# V&V Reference Report
# L2 ASCDS Version : 10.2.1

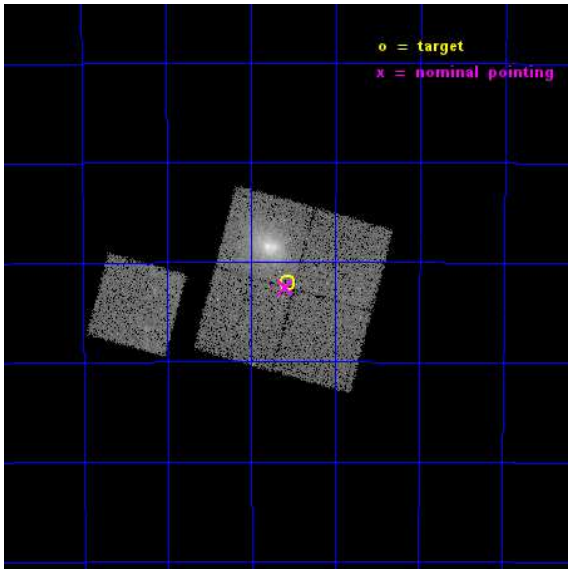
Observation 16598 - L2 Version 2
Chandra X-Ray Center

L2 Processing Date : Dec 10 2014

## Contents

# 1 Front

| | | |
|---|---|---|
| seq_num | 801303 | Sequence number |
| obs_id | 16598 | Observation id |
| title | Extreme Cluster Mergers - Deep Chandra Follow-up to Two Massive Cluster Mergers at Redshift 0.25 Detected by Planck | Proposal title |
| observer | Dr Ralph Kraft | Principal investigator |
| object | Abell S0592 | Source name |
| dtycycle | 0 |   |
| cycle | P | events from which exps? Prim/Second/Both |
| ra_targ | 99.641219 | Observer's specified target RA [deg] |
| dec_targ | -54.035674 | Observer's specified target Dec [deg] |
| ra_nom | 99.648618034173 | Nominal RA [deg] |
| dec_nom | -54.042505001034 | Nominal Dec [deg] |
| roll_nom | 285.31468206384 | Nominal Roll [deg] |
| revision | 2 | Processing version of data |
| ontime | 23535.116852105 | Sum of GTIs [s] |
| livetime | 23227.613224131 | Livetime [s] |
| ontime0 | 23538.134672523 | Sum of GTIs [s] |
| ontime1 | 23538.175712526 | Sum of GTIs [s] |
| ontime2 | 23538.216752529 | Sum of GTIs [s] |
| ontime3 | 23535.116852105 | Sum of GTIs [s] |
| ontime6 | 23534.952672184 | Sum of GTIs [s] |
| l2events | 74210 | Number of level 2 events |

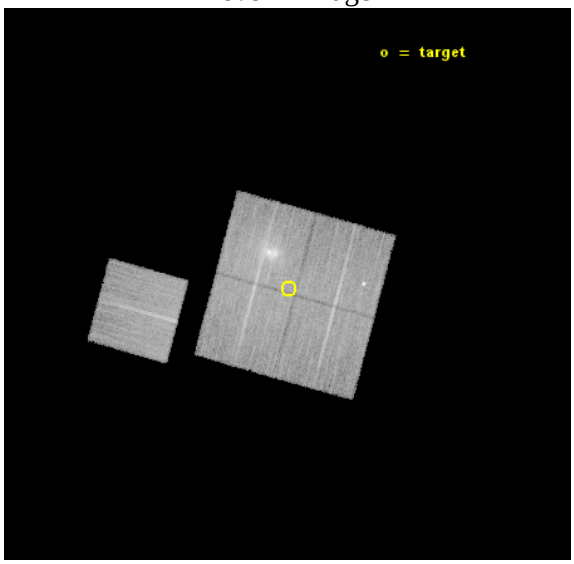


# 2 OBI

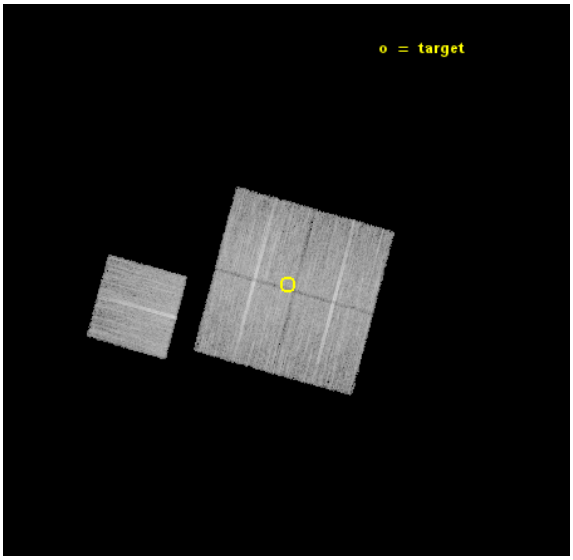
## 2.1 OBI

### 2.1.1 Images

Level 1 Image

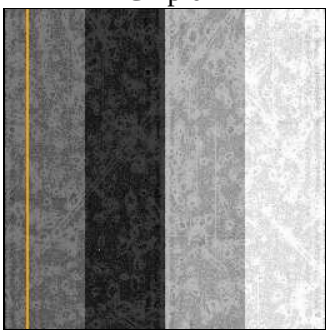



Level 1 Bad Events

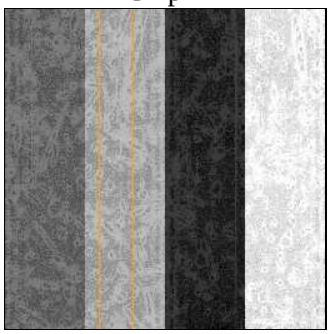



### 2.1.2 Bias

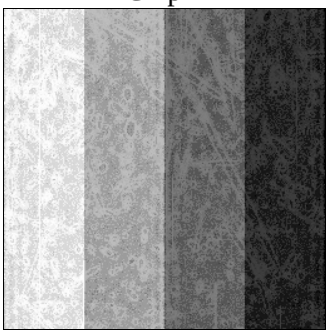
Chip 0



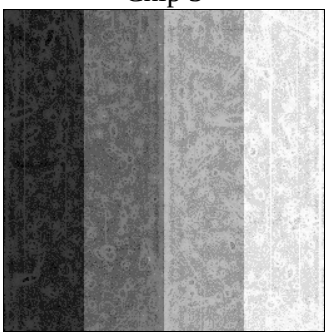
Chip 1



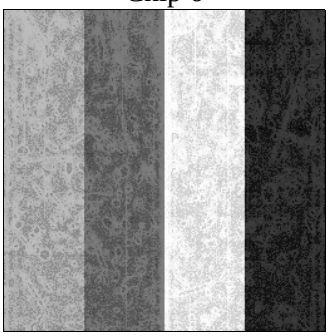
Chip 2



Chip 3



Chip 6



### 2.1.3 Parameters

| | | |
|---|---|---|
| obi_num | 0 | Obi number |
| ascdsver | 10.3.1 | Processing system revision |
| caldbver | 4.6.4 |   |
| date | 2014-12-10T16:05:29 | Date and time of file creation |
| revision | 2 | Processing version of data |

| | | |
|---|---|---|
| sched_exp_time | 23453.336000 | [s] Scheduled observation exposure time |
| ontime | 23535.116852105 | Sum of GTIs [s] |
| ontime0 | 23538.134672523 | Sum of GTIs [s] |
| ontime1 | 23538.175712526 | Sum of GTIs [s] |
| ontime2 | 23538.216752529 | Sum of GTIs [s] |
| ontime3 | 23535.116852105 | Sum of GTIs [s] |
| ontime6 | 23534.952672184 | Sum of GTIs [s] |
| l1events | 505723 | Number of level 1 events |

### 2.1.4 Events

| | **ccd 0** | **ccd 1** | **ccd 2** | **ccd 3** | **ccd 6** |
|---|---|---|---|---|---|
| level 1 events | 89145 | 93810 | 100720 | 123024 | 99024 |
| rejected events | 77004 | 79192 | 87996 | 88552 | 86463 |
| rejected % | 86% | 84% | 87% | 71% | 87% |

