

# V&V Reference Report

## L2 ASCDS Version : 10.9.1

Observation 6101 - L2 Version 6  
Chandra X-Ray Center

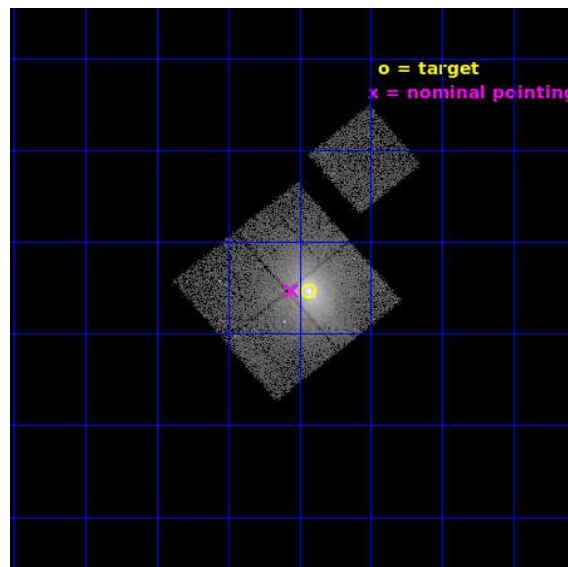
L2 Processing Date : Oct 5 2020

## 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 6 . . . . .              | 11        |
| 2.4.4    | Slot 7 . . . . .              | 12        |
| 2.5      | FID Slots . . . . .           | 13        |
| 2.5.1    | Slot 0 . . . . .              | 13        |
| 2.5.2    | Slot 1 . . . . .              | 14        |
| 2.5.3    | Slot 2 . . . . .              | 15        |
| <b>A</b> | <b>Summary</b>                | <b>16</b> |
| A.1      | Status . . . . .              | 16        |
| A.2      | Comments . . . . .            | 16        |

# 1 Front

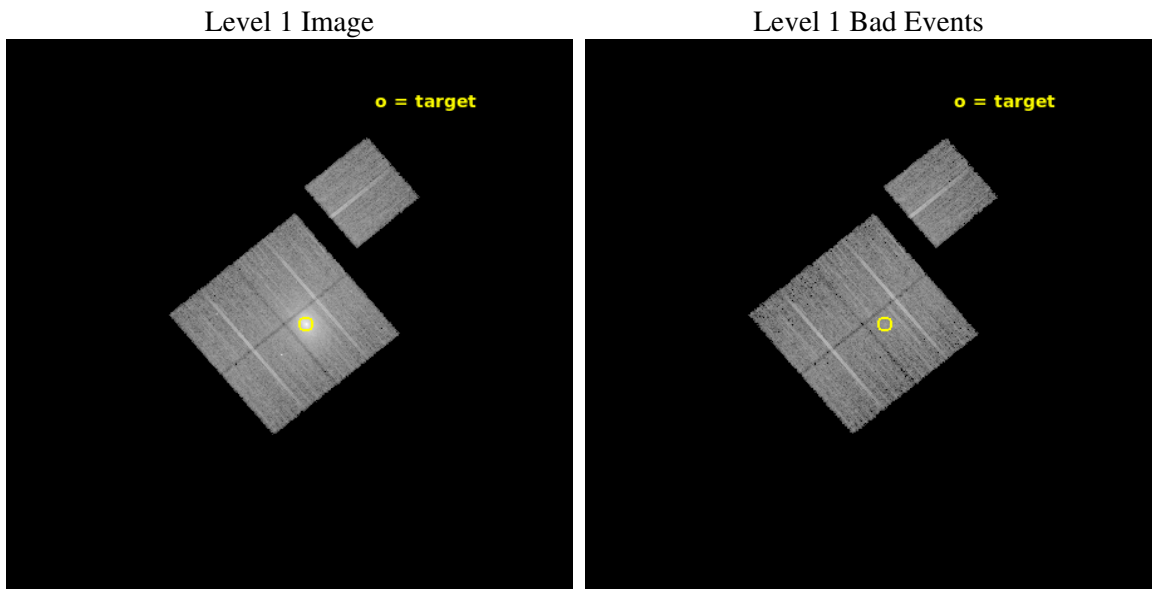
|          |  |   |
|----------|--|---|
| seq_num  | 800549   | Sequence number                             |
| obs_id   | 6101   | Observation id                              |
| title    | Probing dark energy using the X-ray gas mass fraction in dynamically relaxed galaxy clusters | Proposal title                              |
| observer | Steve Allen  | Principal investigator                      |
| object   | Abell 2029   | Source name                                 |
| dtcycle  | 0  | &#160                                       |
| cycle    | P  | events from which exps?<br>Prim/Second/Both |
| ra_targ  | 227.734167   | Observer's specified target RA [deg]        |
| dec_targ | 5.744583   | Observer's specified target Dec [deg]       |
| ra_nom   | 227.76329837345  | Nominal RA [deg]                            |
| dec_nom  | 5.7448945216542  | Nominal Dec [deg]                           |
| roll_nom | 50.150858195615  | Nominal Roll [deg]                          |
| revision | 6  | Processing version of data                  |
| ontime   | 10050.199980646  | Sum of GTIs [s]                             |
| livetime | 9918.8867190496  | Livetime [s]                                |
| ontime0  | 10047.059010416  | Sum of GTIs [s]                             |
| ontime1  | 10050.199980646  | Sum of GTIs [s]                             |
| ontime2  | 10050.199980646  | Sum of GTIs [s]                             |
| ontime3  | 10050.199980646  | Sum of GTIs [s]                             |
| ontime6  | 10047.058990479  | Sum of GTIs [s]                             |
| l2events | 125033   | Number of level 2 events                    |



