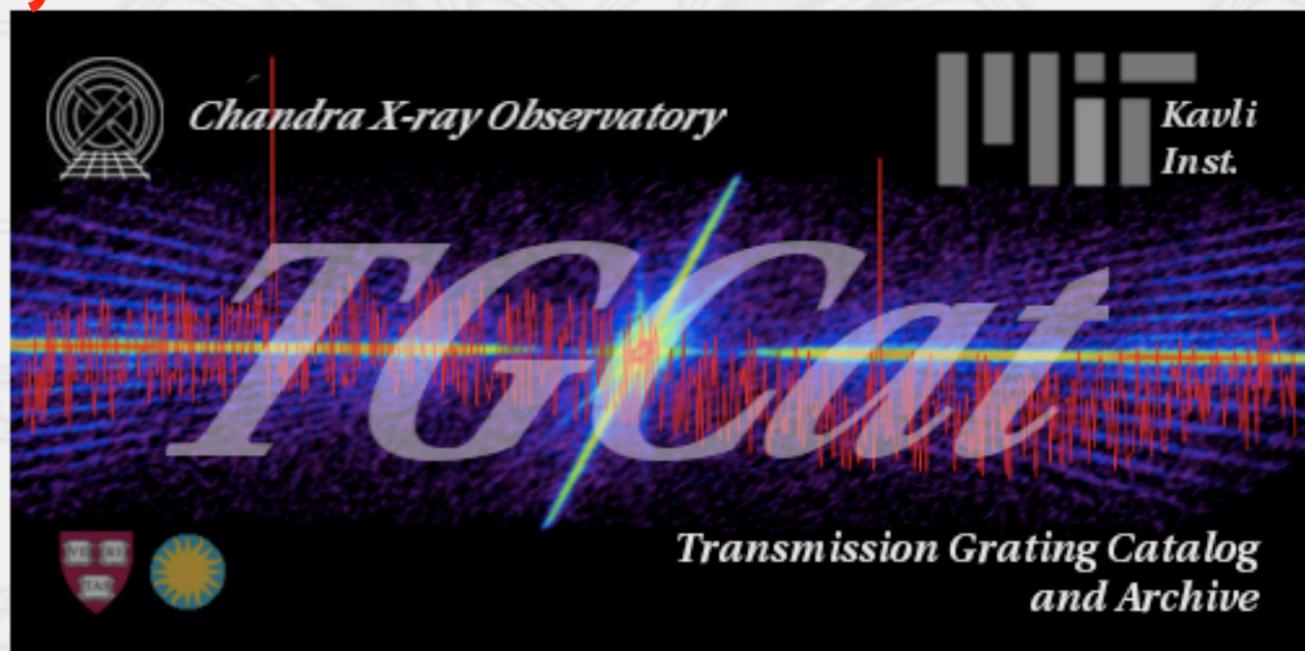


Now Playing



[Query](#)
[About](#)
[Trends and Stats](#)

[Software](#)
[Help](#)

Beta

Credits:

David P. Huenemoerder (MIT),
 Arik Mitschang (SAO),
 Claude R. Canizares (MIT),
 John E. Davis (MIT),
 Dan Dewey (MIT),
 John C. Houck (MIT),
 Herman L. Marshall (MIT),
 Doug Morgan (SAO),
 Joy Nichols (SAO),
 Michael A. Nowak (MIT),
 Norbert S. Schulz (MIT),

Goals & Contents of the Catalog

- Make all grating observations more accessible and visible (~800 obsids; ACIS-S, HRC-S; HETG and LETG; ACIS CC mode).
- Provide analysis-ready counts spectra and response files;
- Provide associated summary products (field images; spectral images; counts and flux plots; light curves; summary tables);
- Provide a web interface for searching, browsing, plotting, and downloading catalog products;
- Start with a *simple* catalog and enhance per user requests;
- Provide scripts for easy reprocessing or customized extraction;

Heritage, Motivation

Other spectral catalogs, which we used for guidance:

