

Science Releases and Analysis Needs Assessment

I. Overview

- DS7.3 release includes Repro III
- Ciao3.1 release & highlights

II. Analysis Needs Assessment

- Summary of the process
- Selected major themes

III. Demos

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- Ciao scripts demo
- Point Source Aperture Photometry
- HETG Lightcurve Analysis via Interactive Filters

I. Overview

- DS7.3 / Repro III release – pipeline/tool upgrades includes

ACIS time varying gain applied ACIS+CC mode enhancements Destreak tool added to ACIS L1 pipeline HRC AMPSFCORR test added to correct some event positions HRC dead time factors corrected for double counting problem in rate-scalars

- Ciao3.1 release – tools to support ACIS bakeout includes

acis_process_events - added time dependent gain correction mkacisrmf - new RMF generator bug fixes and enhancements - DM, science tools, UI, & Sherpa, documentation

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Ciao 3.1 Highlights





II.1 Analysis Needs Assessment Process

- 1. Group members developed ~30 "Analysis Threads" in 3 areas and identified "Gaps" in analysis:
 - Grating Analysis
 - Imaging/Spectroscopy
 - Extended Source Analysis
- 2. SDS reviewed threads, assessed needs over the course of numerous meetings, and set priorities based on several criteria, including:
 - 1. Importance for scientific analysis
 - 2. Recurrence of science issues
 - 3. User support, user requests, HelpDesk
 - 4. Feedback from CIAO workshops
 - 5. Information from User survey, CUC
 - 6. Internal CXC review (in progress)
- 3. We identified several science-based themes.

•See "SDS Planning: Filling the Gaps" and the link to the "Analysis Threads" at: http://cxc.harvard.edu/cdo/cuc/cuc_file04/june04/melvis

Example: Data Analysis Thread

Thread T18 Multiple Point Source Aperture Photometry

Көу	Task	Thread/Tool	Comments]
V	Data Preparation	Various Threads	As Applicable:	
			Tagging Bad Pixels;	
1			Fillering Background Flares;	
1			Destreaking;	
			Updaling Gain Maps;	
			Applying CTI Corrections;	
			Removing Pixel or PHA Randomization;	
			Updating HRC AMP_SF/Tap-ringing;	
•	Source detection with exposure maps	Dmcopy; wavdetect; mkinstmap; mkexpmap;	Multi-chip source detection with recursive blocking as in celldetect. Not ugly, just tedious. Need to run wavdetect with several scales at each of 3-4 blocking tactors and to reach desired energy band. For each binned image need to make congruent exposure map at appropriate energy. Adam wrote a shell script to do this tor L3. Could be generalized, but very time-consuming to run. Some improvement possible with mask tiles (see below) which just define edges of detector, not actual eff area, but not clear this works as well as real expmap (research project).	
-	Source detection with detector masks	Dmcopy, SExtractor; skylov; dmimgcale	Afternative to above step. Same recursive blocking, but exprraps not used. Edges defined by mask images, set to 1 inside detector tov, 0 outside. L3 tool runs SExtractor in recursive blocking mode and automatically makes masks. Much taster, but not clear it' as robust or reliable as previous step.	
V	Merge multiple source lists	merge_src	Not really in CIAO yet, but in CIAOD - L3 tool to merge multiple lists from different binning/energies according to user-input merging rules.	
•	Build src and bgd extraction regions	N/A	ct. acis_extract contributed s/w package, but use new enc. Energy vs. theta, phi, energy tables from CAL to determine PSFFRAC, instead of mkpst. For user-input PSFFRAC and energy band, generate circular src and annular bod regions for each source.	\rightarrow Feeds into several
V	Review/edit extraction regions	Ds9; dimgroupreg	Display regions on image to check for overlapping regions. Adjust as necessary. Other regions, e.g., for sources detected at other wavelengths, can be added here.	of our major
				themes

Gap→

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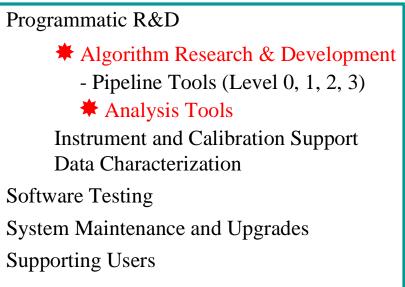
II.2 Major Analysis Themes for Future Development

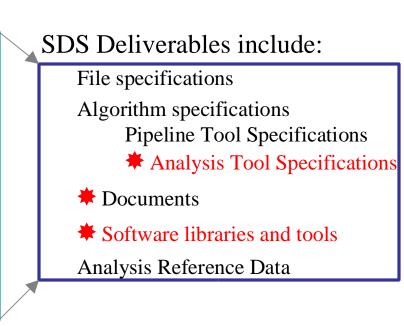
- I. Flux. Tools to calculate/estimate flux and flux upper limits.
- II. Background. Tools to determine/model background; improved documentation. Initiated discussion with calibration group.
- III. PSF and LSF. Arfs for fractional psf; encircled energies; aspect tools; sub-pixel resolution; instrumental effects in conjunction with calibration group.
- IV. Pile-up. Diagnostics for pile-up, including gratings; improved documentation; mitigation.
- V. Combining Data Sets. Review of best methods, including appropriate statistical treatment; improved documentation/advice to users; tools to correct grating zero-order.
- VI. Timing. Tools for efficient filtering and binning; improved lightcurve accuracy; improved GTI correction for gratings.
- VII. Infrastructure. Various, e.g. improved region libraries.
- VIII. Extended Source Analysis. Improved documentation; script for spectral mapping, spectral deprojection.
- IX. Other. Miscellaneous, ranging "user pipeline scripts" to new spectral models.



Overview of SDS Planning Process and Analysis Needs Assessment[*]

SDS Tasks include:





- speed & stability improvements
- infrastructure enhancements including Chips
- L3 pipeline, etc.

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1/04 CUC comments highlights

* Request for more demos with emphasis on science analysis

- we include several demos of current analysis possibilities, and future analysis tools resulting from the Analysis Needs Assessment

* "getting the community to embrace S-Lang"

- new web pages "S-Lang in Ciao"
- workshop in 2005; presentations at meetings e.g. ADASS

*"take a lead at planning for commonality of e.g. software, scripting languages, etc."

- initiated discussion with major centers
- placed issue on ADEC agenda for Fall
- ADASS presentations

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III. Demos

- Ciao Scripts demo
- Point Source Aperture Photometry
- HETG Lightcurve Analysis via Interactive Filters

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