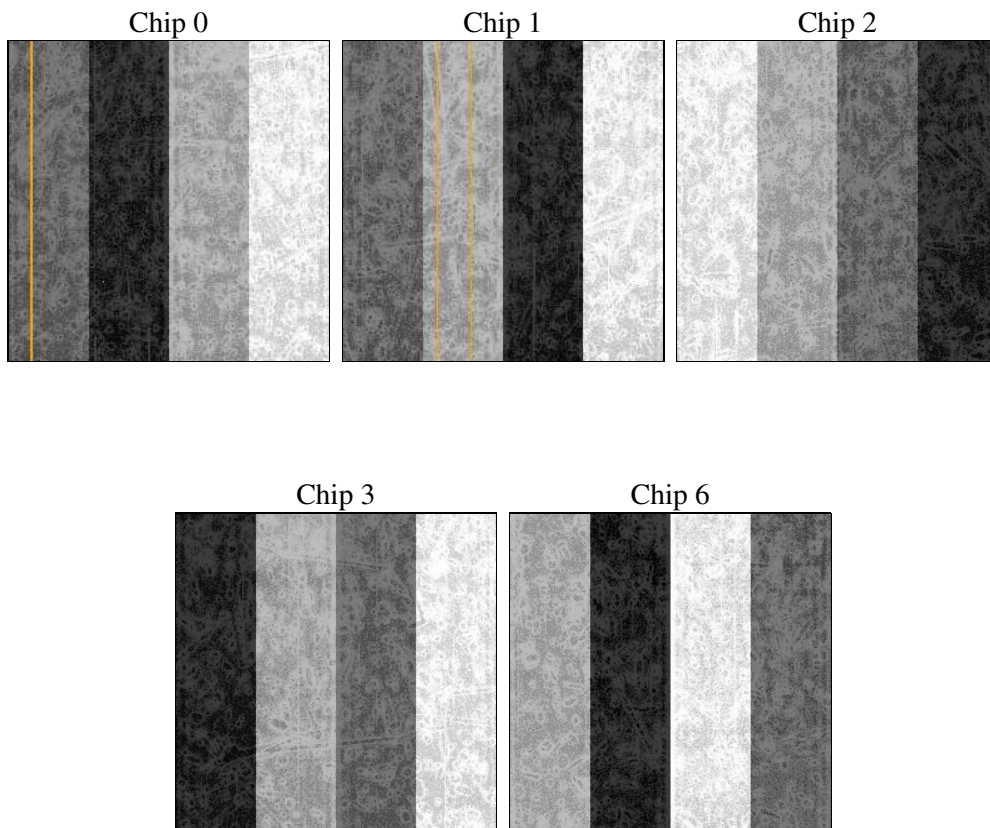
## 2 OBI

### 2.1 OBI

#### 2.1.1 Images



#### 2.1.2 Bias



### 2.1.3 Parameters

|          |                     |                                |                |                 |   |
|----------|---------------------|--------------------------------|----------------|-----------------|---|
| obi_num  | 1                   | Obi number                     | sched_exp_time | 10000.000000    | [s] Scheduled observation exposure time |
| ascdsver | 10.9.1              | Processing system revision     | ontime         | 10050.199980646 | Sum of GTIs [s]                         |
| caldsver | 4.9.2               | &#160                          | ontime0        | 10047.059010416 | Sum of GTIs [s]                         |
| date     | 2020-10-05T17:53:22 | Date and time of file creation | ontime1        | 10050.199980646 | Sum of GTIs [s]                         |
| revision | 6                   | Processing version of data     | ontime2        | 10050.199980646 | Sum of GTIs [s]                         |
|          |                     |                                | ontime3        | 10050.199980646 | Sum of GTIs [s]                         |
|          |                     |                                | ontime6        | 10047.058990479 | Sum of GTIs [s]                         |
|          |                     |                                | l1events       | 429872          | Number of level 1 events                |

### 2.1.4 Events

|                 | ccd 0 | ccd 1 | ccd 2 | ccd 3  | ccd 6 |
|-----------------|-------|-------|-------|--------|-------|
| level 1 events  | 66908 | 72221 | 83837 | 140147 | 66759 |
| rejected events | 56226 | 54710 | 63848 | 61939  | 59192 |
| rejected %      | 84%   | 75%   | 76%   | 44%    | 88%   |

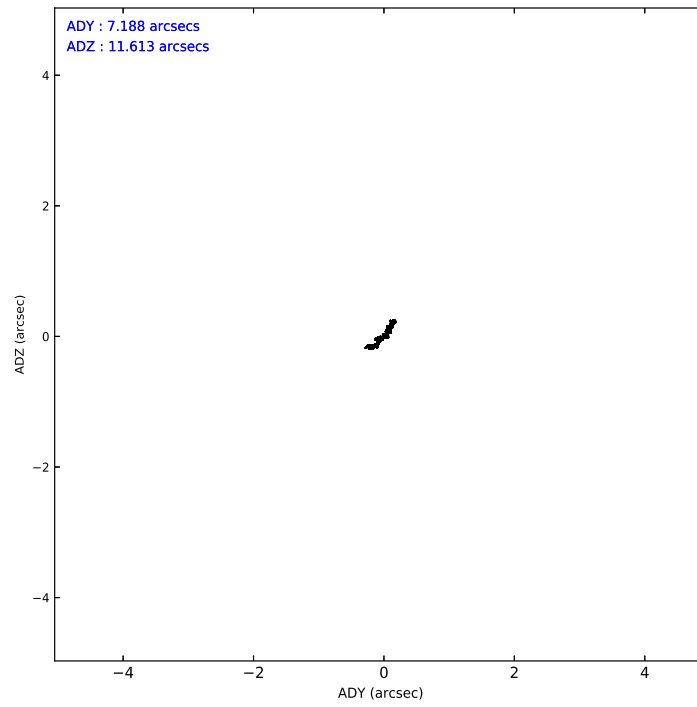
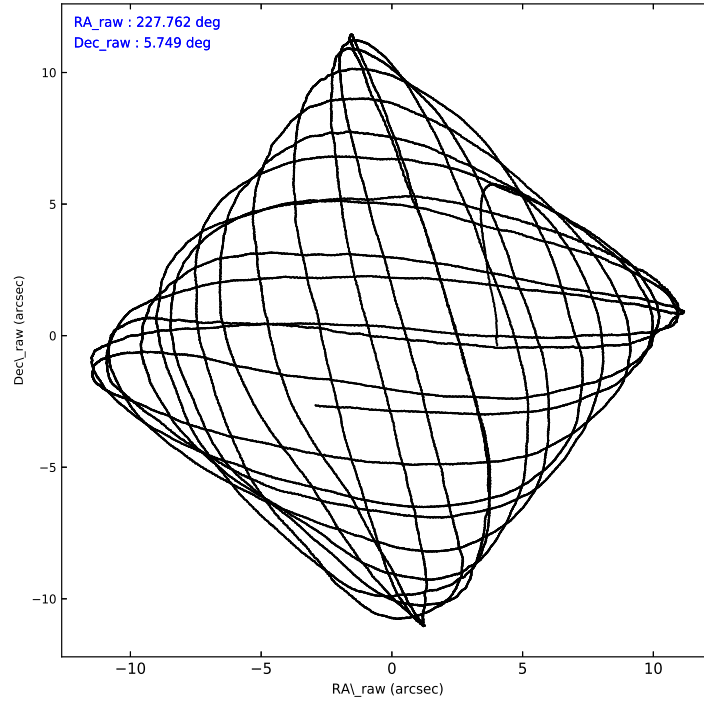
|                | ccd 0 | ccd 1 | ccd 2 | ccd 3 | ccd 6 |
|----------------|-------|-------|-------|-------|-------|
| grade 0 events | 5603  | 10958 | 13530 | 61234 | 3125  |
|                | 8%    | 15%   | 16%   | 43%   | 4%    |
| grade 1 events | 49    | 60    | 90    | 412   | 32    |
|                | 0%    | 0%    | 0%    | 0%    | 0%    |
| grade 2 events | 2013  | 2612  | 2721  | 8309  | 1515  |
|                | 3%    | 3%    | 3%    | 5%    | 2%    |
| grade 3 events | 896   | 1105  | 1160  | 2797  | 780   |
|                | 1%    | 1%    | 1%    | 1%    | 1%    |
| grade 4 events | 832   | 1121  | 1092  | 2844  | 756   |
|                | 1%    | 1%    | 1%    | 2%    | 1%    |
| grade 5 events | 2244  | 2536  | 2267  | 2878  | 2527  |
|                | 3%    | 3%    | 2%    | 2%    | 3%    |
| grade 6 events | 1339  | 1721  | 1495  | 3042  | 1393  |
|                | 2%    | 2%    | 1%    | 2%    | 2%    |
| grade 7 events | 53932 | 52108 | 61482 | 58631 | 56631 |
|                | 80%   | 72%   | 73%   | 41%   | 84%   |