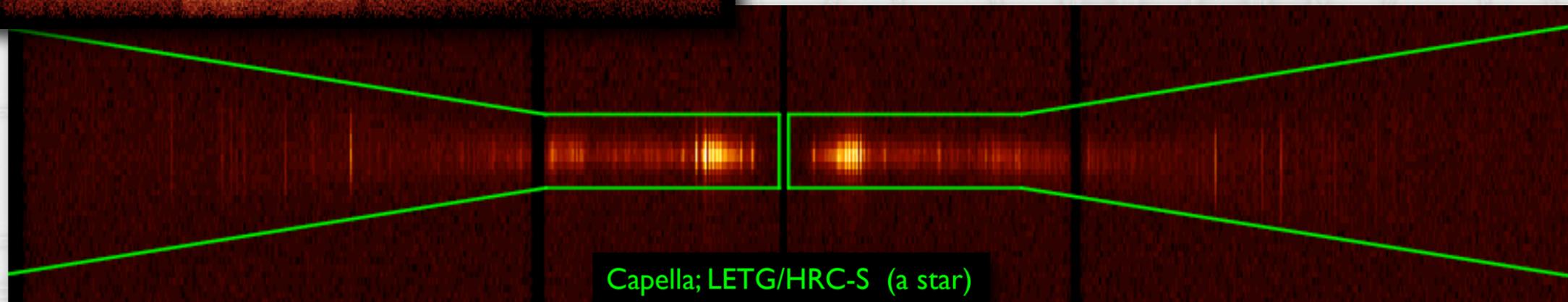
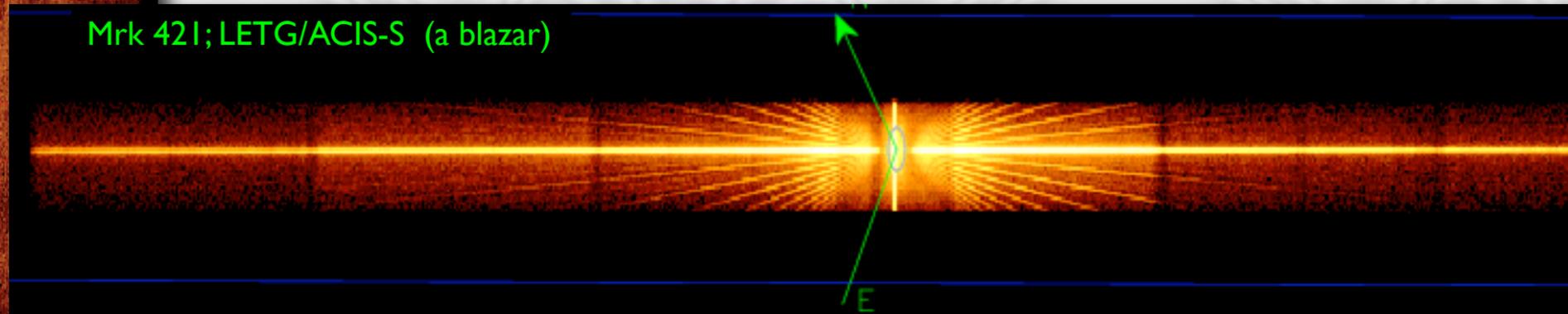
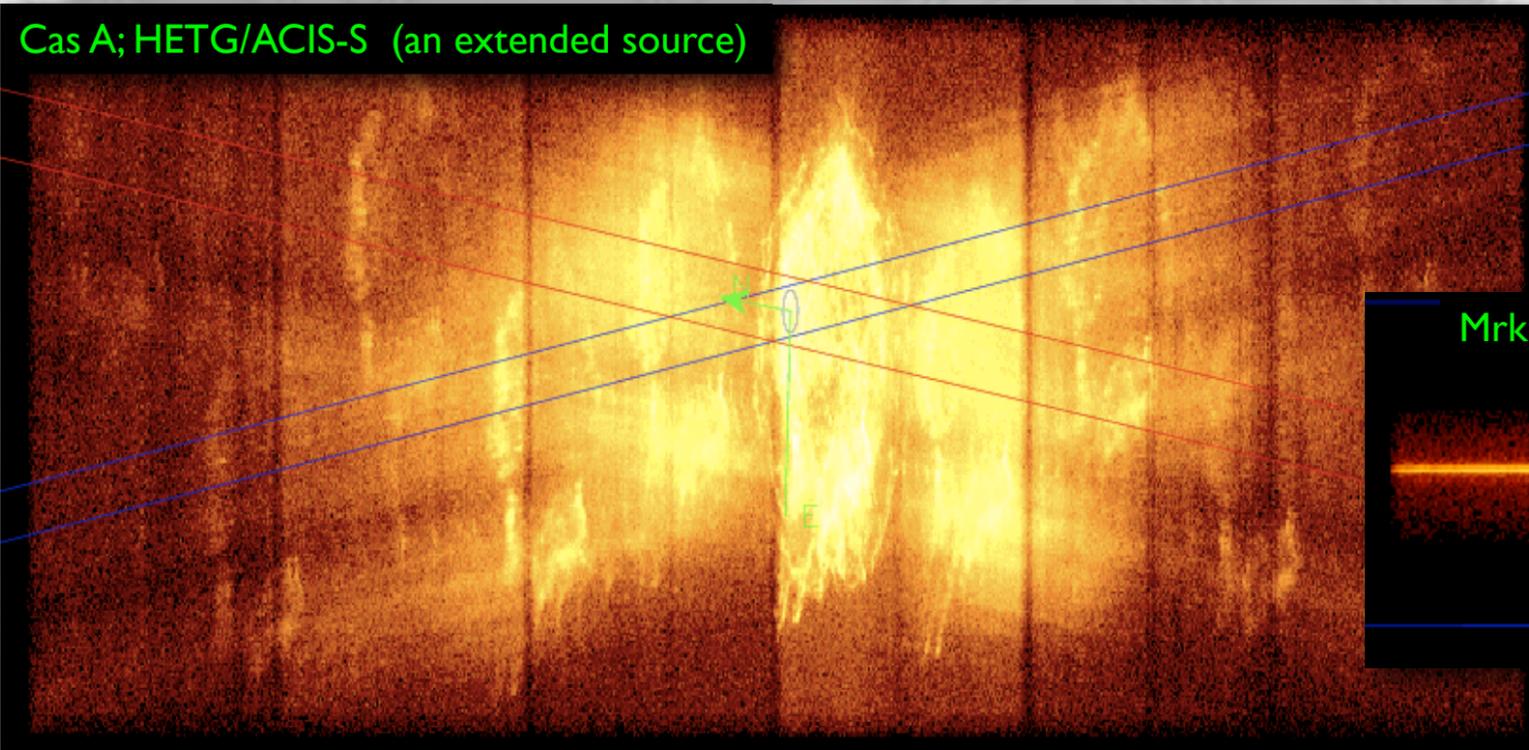
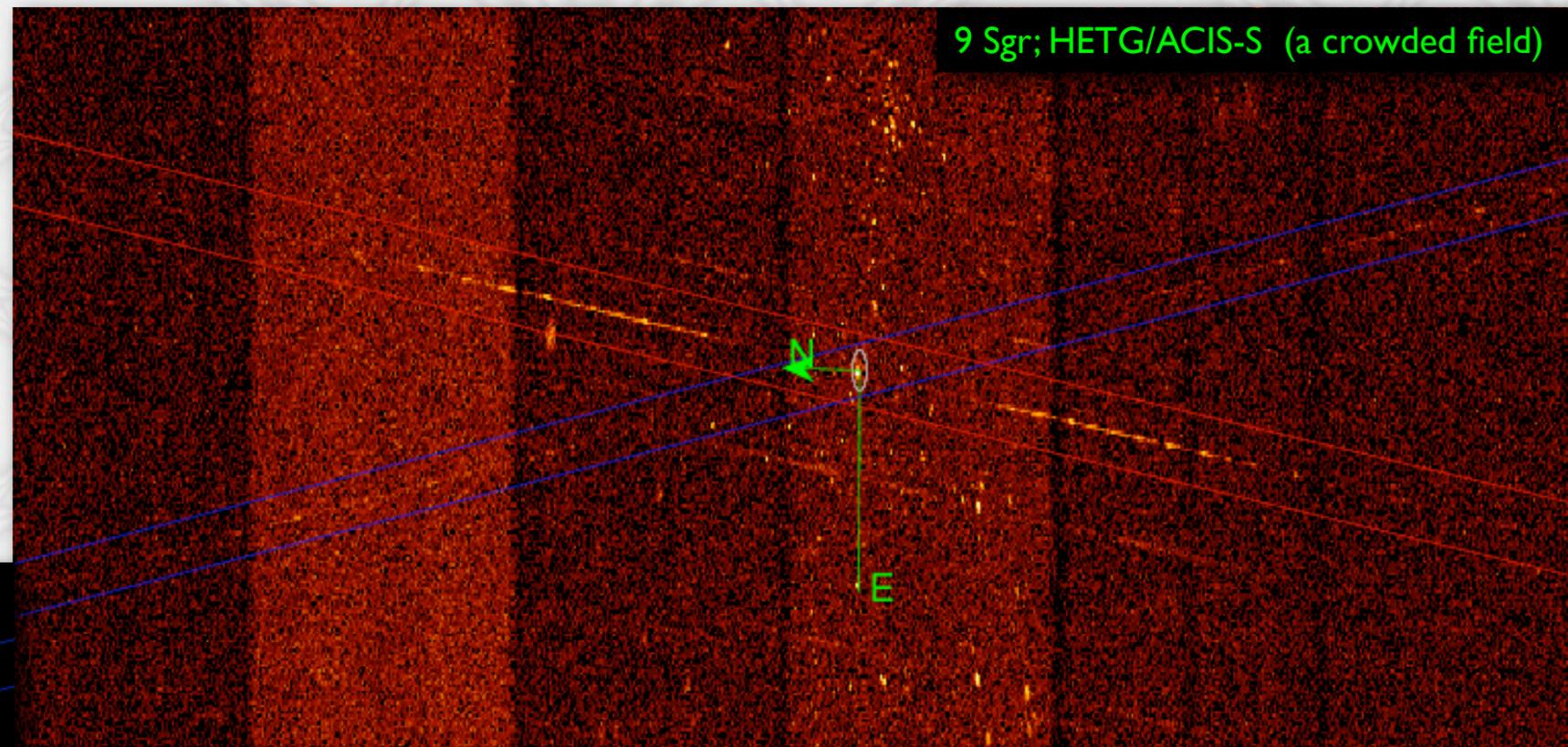
- BiRD: XMM/RGS spectral browser (<http://xmm.esac.esa.int/BiRD/>)
- HotGas: database of Active Galactic Nuclei (<http://hotgas.pha.jhu.edu>)
- X-Atlas: HETGS stellar spectra (<http://cxc.harvard.edu/XATLAS/>), (and since expanded to all point sources).

