



**HEASARC**  
High Energy Astrophysics  
Science Archive Research Center

# Data Access Services at the HEASARC

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## Outline

- Browse
- *SkyView*
- NVO
- Future Prospects



## Browse: Major changes

- Chandra FOV search capability (HUG Request)
- Keyword search on home (HUG Request)
  - Better support for simple target names
- Google Sky interfaces (KML)
- Reorganization of archive interfaces
- Port of old Browse interface from ASI
- VO metadata



# Chandra FOV

FOV service shows Chandra observations overlaid on DSS image as well as links to archive data.

Several NVO efforts are underway in building footprint services for major observatories.

The screenshot shows the HEASARC Browse interface in a Mozilla browser window. The main display area shows a dark sky image with several overlapping white rectangular fields of view (FOVs) overlaid on it. The background is a digitized Sky Survey image from SkyView. Below the image, there is a search position indicator and a button to 'Select Individual FOVs'. Below the image, there are controls for redisplaying the data as an HTML table, a printer-friendly version, and a reset button. A table name and row count are shown as 'chanmaster:Chandra Observations' with 12 rows. Below this, there is a table of Chandra observations with columns for select, related links, services, obsid, status, name, ra, dec, time, detector, grating, and ex.

★ Search Position  
Fields of view are only displayed for observations that have been archived.  
Background is a Digitized Sky Survey image from [SkyView](#).  
[Select Individual FOVs](#)

Redisplay as

Table Name and Row Count  
 12

**Chandra Observations (chanmaster)**  
Search radius used: 120.00"

Select	Related Links	Services	obsid	status	name	ra	dec	time	detector	grating	ex
<input type="checkbox"/>	<a href="#">ASCA ROSAT RXTE XMM</a>	<a href="#">O</a> <a href="#">R</a> <a href="#">N</a> <a href="#">S</a> <a href="#">D</a> <a href="#">H</a> <a href="#">F</a>	1670	archived	COMA	12 59 48.00	+27 58 00.0	2001-03-05 16:07:00	HRC-I	NONE	17
<input type="checkbox"/>	<a href="#">ASCA ROSAT RXTE XMM</a>	<a href="#">O</a> <a href="#">R</a> <a href="#">N</a> <a href="#">S</a> <a href="#">D</a> <a href="#">H</a> <a href="#">F</a>	558	archived	COMA CLUSTER	12 59 48.00	+27 58 00.0	1999-11-12 22:05:54	HRC-I	NONE	10
<input type="checkbox"/>	<a href="#">ASCA ROSAT RXTE XMM</a>	<a href="#">O</a> <a href="#">R</a> <a href="#">N</a> <a href="#">S</a> <a href="#">D</a> <a href="#">H</a> <a href="#">F</a>	557	archived	COMA CLUSTER	12 59 48.00	+27 58 00.0	2000-02-14 00:09:14	HRC-I	NONE	10



# Update notification service

- Send automatic notifications when new data becomes available at HEASARC (or other sites)
- Prototyped by Mike Corcoran based upon freeware tools.
- Currently being tested

The screenshot shows a web browser window titled "HEASARC Browse Notification Service - SeaMonkey". The address bar shows the URL "http://heasarcdev/cgi-bin/W3Browse/notification/monitor". The page content includes a header "Browse Notification Service" and a sub-header "The HEASARC Data Monitoring Service". Below this, there is a text box for "Name" containing "tam" and a "Cancel Notification Service" button. A section titled "Delete Watch List entries or make other additions/changes and hit Submit" contains an "Email" field with "tam@milkyway.gsfc.nasa.gov". A table titled "Current Watch List" has columns for "Source or Position", "Chandra", "XMM", "Swift", "Suzaku", "RXTE", "INTEGRAL", and "Spitzer". Two rows are listed: "bv her" and "ty dra", both with checked boxes in the Chandra and Spitzer columns. Below the table, there is a "Source name/position:" field and a "Select missions:" section with checkboxes for Chandra, XMM, Swift, Suzaku, RXTE, INTEGRAL, and Spitzer, along with a "Select All Missions" button. At the bottom, there are "SUBMIT", "SUBMIT and email List", and "Logout" buttons.