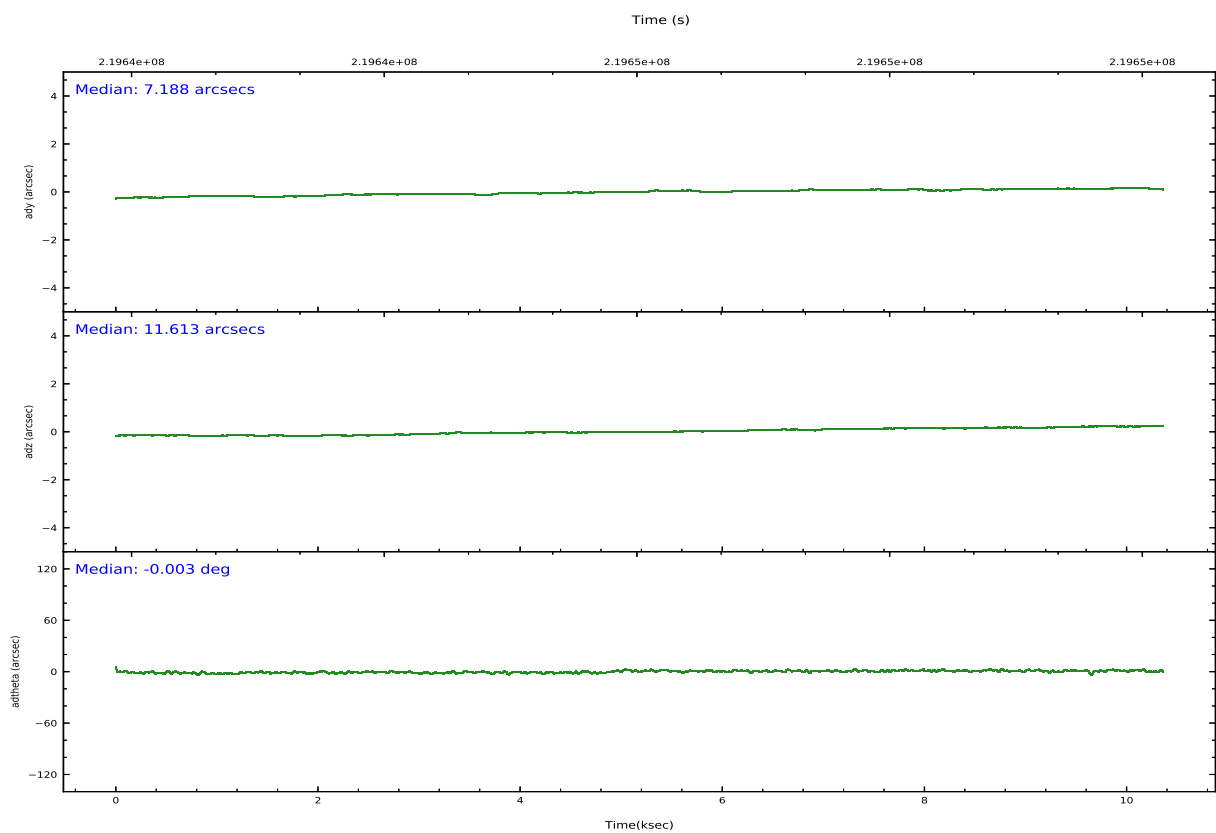
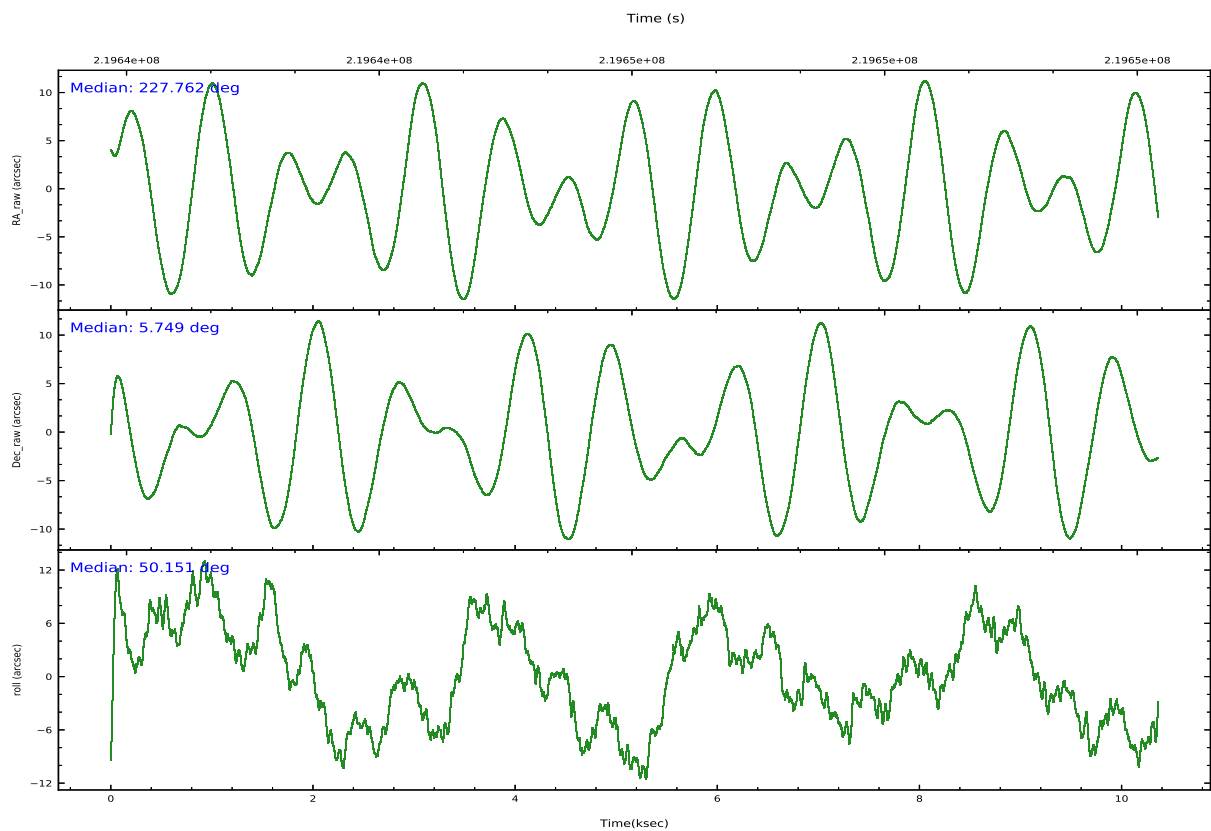


## 2.2 Compared Parameters

| Parameter                         | Planned             | Actual                | Parameter                             | Planned   | Actual  |
|-----------------------------------|---------------------|-----------------------|---------------------------------------|-----------|---------|
| Instrument                        | ACIS                | ACIS                  | Obspar version number                 | 8         | 8       |
| Detector                          | ACIS-01236          | ACIS-01236            | Obspar file type                      | PREDICTED | ACTUAL  |
| Grating                           | NONE                | NONE                  | Obspar update status                  | NONE      | UPDATED |
| Data mode                         | VFAINT              | VFAINT                | Number of optional ACIS chips dropped | 0         | 0       |
| Observation mode                  | POINTING            | POINTING              | On-chip summing requested             | N         | N       |
| [deg] Pointing RA                 | 227.757317          | 227.76329837345       | Subarray requested                    | NONE      | NONE    |
| [deg] Pointing Dec                | 5.721736            | 5.7448945216542       | Alternating exposures requested       | N         | N       |
| [deg] Pointing Roll               | 49.948022           | 50.150858195615       | [s] Primary exposure time             | 0.000000  | 3.1     |
| [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)  | 219642705.184000    | 219641685.5667        |                                       |           |         |
| Observation start date            | 2004-12-17T03:50:41 | 2004-12-17T03:34:45   |                                       |           |         |
| [s] Observation end time (MET)    | 219652705.184000    | 219653301.89222       |                                       |           |         |
| Observation end date              | 2004-12-17T06:37:21 | 2004-12-17T06:48:21   |                                       |           |         |
| Read mode                         | TIMED               | TIMED                 |                                       |           |         |