BiRD is browse-only - no data download. But it is simple.

X-Atlas and HotGas are research-topic oriented, with many model-dependent derived products. HotGas is AGN specific, uses CIAO standard products, has some modeling. X-atlas is quite complex, with many derived quantities and both standard and custom products.

We include nearly all HETG and LETG observations using ACIS-S or HRC-S (extended sources, crowded fields, CC-mode, blocked zero order).

A few examples from TGCat summary products:



TGCat: <http://spacebase-alpha.mit.edu/tgcat>

Features of the Catalog

- Flexible web interface: query by name, coordinate, property, or generic database field; sort by column value; package for download;

The screenshot displays the TGCat web interface. On the left, the 'SEARCH CRITERIA' section includes a 'SEARCH BY OBSID' form with a text input field, an 'Upload File' button, and a 'Browse...' button. Below this are four search options: 'SEARCH BY NAME', 'SEARCH BY COORD', 'SEARCH BY SPECPROP', and 'SEARCH BY OTHER'. The main search area contains a table of results with columns for 'obsid', 'object', 'instrument', 'grating', 'ra (h:m:s)', 'decl (d:m:s)', 'date_obs (y-m-d t)', and 'exposure (s)'. A 'Counts Spectrum' plot is overlaid on the table, showing two spectra for 'Her X-1'. At the bottom, there are buttons for 'Go', 'Change Columns', 'New Search', and 'Help', along with radio buttons for 'limit', 'download', and 'plot combined'.

SEARCH CRITERIA

SEARCH BY OBSID

Search by *Chandra* ObsID. List an arbitrary number of ObsIDs in the box separated by ",", newlines, or spaces OR select a file listing one obsid per line (NOTE: *This is a strict standard*). In either search the wildcard character "%" will match *zero* or more numbers.

Obsid(s): Upload File

Instrument Grating

ACIS-S HETG
 HRC-S LETG

SEARCH BY NAME Search Object name; Optionally use SIMBAD resolver ... [More](#)

SEARCH BY COORD Search by Coordinates in a number of systems ... [More](#)

SEARCH BY SPECPROP Search by Derived Spectral Properties ... [More](#)

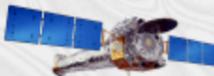
SEARCH BY OTHER Search by other database field(s) ... [More](#)

RESULTS: Found 23 matching records

+/-	Links	obsid	object	instrument	grating	ra (h:m:s)	decl (d:m:s)	date_obs (y-m-d t)	exposure (s)
<input type="checkbox"/>	o p s	2743	CYG X-1	ACIS	HETG	19:58:22.080	+35:12:40.680	2002-04-13 20:53:02	2991.99
<input type="checkbox"/>	o p s	2741	CYG X-1	ACIS	HETG	19:58:24.480	+35:12:7.200	2002-01-28 05:34:31	1888.7
<input type="checkbox"/>	o p s	2742	CYG X-1	ACIS	HETG	19:58:24.480	+35:12:9.000	2002-01-30 01:23:31	1892.1
<input checked="" type="checkbox"/>	o p s	4585	Her X-1	ACIS	HETG	16:57:50.400	+35:20:27.960	2004-11-26 06:09:20	19914.8
<input checked="" type="checkbox"/>	o p s	3821	HER X-1	ACIS	HETG	16:57:50.400	+35:20:58.920	2003-08-24 21:16:19	30002.1
<input checked="" type="checkbox"/>	o p s	6149	Her X-1	ACIS	HETG	16:57:50.400	+35:20:27.600	2004-11-29 15:07:41	22527.2
<input checked="" type="checkbox"/>	o p s	3822	HER X-1	ACIS	HETG	16:57:50.400	+35:20:45.600	2003-12-09 23:42:48	31592.1
<input checked="" type="checkbox"/>	o p s	6150	Her X-1	ACIS	HETG	16:57:50.400	+35:20:27.240	2004-12-01 08:53:43	21692.2
<input checked="" type="checkbox"/>	o p s	2749	HER X-1	ACIS	HETG	16:57:50.400	+35:20:34.440	2002-05-05 10:15:53	49784.4
<input type="checkbox"/>	o p s	2705	HER X-1 SHORT HI	ACIS	HETG	16:57:49.680	+35:20:40.920	2002-07-18 15:26:29	19709.3
<input type="checkbox"/>	o p s	5933	Holmberg II X-1	ACIS	HETG	08:19:27.600	+70:42:16.200	2005-07-06 11:36:06	96966.3

Counts Spectrum (Click to preview all Images)

Press "Go" to operate on selection: limit download plot combined



TGCat: <http://spacebase-alpha.mit.edu/tgcat>

More Features ...