	Source or Position	Chandra	XMM	Swift	Suzaku	RXTE	INTEGRAL	Spitzer
<input type="button" value="DEL"/>	bv her	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="button" value="DEL"/>	ty dra	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>



# Easy access to keyword search

HEASARC: NASA's X-ray & Gamma-ray Astronomy Data Archive - SeaMonkey

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop  Search Print

Home Bookmarks mozilla.org mozillaZine mozdev.org

GODDARD SPACE FLIGHT CENTER  
 Smithsonian Astrophysical Observatory

Help/FAQ  
What's New  
Site Map  
NASA Homepage

Search HEASARC search this site

HEASARC Quick Links  
---Quick Links---

HEASARC HOME OBSERVATORIES ARCHIVE CALIBRATION SOFTWARE TOOLS STUDENTS / TEACHERS / PUBLIC

**NASA's High Energy Astrophysics Science Archive Research Center**

ABOUT THE HEASARC RESOURCES FOR SCIENTISTS FAQ/HELP SITE MAP OTHER ARCHIVES

Guest Observer Facilities & Science Centers  
Select One →

NASA Archives  
Select One →

HEASARC Tip:  
You can build a customized software download of the HEASoft analysis package tailored to your computer architecture and the

The High Energy Astrophysics Science Archive Research Center (HEASARC) is the primary archive for high-energy astronomy missions, in the extreme ultraviolet, X-ray and gamma-ray wavelengths. The HEASARC provides archival data, multi-mission software and analysis tools, and information about current and past observatory missions.

Archive Data Search Form [More Search Options](#)

Search criteria:

Enter positions, times, missions, ... to query Browse.  
Try ROSAT 3c273 to get ROSAT data on 3c273 or chandra b11>80 status=archived to get archived Chandra data near the north galactic pole. Use quotes around targets that have embedded white space (e.g., "ar lac").  
▲ [More examples and interactive feedback](#)

Latest News

- ◆ [NASA Astronomers Find Bizarre Planet-Mass Object Orbiting Neutron Star](#) (12 Sep 2007)
- ◆ [An Early Release version of the Hubble Legacy Archive is available](#) (24 Aug 2007)
- ◆ [HEASOFT 6.3.1 software suite has been released](#) (27 Jul 2007)
- ◆ [New releases of the interfaces to the nh and X-ray background tools are available](#) (5 Jul 2007)

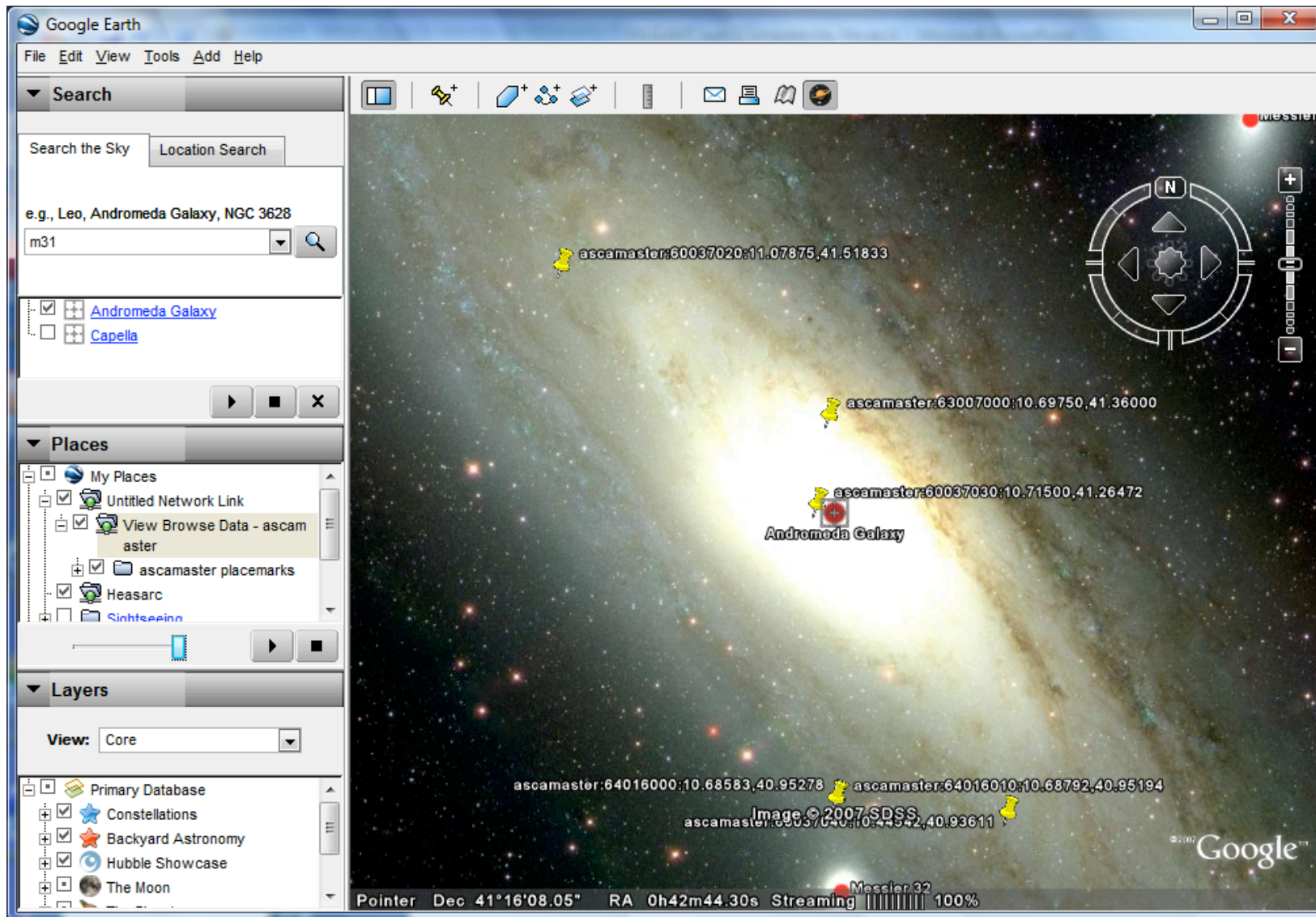
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## HEASARC Catalogs in Google Sky

