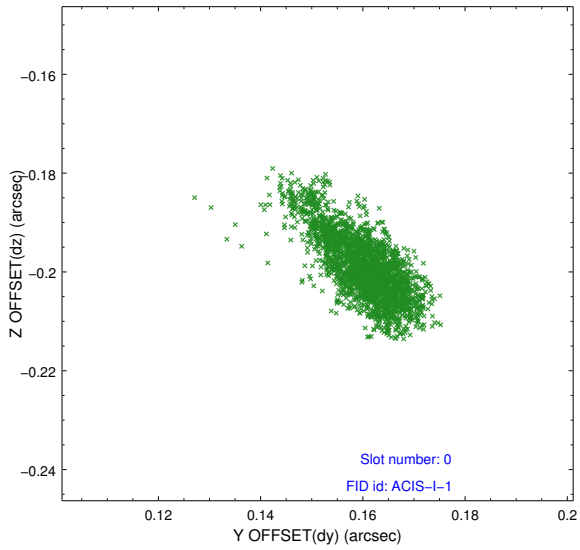

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 358623728

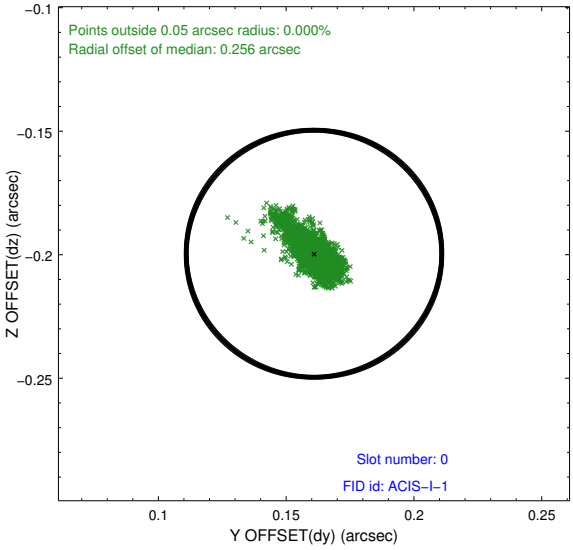

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.305 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 358623728

