



Science Data Systems

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Science Data Systems:

- Really: **Science Analysis User Support**, supporting the users from data download to publication
- CDO supports users in the proposal phase, SDS supports them in the data analysis phase
- **Software/algorithm requirements:**
 - Support spacecraft-driven changes led by Cal and instruments/operations teams
 - Track and anticipate changing user requirements (new science questions, new algorithms, interoperability with new missions)
 - Grow the Chandra user base by making X-ray data analysis easier for newcomers
- **Software testing and validation**
- **User support: helpdesk, documentation, face-to-face**
- “Threads” - cookbook approaches to carrying out X-ray analysis
- Scripts - lowering the bar to entry for astronomers from other wavebands and making standard tasks easier for both newcomers and experts
- Helpdesk – direct support to users' analysis problems
- Workshops and booths – face-to-face software and analysis training for users
- Support for proposal planning tools

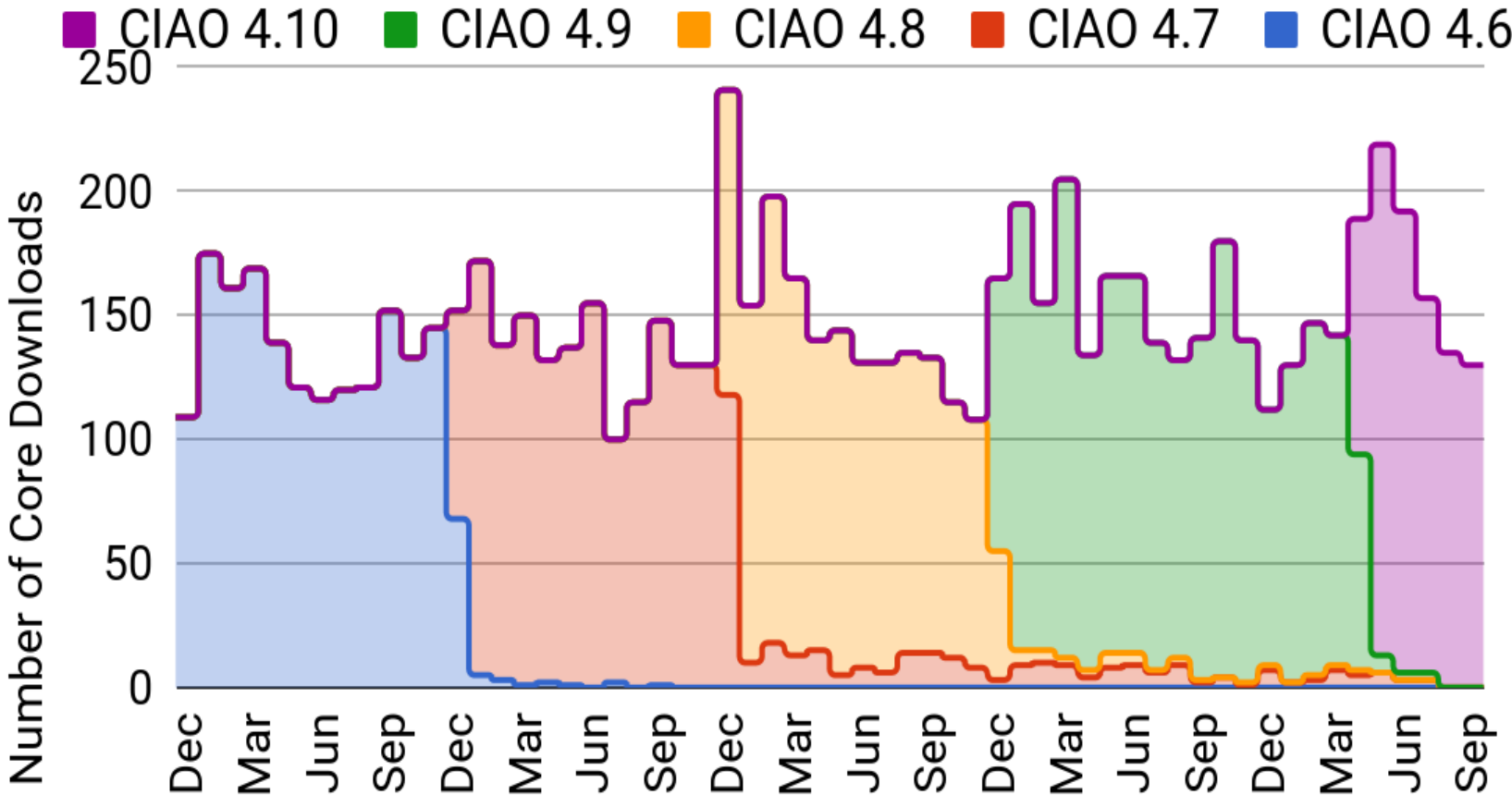
SDS Staffing

- Mike Nowak and Glenn Allen left MIT CXC in 2018
- MIT hired Dave Principe and Mel Nynka to replace them



