

# V&V Reference Report

## L2 ASCDS Version : 10.2.1

Observation 16573 - L2 Version 2  
Chandra X-Ray Center

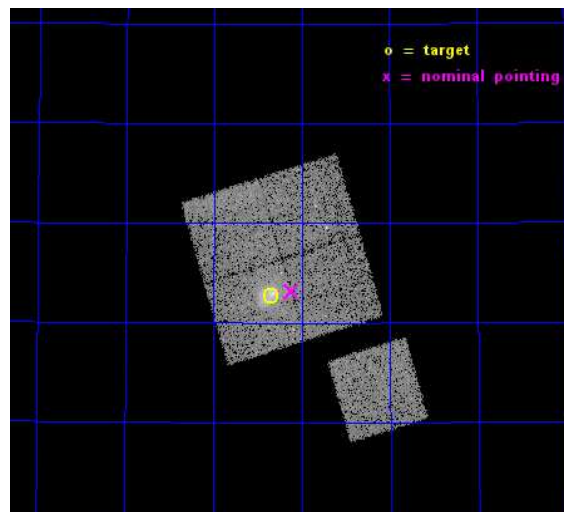
L2 Processing Date : Dec 9 2014

## Contents

|          |                               |           |
|----------|-------------------------------|-----------|
| <b>1</b> | <b>Front</b>                  | <b>2</b>  |
| <b>2</b> | <b>OBI</b>                    | <b>3</b>  |
| 2.1      | OBI . . . . .                 | 3         |
| 2.1.1    | Images . . . . .              | 3         |
| 2.1.2    | Bias . . . . .                | 3         |
| 2.1.3    | Parameters . . . . .          | 4         |
| 2.1.4    | Events . . . . .              | 4         |
| 2.2      | Compared Parameters . . . . . | 5         |
| 2.3      | Aspect . . . . .              | 6         |
| 2.4      | Star Slots . . . . .          | 9         |
| 2.4.1    | Slot 3 . . . . .              | 9         |
| 2.4.2    | Slot 4 . . . . .              | 10        |
| 2.4.3    | Slot 5 . . . . .              | 11        |
| 2.4.4    | Slot 6 . . . . .              | 12        |
| 2.4.5    | Slot 7 . . . . .              | 13        |
| 2.5      | FID Slots . . . . .           | 14        |
| 2.5.1    | Slot 0 . . . . .              | 14        |
| 2.5.2    | Slot 1 . . . . .              | 15        |
| 2.5.3    | Slot 2 . . . . .              | 16        |
| <b>A</b> | <b>Summary</b>                | <b>17</b> |
| A.1      | Status . . . . .              | 17        |
| A.2      | Comments . . . . .            | 17        |

# 1 Front

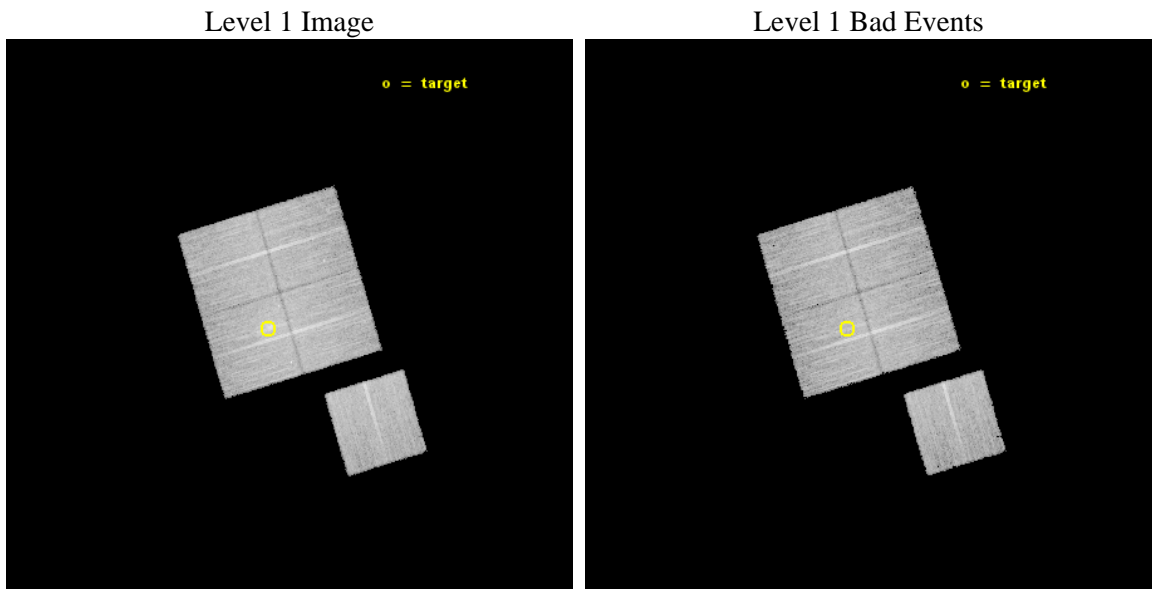
|          |  |   |
|----------|--|---|
| seq_num  | 801266   | Sequence number                             |
| obs_id   | 16573  | Observation id                              |
| title    | A Chandra-Planck Legacy Program for Massive Clusters of Galaxies | P   |
| observer | Dr. Christine Jones  | Principal investigator                      |
| object   | G164.61+46.39  | Source name                                 |
| dtcycle  | 0  | &#160                                       |
| cycle    | P  | events from which<br>exps? Prim/Second/Both |
| ra_targ  | 144.589167   | Observer's specified<br>target RA [deg]     |
| dec_targ | 52.044   | Observer's specified<br>target Dec [deg]    |
| ra_nom   | 144.52933746888  | Nominal RA [deg]                            |
| dec_nom  | 52.052680633167  | Nominal Dec [deg]                           |
| roll_nom | 163.25586765801  | Nominal Roll [deg]                          |
| revision | 2  | Processing version of<br>data               |
| ontime   | 20081.392608821  | Sum of GTIs [s]                             |
| livetime | 19819.014430681  | Livetime [s]                                |
| ontime0  | 20081.269488811  | Sum of GTIs [s]                             |
| ontime1  | 20081.310528815  | Sum of GTIs [s]                             |
| ontime2  | 20081.351568818  | Sum of GTIs [s]                             |
| ontime3  | 20081.392608821  | Sum of GTIs [s]                             |
| ontime6  | 20081.228448808  | Sum of GTIs [s]                             |
| l2events | 53342  | Number of level 2<br>events                 |



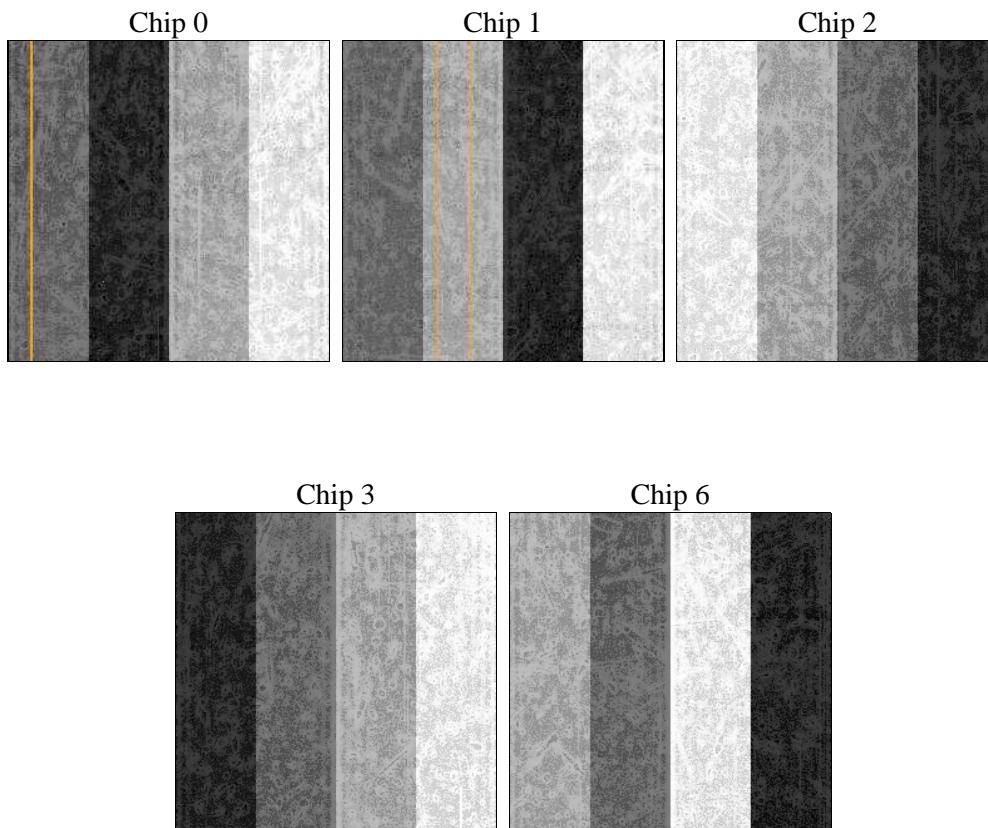
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

|          |                     |                                |                |                 |   |
|----------|---------------------|--------------------------------|----------------|-----------------|---|
| obi_num  | 0                   | Obi number                     | sched_exp_time | 19996.000000    | [s] Scheduled observation exposure time |
| ascdsver | 10.3.1              | Processing system revision     | ontime         | 20081.392608821 | Sum of GTIs [s]                         |
| caldbver | 4.6.4               | &#160                          | ontime0        | 20081.269488811 | Sum of GTIs [s]                         |
| date     | 2014-12-10T02:29:54 | Date and time of file creation | ontime1        | 20081.310528815 | Sum of GTIs [s]                         |
| revision | 2                   | Processing version of data     | ontime2        | 20081.351568818 | Sum of GTIs [s]                         |
|          |                     |                                | ontime3        | 20081.392608821 | Sum of GTIs [s]                         |
|          |                     |                                | ontime6        | 20081.228448808 | Sum of GTIs [s]                         |
|          |                     |                                | l1events       | 476623          | Number of level 1 events                |

### 2.1.4 Events

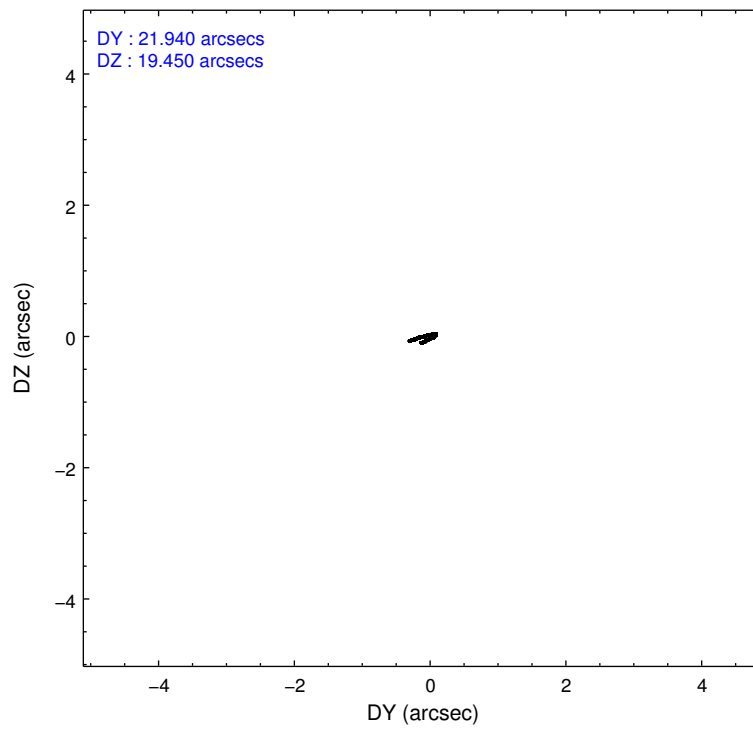
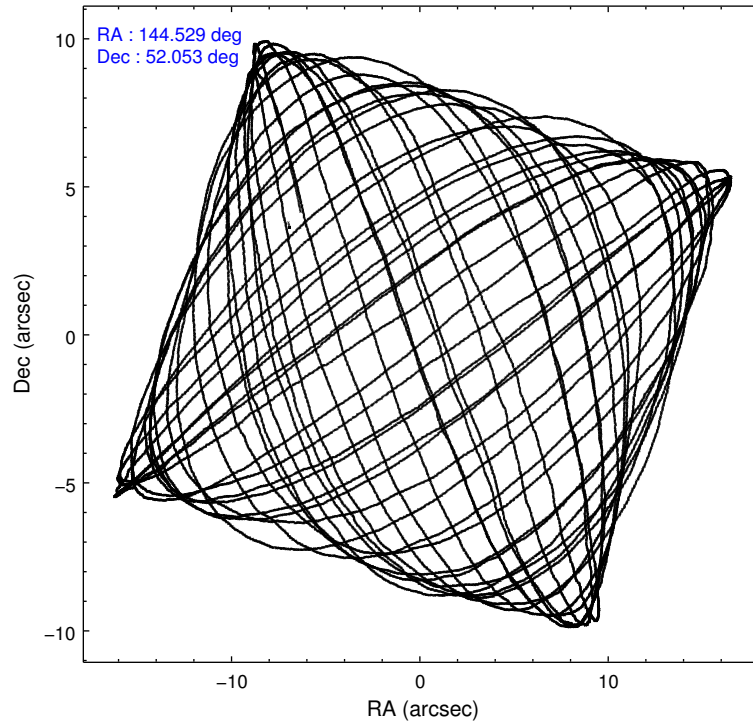
|                 | ccd 0 | ccd 1 | ccd 2 | ccd 3  | ccd 6 |
|-----------------|-------|-------|-------|--------|-------|
| level 1 events  | 90075 | 93507 | 98295 | 100049 | 94697 |
| rejected events | 78425 | 81013 | 87103 | 84478  | 83119 |
| rejected %      | 87%   | 86%   | 88%   | 84%    | 87%   |

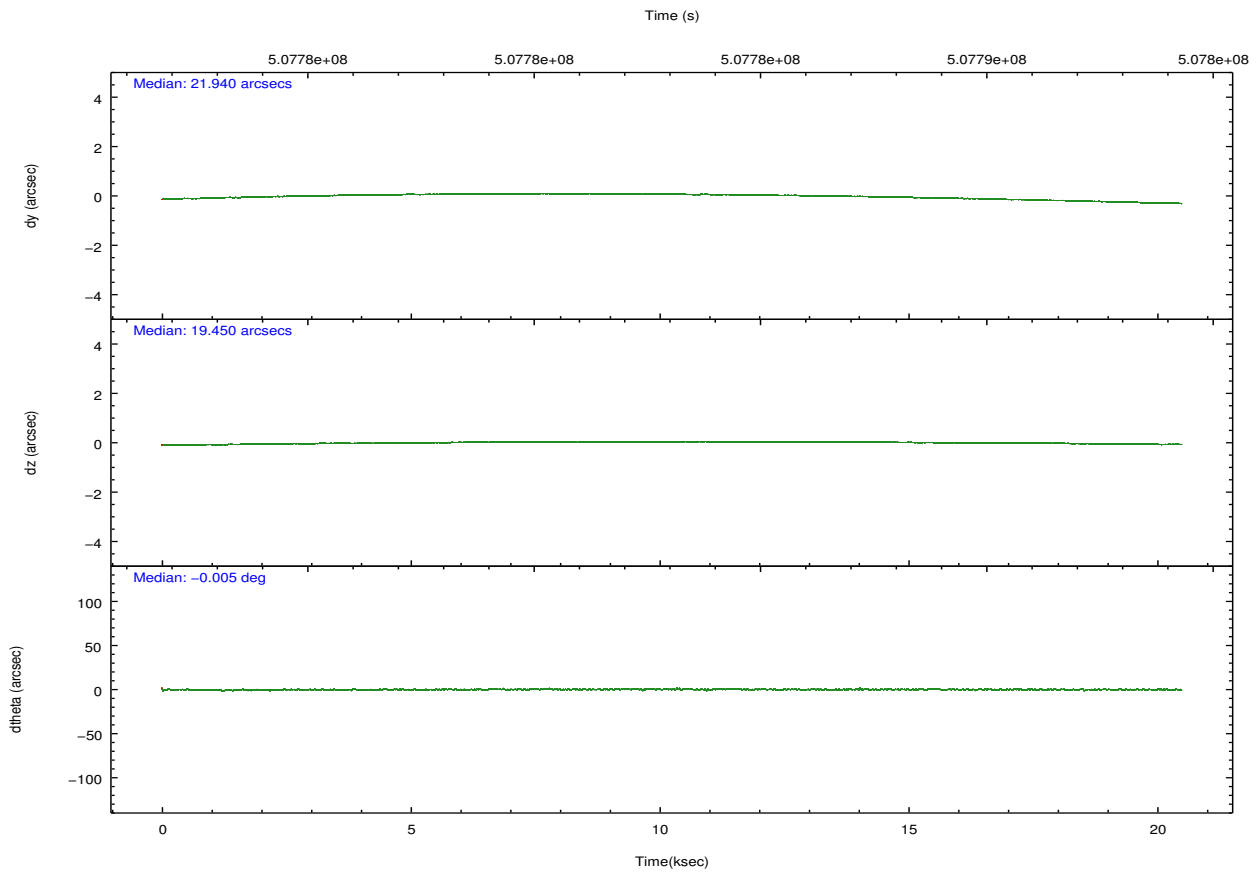
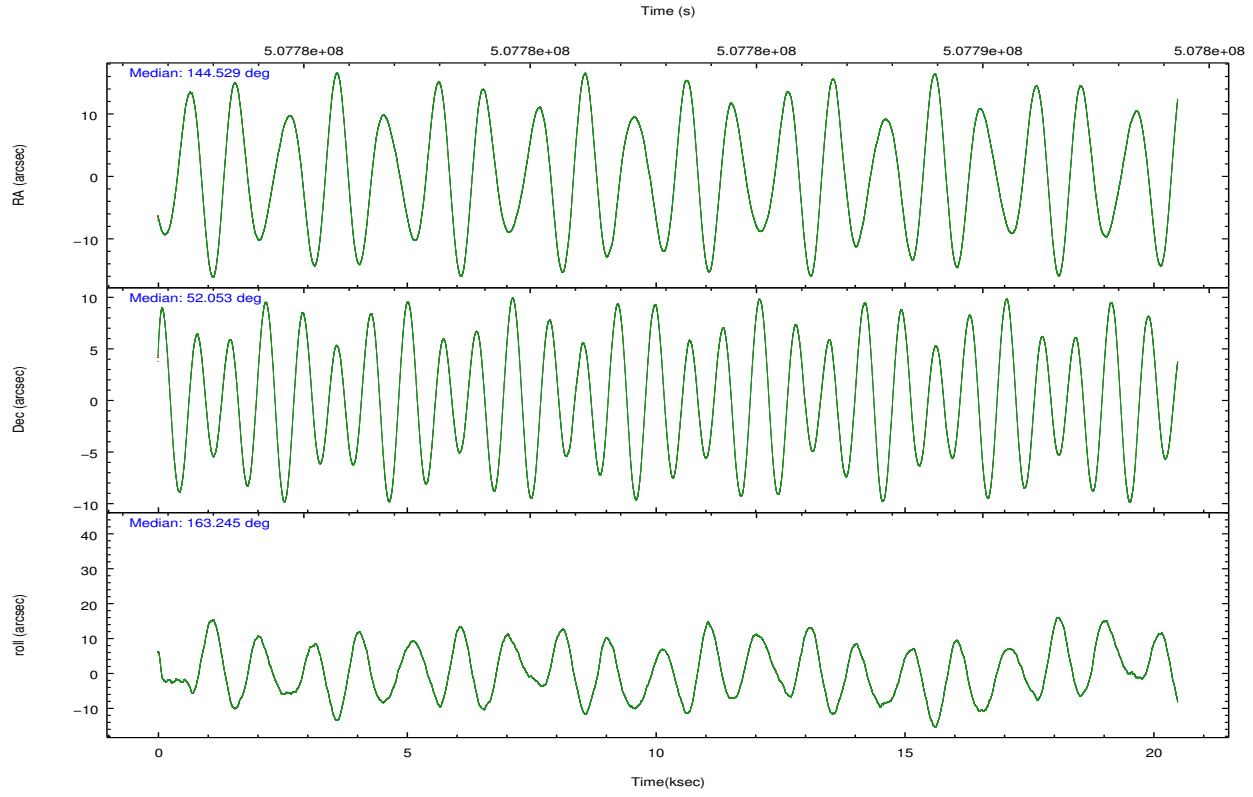
|                | ccd 0 | ccd 1 | ccd 2 | ccd 3 | ccd 6 |
|----------------|-------|-------|-------|-------|-------|
| grade 0 events | 4009  | 4291  | 3836  | 7570  | 3858  |
|                | 4%    | 4%    | 3%    | 7%    | 4%    |
| grade 1 events | 49    | 44    | 58    | 77    | 33    |
|                | 0%    | 0%    | 0%    | 0%    | 0%    |
| grade 2 events | 2965  | 3050  | 2789  | 2978  | 2659  |
|                | 3%    | 3%    | 2%    | 2%    | 2%    |
| grade 3 events | 1191  | 1230  | 1091  | 1280  | 1204  |
|                | 1%    | 1%    | 1%    | 1%    | 1%    |
| grade 4 events | 1137  | 1202  | 1147  | 1303  | 1146  |
|                | 1%    | 1%    | 1%    | 1%    | 1%    |
| grade 5 events | 4764  | 4936  | 4436  | 5402  | 5243  |
|                | 5%    | 5%    | 4%    | 5%    | 5%    |
| grade 6 events | 2356  | 2726  | 2332  | 2443  | 2712  |
|                | 2%    | 2%    | 2%    | 2%    | 2%    |
| grade 7 events | 73604 | 76028 | 82606 | 78996 | 77842 |
|                | 81%   | 81%   | 84%   | 78%   | 82%   |

