CUC Sep 2007

Science Data Systems – Jonathan McDowell

Summary

Staffing

CIAO releases

Source Catalog

- Ian Evans: Software release and implementation
- Jonathan: Science issues

Staffing and Helpdesk

No staff changes to date

SDS taking over Helpdesk CIAO tickets from CDO - Liz Galle as lead

Open position for new helpdesk staff person

CIAO 4 Beta 1: released May 15

- Updates to wavdetect (but improvements to doc still needed)
- Dead area response on in arf tools,
- First increment of new infrastructure (compilers, libraries, etc)

CIAO 4 Beta 2: released Aug 23

- New ChIPS plotting package based on VTK
- Python support

CIAO 4 Beta 3: November 7

- New Sherpa fitting application
- DM tools work on ASCII text file tables

CIAO 4.0: December 15

- Proposal tools for next cycle
- Beta 2/3 bug fixes

First deployment of python support

GPL compliant

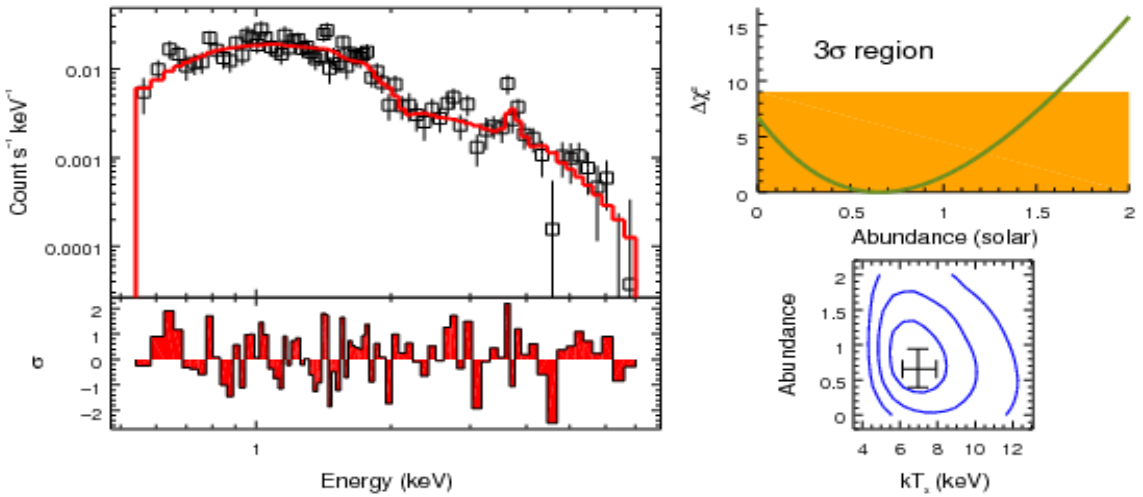
Further infrastructure enhancements

ChIPS has advanced features (undo, change properties of individual curves, layers...)

Released with CIAO 4 beta 2

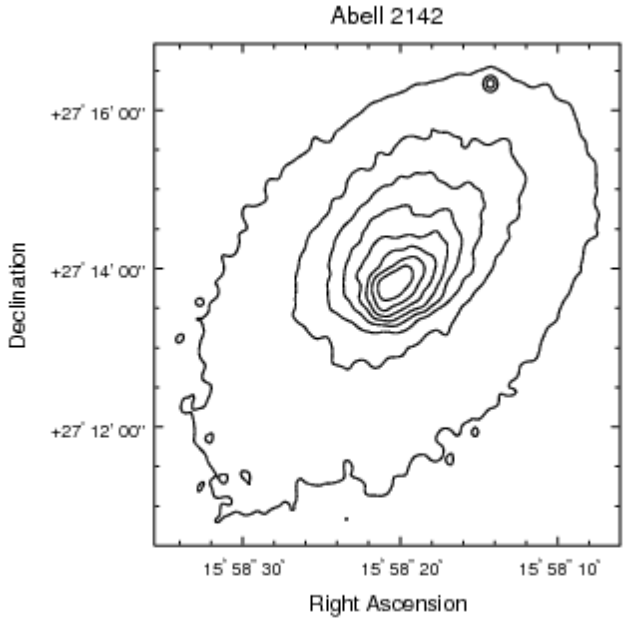
- Solves the SM licence issue; fully GPL compliant
- Replicates previous functionality and adds capabilities as demanded by users and other parts of the system (eg. V&V, Sherpa, tools)
- Includes Python and S-Lang scripting languages
- It is easy to extend with external modules

