V&V Reference Report
L2 ASCDS Version : 10.7.1

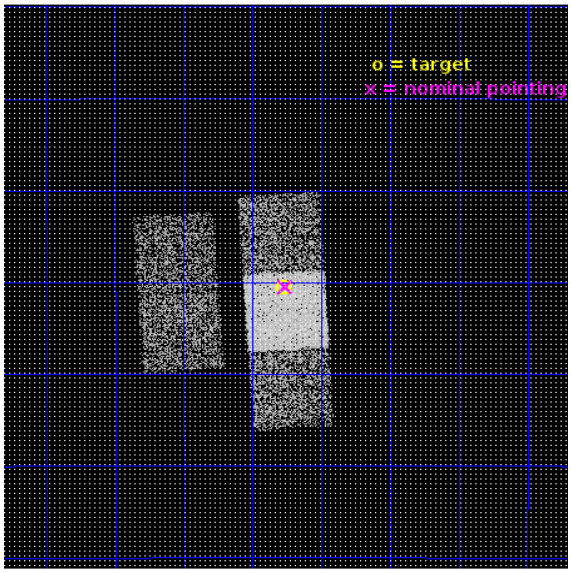
Observation 21291 - L2 Version 1
Chandra X-Ray Center

L2 Processing Date : Feb 28 2019

Contents

1 Front

seq_num	503064	Sequence number
obs_id	21291	Observation id
title	Where Have All the Central Compact Objects Gone?	Proposal title
observer	Eric Gotthelf	Principal investigator
object	PSR J1744-1610	Source name
dtycycle	0	
cycle	P	events from which exps? Prim/Second/Both
ra_targ	266.06875	Observer's specified target RA [deg]
dec_targ	-16.176611	Observer's specified target Dec [deg]
ra_nom	266.06533761208	Nominal RA [deg]
dec_nom	-16.174821700121	Nominal Dec [deg]
roll_nom	86.358079026525	Nominal Roll [deg]
revision	1	Processing version of data
ontime	3548.9286539555	Sum of GTIs [s]
livetime	3502.5592884083	Livetime [s]
ontime2	3548.7644939423	Sum of GTIs [s]
ontime3	3548.8465739489	Sum of GTIs [s]
ontime6	3548.8876140118	Sum of GTIs [s]
ontime7	3548.9286539555	Sum of GTIs [s]
ontime8	3542.523363471	Sum of GTIs [s]
l2events	25420	Number of level 2 events

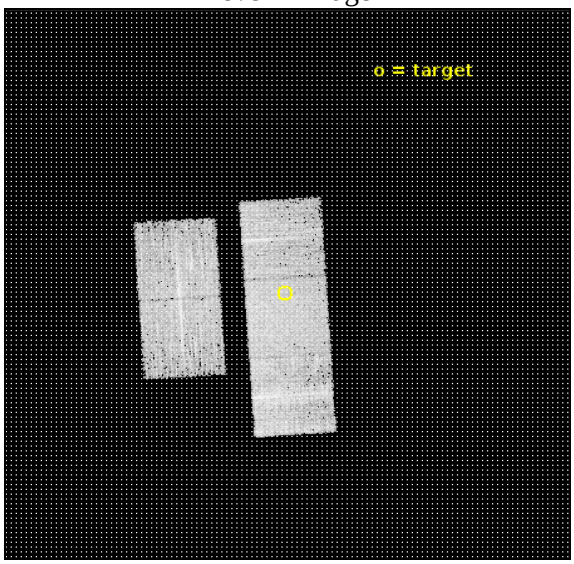


2 OBI

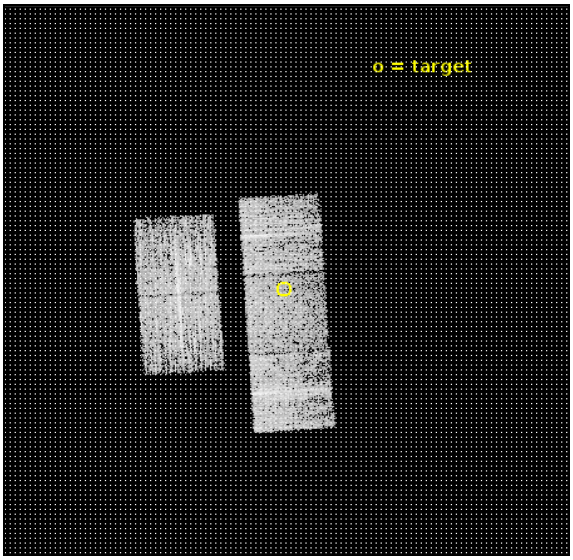
2.1 OBI

2.1.1 Images

Level 1 Image

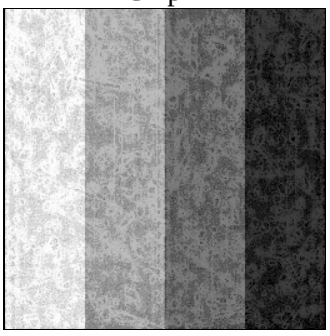


Level 1 Bad Events

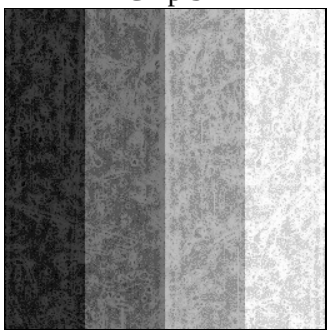


2.1.2 Bias

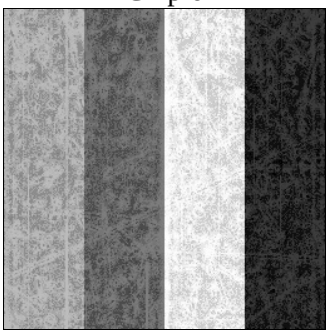
Chip 2



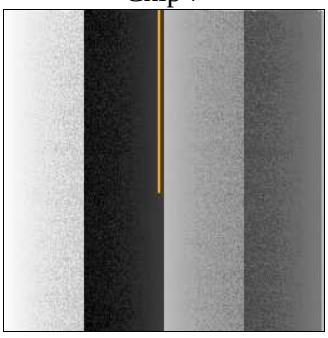
Chip 3



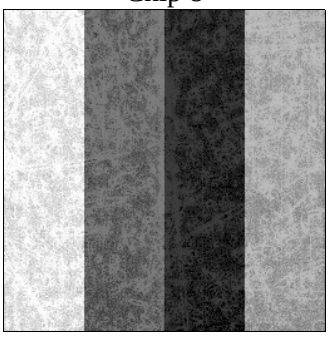
Chip 6



Chip 7



Chip 8



2.1.3 Parameters

obi_num	0	Obi number
ascdsver	10.7.1	Processing system revision
caldbver	4.8.2	
date	2019-03-01T03:14:37	Date and time of file creation
revision	1	Processing version of data

sched_exp_time	3500.000000	[s] Scheduled observation exposure time
ontime	3548.9286539555	Sum of GTIs [s]
ontime2	3548.7644939423	Sum of GTIs [s]
ontime3	3548.8465739489	Sum of GTIs [s]
ontime6	3548.8876140118	Sum of GTIs [s]
ontime7	3548.9286539555	Sum of GTIs [s]
ontime8	3542.523363471	Sum of GTIs [s]
l1events	156348	Number of level 1 events

2.1.4 Events

	ccd 2	ccd 3	ccd 6	ccd 7	ccd 8
level 1 events	28081	28171	28258	35442	36396
rejected events	25370	25361	25100	20175	27649
rejected %	90%	90%	88%	56%	75%

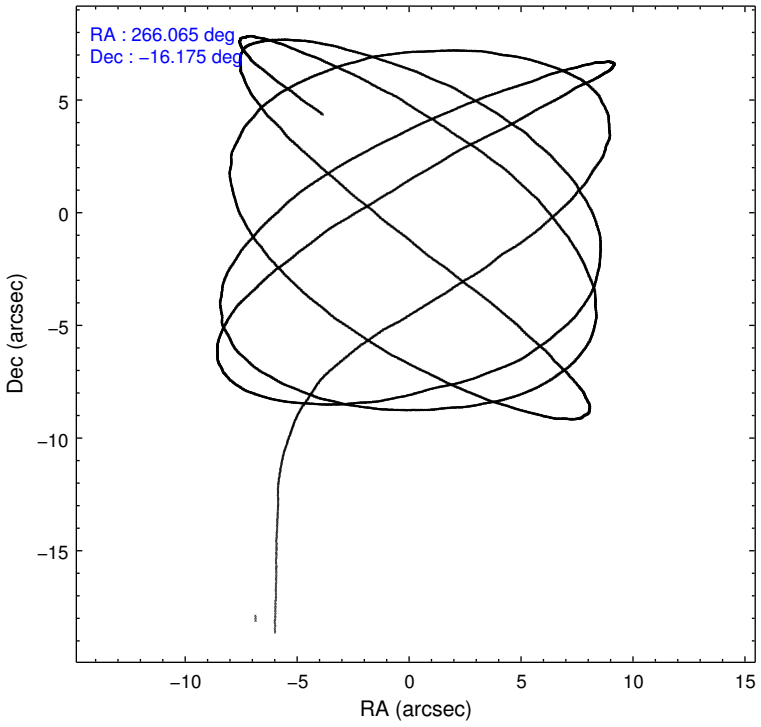
	ccd 2	ccd 3	ccd 6	ccd 7	ccd 8
grade 0 events	916	998	924	1296	2466
	3%	3%	3%	3%	6%
grade 1 events	29	13	9	56	29
	0%	0%	0%	0%	0%
grade 2 events	640	627	869	3124	2262
	2%	2%	3%	8%	6%
grade 3 events	264	286	256	1190	824
	0%	1%	0%	3%	2%
grade 4 events	297	258	231	1192	740
	1%	0%	0%	3%	2%
grade 5 events	1006	1203	1067	3374	1778
	3%	4%	3%	9%	4%
grade 6 events	598	645	878	8477	2460
	2%	2%	3%	23%	6%
grade 7 events	24331	24141	24024	16733	25837
	86%	85%	85%	47%	70%

