



The Aspect Solution & pcad_asol1.fits Files

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Introduction

The aspect solution describes the orientation of the telescope as a function of time. The detected position of an event and the corresponding telescope aspect are combined for an accurate determination of the celestial position of that event. The most current aspect-related information, including accuracy reports, is located on the [Chandra Aspect](#) page.

Collecting & Storing Aspect Information

Aspect data is collected through three instruments of the Pointing Control and Attitude Determination ([PCAD](#)) system. Gyroscopes are used to measure the short-term changes in the aspect, while a 4.25 inch optical telescope images guide stars for long-term tracking on the celestial coordinate system. Finally, a set of fiducial lights from the Science Instrument Module ([SIM](#); where the [ACIS](#) and [HRC](#) detectors are located) is projected onto the optical imager to track the internal movement and flexure (focusing mechanism) of the telescope. Star positions from [Hipparcos](#) and other astrometric surveys are used to put the aspect solution into a standard reference frame.

The aspect information is stored in the aspect solution files, which are of the form *pcad<TSTART>_asol1.fits*, where <TSTART> is taken from the header keyword of the same name (e.g. the aspect solution file for ObsId 1838 is *pcadf084244404N001_asol1.fits*). The asol1 file(s) are located in the `primary` directory of the standard data distribution; if you don't see the files there, check the `secondary/aspect` directory. For more details about this file, see the [ASOL section](#) of the [Data Products Guide](#).

IMPORTANT: There is a set of files located in the `secondary` directory with the file extension *osol1.fits*. These *may not* be used in place of the aspect solution files describe above. The asol1.fits files are the result of ground-based aspect analysis using all PCAD data, while the osol1.fits files are based on aspect determined by the on-board computer. Ground processing gives a better product because more information is available. The osol1.fits files are **NEVER** needed in Chandra data analysis.

Using the pcad_asol1.fits Files

Since an aspect solution file is created for each stable aspect interval, there is often more than one asol1.fits file for an observation. *All* the files must be used whenever a tool requires the aspect solution as input. Although it is possible to use [dmerge](#) to create one complete aspect solution file for the observation, all the CIAO tools will accept either a time-sorted list or a [stack](#) of asol1 files:

```
unix% pset tg_resolve_events acaofffile="@pcad_asol1.lis"
unix% more pcad_asol1.lis
```

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```
pcadf063874624N002_asol1.fits  
pcadf063875522N002_asol1.fits  
pcadf063902942N002_asol1.fits
```

This example of the stack syntax is from the Run tg_resolve_events step of the Obtain Grating Spectra from HETG/ACIS-S Data thread and uses ObsId 459, an HETG/ACIS-S observation of 3C 273.

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URL:
<http://cxc.harvard.edu/ciao3.4/why/asol.html>
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