## 2.3 Aspect



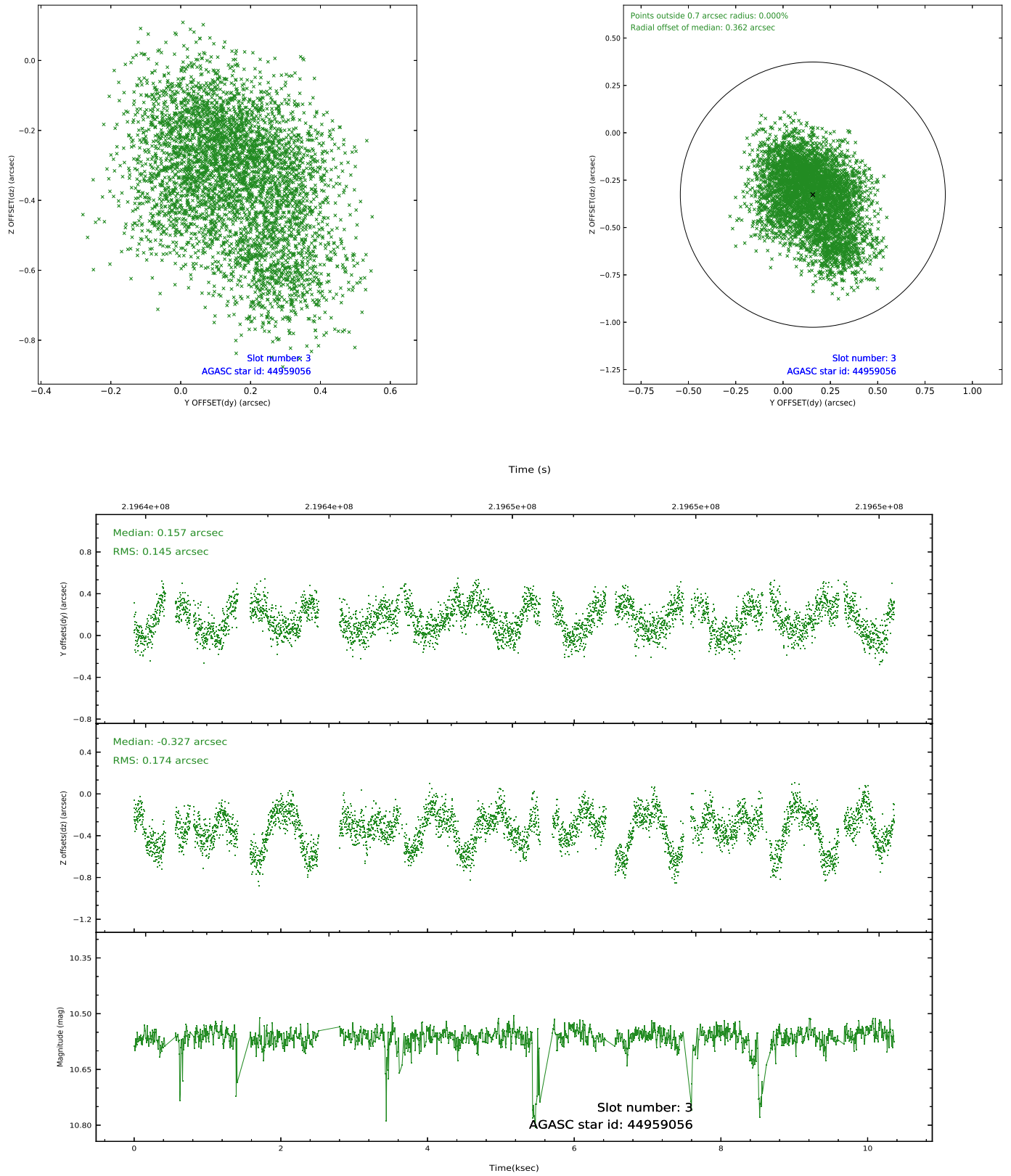


Slot Statistics

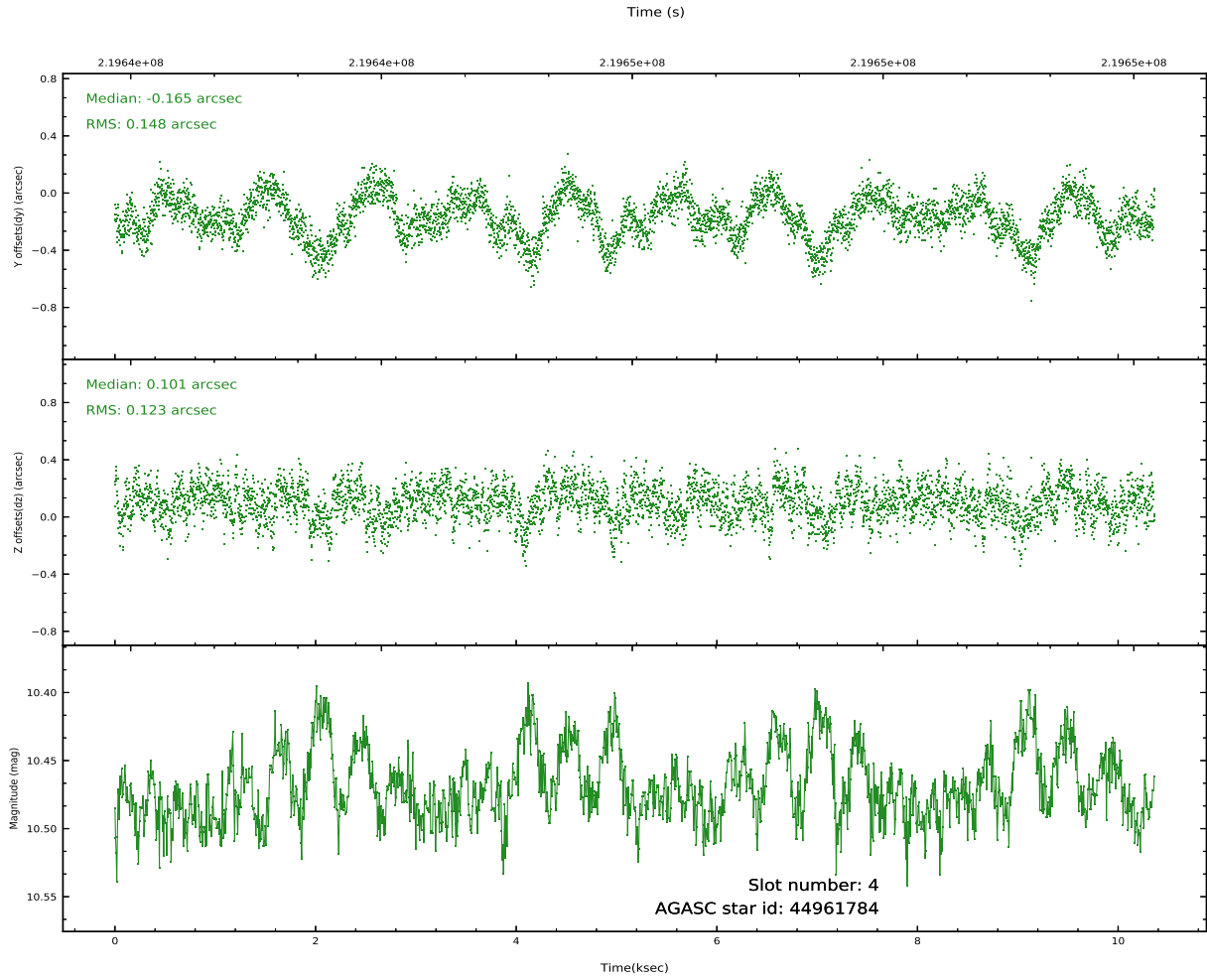
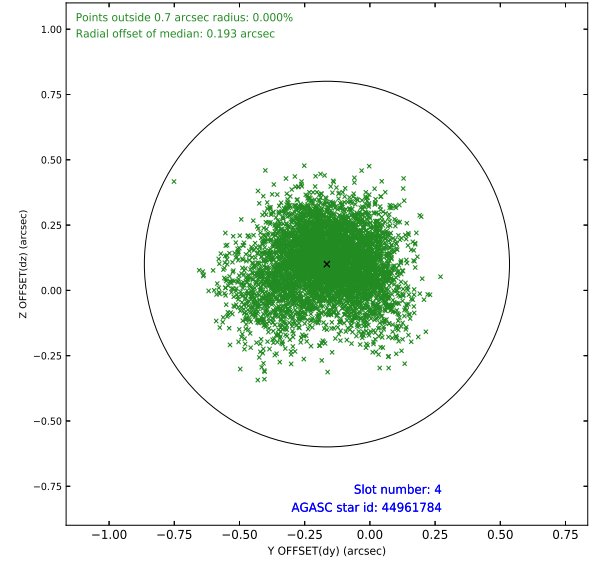
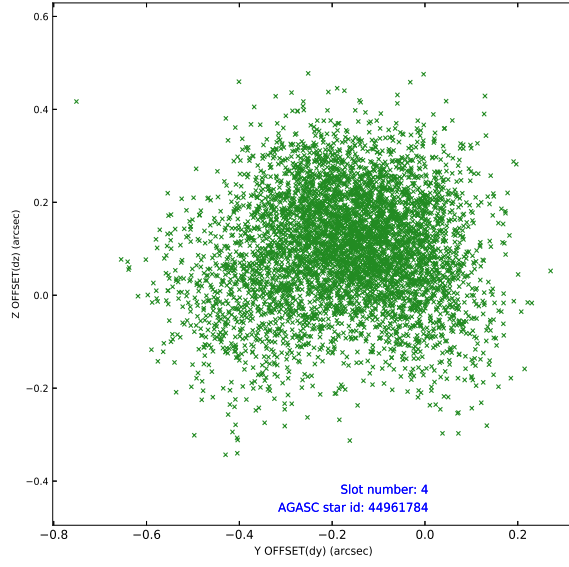
|  | status  | used | id       | mag   | n_pts | frac_pts | med_dy | med_dz | dr1   | dr2   | ra         | dec      | mean_y   | m   |
|--|---------|------|----------|-------|-------|----------|--------|--------|-------|-------|------------|----------|----------|-----|
|  | FID     |      | ACIS-I-1 | 7.24  | 2528  | 1.000    | -0.059 | -0.030 | 0.012 | 0.021 | 0.000000   | 0.000000 | 932.46   | -8  |
|  | FID     |      | ACIS-I-2 | 7.14  | 2528  | 1.000    | -0.174 | -0.068 | 0.008 | 0.014 | 0.000000   | 0.000000 | -761.46  | -8  |
|  | FID     |      | ACIS-I-4 | 7.17  | 2528  | 1.000    | 0.135  | 0.165  | 0.008 | 0.014 | 0.000000   | 0.000000 | 2152.28  | 10  |
|  | BAD     | used | 44959056 | 10.56 | 4380  | 1.000    | 0.157  | -0.327 | 0.242 | 0.389 | 227.388506 | 5.331015 | -1928.03 | 1   |
|  | GUIDE   | used | 44961784 | 10.47 | 5051  | 1.000    | -0.165 | 0.101  | 0.204 | 0.341 | 228.123885 | 5.352388 | -172.59  | -18 |
|  | OMITTED |      |          | 0.00  | 0     | 0.000    | 0.000  | 0.000  | 0.000 | 0.000 | 0.000000   | 0.000000 | 0.00     |     |
|  | GUIDE   | used | 44959920 | 11.19 | 5047  | 1.000    | 0.072  | 0.212  | 0.322 | 0.481 | 227.796954 | 4.888165 | -2205.59 | -20 |
|  | GUIDE   | used | 44961936 | 10.26 | 5052  | 1.000    | -0.032 | -0.015 | 0.165 | 0.282 | 226.889483 | 5.605009 | -2321.46 | 21  |