- Two pieces:
  - Base KML that users load into Google Sky.
    - [http://heasarc.gsfc.nasa.gov/cgi-bin/W3Browse/w3bgooglesky.pl?table=xxx\[&table=xxx...\]](http://heasarc.gsfc.nasa.gov/cgi-bin/W3Browse/w3bgooglesky.pl?table=xxx[&table=xxx...])
  - Invokes dynamic KML that returns results for a given region of the sky.
- Placemarks and links to archive implemented.
- Region overlays and images feasible
- Some funding for SkyView KML servers in AISR proposal.
- Download GoogleEarth from: <http://earth.google.com/download-earth.html>

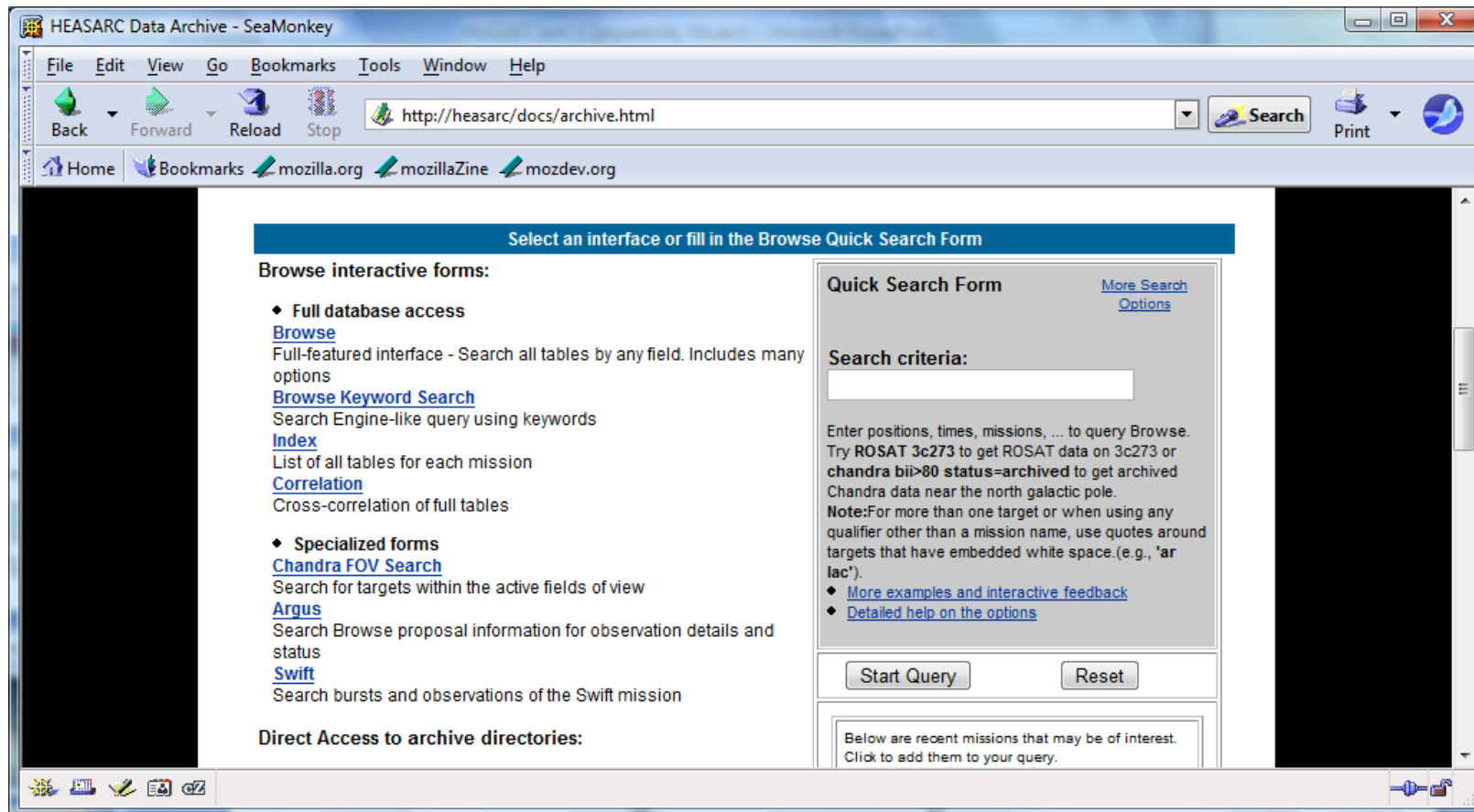
# ASCA observations of M31







# Re-organization of interfaces





## VO Metadata

- Funded through NVO
- Uniform column descriptors (UCDs) give consistent information about what is in column
  - Examples: pos.eq.ra;meta.main or phot.flux;em.x-ray.hard
- VO registry queries will allow searches for tables with requested information
- Explore feasibility of standardized descriptions for data.



## Browse: What's next?

- Integration with VO
  - Similar to current VizieR data
  - Access to Galex, SDSS and other major tables data
  - Support full cross-correlations for small datasets regardless of origin
- Uploads of user datasets
- Simpler interface to complex queries