## 2.2 Compared Parameters

| Parameter                         | Planned             | Actual               | Parameter                             | Planned   | Actual  |
|-----------------------------------|---------------------|----------------------|---------------------------------------|-----------|---------|
| Instrument                        | ACIS                | ACIS                 | Obspar format version number          | 7         | 7       |
| Detector                          | ACIS-01236          | ACIS-01236           | Obspar file type                      | PREDICTED | ACTUAL  |
| Grating                           | NONE                | NONE                 | Obspar update status                  | NONE      | UPDATED |
| Data mode                         | VFAINT              | VFAINT               | CCD I0 on                             | Y         | Y       |
| Observation mode                  | POINTING            | POINTING             | CCD I1 on                             | Y         | Y       |
| [deg] Pointing RA                 | 144.572854          | 144.5293374688837    | CCD I2 on                             | Y         | Y       |
| [deg] Pointing Dec                | 52.059097           | 52.05268063316672    | CCD I3 on                             | Y         | Y       |
| [deg] Pointing Roll               | 163.012852          | 163.2558676580118    | CCD S0 on                             | N         | N       |
| [mm] SIM focus pos                | -0.782348           | -0.7809083437167272  | CCD S1 on                             | N         | N       |
| [mm] SIM defocus                  | 0                   | 0.001439871863259334 | CCD S2 on                             | O1        | Y       |
| [mm] SIM translation stage pos    | -225.842463         | -225.8433433320239   | CCD S3 on                             | N         | N       |
| [mm] SIM translation stage offset | -7.75               | -7.749109670905796   | CCD S4 on                             | N         | N       |
| [s] Observation start time (MET)  | 507773283.184000    | 507772190.63824      | CCD S5 on                             | N         | N       |
| Observation start date            | 2014-02-03T00:06:56 | 2014-02-02T23:49:50  | Number of optional ACIS chips dropped | 0         | 0       |
| [s] Observation end time (MET)    | 507793279.184000    | 507794308.60196      | On-chip summing requested             | N         | N       |
| Observation end date              | 2014-02-03T05:40:12 | 2014-02-03T05:58:28  | Subarray requested                    | NONE      | NONE    |
| Read mode                         | TIMED               | TIMED                | Alternating exposures requested       | N         | N       |
|                                   |                     |                      | [s] Primary exposure time             | 0.000000  | 3.1     |

## 2.3 Aspect





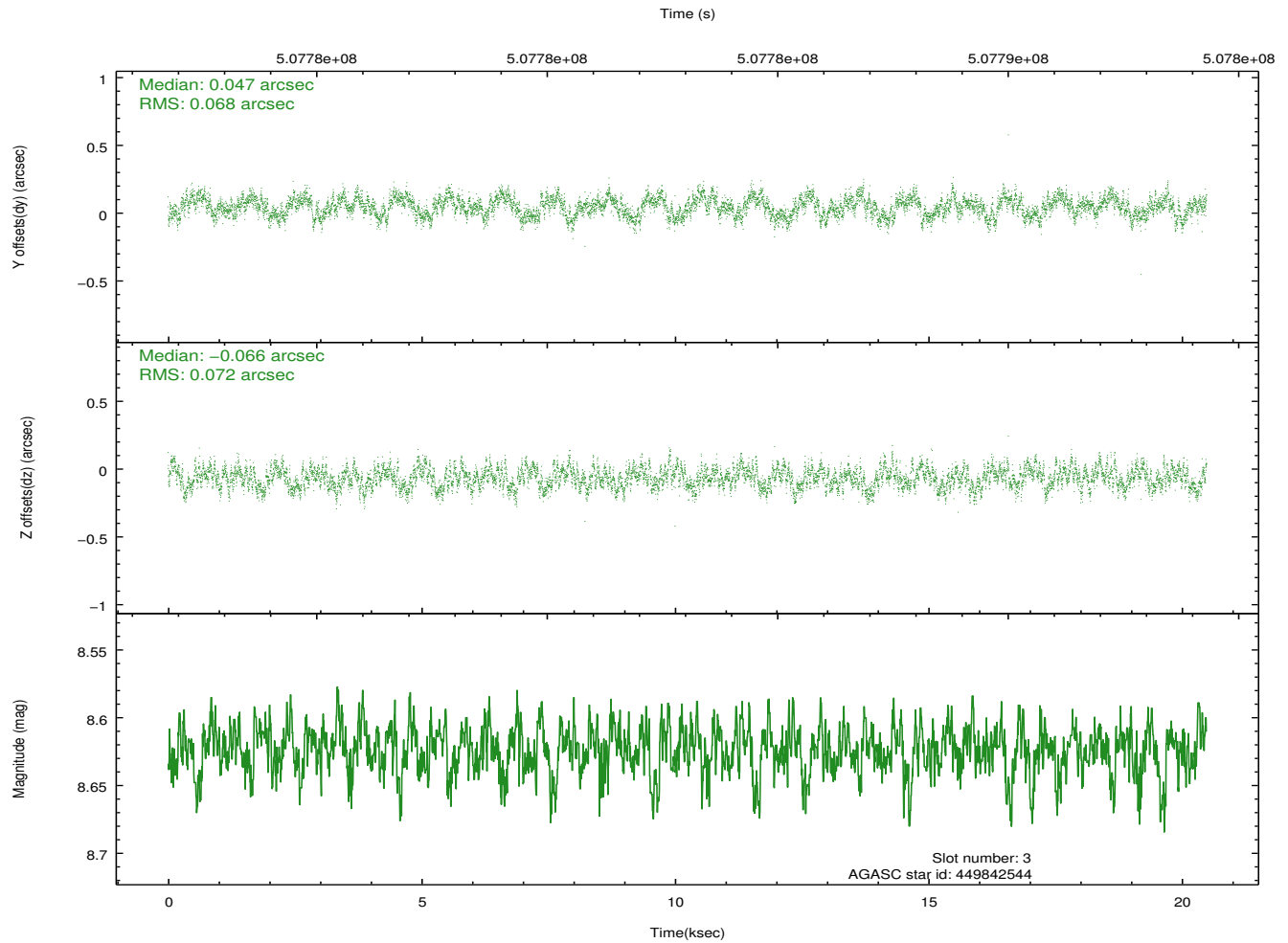
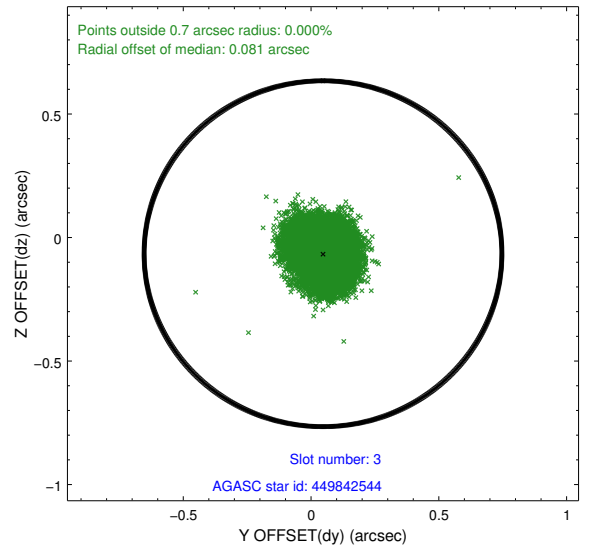
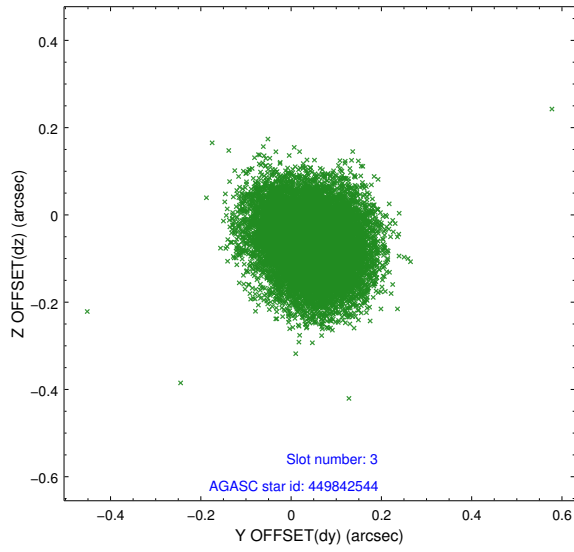
### Slot Statistics