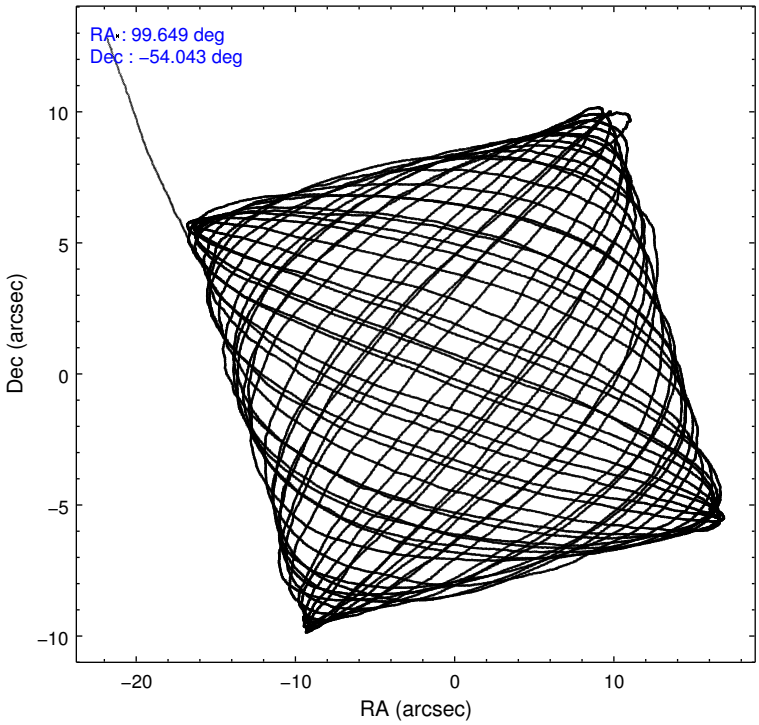
| | **ccd 0** | **ccd 1** | **ccd 2** | **ccd 3** | **ccd 6** |
|---|---|---|---|---|---|
| grade 0 events | 4338 | 6173 | 5009 | 22774 | 4802 |
| | 4% | 6% | 4% | 18% | 4% |
| grade 1 events | 61 | 66 | 61 | 117 | 50 |
| | 0% | 0% | 0% | 0% | 0% |
| grade 2 events | 3018 | 3109 | 3099 | 4934 | 2730 |
| | 3% | 3% | 3% | 4% | 2% |
| grade 3 events | 1243 | 1288 | 1174 | 1894 | 1217 |
| | 1% | 1% | 1% | 1% | 1% |
| grade 4 events | 1151 | 1334 | 1221 | 1960 | 1224 |
| | 1% | 1% | 1% | 1% | 1% |
| grade 5 events | 4088 | 4558 | 3915 | 4882 | 4606 |
| | 4% | 4% | 3% | 3% | 4% |
| grade 6 events | 2394 | 2714 | 2222 | 2914 | 2588 |
| | 2% | 2% | 2% | 2% | 2% |
| grade 7 events | 72852 | 74568 | 84019 | 83549 | 81807 |
| | 81% | 79% | 83% | 67% | 82% |

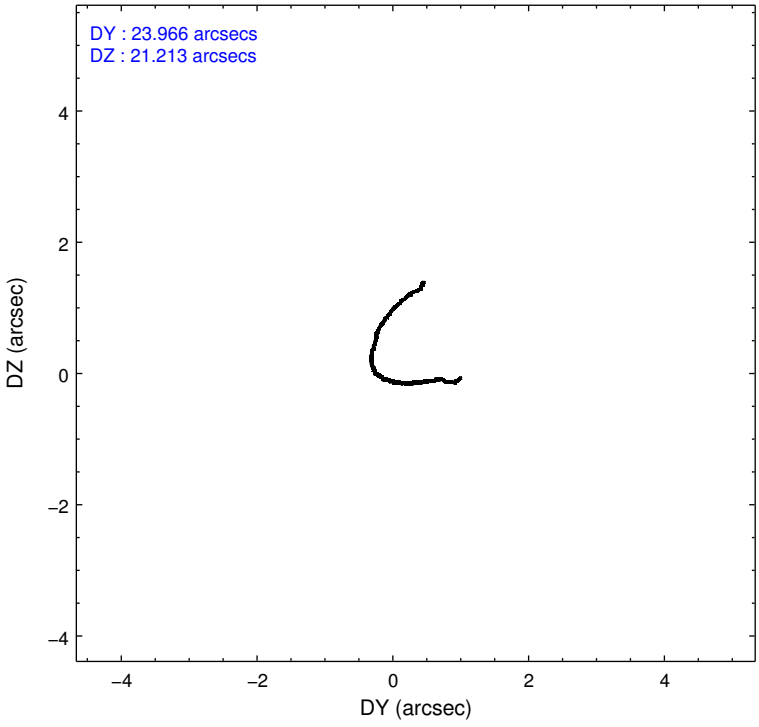
## 2.2 Compared Parameters

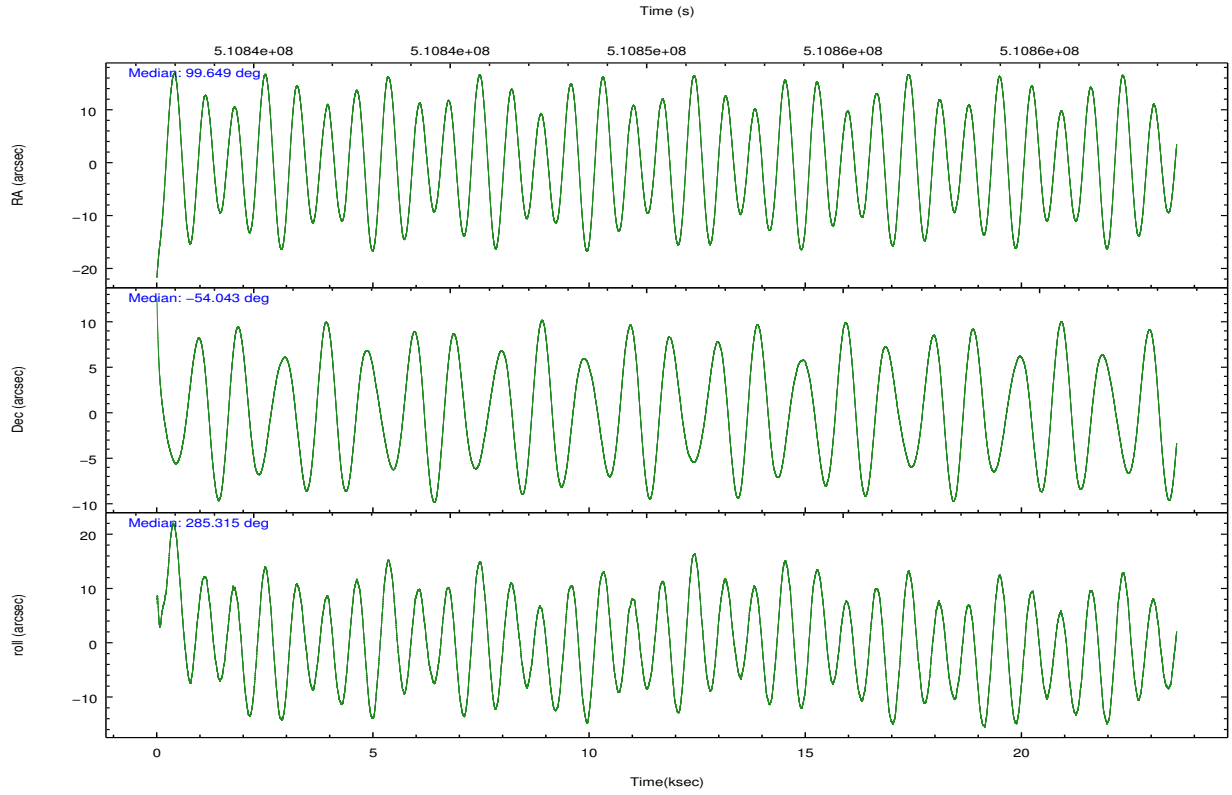
| Parameter | Planned | Actual |
|---|---|---|
| Instrument | ACIS | ACIS |
| Detector | ACIS-01236 | ACIS-01236 |
| Grating | NONE | NONE |
| Data mode | VFAINT | VFAINT |
| Observation mode | POINTING | POINTING |
| [deg] Pointing RA | 99.615220 | 99.64861803417261 |
| [deg] Pointing Dec | -54.023220 | -54.04250500103442 |
| [deg] Pointing Roll | 285.078956 | 285.3146820638415 |
| [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) | 510838859.184000 | 510837725.4445 |
| Observation start date | 2014-03-10T11:39:52 | 2014-03-10T11:22:05 |
| [s] Observation end time (MET) | 510862312.184000 | 510862548.89587 |
| Observation end date | 2014-03-10T18:10:45 | 2014-03-10T18:15:48 |
| Read mode | TIMED | TIMED |