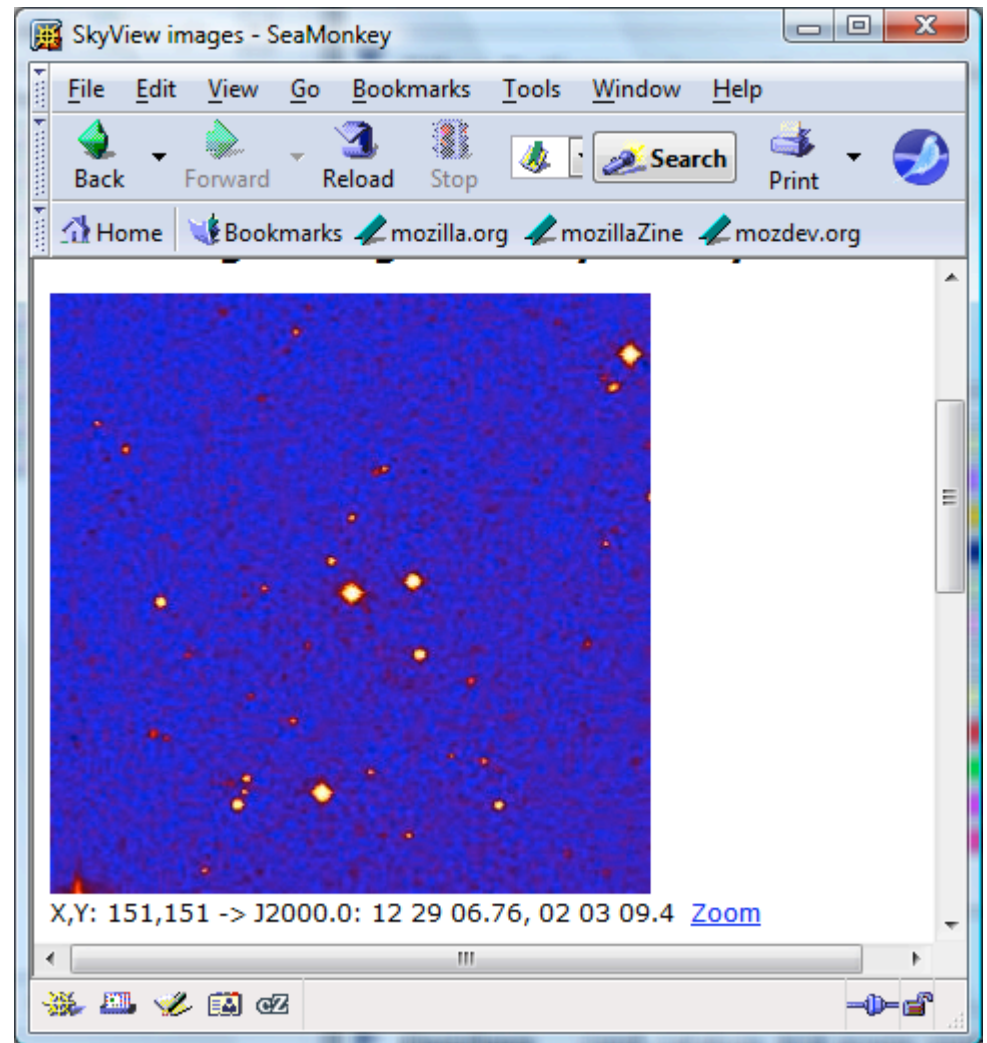
## *SkyView*

- New hardware and operating system
- New suite of server software.
  - Uses same code as *SkyView-in-a-Jar* client.
- New Web interfaces and documentation.
- Largely funded through AISR grants.
- Usage has more than doubled since upgrade in June.
- *SkyView* positioned as a survey publication service.



## New capabilities and surveys

- SDSS Release 5
- VLSS (VLA Low Frequency Sky Survey)
- Can handle much larger images
- Image rotation
- Efficient flux-conserving resamplers
- High-order resamplers for well-sampled surveys
- JPEG, GIF, PNG, TIFF, ...
- Position calculator and image zoom
- Enhanced contouring support
- Local copies of DSS2
- Access to any VO Cone search catalog service





## What is the NVO?

- The National Virtual Observatory is the US participant in the International Virtual Observatory Alliance.
- Approximately 15 US astronomy organizations in NVO collaboration.
- Supports the development of standards and standardized services for access to and analysis of astronomy data
- Originally funded through NSF (HEASARC contribution through USRA). In FY08 jointly funded by NSF and NASA (about 3-1).
- HEASARC funding: \$215K for FY08.



## Future Funding

- MOU between NSF and NASA signed to facilitate collaborative support of a long-term NVO facility.
- AO expected ~1/08.
- HEASARC expects to participate in collaboration with ~8 other members in the NVO team including ST ScI/JHU, CalTech/IRSA, CfA, NRAO, NOAO, NCSA
- Anticipate funding of smaller members of current collaboration through other grants.



## Current HEASARC Role in NVO

- Major data provider