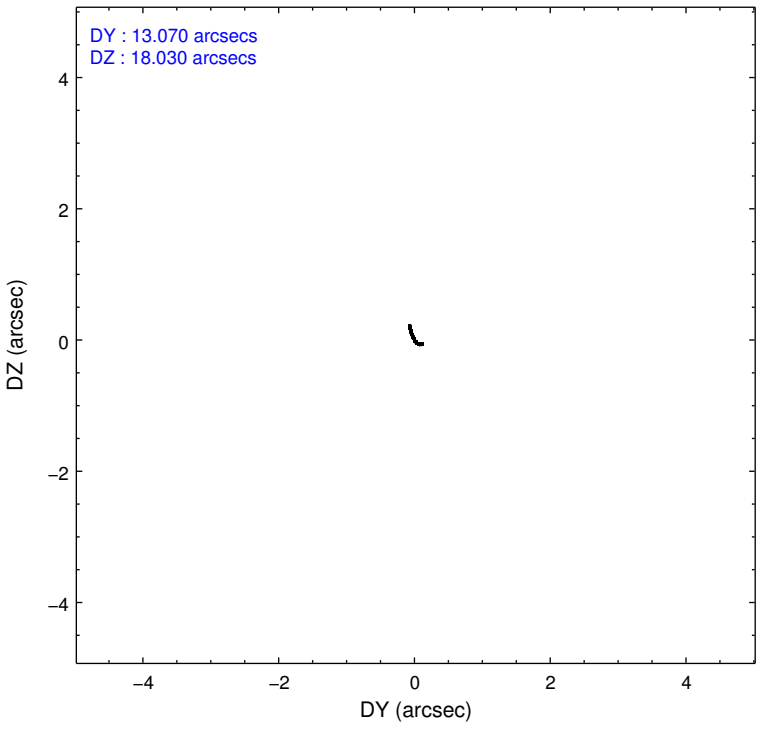
2.2 Compared Parameters

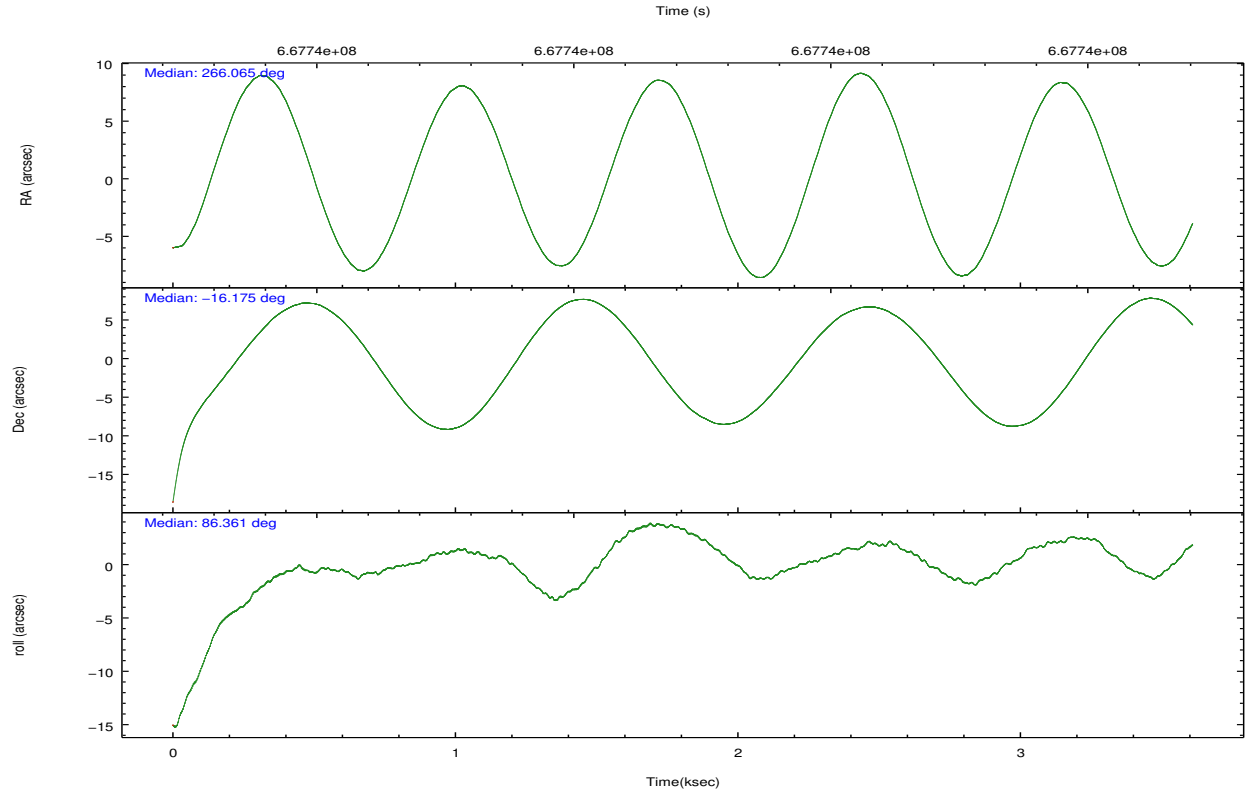
Parameter	Planned	Actual
Instrument	ACIS	ACIS
Detector	ACIS-23678	ACIS-23678
Grating	NONE	NONE
Data mode	VFAINT	VFAINT
Observation mode	POINTING	POINTING
[deg] Pointing RA	266.078397	266.0653376120765
[deg] Pointing Dec	-16.199326	-16.17482170012054
[deg] Pointing Roll	86.205135	86.35807902652515
[mm] SIM focus pos	-0.684267	-0.6828225247311905
[mm] SIM defocus	0	0.001444936568705701
[mm] SIM translation stage pos	-190.132523	-190.1425803651734
[mm] SIM translation stage offset	0	0.01005778216563158
[s] Observation start time (MET)	667741756.184000	667740602.4639699
Observation start date	2019-02-28T11:48:07	2019-02-28T11:30:02
[s] Observation end time (MET)	667745256.184000	667746194.3518
Observation end date	2019-02-28T12:46:27	2019-02-28T13:03:14
Read mode	TIMED	TIMED

