

# V&V Reference Report

## L2 ASCDS Version : 10.6.4.1

Observation 21844 - L2 Version 1  
Chandra X-Ray Center

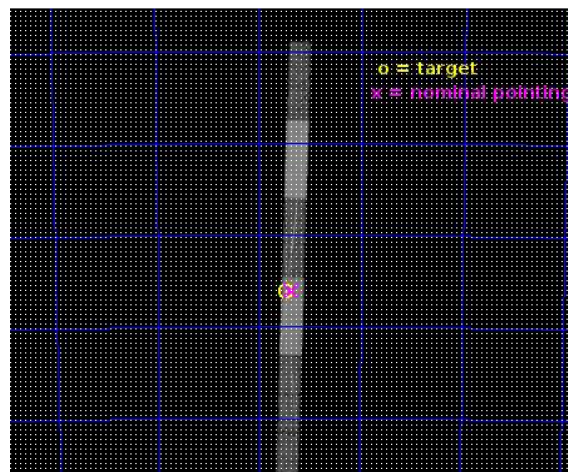
L2 Processing Date : Sep 17 2018

## 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>3</b> | <b>Gratings</b>               | <b>17</b> |
| 3.1      | HEG Arm . . . . .             | 17        |
| 3.2      | MEG Arm . . . . .             | 19        |
| <b>A</b> | <b>Summary</b>                | <b>21</b> |
| A.1      | Status . . . . .              | 21        |
| A.2      | Comments . . . . .            | 21        |

# 1 Front

|          |                                                              |                                             |
|----------|--------------------------------------------------------------|---------------------------------------------|
| seq_num  | 502976                                                       | Sequence number                             |
| obs_id   | 21844                                                        | Observation id                              |
| title    | Chandra Cycle 19 Spatial and Spectral Monitoring of SN 1987A | Propo                                       |
| observer | David Burrows                                                | Principal investigator                      |
| object   | SN 1987A                                                     | Source name                                 |
| dtcycle  | 0                                                            | &#160                                       |
| cycle    | P                                                            | events from which exps?<br>Prim/Second/Both |
| ra_targ  | 83.866667                                                    | Observer's specified<br>target RA [deg]     |
| dec_targ | -69.26975                                                    | Observer's specified<br>target Dec [deg]    |
| ra_nom   | 83.84119691428                                               | Nominal RA [deg]                            |
| dec_nom  | -69.267845928557                                             | Nominal Dec [deg]                           |
| roll_nom | 91.632794580188                                              | Nominal Roll [deg]                          |
| revision | 1                                                            | Processing version of<br>data               |
| ontime   | 35088.900760651                                              | Sum of GTIs [s]                             |
| livetime | 33826.851676291                                              | Livetime [s]                                |
| ontime4  | 35088.900760651                                              | Sum of GTIs [s]                             |
| ontime5  | 35088.900760651                                              | Sum of GTIs [s]                             |
| ontime6  | 35088.900760651                                              | Sum of GTIs [s]                             |
| ontime7  | 35088.900760651                                              | Sum of GTIs [s]                             |
| ontime8  | 35088.900760651                                              | Sum of GTIs [s]                             |
| ontime9  | 35088.900760651                                              | Sum of GTIs [s]                             |
| l2events | 121458                                                       | Number of level 2<br>events                 |

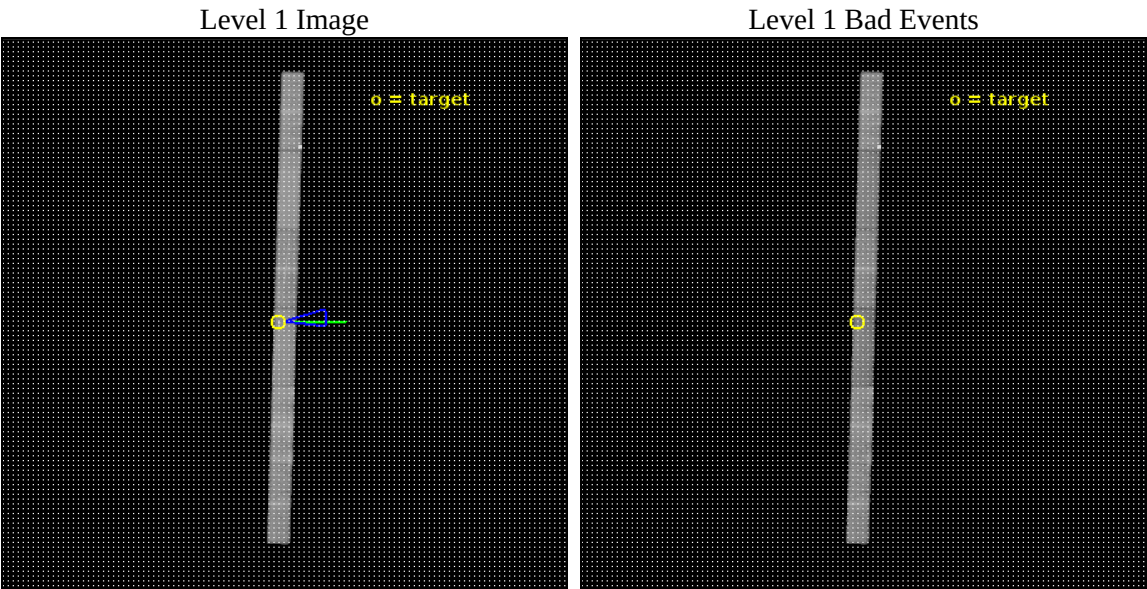




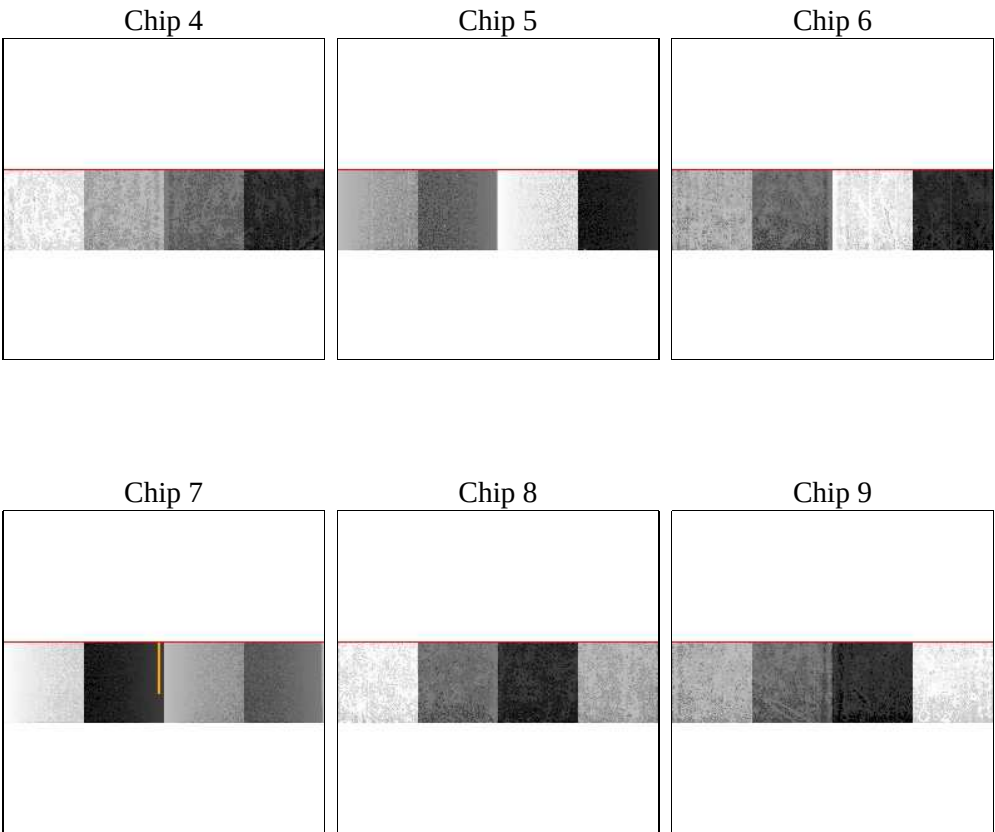
# 2 OBI

## 2.1 OBI

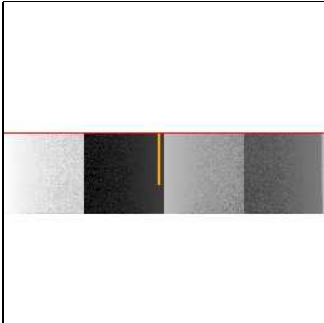
### 2.1.1 Images



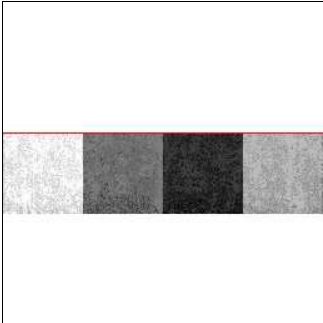
### 2.1.2 Bias



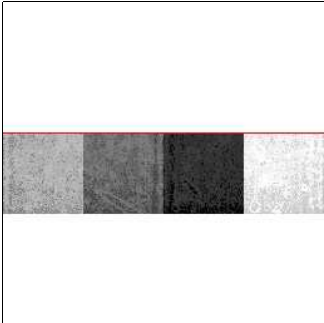
Chip 7



Chip 8



Chip 9



### 2.1.3 Parameters

|          |                     |                                |                |                    |                                         |
|----------|---------------------|--------------------------------|----------------|--------------------|-----------------------------------------|
| obi_num  | 0                   | Obi number                     | sched_exp_time | 35000.000000       | [s] Scheduled observation exposure time |
| ascdsver | 10.6.4.1            | Processing system revision     | ontime         | 35088.900760651    | Sum of GTIs [s]                         |
| caldsver | 4.8.0               | &#160                          | ontime4        | 35088.900760651    | Sum of GTIs [s]                         |
| date     | 2018-09-17T05:36:59 | Date and time of file creation | ontime5        | 35088.900760651    | Sum of GTIs [s]                         |
| revision | 1                   | Processing version of data     | ontime6        | 35088.900760651    | Sum of GTIs [s]                         |
|          |                     |                                | ontime7        | 35088.900760651    | Sum of GTIs [s]                         |
|          |                     |                                | ontime8        | 35088.900760651    | Sum of GTIs [s]                         |
|          |                     |                                | ontime9        | 35088.900760651    | Sum of GTIs [s]                         |
|          |                     |                                | l1events       | 505477             | Number of level 1 events                |
|          |                     |                                | tgmethod       | TGDETECT           | Method used to create src1a file        |
|          |                     |                                | src1a_pos      | (4020.17, 4082.42) | src1a sky pixel position                |

