V&V Reference Report
L2 ASCDS Version : 8.4.5

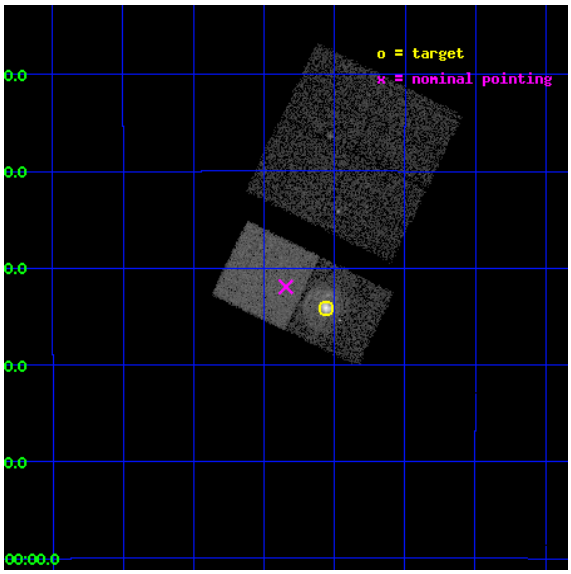
Observation 1781 - L2 Version 5
Chandra X-Ray Center

L2 Processing Date : Aug 30 2012

Contents

1 Front

seq_num	590207	Sequence number
obs_id	1781	Observation id
title	HRC RESPONSE TO CONTINUUM SOURCE.	Proposal title
observer	Dr. CXC Calibration	Principal investigator
object	G21.5-0.9 [Chip S2, T=110, Offsets=5,0,0]	Source name
dtycycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	278.389583	Observer's specified target RA [deg]
dec_targ	-10.568528	Observer's specified target Dec [deg]
ra_nom	278.46121307673	Nominal RA [deg]
dec_nom	-10.53243263397	Nominal Dec [deg]
roll_nom	206.01693070185	Nominal Roll [deg]
revision	5	Processing version of data
ontime	7318.4000068009	Sum of GTIs [s]
livetime	7225.7300193033	Livetime [s]
ontime0	7318.4000068009	Sum of GTIs [s]
ontime1	7318.4000068009	Sum of GTIs [s]
ontime2	7318.4000068009	Sum of GTIs [s]
ontime3	7318.4000068009	Sum of GTIs [s]
ontime6	7318.4000068009	Sum of GTIs [s]
ontime7	7318.4000068009	Sum of GTIs [s]
l2events	65590	Number of level 2 events

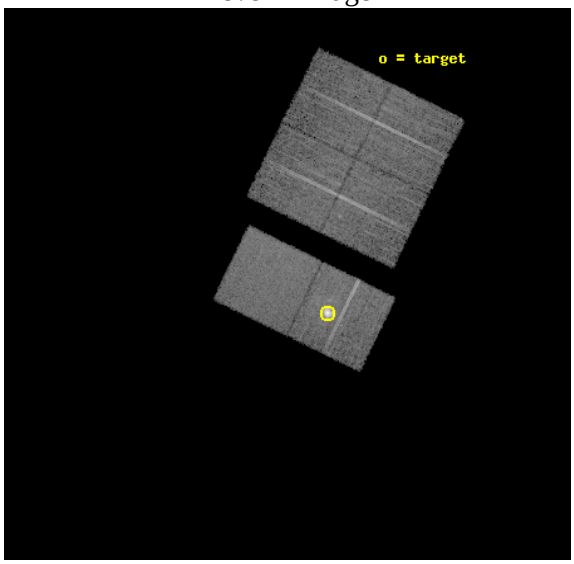


2 OBI

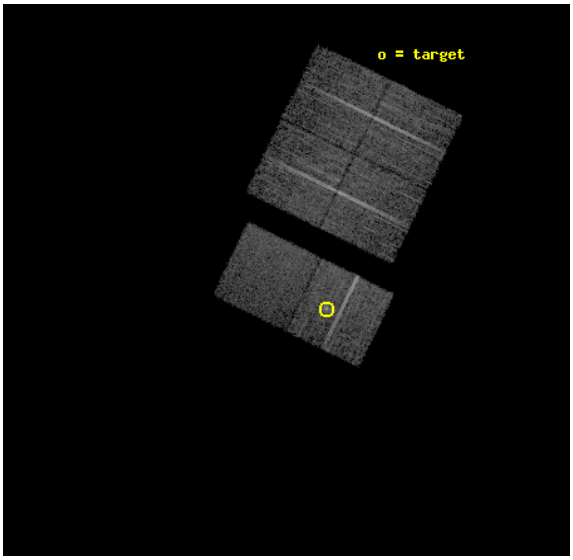
2.1 OBI

2.1.1 Images

Level 1 Image

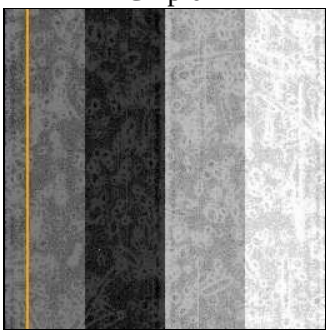


Level 1 Bad Events

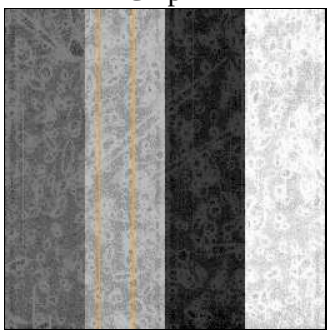


2.1.2 Bias

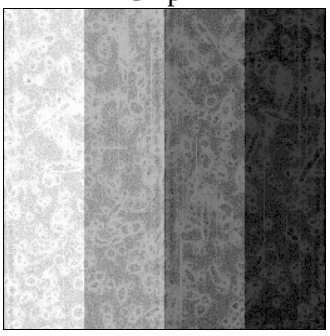
Chip 0



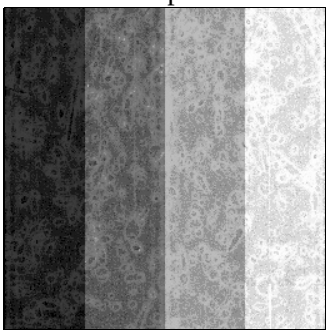
Chip 1



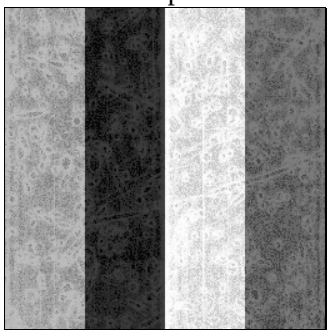
Chip 2



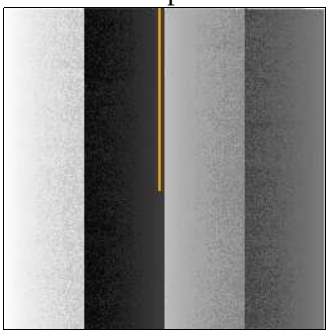
Chip 3



Chip 6



Chip 7



2.1.3 Parameters

obi_num	0	Obi number
ascdsver	8.4.5	Processing system revision
caldbver	4.5.1.1	
date	2012-08-30T03:40:01	Date and time of file creation
revision	5	Processing version of data

sched_exp_time	7560.000000	[s] Scheduled observation exposure time
ontime	7318.4000068009	Sum of GTIs [s]
ontime0	7318.4000068009	Sum of GTIs [s]
ontime1	7318.4000068009	Sum of GTIs [s]
ontime2	7318.4000068009	Sum of GTIs [s]
ontime3	7318.4000068009	Sum of GTIs [s]
ontime6	7318.4000068009	Sum of GTIs [s]
ontime7	7318.4000068009	Sum of GTIs [s]
l1events	331490	Number of level 1 events

2.1.4 Events

	ccd 0	**ccd 1**	**ccd 2**	**ccd 3**	**ccd 6**	**ccd 7**
level 1 events	51224	46183	50627	50596	75113	57747
rejected events	45722	40665	45279	45404	47490	35657
rejected %	89%	88%	89%	89%	63%	61%