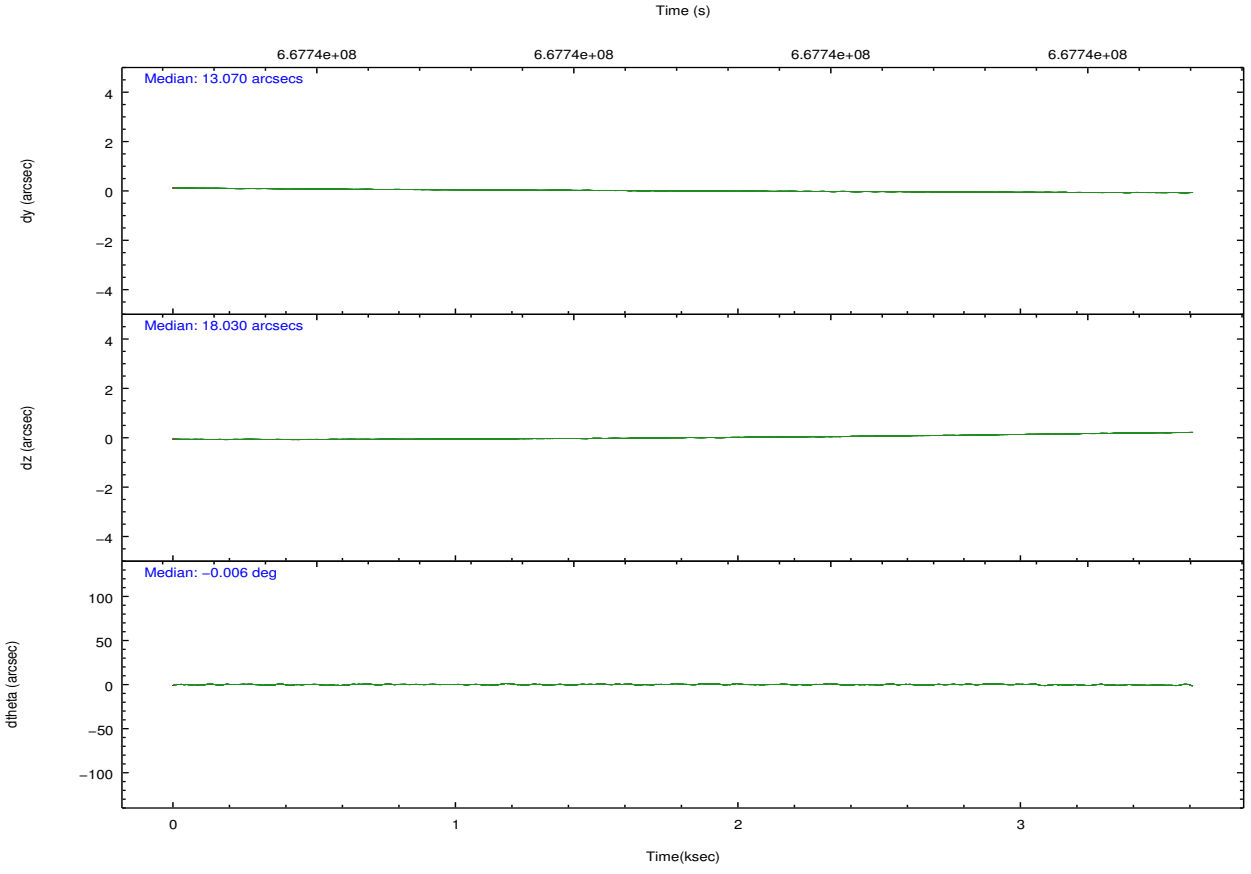
Parameter	Planned	Actual
Obspar format version number	7	7
Obspar file type	PREDICTED	ACTUAL
Obspar update status	NONE	UPDATED
CCD I0 on	N	N
CCD I1 on	N	N
CCD I2 on	O1	Y
CCD I3 on	O2	Y
CCD S0 on	N	N
CCD S1 on	N	N
CCD S2 on	Y	Y
CCD S3 on	Y	Y
CCD S4 on	Y	Y
CCD S5 on	N	N
Number of optional ACIS chips dropped	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 : 266.065 deg
Dec : −16.175 deg
Dec (arcsec)
RA (arcsec)
5
0
−5
−10
−15
−10
−5
0
5
10
15


DY : 13.070 arcsecs
DZ : 18.030 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
−2
−4
−4
−2
0
2
4


Time (s)
6.6774e+08
6.6774e+08
6.6774e+08
6.6774e+08
Median: 266.065 deg
RA (arcsec)
Median: −16.175 deg
Dec (arcsec)
Median: 86.361 deg
roll (arcsec)
Time(ksec)

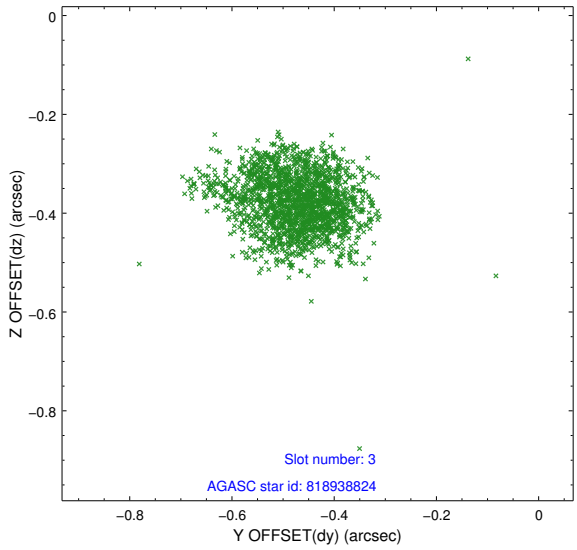

Time (s)
6.6774e+08
6.6774e+08
6.6774e+08
6.6774e+08
Median: 13.070 arcsecs
dy (arcsec)
Median: 18.030 arcsecs
dz (arcsec)
Median: −0.006 deg
dtheta (arcsec)
Time(ksec)

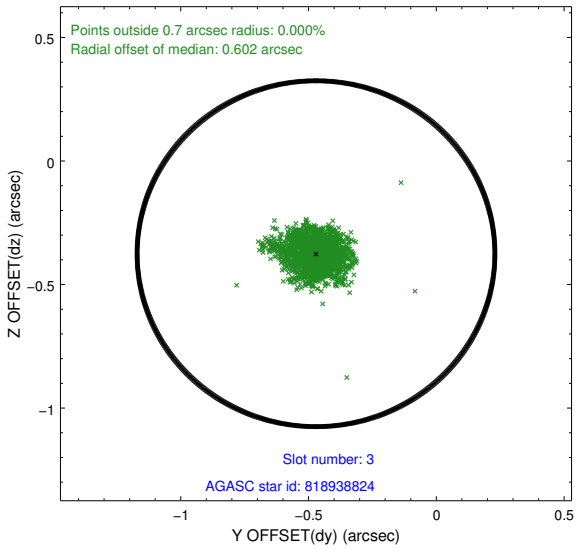
Slot Statistics

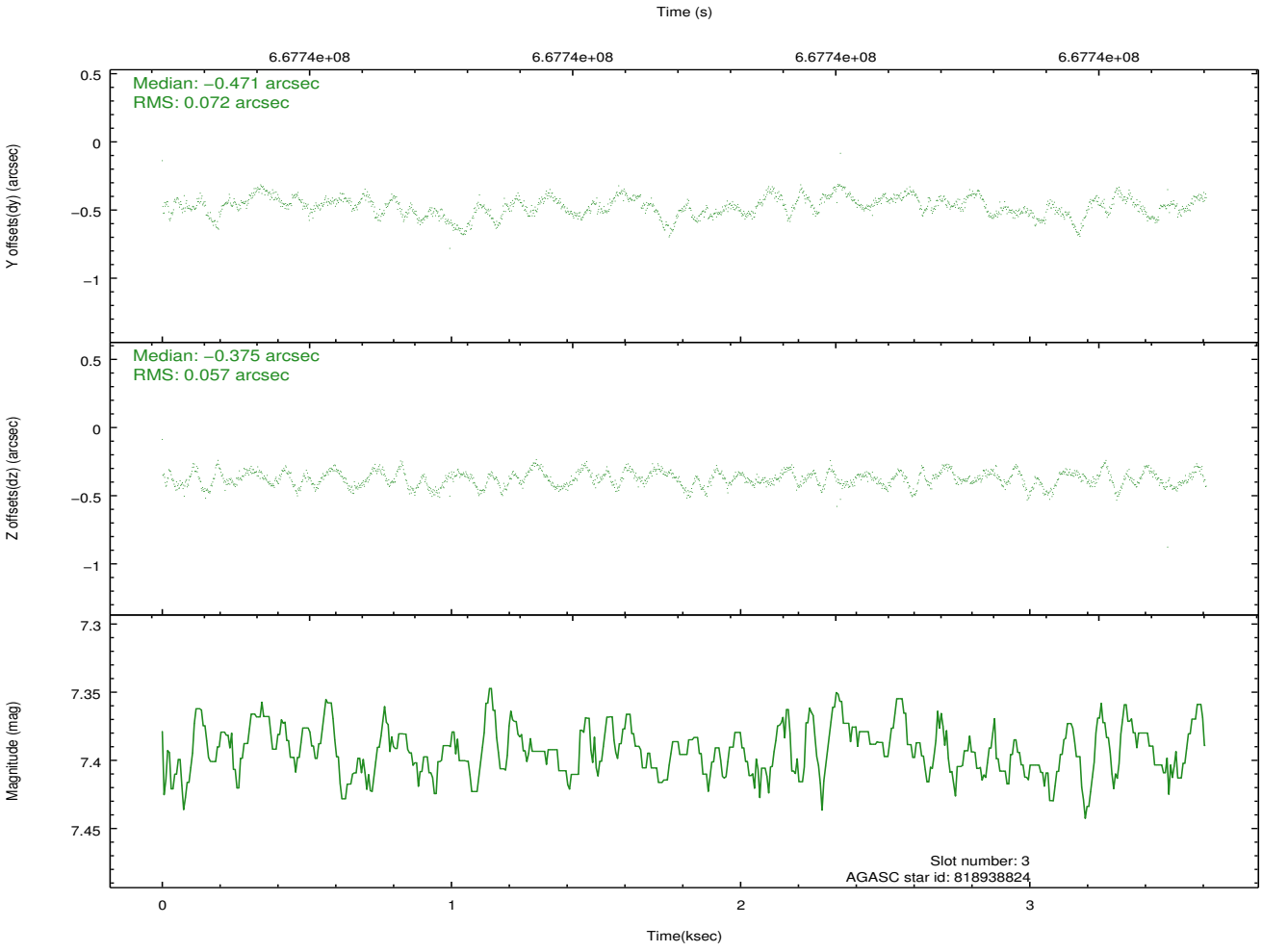
ot	status	used	id	mag	n_pts	frac_pts	med_dy	med_dz	dr1	dr2	ra	dec	mean_y	mea
0	FID		ACIS-S-2	7.14	881	1.000	-0.248	-0.237	0.007	0.011	0.000000	0.000000	-766.19	-1739
1	FID		ACIS-S-4	7.27	881	1.000	0.758	0.183	0.006	0.012	0.000000	0.000000	2147.24	167
2	FID		ACIS-S-5	7.25	881	1.000	-0.540	0.062	0.008	0.014	0.000000	0.000000	-1817.14	162
3	GUIDE	used	818938824	7.39	1762	1.000	-0.471	-0.375	0.096	0.150	265.667656	-15.559234	2202.75	1572
4	GUIDE	used	818941976	8.05	1761	1.000	-0.250	-0.400	0.089	0.156	265.738191	-15.958175	788.17	1232
5	GUIDE	used	818946584	7.90	1762	1.000	-0.385	-0.337	0.094	0.145	265.621311	-15.992931	634.71	1627
6	GUIDE	used	819075240	8.30	1761	1.000	0.395	0.458	0.105	0.182	266.651468	-16.003640	831.41	-1931
7	GUIDE	used	819073440	7.64	1761	1.000	0.708	0.665	0.097	0.145	266.081969	-16.864794	-2389.75	-171