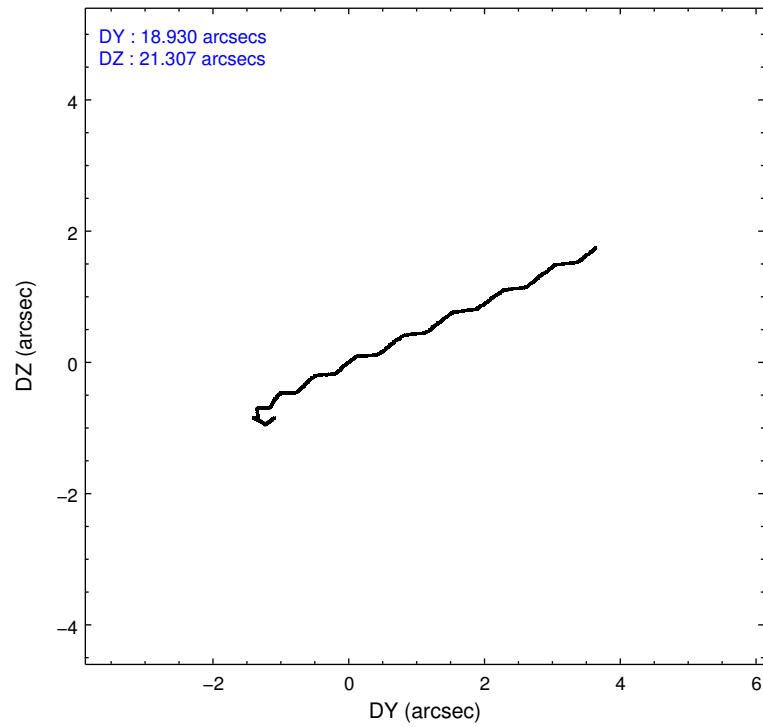
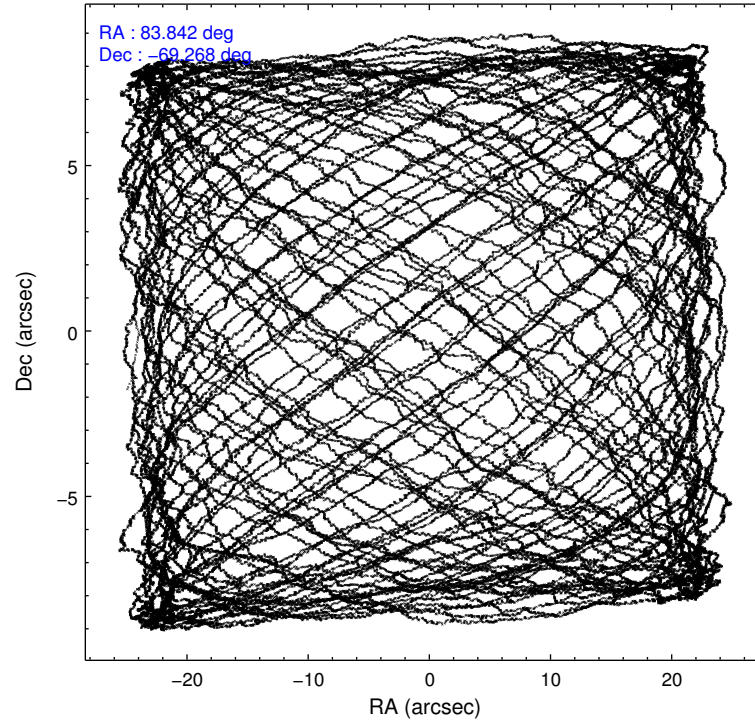
### 2.1.4 Events

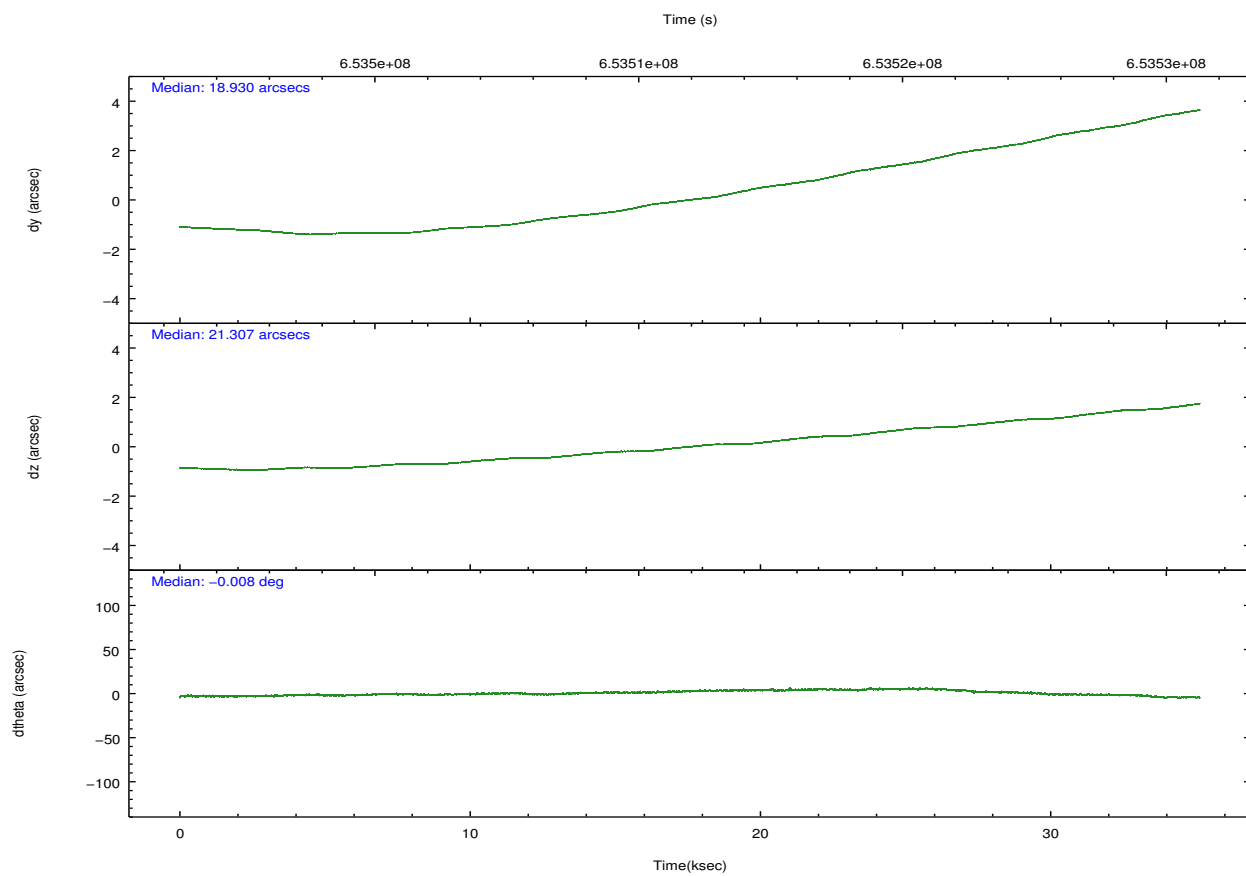
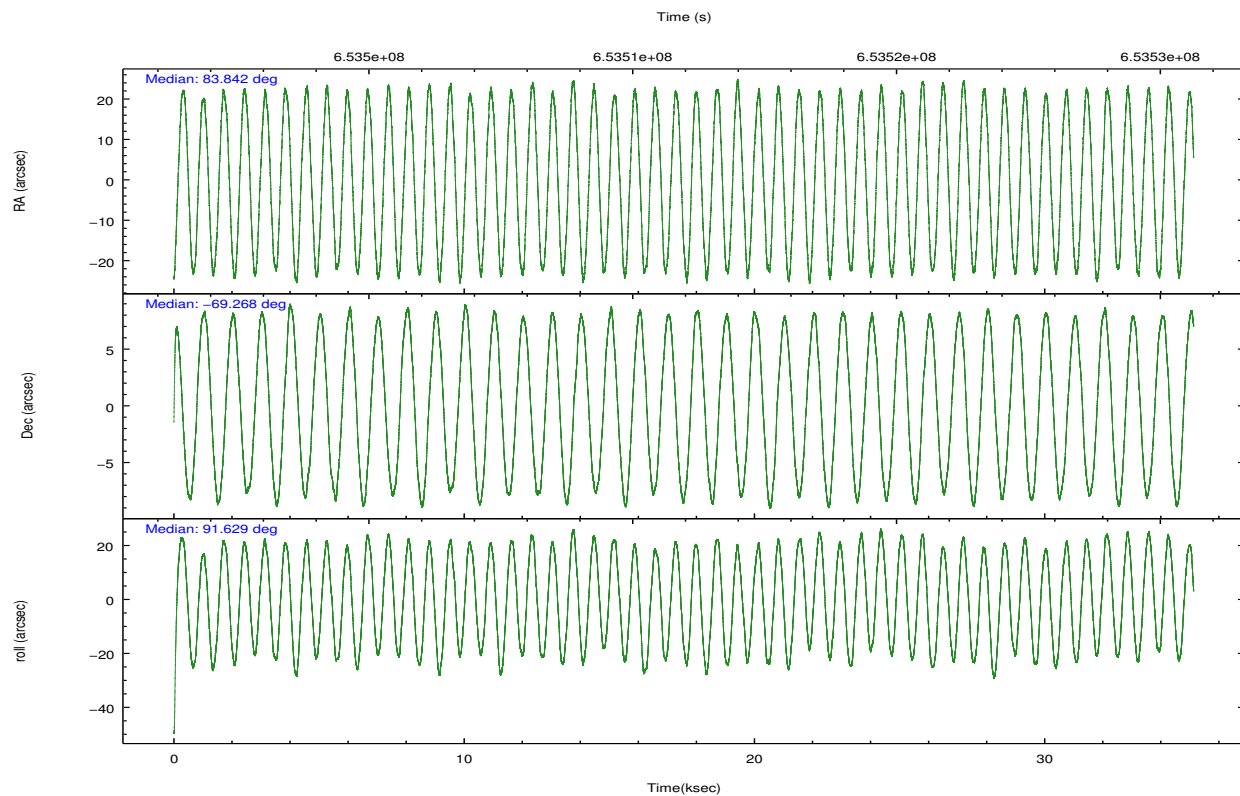
|                 | ccd 4 | ccd 5 | ccd 6 | ccd 7 | ccd 8 | ccd 9 |                | ccd 4 | ccd 5 | ccd 6 | ccd 7 | ccd 8 | ccd 9 |
|-----------------|-------|-------|-------|-------|-------|-------|----------------|-------|-------|-------|-------|-------|-------|
| level 1 events  | 91102 | 96390 | 71869 | 80827 | 97626 | 67663 | grade 0 events | 2953  | 4562  | 4720  | 5383  | 6876  | 2668  |
| rejected events | 82041 | 45863 | 61072 | 37491 | 72019 | 59609 |                | 3%    | 4%    | 6%    | 6%    | 7%    | 3%    |
| rejected %      | 90%   | 47%   | 84%   | 46%   | 73%   | 88%   | grade 1 events | 64    | 312   | 29    | 162   | 55    | 29    |
|                 |       |       |       |       |       |       |                | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    |
|                 |       |       |       |       |       |       | grade 2 events | 2249  | 15978 | 1979  | 10131 | 6131  | 1617  |
|                 |       |       |       |       |       |       |                | 2%    | 16%   | 2%    | 12%   | 6%    | 2%    |
|                 |       |       |       |       |       |       | grade 3 events | 1175  | 2995  | 1185  | 4669  | 2738  | 1156  |
|                 |       |       |       |       |       |       |                | 1%    | 3%    | 1%    | 5%    | 2%    | 1%    |
|                 |       |       |       |       |       |       | grade 4 events | 1165  | 2854  | 1238  | 4501  | 2621  | 1065  |
|                 |       |       |       |       |       |       |                | 1%    | 2%    | 1%    | 5%    | 2%    | 1%    |
|                 |       |       |       |       |       |       | grade 5 events | 2916  | 8553  | 2633  | 8115  | 4125  | 2845  |
|                 |       |       |       |       |       |       |                | 3%    | 8%    | 3%    | 10%   | 4%    | 4%    |
|                 |       |       |       |       |       |       | grade 6 events | 1521  | 24140 | 1675  | 18657 | 7241  | 1549  |
|                 |       |       |       |       |       |       |                | 1%    | 25%   | 2%    | 23%   | 7%    | 2%    |
|                 |       |       |       |       |       |       | grade 7 events | 79059 | 36996 | 58410 | 29209 | 67839 | 56734 |
|                 |       |       |       |       |       |       |                | 86%   | 38%   | 81%   | 36%   | 69%   | 83%   |