| slot | status | used | id        | mag  | n_pts | med_dy | med_dz | dr1   | dr2   | ra         | dec       | mean_y   | mean_z   |
|------|--------|------|-----------|------|-------|--------|--------|-------|-------|------------|-----------|----------|----------|
| 0    | FID    |      | ACIS-I-1  | 7.12 | 4998  | 0.127  | -0.103 | 0.007 | 0.012 | 0.000000   | 0.000000  | 917.39   | -1002.29 |
| 1    | FID    |      | ACIS-I-5  | 7.10 | 4998  | -0.342 | 0.084  | 0.006 | 0.011 | 0.000000   | 0.000000  | -1831.18 | 895.12   |
| 2    | FID    |      | ACIS-I-6  | 7.12 | 4998  | 0.123  | 0.090  | 0.007 | 0.012 | 0.000000   | 0.000000  | 382.61   | 1539.95  |
| 3    | GUIDE  | used | 449842544 | 8.62 | 9986  | 0.047  | -0.066 | 0.108 | 0.164 | 144.787223 | 52.326058 | -169.82  | -1056.37 |
| 4    | GUIDE  | used | 449843776 | 9.10 | 9990  | 0.038  | -0.176 | 0.109 | 0.177 | 145.003350 | 51.524715 | -1483.45 | 1555.60  |
| 5    | GUIDE  | used | 449843800 | 7.99 | 9992  | -0.129 | 0.233  | 0.084 | 0.127 | 145.360838 | 52.113273 | -1607.01 | -703.53  |
| 6    | GUIDE  | used | 449849376 | 9.67 | 9981  | 0.047  | -0.208 | 0.251 | 0.367 | 145.198524 | 51.350436 | -2089.65 | 2023.12  |
| 7    | GUIDE  | used | 498998576 | 8.27 | 9986  | 0.006  | 0.211  | 0.092 | 0.148 | 145.260103 | 52.618763 | -845.16  | -2370.66 |

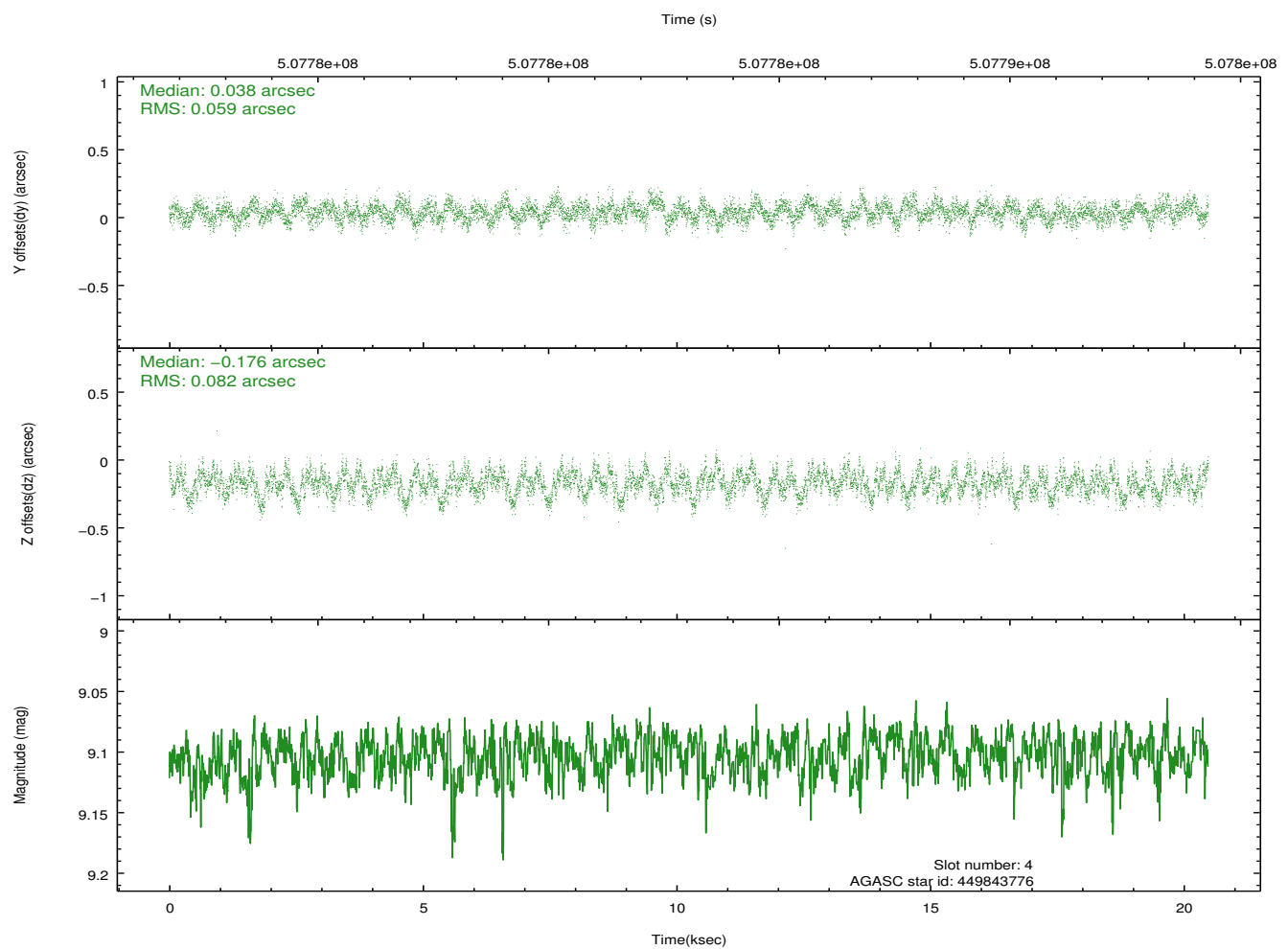
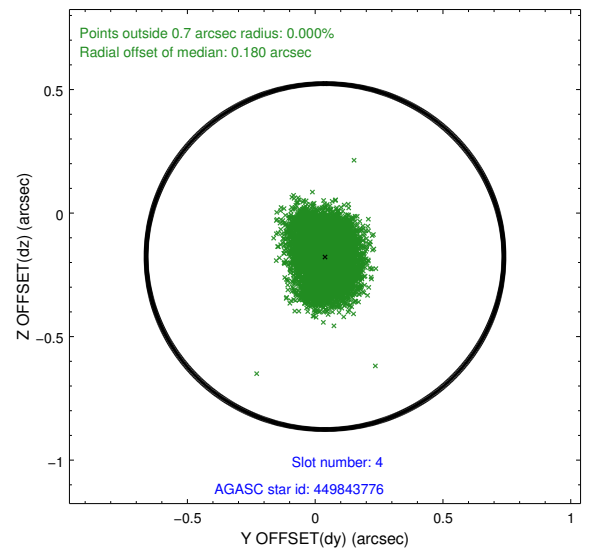
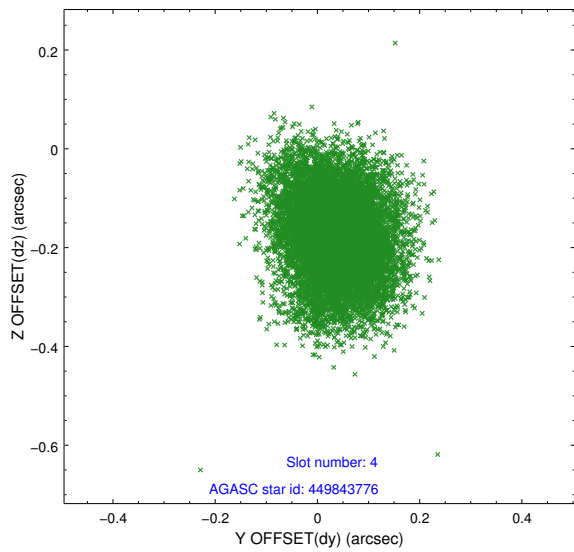
∞