  - All Browse Catalogs
    - Standardized Cone search protocol
    - Entire catalogs in VOTable format
  - All SkyView surveys
- DataScope access to major VO data holdings
- Service monitoring
- NVO Summer School dean and NVO book editor
- Management (NVO Executive committee)
- Recently took lead for Operations and Applications areas.





# NVO Operations Monitor

Customized VO - SeaMonkey

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop <http://heasarc/cgi-bin/vo/monitor/monitor.pl> Search Print

Home Bookmarks mozilla.org mozillaZine mozdev.org

**NVO**  
NATIONAL VIRTUAL OBSERVATORY

**Summary and Status of VO Services**

Hosted by:  
HEASARC  
NASA/GSFC

[NVO Home](#) [VO Tools and Services](#) [NVO Feedback](#) [Monitor Help](#)

User Tools	Data Services
Tools: 10 out of 10 services are up	Images: 32 out of 34 services are up
Querying for VO data at JHU	Spectra: 16 out of 16 services are up
Querying for data at Caltech using Carnivore	Tables: 17 out of 18 services are up
DataScope: Look for all data on a given source	Databases: 4 out of 4 services are up
NED	
NVO Sky Statistics Service	
OpenSkyQuery: SQL-like queries of astronomical tables	<b>Operations and Testing</b>
SIMBAD	Service Tests: 3 out of 3 services are up
Spectrum Service: Query and view SDSS and other spectra	Publishing Registries: 4 out of 4 services are up
WCSFixer	
WESIX: Find objects in images	

Last service status updated on: 2007-10-11 18:45:01:00 UTC

We do not check all VO services. Instead, we try to query a representative subset of all services for each VO host. If you feel that an important service is missing from this page please send us a [note](#).

