

# V&V Reference Report

## L2 ASCDS Version : 10.6

Observation 19662 - L2 Version 1  
Chandra X-Ray Center

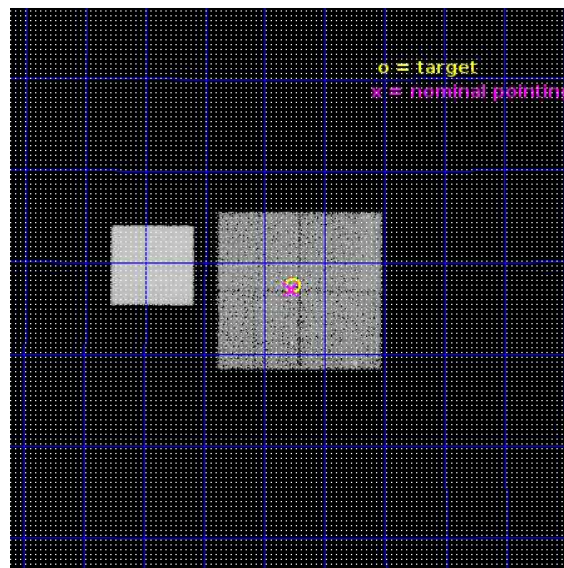
L2 Processing Date : Aug 22 2017

## 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  | 901369                                                                                             | Sequence number                             |
| obs_id   | 19662                                                                                              | Observation id                              |
| title    | The Chandra Deep Wide-Field Survey: Completing the new generation of Chandra extragalactic surveys | Proposal title                              |
| observer | Ryan Hickox                                                                                        | Principal investigator                      |
| object   | CDWFS                                                                                              | Source name                                 |
| dtcycle  | 0                                                                                                  | &#160                                       |
| cycle    | P                                                                                                  | events from which exps?<br>Prim/Second/Both |
| ra_targ  | 216.93979                                                                                          | Observer's specified target RA [deg]        |
| dec_targ | 33.125827                                                                                          | Observer's specified target Dec [deg]       |
| ra_nom   | 216.94483734892                                                                                    | Nominal RA [deg]                            |
| dec_nom  | 33.117514096041                                                                                    | Nominal Dec [deg]                           |
| roll_nom | 270.20593020076                                                                                    | Nominal Roll [deg]                          |
| revision | 1                                                                                                  | Processing version of data                  |
| ontime   | 24769.000190616                                                                                    | Sum of GTIs [s]                             |
| livetime | 24445.374968453                                                                                    | Livetime [s]                                |
| ontime0  | 24765.859140396                                                                                    | Sum of GTIs [s]                             |
| ontime1  | 24769.000190616                                                                                    | Sum of GTIs [s]                             |
| ontime2  | 24769.000190616                                                                                    | Sum of GTIs [s]                             |
| ontime3  | 24769.000190616                                                                                    | Sum of GTIs [s]                             |
| ontime7  | 24769.000190616                                                                                    | Sum of GTIs [s]                             |
| l2events | 148116                                                                                             | Number of level 2 events                    |

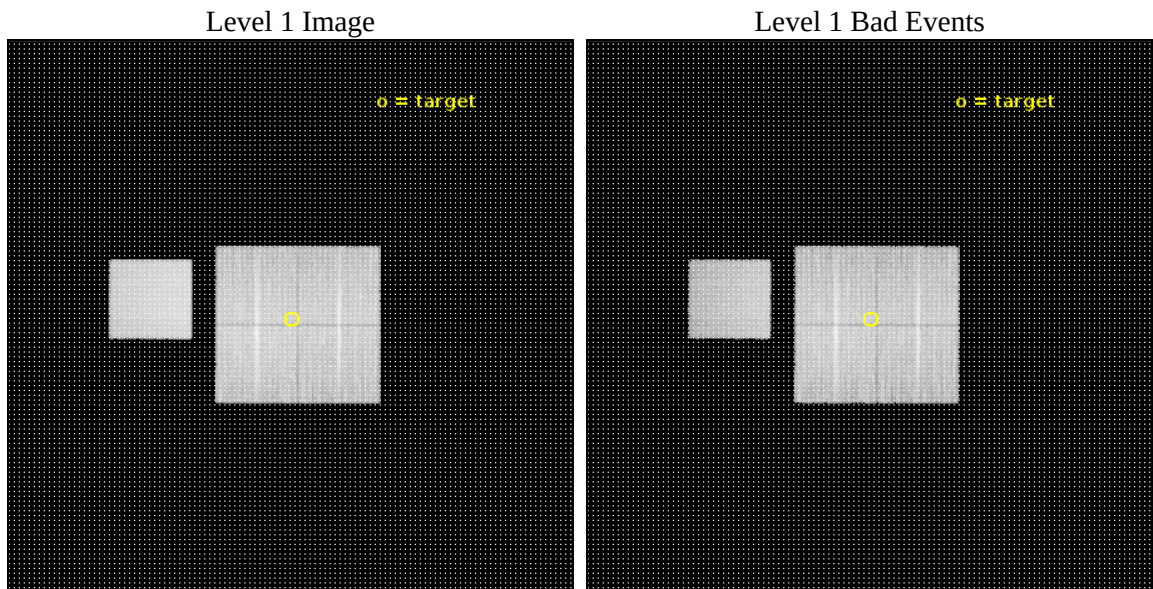




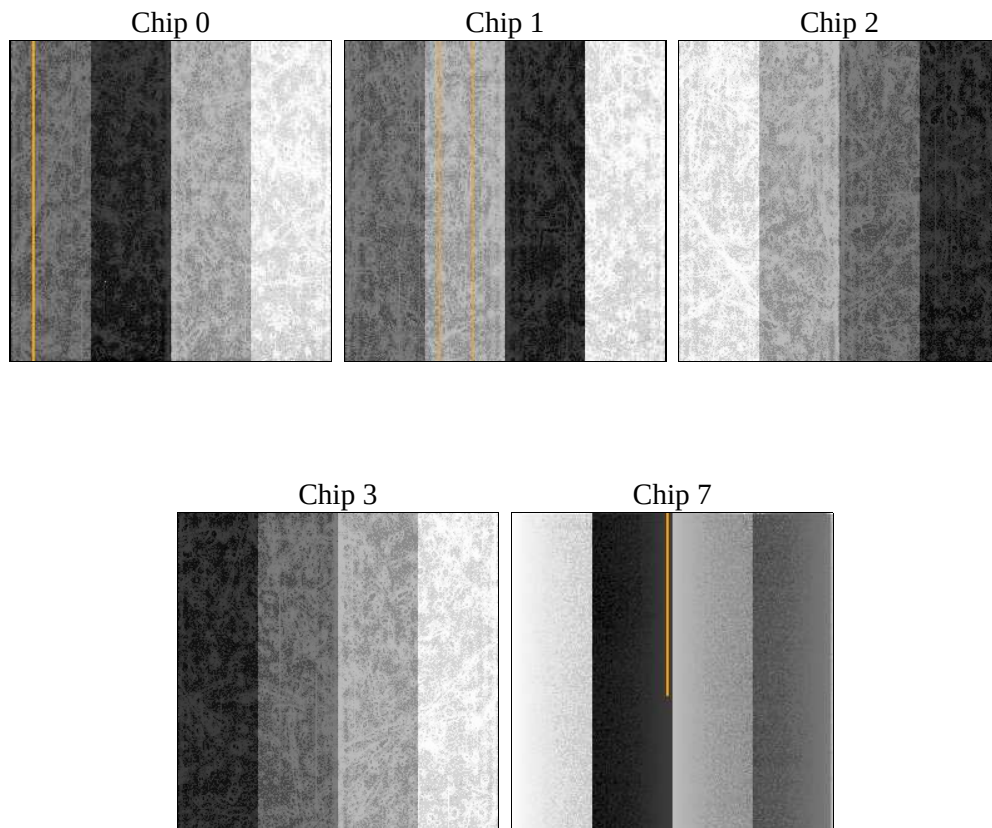
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

|          |                     |                                |                |                 |                                         |
|----------|---------------------|--------------------------------|----------------|-----------------|-----------------------------------------|
| obi_num  | 0                   | Obi number                     | sched_exp_time | 25000.000000    | [s] Scheduled observation exposure time |
| ascdsver | 10.6                | Processing system revision     | ontime         | 24769.000190616 | Sum of GTIs [s]                         |
| caldbver | 4.7.5               | &#160                          | ontime0        | 24765.859140396 | Sum of GTIs [s]                         |
| date     | 2017-08-22T22:50:05 | Date and time of file creation | ontime1        | 24769.000190616 | Sum of GTIs [s]                         |
| revision | 1                   | Processing version of data     | ontime2        | 24769.000190616 | Sum of GTIs [s]                         |
|          |                     |                                | ontime3        | 24769.000190616 | Sum of GTIs [s]                         |
|          |                     |                                | ontime7        | 24769.000190616 | Sum of GTIs [s]                         |
|          |                     |                                | l1events       | 844444          | Number of level 1 events                |