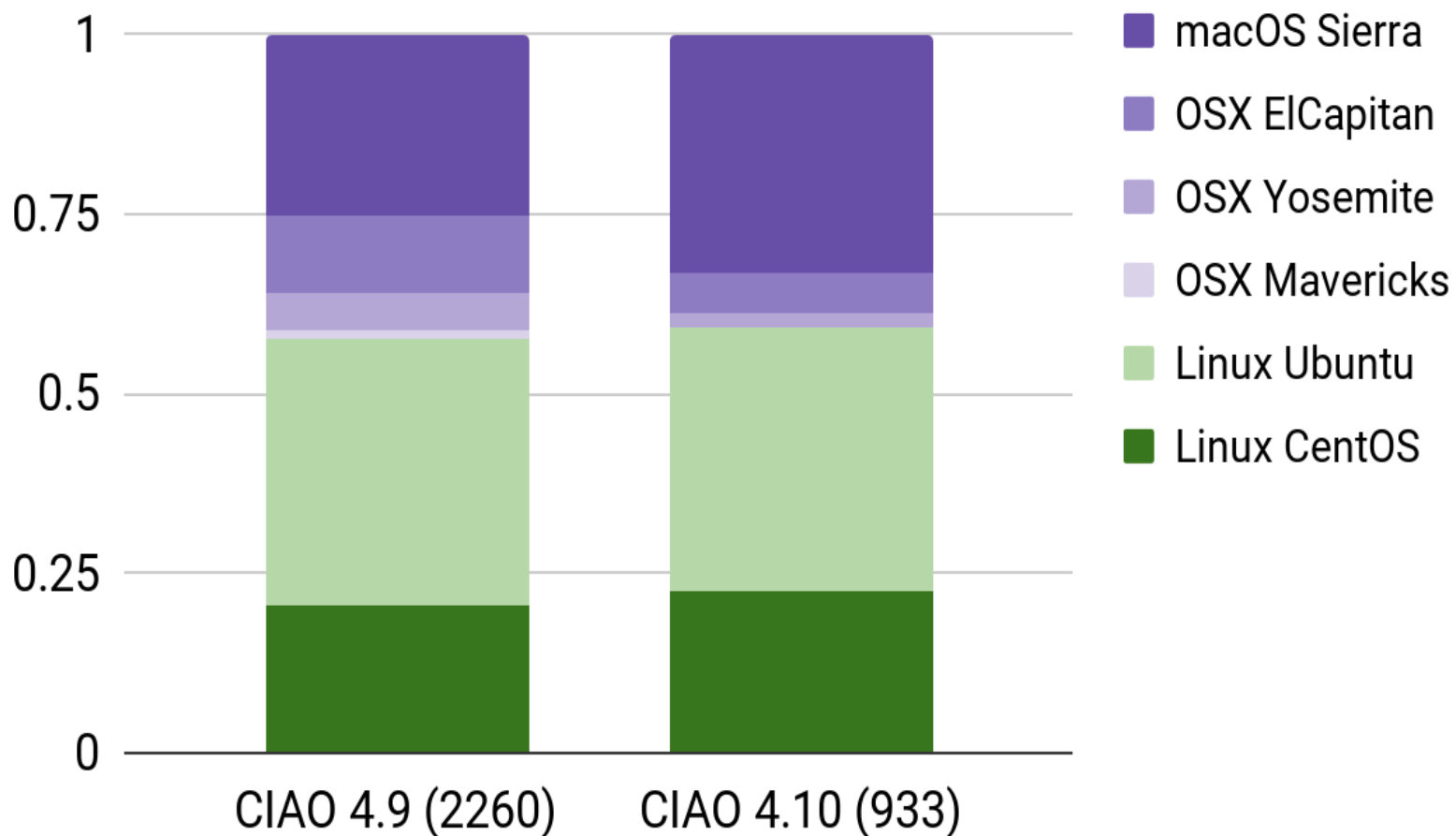
Community Support: Downloads, Documentation, Helpdesk