## 2.2 Compared Parameters

| Parameter                            | Planned             | Actual               | Parameter                             | Planned   | Actual  |
|--------------------------------------|---------------------|----------------------|---------------------------------------|-----------|---------|
| Instrument                           | ACIS                | ACIS                 | Obspar format version number          | 7         | 7       |
| Detector                             | ACIS-456789         | ACIS-456789          | Obspar file type                      | PREDICTED | ACTUAL  |
| Grating                              | HETG                | HETG                 | Obspar update status                  | NONE      | UPDATED |
| Data mode                            | FAINT               | FAINT                | CCD I0 on                             | N         | N       |
| Observation mode                     | POINTING            | POINTING             | CCD I1 on                             | N         | N       |
| [deg] Pointing RA                    | 83.882749           | 83.84119691427969    | CCD I2 on                             | N         | N       |
| [deg] Pointing Dec                   | -69.291031          | -69.26784592855661   | CCD I3 on                             | N         | N       |
| [deg] Pointing Roll                  | 91.515044           | 91.63279458018766    | CCD S0 on                             | O1        | Y       |
| [deg] Roll angle                     | 84.000000           | 84.000000            | CCD S1 on                             | Y         | Y       |
| [deg] Roll tolerance                 | 12.000000           | 12.000000            | CCD S2 on                             | Y         | Y       |
| Roll constraint allows 180D rotation | N                   | N                    | CCD S3 on                             | Y         | Y       |
| [s] Window start time (MET)          | 653011269.184000    | 653011269.184000     | CCD S4 on                             | Y         | Y       |
| [s] Window stop time (MET)           | 655084869.184000    | 655084869.184000     | CCD S5 on                             | Y         | Y       |
| [mm] SIM focus pos                   | -0.684267           | -0.6828225247311905  | Number of optional ACIS chips dropped | 0         | 0       |
| [mm] SIM defocus                     | 0                   | 0.001444936568705701 | On-chip summing requested             | N         | N       |
| [mm] SIM translation stage pos       | -190.132523         | -190.1400660498719   | Subarray requested                    | CUSTOM    | 1/4     |
| [mm] SIM translation stage offset    | 0                   | 0.00754346686406393  | Subarray start row                    | 351       | 351     |
| [s] Observation start time (MET)     | 653494497.184000    | 653493484.3724       | Subarray row count                    | 256       | 256     |
| Observation start date               | 2018-09-16T14:13:48 | 2018-09-16T13:58:04  | Alternating exposures requested       | N         | N       |
| [s] Observation end time (MET)       | 653529497.184000    | 653530297.76209      | [s] Primary exposure time             | 0.000000  | 1.1     |
| Observation end date                 | 2018-09-16T23:57:08 | 2018-09-17T00:11:37  |                                       |           |         |
| Read mode                            | TIMED               | TIMED                |                                       |           |         |

## 2.3 Aspect



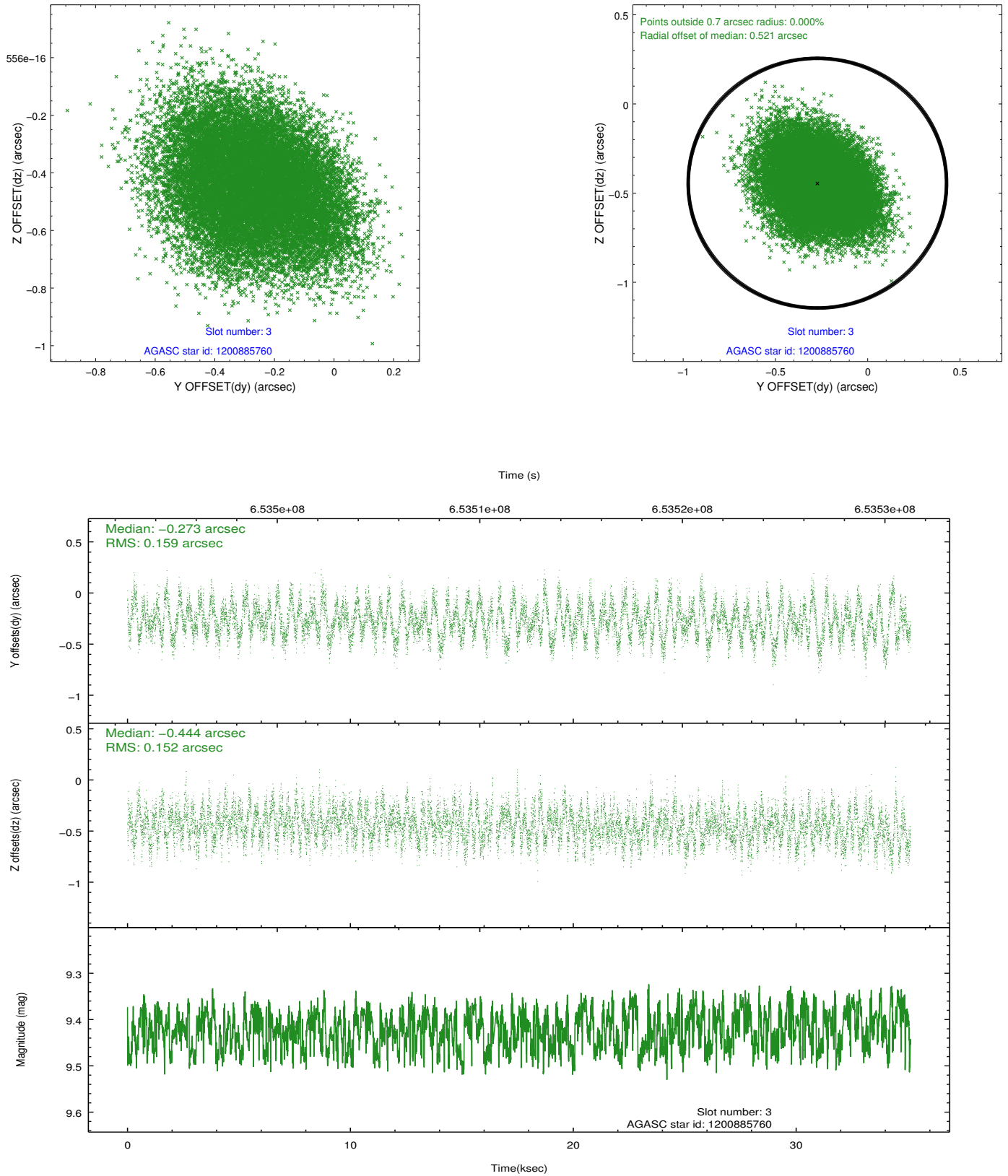


# Slot Statistics

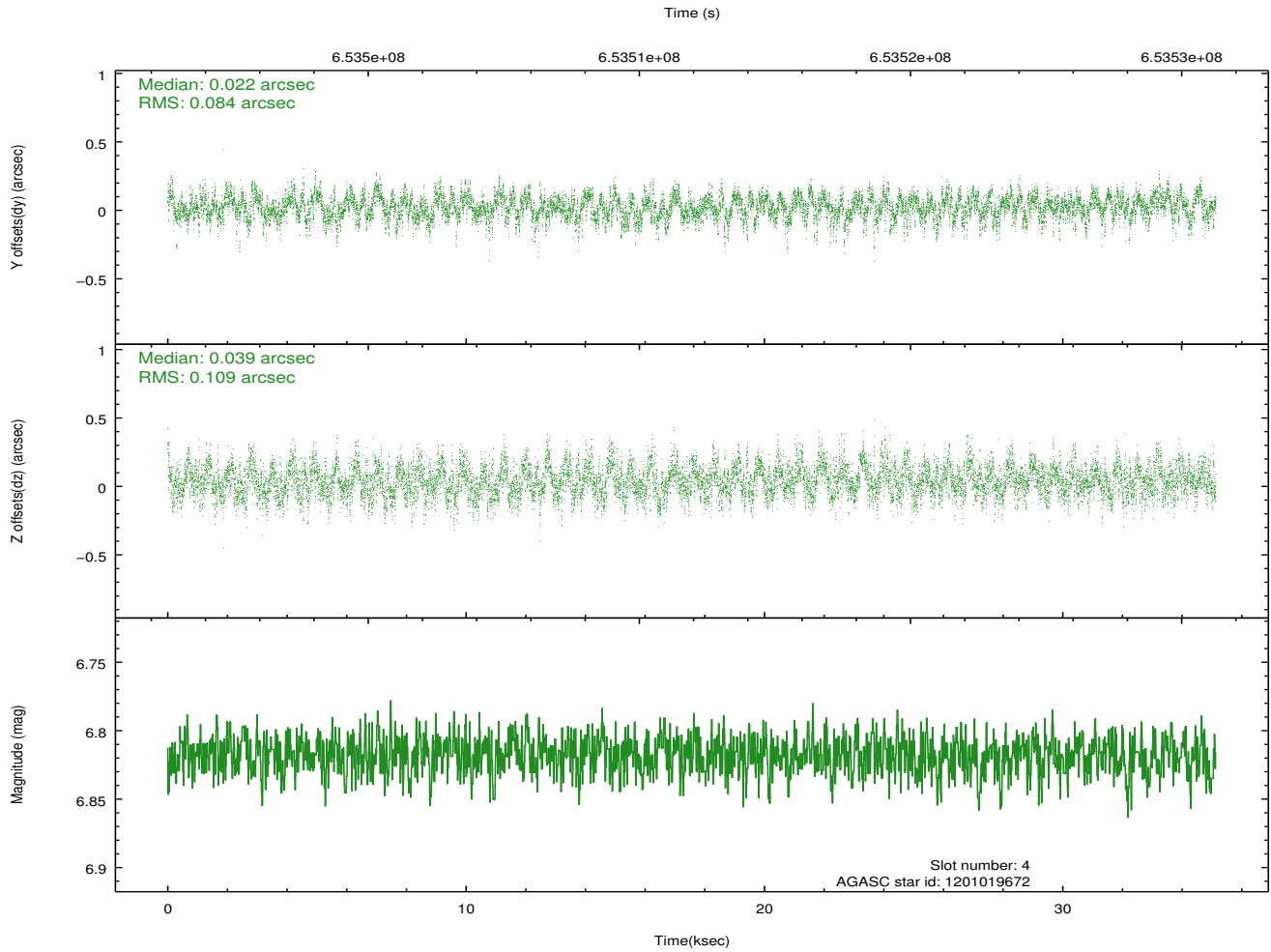
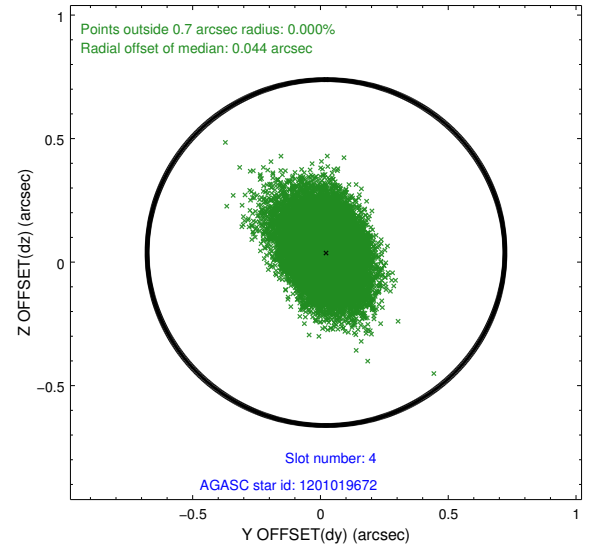
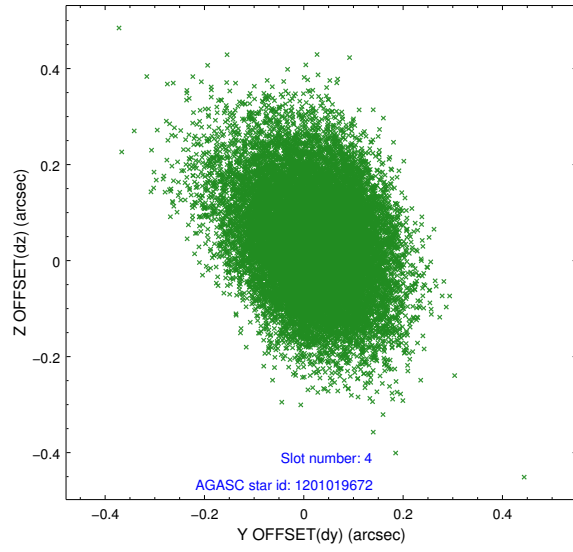
| pt | status | used | id         | mag  | n_pts | frac_pts | med_dy | med_dz | dr1   | dr2   | ra        | dec        | mean_y   | mea   |
|----|--------|------|------------|------|-------|----------|--------|--------|-------|-------|-----------|------------|----------|-------|
| 0  | FID    |      | ACIS-S-1   | 7.04 | 8569  | 1.000    | 0.140  | -0.089 | 0.035 | 0.070 | 0.000000  | 0.000000   | 923.83   | -1738 |
| 1  | FID    |      | ACIS-S-5   | 7.07 | 8569  | 1.000    | -0.328 | 0.058  | 0.018 | 0.031 | 0.000000  | 0.000000   | -1825.68 | 158   |
| 2  | FID    |      | ACIS-S-6   | 7.22 | 8569  | 1.000    | 0.168  | 0.041  | 0.021 | 0.065 | 0.000000  | 0.000000   | 389.28   | 802   |
| 3  | GUIDE  | used | 1200885760 | 9.42 | 17047 | 1.000    | -0.273 | -0.444 | 0.239 | 0.369 | 83.723637 | -68.777667 | 1852.42  | 158   |
| 4  | GUIDE  | used | 1201019672 | 6.82 | 17137 | 1.000    | 0.022  | 0.039  | 0.145 | 0.239 | 85.312192 | -68.770187 | 1804.02  | -1911 |
| 5  | GUIDE  | used | 1201020040 | 8.56 | 17125 | 1.000    | -0.037 | 0.253  | 0.164 | 0.281 | 85.379163 | -68.879396 | 1406.93  | -1978 |
| 6  | GUIDE  | used | 1201540776 | 9.51 | 17102 | 1.000    | 0.389  | 0.475  | 0.195 | 0.321 | 85.107945 | -69.858480 | -2096.62 | -1463 |
| 7  | GUIDE  | used | 1201410616 | 9.30 | 17112 | 1.000    | -0.125 | -0.316 | 0.212 | 0.402 | 82.516808 | -69.784406 | -1749.30 | 1745  |