### 2.1.4 Events

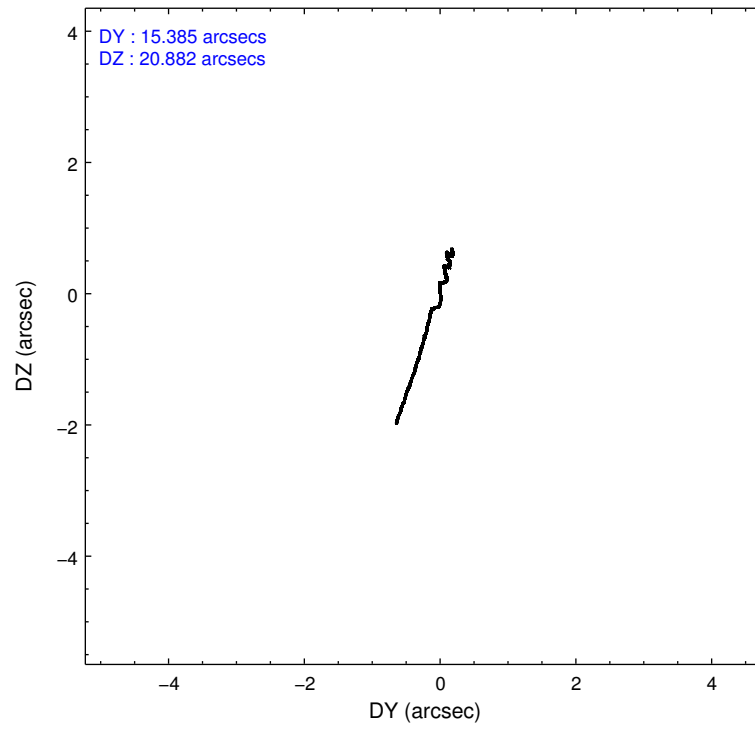
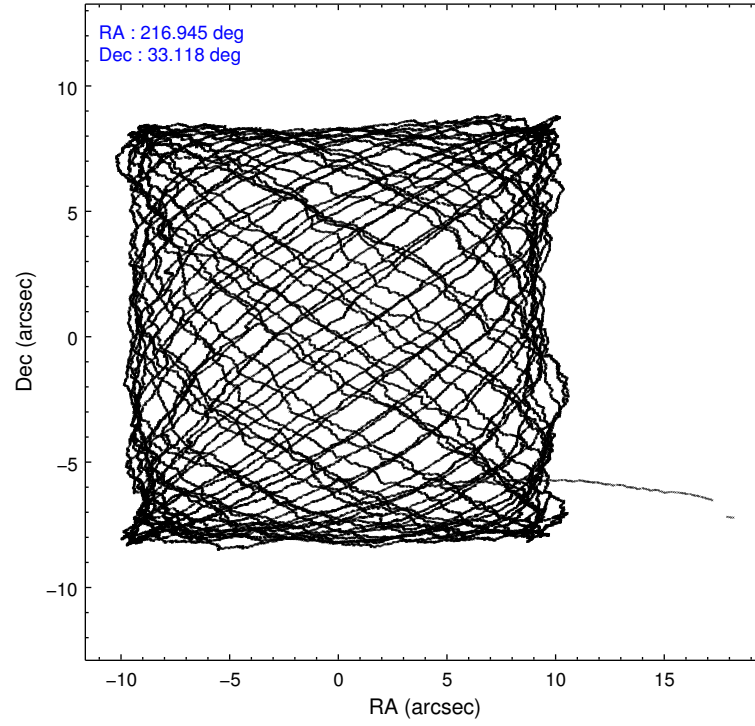
|                 | ccd 0  | ccd 1  | ccd 2  | ccd 3  | ccd 7  |
|-----------------|--------|--------|--------|--------|--------|
| level 1 events  | 150914 | 155595 | 169054 | 158868 | 210013 |
| rejected events | 133208 | 135280 | 151793 | 141948 | 119910 |
| rejected %      | 88%    | 86%    | 89%    | 89%    | 57%    |