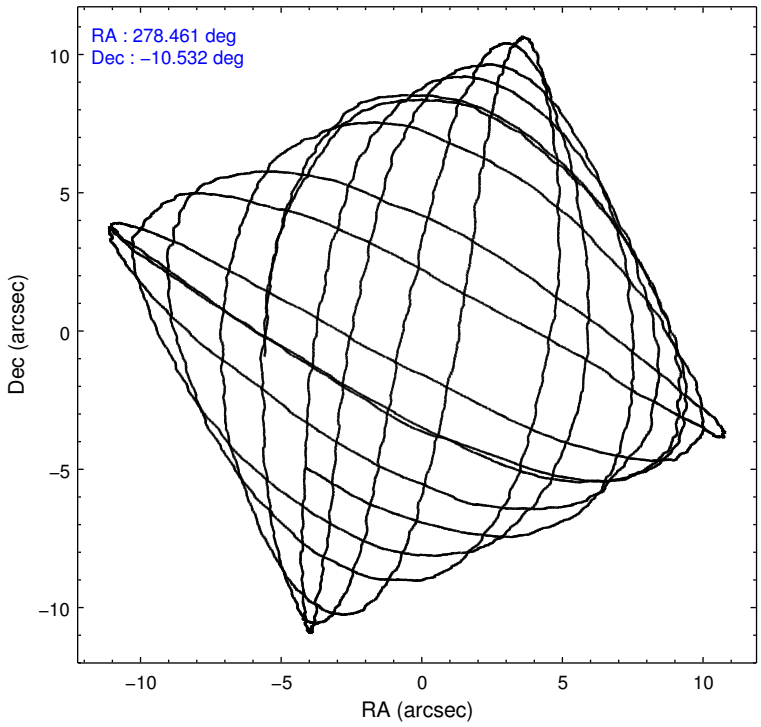
	ccd 0	**ccd 1**	**ccd 2**	**ccd 3**	**ccd 6**	**ccd 7**
grade 0 events	1397	1328	1260	1135	11354	1371
	2%	2%	2%	2%	15%	2%
grade 1 events	10	9	6	3	77	22
	0%	0%	0%	0%	0%	0%
grade 2 events	2077	2027	2279	2146	11321	4764
	4%	4%	4%	4%	15%	8%
grade 3 events	398	415	288	327	875	1424
	0%	0%	0%	0%	1%	2%
grade 4 events	363	372	307	301	865	1236
	0%	0%	0%	0%	1%	2%
grade 5 events	1089	1084	881	1032	1308	3558
	2%	2%	1%	2%	1%	6%
grade 6 events	1272	1382	1222	1286	3232	13309
	2%	2%	2%	2%	4%	23%
grade 7 events	44618	39566	44384	44366	46081	32063
	87%	85%	87%	87%	61%	55%

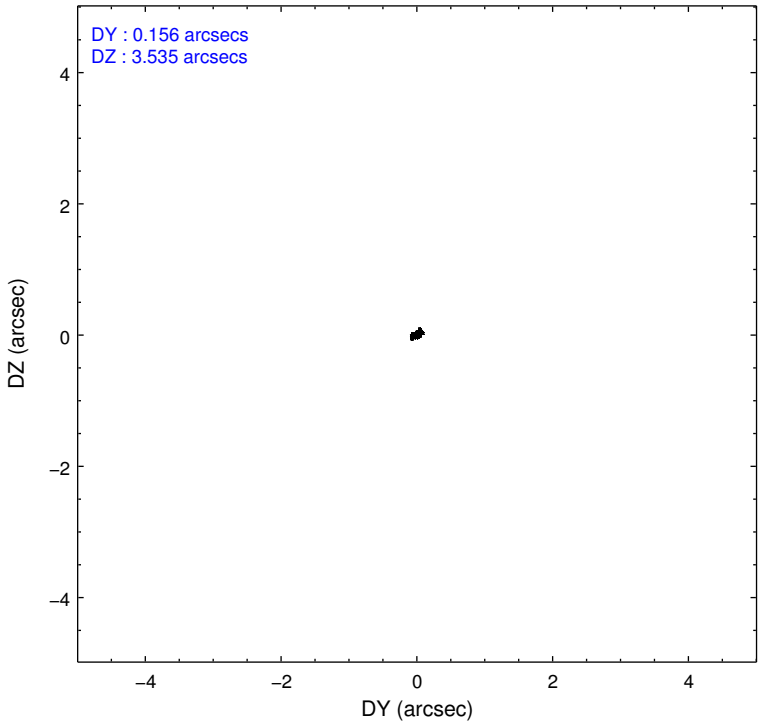
2.2 Compared Parameters

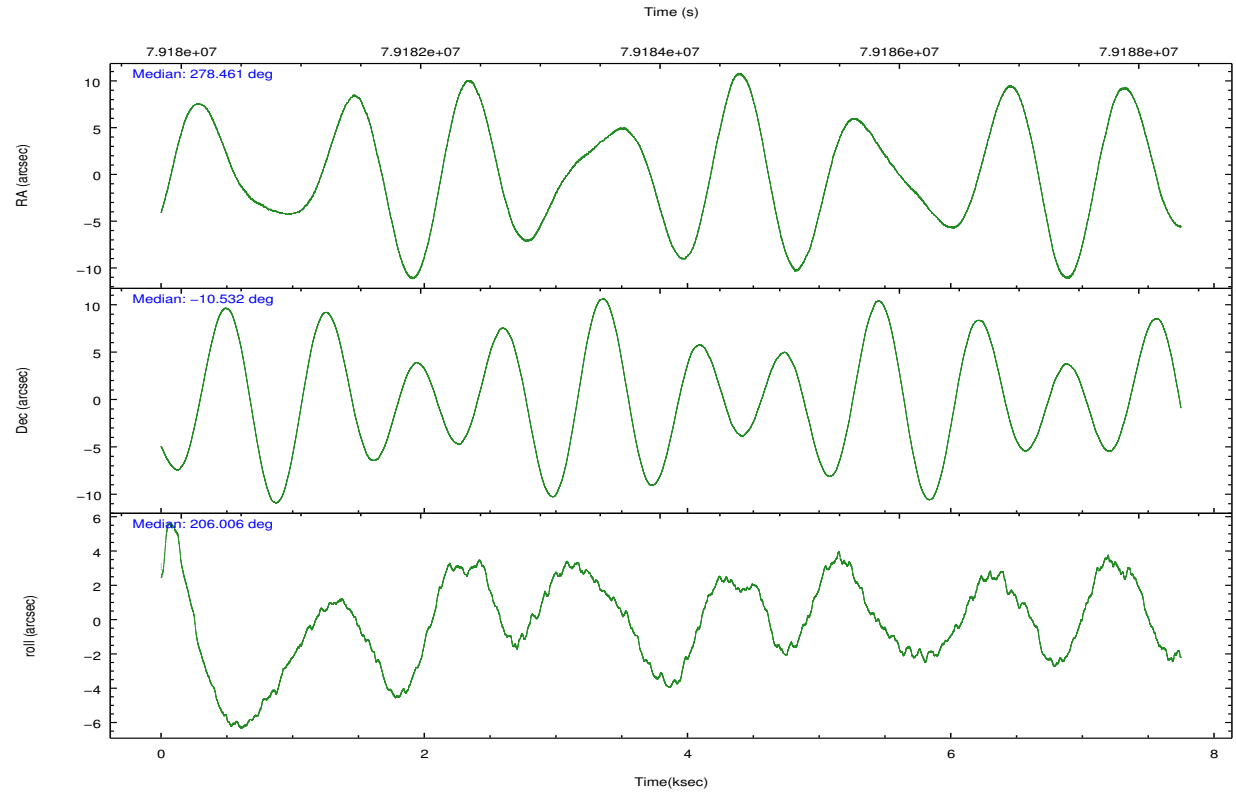
Parameter	Planned	Actual
Instrument	ACIS	ACIS
Detector	ACIS-012367	ACIS-012367
Grating	NONE	NONE
Data mode	FAINT	FAINT
Observation mode	POINTING	POINTING
[deg] Pointing RA	278.476606	278.4612130767251
[deg] Pointing Dec	-10.509650	-10.53243263396973
[deg] Pointing Roll	205.863107	206.0169307018546
[mm] SIM focus pos	-0.684267	-0.6828225247311905
[mm] SIM defocus	0	0.001444936568705701
[mm] SIM translation stage pos	-189.459123	-189.4561722878476
[mm] SIM translation stage offset	-0.6734	-0.6763502951602334
[s] Observation start time (MET)	79180406.184000	79180029.86637799
Observation start date	2000-07-05T10:32:22	2000-07-05T10:27:09
[s] Observation end time (MET)	79187966.184000	79188099.69167601
Observation end date	2000-07-05T12:38:22	2000-07-05T12:41:39
Read mode	TIMED	TIMED