CIAO Downloads





Download by OS

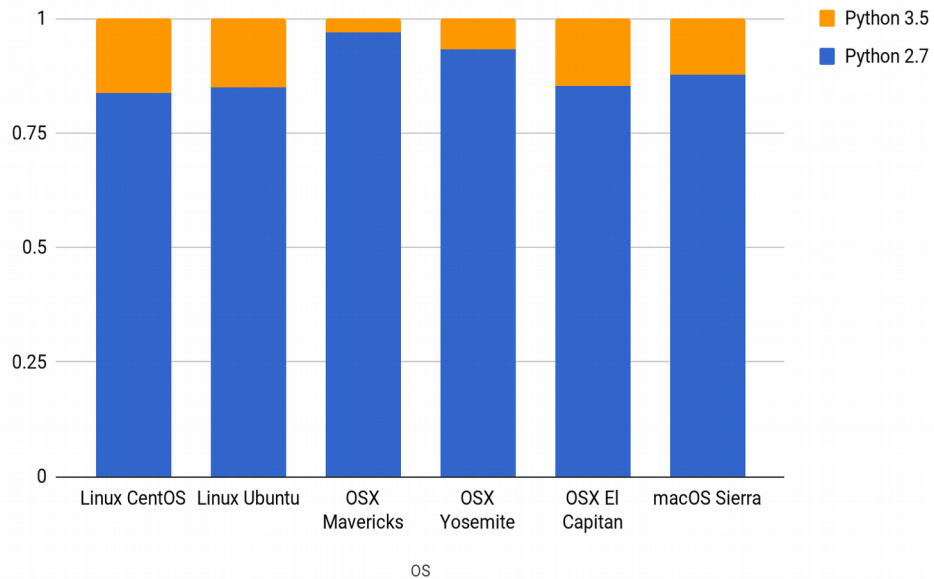




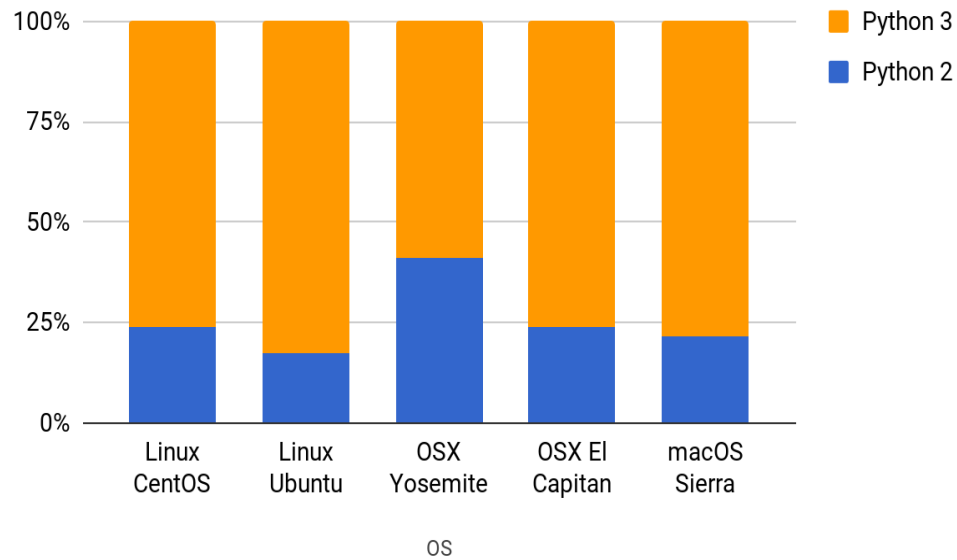
Downloads (lifetime)

	CIAO 4.9 (2016-12-15)			CIAO 4.10 (2018-04-15)		
OS	Python 2	Python 3	Total	Python 2	Python 3	Total
Linux CentOS	389	76	1302	56	154	552
Linux Ubuntu	709	128		58	284	
OSX Mavericks	30	1	959	0	0	381
OSX Yosemite	107	8		9	10	
OSX El Capitan	205	35		12	41	
macOS Sierra	504	69		69	240	
Source	95			26		
Total	2356			959		

CIAO 4.9 Python Selection



CIAO 4.10 Python Selection





Website statistics: 2018-03-15 to 2018-09-30

	CIAO	Sherpa	Chips
Sessions	36,664	10,017	2,202
Users	12,470	4,235	1,699
Page Views	112,657	26,328	3,801
Duration	5:29	4:17	1:39



Helpdesk Stats

	Fall 2017	Spring 2018	Fall 2018
Number of Tickets	139	158	168
Median time to 1st contact [hrs]	0.95	1.53	0.68
Median time to close [hrs]	10.07	7.54	5.97
Maximum time to close [hrs]	1918.1	722.5	1201.9
% handled by techs	93.5	81.6	88.1

Maximum time was for a student trying to run chandra_repro on dataset with multiple evt1 files. Routine ticket just that user took long time to respond.

Common helpdesk topics

- Increase in number of users reporting download problems (md5sum mismatch for largest files)
- Users requesting 3rd party package integration with CIAO
 - astropy, scipy, pygsl, matplotlib, spyder, jupyter
- Several (unrelated) questions about radial profiles
 - extracting, fitting (including PSF), errors, etc
- Multi-mission usage
 - NuSTAR, XMM/Newton, use MARX with N-body simulation, use dmfilth with radio data, wavdetect on Swift/XRT + Athena/WFI, dmimg2jpg CTIO 4.0m telescope

Examples of Bugs

- ciao_install internationalization problem (output from 'df' command in Spanish)
 - sherpa_sample_flux problem clipping values at 0 when computing median
 - addressp problem with SAS (XMM/Newton) response files
 - problem downloading all rows and most columns from CSC2 (increased memory)
 - mktgresp failing to create both HEG and MEG responses (python3 issue)
 - smoke tests on systems without 'make' command installed failing due to PATH issue.
-