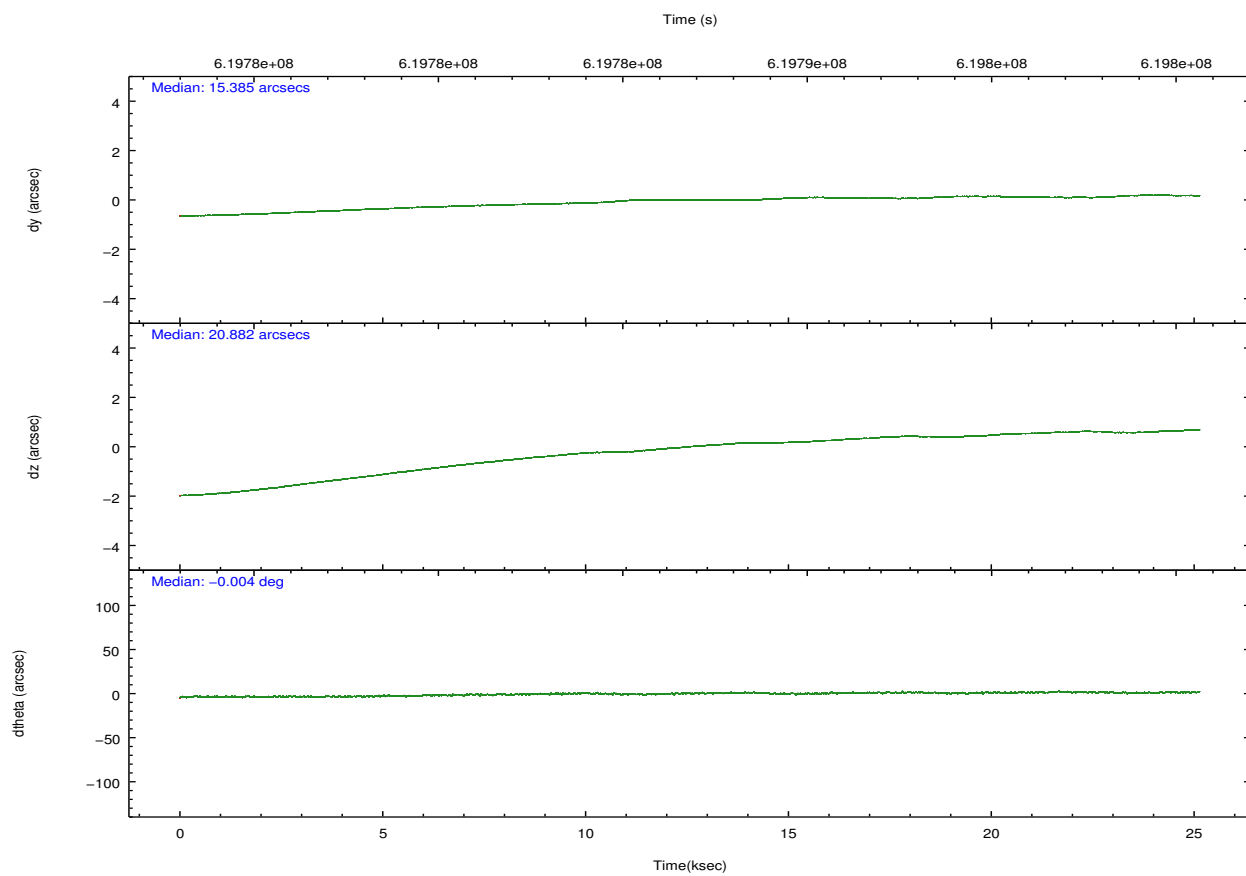
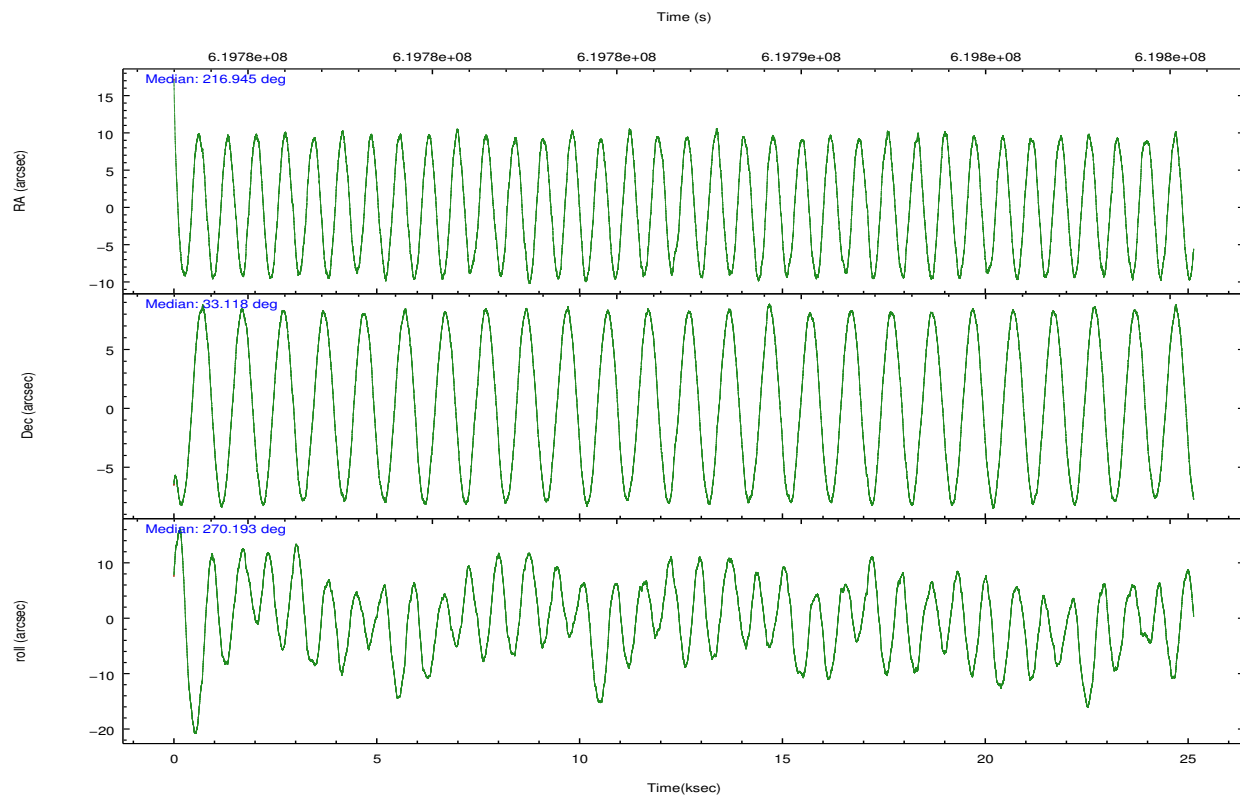
|                | ccd 0  | ccd 1  | ccd 2  | ccd 3  | ccd 7 |
|----------------|--------|--------|--------|--------|-------|
| grade 0 events | 5973   | 6938   | 6078   | 6041   | 7584  |
|                | 3%     | 4%     | 3%     | 3%     | 3%    |
| grade 1 events | 76     | 65     | 83     | 98     | 291   |
|                | 0%     | 0%     | 0%     | 0%     | 0%    |
| grade 2 events | 4538   | 5135   | 4258   | 3664   | 18509 |
|                | 3%     | 3%     | 2%     | 2%     | 8%    |
| grade 3 events | 1777   | 1831   | 1747   | 1847   | 7234  |
|                | 1%     | 1%     | 1%     | 1%     | 3%    |
| grade 4 events | 1597   | 1863   | 1776   | 1786   | 7104  |
|                | 1%     | 1%     | 1%     | 1%     | 3%    |
| grade 5 events | 6594   | 7167   | 6222   | 7875   | 20763 |
|                | 4%     | 4%     | 3%     | 4%     | 9%    |
| grade 6 events | 3827   | 4555   | 3407   | 3584   | 49699 |
|                | 2%     | 2%     | 2%     | 2%     | 23%   |
| grade 7 events | 126532 | 128041 | 145483 | 133973 | 98829 |
|                | 83%    | 82%    | 86%    | 84%    | 47%   |

## 2.2 Compared Parameters

| Parameter                         | Planned             | Actual                | Parameter                             | Planned   | Actual  |
|-----------------------------------|---------------------|-----------------------|---------------------------------------|-----------|---------|
| Instrument                        | ACIS                | ACIS                  | Obspar format version number          | 7         | 7       |
| Detector                          | ACIS-01237          | ACIS-01237            | 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                 | 216.928169          | 216.944837348915      | CCD I2 on                             | Y         | Y       |
| [deg] Pointing Dec                | 33.141327           | 33.11751409604085     | CCD I3 on                             | Y         | Y       |
| [deg] Pointing Roll               | 270.006352          | 270.2059302007601     | 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                             | N         | N       |
| [mm] SIM translation stage pos    | -233.592463         | -233.5874344608287    | CCD S3 on                             | O1        | Y       |
| [mm] SIM translation stage offset | 0                   | -0.005018542100998502 | CCD S4 on                             | N         | N       |
| [s] Observation start time (MET)  | 619774363.184000    | 619773180.49751       | CCD S5 on                             | N         | N       |
| Observation start date            | 2017-08-22T07:31:34 | 2017-08-22T07:13:00   | Number of optional ACIS chips dropped | 0         | 0       |
| [s] Observation end time (MET)    | 619799363.184000    | 619799551.18656       | On-chip summing requested             | N         | N       |
| Observation end date              | 2017-08-22T14:28:14 | 2017-08-22T14:32:31   | Subarray requested                    | NONE      | NONE    |
| Read mode                         | TIMED               | TIMED                 | Alternating exposures requested       | N         | N       |
|                                   |                     |                       | [s] Primary exposure time             | 0.000000  | 3.1     |