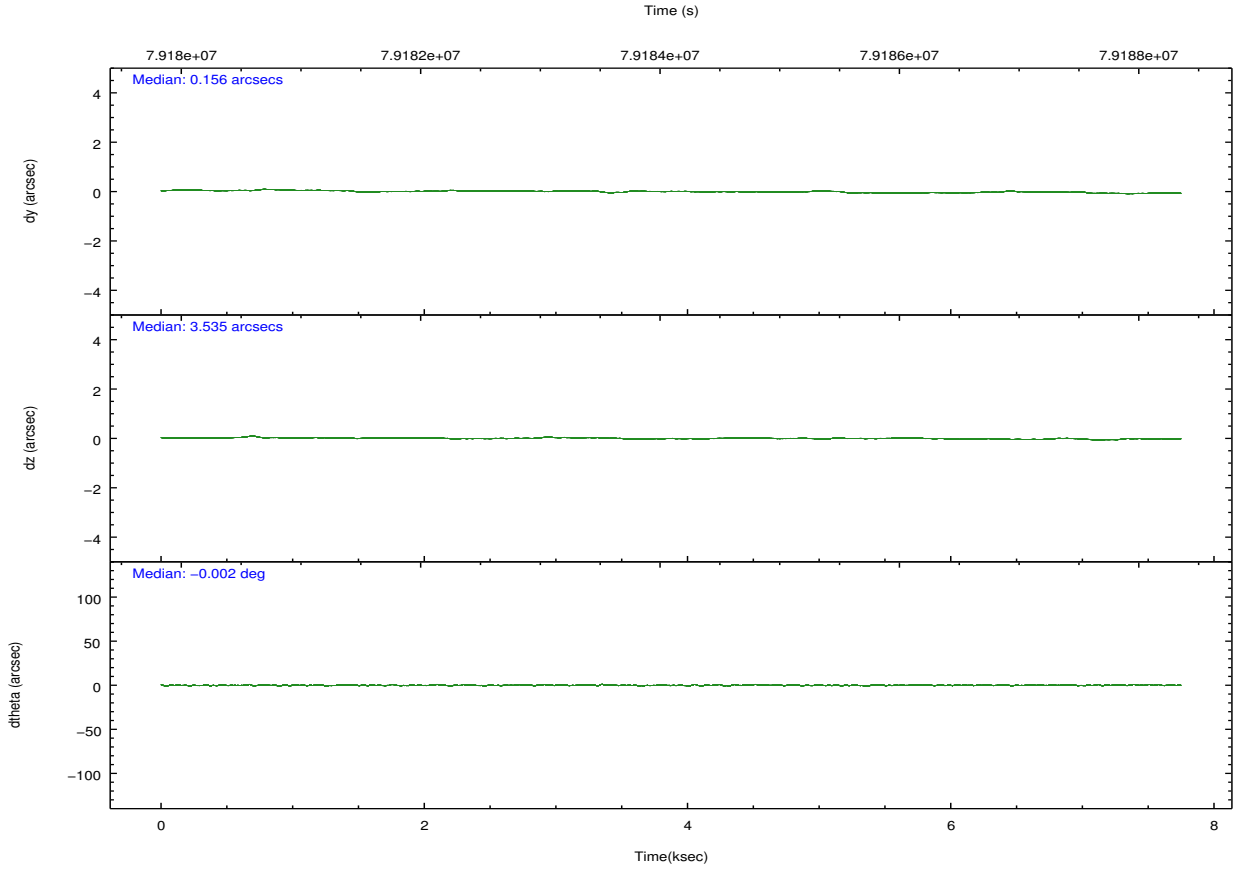
Parameter	Planned	Actual
Obspar format version number	7	7
Obspar file type	PREDICTED	ACTUAL
Obspar update status	NONE	UPDATED
Number of optional ACIS chips dropped	0	0
On-chip summing requested	N	N
Subarray requested	NONE	NONE
Alternating exposures requested	N	N
[s] Primary exposure time	0.000000	3.2

2.3 Aspect


RA : 278.461 deg
Dec : −10.532 deg
Dec (arcsec)
RA (arcsec)
10
5
0
−5
−10
−10
−5
0
5
10


DY : 0.156 arcsecs
DZ : 3.535 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
−2
−4
−4
−2
0
2
4


Time (s)
7.918e+07
7.9182e+07
7.9184e+07
7.9186e+07
7.9188e+07
Median: 278.461 deg
RA (arcsec)
Median: −10.532 deg
Dec (arcsec)
Median: 206.006 deg
roll (arcsec)
Time(ksec)

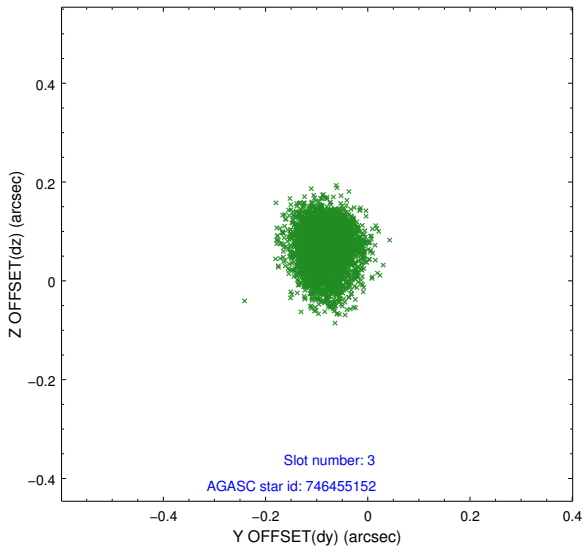

Time (s)
7.918e+07
7.9182e+07
7.9184e+07
7.9186e+07
7.9188e+07
Median: 0.156 arcsecs
dy (arcsec)
Median: 3.535 arcsecs
dz (arcsec)
Median: −0.002 deg
dtheta (arcsec)
Time(ksec)

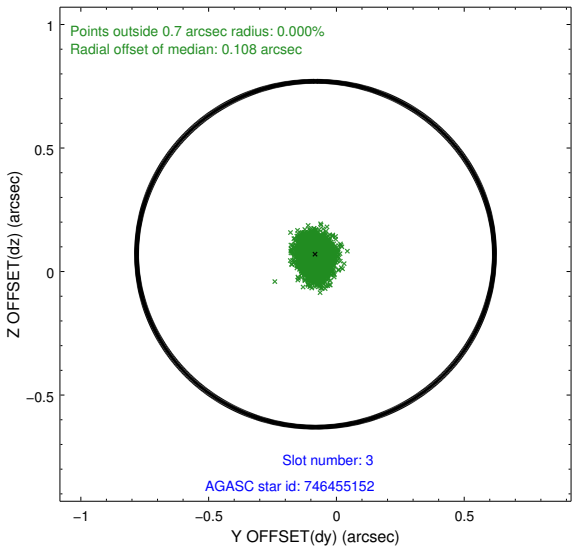
Slot Statistics

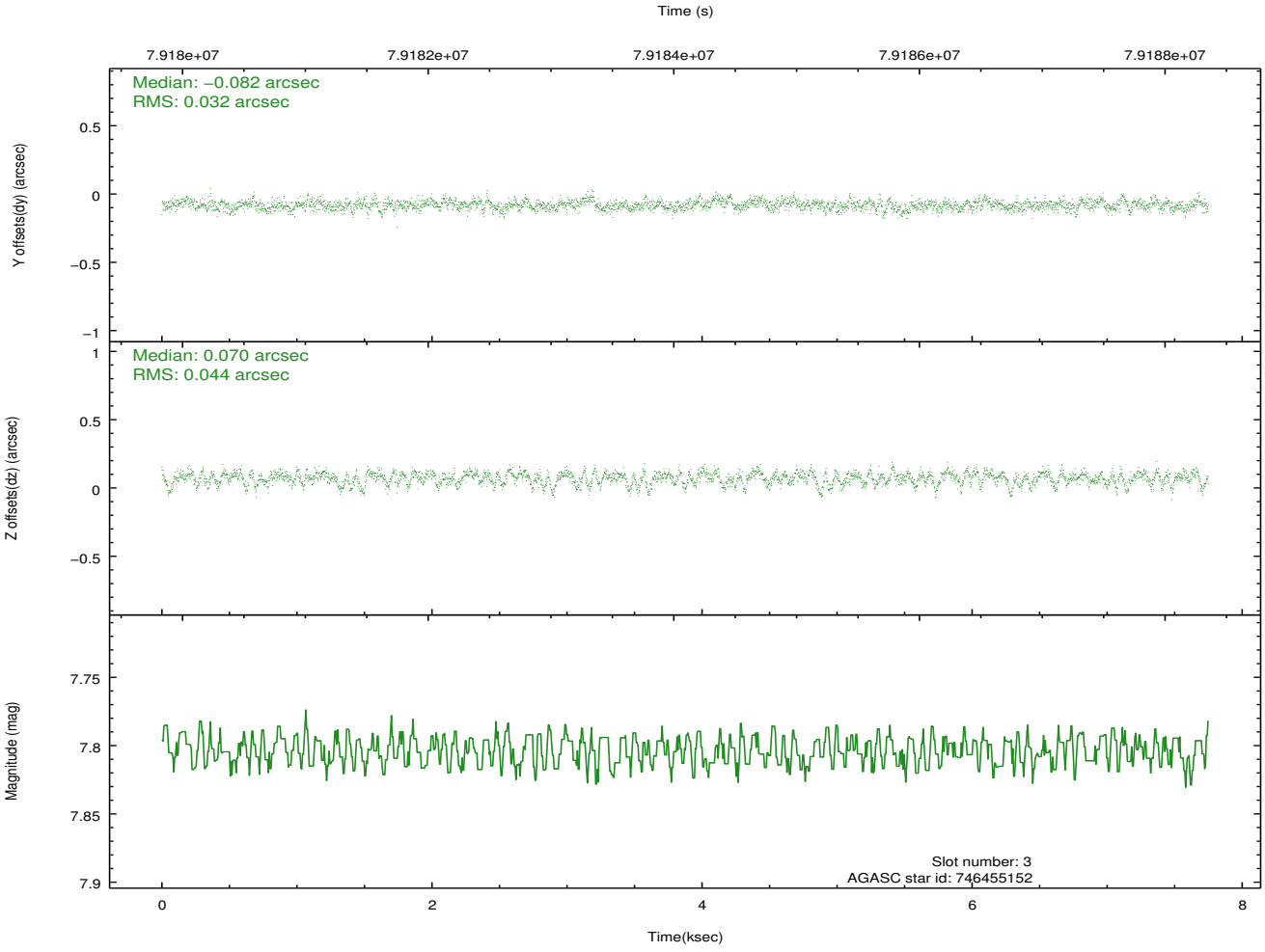
slot	status	id	mag	n_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mean_z
0	FID	ACIS-S-3	7.36	1890	-0.037	-0.088	0.007	0.012	0.000000	0.000000	60.44	-1867.85
1	FID	ACIS-S-4	7.20	1889	0.058	0.062	0.006	0.010	0.000000	0.000000	2160.77	168.96
2	FID	ACIS-S-5	7.24	1888	-0.050	0.036	0.006	0.011	0.000000	0.000000	-1804.62	163.62
3	GUIDE	746455152	7.80	3777	-0.082	0.070	0.057	0.095	278.447893	-9.976732	-744.93	-1770.34
4	GUIDE	746462456	8.38	3781	-0.041	-0.024	0.069	0.114	278.652171	-10.530173	-527.02	337.68
5	GUIDE	746462392	8.55	3781	-0.120	-0.072	0.078	0.131	279.038421	-10.890715	-1188.58	2102.87
6	GUIDE	746455112	8.93	3780	0.210	-0.040	0.064	0.107	278.266531	-10.703234	972.71	304.37
7	GUIDE	746460328	9.81	3775	0.025	0.068	0.100	0.166	278.603974	-9.898096	-1366.08	-1783.55

2.4 Star Slots

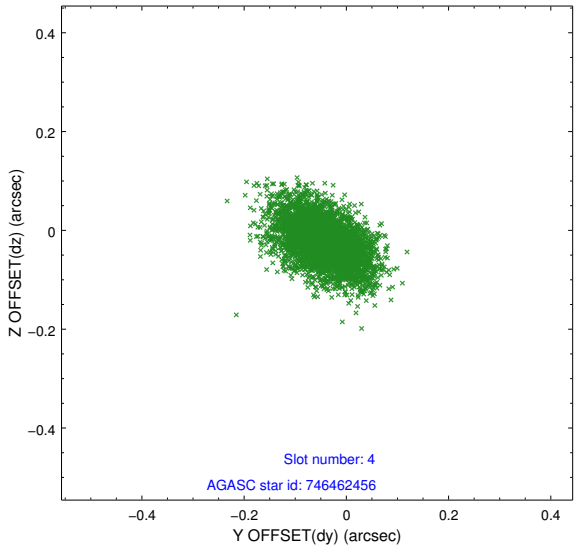
2.4.1 Slot 3

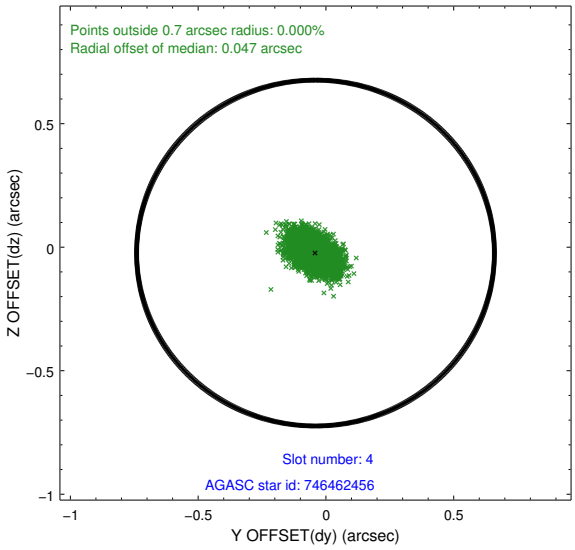


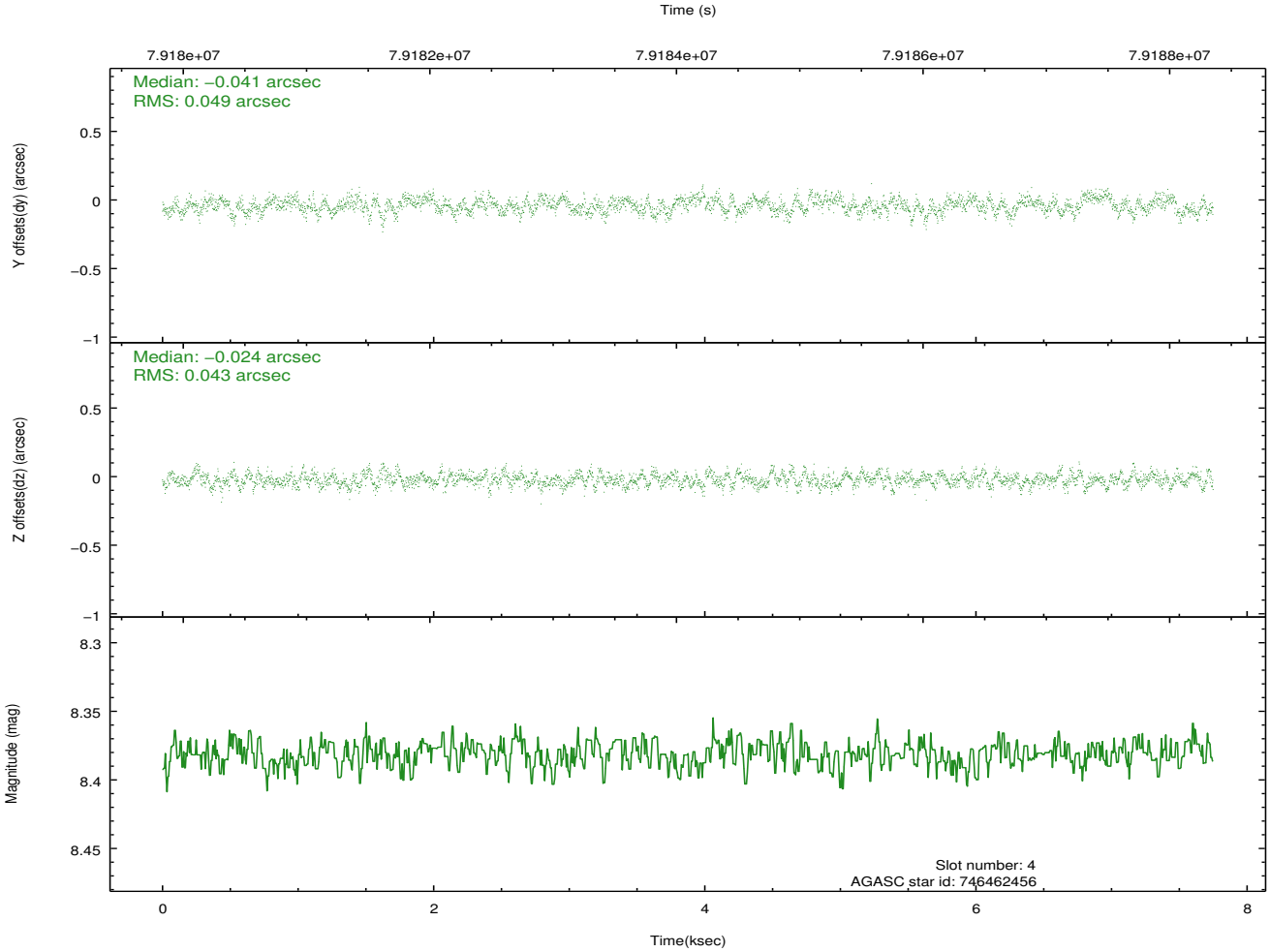




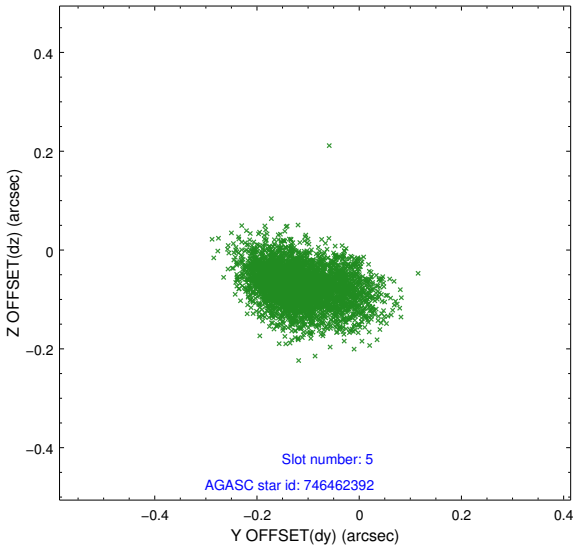
2.4.2 Slot 4

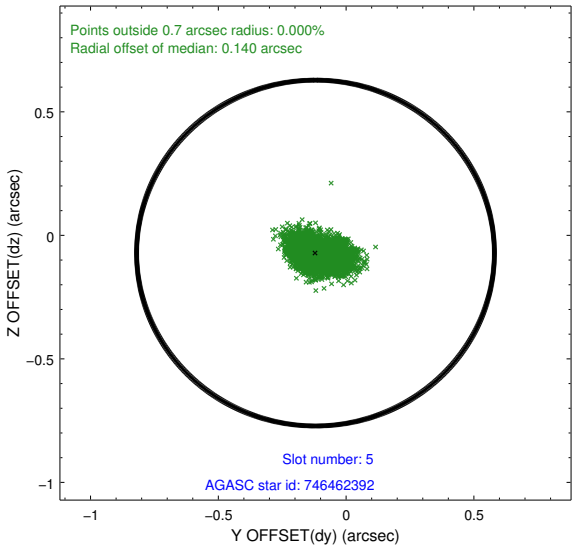

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 746462456

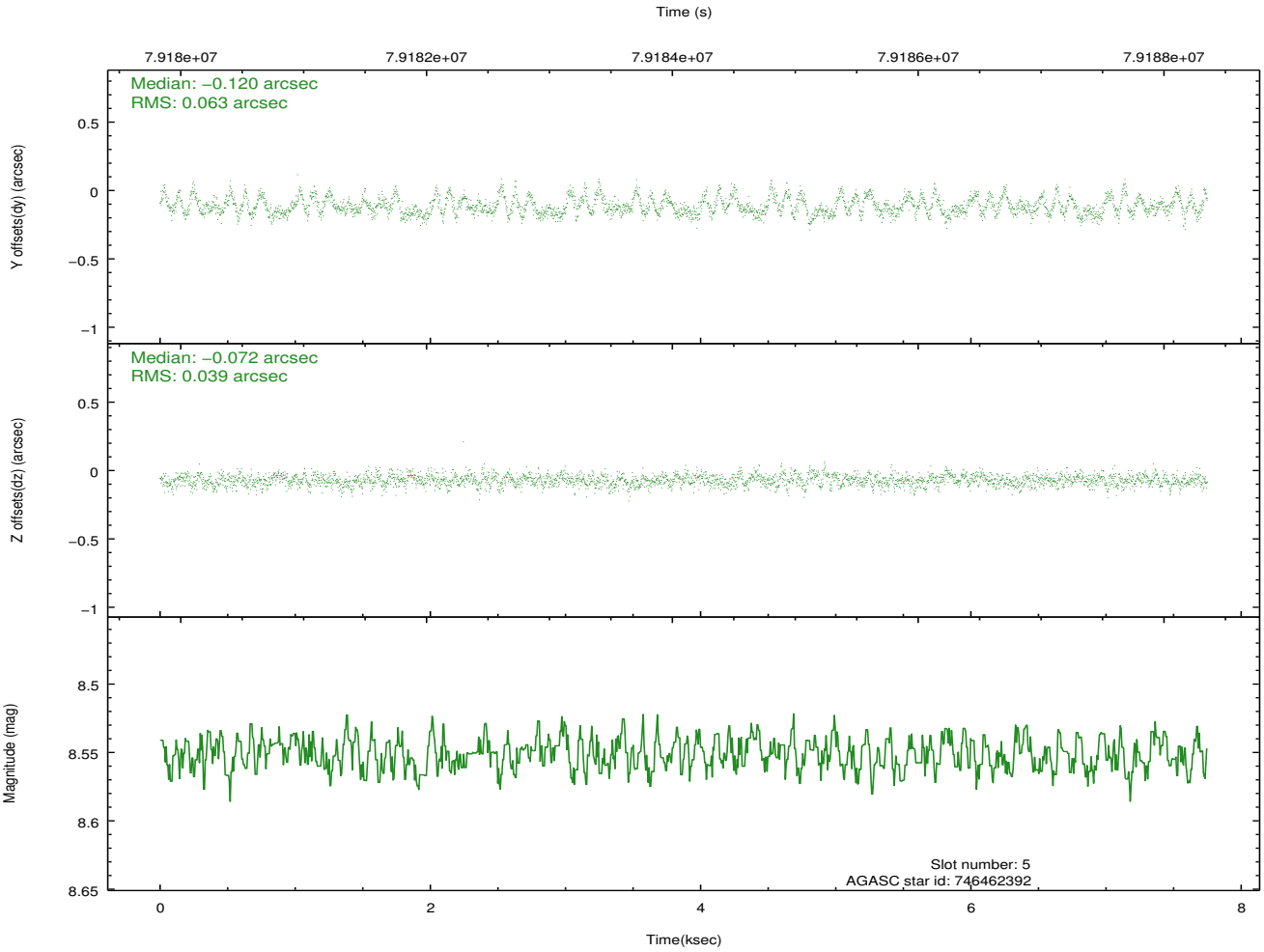

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.047 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 746462456


Time (s)
7.918e+07
7.9182e+07
7.9184e+07
7.9186e+07
7.9188e+07
Median: −0.041 arcsec
RMS: 0.049 arcsec
Y offsets(dy) (arcsec)
Median: −0.024 arcsec
RMS: 0.043 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 746462456
Time(ksec)