## 2.4 Star Slots

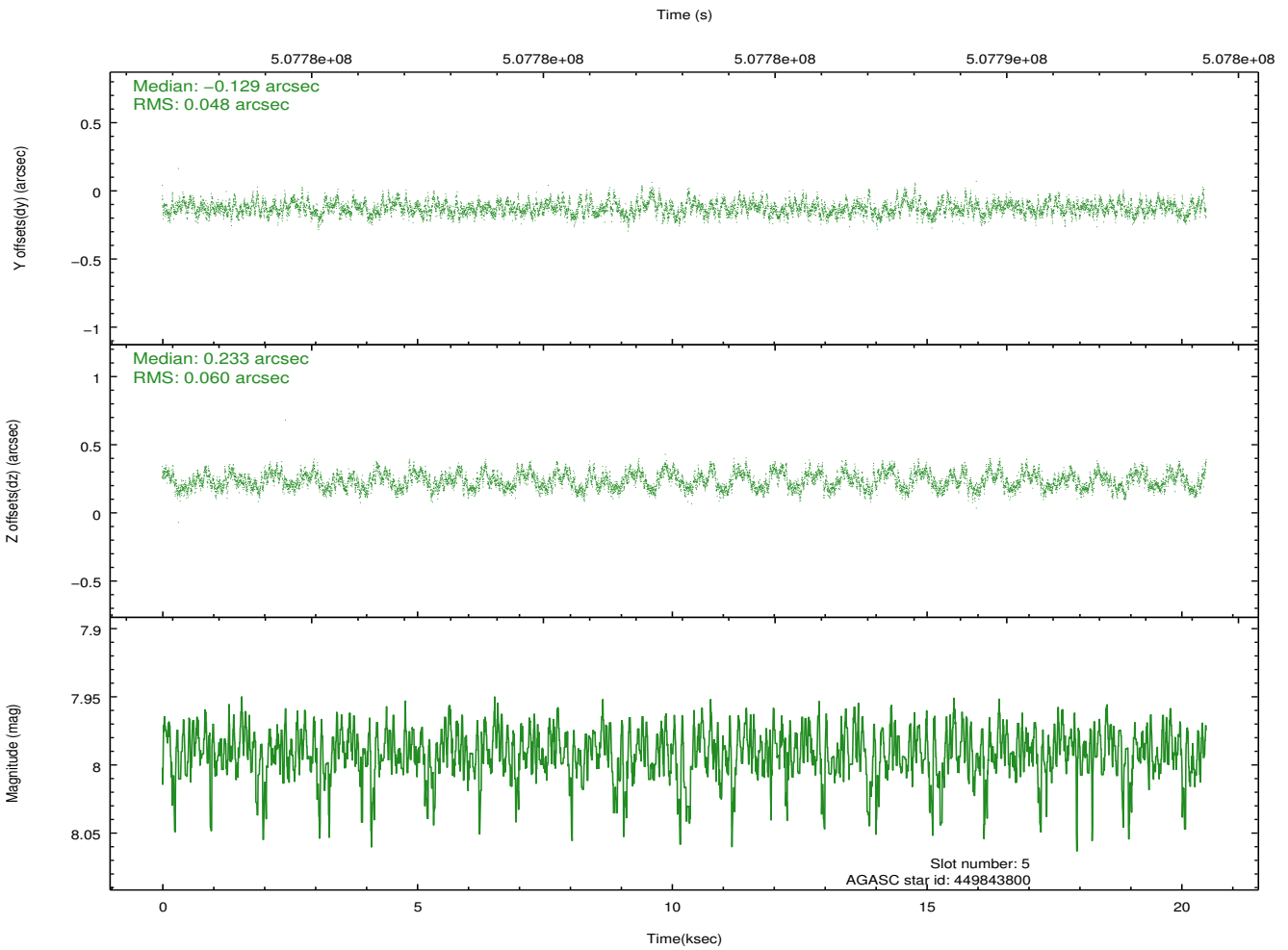
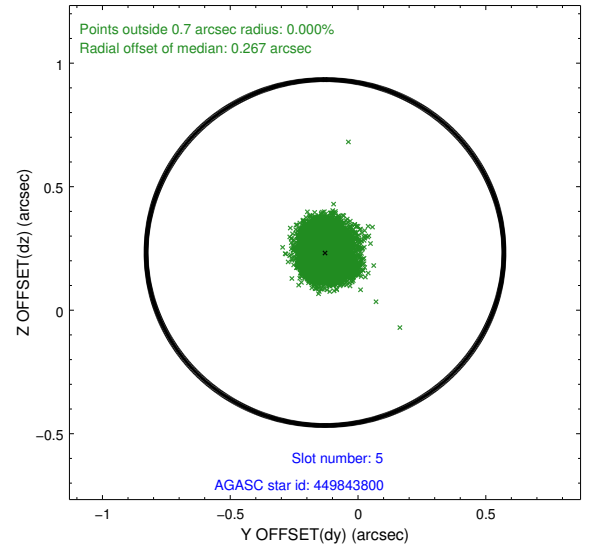
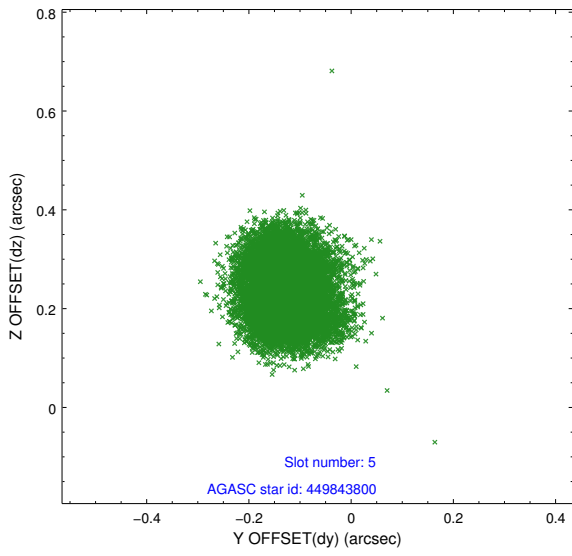
### 2.4.1 Slot 3