2.4 Star Slots

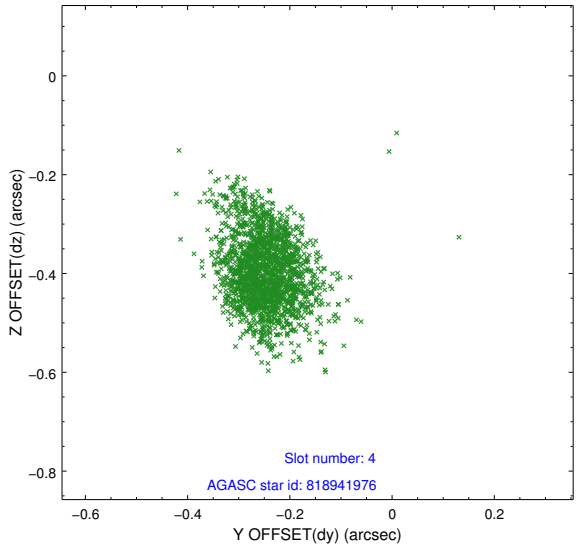
2.4.1 Slot 3

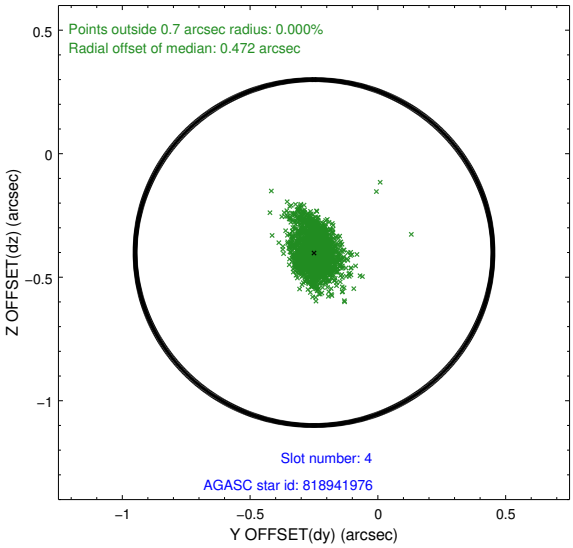


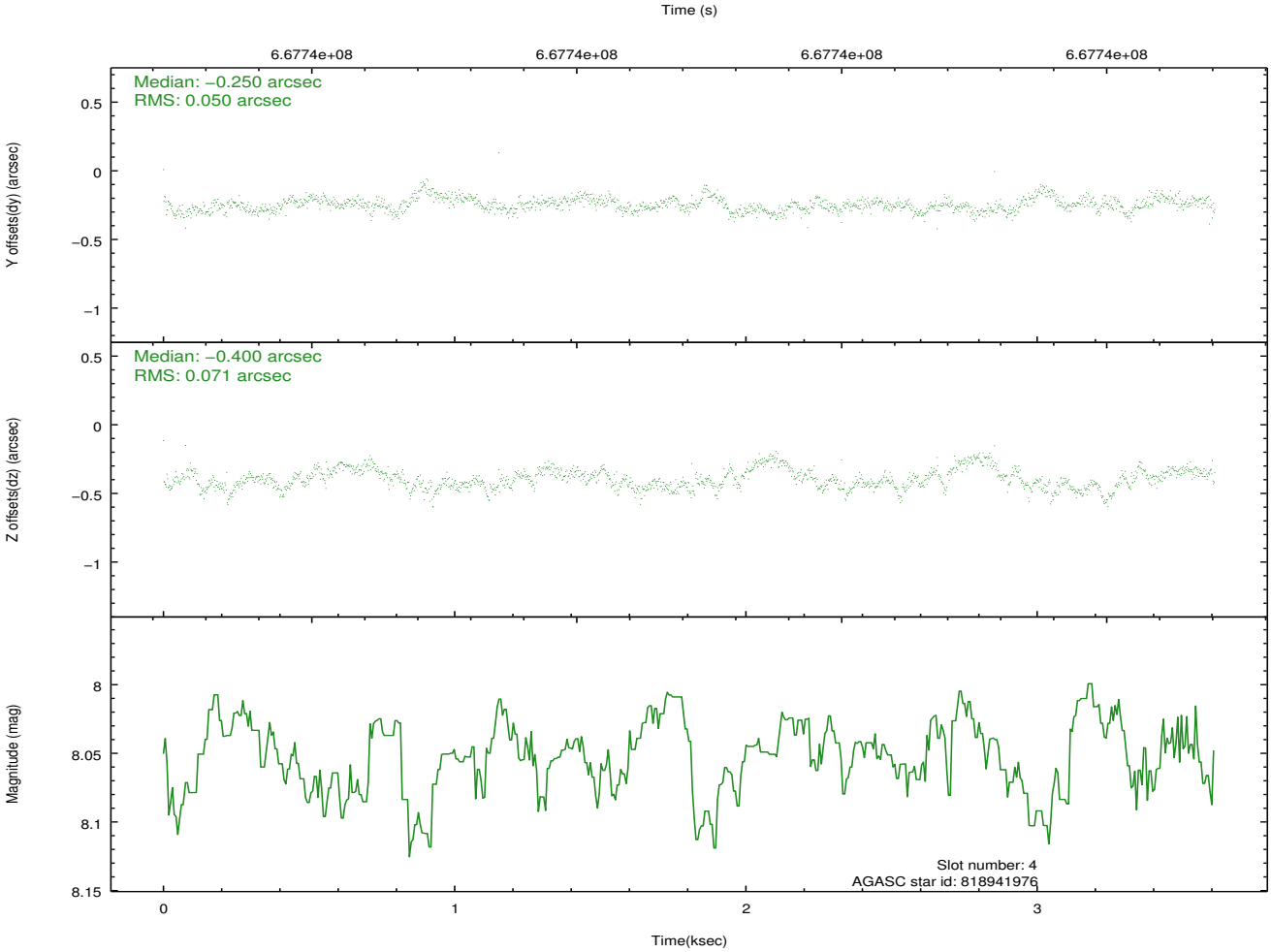




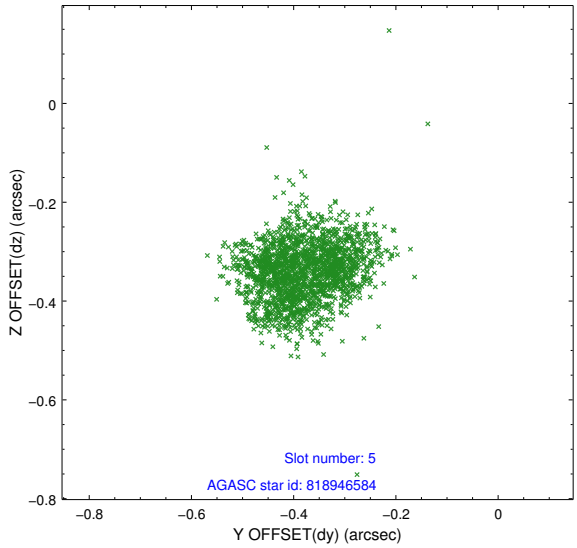
2.4.2 Slot 4

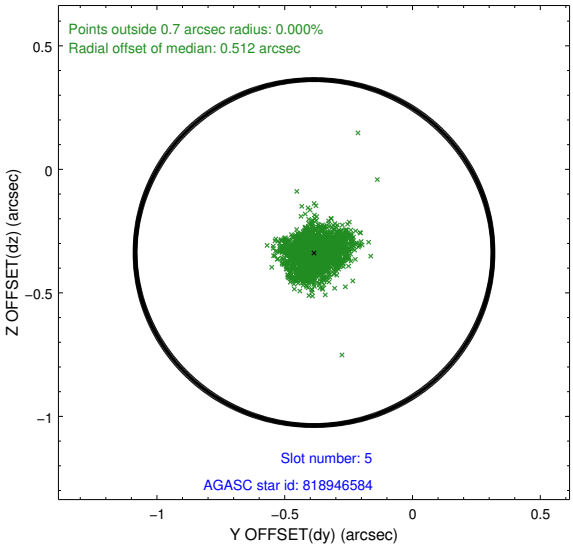

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 818941976

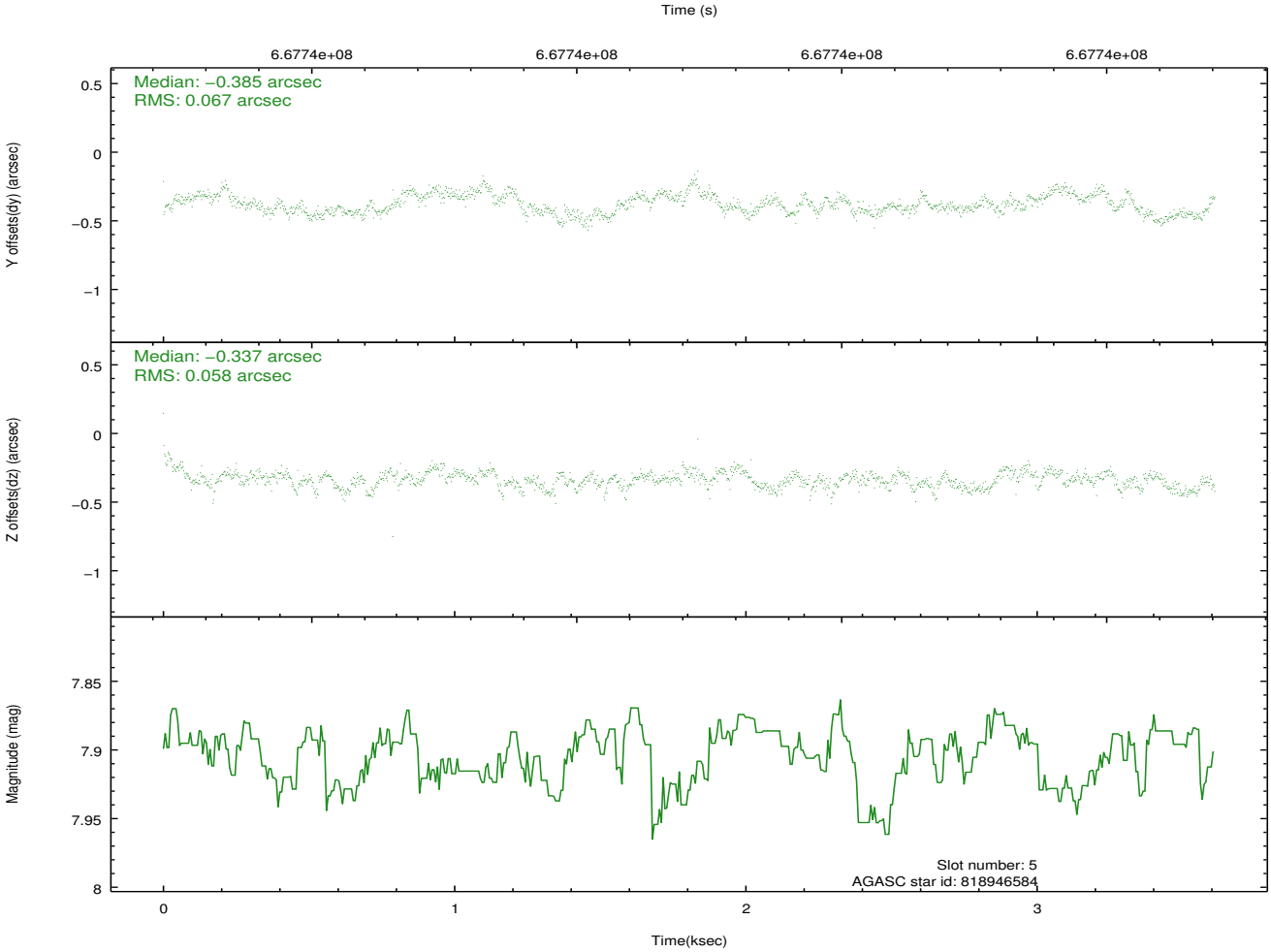

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.472 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 818941976


Time (s)
6.6774e+08
Median: −0.250 arcsec
RMS: 0.050 arcsec
Y offsets(dy) (arcsec)
Median: −0.400 arcsec
RMS: 0.071 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 818941976
Time(ksec)

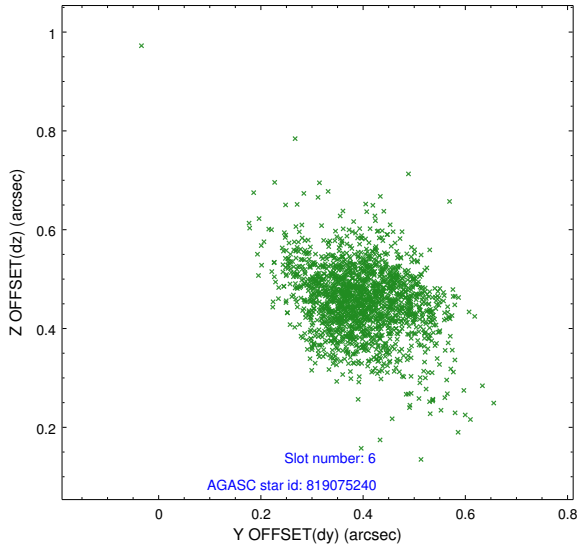
2.4.3 Slot 5

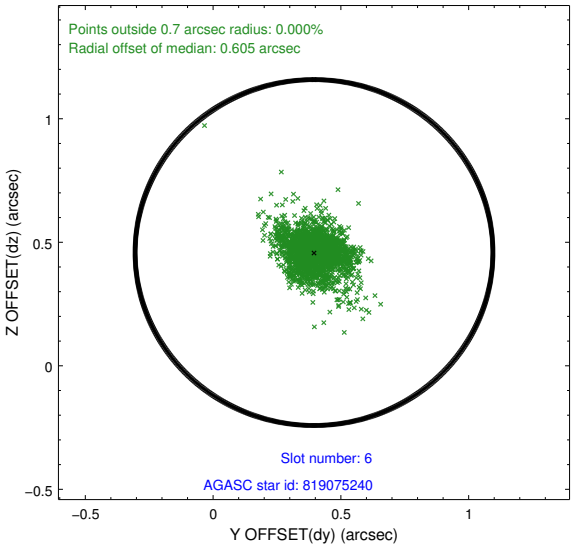

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 818946584

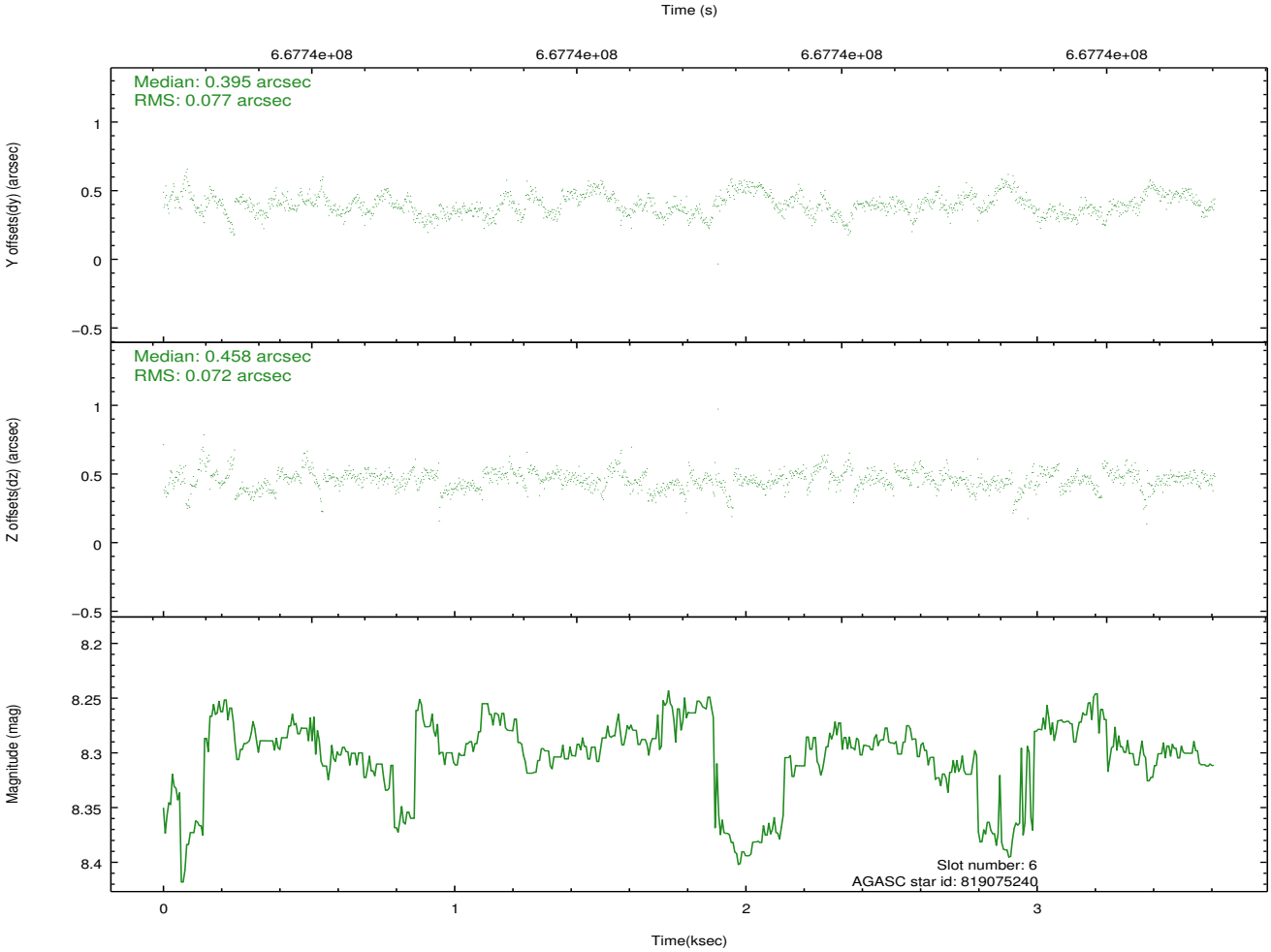

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.512 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 818946584


Time (s)
6.6774e+08
Median: −0.385 arcsec
RMS: 0.067 arcsec
Y offsets(dy) (arcsec)
Median: −0.337 arcsec
RMS: 0.058 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 818946584
Time(ksec)

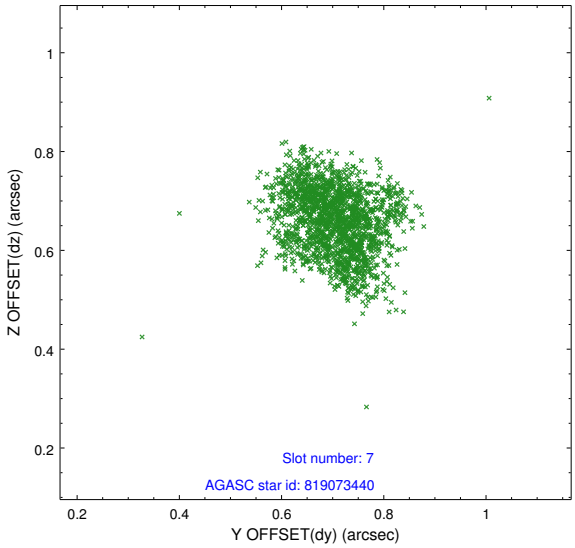
2.4.4 Slot 6

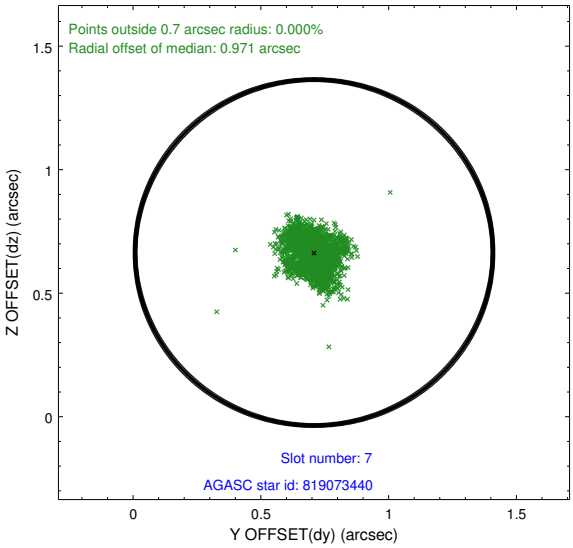

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 819075240

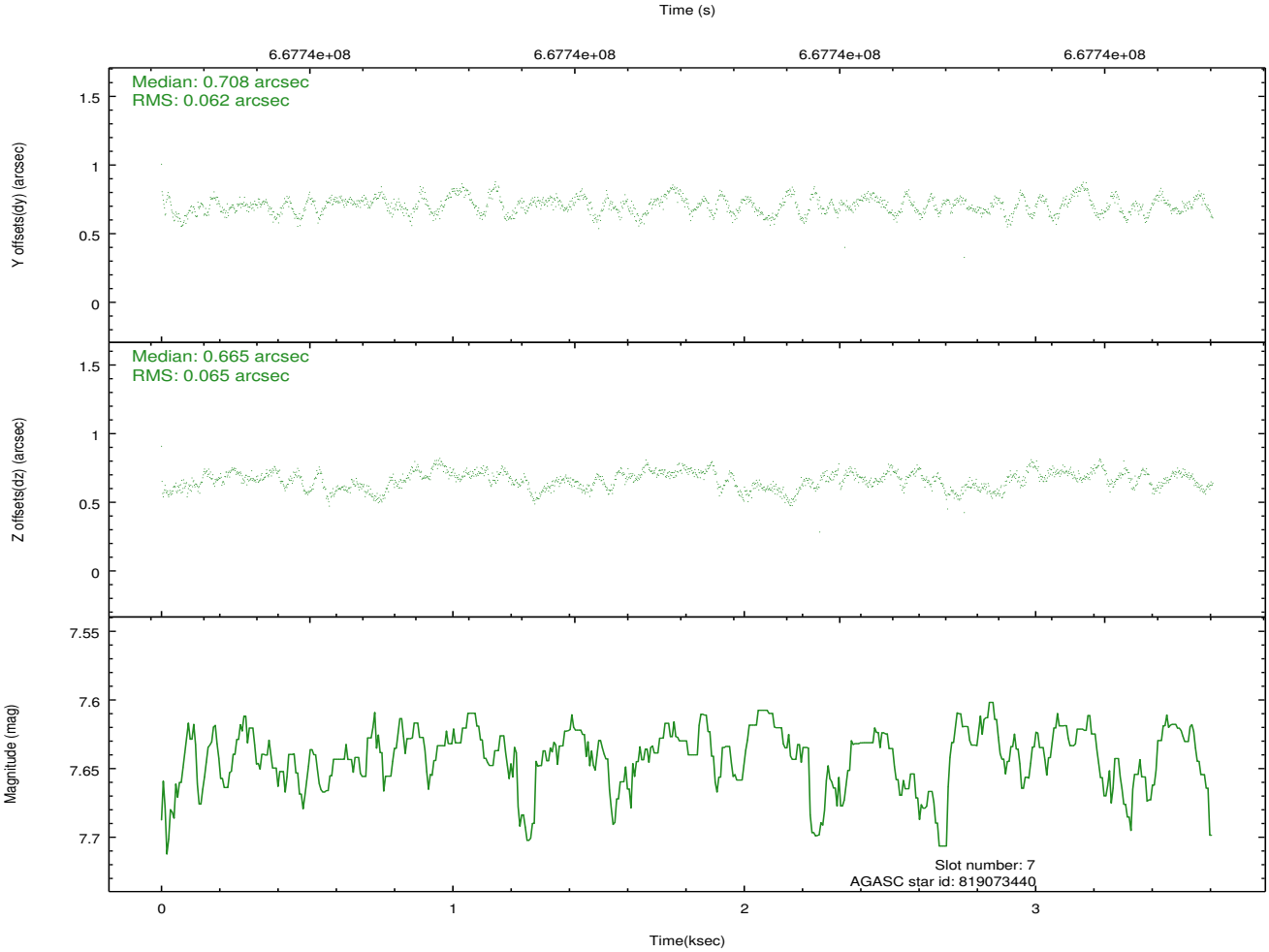

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.605 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 819075240


Time (s)
6.6774e+08
Median: 0.395 arcsec
RMS: 0.077 arcsec
Y offsets(dy) (arcsec)
Median: 0.458 arcsec
RMS: 0.072 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 819075240
Time(ksec)