## 2.4 Star Slots

### 2.4.1 Slot 3

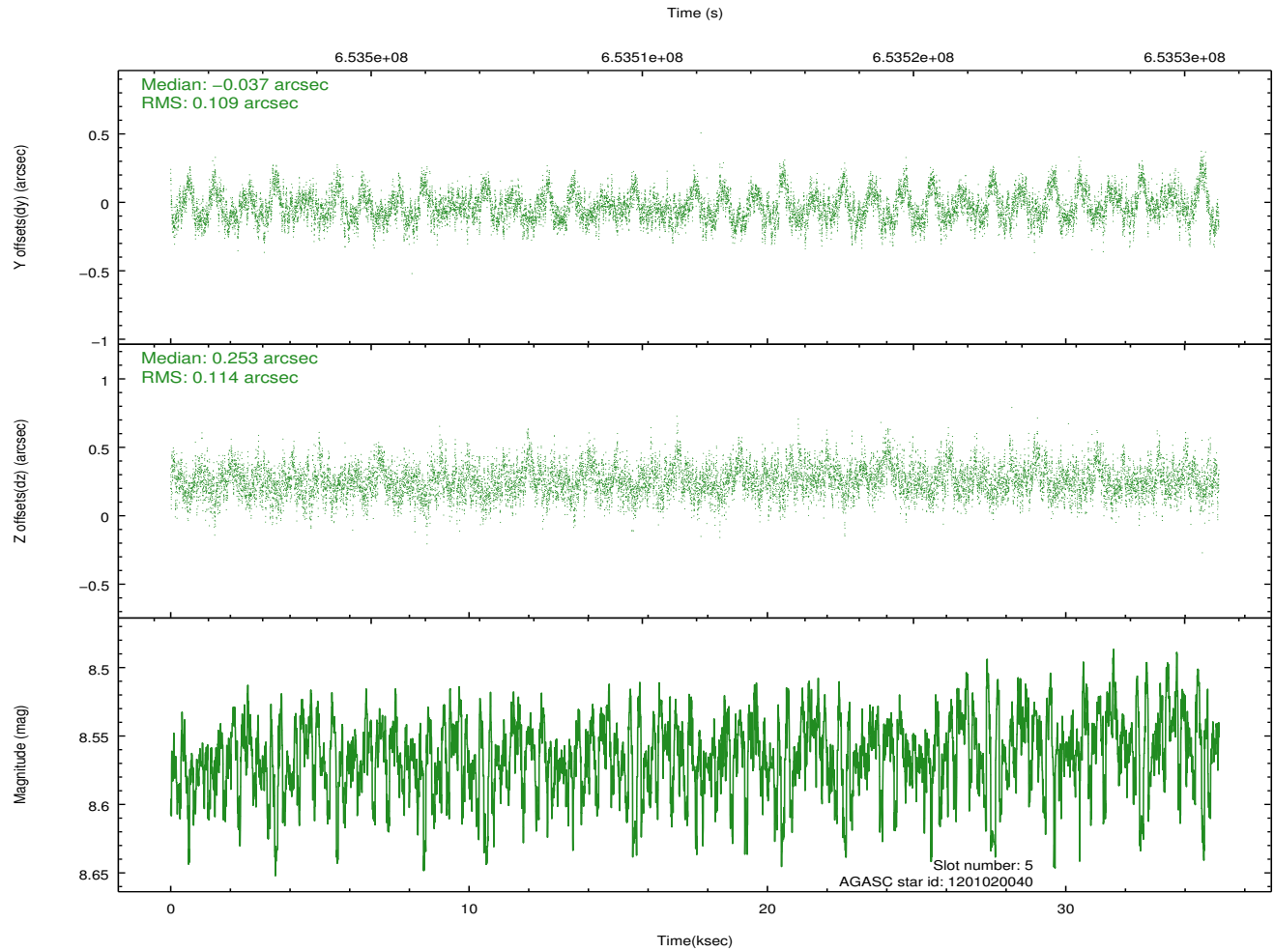
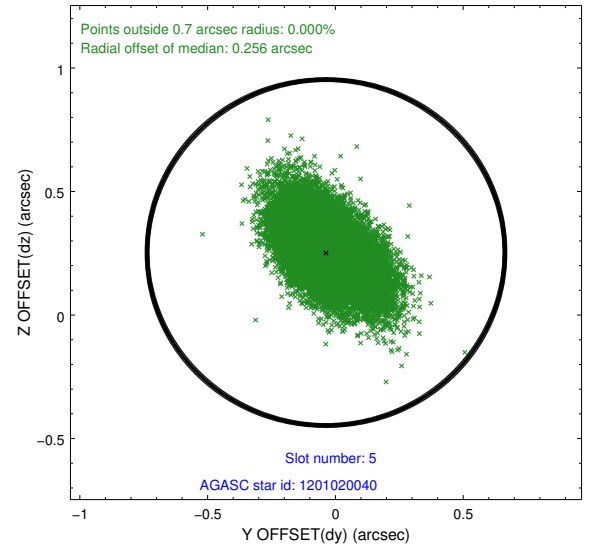
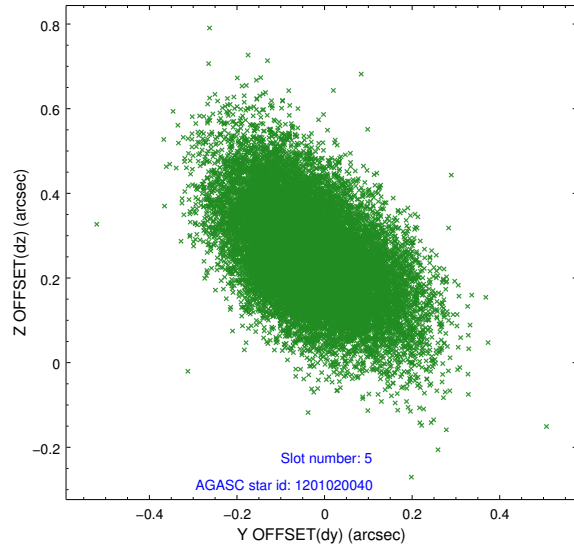