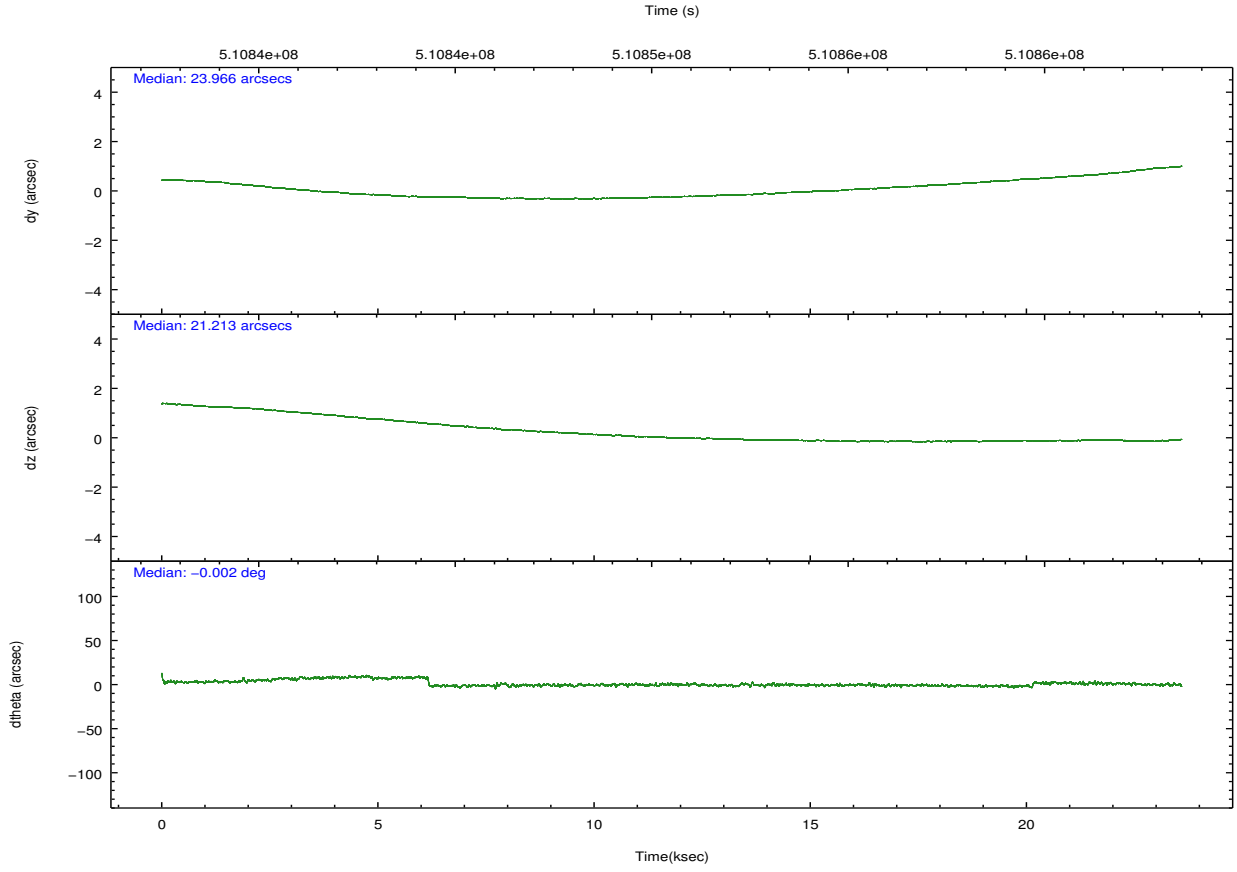
| Parameter | Planned | Actual |
|---|---|---|
| Obspar format version number | 7 | 7 |
| Obspar file type | PREDICTED | ACTUAL |
| Obspar update status | NONE | UPDATED |
| Number of optional ACIS chips dropped | 0 | 0 |
| On-chip summing requested | N | N |
| Subarray requested | NONE | NONE |
| Alternating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

## 2.3 Aspect


RA : 99.649 deg
Dec : −54.043 deg
Dec (arcsec)
RA (arcsec)
10
5
0
−5
−10
−20
−10
0
10


DY : 23.966 arcsecs
DZ : 21.213 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
−2
−4
−4
−2
0
2
4


Time (s)
5.1084e+08
5.1084e+08
5.1085e+08
5.1086e+08
5.1086e+08
Median: 99.649 deg
RA (arcsec)
Median: −54.043 deg
Dec (arcsec)
Median: 285.315 deg
roll (arcsec)
Time(ksec)

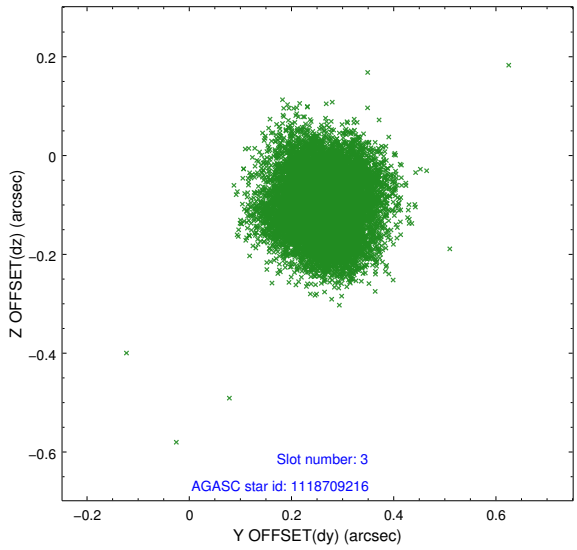

Time (s)
5.1084e+08
5.1084e+08
5.1085e+08
5.1086e+08
5.1086e+08
Median: 23.966 arcsecs
dy (arcsec)
Median: 21.213 arcsecs
dz (arcsec)
Median: −0.002 deg
dtheta (arcsec)
Time(ksec)

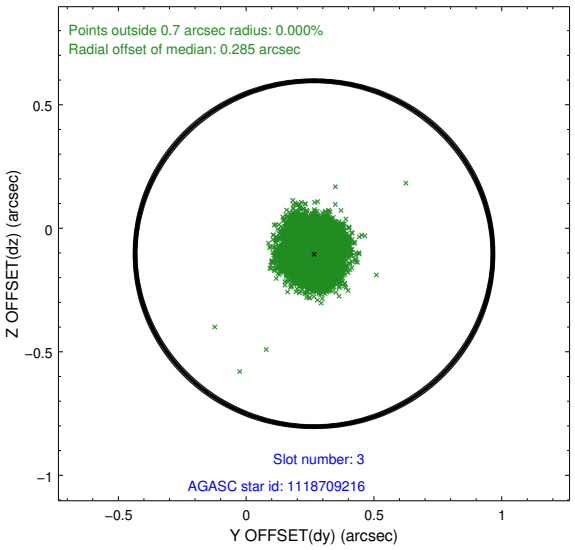
Slot Statistics

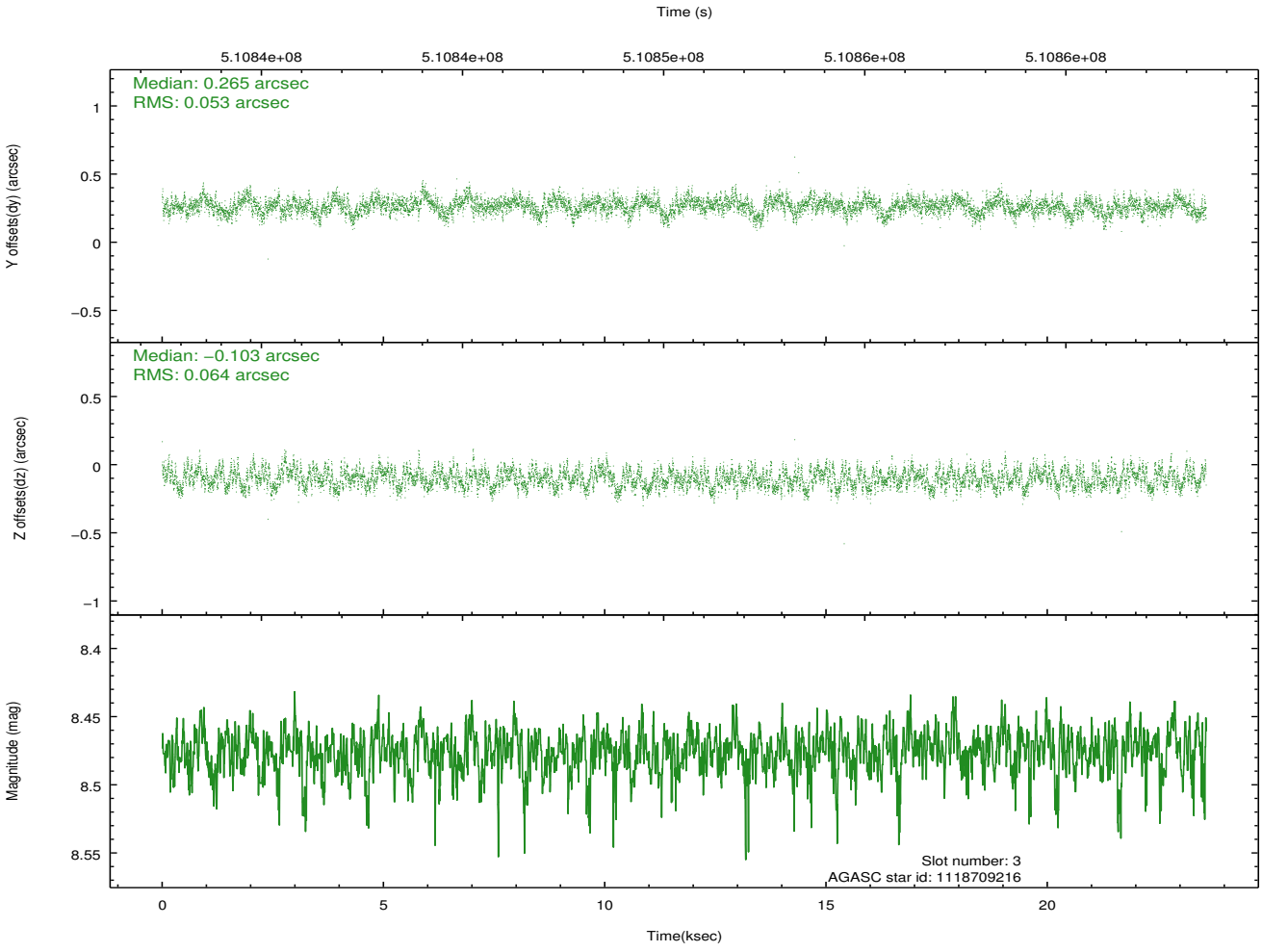
| slot | status | used | id | mag | n_pts | med_dy | med_dz | dr1 | dr2 | ra | dec | mean_y | mean_z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | FID | | ACIS-I-1 | 7.07 | 5753 | -0.022 | -0.030 | 0.031 | 0.082 | 0.000000 | 0.000000 | 915.13 | -845.26 |
| 1 | FID | | ACIS-I-2 | 6.98 | 5753 | -0.249 | -0.098 | 0.015 | 0.026 | 0.000000 | 0.000000 | -779.11 | -851.85 |
| 2 | FID | | ACIS-I-4 | 7.00 | 5752 | 0.177 | 0.195 | 0.030 | 0.069 | 0.000000 | 0.000000 | 2135.16 | 1054.65 |
| 3 | GUIDE | used | 1118709216 | 8.48 | 11505 | 0.265 | -0.103 | 0.089 | 0.138 | 99.610405 | -53.652137 | -1292.59 | 337.91 |
| 4 | GUIDE | used | 1118712456 | 7.72 | 11503 | 0.048 | -0.137 | 0.082 | 0.133 | 99.930550 | -53.451369 | -1810.23 | 1188.48 |
| 5 | GUIDE | used | 1118715984 | 8.87 | 11504 | -0.094 | 0.269 | 0.104 | 0.161 | 98.870437 | -53.710801 | -1490.87 | -1241.07 |
| 6 | GUIDE | used | 1119230000 | 9.47 | 11499 | 0.158 | 0.136 | 0.146 | 0.230 | 99.372506 | -54.486244 | 1478.50 | -923.56 |
| 7 | GUIDE | used | 1119356480 | 8.29 | 11503 | -0.380 | -0.159 | 0.066 | 0.106 | 100.106738 | -54.468226 | 1817.75 | 575.40 |