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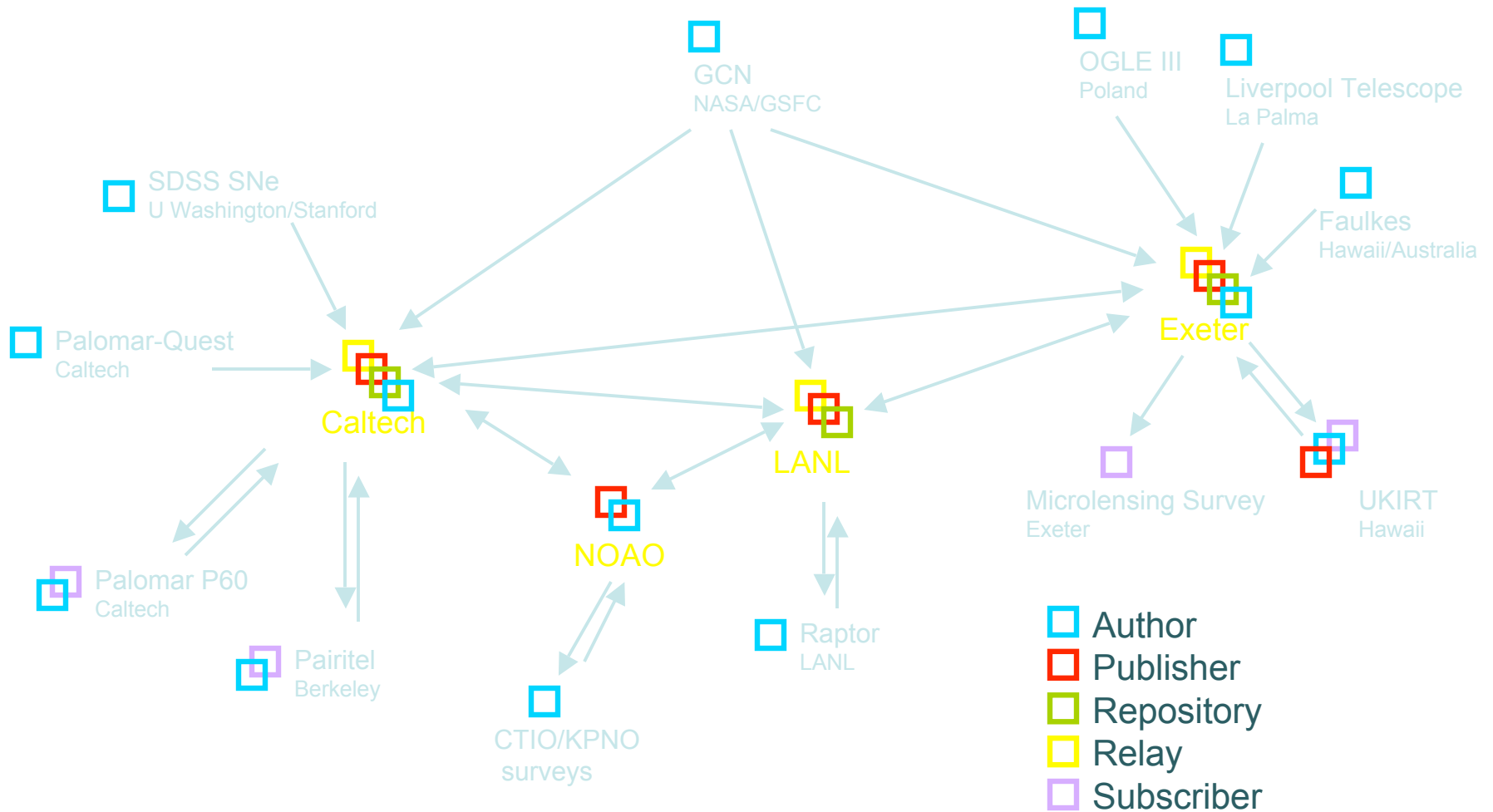
## Usage of HEASARC by NVO

- Naïve counts of queries would indicate ~40% of Browse queries from NVO access.
  - This substantially over counts since many NVO services query prospectively for users.
- HEASARC resources published through searchable NVO registries
- ~5% of *SkyView* query requests
- GCN visibility through VOEvent network



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VOEventNet



## HEASARC access to external data using NVO

- *SkyView* access to SDSS and FIRST imagery.
- Browse interfaces to remote datasets (e.g., Galex and SDSS) in test.



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## Future of the NVO at the HEASARC

- Facility operations
  - Reliable and robust software and services
  - Reliable funding
- Transparent access from Browse to all catalogs, images and spectra.
- GCN integration into VOEvent network



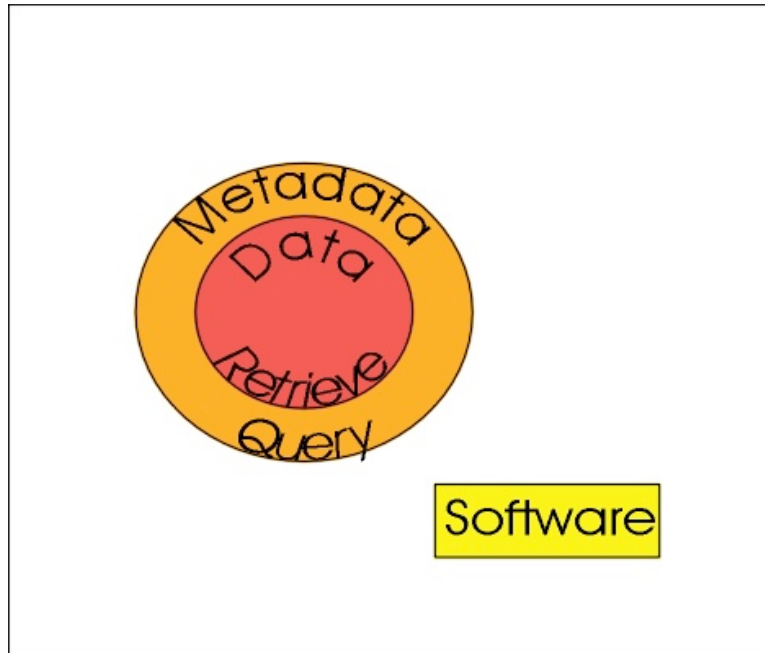
## Future initiatives

### 2<sup>nd</sup> Heaven

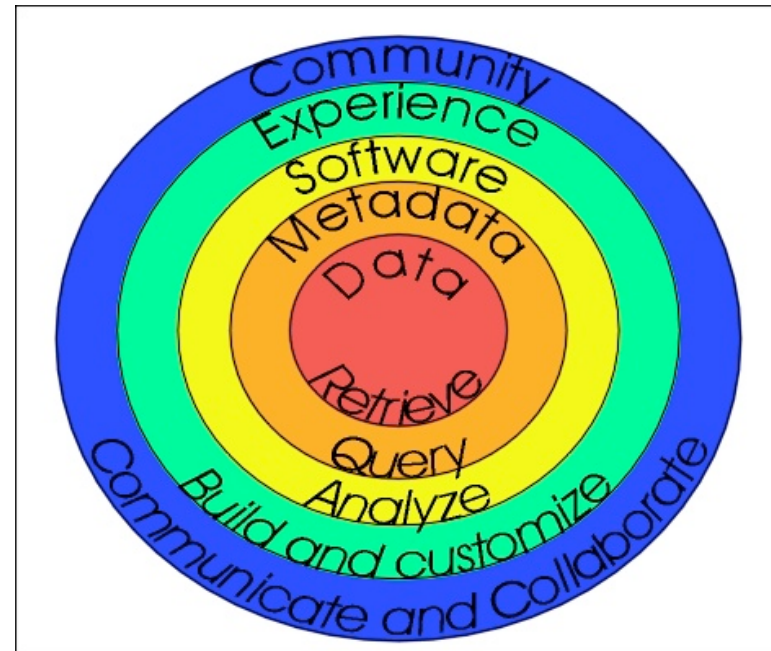
- AISR funded prototype to look at how we use scientific archives in research.
- Modern scientific research is almost always a collaborative effort, but the on-line tools are designed for a single user.