## 2.4 Star Slots

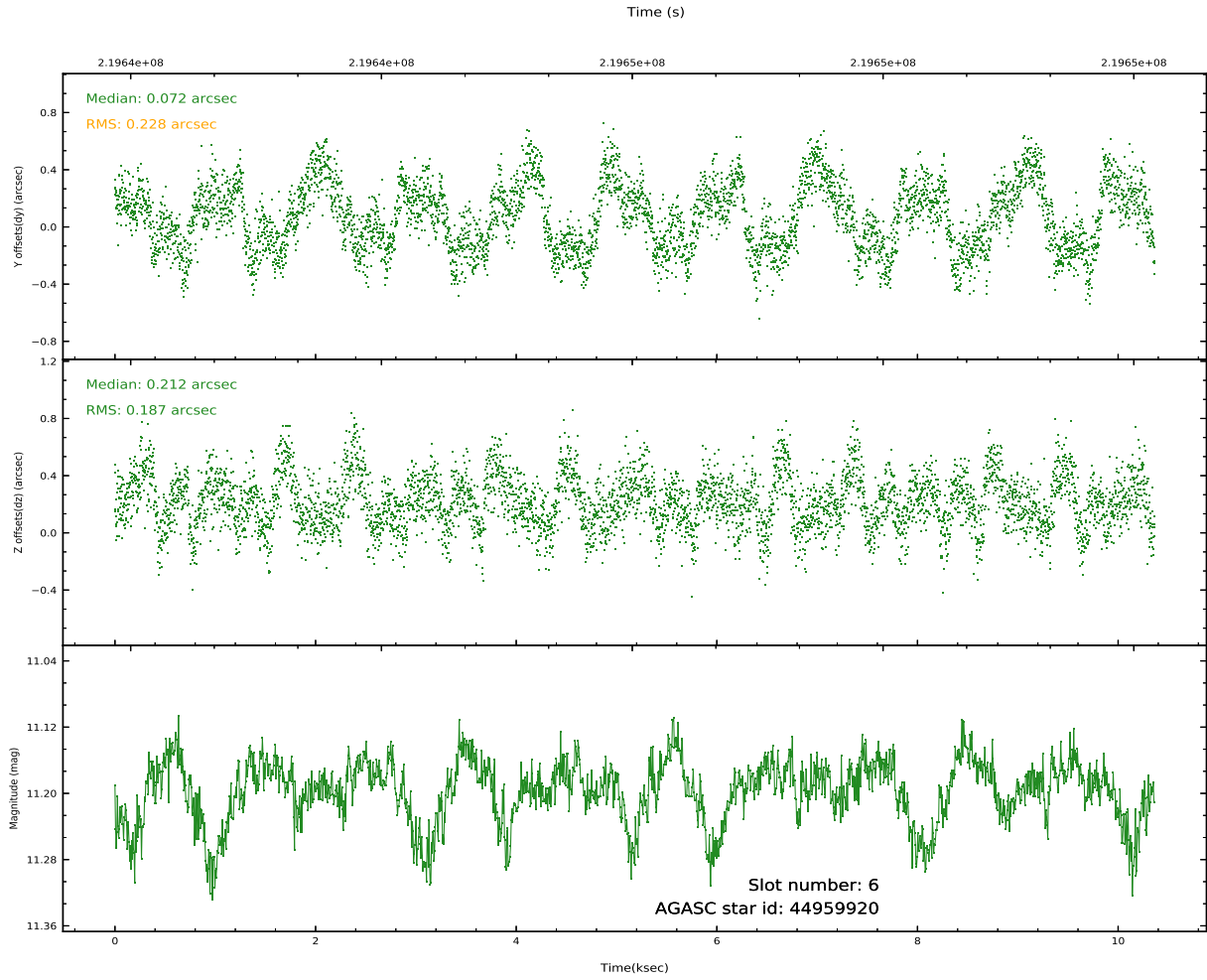
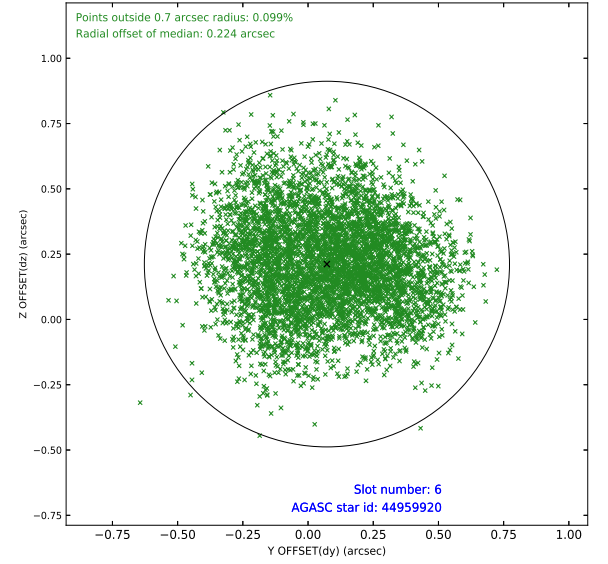
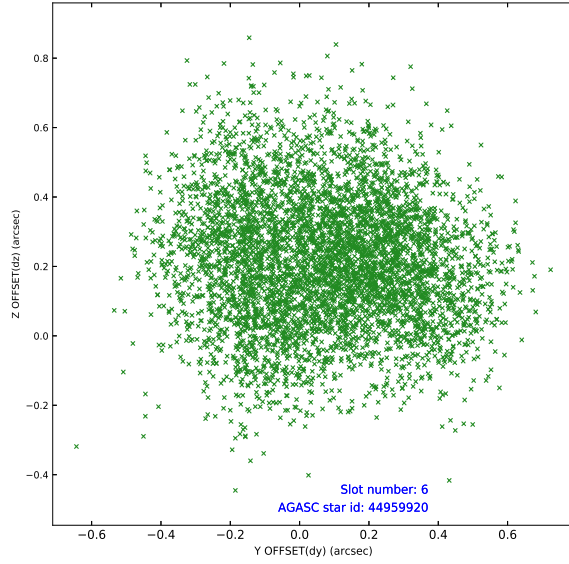
### 2.4.1 Slot 3