## 2.4 Star Slots

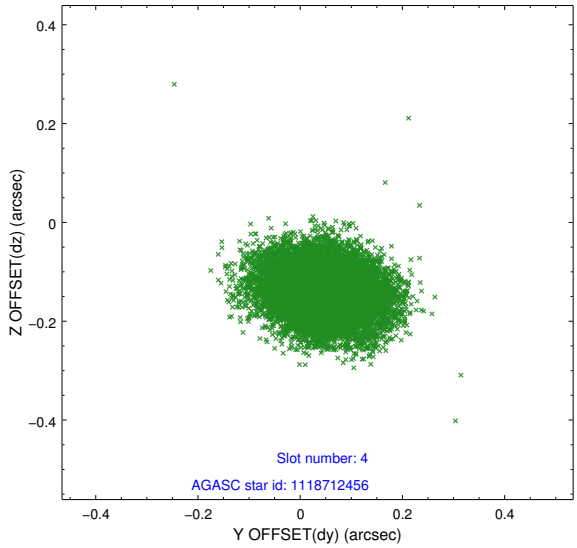
### 2.4.1 Slot 3

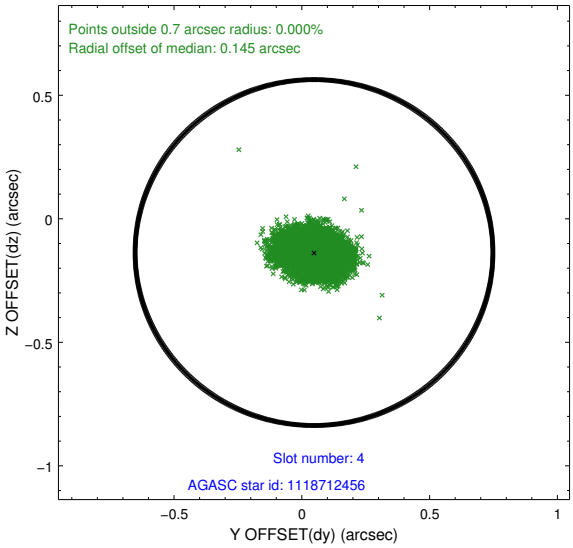


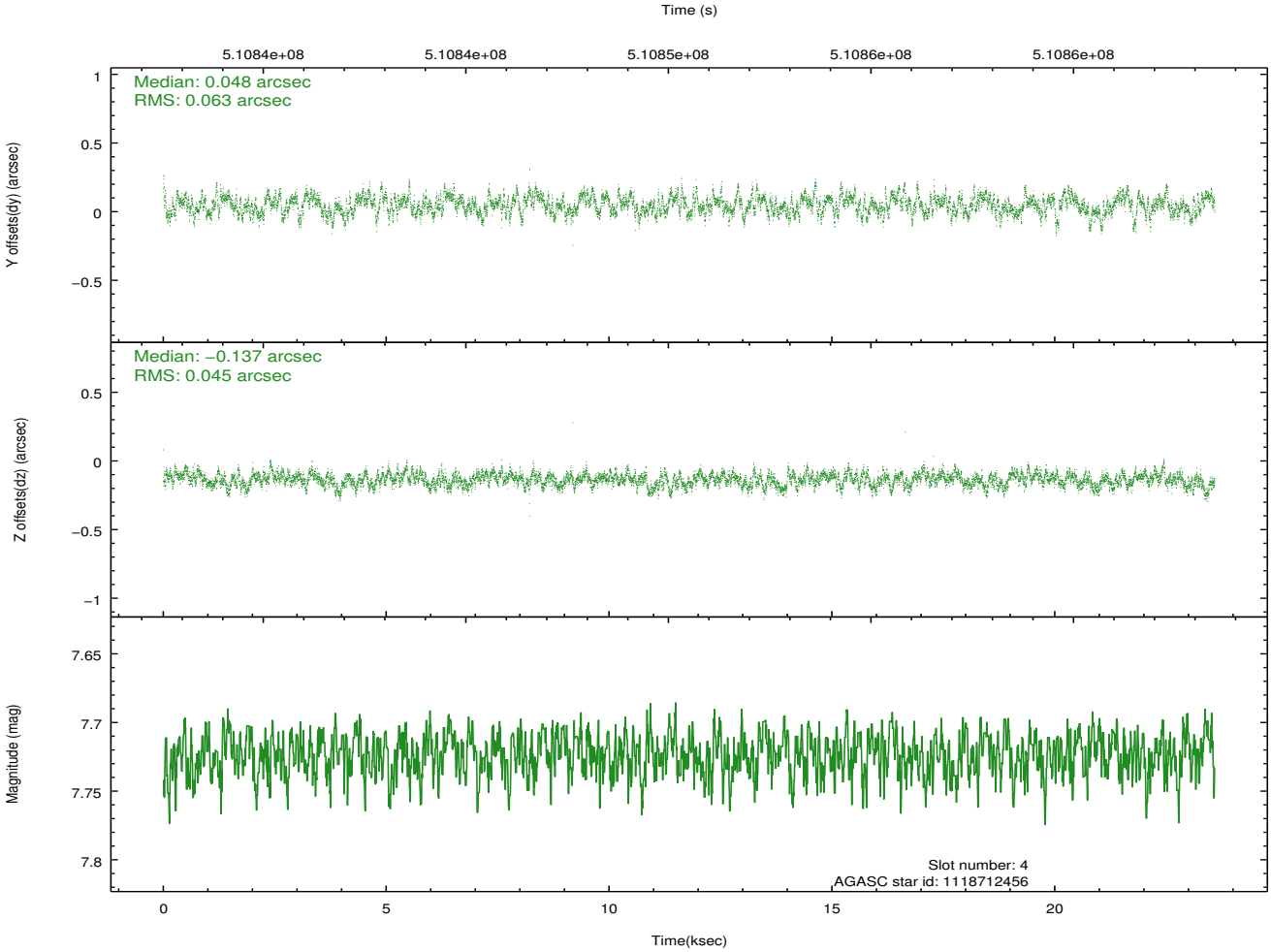



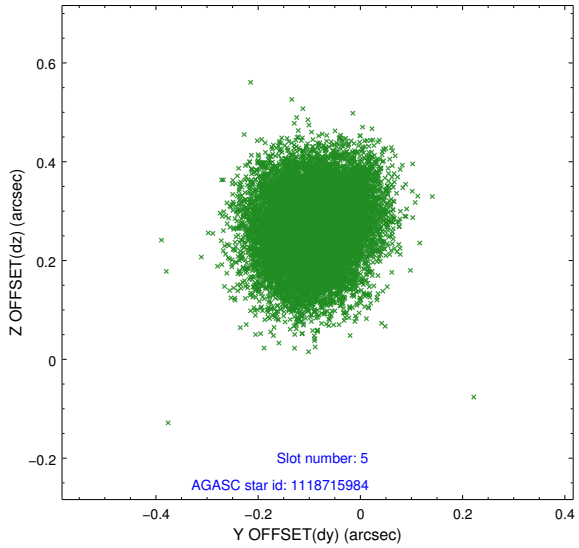
### 2.4.2 Slot 4

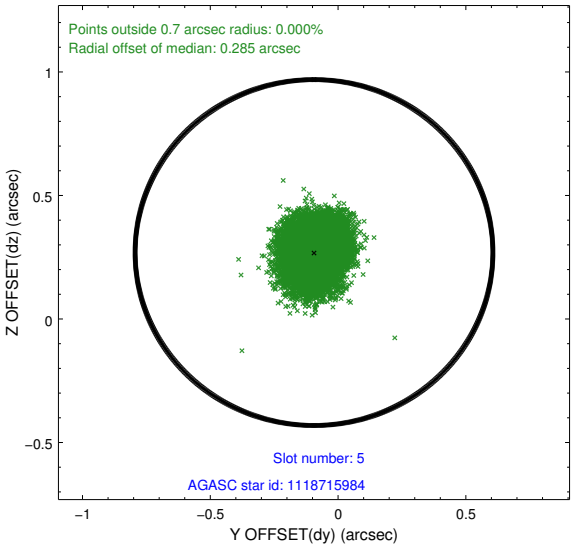

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 1118712456

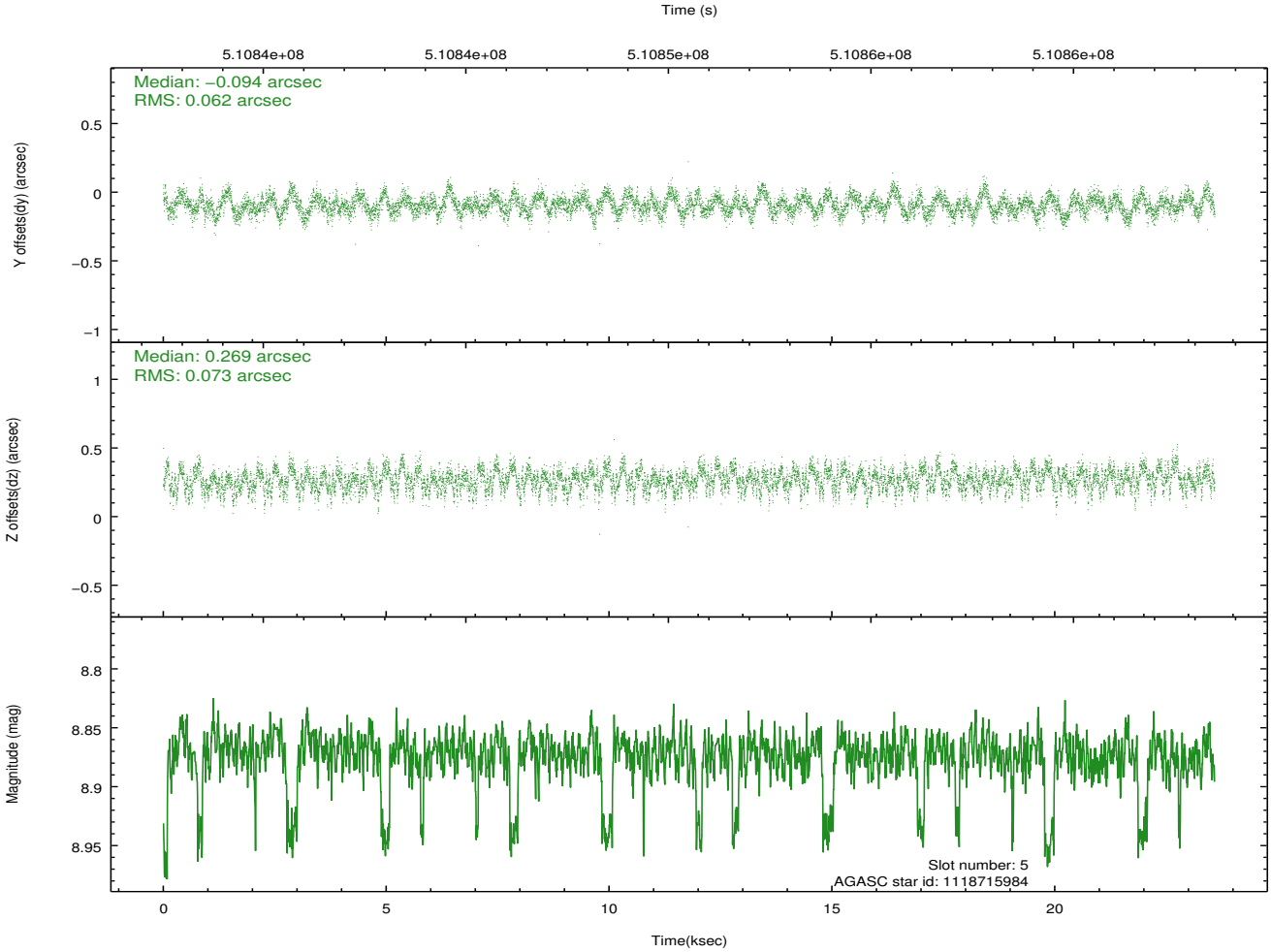

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.145 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 1118712456


Time (s)
Median: 0.048 arcsec
RMS: 0.063 arcsec
Y offsets(dy) (arcsec)
Median: −0.137 arcsec
RMS: 0.045 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 1118712456
Time(ksec)