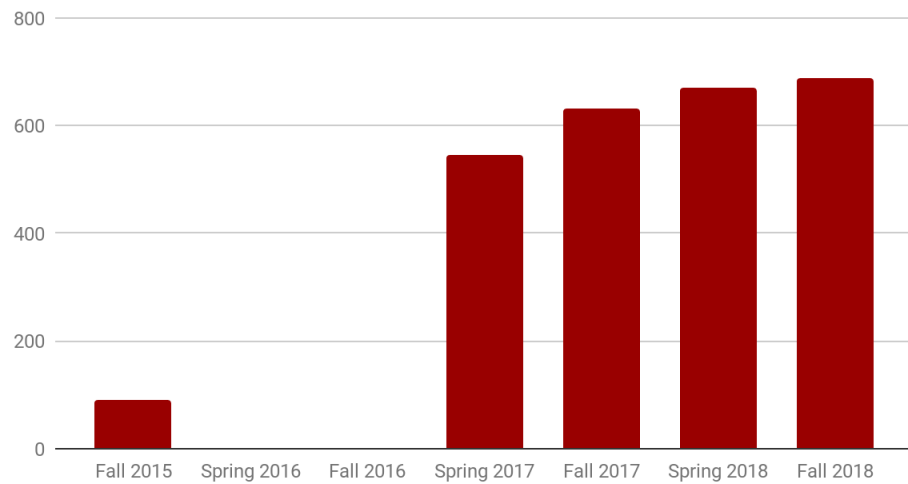
Community

Social Media

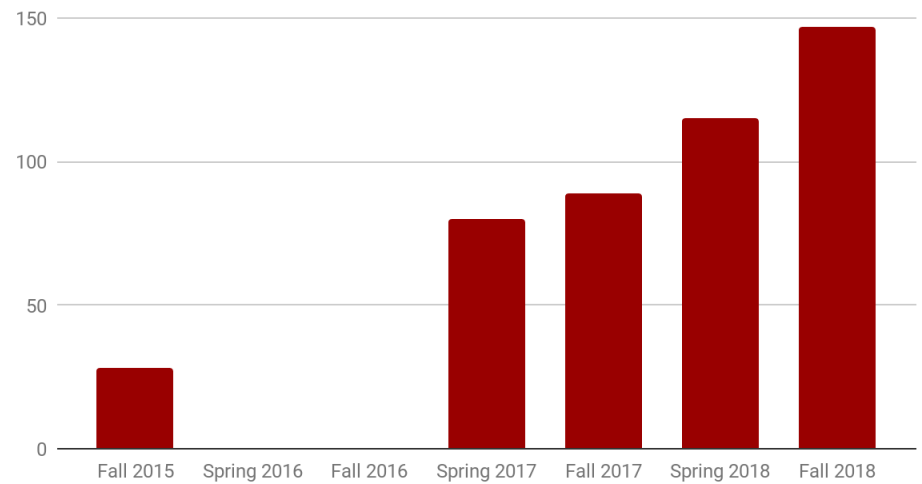
Facebook	ChandraCIAO	685 followers
Twitter	@chandraCIAO	148 followers
Google+	Chandra CIAO	15 followers

Long Term Social Media Trends

Facebook



Twitter



Community Support

- June 2018, AAS, Denver, CO
- August 2018, Chandra/CIAO workshop, Cambridge, MA
- August 2018, IAU, Vienna, Austria

Planned:

- January 2019 - AAS/Seattle First Chandra/CIAO AAS Workshop
 - April 2019 – Possible Chandra/CIAO regional workshop in Crete
-



2018 Winter AAS, Washington, DC



2018 Summer AAS, Denver, CO



2018 Chandra/CIAO Workshop,
Cambridge, MA

Docs

- CSC2 catalog documentation – major effort
- CIAO pages: mostly routine updates
 - Bug pages updated as issues are identified
 - Sundry thread and help file edits based on user feedback
- New caveat for ACIS-5 FP_TEMP dependent badpixel
- New thread to showcase Pixel Mask functionality to be released with CIAO 4.10
- New thread to showcase aimpoint drift correction for long observations with bright point sources.
http://cxc.cfa.harvard.edu/ciao/threads/periscope_drift/
- AAS handout
- Pune workshop
 - New Exercises workbook for students to follow.