## 2.4.2 Slot 4

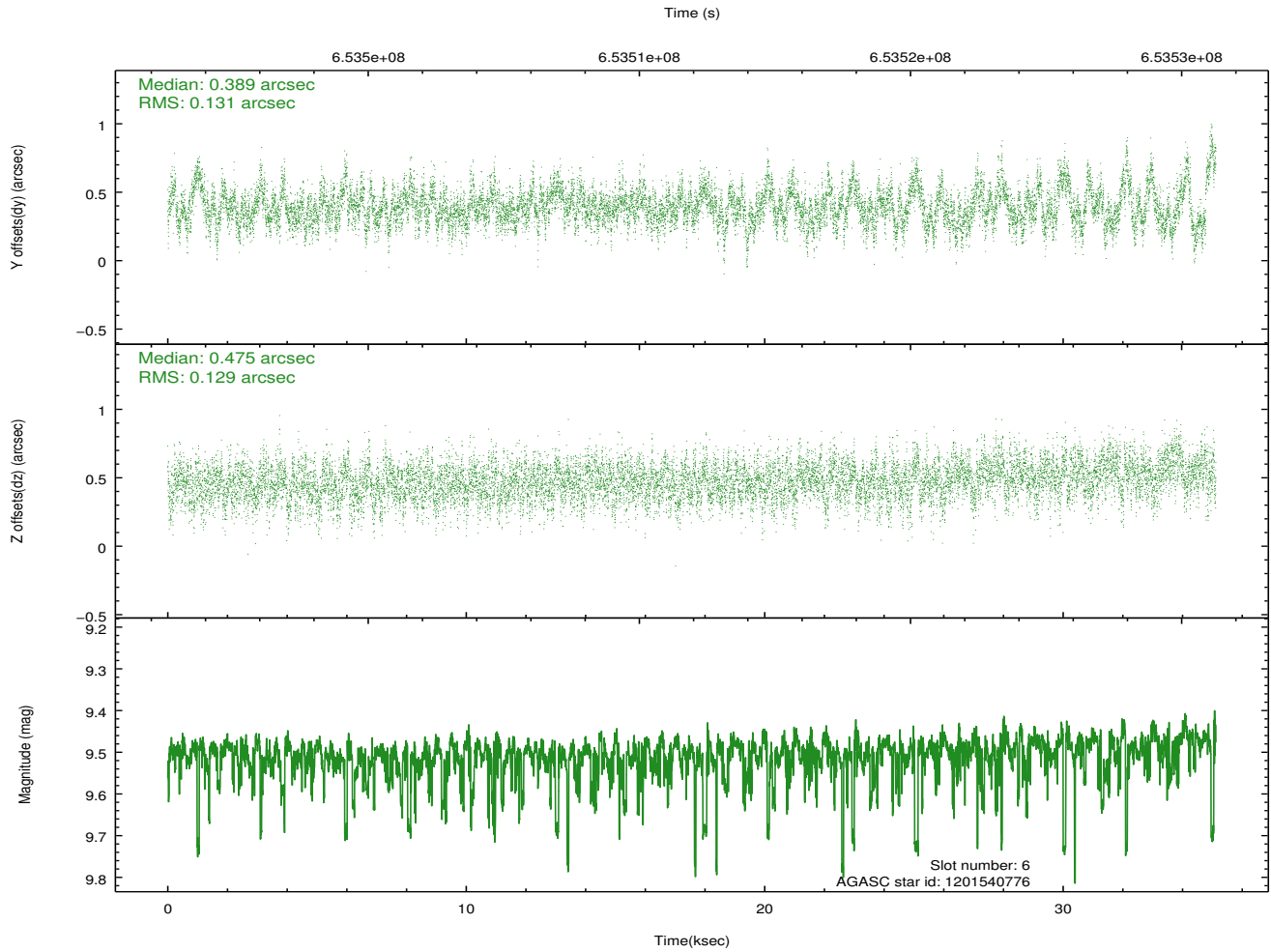
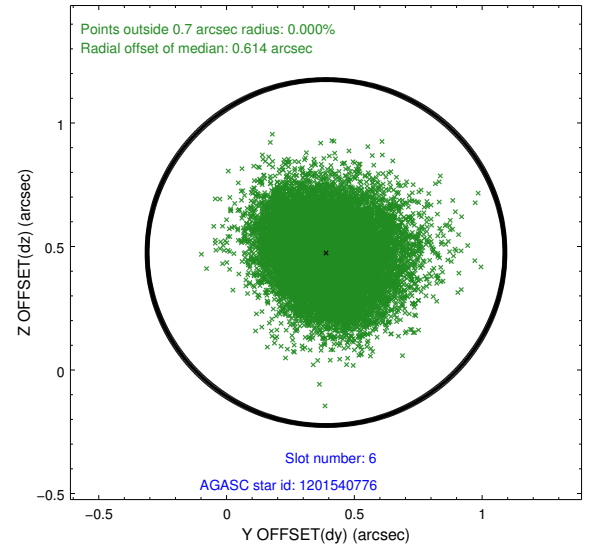
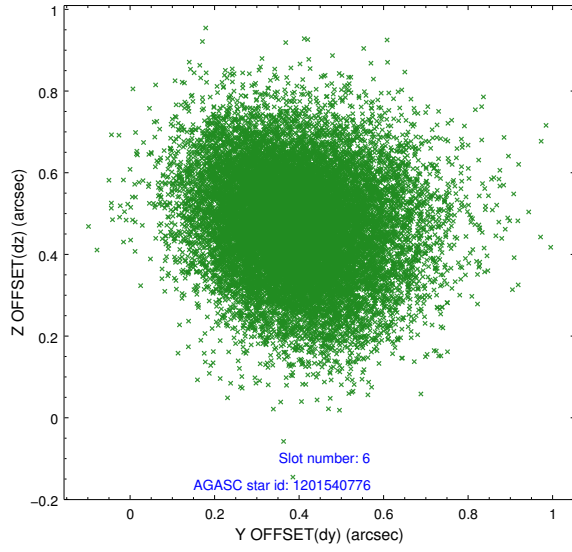




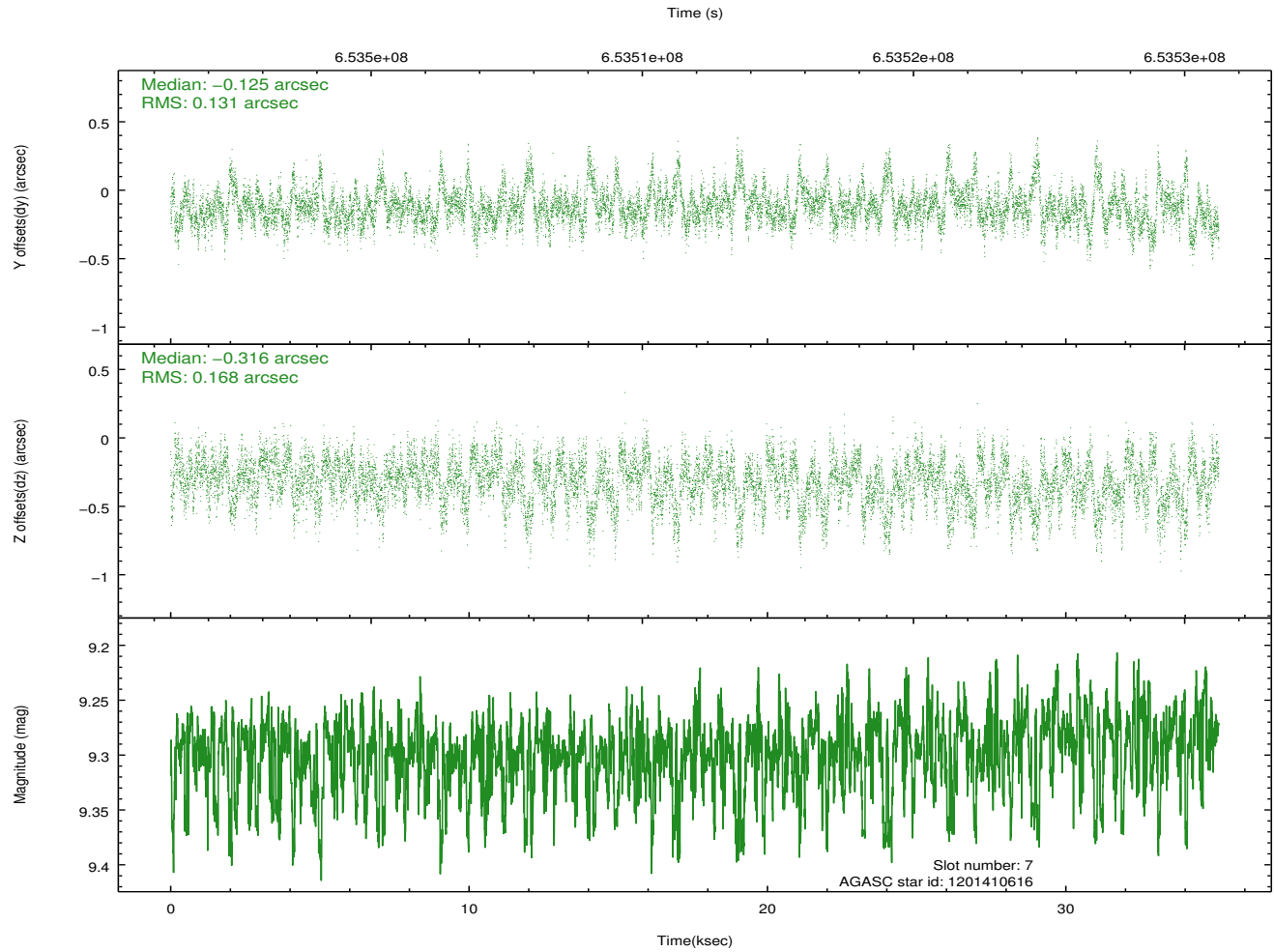
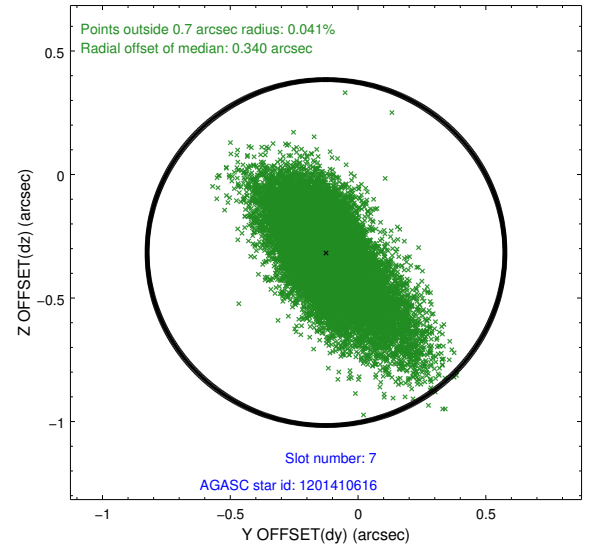
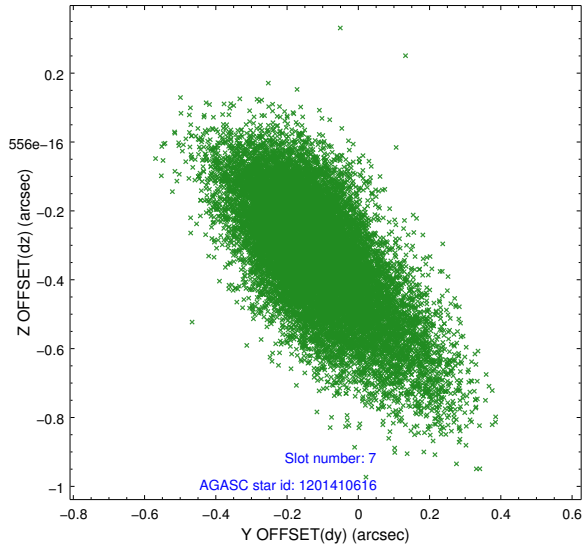
### 2.4.3 Slot 5