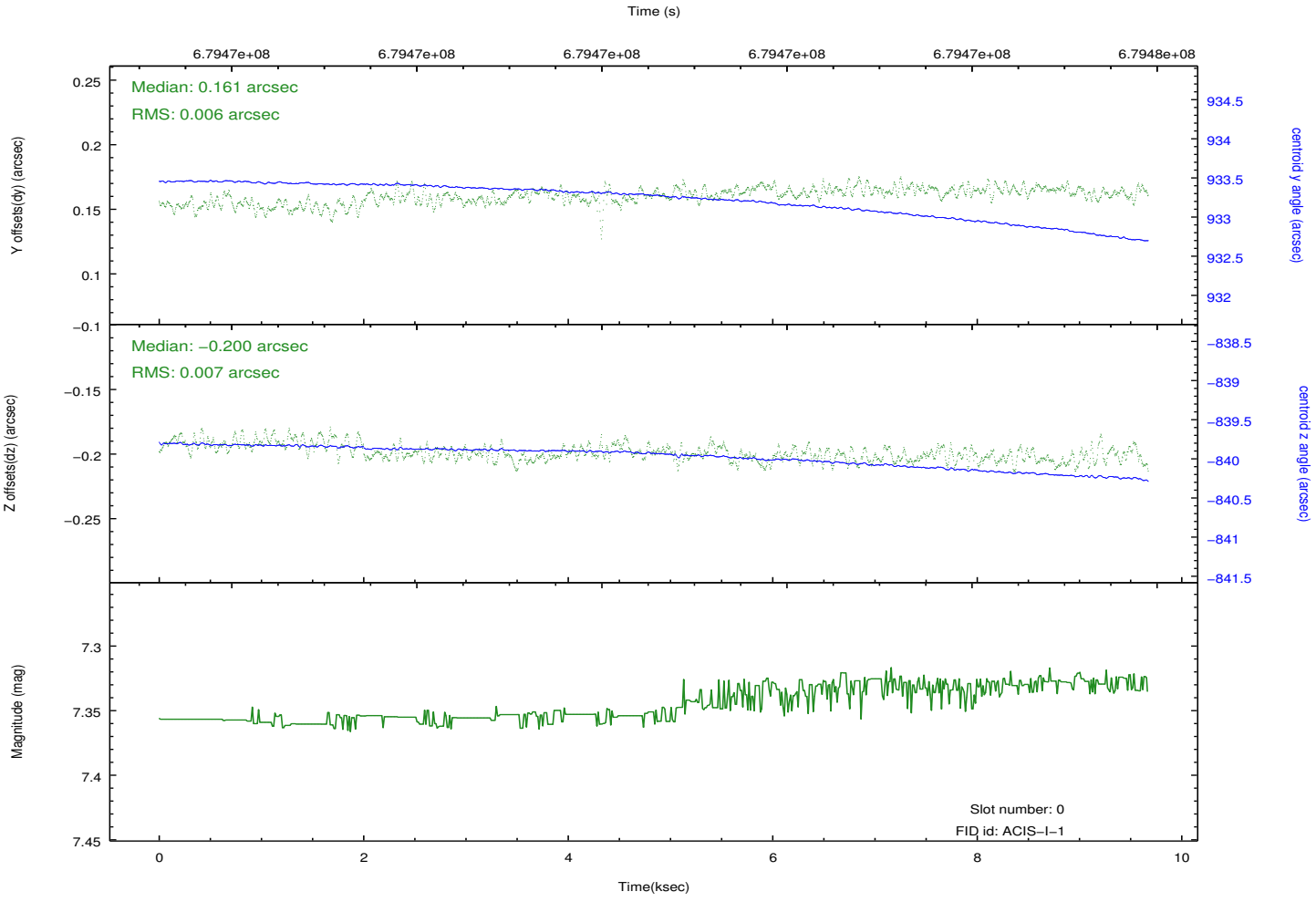

Time (s)
Median: −0.152 arcsec
RMS: 0.066 arcsec
Y offsets(dy) (arcsec)
Median: 0.264 arcsec
RMS: 0.051 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 358623728
Time(ksec)