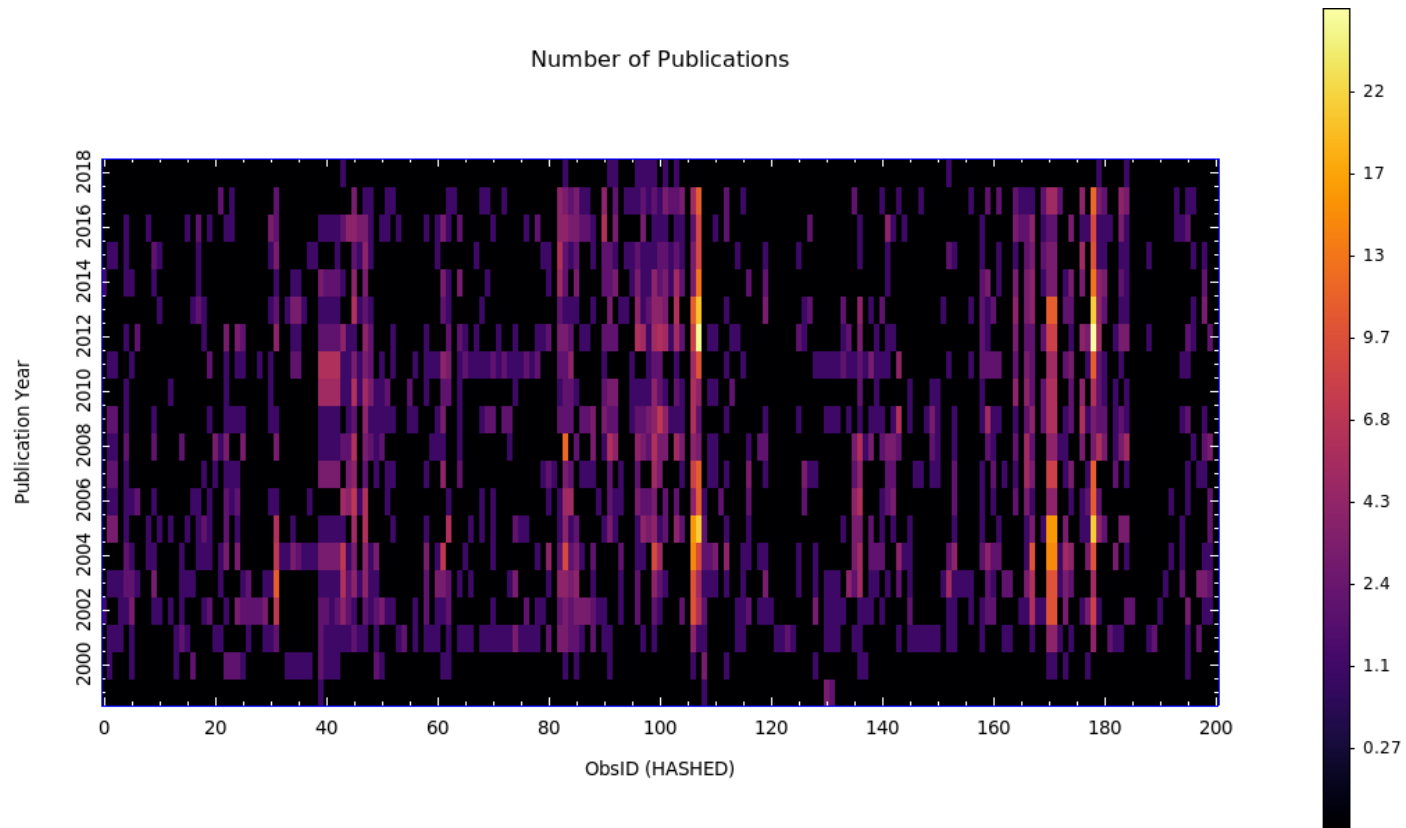


CIAO 4.11 and Scripts Overview

2018 Priorities

- Catalog 2 support
- Planning and support for future archive reprocessing
- CIAO 4.11
 - Planned for December 2018
 - Dropping Python 2
 - Support for retaining HISTORY in scripts via the crates module
 - Various bug fixes and enhancements
 - HRC coordinate tweaks

Repro Early Datasets



Publication rate for 202 datasets taken before January 2000 (aka 'warm datasets') not included in Repro-4.

Script releases

4.10.1

- Bug fixes
- list_datasetid withdrawn

4.10.2

- Workaround to support footprint server move to https://
 - specextract bug fix for HRC grids
-

Packaging and Distribution

Based on numerous user requests, and building on our experience with the standalone Sherpa, CXC is planning to improve CIAO's integration with python and make other packaging enhancements:

- 1) Move to python3
 - 2) Support for external python packages in CIAO environments.
 - 3) Move from ChiPS to matplotlib
-

Packaging and Distribution

1) Support for Python 2.7 is being dropped for major scientific packages in the coming years (CIAO 4.10 uses NumPy and IPython). We are dropping Python2.7 support in this year's release.

CIAO 4.9 (December 2016) provided a beta release with Python 3.5 support (users had to explicitly choose to install this version).

CIAO 4.10 (April 2018) made Python 3.5 the default (so users have to explicitly choose Python 2.7 now). There have been very few, if any, HelpDesk tickets about users having problems with changes in Python 3.5, and ~ 75% of the downloads are Python 3.5.

CXC announced 26 June 2018 that CIAO 4.11 would only support Python 3.5. The only reaction we have had is “why not Python 3.6?” (Answer: we haven't had resources to update further at this time).

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Packaging and Distribution

2) A common HelpDesk question is of the form “Can I use CIAO and <insert favorite Python package>?”.

In CIAO 4.11 we are aiming to simplify the installation of Python packages into the CIAO installation area, using standard tools (pip/setuptools). This is somewhat possible in CIAO 4.10 but it depends on the OS and Python version that is being used (the need to access a web service via SSL/https).

Longer term we are investigating how to enable the use case of “Can I use my version of Python with CIAO packages?” by improving the source build and tracking options such as the Conda package/environment management system.

Packaging and Distribution

3) Plotting in CIAO

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We have made the decision to end further active development of ChiPS and focus on matplotlib support.

ChiPS already doesn't work well on recent MacOS releases, and depends on VTK which is hard to support.

For CIAO 4.11, ChiPS will be included in CIAO (but with limited support for macOS Sierra and later.)

The matplotlib Python plotting package will be included in CIAO for the first time.