- Accurate zeroth order position determination if piled, or blocked;

Summary plots page
example for a blocked
zeroth order case

available plots:

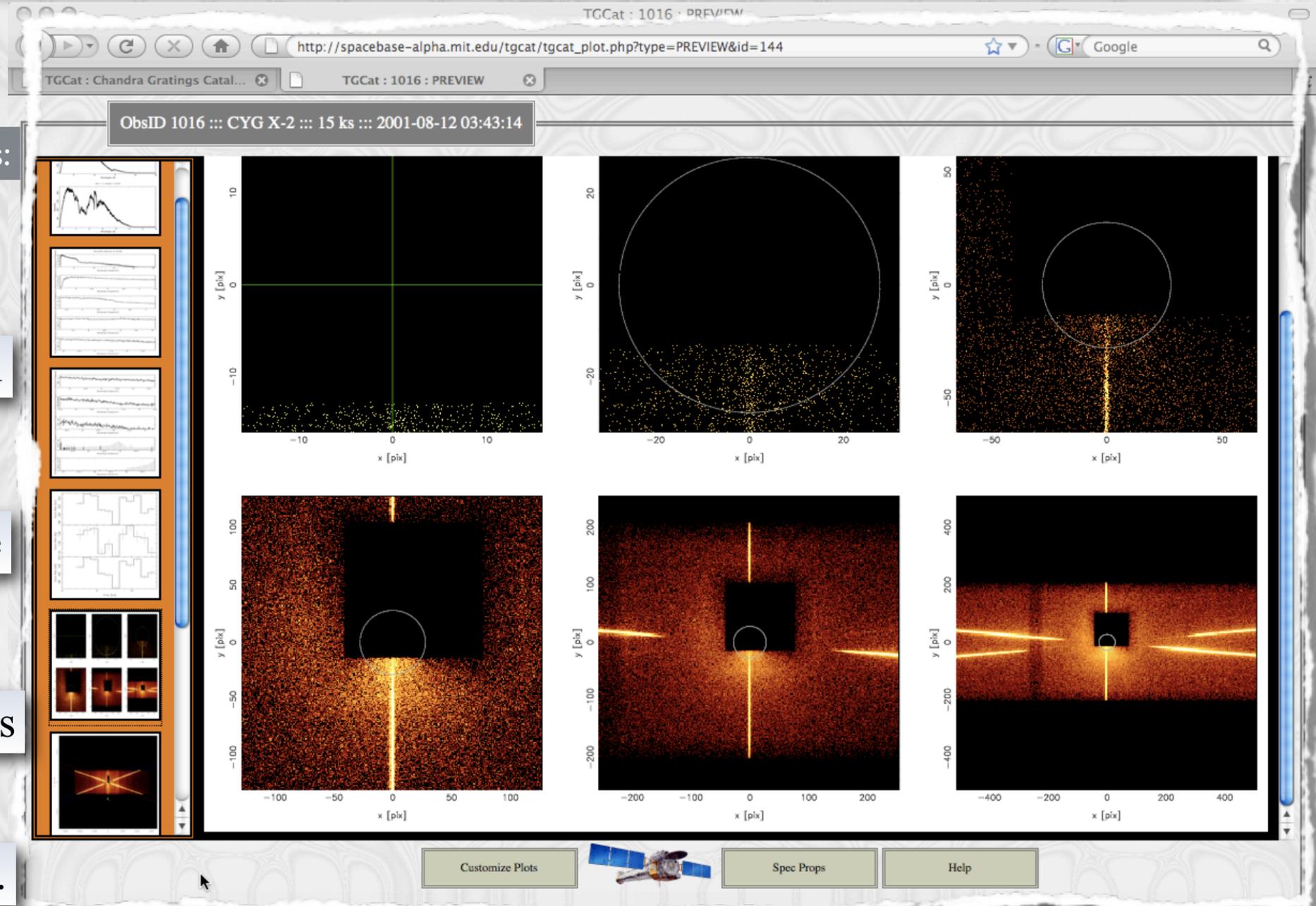
counts

flux, detail

light curve

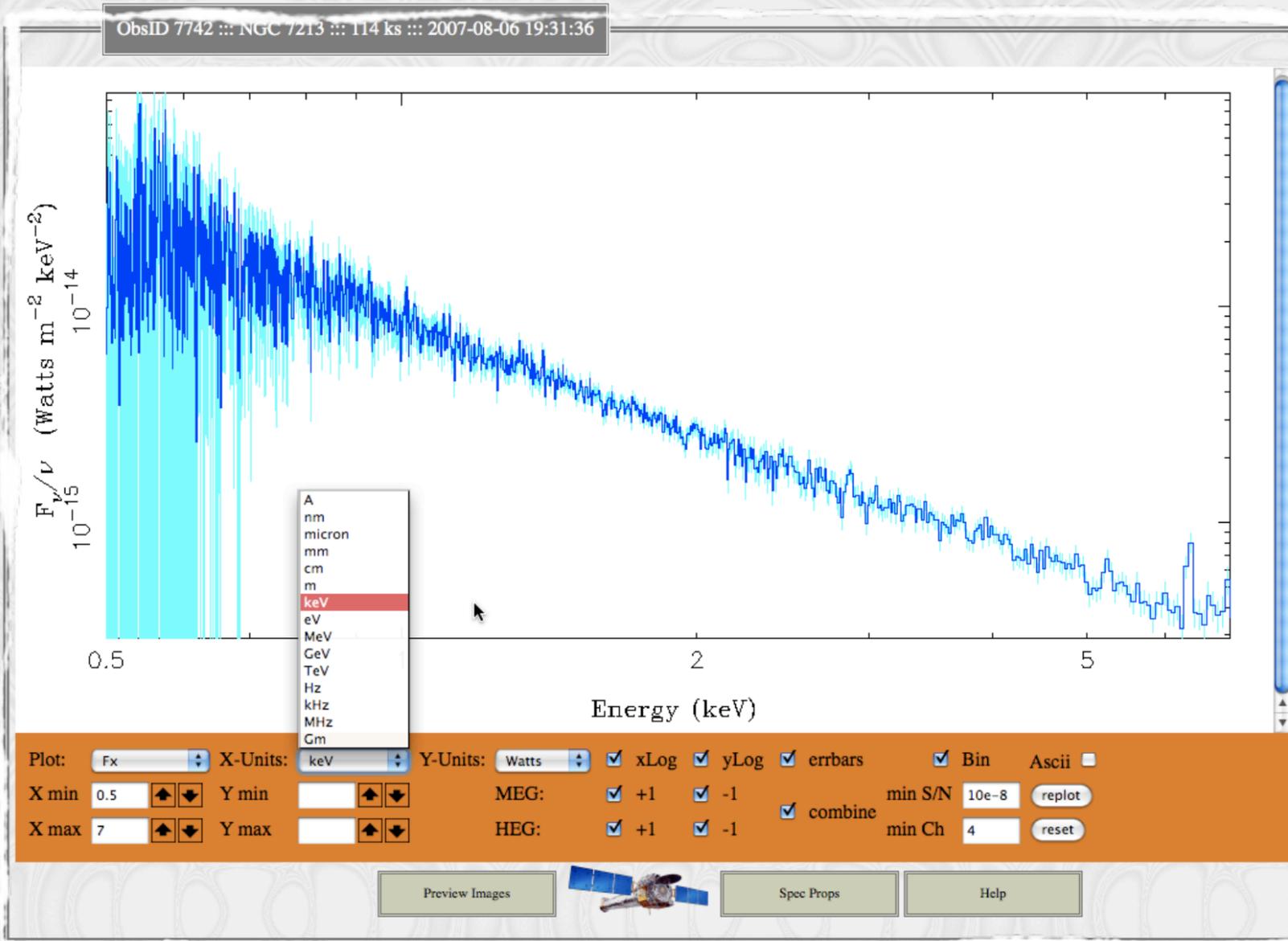
field images

and more...



More Features ...

- Interactive plotting; flexible units and scales; ability to dynamically bin and combine orders or spectra (via ISIS scripts)



TGCat: Chandra Gratings Catalog and Archive

http://spacebase-alpha.mit.edu/tgcat/tgcat_main.html

SELECTED OBSIDS -- Scheduled download -- 40 files totalling 200420 kbytes

ObsId:	Object:	PI:	TGCat Id:
7449	EXHYA	Dr. Nancy Brickhouse	234
7450			241

Products	Observational Parameters	Spectral Band Rates	Processing Parameters	Comments
<input checked="" type="checkbox"/> pha2	Instrument: ACIS Grating: HETG Readmode: TIMED Exposure: 128544	band cnt rate (c/s) heg_band: 2.21139 meg_band: 2.30344	TGCat ver: 1.1.0 Date: 2008-07-15 CIAO ver: 3.4	this obsid has not been reviewed by the TGCat team
<input checked="" type="checkbox"/> rmf	file(s): 48360 kb		3.4.0	
<input checked="" type="checkbox"/> arf	file(s): 4 kb		f	
<input checked="" type="checkbox"/> obspar	file(s): 1 kb			

DEFAULTS:

PHA2 (Level 2 counts spectrum file) RMF (Response matrix file)

ARF (Ancillary response file)

OTHER:

EVT2 (Level 2 event file) LTC (Binned light curve file)

OBSPAR (Observation parameter file)

Buttons: Save, Okay, Defaults

Products	Observational Parameters	Spectral Band Rates	Processing Parameters	Comment
<input checked="" type="checkbox"/> pha2	Instrument: ACIS Grating: HETG Readmode: TIMED Exposure: 160314 (s)	band cnt rate (c/s) heg_band: 2.14382 meg_band: 2.23457 zeroth_order: 0.291675	TGCat ver: 1.1.0 Date: 2008-07-15 CIAO ver: 3.4 CalDB ver: 3.4.0	this obsid has not been reviewed by the TGCat team