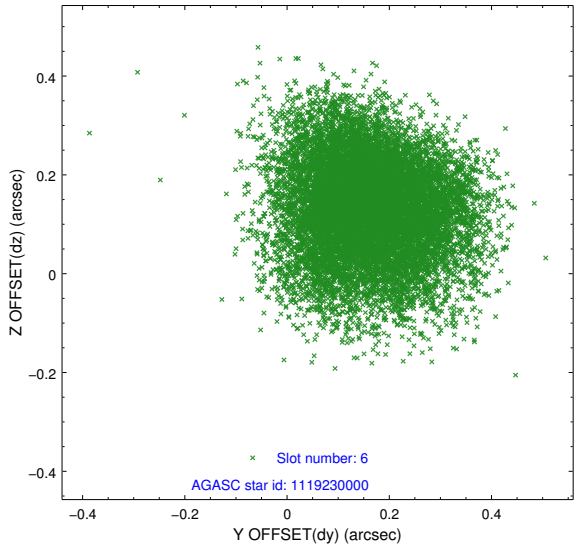
### 2.4.3 Slot 5

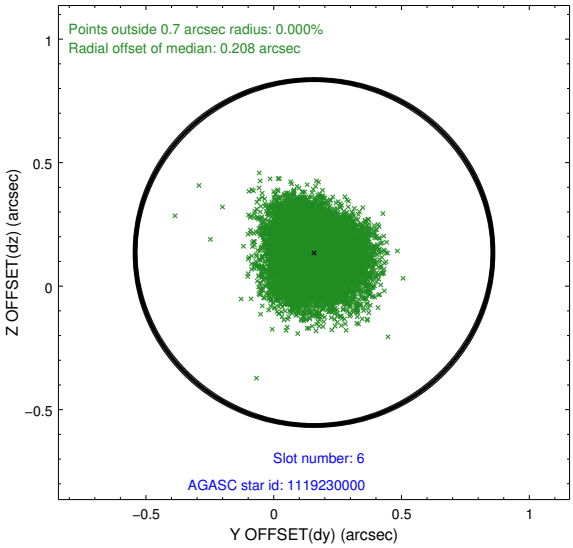

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 1118715984

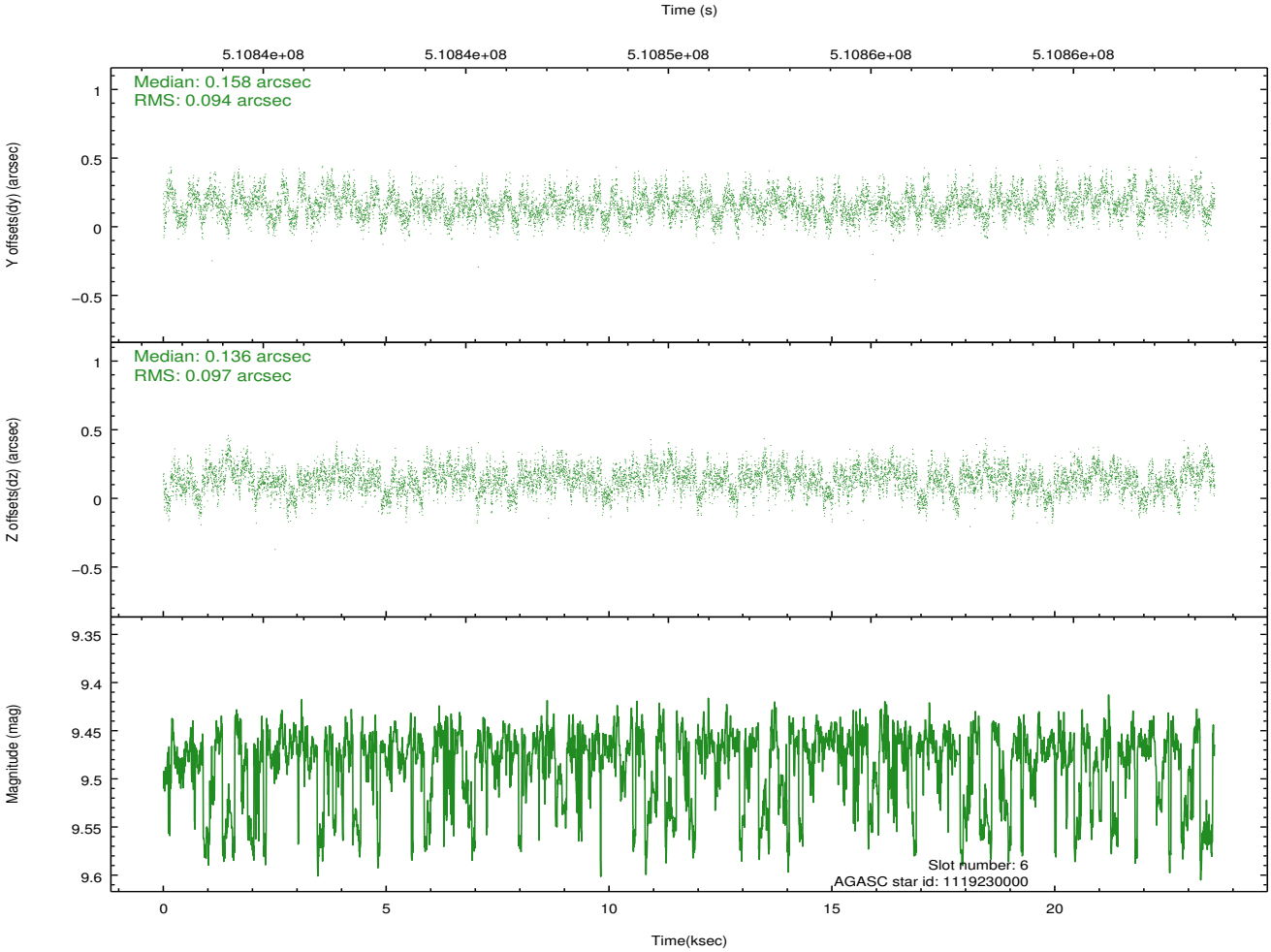

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.285 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 1118715984


Time (s)
5.1084e+08
5.1084e+08
5.1085e+08
5.1086e+08
5.1086e+08
Median: −0.094 arcsec
RMS: 0.062 arcsec
Y offsets(dy) (arcsec)
Median: 0.269 arcsec
RMS: 0.073 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 1118715984
Time(ksec)

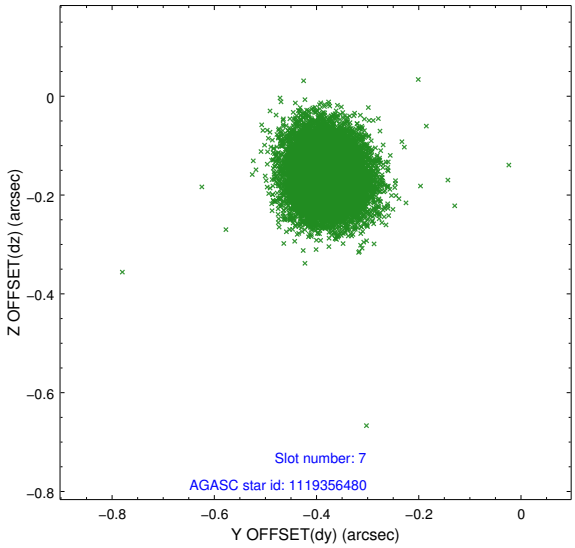
### 2.4.4 Slot 6

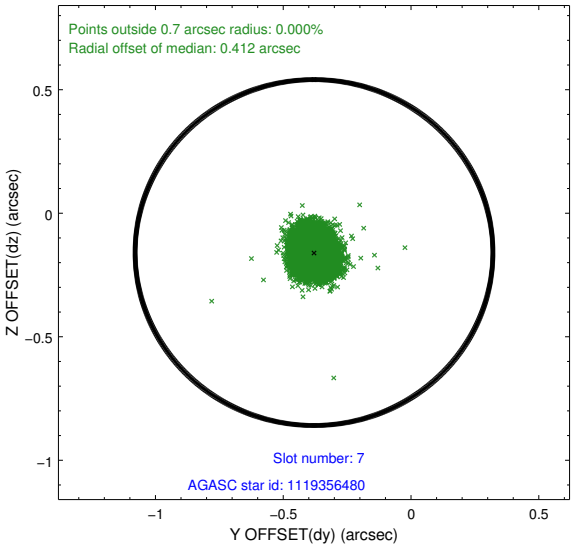

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 1119230000

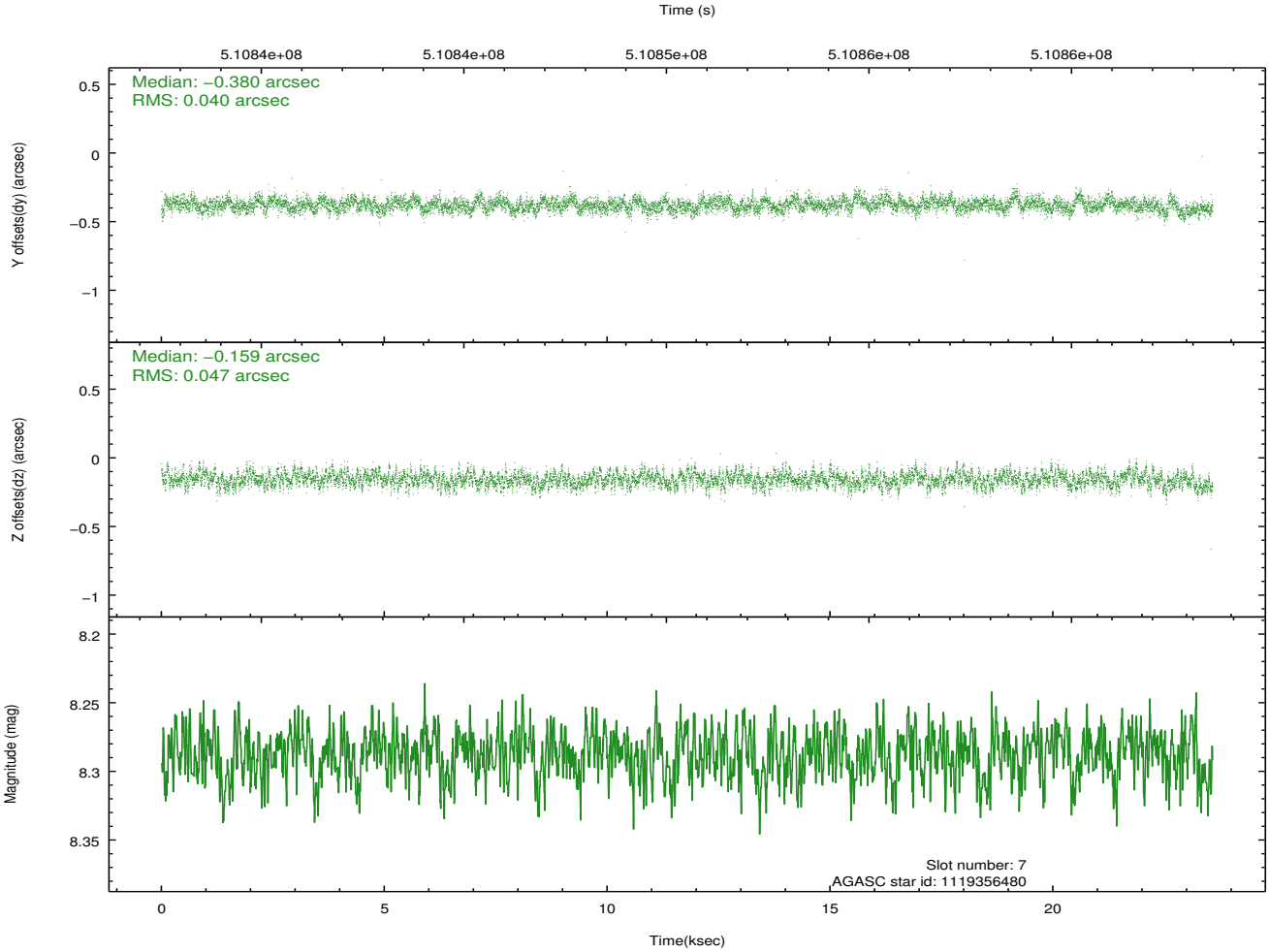

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.208 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 1119230000


Time (s)
Median: 0.158 arcsec
RMS: 0.094 arcsec
Y offsets(dy) (arcsec)
Median: 0.136 arcsec
RMS: 0.097 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 1119230000
Time(ksec)