- We already use matplotlib for the standalone Sherpa backend, so basic Sherpa plotting with matplotlib in the CIAO environment doesn't require new work.
 - matplotlib is one of the packages we often get asked by users to include in CIAO.
 - in future releases we will focus on using matplotlib for plotting, and will not put further resources into ChiPS
-



Catalog Support



SDS Support for Catalog

SDS supports the catalog at 2.0 FTE level (Primini, Burke, Siemiginowska, Lee, with some additional relevant work by others)

Details of progress in I Evans presentation

Primini:

- Quality assurance and reviews on data, detect list and data products
- Testing of aperture-photometry tool
- Work on limiting sensitivity

Burke

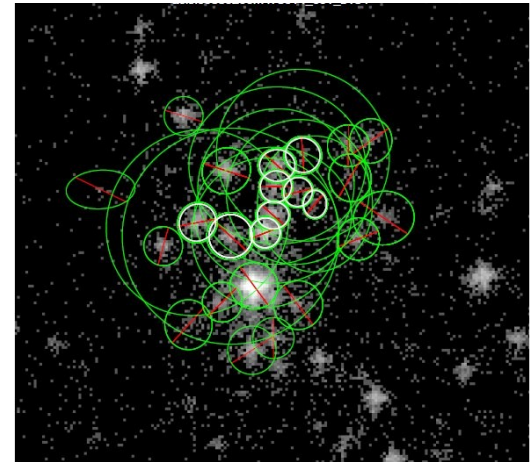
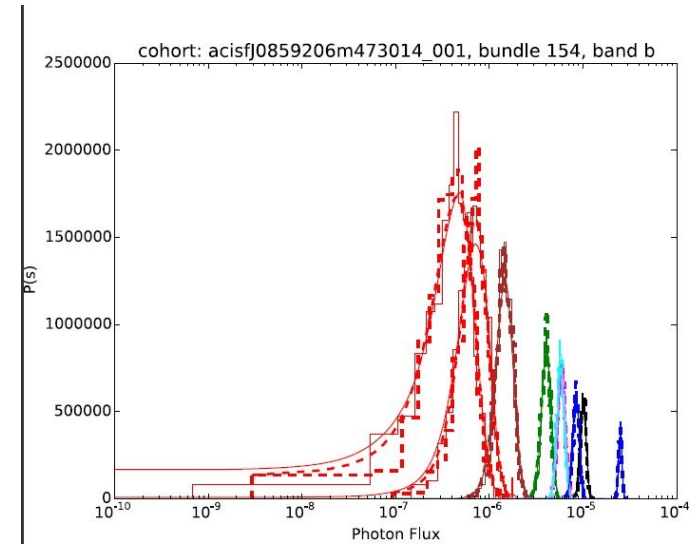
- Master match support, convex hull support, visualization

Siemiginowska

- Fitting

Burke, McDowell, Lee

- Documentation.





Sherpa

Sherpa Development 2018

- Sherpa 4.10 for CIAO was released on April 18, 2018 (May 11, 2018 on GitHub).
 - This Sherpa for CIAO contains the code introduced in the Sherpa standalone during 2017 development year.
 - Sherpa now runs under Python 2.7, 3.5 and 3.6.
 - The main updates include:
 - the XSPEC models in the version 12.9.1n and modifications to model parameters names and limits to reflect changes introduced by XSPEC.
 - Many bug fixes related to handling instrument responses, Python 3 support.
 - Details on <https://github.com/sherpa/sherpa/releases>
 - Development in 2018 focused on a few specific issues:
 - Model evaluation on arbitrary grid – allowing the size of the PSF bins to be independent of the data bins.
 - Function to define a diagonal matrix (e.g. RMFs).
 - Function to calculate uncertainties on line equivalent width using sampling
 - Performance updates to simultaneous fitting of multiple data sets.
 - Documentation changes – use *sphinx* for building web documents
-

Sherpa github page

sherpa / sherpa

Unwatch 11 Unstar 34 Fork 28

Code Issues 118 Pull requests 17 Projects 1 Wiki Insights

Releases Tags

Draft a new release

Latest release

4.10.0
9fcec0d

Sherpa 4.10.0

olaurino released this on May 11 · 31 commits to master since this release

Assets 2

- Source code (zip)
- Source code (tar.gz)

Sherpa 4.10.0

This release of Standalone Sherpa corresponds to the Sherpa code released as part of CIAO 4.10.

Sherpa 4.10.0 fixes several bugs related to the support of instrumental responses, including improved support of XMM and Swift responses.

Also, this release fixes a significant bug in the support of user statistics, improvements to the Python 3 compatibility, more robust usage of the numpy API, as well as several other minor bug fixes and new tests.

Additionally, this release introduces support for XSPEC 12.9.1n models, as well as the ability to use aliases for parameter names. Some parameter names have been deprecated and may be removed in a future release. We reviewed the parameter limits for many models and updated them to reflect the latest XSPEC specification. Also, multiple versions of XSPEC are now supported, through optional models and version-dependent low-level function calls. This feature is for advanced users building Sherpa from source. Note that Sherpa has been tested against XSPEC 12.9.0i, 12.9.0o, and 12.9.1n. Note that XSPEC is not directly supported by the standalone binary builds, and users are expected to build Sherpa from sources if they want to link it against their version of XSPEC. These changes make it easier for user to link different versions of XSPEC with the same Sherpa code base. Also note, however, that XSPEC 12.10 is not currently supported.

Sherpa now requires pytest-3.3 or later for running the tests.

Details

#451 Release/4.10.0

Testing code now works with pip 10 as well, despite a change in the pip 10 API. Also, the README is now properly rendered as markdown in PyPI.