<input checked="" type="checkbox"/> rmf	file(s): 48360 kb			

Buttons: Download, print, Plot Combined, products, Help

More Features ...

- Some *simple* derived properties: count rates in bands; fluxes in bands (if ACIS)
- Extensible MySQL database as backbone
- Software: ISIS/S-Lang scripts which set up and run CIAO tools and make summary plots and tables is also available to users.

Fewer Features ...

- No modeling or fitting;
- No color ratios, color-color plots;
- No spectral comparisons

Future Enhancements

- The initial release of the catalog is deliberately provided with minimal features. We hope that use by the community will lead to definition of valuable additions.
- Planned enhancements: object class search; high-level convenience functions for the scripts (time-slicing; extraction widths)
- Possible enhancements: organization by sequence number instead of obsid, with multiple obsids combined; crowded field extractions; extended source extractions; serendipitous source extractions

Schedule

- Alpha release complete; software, database, web interface, custom sorting and search functions all complete; approximately 500 observations in catalog
- Beta release: Fall 2008; make available to group of internal and external high resolution researchers for review (ready NOW)
- Expand documentation: general help; usage threads; support for proposal planning. Add more examples to software reference manual.
- Evaluation of comments: Nov 2008; update, test Nov-Dec.
- Formal Verification & Validation: start after beta review (procedures are in place)
- Release: Early 2009 (Jan-Feb, in time for proposal planning support)