### 2.4.5 Slot 7

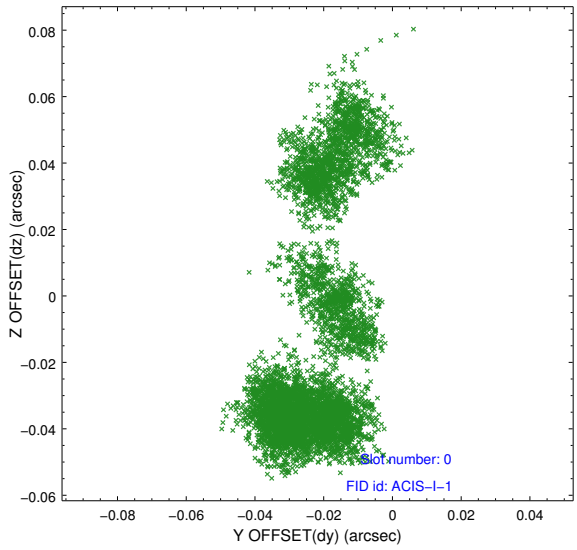

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 1119356480

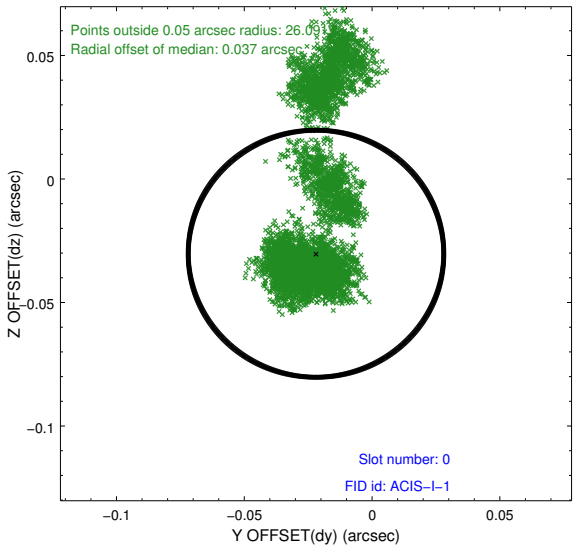

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.412 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 1119356480

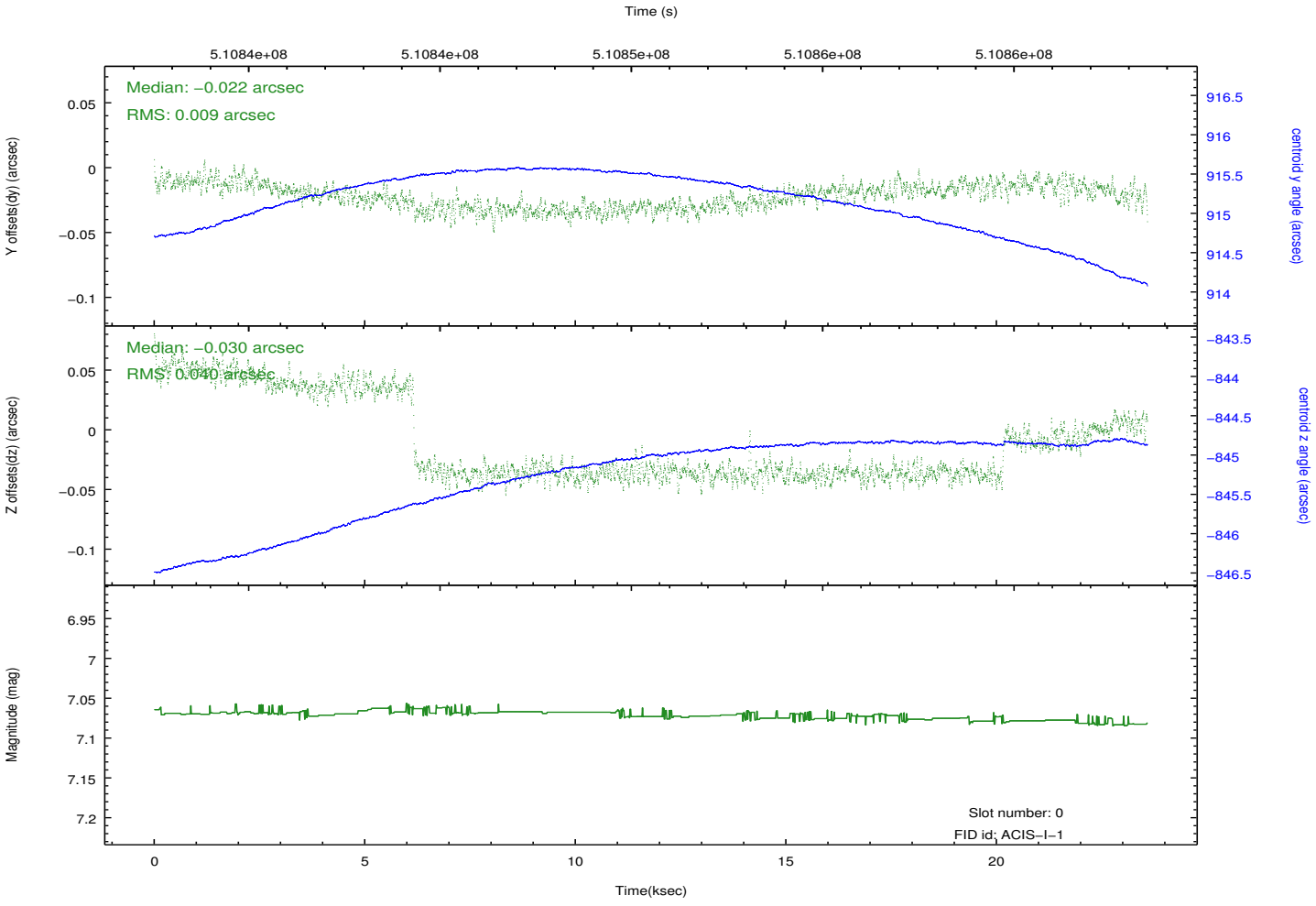

Time (s)
5.1084e+08
5.1084e+08
5.1085e+08
5.1086e+08
5.1086e+08
Median: −0.380 arcsec
RMS: 0.040 arcsec
Y offsets(dy) (arcsec)
Median: −0.159 arcsec
RMS: 0.047 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 1119356480
Time(ksec)