#438 Change from error to warning for OGIP violations

Given that users can not easily change a response file, and previous versions of Sherpa would allow the responses to be used, this commit changes some of the errors recently introduced (in PR #383) into warnings. The errors for the first bin edge being ≤ 0 are still left in because users of the sherpa.astro.ui module will find that these files are auto-corrected for them (by PR #383).

sherpa / sherpa

Unwatch 11 Unstar 34 Fork 28

Code Issues 118 Pull requests 17 Projects 1 Wiki Insights

Filters is:issue is:open Labels Milestones

New issue

- 118 Open 104 Closed
- | Author | Labels | Projects | Milestones | Assignee | Sort |
|--------------------------------------------------------------------------------------|------------------------------------|----------|------------|----------|------|
| save_pha with crates backend creates non-integer columns; is this an OGIP violation? | | | | | |
| ELF file OS ABI invalid | | | | | 8 |
| numpy 1.15 and python 3.5 warning | type:bug | | | | |
| Add a get_component method to Model/CompositeModel? | type:enhancement | | | | 1 |
| improve docs for get_draws when using multiple data sets | area:docs | | | | |
| should we make the region module a required module or allow it to be optional? | area:code type:question area:build | | | | 2 |
| sample_flux ignoring flux=0 is biasing results | priority:high | | | | |
| Sherpa module setup is complicated (e.g. when mocking modules for sphinx) | area:build area:docs | | | | 3 |
| Review X-ray response generation (RMF/ARF; follow on from #438) | | | | | |
| Calculate confidence when dof = 0 | | | | | |
| Rethink the tolerance for the optimization methods and the EstMethod class. | | | | | |
| Update conda installation instructions for recent changes (e.g. source -> conda) | area:docs note:not-a-bug | | | | 2 |
| dof in t-distribution - mh.py | | | | | 1 |
| Covariance matrix from LevMar | | | | | 1 |
| modernize pager code | area:code type:enhancement | | | | 5 |
| Performance Improvements | | | | | |
| Add an easy way to remove a jdpileup model | area:code type:enhancement | | | | |

Using Sherpa in Astronomy Research

1111 publications in ApJ, AJ, MNRAS and A&A use Sherpa (since 2001 and including astro-ph abstracts)

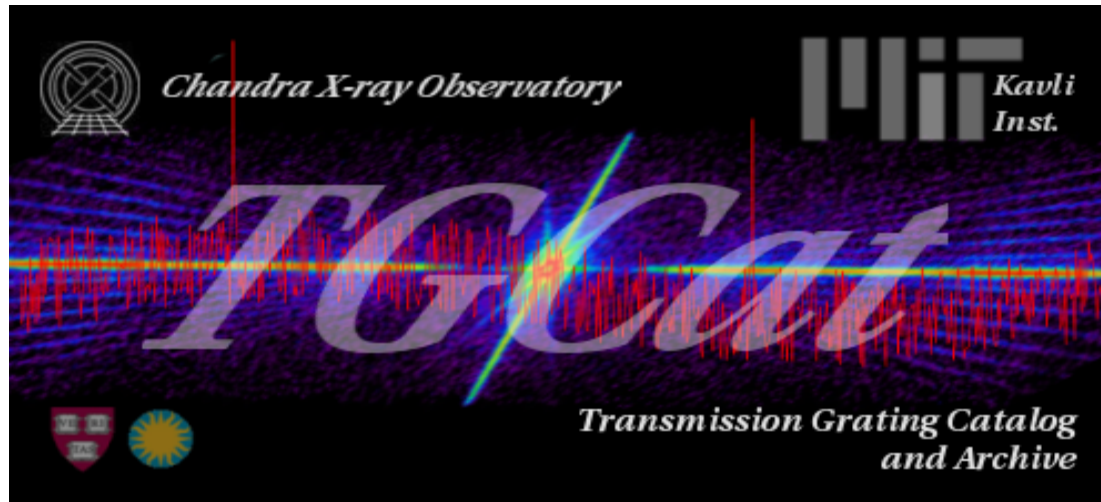
229 citations to Freeman et al 2001 SPIE paper

68 research papers in Jan-Sep 2018, 87 papers in 2017

7 PhD theses listed in ADS that used Sherpa



Instruments Gratings



TGCAT updates continue

- Must be ported to modern OS to maintain service
- Scoping future archive needs

Grating work

- Revised HRC-S PI computation, improves LETG background (Cal data pending)
- Prelim analysis of HETG/HRC-I test data (provides high spectral res at low energy)