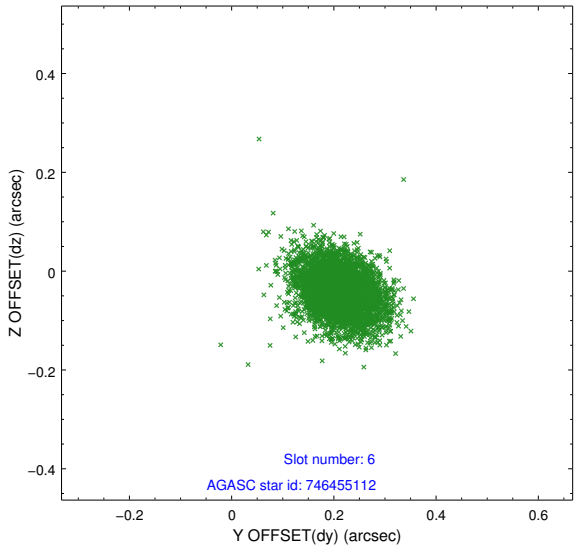
2.4.3 Slot 5

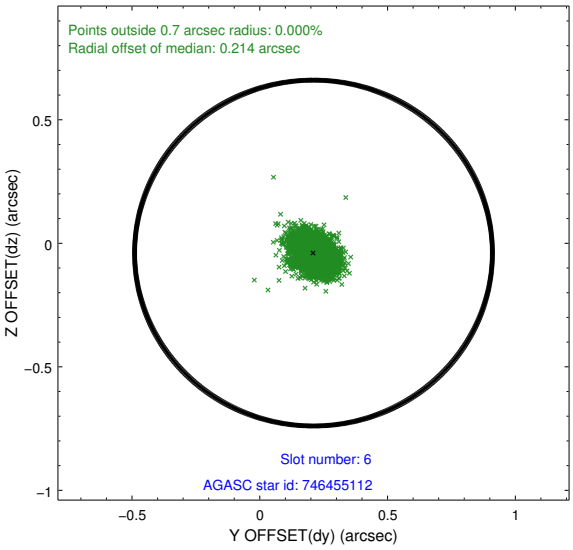

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 746462392

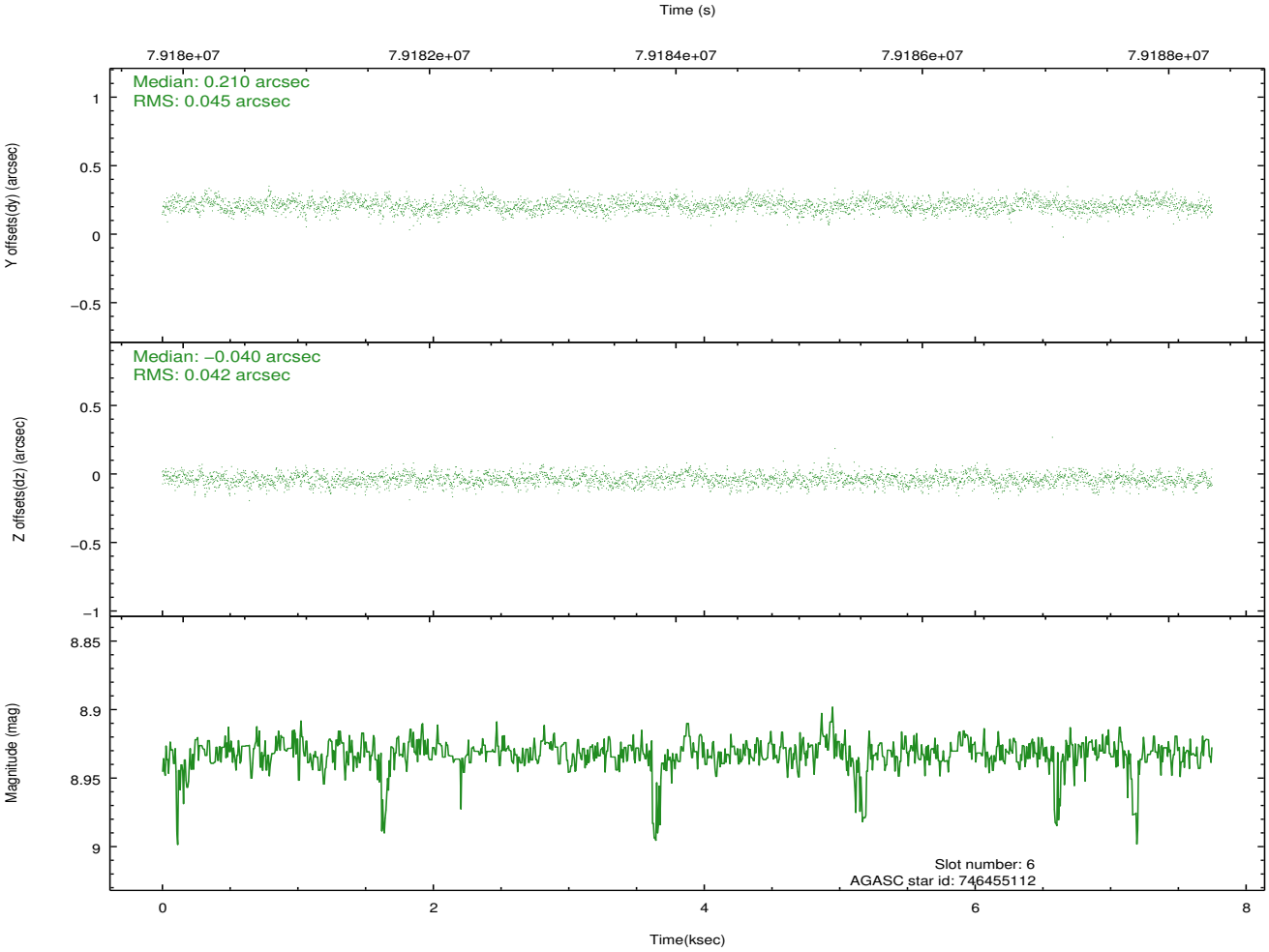

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.140 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 746462392


Time (s)
7.918e+07
7.9182e+07
7.9184e+07
7.9186e+07
7.9188e+07
Median: −0.120 arcsec
RMS: 0.063 arcsec
Y offsets(dy) (arcsec)
Median: −0.072 arcsec
RMS: 0.039 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 746462392
Time(ksec)

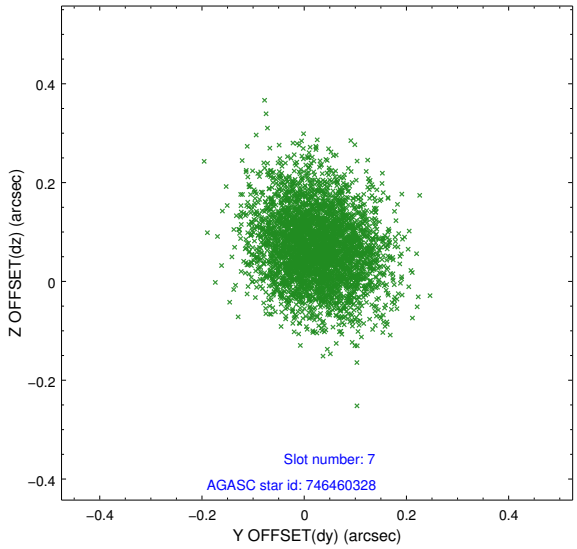
2.4.4 Slot 6

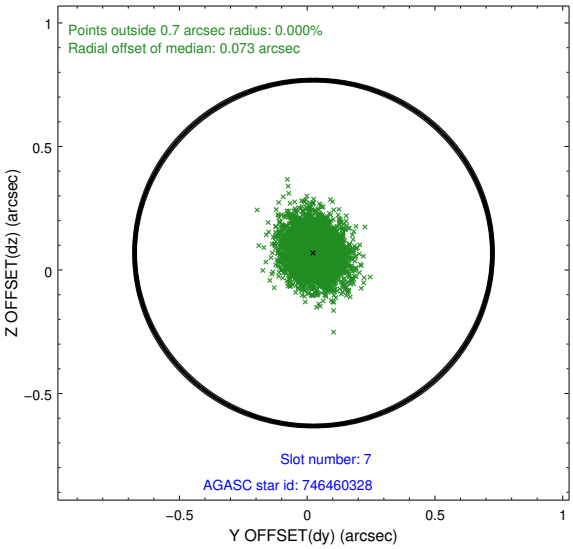

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 746455112

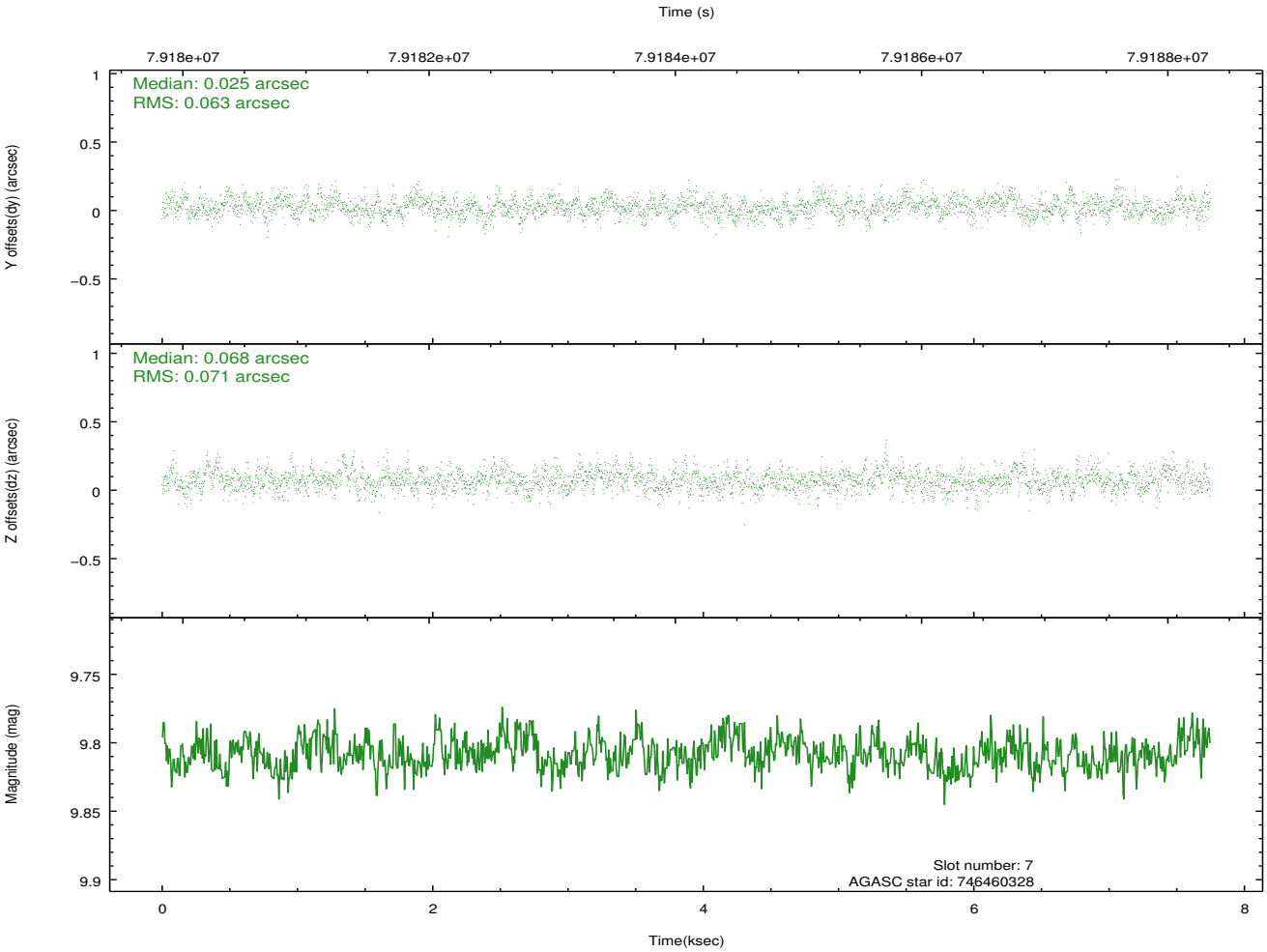

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.214 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 746455112


Time (s)
7.918e+07
7.9182e+07
7.9184e+07
7.9186e+07
7.9188e+07
Median: 0.210 arcsec
RMS: 0.045 arcsec
Y offsets(dy) (arcsec)
Median: −0.040 arcsec
RMS: 0.042 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 746455112
Time(ksec)

2.4.5 Slot 7

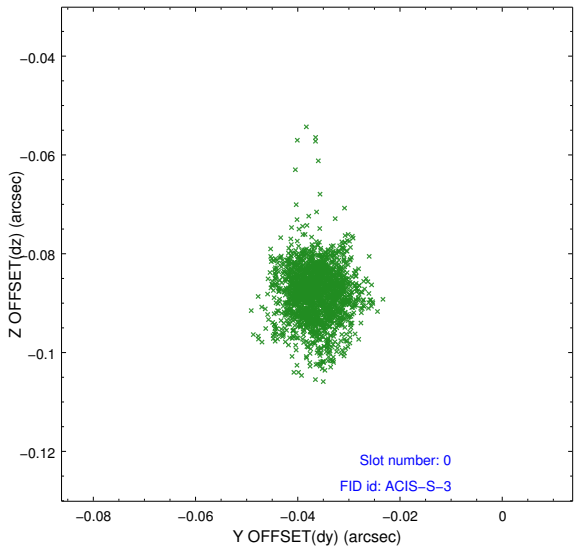

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 746460328

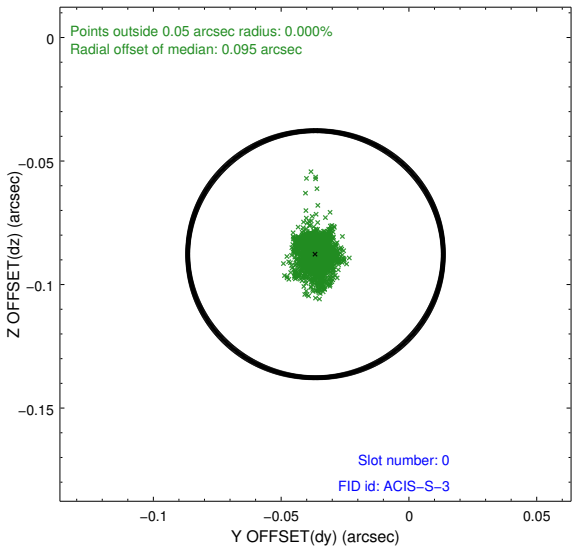

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.073 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 746460328

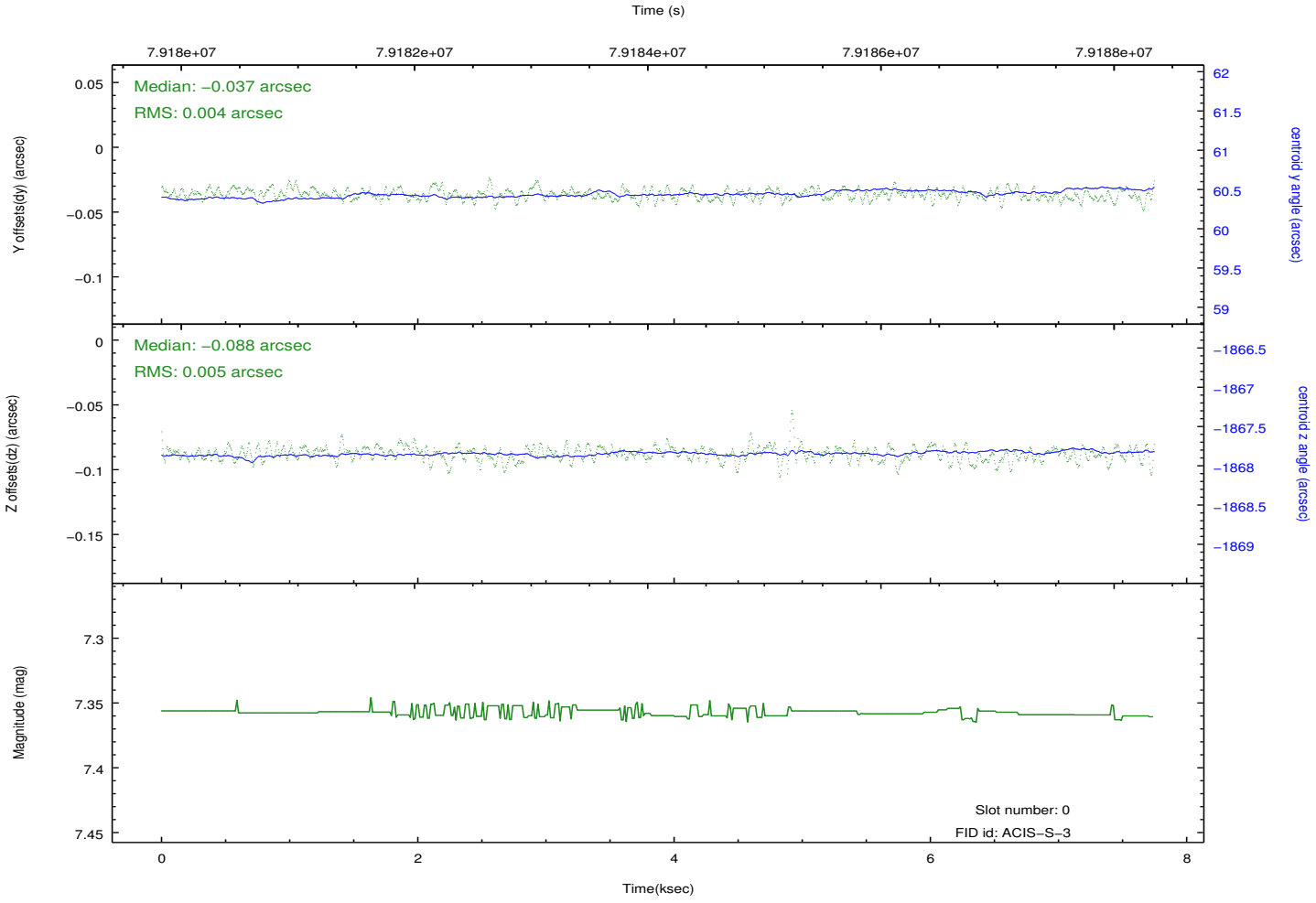

Time (s)
Median: 0.025 arcsec
RMS: 0.063 arcsec
Y offsets(dy) (arcsec)
Median: 0.068 arcsec
RMS: 0.071 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 746460328
Time(ksec)