2.4.5 Slot 7

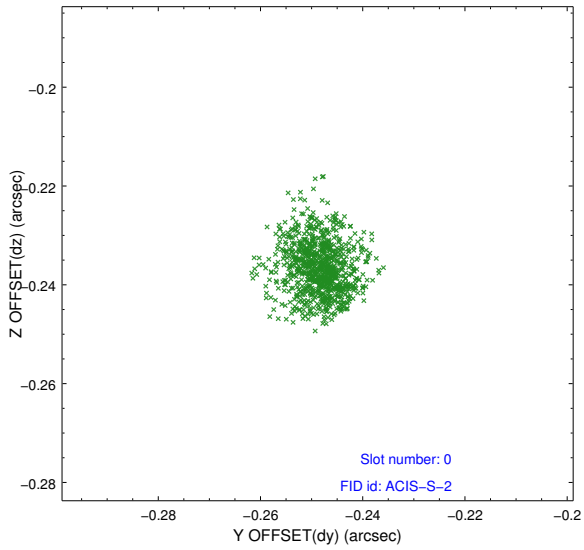

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 819073440

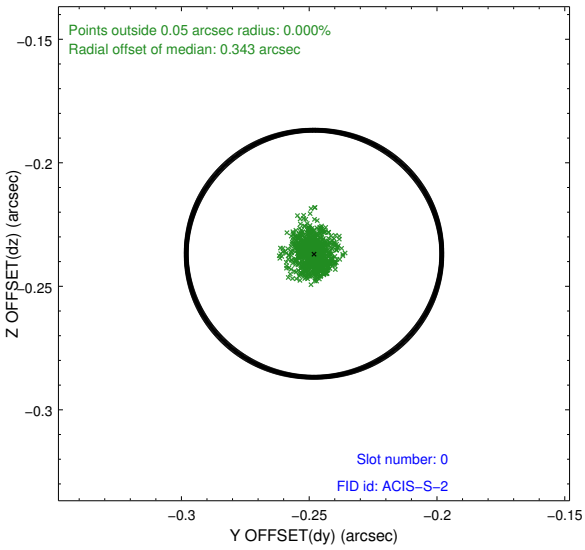

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.971 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 819073440

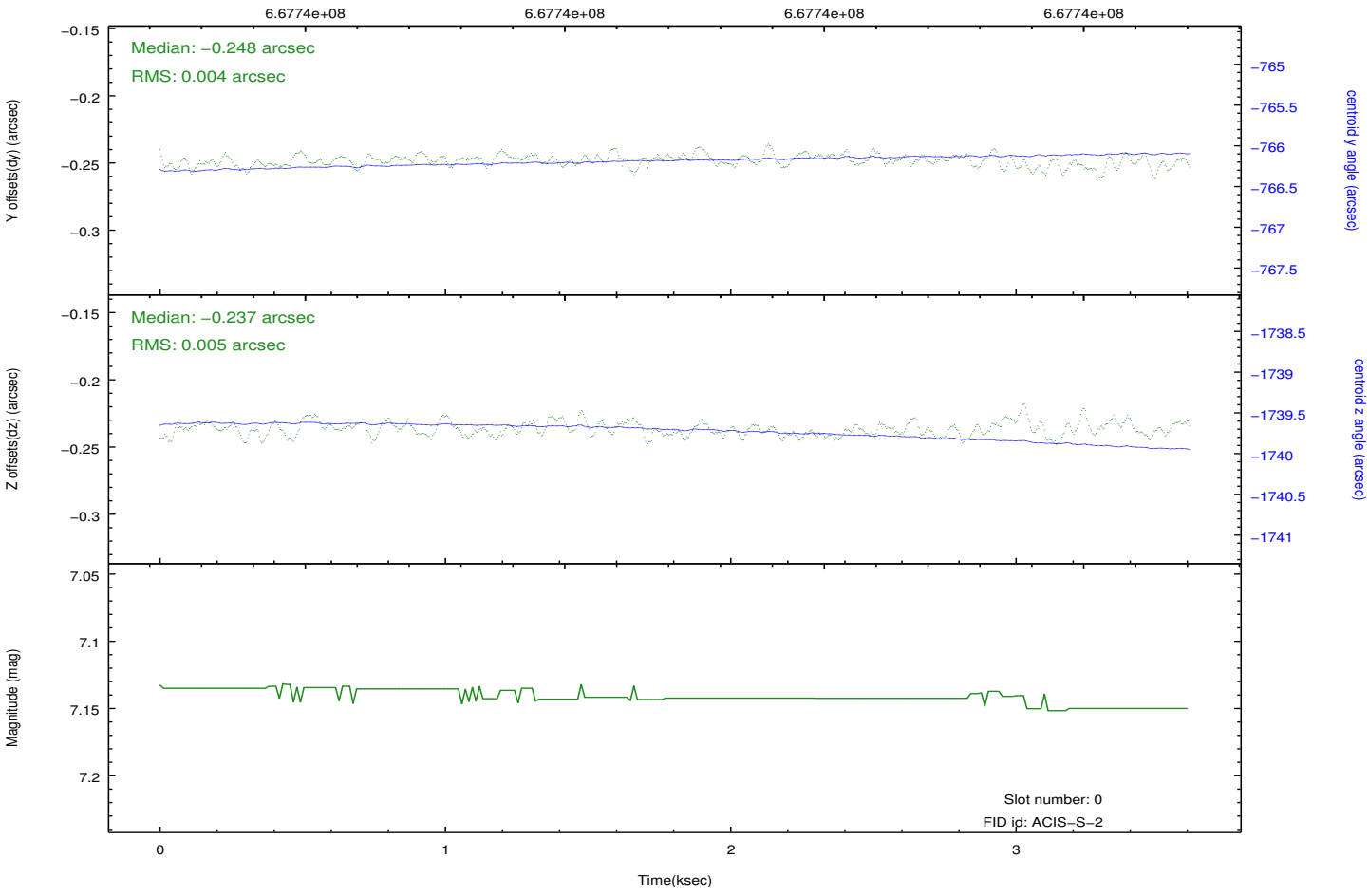

Time (s)
6.6774e+08
Median: 0.708 arcsec
RMS: 0.062 arcsec
Y offsets(dy) (arcsec)
Median: 0.665 arcsec
RMS: 0.065 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 819073440
Time(ksec)