## 2.4.4 Slot 6

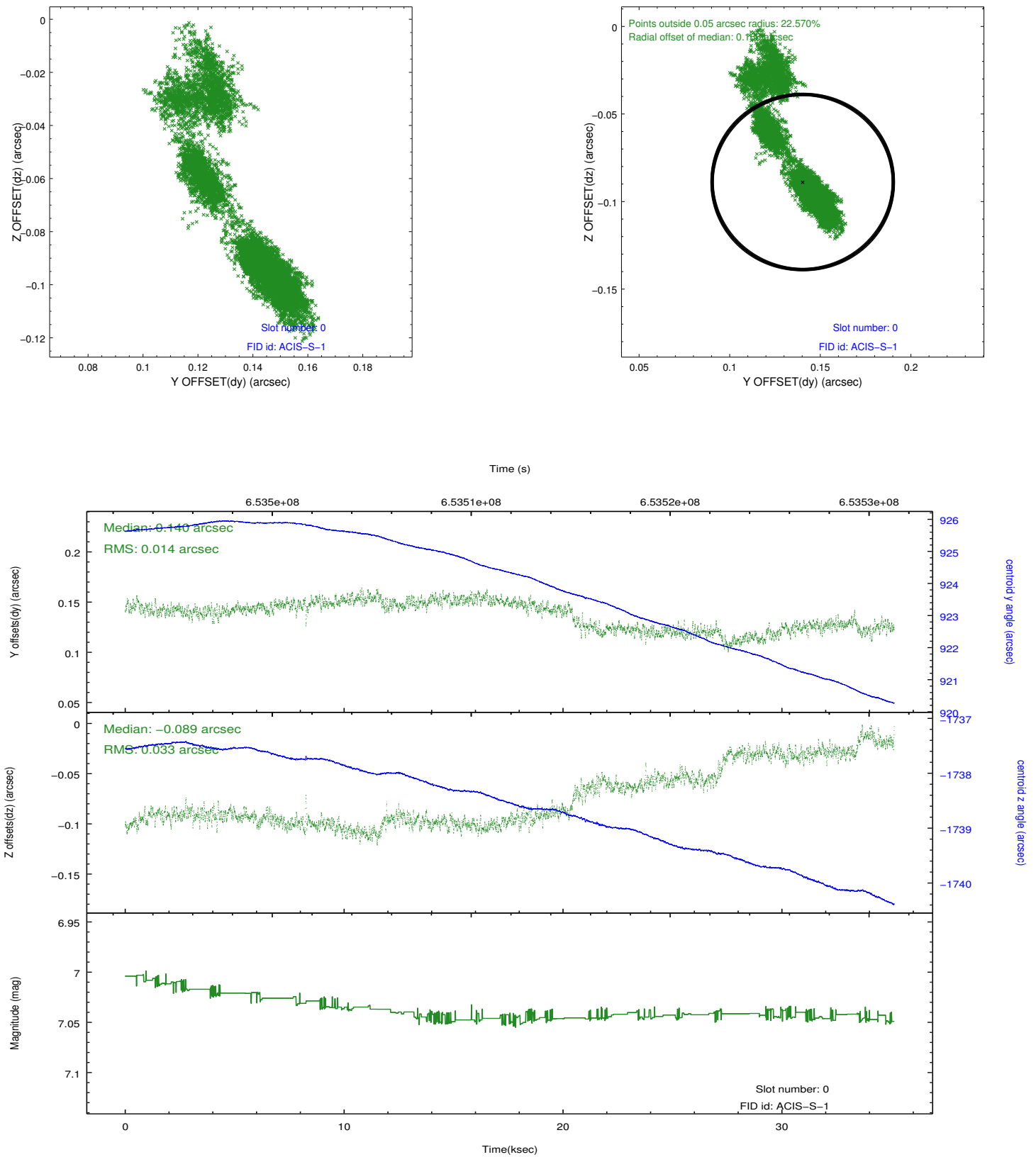


## 2.4.5 Slot 7

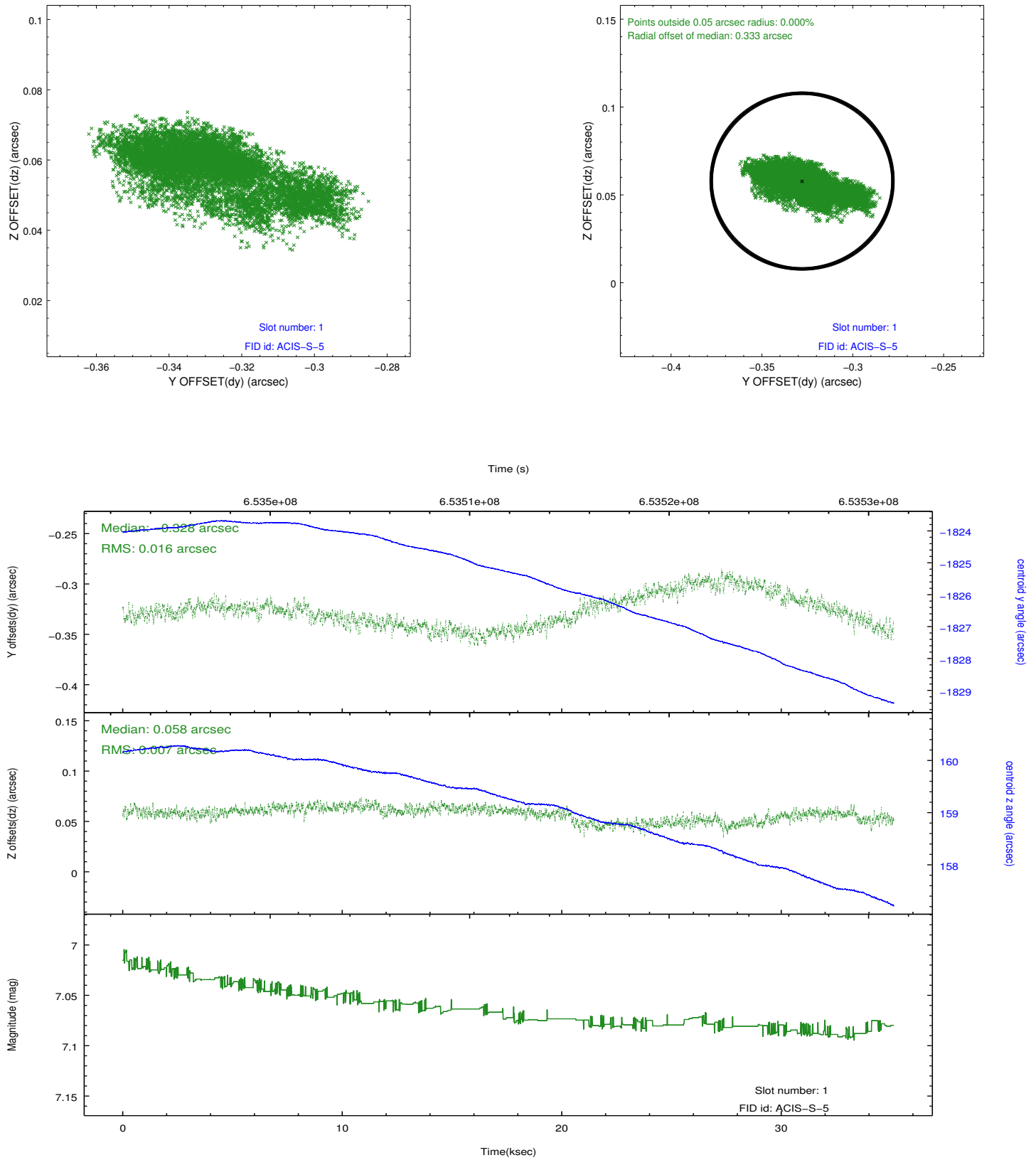


## 2.5 FID Slots

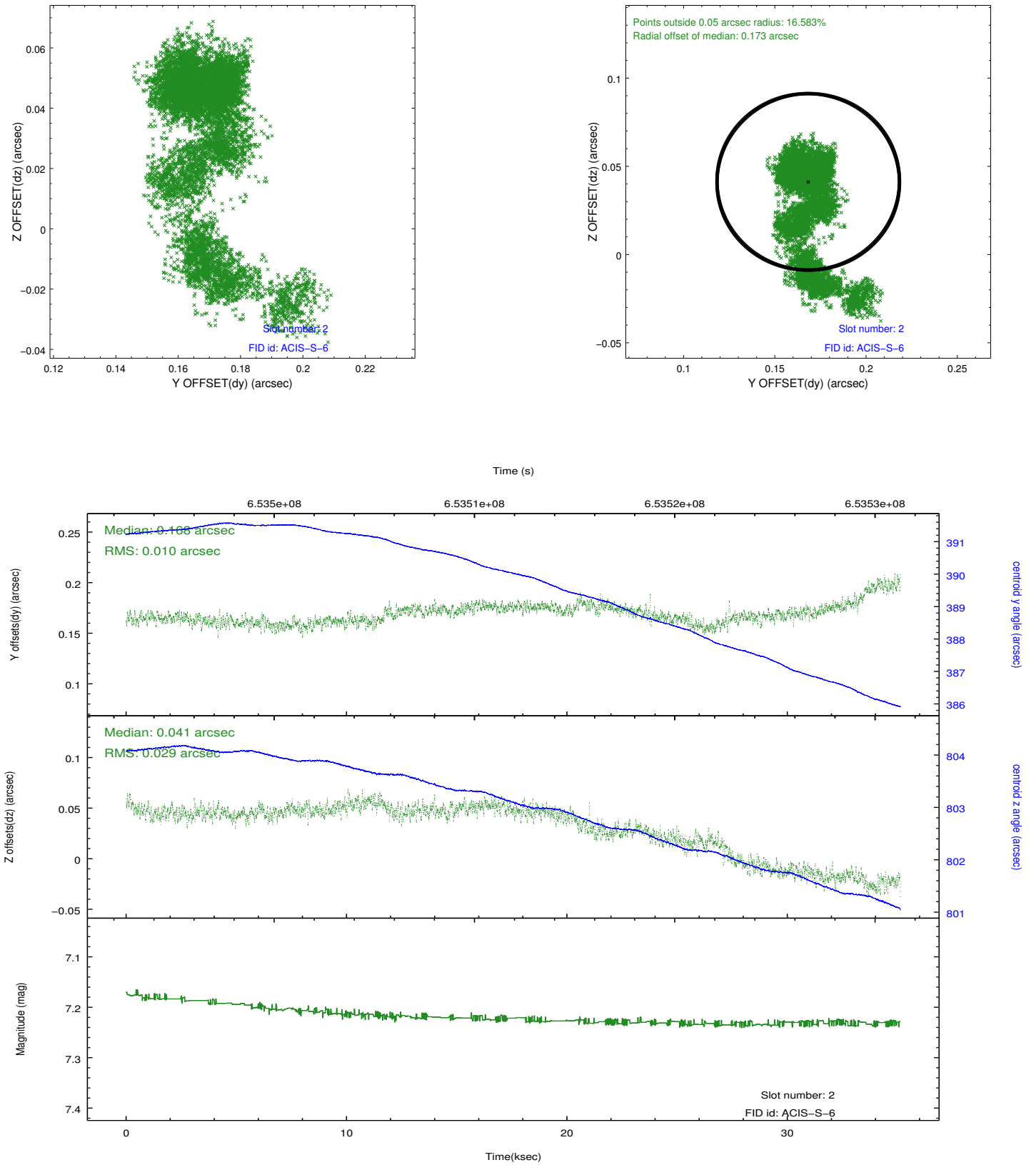
### 2.5.1 Slot 0



## 2.5.2 Slot 1

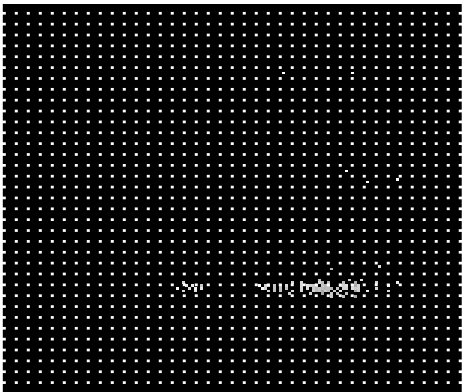


### 2.5.3 Slot 2

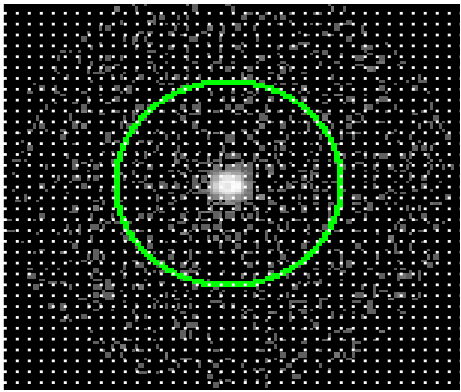


# 3 Gratings

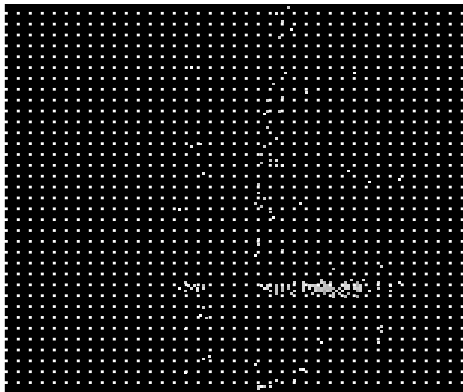
## 3.1 HEG Arm



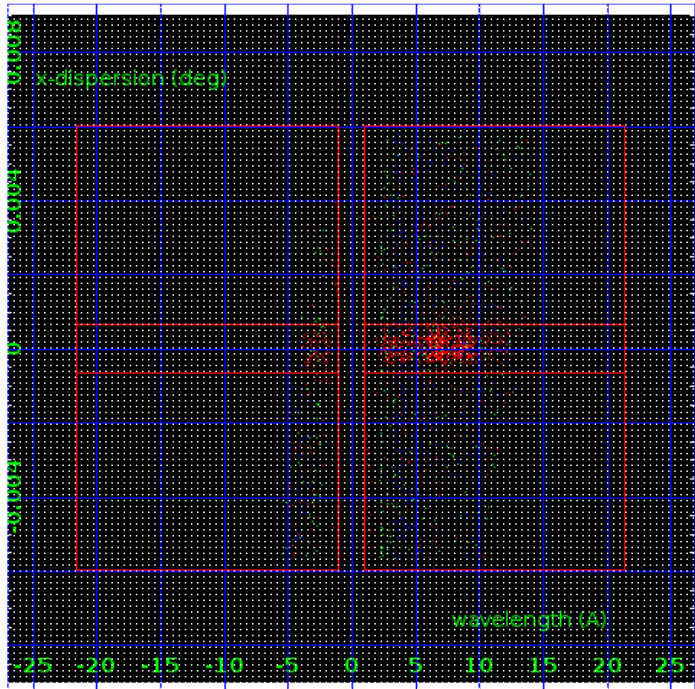
HEG Order Sort 123



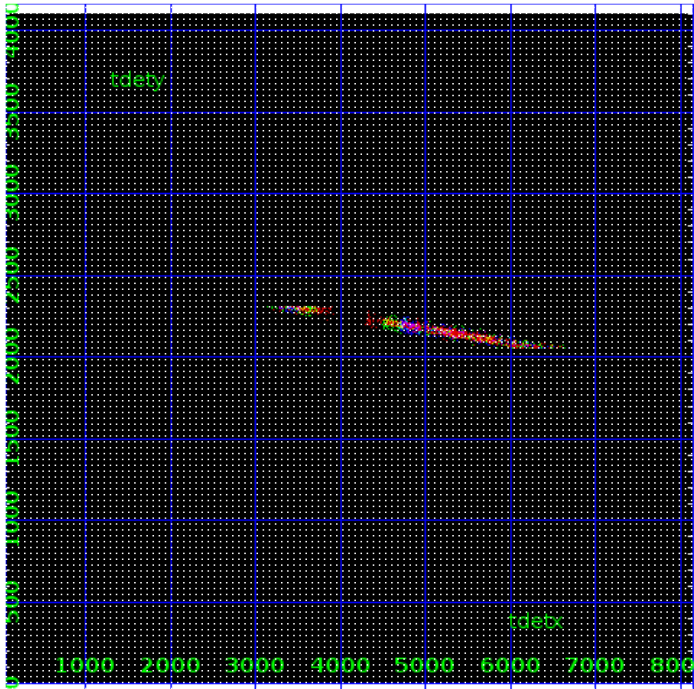
HEG Zero Order



HEG Order Sort ALL