2.5 FID Slots

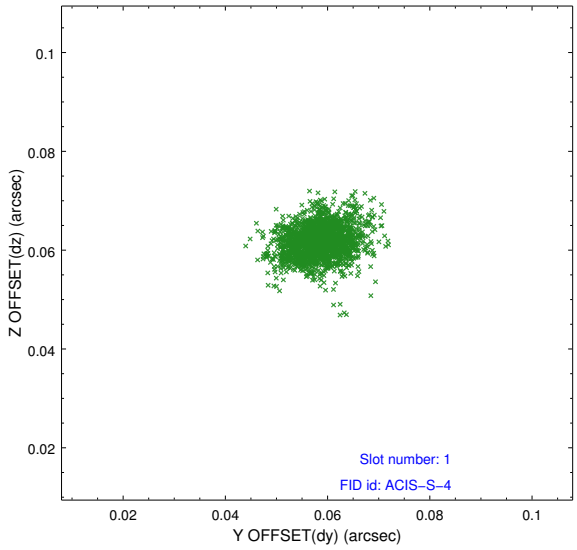
2.5.1 Slot 0

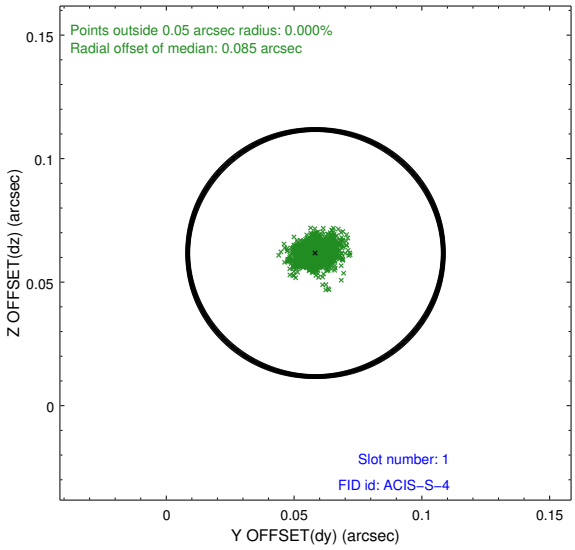


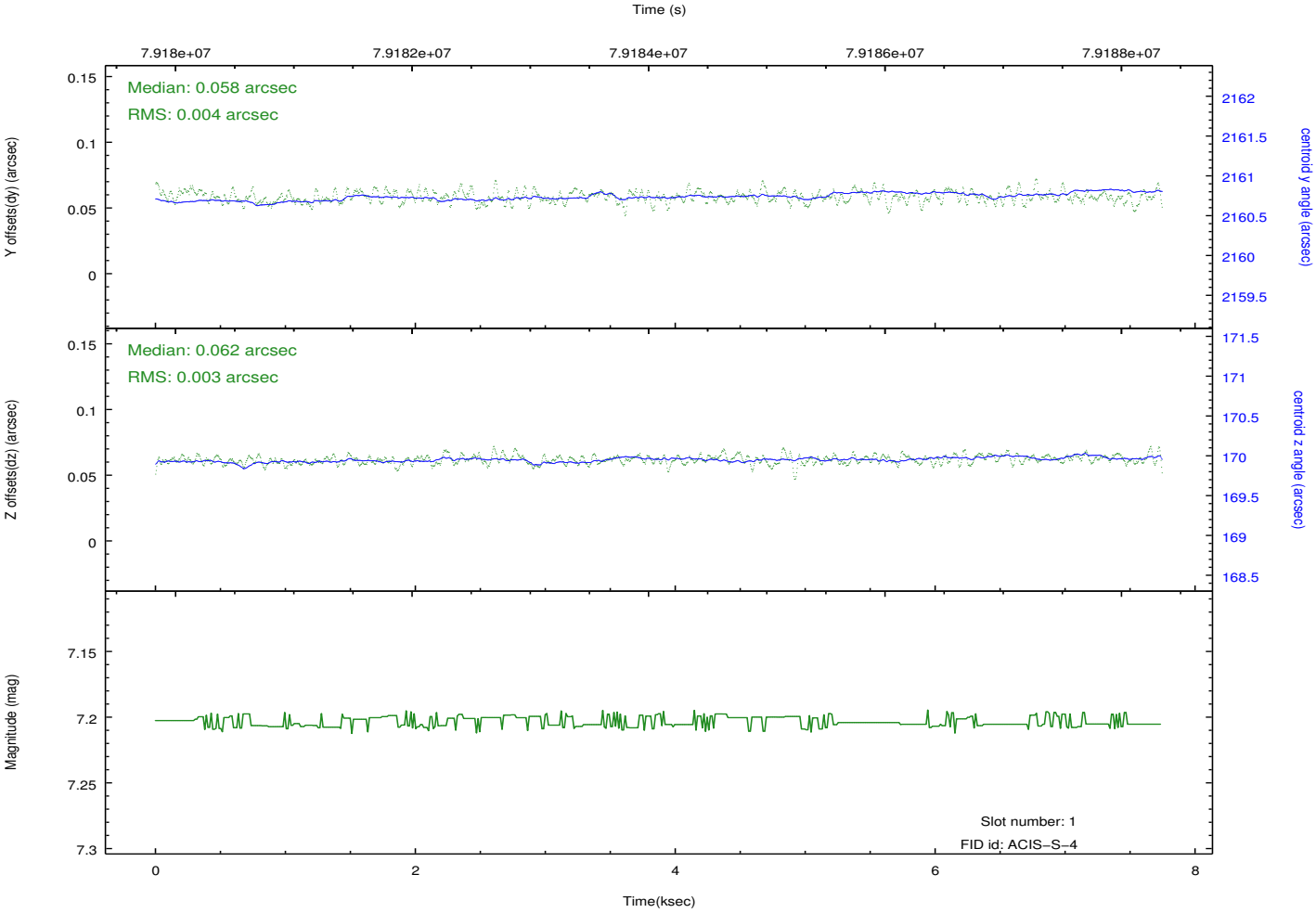




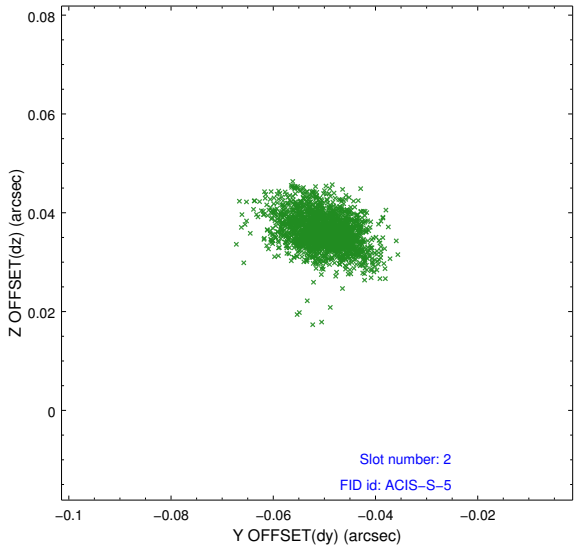
2.5.2 Slot 1

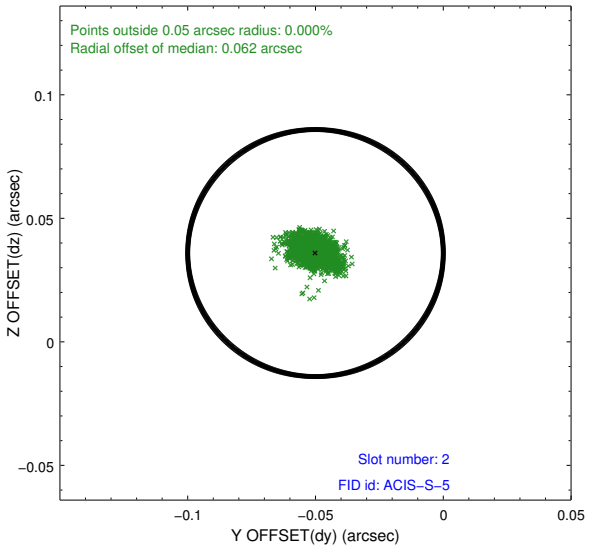

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4

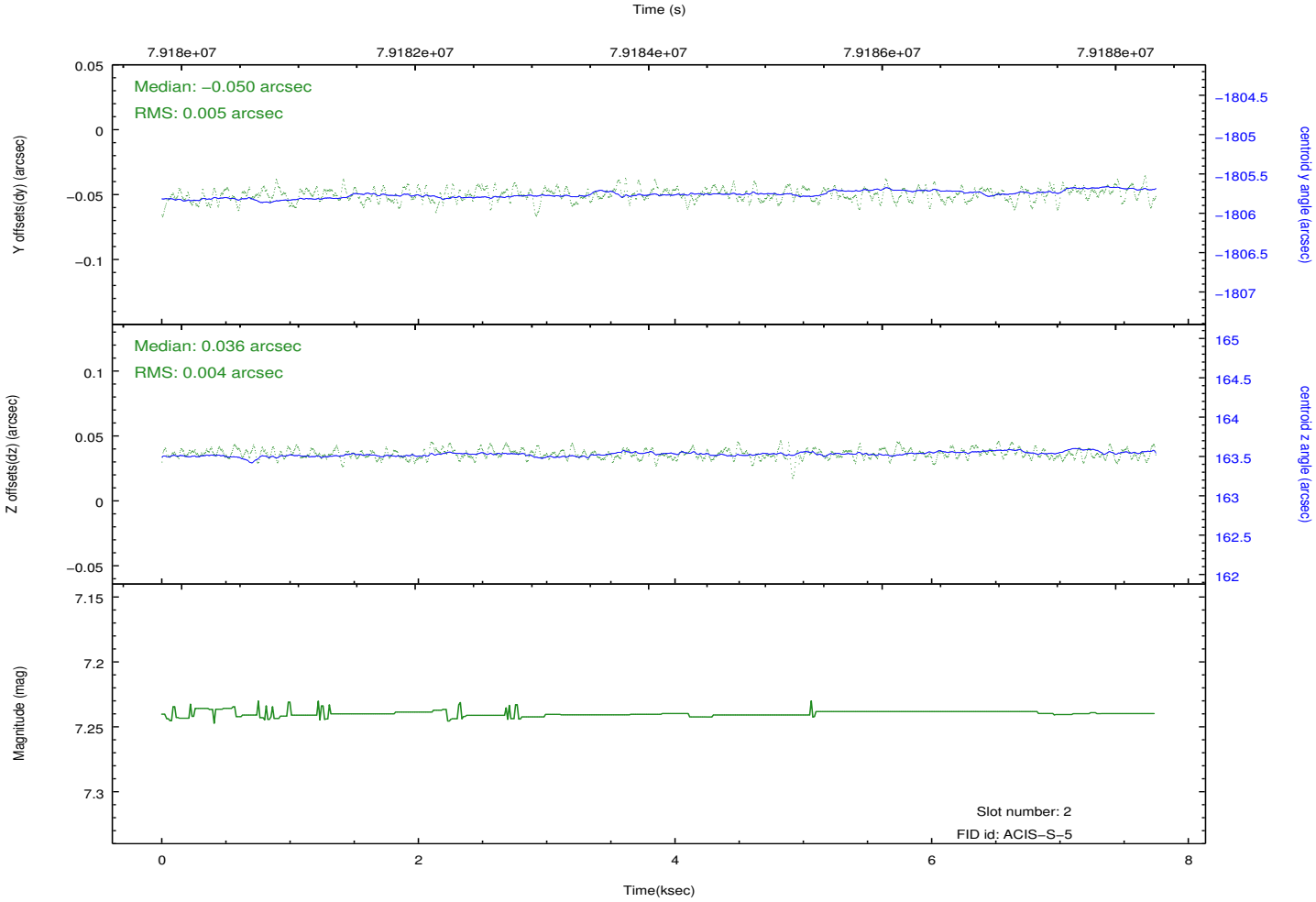

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.085 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4


Time (s)
Median: 0.058 arcsec
RMS: 0.004 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.062 arcsec
RMS: 0.003 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 1
FID id: ACIS−S−4
Time(ksec)

2.5.3 Slot 2


Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−5


Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.062 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−5


Time (s)
Median: −0.050 arcsec
RMS: 0.005 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.036 arcsec
RMS: 0.004 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 2
FID id: ACIS−S−5
Time(ksec)

A Summary

A.1 Status

V&V Scientist	Beth Sundheim
V&V Date (YYYY-MM-DD)	2018.03.05
V&V Edition	2
V&V Disposition and Status	OK
V&V Charge Time	7.324

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., -114.0 C for ACIS-I and -112.0 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.html

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.