2.5 FID Slots

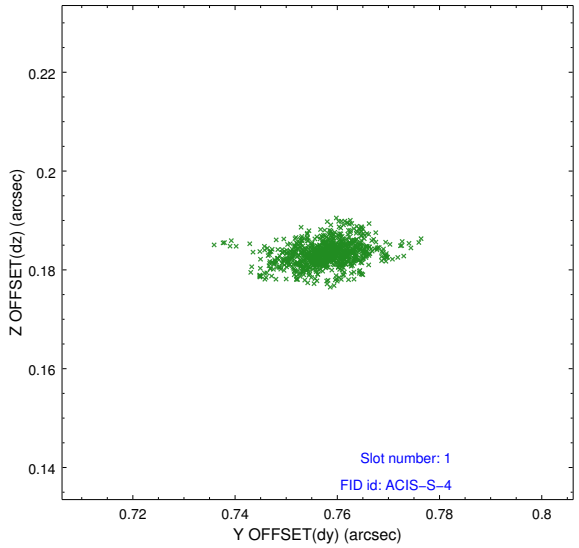
2.5.1 Slot 0

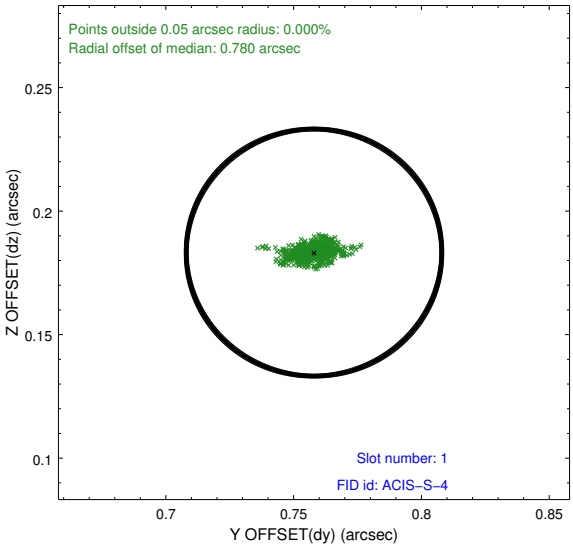


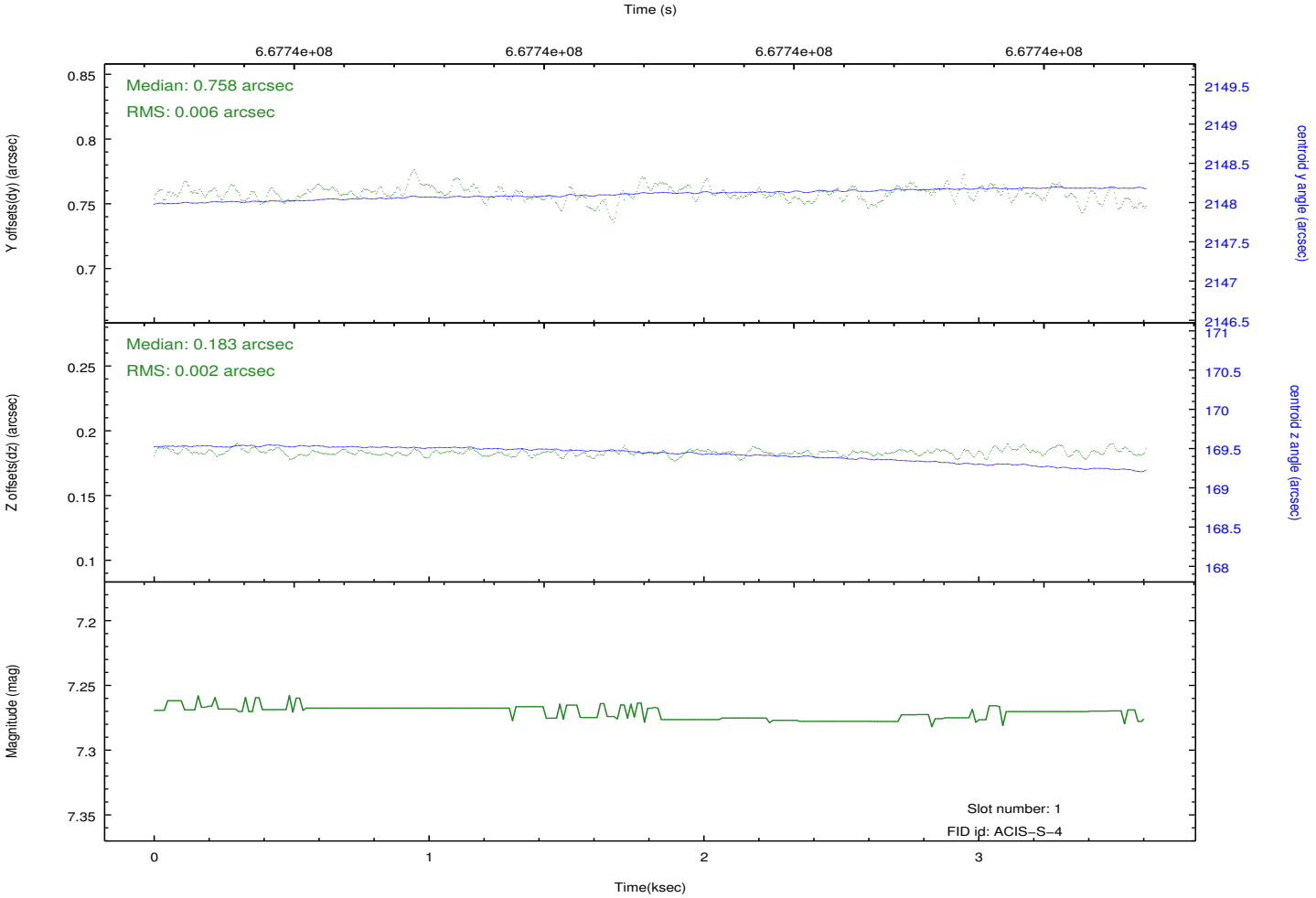




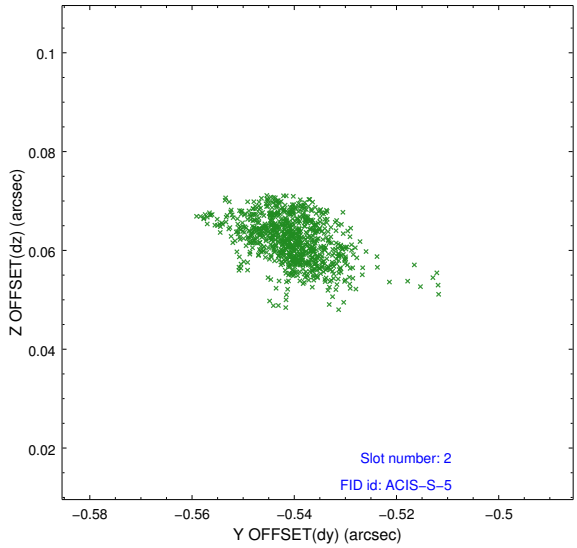
2.5.2 Slot 1

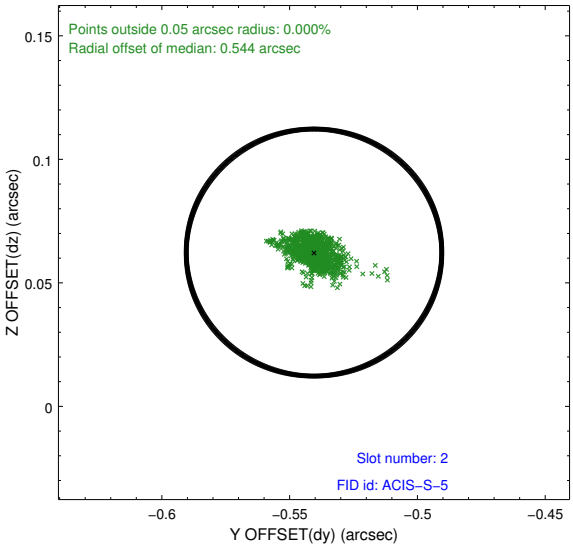

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS–S–4

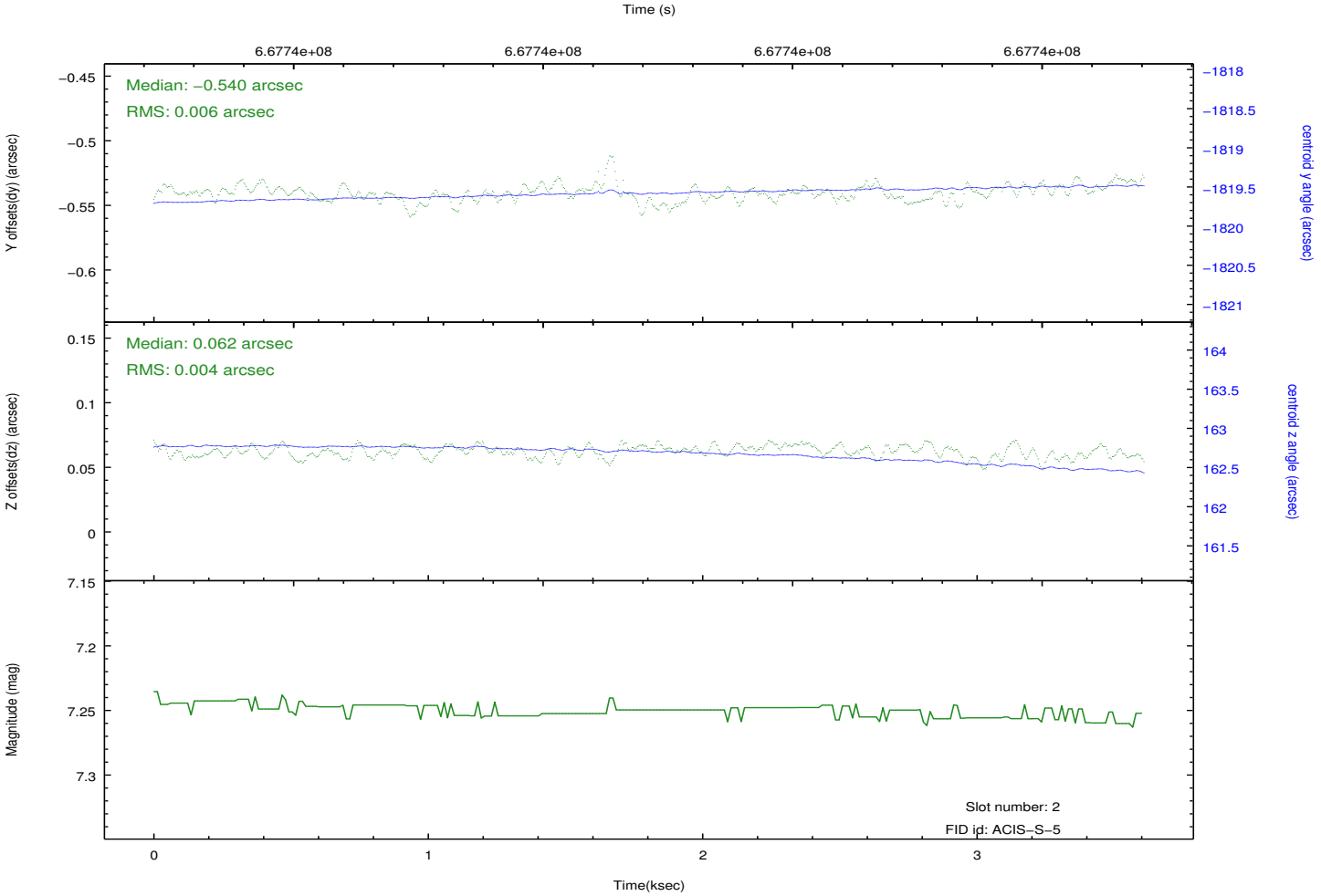

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.780 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS–S–4


Time (s)
6.6774e+08
Median: 0.758 arcsec
RMS: 0.006 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.183 arcsec
RMS: 0.002 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: 0.544 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−5


Time (s)
Median: −0.540 arcsec
RMS: 0.006 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.062 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	Joy Nichols
V&V Date (YYYY-MM-DD)	2019.03.01
V&V Edition	1
V&V Disposition and Status	OK
V&V Charge Time	3.5489286539555

A.2 Comments

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The ACIS focal plane temperature is warmer than -112.0 C degrees during
the interval 667741701.41 - 667745247.81 (MET s) of this observation.
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/A
CIS_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.
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