New ChIPS website at: http://cxc.harvard.edu/chipsbeta/



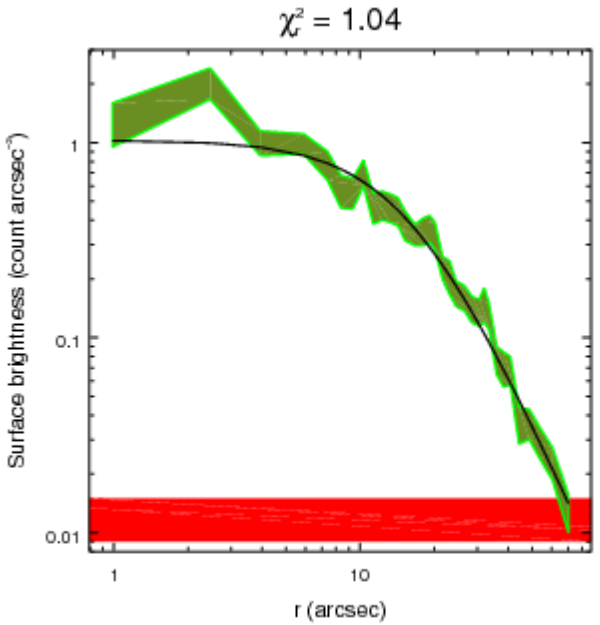
ChIPS Gallery 1

http://cxc.harvard.edu/chipsbeta/gallery/

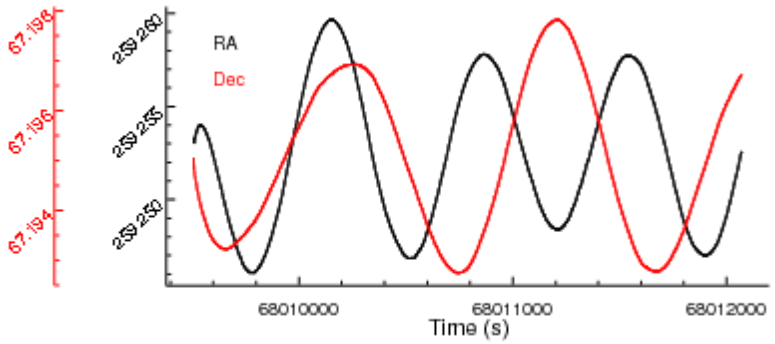


Contours can now be drawn using WCS information and axes labeled with sexagesimal notation

Polygons can be created and, if simple, filled with a color, which can be given by name ("red") or by RGB value ("FF0000").



ChIPS Gallery 2

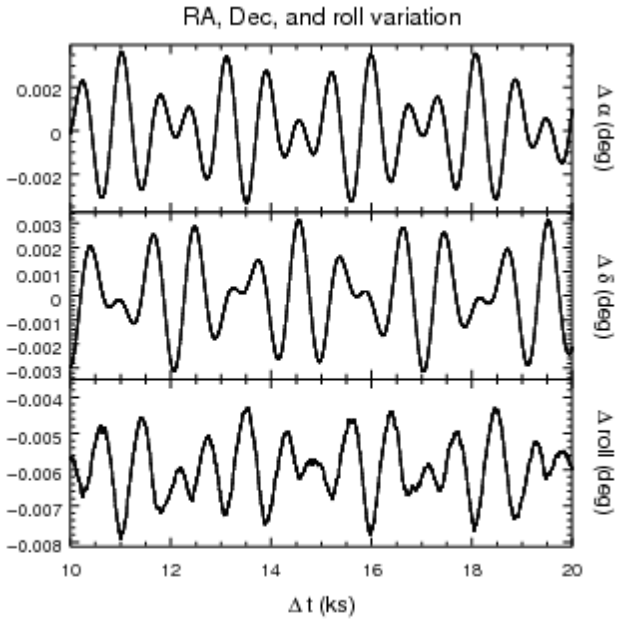


Axes can be bound together so changing the range of one will automatically change the others.