2.5 FID Slots

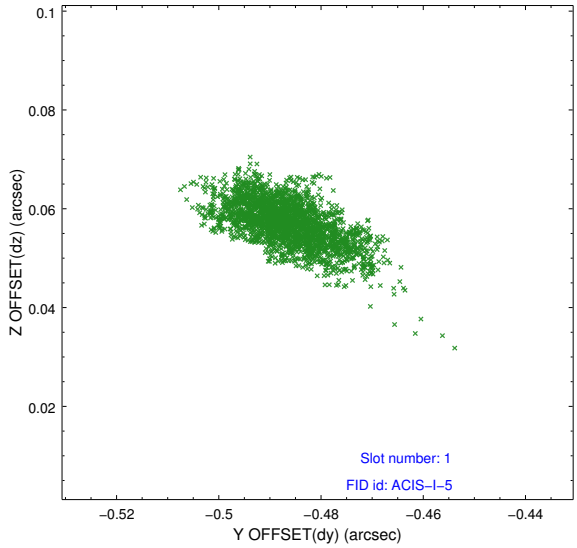
2.5.1 Slot 0

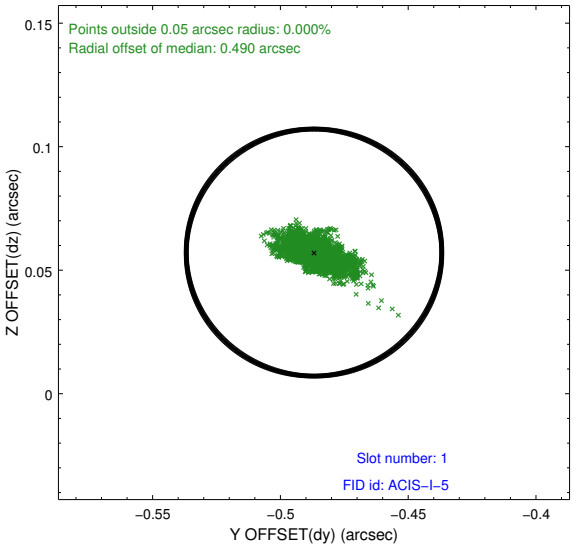


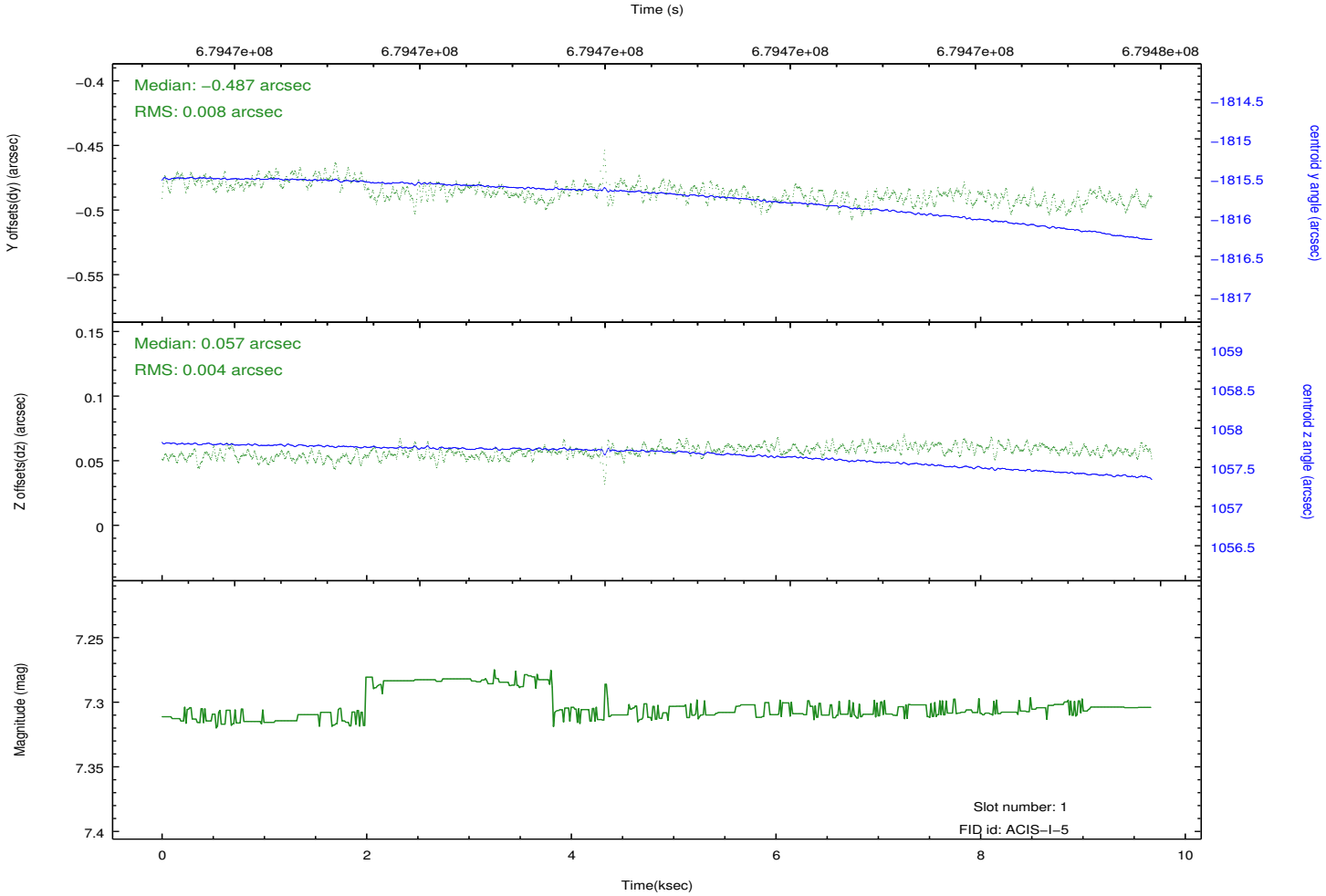




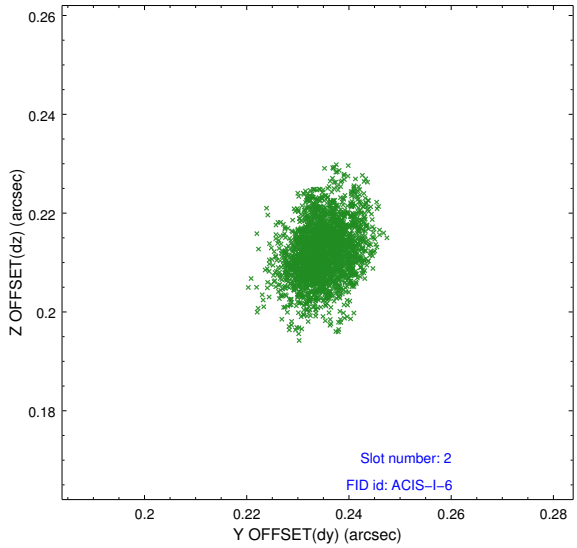
2.5.2 Slot 1

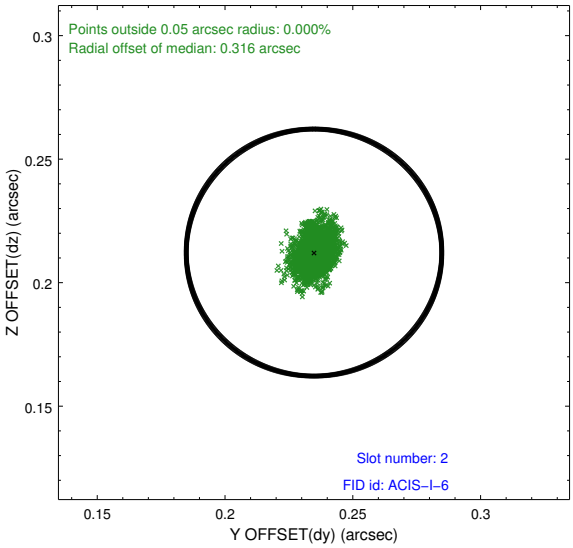

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS–I–5

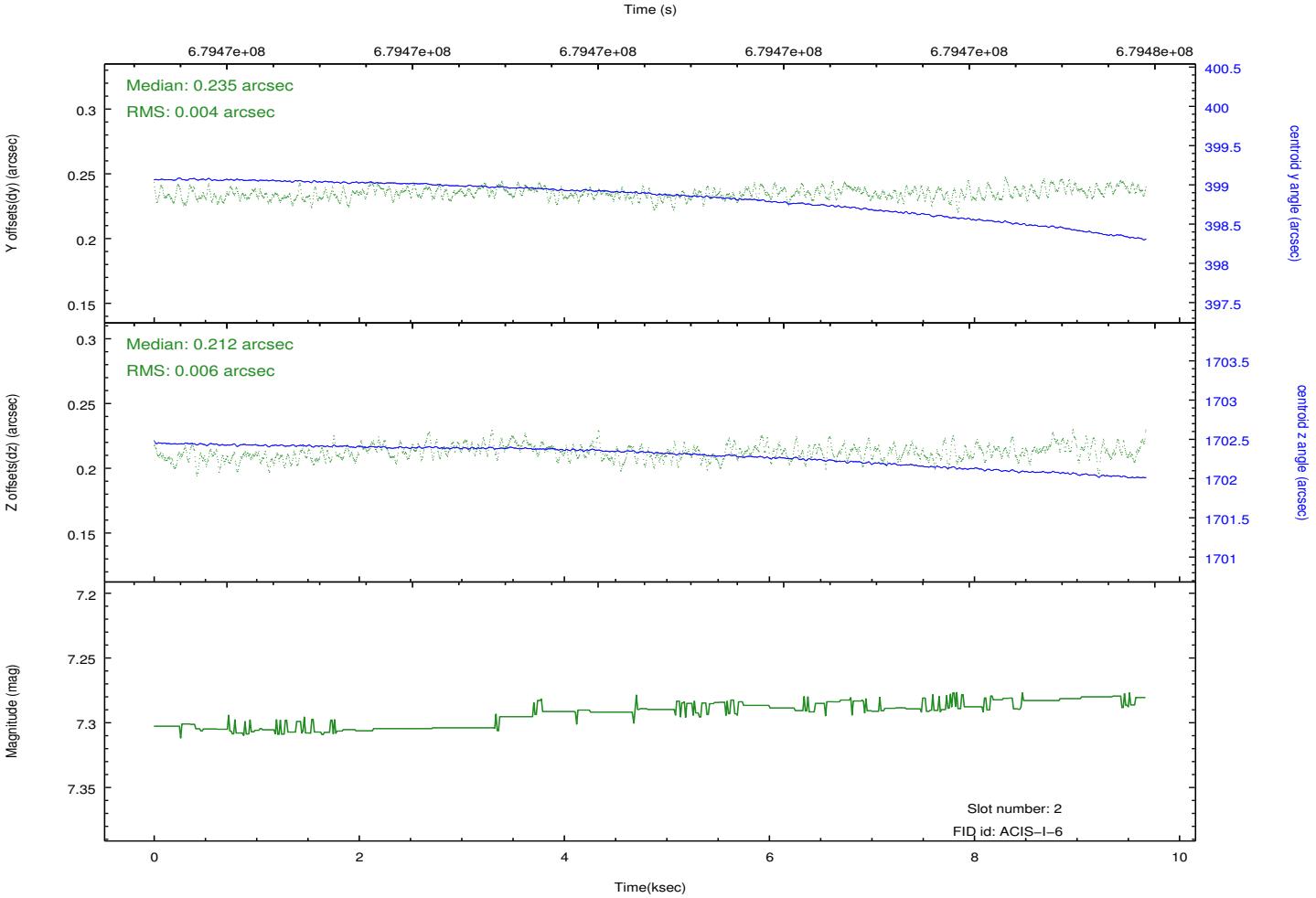

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.490 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS–I–5


Time (s)
Median: –0.487 arcsec
RMS: 0.008 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.057 arcsec
RMS: 0.004 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 1
FID id: ACIS–I–5
Time(ksec)

2.5.3 Slot 2


Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS–I–6


Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.316 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS–I–6


Time (s)
Median: 0.235 arcsec
RMS: 0.004 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.212 arcsec
RMS: 0.006 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 2
FID id: ACIS–I–6
Time(ksec)

A Summary

A.1 Status

V&V Scientist	Beth Sundheim
V&V Date (YYYY-MM-DD)	2019.07.14
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	9.5747605499029

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., -111.0 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

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.