# Can an archive support collaborative research?



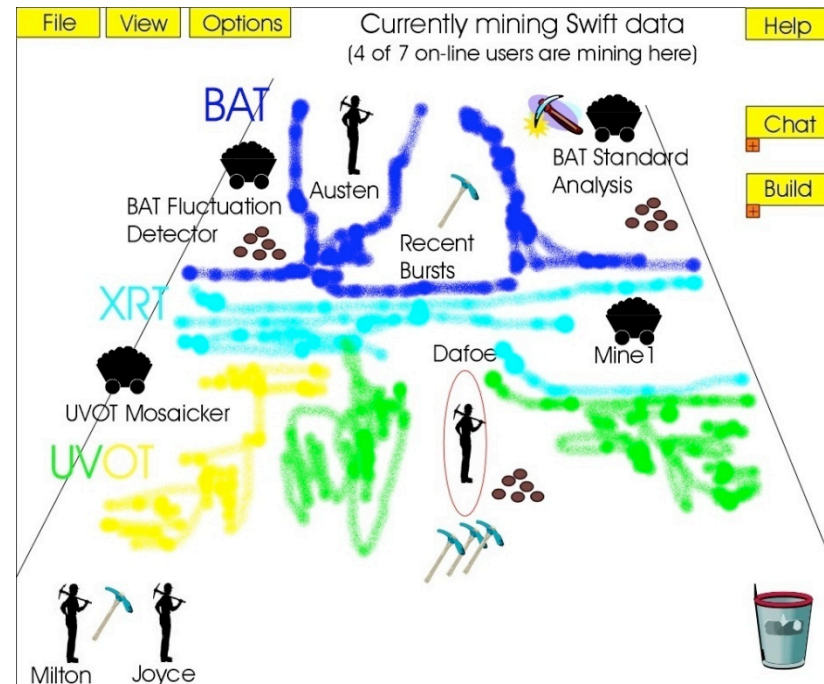
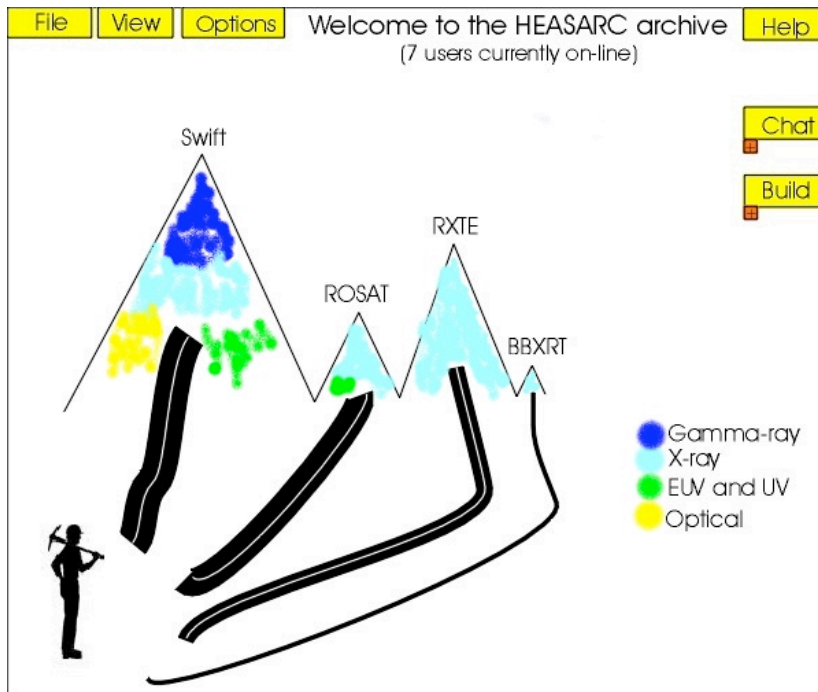
The traditional archive



What we want to build



# Look at ideas and interfaces from games, virtual realities, ...



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# Re-engineering the archive

Should we re-build Browse?

- Why?
  - New functionality
    - Respond to opportunities from GoogleSky and followons
    - User tables, image integration, footprint searches, ...
    - Customizability
  - Outmoded and unclear design
  - Code obsolescence and function accretion
  - Difficulties in maintenance.
    - Requirements, testing, CMS, efficiency
  - Emergent standards (VO, AJAX, SQL)
- Why not?
  - Current system works and users are used to it
  - Major effort
  - Risk of failure
  - Opportunity costs
- *SkyView* example shows this is possible but took longer than anticipated.