## 2.5 FID Slots

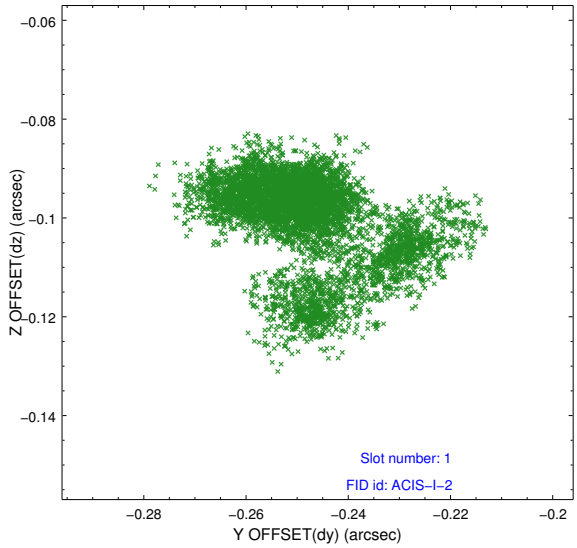
### 2.5.1 Slot 0

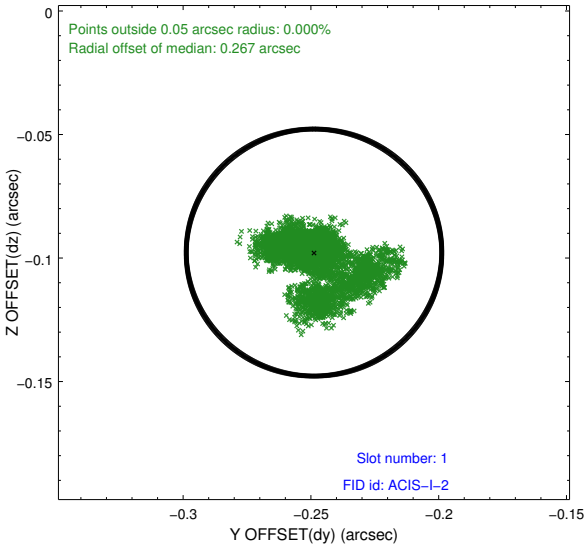


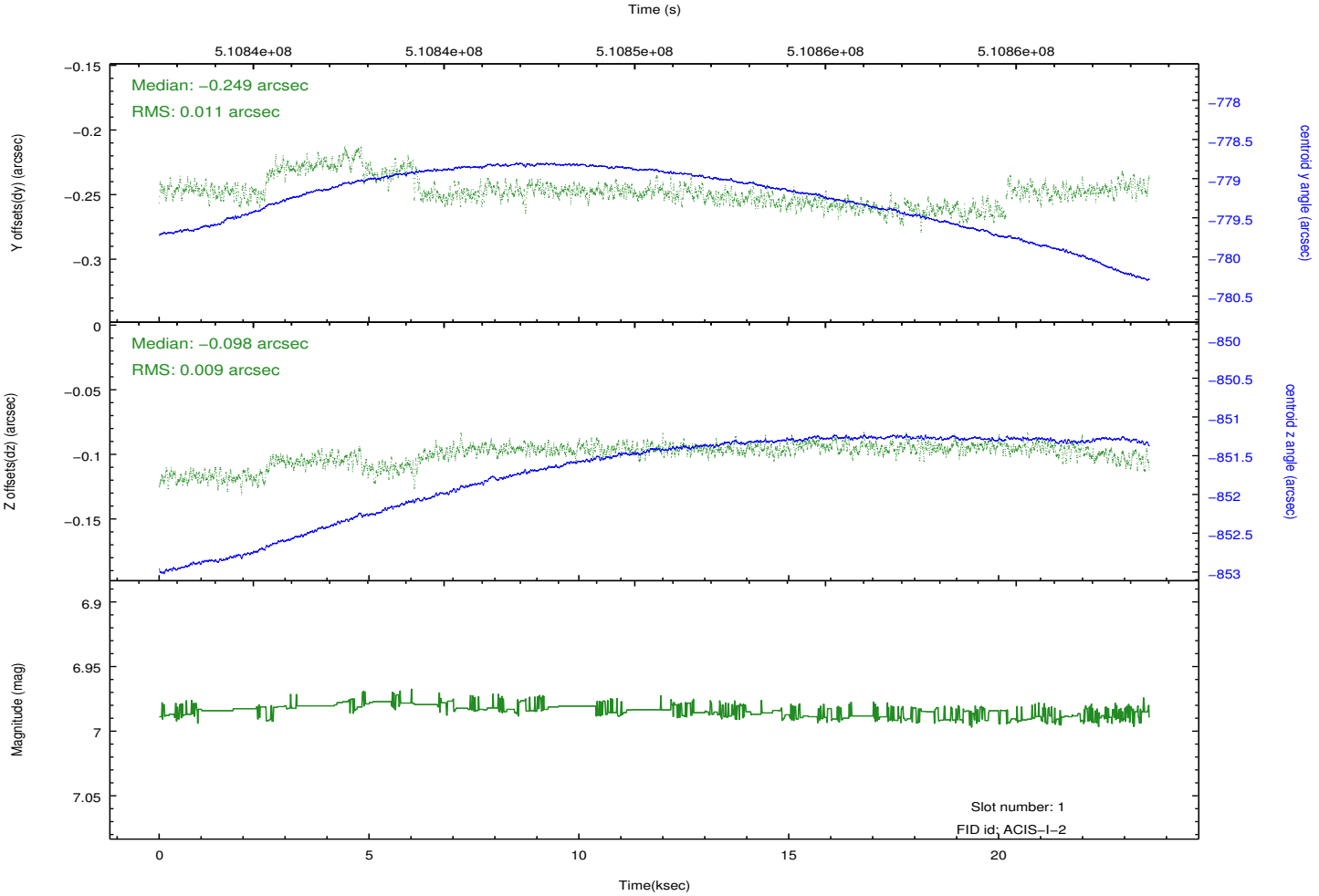



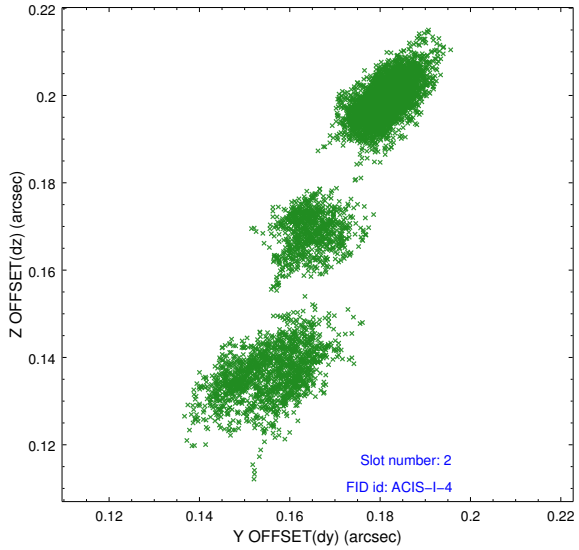
### 2.5.2 Slot 1

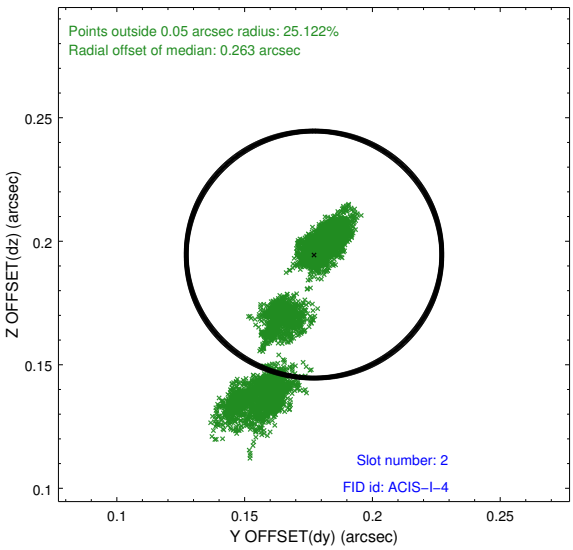

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−I−2

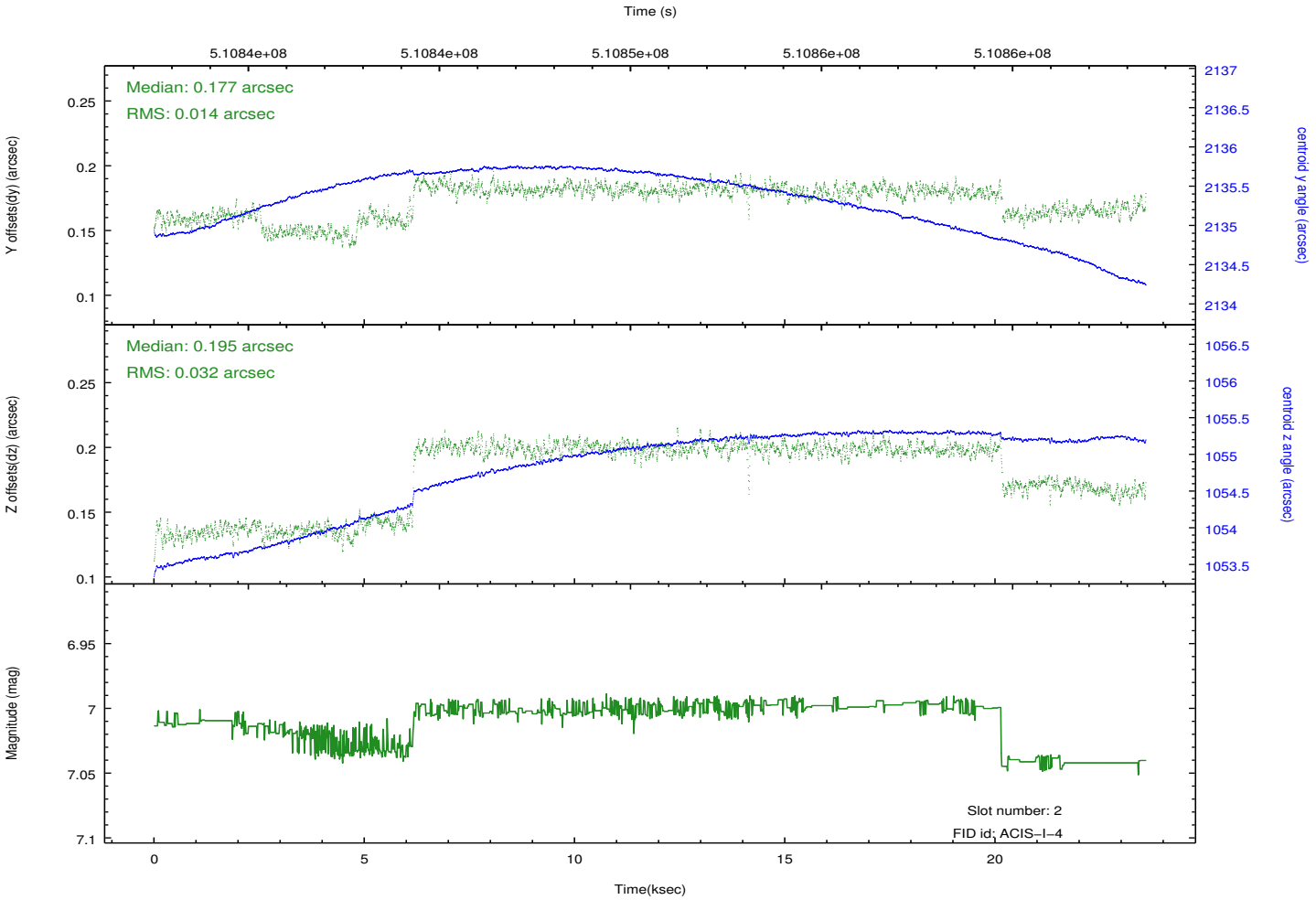

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.267 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−I−2


Time (s)
Median: −0.249 arcsec
RMS: 0.011 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: −0.098 arcsec
RMS: 0.009 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 1
FID id: ACIS−I−2
Time(ksec)

### 2.5.3 Slot 2


Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS–I–4


Points outside 0.05 arcsec radius: 25.122%
Radial offset of median: 0.263 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS–I–4


Time (s)
Median: 0.177 arcsec
RMS: 0.014 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.195 arcsec
RMS: 0.032 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 2
FID id: ACIS–I–4
Time(ksec)

# A Summary

## A.1 Status

| | |
|---|---|
| V&V Scientist | Jen Lauer |
| V&V Date (YYYY-MM-DD) | 2014.12.18 |
| V&V Edition | 1 |
| V&V Disposition and Status | OK |
| V&V Charge Time | 23.535116852105 |

## 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.
```