Current work

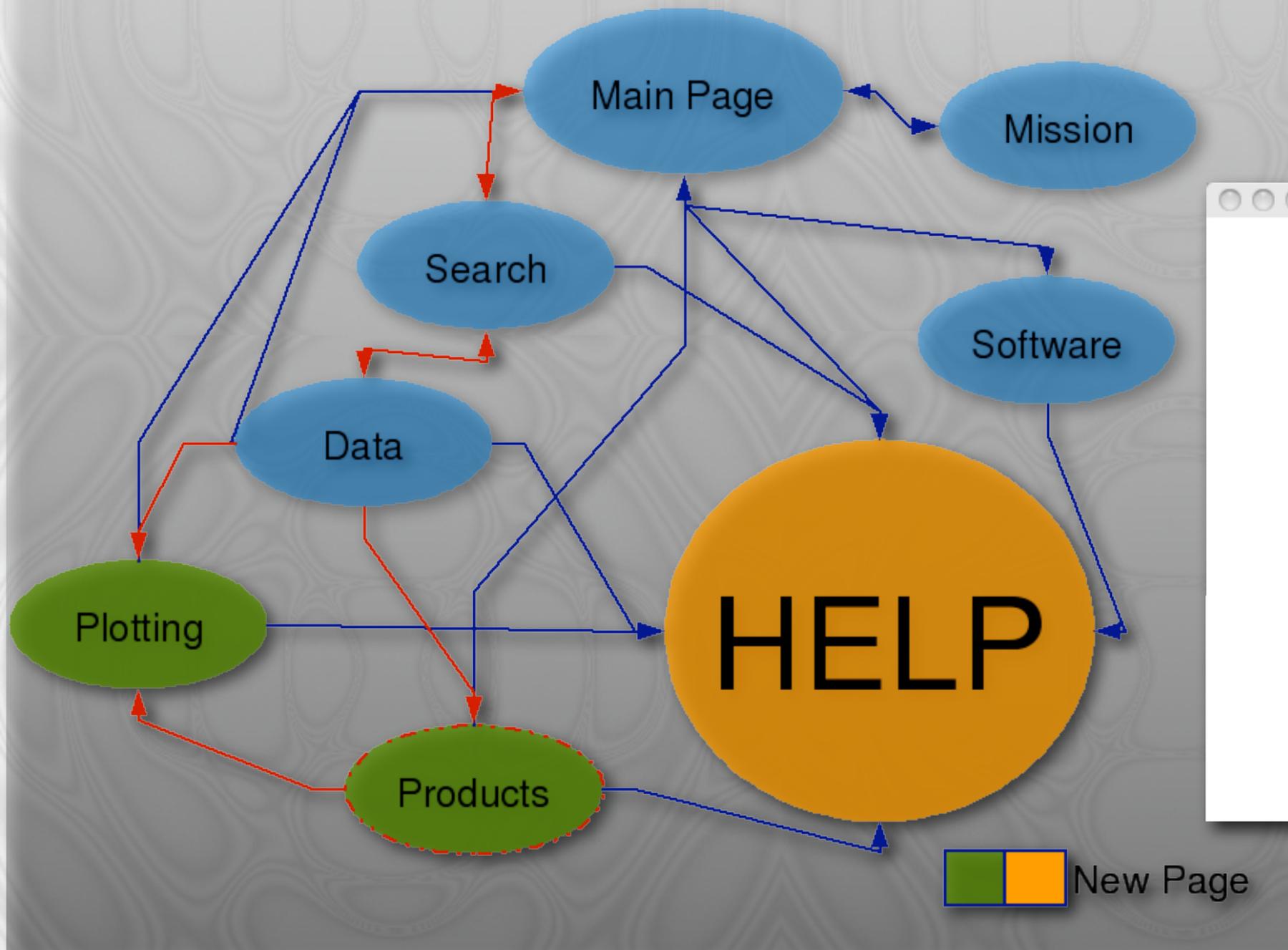
- Scrubbing interfaces - download dialog; combined observation plotting; uniform “pop-up” thumbnail plot.
- Scrubbing source list - human review necessary for zero order method, object class assignments, principle object name, additional source extraction, extended source extraction.
- Documentation: web interface, usage threads;
- Documentation: reprocessing software - examples of customized processing

What we need from beta-test

- Use/review of interface (navigation, presentation, clarity, responsiveness)
- Review of products: convenience, usefulness, quality;
- Derived products: what would be useful? is flux/counts/rates in bands table of use? Are there quantities needed to search for “interesting” observations?
- Usage scenarios - can you do what you need to do? e.g., “Was X observed? If so, get the data.” vs “Are there any observations with property Y? If so, list their basic information.” vs ???
- Reprocessing software - usage, convenience.

Appendices

TGCat Navigation, Help Contents



TGCat : HELP Page

HELP TOPICS

General Help: Intro Navigating around Glossary	Page Descriptions: Search Results Plotting/Summary Products Software	HowTo: Search by Name Search by Coord Search by Obsid Search by Field Change Display Columns	Plot Customization:
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Help Contents (many entries to be written)

Processing, Database Details

The Chandra archive is the primary repository - we obtain ~5 files per ObsID for reprocessing.

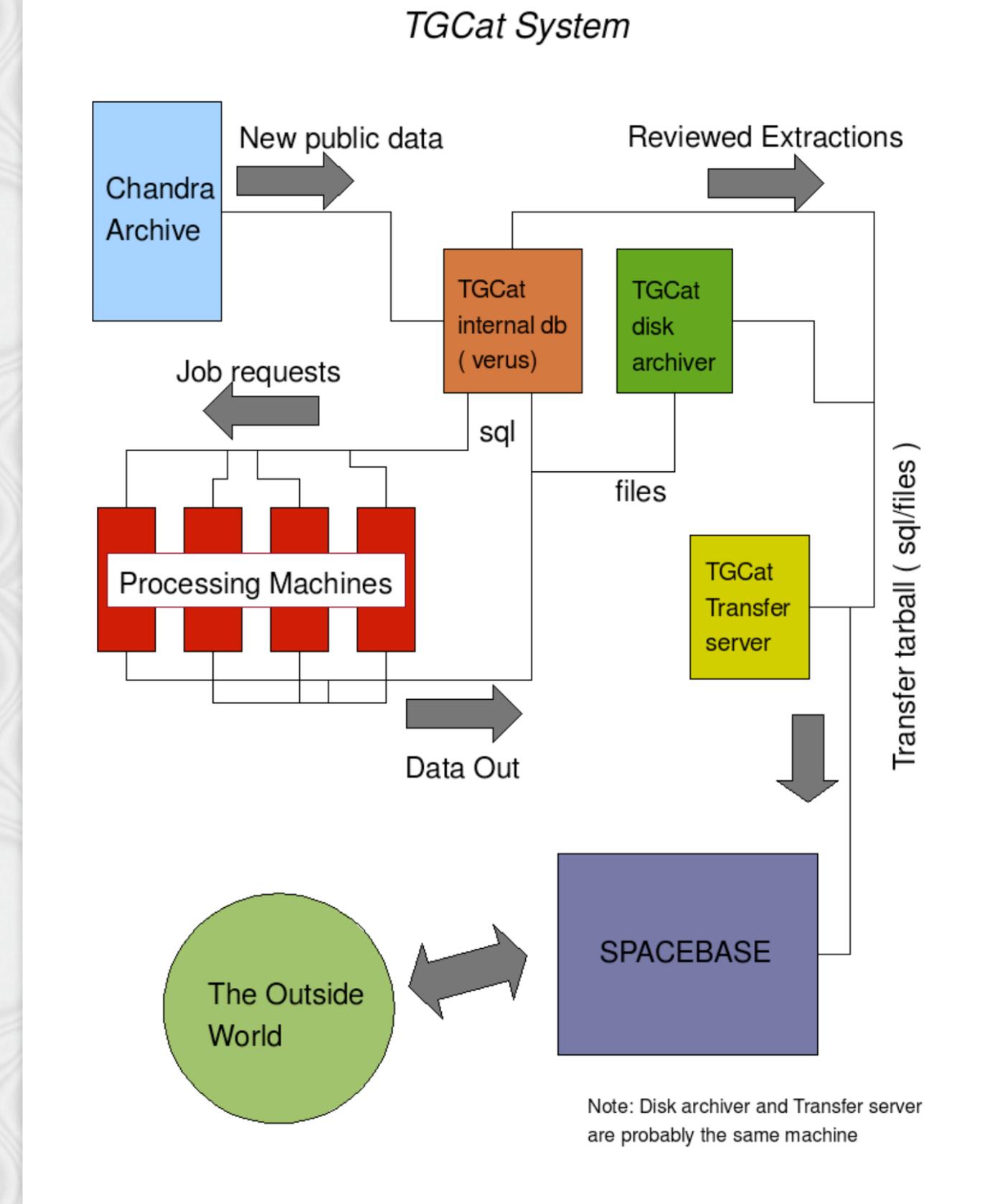
Processing is managed by a local server running MySQL.