## 2.3 Aspect



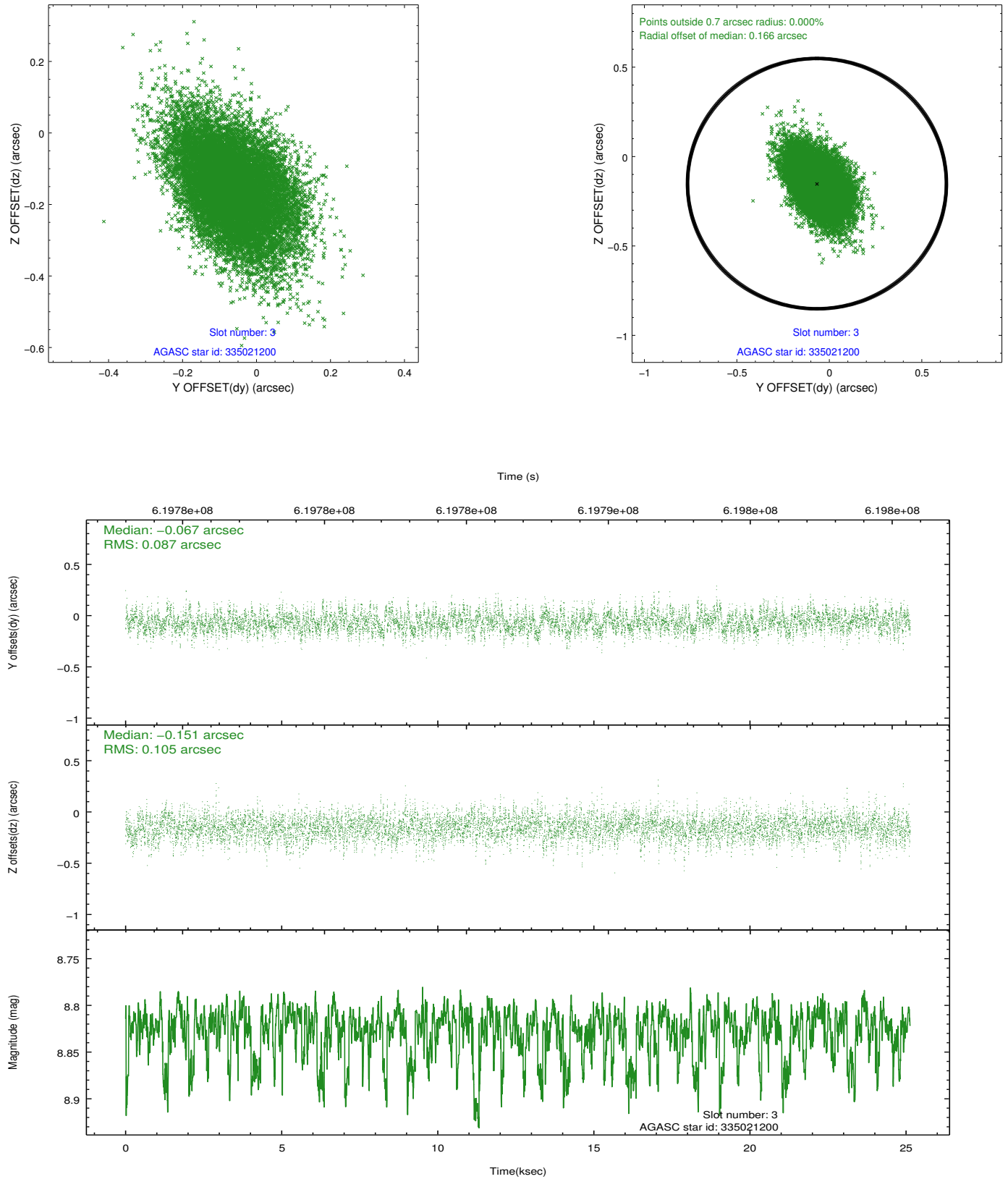


# Slot Statistics

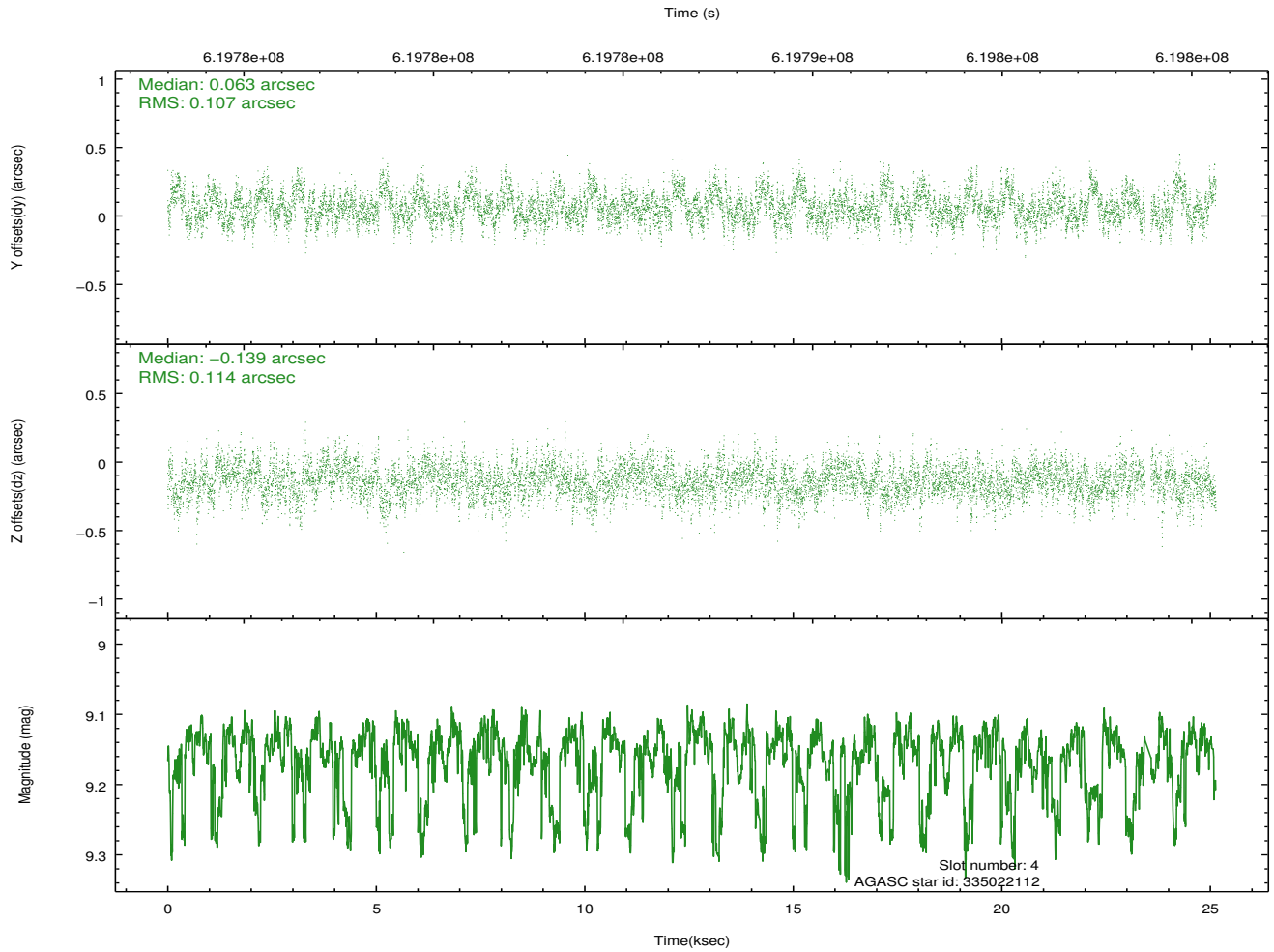
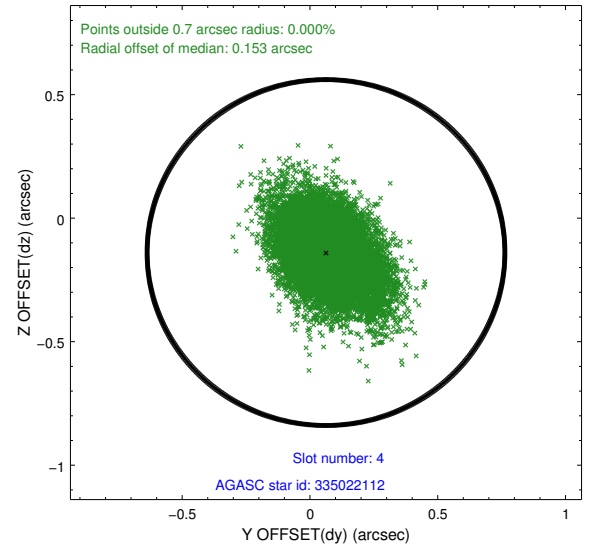
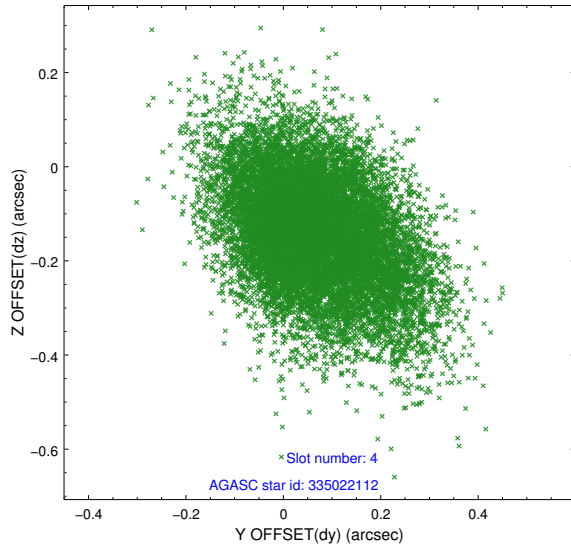
| slot | status | used | id        | mag  | n_pts | med_dy | med_dz | dr1   | dr2   | ra         | dec       | mean_y   | mean_z   |
|------|--------|------|-----------|------|-------|--------|--------|-------|-------|------------|-----------|----------|----------|
| 0    | FID    |      | ACIS-I-1  | 7.25 | 6132  | 0.088  | -0.066 | 0.016 | 0.048 | 0.000000   | 0.000000  | 924.29   | -844.39  |
| 1    | FID    |      | ACIS-I-5  | 7.25 | 6131  | -0.376 | 0.037  | 0.014 | 0.020 | 0.000000   | 0.000000  | -1824.30 | 1053.01  |
| 2    | FID    |      | ACIS-I-6  | 7.26 | 6132  | 0.196  | 0.097  | 0.021 | 0.036 | 0.000000   | 0.000000  | 389.71   | 1697.81  |
| 3    | GUIDE  | used | 335021200 | 8.83 | 12250 | -0.067 | -0.151 | 0.141 | 0.243 | 216.377257 | 32.627867 | 1844.32  | -1671.01 |
| 4    | GUIDE  | used | 335022112 | 9.16 | 12184 | 0.063  | -0.139 | 0.163 | 0.277 | 216.659296 | 32.794758 | 1248.11  | -813.32  |
| 5    | GUIDE  | used | 335028240 | 9.14 | 12248 | -0.089 | 0.330  | 0.160 | 0.267 | 216.746851 | 33.385009 | -877.90  | -545.60  |
| 6    | GUIDE  | used | 335029808 | 9.03 | 12253 | 0.240  | 0.179  | 0.143 | 0.248 | 216.789548 | 33.180488 | -140.90  | -417.48  |
| 7    | GUIDE  | used | 335025848 | 9.66 | 12227 | -0.154 | -0.211 | 0.197 | 0.337 | 217.530531 | 33.778292 | -2298.40 | 1802.37  |