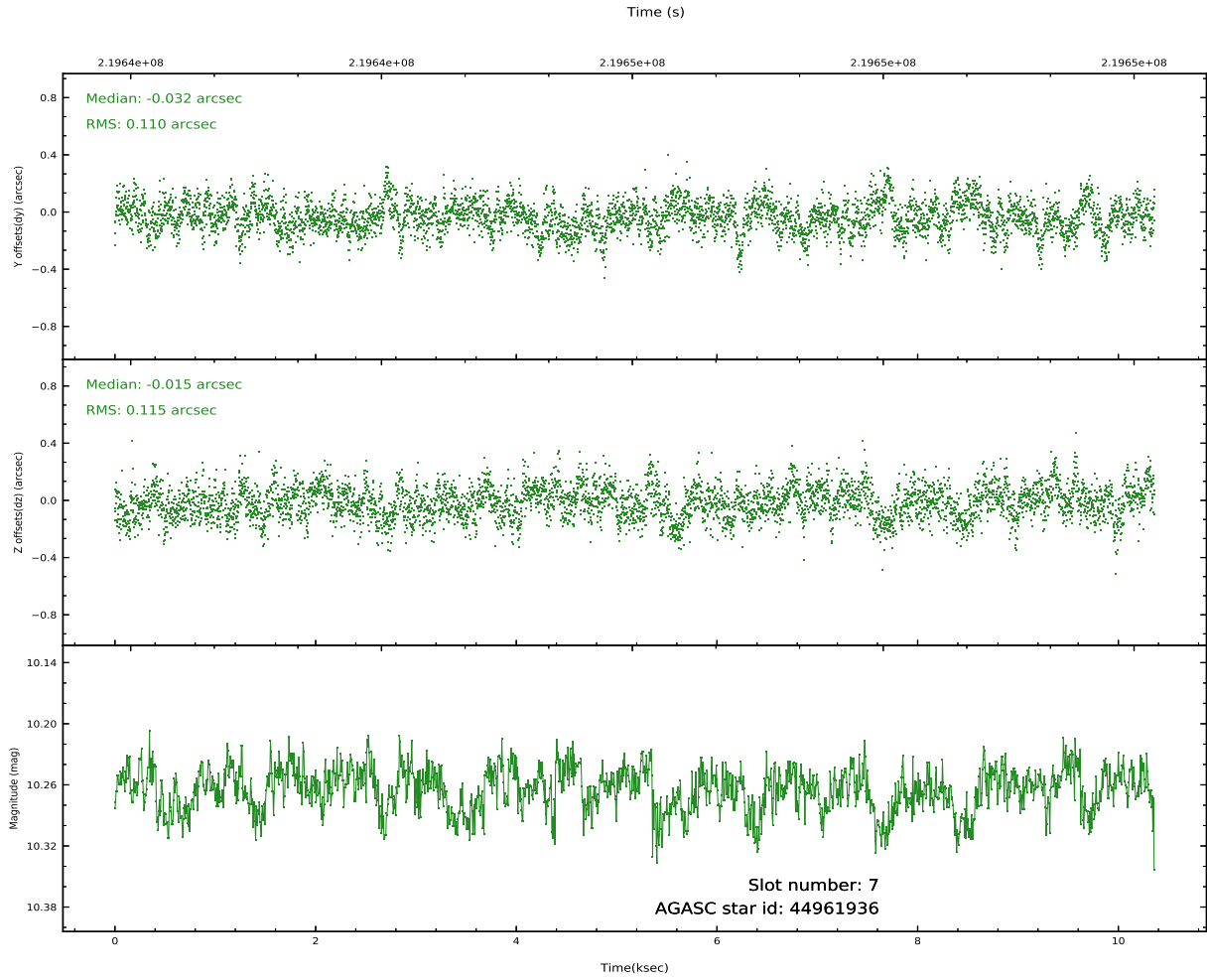
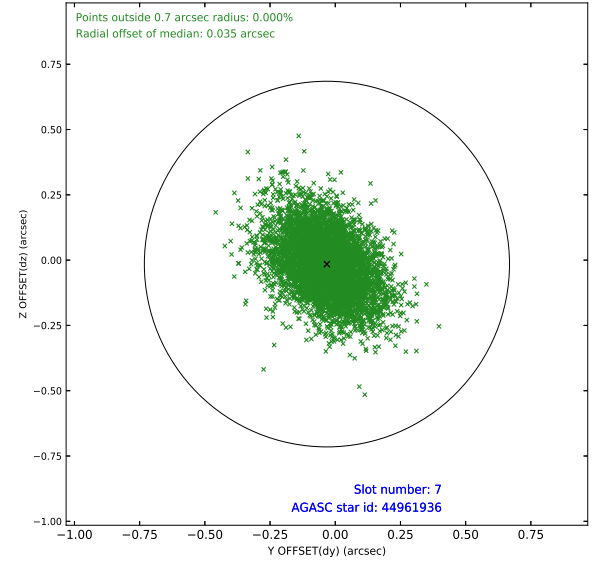
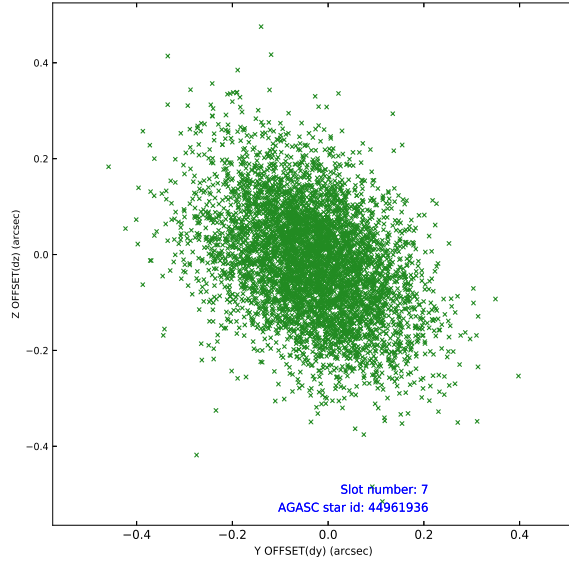
## 2.4.2 Slot 4