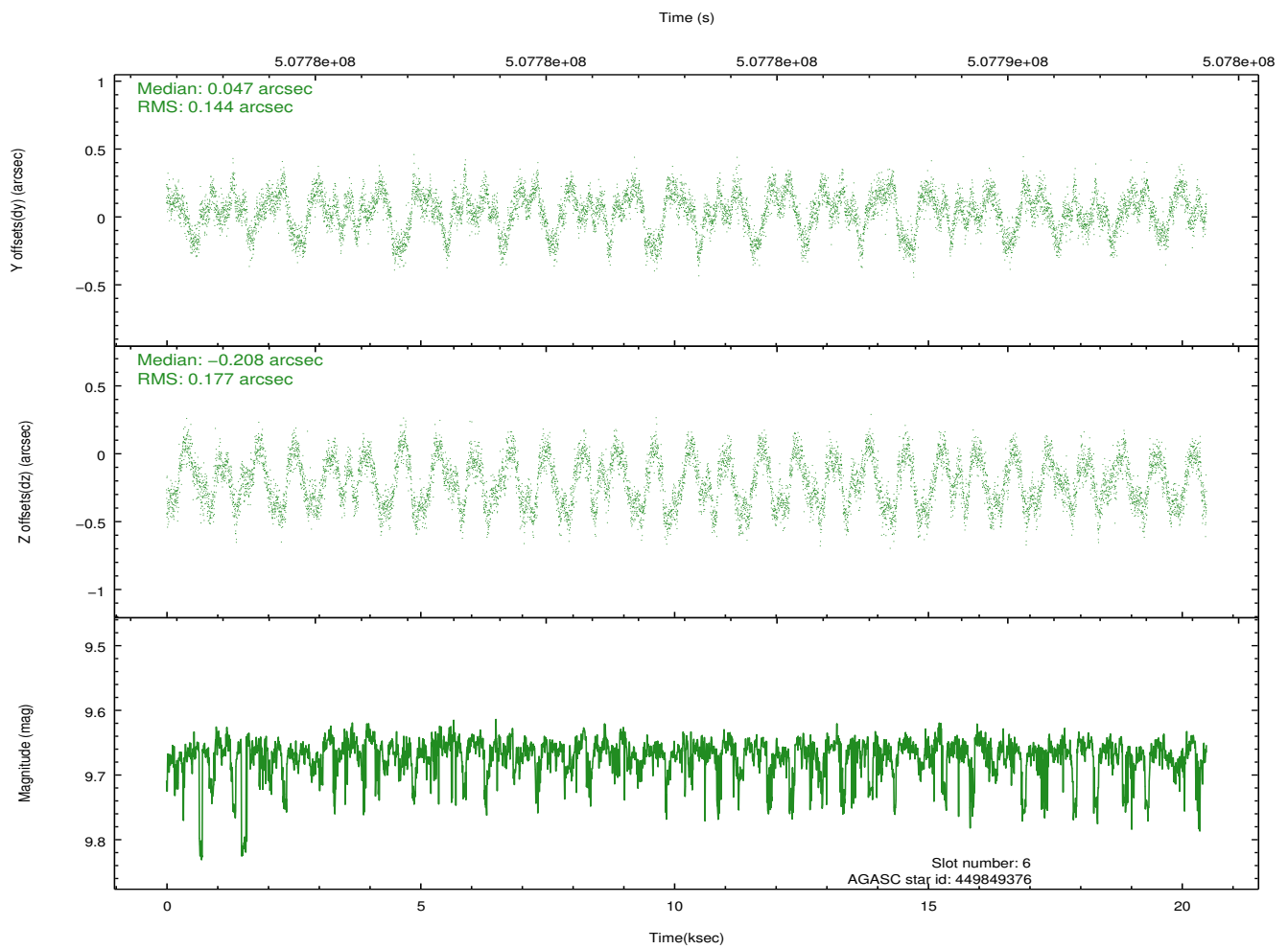
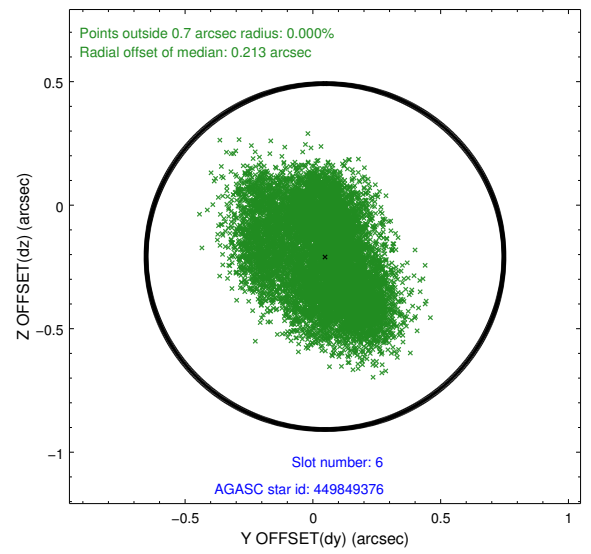
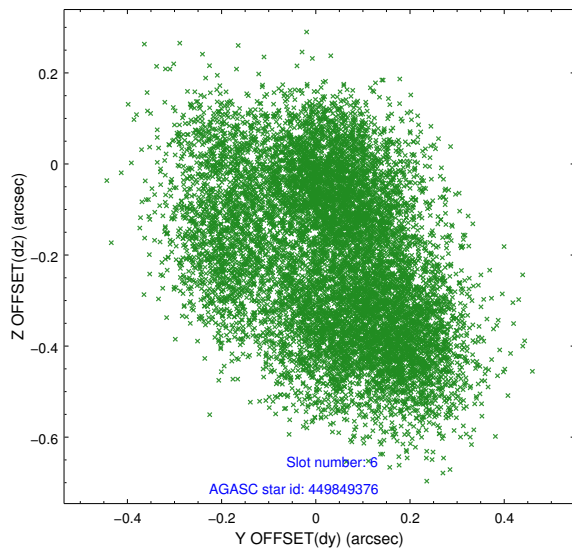
## 2.4.2 Slot 4



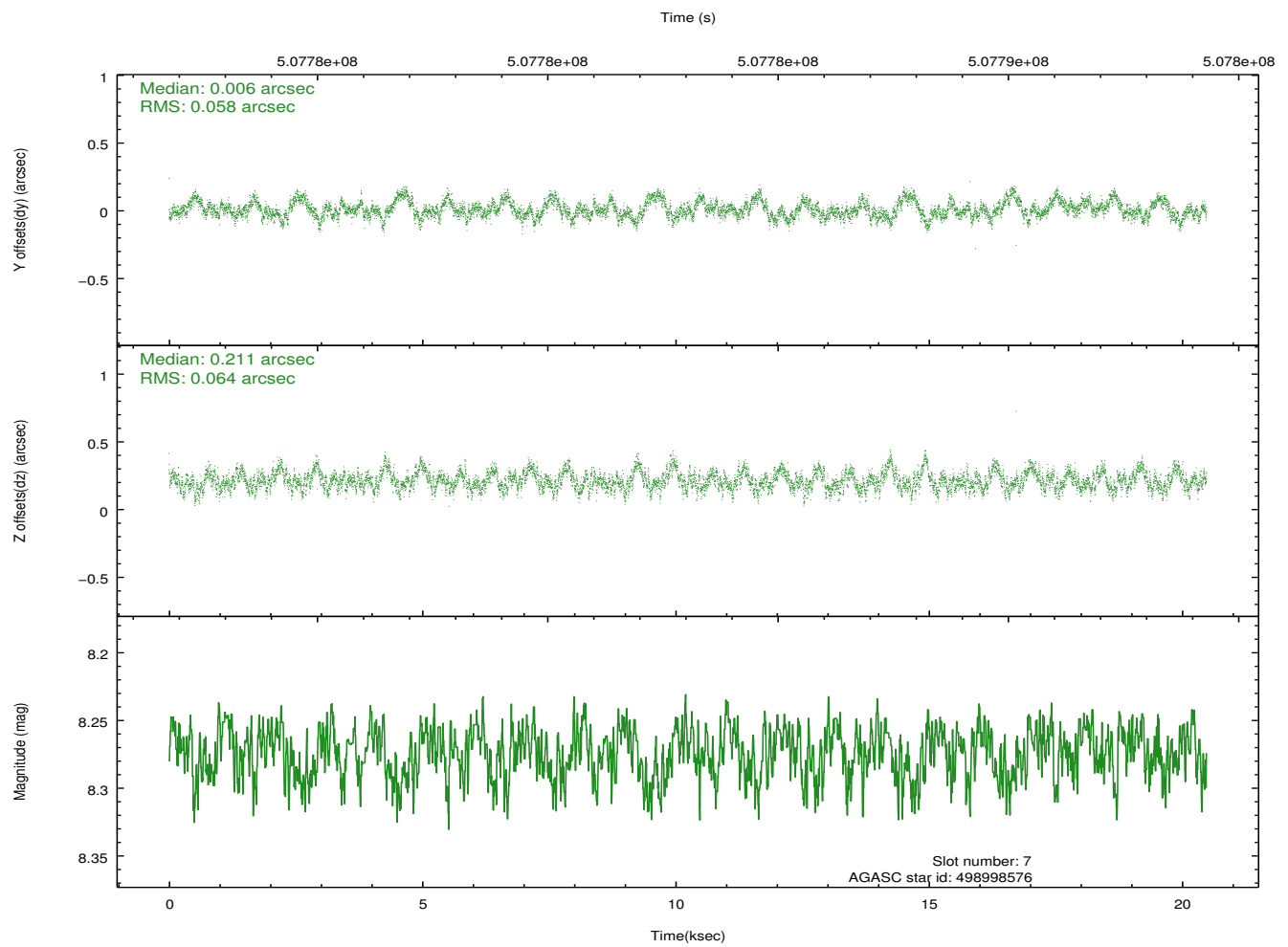
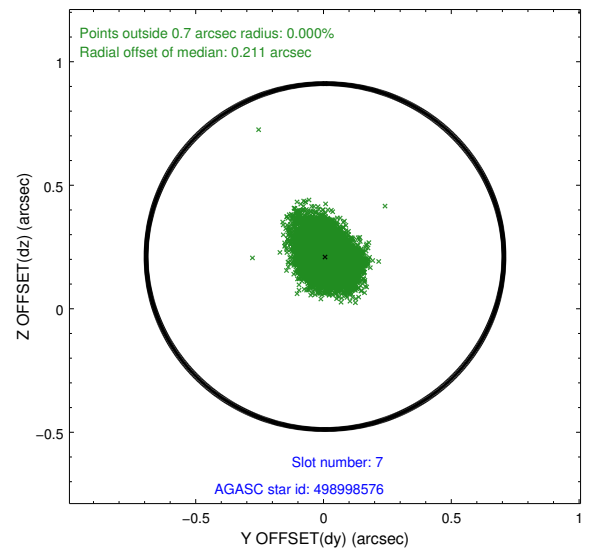
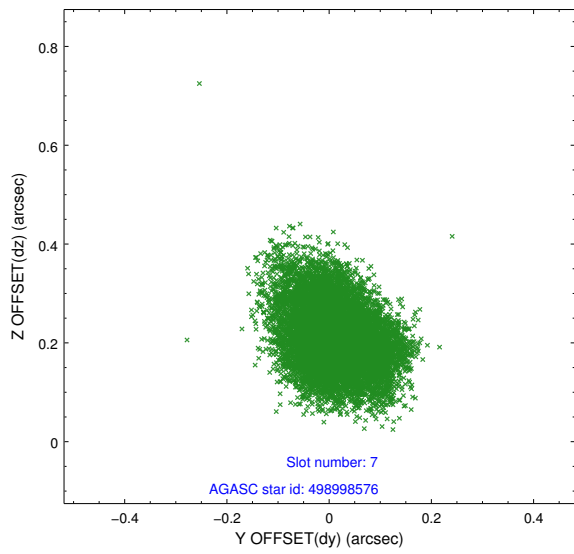
### 2.4.3 Slot 5