## 2.4 Star Slots

### 2.4.1 Slot 3

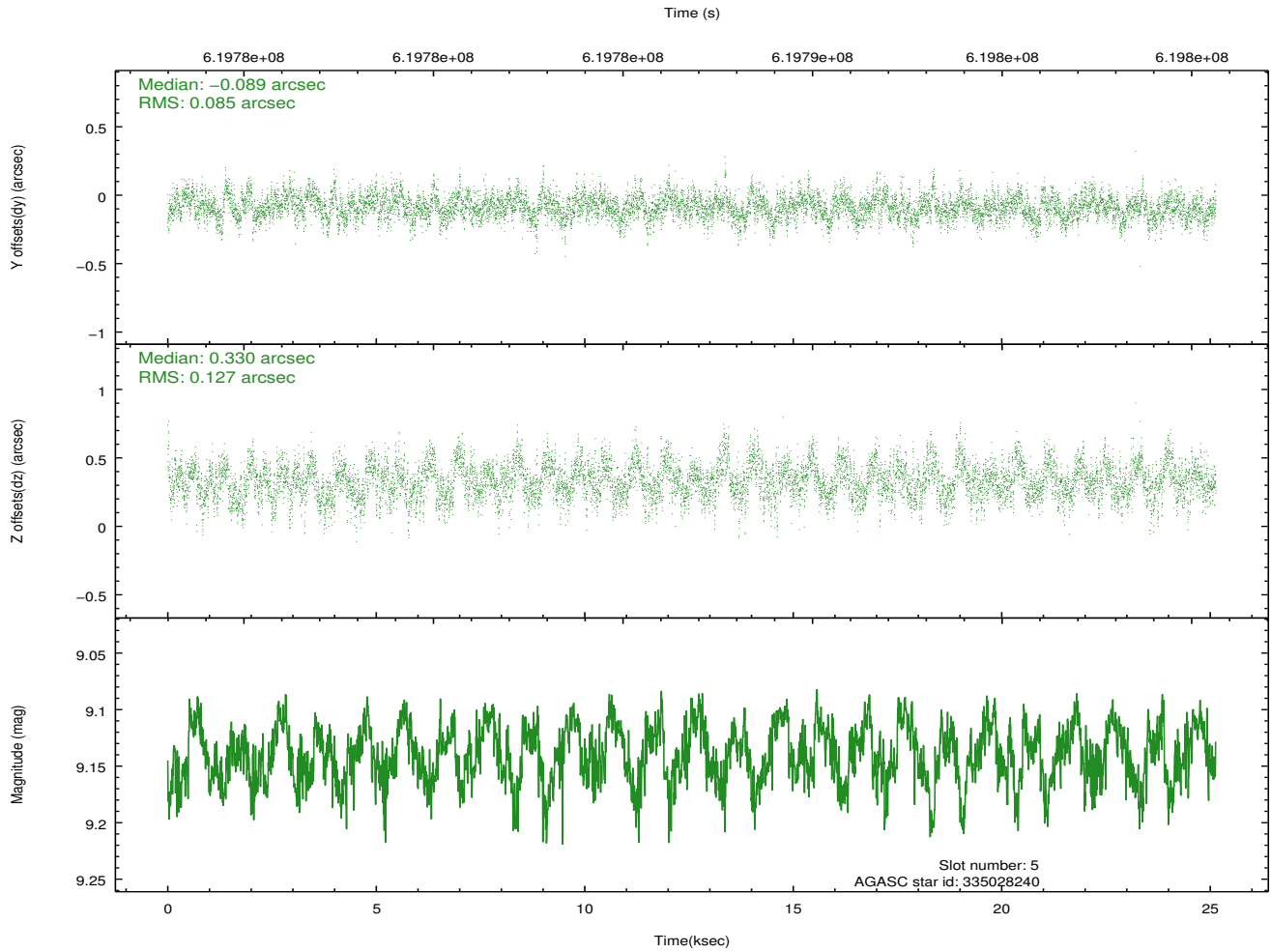
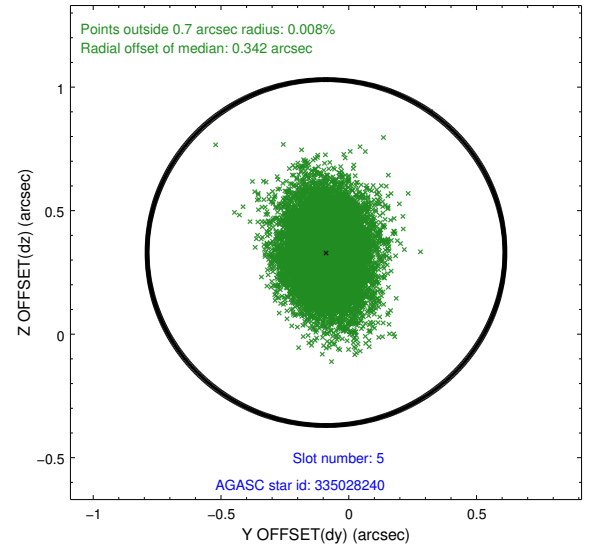
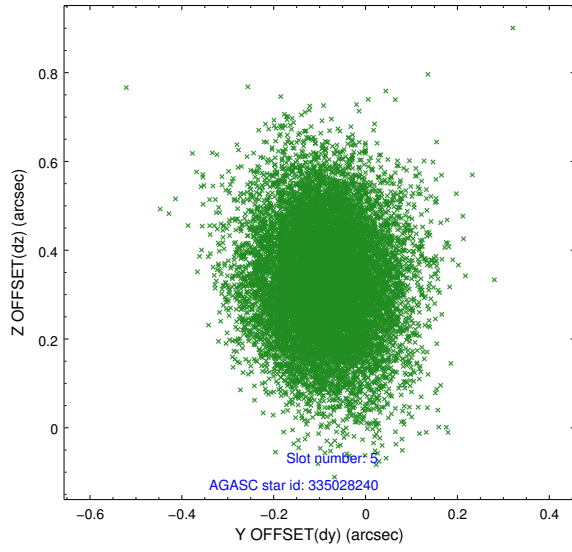


