



CIAO 2.2.1 Highlights

http://cxc.harvard.edu/ciao/intro_releasenotes.html

Extended Source Analysis

The major focus of CIAO 2.2 was the addition of new tools and improvement of existing tools to accommodate extended source analysis. The CIAO 2.2.1 patch introduced several tool improvements and bug fixes (see the release notes at http://cxc.harvard.edu/ciao/documents_releasenotes.html).

mkwarf & mkrmf

Users can now create weighted responses (ARFs and RMFs) using detector WMAPs. **mkwarf** creates a weighted ARF file based on an input weight map. It also produces a set of weights that are used by the newly upgraded **mkrmf** to create the associated weighted RMF.

reproject_events

Using the available blank-sky event files, users can create background datasets appropriate for their observation. **reproject_events** now replicates the functionality of Maxim's `make_acisbg` tool (applying the aspect solution of an observation to blank-sky datasets).

dmfilth

Tired of those annoying point sources? Fill them in! **dmfilth** removes sources from an image and replaces them with one of several methods, including bilinear interpolation, polynomial fit, and Poisson distributed data.

New Tools

acisreadcorr

Flag and relocate out-of-time CCD events from a bright source. **acisreadcorr** removes the readout streak from the image (for cosmetic reasons) and retains the streak photons (for accurate timing information unaffected by pile-up).

asphist

Essentially an entirely new tool, **asphist** now works directly on the aspect solution (asol) files. The SIM aspect corrections, previously applied with **asp_apply_sim**, are now taken into account by **asphist** as well.

dmimgthresh

Set low exposure regions of an image to a constant value. With strongly variable exposure across an image, you can get spurious results from smoothing or source detection algorithms. Using **dmimgthresh** to blank out regions of an image improves the accuracy of the other tools.

dmjoin

Join two files whose sampling is different. **dmjoin** allows you, for example, to generate an aspect solution with one record per photon, interpolated to the times of a given set of photon events.

mkgrmf

Create grating RMFs instead of using the off-the-shelf versions! **mkgrmf** generates an OGIP-style RMF appropriate for spectral analysis of grating observations. The gRMF is a representation of how the incident source photons are redistributed onto the detector.

rmfimg

Turn an RMF into a 2D image that can be easily viewed with ds9. The ARF can also be included, either independently or multiplied by the RMF to give an image of the total response.

Sherpa

There are many enhancements to the CIAO modeling and fitting program, *Sherpa*:

Generalized use of background

Input source and background do not need to be the same size.
Generalized filtering for source and background data sets is available.

Background instrument models

RMF & ARF allow for simultaneous fitting of the background and source data.

Exposure maps can be used in the analysis

Entered as a GridModel, exposure maps are filtered automatically to match the source filter.

PSFFROMFILE

Convolution performance has been improved.
The function has been generalized to 1D or 2D use.

Filtering enhancements

For PHA files, filtering can be done in either energy or wavelength.
Additional filters can be specified on the command line after some have been entered from a file.

Models

GridModel can be used to input the model from a file.
Added normalized beta1d model, pile-up model; upgraded edge model.
There is now an option to unlink the model parameters and stacks.
Equivalent width can now become an S-Lang function.

Statistics

Added statistical tests MLR and F-tests.
Updated use of statistical and systematic errors.

S-Lang

Added S-Lang functions/models.
Sherpa_eval() added to allow for executing sherpa commands in S-Lang scripts.
More scripts for doing high resolution spectroscopy (GUIDE) are available.

Visualization

New STORE/RESTORE with chips: the plotted data is stored with the FITS file.
Fit images are tiled by default.
CPLOT/SPLIT can be used on arbitrary filtered data; it can also create multiple windows plots.
Filtered/unfiltered spaces may be visualized, as well as arbitrary model stacks.
See data-model residuals using the NONSIGMA function.

WRITE

Uses PLOTX/PLOTY settings to determine X/Y units.
Outputs proper NxM FITS image files, as opposed to 1 x (NxM), in 2D.
Writing to fitsbin or qpoe includes more accurate specification of column names and units.
By default, uses ASCII for 1D and FITS for 2D.

Prism

A number of file editing options have been incorporated into the file browser GUI:

Cell editing

Perform simple cell value editing on tables and images.
Limited range, overflow, and type checking are provided.
An undo option exists for cell edits.

Column appending

Append new columns (scalar or array) to a table extension.
Users specify the number of elements (if an array), column name, data type, units, and description.

Row appending

Append one or more rows to a table extension.

Recently accessed files list

A list of up to the last 10 accessed files is maintained.
Selecting one of the specified files reloads it into the file browser.

Column filtered file viewing

View a table extension column filtered to the user's preference.
Which columns to display (and in what order to display them) may be specified.

CIAO 3.0

The next major development efforts are focused on the CIAO 3.0 release, scheduled for Spring 2003. Current plans include major infrastructure changes:

- Cleaning up the datamodel code to make maintenance and user development easier
- Improving *Sherpa* grammar
- Extending support for use of the *S-Lang* scripting language

plus much more!

ISIS

The Interactive Spectral Interpretation System (**ISIS**) is designed to support the analysis and interpretation of high resolution X-ray spectra using a spectroscopy database such as APED/APEC. It is currently a stand-alone, programmable, and extensible S-Lang based system, independent of GUIDE and Sherpa, but is on an integration path for CIAO 3.0. A variety of fitting modes are provided to support simple line profile fits as well as global fits; a pileup model for CCD spectra is also included. See the ISIS web page (<http://space.mit.edu/CXC/ISIS>) for more information and download instructions.

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