## 2.4.4 Slot 6

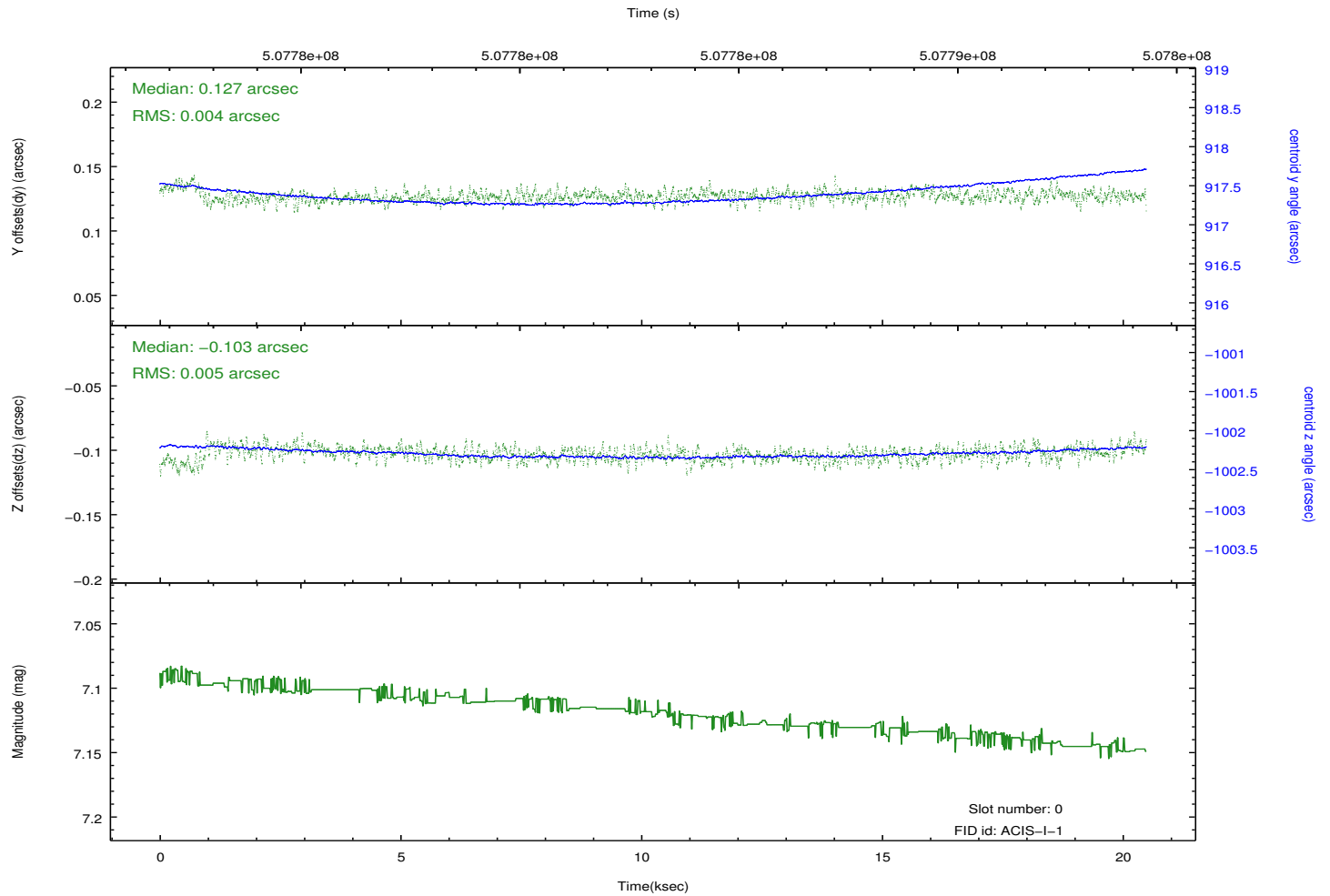
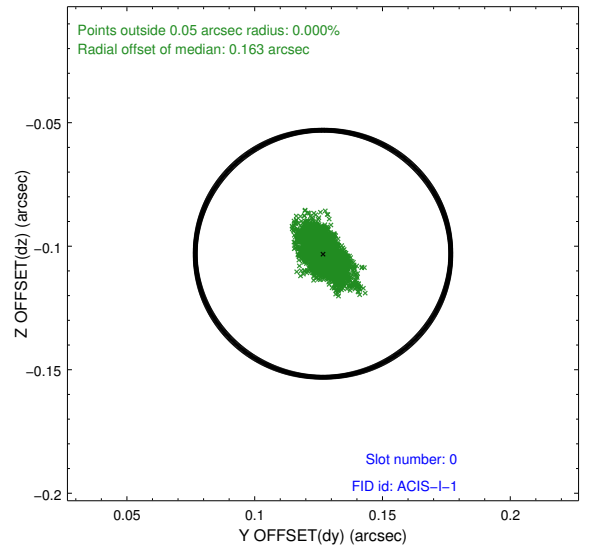
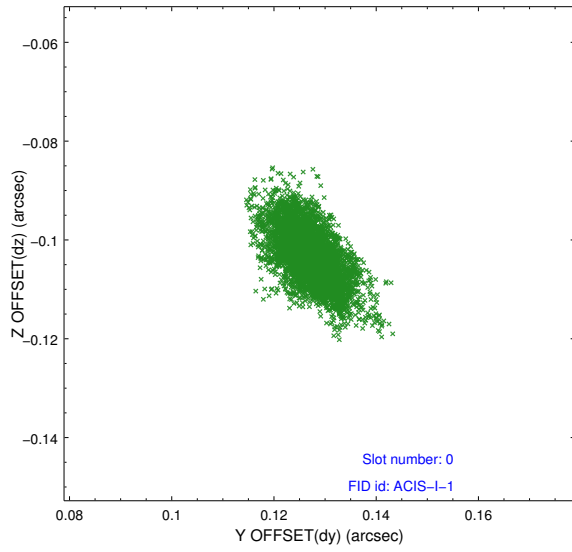


## 2.4.5 Slot 7

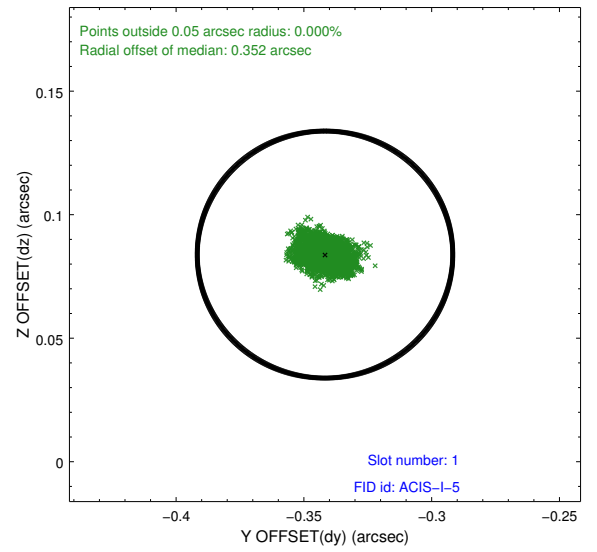
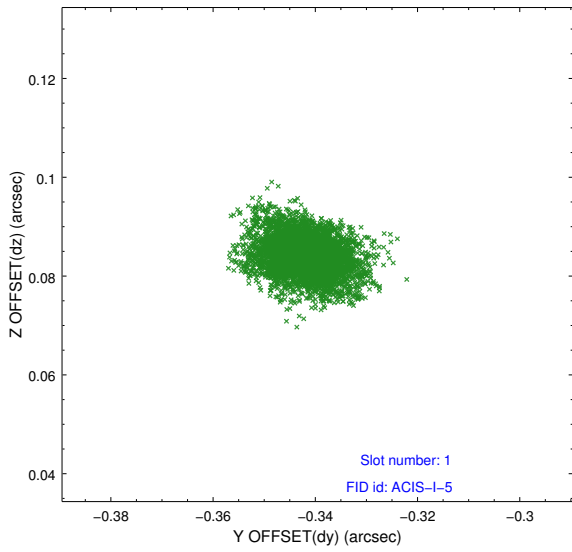