## 2.4.2 Slot 4

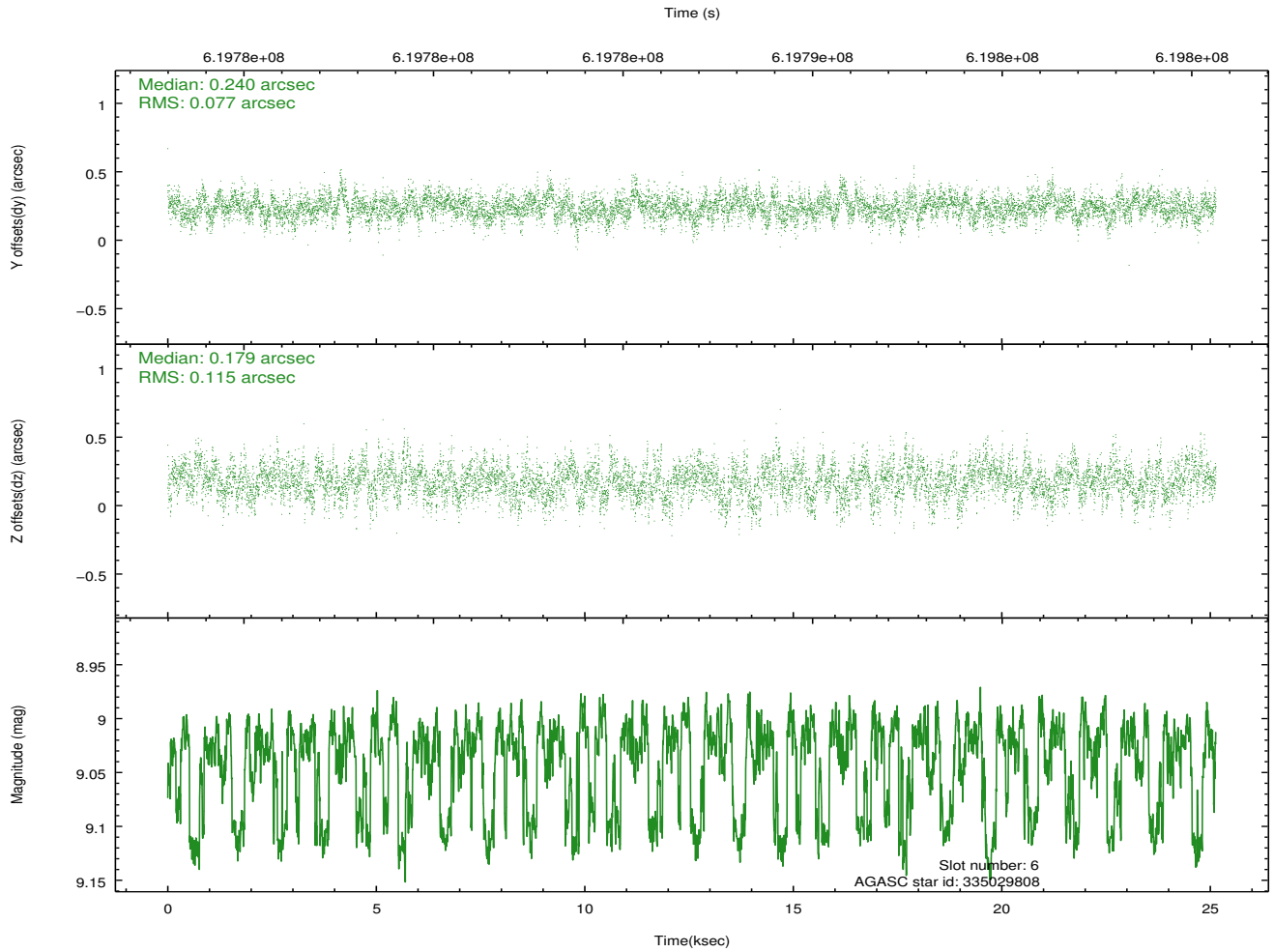
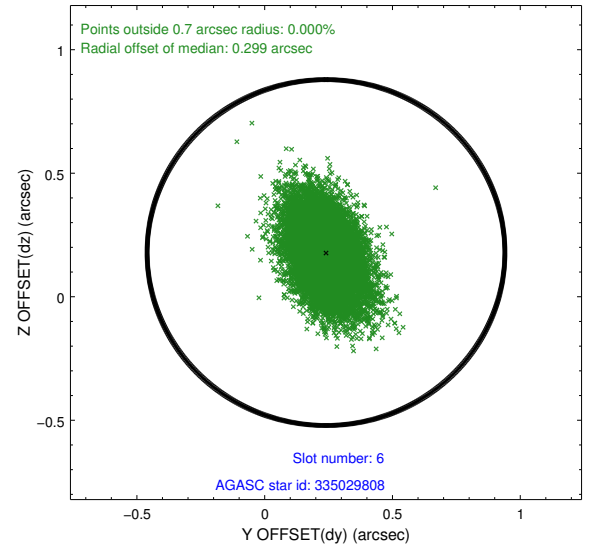
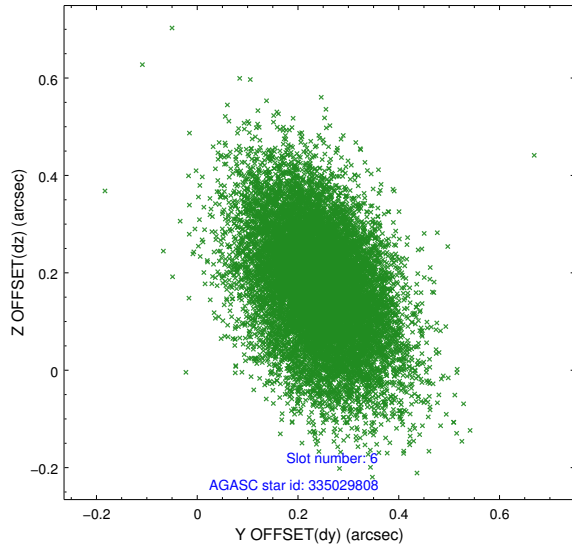




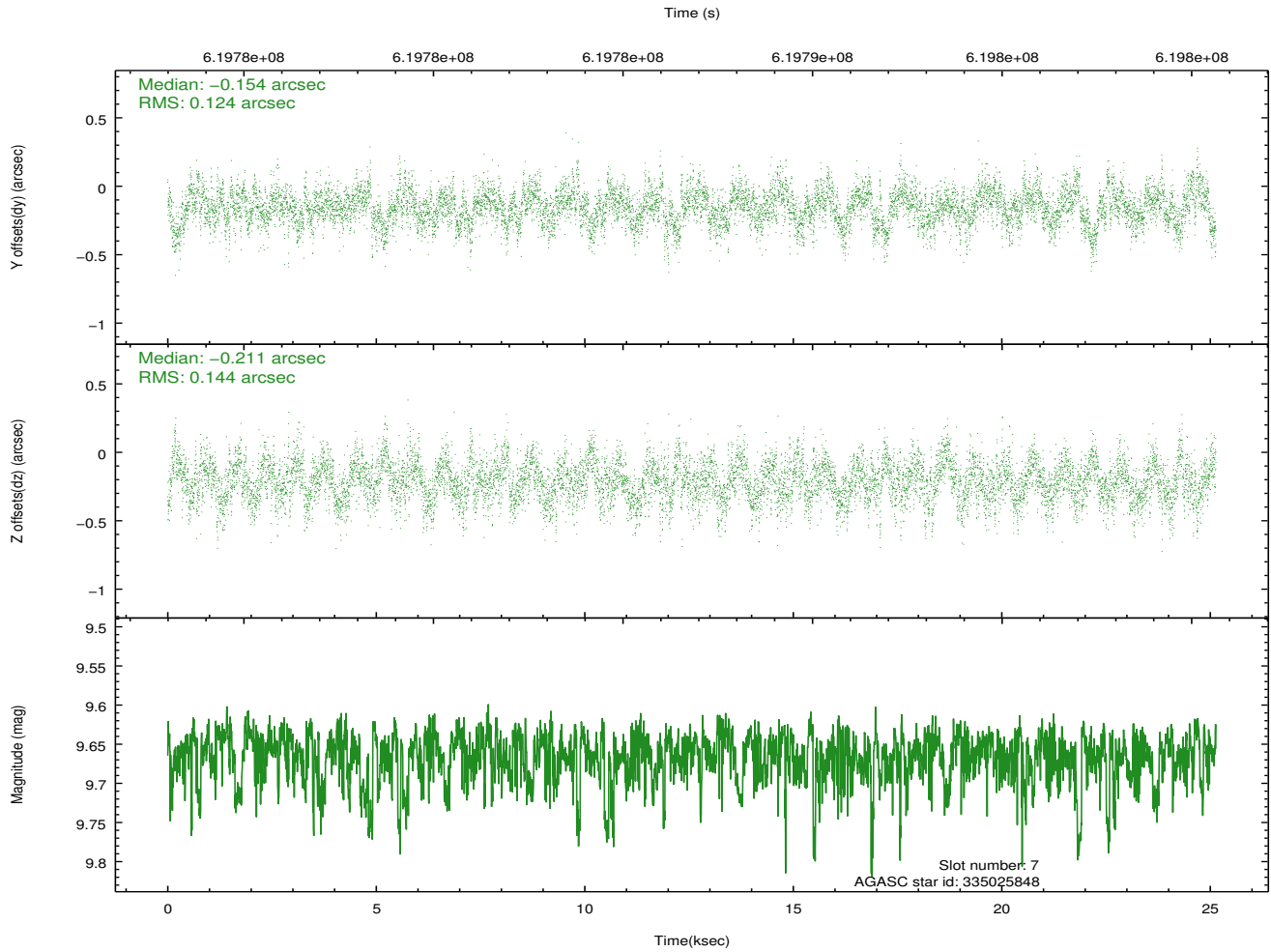
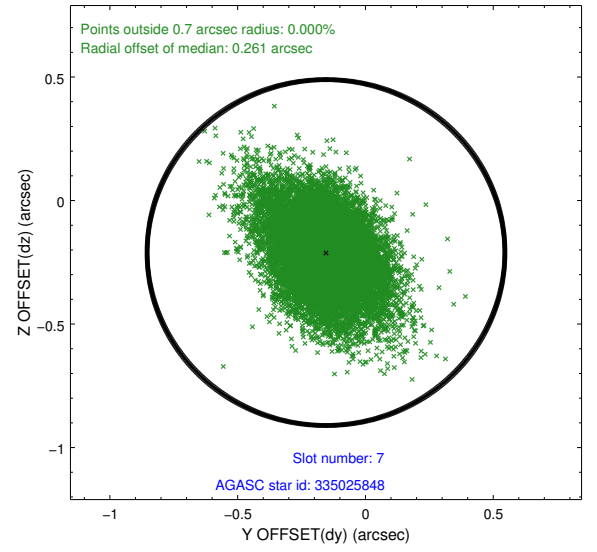
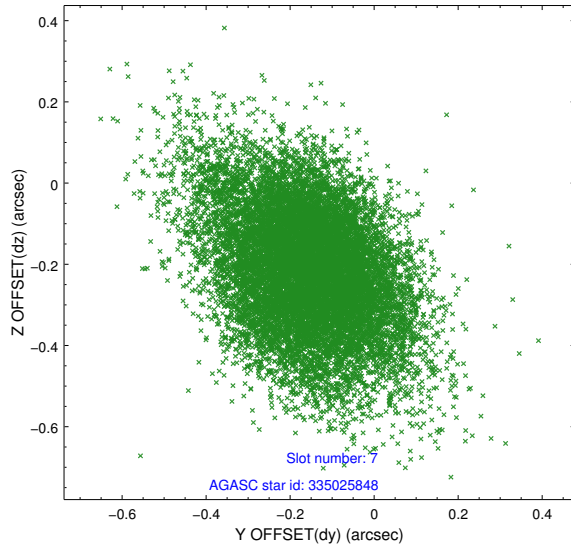
### 2.4.3 Slot 5