ACIS work

- CTI temperature dependence
- ACIS-S1 L-shaped hot pixel area



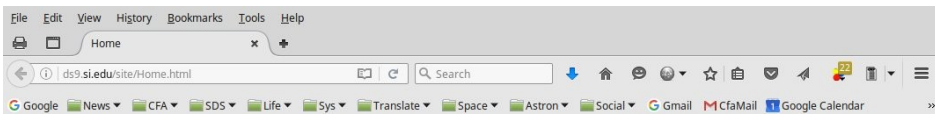
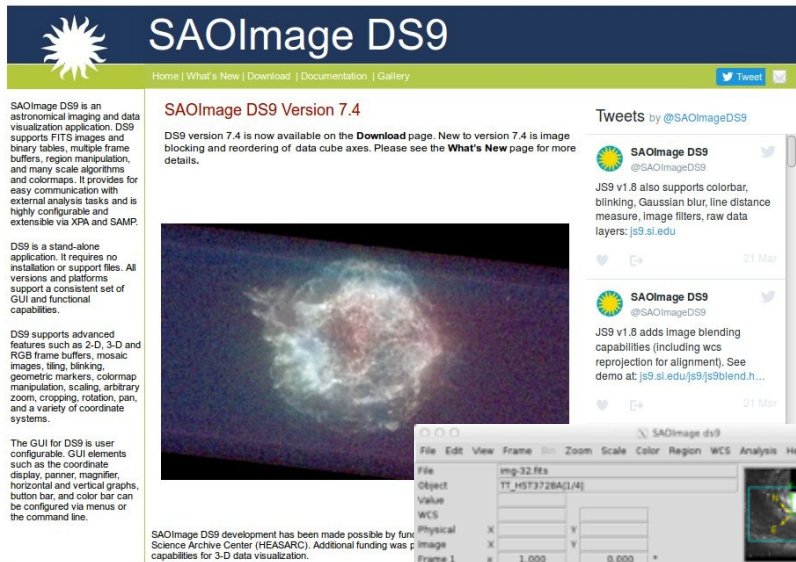
Visualization



ds9 imaging

ds9 is an imaging program widely used in the astronomical community, well beyond X-ray astronomy. It was the successor to the earlier, also widely adopted, SAOImage program

ds9 is a key part of the Chandra data analysis infrastructure – it directly supports X-ray event files.

SAOImage DS9

Home | What's New | Download | Documentation | Gallery

SAOImage DS9 is an astronomical imaging and data visualization application. DS9 supports FITS images and binary tables, multiple frame buffers, region manipulation, and many scale algorithms and colormaps. It provides for easy communication with external analysis tasks and is highly configurable and extensible via XPA and SAMP.

DS9 is a stand-alone application. It requires no installation or support files. All versions and platforms support a consistent set of GUI and functional capabilities.

DS9 supports advanced features such as 2-D, 3-D and RGB frame buffers, mosaic images, limg, blinking, geometric markers, colormap manipulation, scaling, arbitrary zoom, cropping, rotation, pan, and a variety of coordinate systems.

The GUI for DS9 is user configurable. GUI elements such as the coordinate display, panner, magnifier, horizontal and vertical graphs, button bar, and color bar can be configured via menus or the command line.

SAOImage DS9 development has been made possible by funding from the Smithsonian Astrophysical Observatory (SAO) and the Science Archive Center (HEASARC). Additional funding was provided by the Smithsonian Astrophysical Observatory (SAO) for 3-D data visualization.

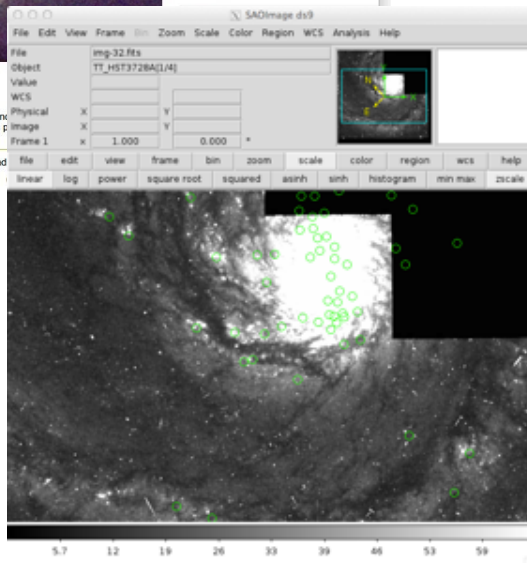
SAOImage DS9 Version 7.4

DS9 version 7.4 is now available on the [Download](#) page. New to version 7.4 is image blocking and reordering of data cube axes. Please see the [What's New](#) page for more details.

Tweets by @SAOImageDS9

SAOImage DS9 @SAOImageDS9
JS9 v1.8 also supports colorbar, blinking, Gaussian blur, line distance measure, image filters, raw data layers: js9.si.edu 21 Mar

SAOImage DS9 @SAOImageDS9
JS9 v1.8 adds image blending capabilities (including wcs reprojection for alignment). See demo at: js9.si.edu/js9/js9blend.h... 21 Mar



ds9 status

- ds9 Version 7.6 – release coordinated with CIAO 4.10 on April 15
 - Support for improved precision in coordinates (needed for HETG wavelengths but generally useful)
 - 10 bug fixes (in compression, GUI, catalog-support areas)
- ds9 Version 8.0 – anticipated release Dec 2018, with release candidate currently available for test
- Infrastructure updates in 8.0:
 - Revised FITS WCS support, including spectral standards (Paper II-IV)
 - Uses AST library (D. Berry, Starlink); includes support for 3D cube WCS from IFS, VLBI
 - Revised parser/API design. New formal parser system will give consistent API, rigorous syntax, parameter verification, error detection.
 - The new parser provides an API that is completely backward compatible and won't affect either scripting or interactive users.

Help requests: 165 (79 CXC helpdesk, 57 direct to ds9, 29 internal SAO)

ADS citations – 175

Twitter followers @SAOImageDS9 401