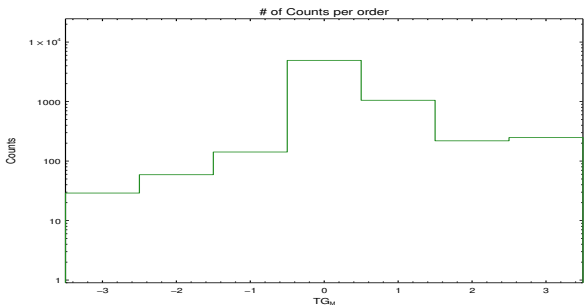


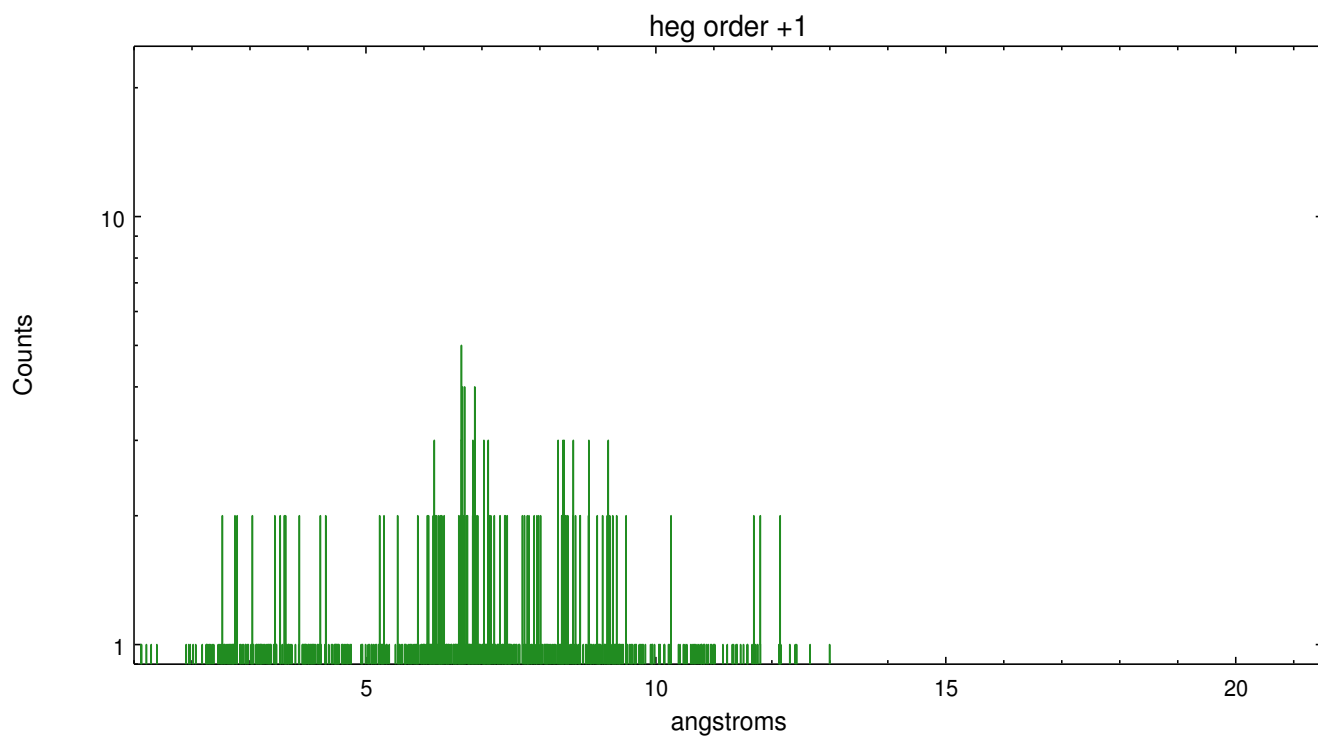
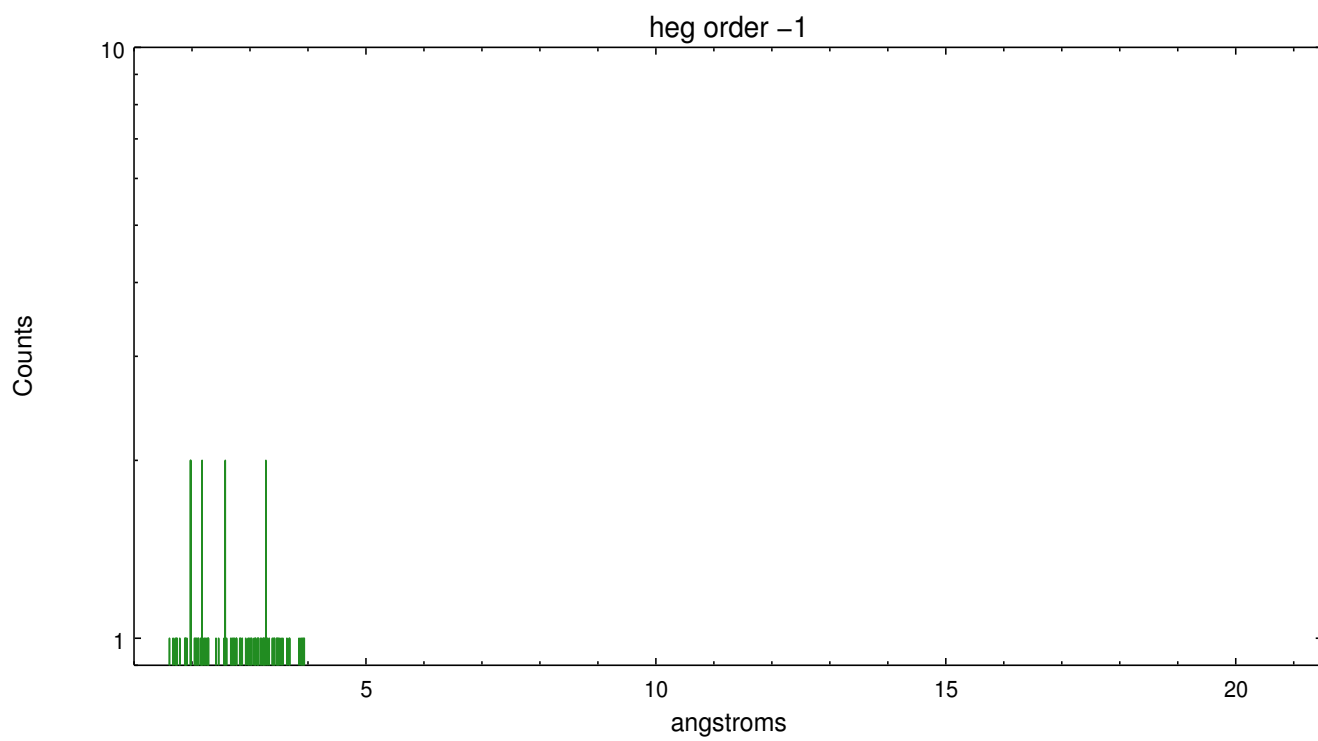
Spot Image HEG



Full Detector HEG

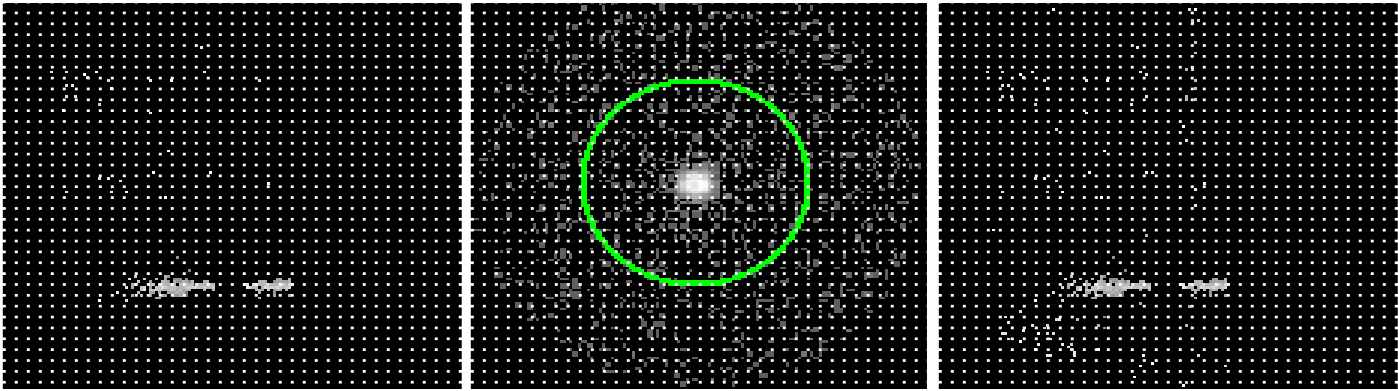
|        | order<br>-3 | order<br>-2 | order<br>-1 | order<br>0 | order<br>1 | order<br>2 | order<br>3 |
|--------|-------------|-------------|-------------|------------|------------|------------|------------|
| Events | 29          | 59          | 142         | 4926       | 1051       | 219        | 248        |