## 2.4.4 Slot 6

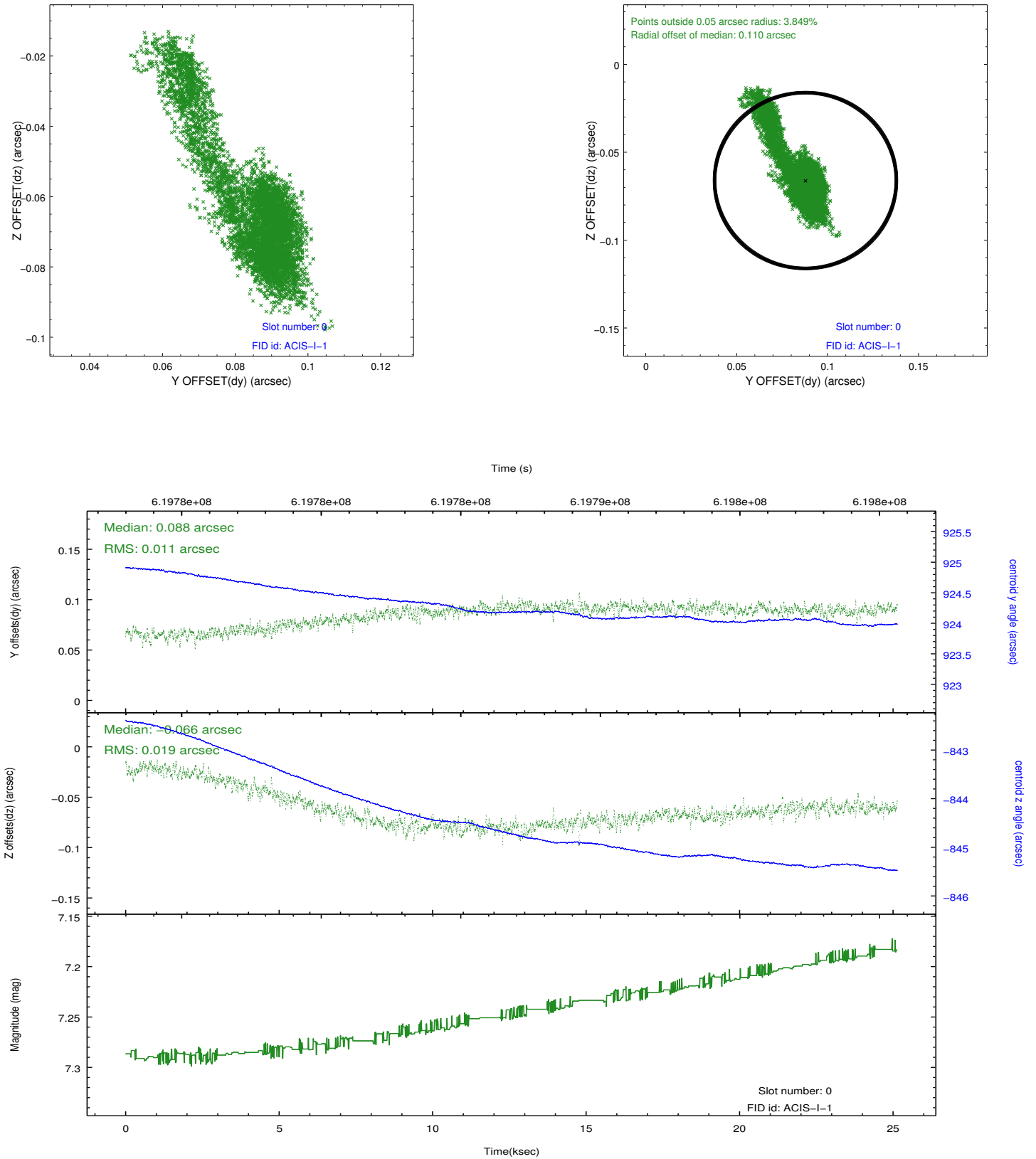


## 2.4.5 Slot 7

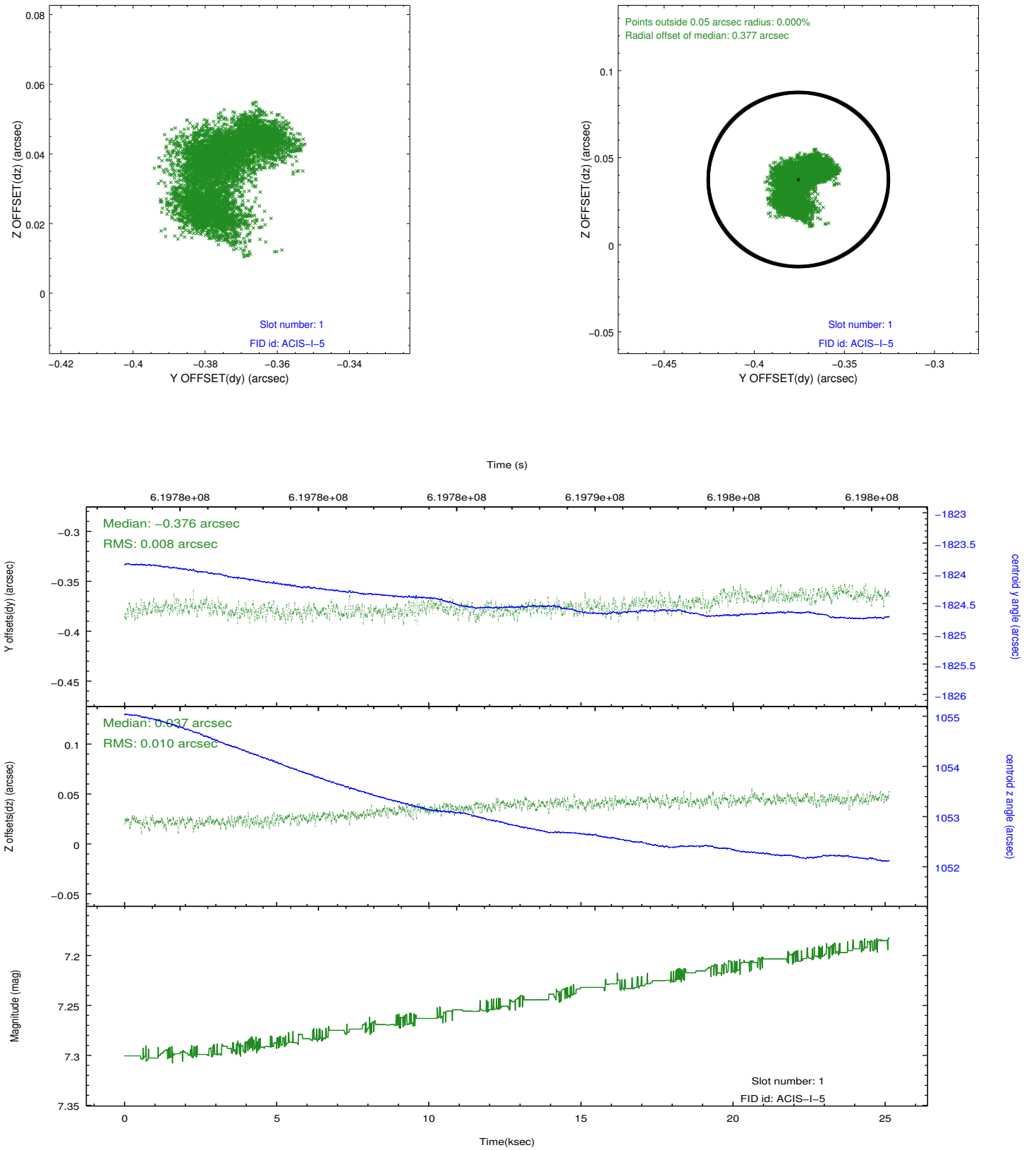


## 2.5 FID Slots

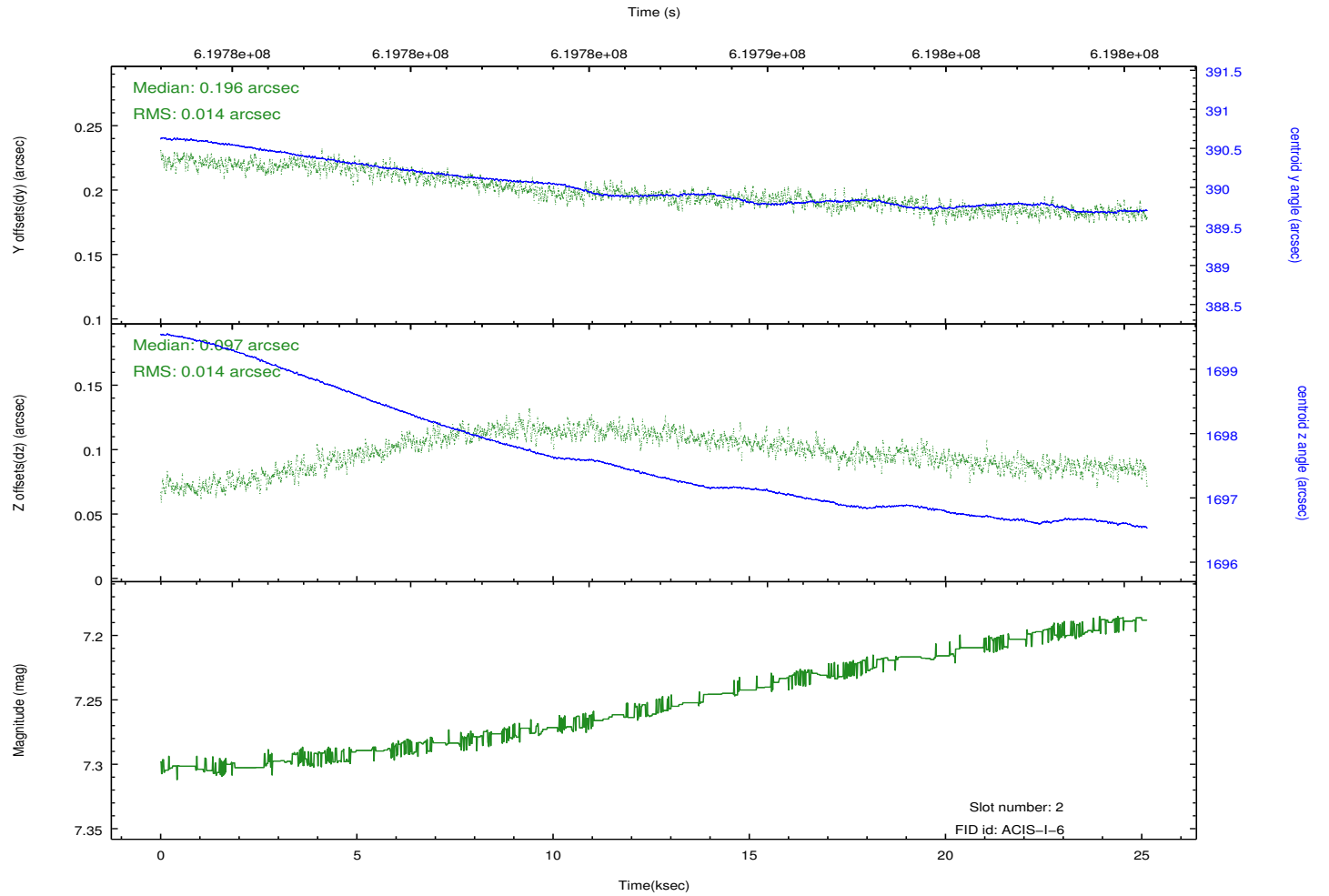
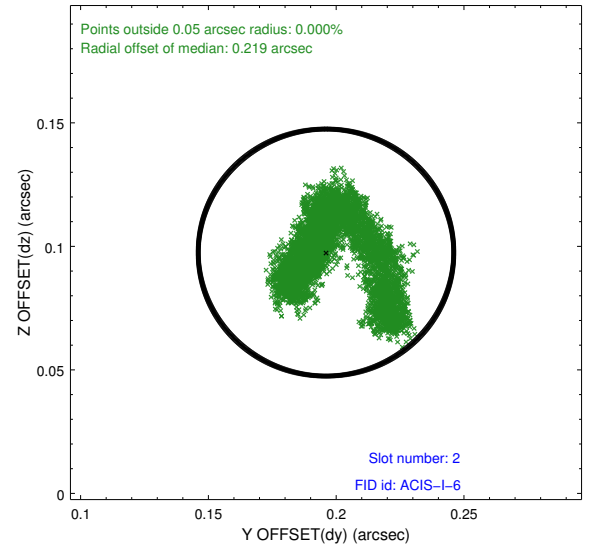
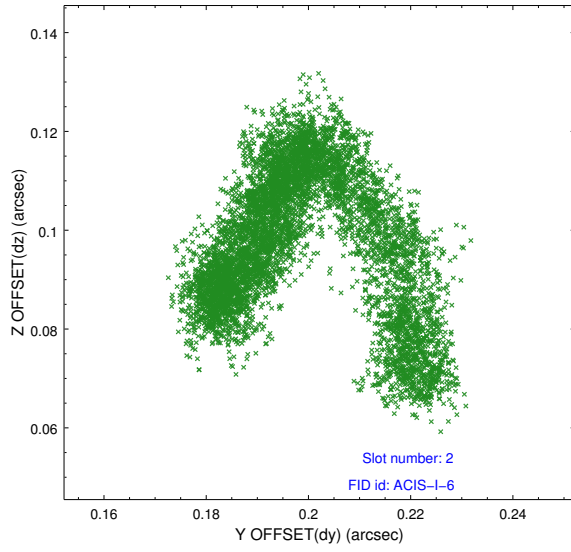
### 2.5.1 Slot 0



## 2.5.2 Slot 1



### 2.5.3 Slot 2



# A Summary

## A.1 Status

|                            |                 |
|----------------------------|-----------------|
| V&V Scientist              | Beth Sundheim   |
| V&V Date (YYYY-MM-DD)      | 2018.03.07      |
| V&V Edition                | 2               |
| V&V Disposition and Status | OK              |
| V&V Charge Time            | 24.769000190616 |

## 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](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.