### 2.4.3 Slot 6



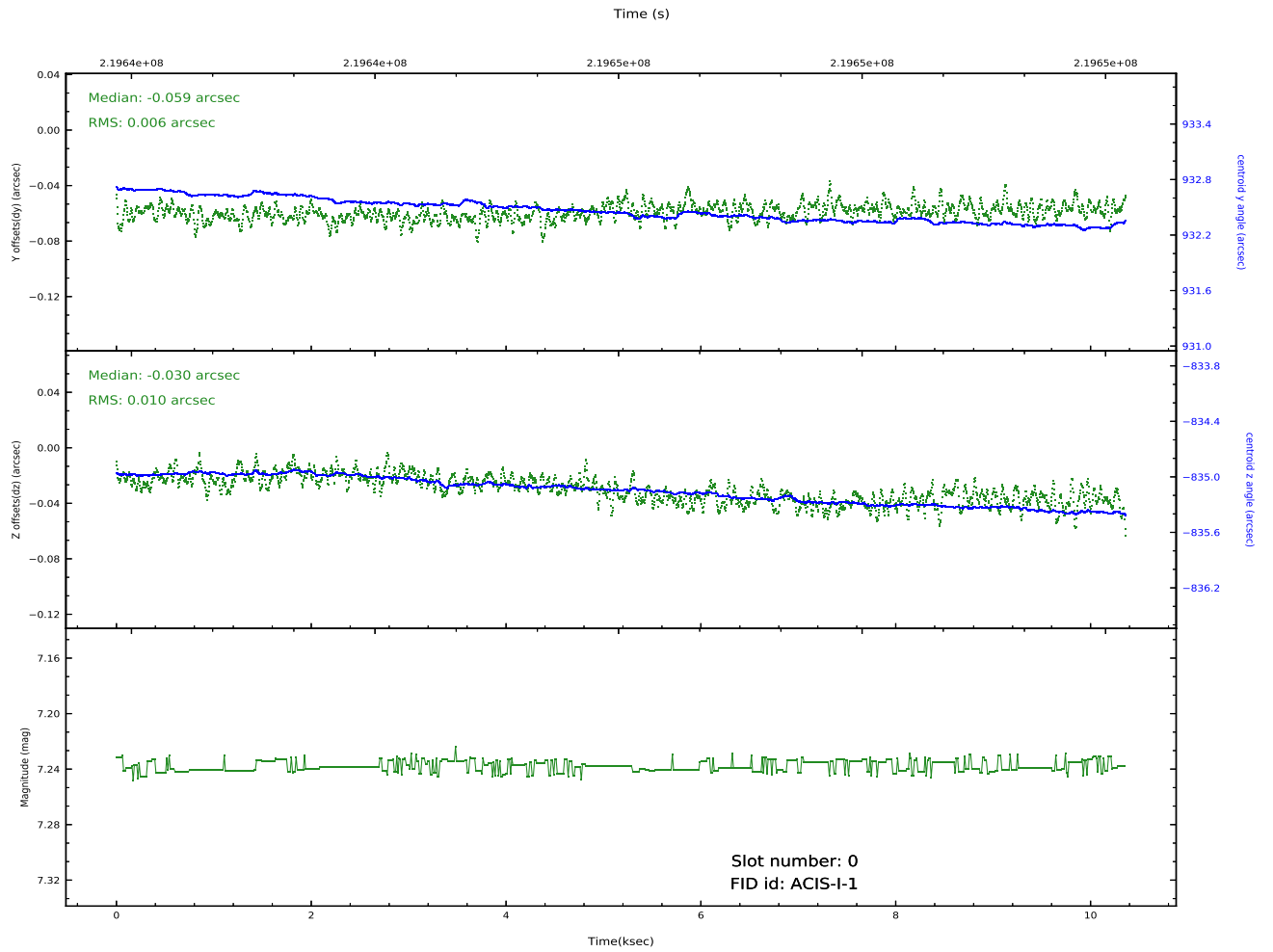
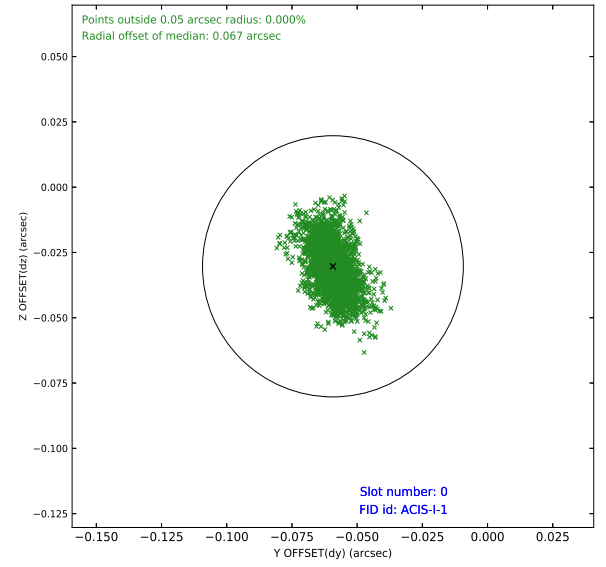
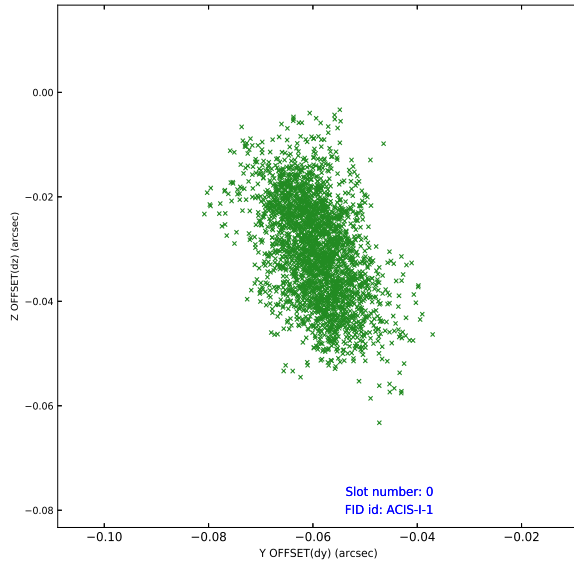
## 2.4.4 Slot 7



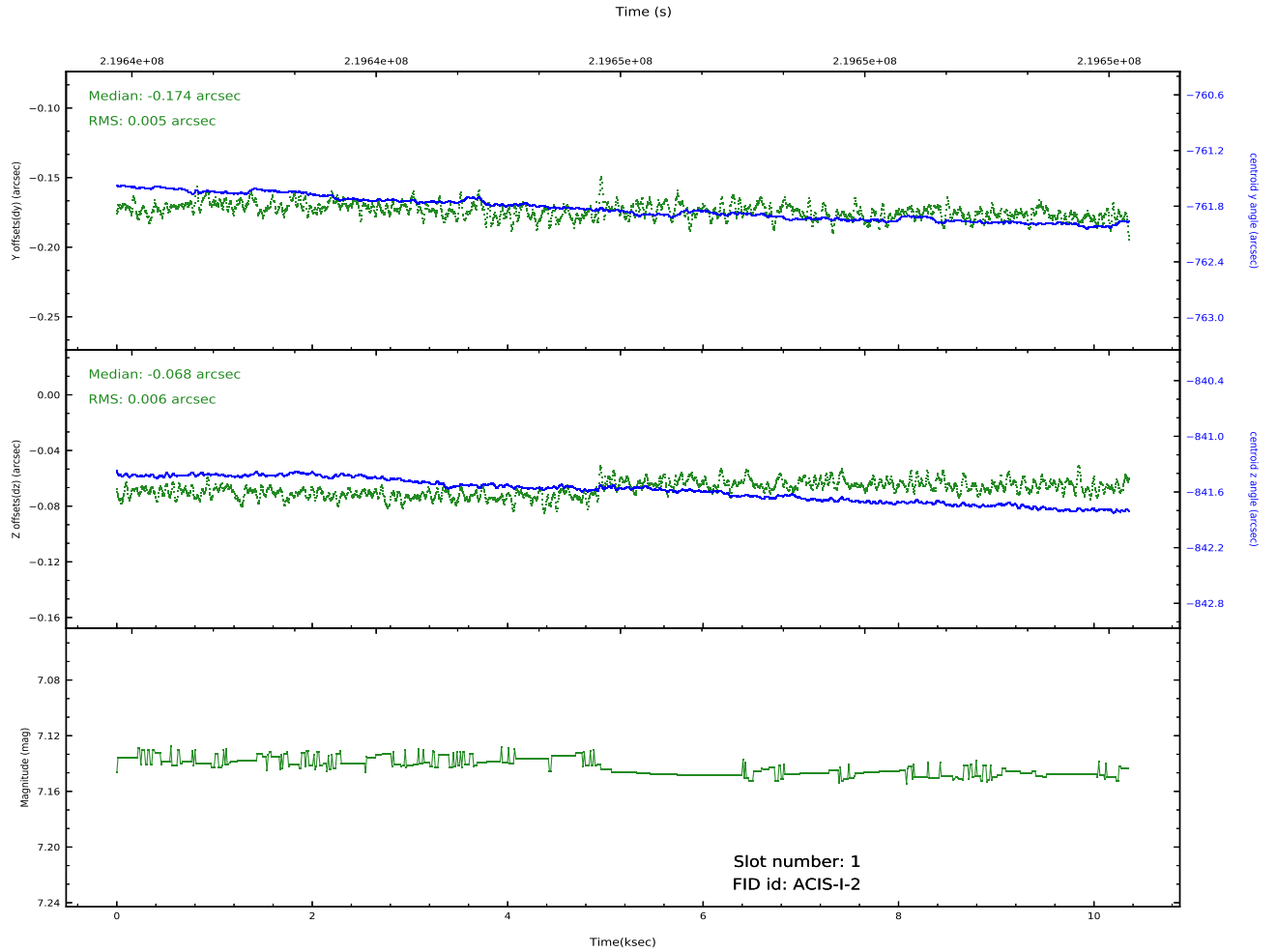
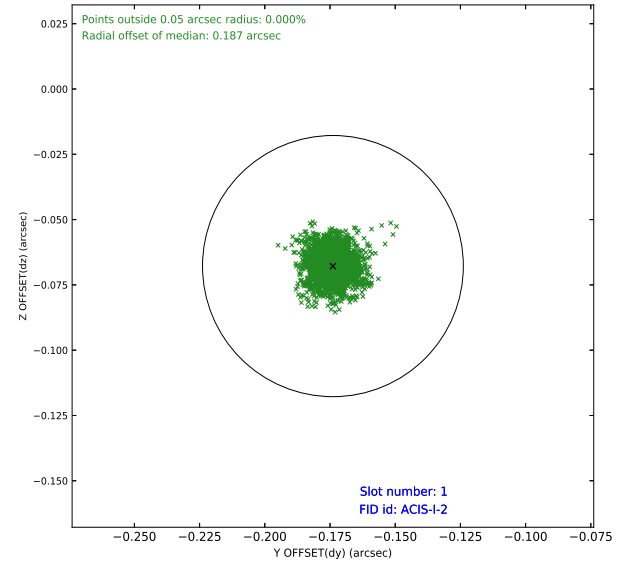
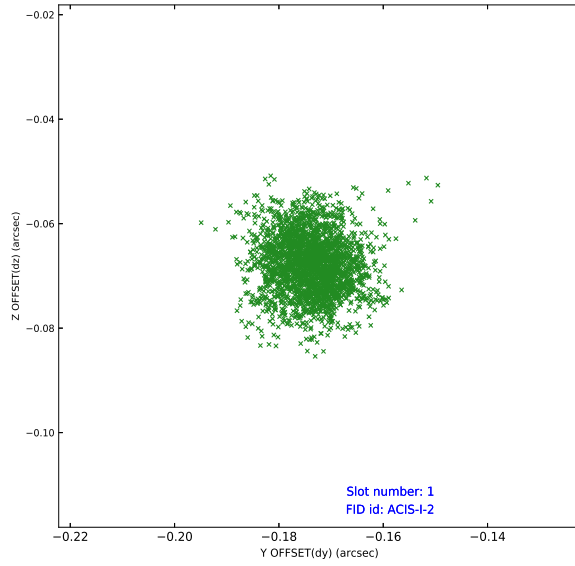