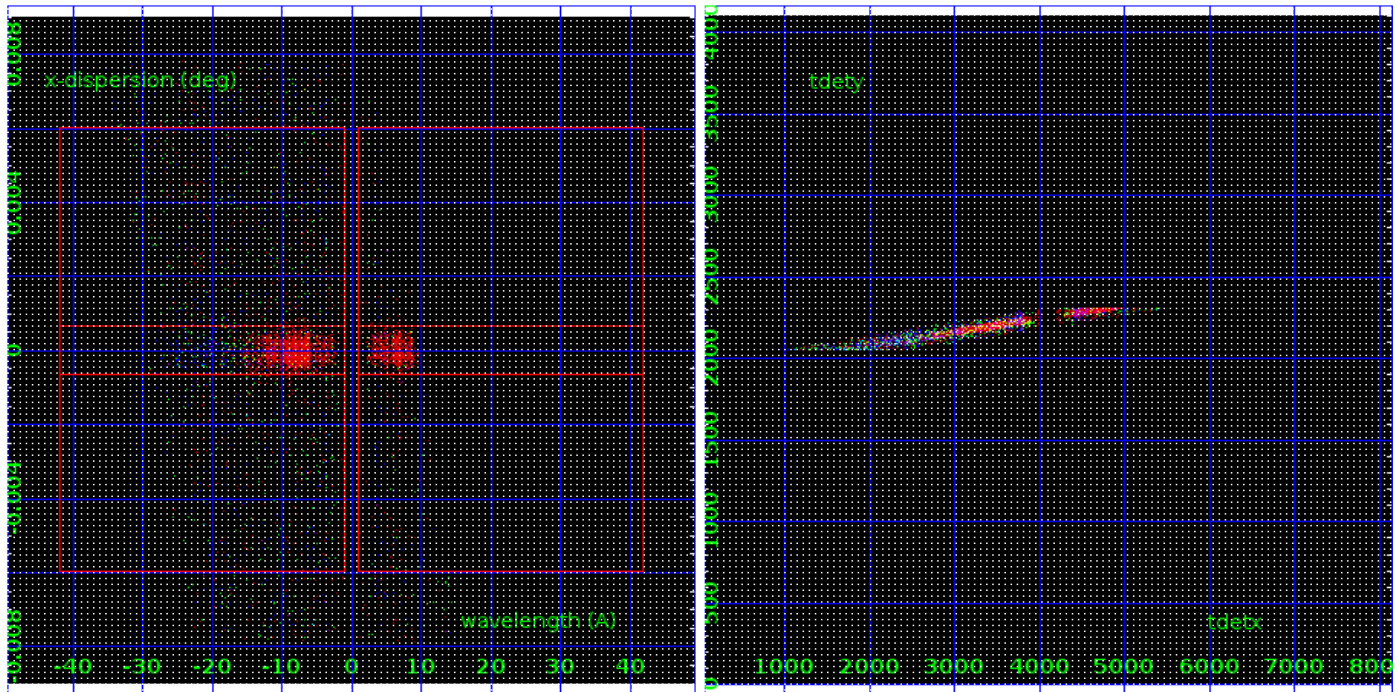
3.2 MEG Arm



MEG Order Sort 123

MEG Zero Order

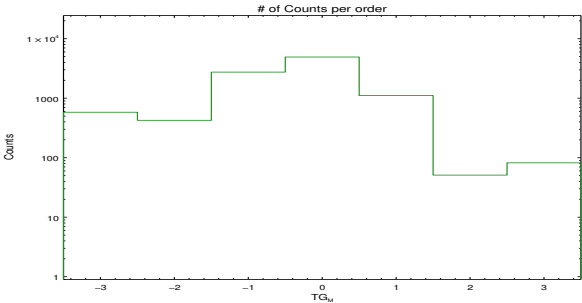
MEG Order Sort ALL

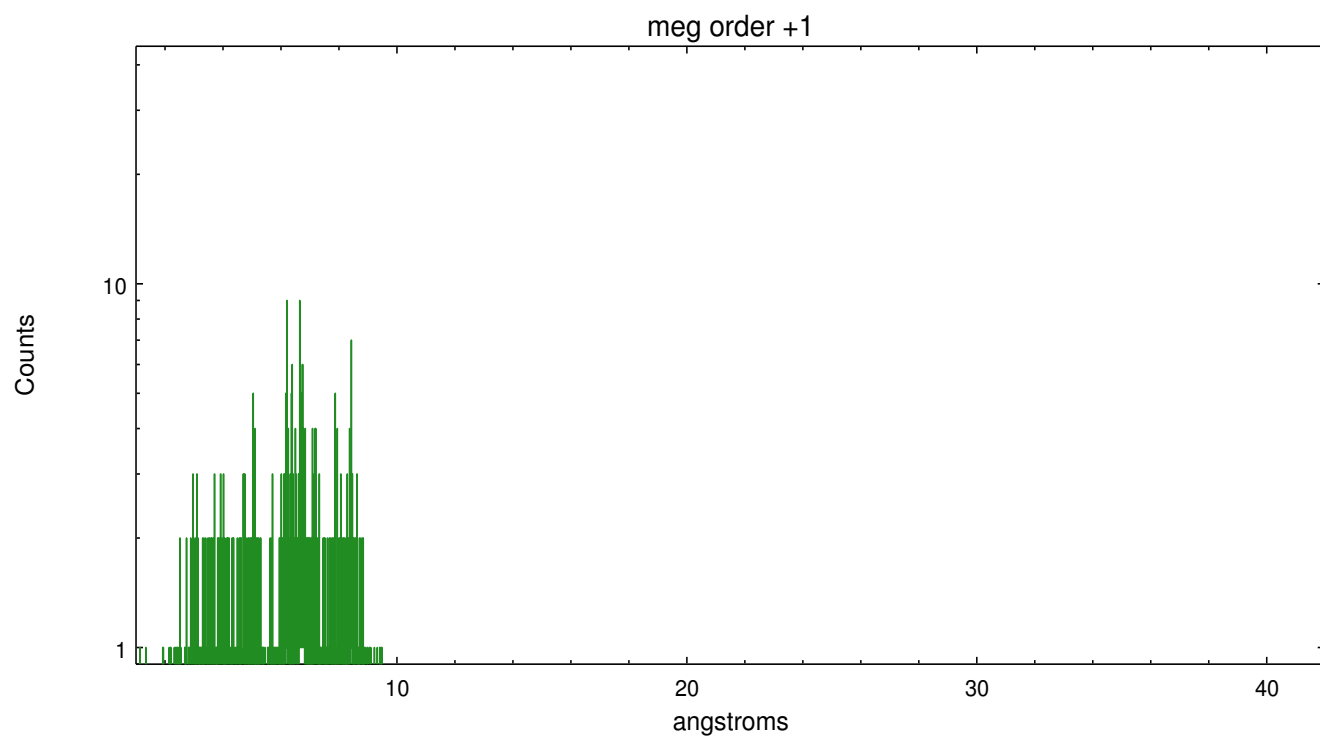
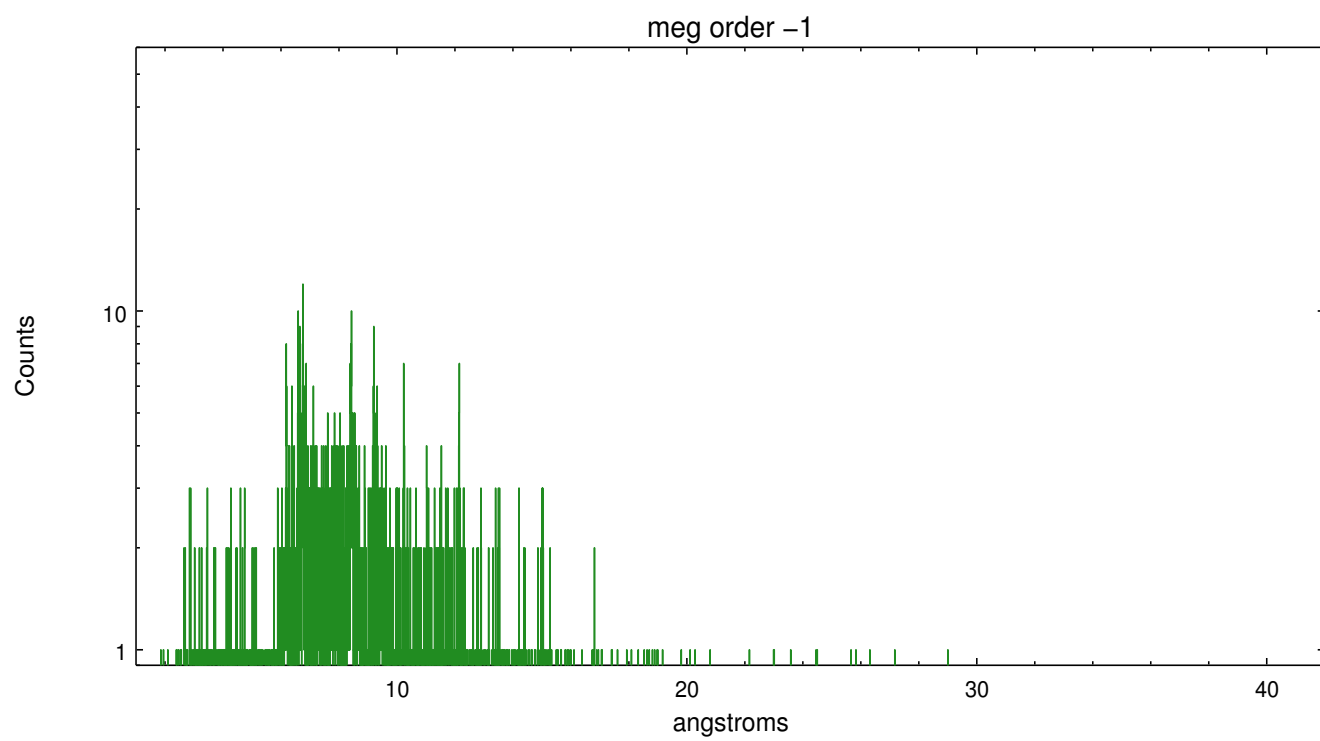


Spot Image MEG

Full Detector MEG

|        | order<br>-3 | order<br>-2 | order<br>-1 | order<br>0 | order<br>1 | order<br>2 | order<br>3 |
|--------|-------------|-------------|-------------|------------|------------|------------|------------|
| Events | 581         | 425         | 2746        | 4926       | 1110       | 51         | 82         |





# A Summary

## A.1 Status

|                            |                 |
|----------------------------|-----------------|
| V&V Scientist              | Joy Nichols     |
| V&V Date (YYYY-MM-DD)      | 2018.09.17      |
| V&V Edition                | 1               |
| V&V Disposition and Status | OK              |
| V&V Charge Time            | 35.088900760651 |

## A.2 Comments

Roll constraint met.

=== WARNING: Zeroth order selected by pipeline tools is well-centered in the supernova remnant but is not at the position(s) of brightest emission. The user may want to select a region or source of interest, then use software tools such as CIAO to specify the coordinates of the zeroth order source of interest before running the tools to resolve the dispersed events.