## 2.5 FID Slots

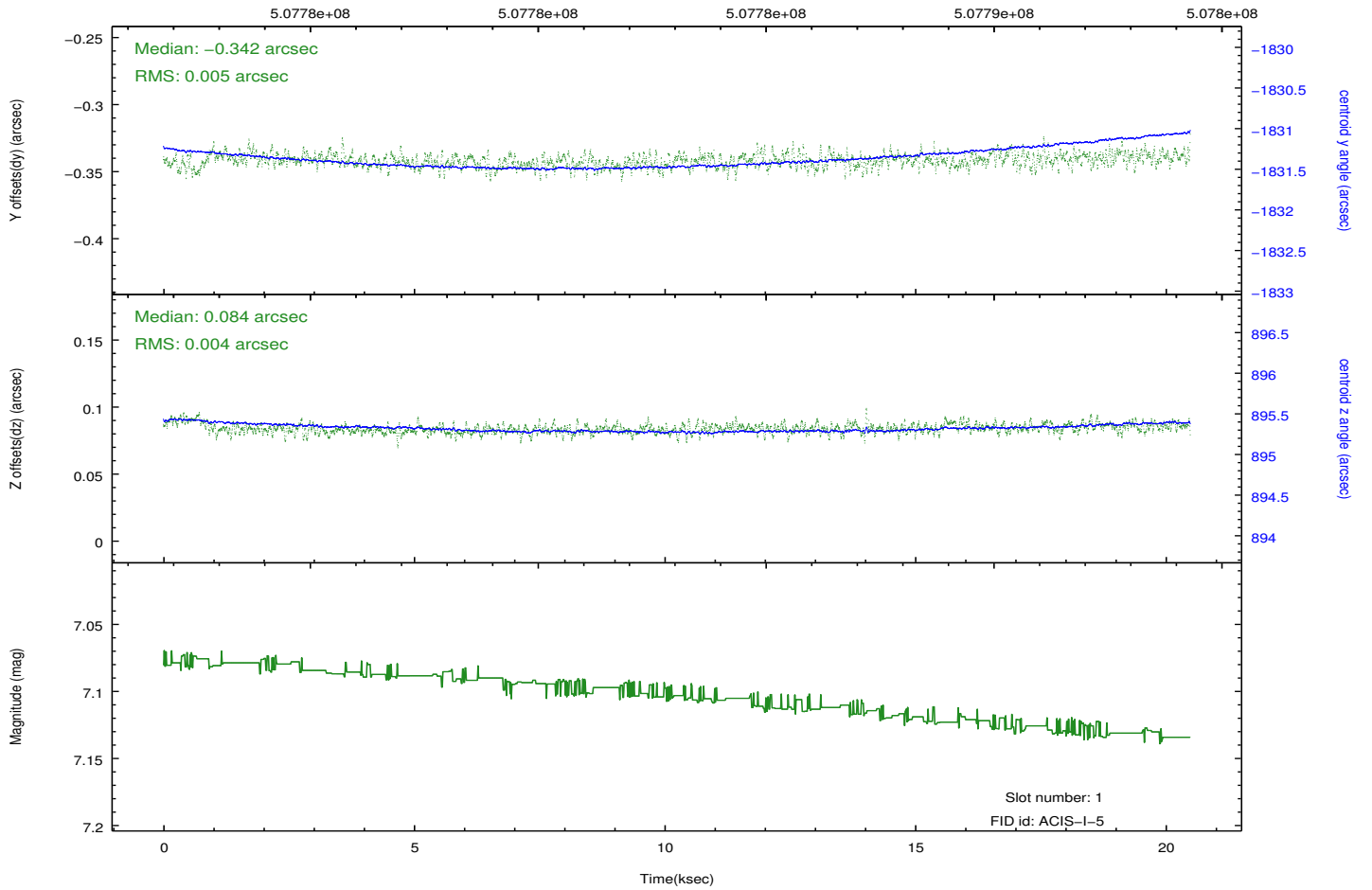
### 2.5.1 Slot 0



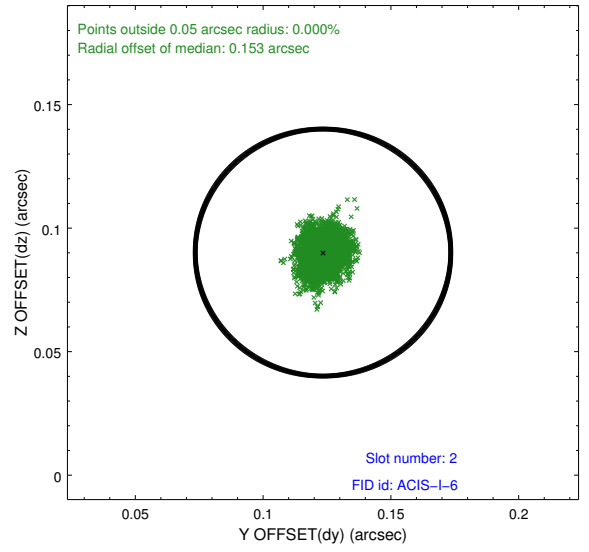
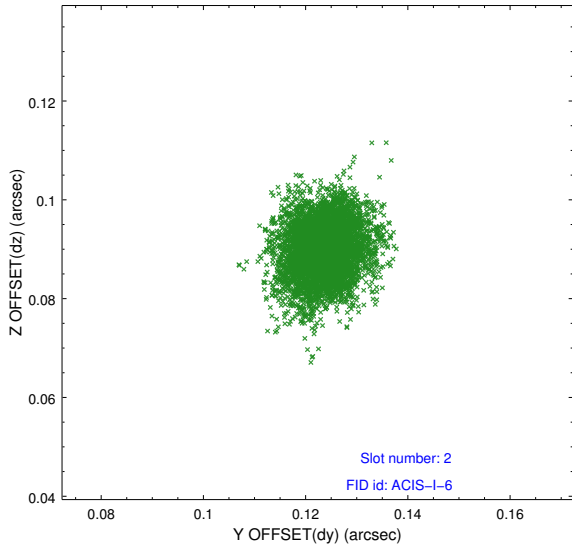
## 2.5.2 Slot 1



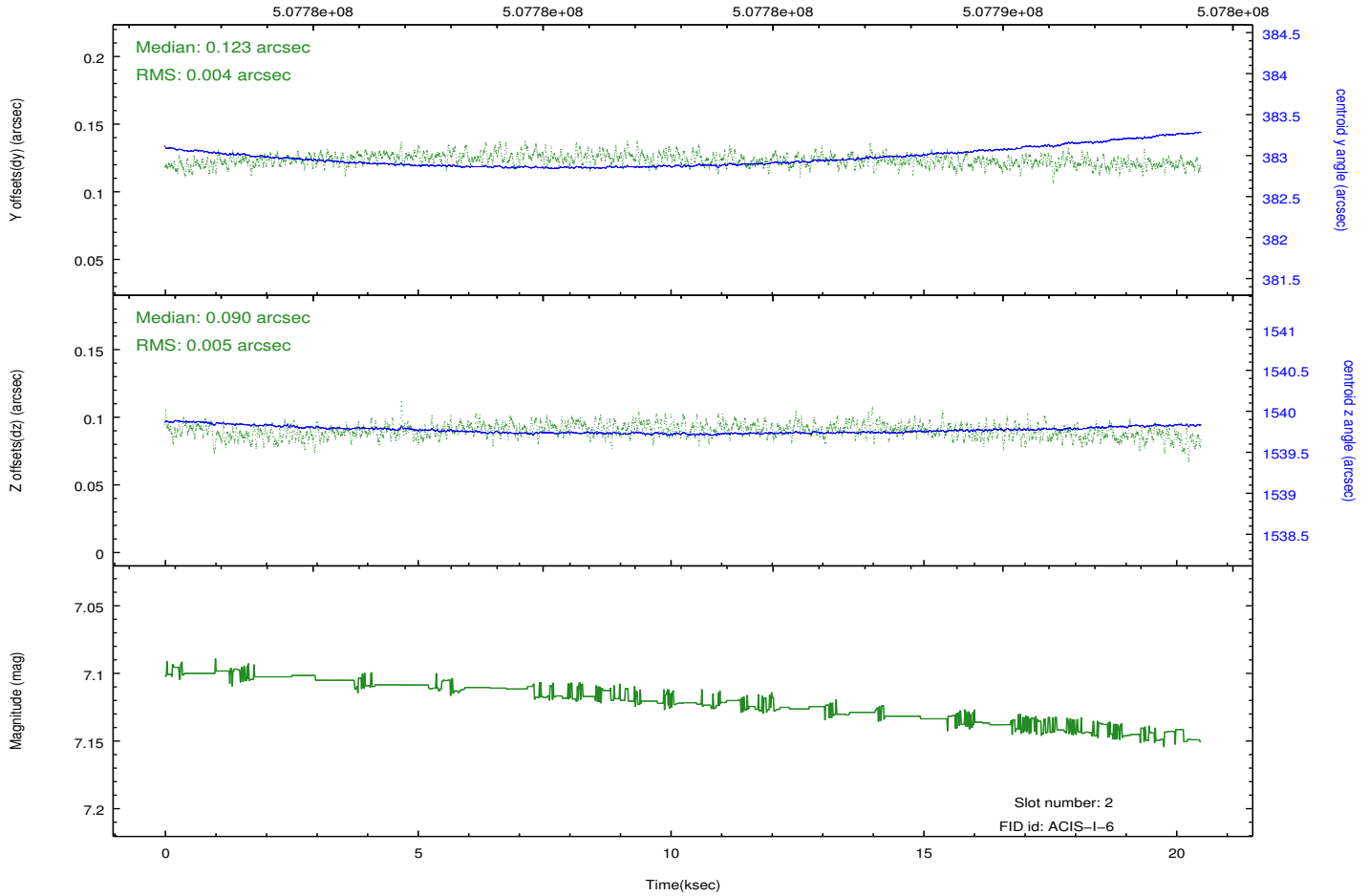
Time (s)



### 2.5.3 Slot 2



Time (s)



# A Summary

## A.1 Status

|                            |                 |
|----------------------------|-----------------|
| V&V Scientist              | Jen Lauer       |
| V&V Date (YYYY-MM-DD)      | 2014.12.17      |
| V&V Edition                | 1               |
| V&V Disposition and Status | OK              |
| V&V Charge Time            | 20.081392608821 |

## 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.