## 2.5 FID Slots

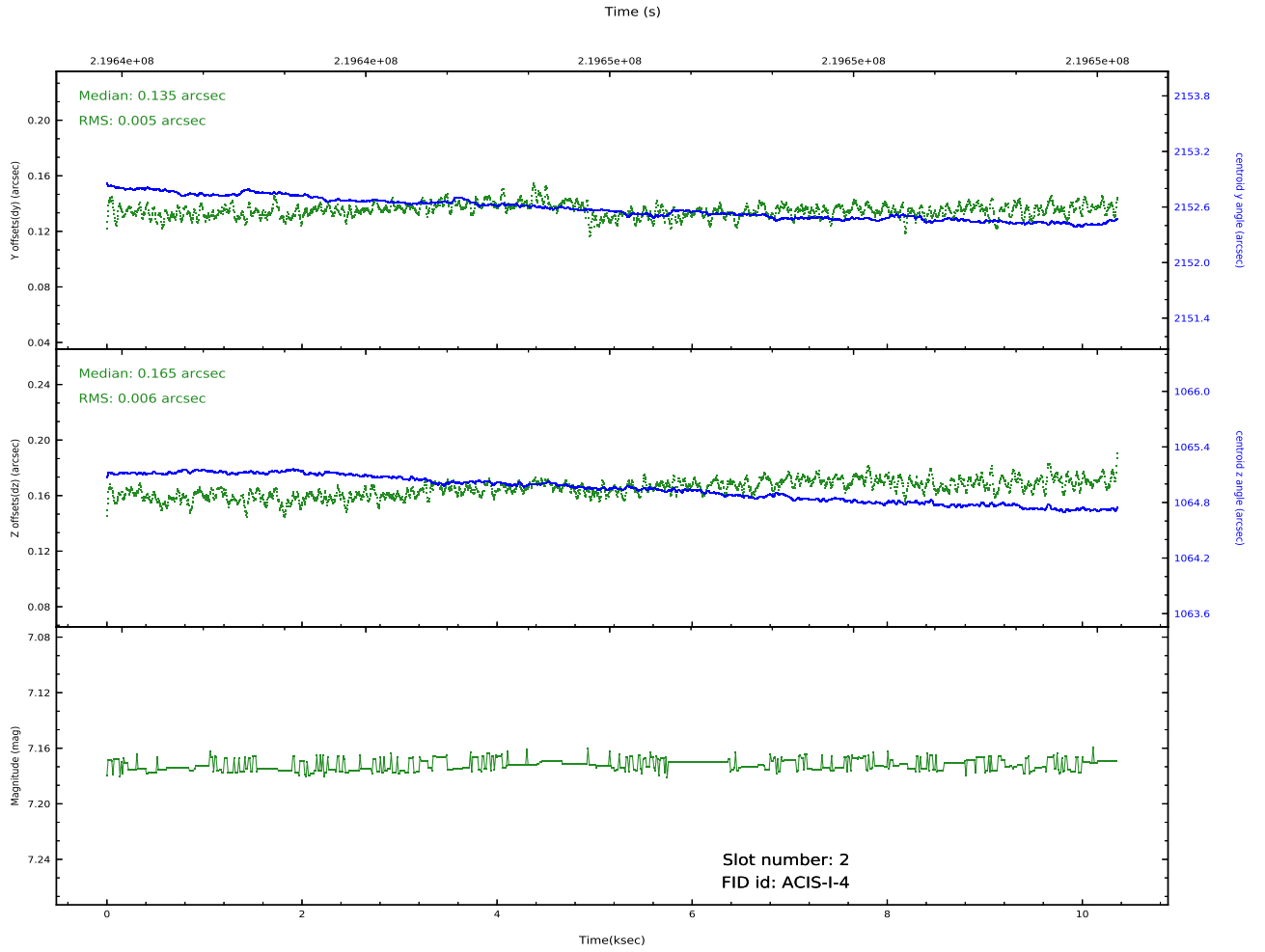
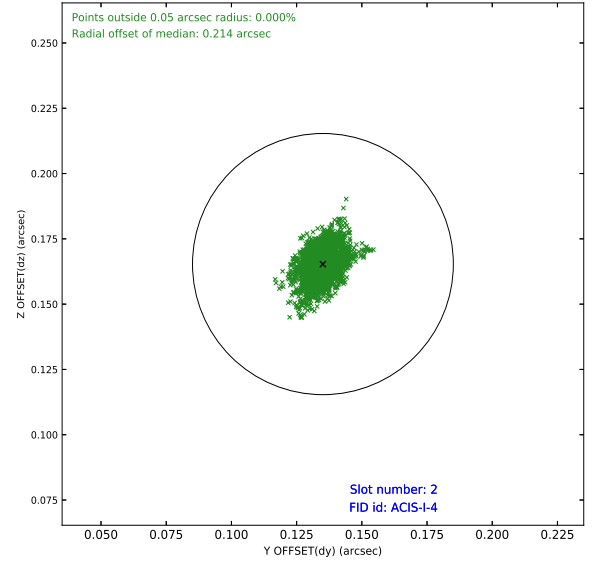
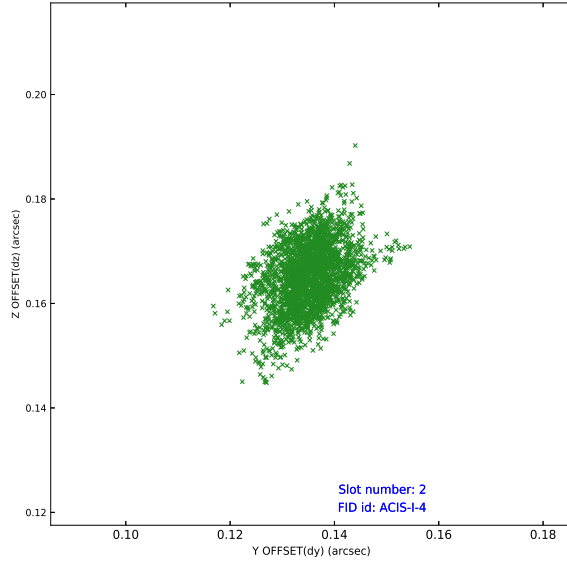
### 2.5.1 Slot 0



## 2.5.2 Slot 1



## 2.5.3 Slot 2



## A Summary

### A.1 Status

|                            |            |
|----------------------------|------------|
| V&V Scientist              | Jen Lauer  |
| V&V Date (YYYY-MM-DD)      | 2020.10.06 |
| V&V Edition                | 1          |
| V&V Disposition and Status | OK         |
| V&V Charge Time            | 10.05019   |

### A.2 Comments

The guide star in slot 5 was removed from the aspect solution due to poor data quality. The aspect solution is improved by the removal of this guide star from the solution.