ISIS/S-Lang scripts run CIAO tools to reprocess on local network.

Secondary data products are stored locally, and transferred to the public server.

Data will be queued and processed at some interval TBD as new observations become public.

We estimate < 1TB storage for the secondary products, and about 2-4 weeks to produce all products for ~800 obsids.



Some Software Details

Processing scripts are written in ISIS/S-Lang. The scripts set up and call CIAO tools and read the resulting products to make summary plots and tables. The same scripts used for generating the catalog are available to users; documentation is linked from the TGCat pages (<http://space.mit.edu/cxc/analysis/tgcat/index.html>)

High level scripts are analogous to `acis_extract` for end-to-end processing. Low-level functions are available for customization, but still with some convenience in built-in knowledge of typical grating tool parameters.

All tgcat software is non-proprietary.

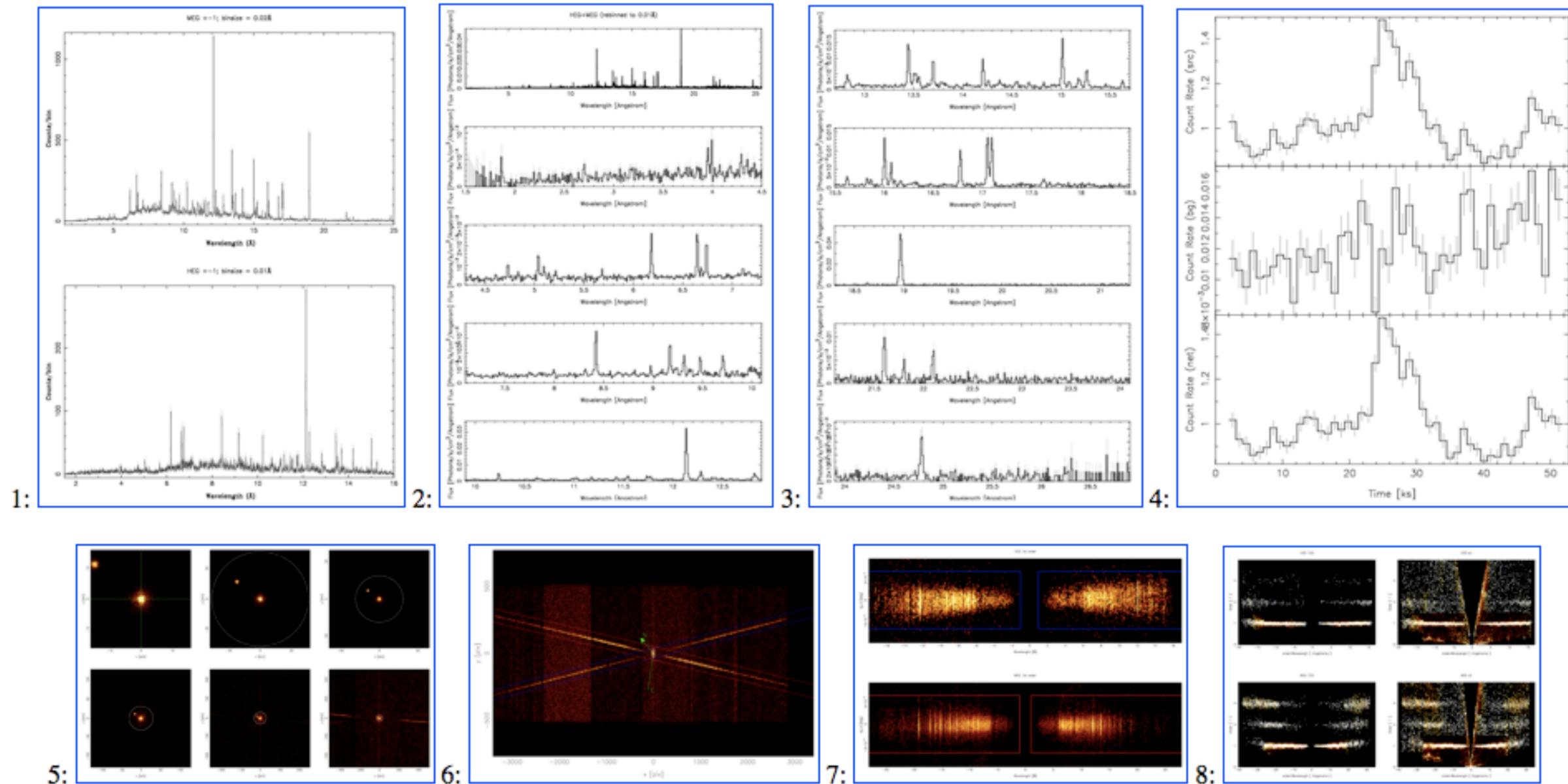
```
> download_obsid 16      # slsh script; requires some modules (pcre, curl); retrieves files from cdaftp site.
> setup_obsdir obs_16   # shell script; sets up links required by tgcat ISIS scripts.
> isis                  # start isis in a ciao-configured shell
isis> require( "tgcat" ); % load the scripts
isis> run_cfg( "obs_16", 1); % run the pipeline using the configuration read from a header, use findzo
isis> exit;
> display obs_16/summary*.ps &
```

...and in 10-15 minutes you get a pha file (spectrum), responses (grating ARFs and RMFs), light curves, and quick-look summary plots.