Multiple axes can be added to plots; here a second axis, in red, is used to show the variation in declination.

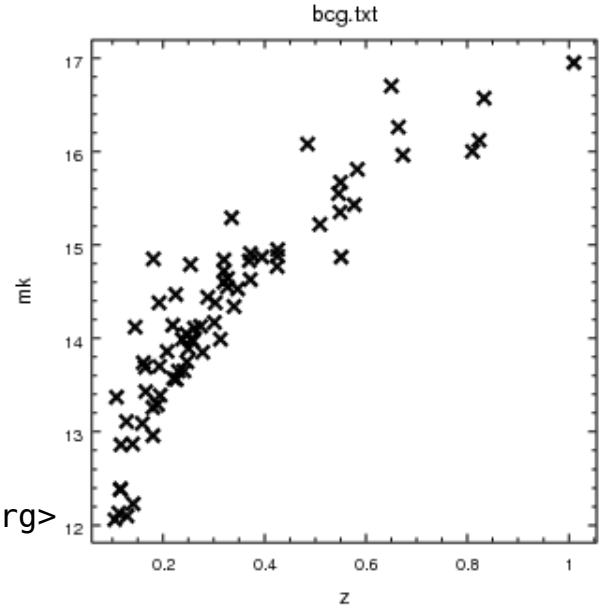
Text support now includes multiple fonts, font styles, rotation, and color support.

Visualizations can be written out as ps, eps, PDF, PNG, and JPEG formats.



ChIPS Plotting

```
unix% head bcg.txt
#   name      z      Lx     mk         alpha
ms0002_8  0.116   1.643  12.38  7.830333e-01
ms0007_2  0.050   0.517  11.11  4.452510e-01
ms0015_9  0.546  14.639  15.55  8.423755e-01
...
```



S-Lang

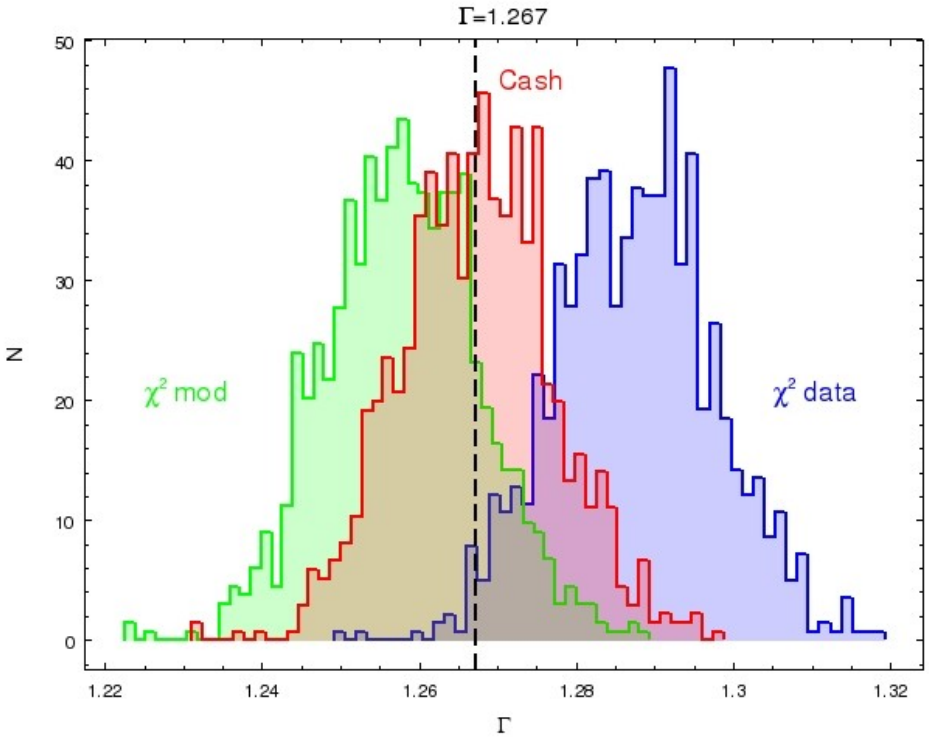
```
unix% chips
slsh version 0.7.7-1; S-Lang version: 2.0.7
Copyright (C) 2005-2006 John E. Davis <jed@jedsoft.org>
This is free software with ABSOLUTELY NO WARRANTY.

chips-1> make_figure("bcg.txt[z>0.1][cols z,mk]","line.style=noline");
chips-2> print_window("bcg");
```

Python

```
unix% chips
chips-1> make_figure("bcg.txt[z>0.1][cols z,mk]","line.style=noline")
chips-2> print_window("bcg")
```

Sherpa

- Python and S-Lang scripting capability
- Base C++/Fortran layer for computations
- Application logic in Python
- Science functionality implemented
- Now in science testing and debugging
- Example: absorbed power law
- 1000 simulations
- Tested Cash vs chi-sq
- Cash recovers correct params
- Chi-sq has known bias



CIAO 4 Infrastructure

- Platforms: Solaris, Fedora Core, Mac PPC and Intel; drop RH8?
- Codebase: GPL compliance
- Updated off-the-shelf software (CFITSIO, WCSLIB etc)
- Reworked CIAO libraries to separate out packages - allows separate releases of ChiPS, Sherpa, tools; greatly helps our release cycle and also makes it possible for other projects to pick up parts of the system without getting the whole system.
- Added Python scripting interface support. ChIPS and Sherpa now come as Python packages, with Crates (data model interface for data I/O) as a common component in python and S-Lang which has knowledge of X-ray specific file formats (pha, arf) as well as more generic data access. Allows users to write more capable scripts and access data arrays that used to be internal
- Continue to support S-Lang scripting interface and enhanced access to ChIPS/Sherpa internals via PySL python-to-slang wrappers

Infrastructure - continued

- Improved integration between ChIPS, Sherpa, other script packages (and Crates) – e.g in Python, call Sherpa commands to fit and plot the fit, then modify the plot using ChIPS commands, modify arrays using Python math expressions, and save to FITS file using CRATES. (same in S-Lang).

- Source builds (a work in progress): revised configure/Makefile system, improved portability
- New “smoke tests” provided to users – verify CIAO installed correctly.
- Compiler support for gcc4

Beyond CIAO4

Beyond CIAO4 and Catalog

- Our focus in early 2008 will be completion of the Catalog rather than major new initiatives with CIAO
- Will review catalog pipeline for tools we should develop into CIAO user tools
- Anticipate a patch for Sherpa bug fixes
- Reviewing future projects

Beyond CIAO4

Future projects

- Improved CALDB to better handle varying calibrations (index vs temperature or other parameter instead of time)
- Better responses for difficult cases, eg source near chip edge, further improvements to analysing multiple observations
- Distributable SAOSAC
- Better afterglow algorithm
- Post CIAO4.0 Sherpa fixes and patches (Sherpa is a beta for 4.0)
- Use scripting interfaces to make threads smoother
- GUI analysis interfaces
- Grating reprocessing scripts
- ? What are other community needs and priorities? **CUC input**

Afterglows

- Issue identified by K Nandra, DW Kim, A Fruscione
- Glenn Allen has investigated
- Some afterglows missed by current processing, show up as faint sources
- Current 2D afterglow test is not powerful enough to remove faint afterglows
- Problem also arises when local background is higher than mean and because
- To do a better job, need 3D algorithm (the events in an afterglow are close together in time as well as pixel postion)

Grating scripts

- Want to make grating data more accessible
- Existing non CXC projects:
  - BiRD – XMM RGS, online interactive processing of spectra

    http://xmm.esac.esa.int/BiRD/doc/BiRD_help.html

  - X-atlas – HETG on-line catalog

    http://hea-www.harvard.edu/~owestbro/XATLAS
- Analog to psextract for gratings - generation of order sorted, extracted spectra etc.
  - What outputs would be most useful?