Summary Product Details

These plots are for ObsID 16, AB Dor, a coronally active star.

Summary plots made for an ACIS/HETG observation. Similar plots are made for LETG/HRC-S, but without flux or order-sorting. Some are more useful for the user, some for V&V.



1. [Counts Spectrum](#) for MEG (top) and HEG (bottom), combined first orders.
2. [Flux spectrum](#), combined HEG and MEG first orders. Top panel is broad band, following panels are narrow spectral regions.
3. [Flux spectrum](#) (continued)
4. [Light curve](#) of dispersed photons. Top is source region, middle is background region (usually negligible for HETGS), and bottom is net rate.
5. [Central field images](#) in sky coordinates (north up, east left), zooming out in factors of 2.
6. [Full field image](#) in rotated sky coordinates.
7. [Spectral coordinates image](#): top is HEG, bottom is MEG; -1 order on the left, +1 on the right.
8. [Order sorting image](#): top is HEG, bottom is MEG. Left is as-order-sorted by the CALDB order-sorting table (osip), and right shows all photons for the source region. (Sometimes CTI or gain calibration is poor, and this is to see if we clipped the spectrum).

Summary Product Details

Some derived products are tabulated in a FITS table and made accessible to database queries. These are fluxes (if ACIS was the detector) and rates in bands, and in the zero order. Here is an example file's contents (some rows deleted for presentation).

(Note: fluxes are not possible with HRC-S as a detector.)

fv: Binary Table of summary_fprops.fits[1] in /pirx/d0/dph/Data/tgcat_products/obs_3/

File Edit Tools Help

label wmid wlo whi count_rate err_count_rate photon_flux err_photon_flux energy_flux err_energy_flux flag

Select 14A D D D D D D D D D J

All A A A counts/s counts/s photons/cm^2/s photons/cm^2/s ergs/cm^2/s ergs/cm^2/s

Invert Modify Modify Modify Modify Modify Modify Modify Modify Modify Modify

	label	wmid	wlo	whi	count_rate	err_count_rate	photon_flux	err_photon_flux	energy_flux	err_energy_flux	flag
1	heg_band	8.350	1.700	15.000	8.044E-01	4.032E-03	8.458E-03	5.076E-05	2.745E-11	2.299E-13	0
2	meg_band	13.350	1.700	25.000	8.274E-01	4.089E-03	9.837E-03	7.137E-05	2.900E-11	2.356E-13	0
3	letgs_band	81.000	2.000	160.000	8.234E-01	4.079E-03	9.732E-03	9.218E-05	2.699E-11	1.877E-13	1
4	letg_acis_band	26.000	2.000	50.000	8.234E-01	4.079E-03	9.732E-03	9.218E-05	2.699E-11	1.877E-13	1
5	c	1.750	1.700	1.800	2.425E-04	7.001E-05	1.715E-05	4.979E-06	1.931E-13	5.616E-14	0
6	Fe25	1.850	1.800	1.900	2.748E-03	2.357E-04	1.362E-04	1.171E-05	1.453E-12	1.250E-13	0
7	FeK	1.950	1.900	2.000	1.112E-03	1.499E-04	4.216E-05	5.699E-06	4.280E-13	5.793E-14	0
8	c	2.500	2.000	3.000	2.700E-02	7.387E-04	4.773E-04	1.343E-05	3.777E-12	1.101E-13	0
9	c	5.700	5.400	6.000	2.461E-02	7.053E-04	3.545E-04	1.049E-05	1.235E-12	3.684E-14	0
10	Si14	6.175	6.100	6.250	3.442E-02	8.340E-04	2.167E-04	5.251E-06	6.965E-13	1.688E-14	0
11	c	6.425	6.300	6.550	2.556E-02	7.188E-04	1.523E-04	4.283E-06	4.702E-13	1.322E-14	0
12	Si13	6.700	6.600	6.800	4.616E-02	9.658E-04	2.713E-04	5.710E-06	8.052E-13	1.696E-14	0
13	c	7.800	7.400	8.200	9.017E-02	1.350E-03	4.782E-04	7.166E-06	1.217E-12	1.826E-14	0
14	Mg12	8.400	8.350	8.450	2.478E-02	7.076E-04	1.372E-04	3.919E-06	3.239E-13	9.250E-15	0
15	c	8.800	8.500	9.100	5.079E-02	1.013E-03	3.449E-04	6.943E-06	7.783E-13	1.563E-14	0
16	Mg11	9.250	9.100	9.400	2.795E-02	7.516E-04	2.227E-04	5.997E-06	4.787E-13	1.290E-14	0
17	Ne9	13.600	13.400	13.800	8.650E-03	4.181E-04	2.636E-04	1.275E-05	3.862E-13	1.867E-14	0
18	Fe17	15.000	14.950	15.050	4.891E-03	3.144E-04	1.664E-04	1.070E-05	2.203E-13	1.416E-14	0
19	c	14.925	14.900	14.950	7.477E-04	1.229E-04	2.483E-05	4.081E-06	3.303E-14	5.430E-15	0
20	o8	18.975	18.900	19.050	1.475E-03	1.727E-04	1.313E-04	1.537E-05	1.375E-13	1.609E-14	0
21	c	20.200	19.200	21.200	7.679E-04	1.246E-04	9.007E-05	1.483E-05	8.940E-14	1.465E-14	0
22	zeroth_order	-1.000	-1.000	-1.000	3.176E-01	2.534E-03	-1.000E+00	-1.000E+00	-1.000E+00	-1.000E+00	0

Go to: Edit cell: