Aladin V10 and Aladin Lite

for ESFRI (and other) projects

Pierre Fernique, Thomas Boch, Chaitra (CDS)

Presented by François Bonnarel (CDS)

What is Aladin ?

http://aladin.u-strasbg.fr/

aladin.u-strasbg.fr

Rechercher

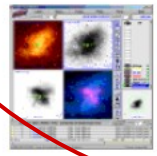
Portal Simbad VizieR Aladin X-Match Other Help

Aladin Sky Atlas

- Overview
- Aladin Desktop
- Aladin Lite
- Information
- → *en français*

Overview

Aladin is an interactive sky atlas allowing the user to visualize digitized astronomical images or full surveys, superimpose entries from astronomical catalogues or databases, and interactively access related data and information from the *Simbad database*, the *VizieR service* and other archives for all known astronomical objects in the field.



Download **Aladin Desktop** on your machine

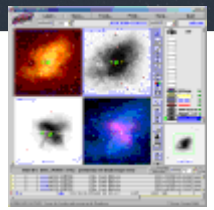
Preview with **Aladin Lite** in your browser

The *Aladin sky atlas* is available in two modes: *Aladin Desktop*, a regular application and *Aladin Lite* an HTML5 javascript web widget.

Key dates

1993	Protos XWindows (C, C++)
1999	Applet (java)
2003	Standalone/Applet (java)
2013	Aladin Lite (javascript)
2017	**Aladin v10** (java)

Aladin Sky Atlas, one in two!



Aladin Desktop

- high level features **desktop**
- access images, catalogs, footprints
- **full range of functionalities**
- interoperable with VO tools
  - Aladin is a VO portal
  - used to validate most standards
- Used for observation preparation tools (APT, GuideCam)
- going all hierarchical now! (HiPS)

Aladin Lite

- **Web** HiPS visualizer
- preview mode
- embed in any webpage
- **easy appropriation**
- **highly used in wide range of sites/services**
- basic functions… but more and more!

Aladin Desktop V10

Main new features

Key figures on Aladin Desktop

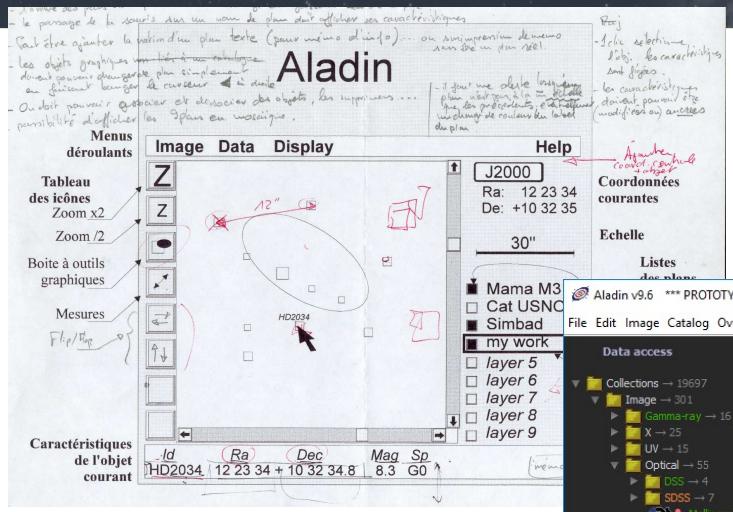
1) **Code**: **5MB jar**, 250k source lines, 500 classes
   - only based on CDS & JDK regular libraries (+ HEALPix lib)
   - 2 main developers (P. Fernique, T. Boch)
     + dozen of contributors (recently Chaitra)

2) **Usage**: **1k sessions per day** for 150k http queries (HiPS tiles queries included)

3) **Language**: **85% en**, 10% fr, 2% de, 1% it, 1% es ..

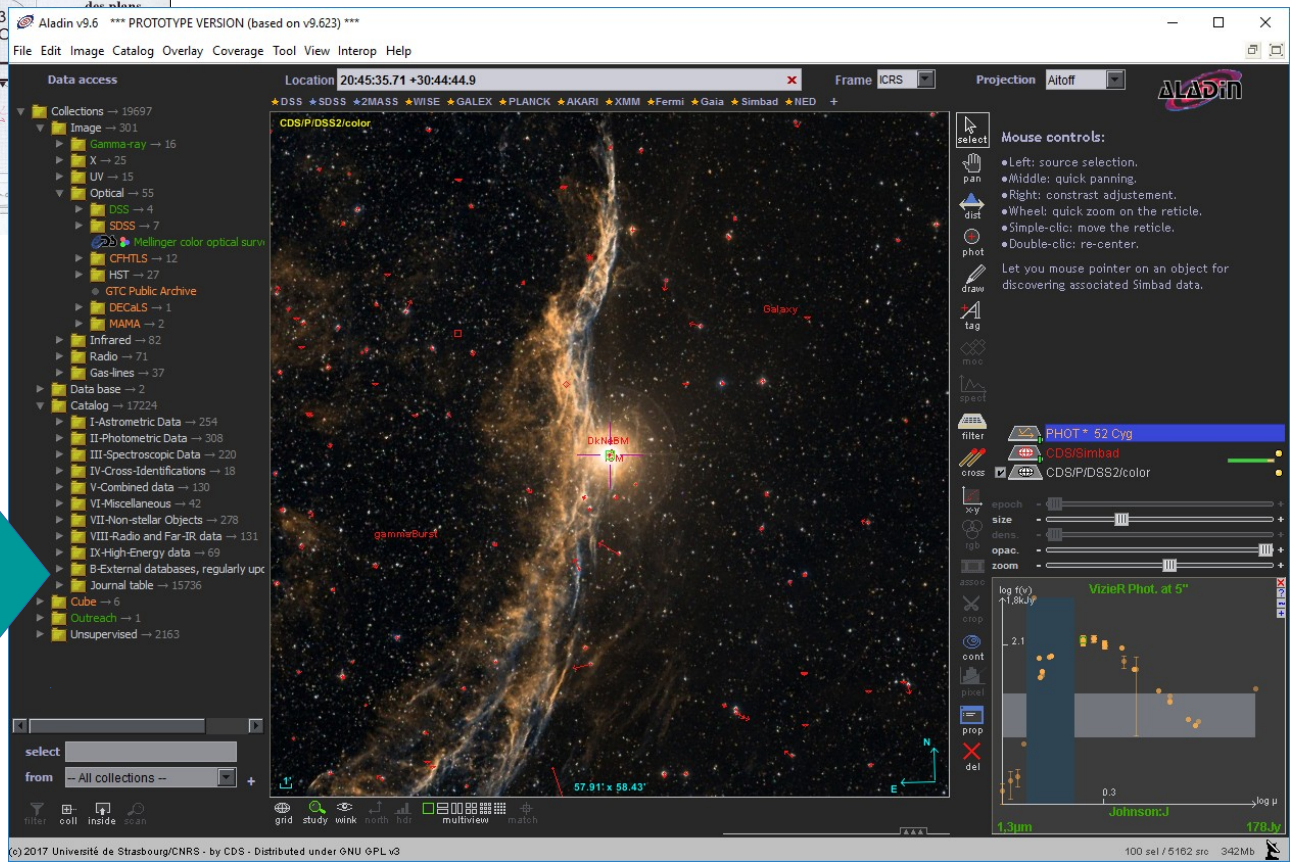
4) **Java**: **75% 1.8**, 12% 1.7, 12% 1.6, 0.2% 1.5, ...

Aladin Desktop



Aladin v0 (1999)

Aladin v10



Release v10

1) Integration++:

- IVOA protocols: SIAv2, TAP, Datalink/SODA, VO registry (via RegTAP), VOSpace, MOC, HiPS
- CDS advanced services: MocServer, Xmatch, query by MOC

2) Desktop only
=> no longer applet support, full screen

3) New look & feel
=> modernisation, simplification

The plan of the slide demo…

1) Load Simbad over DSS HiPS

2)Load the region (MOC) of the sky both observed by Chandra and XMM

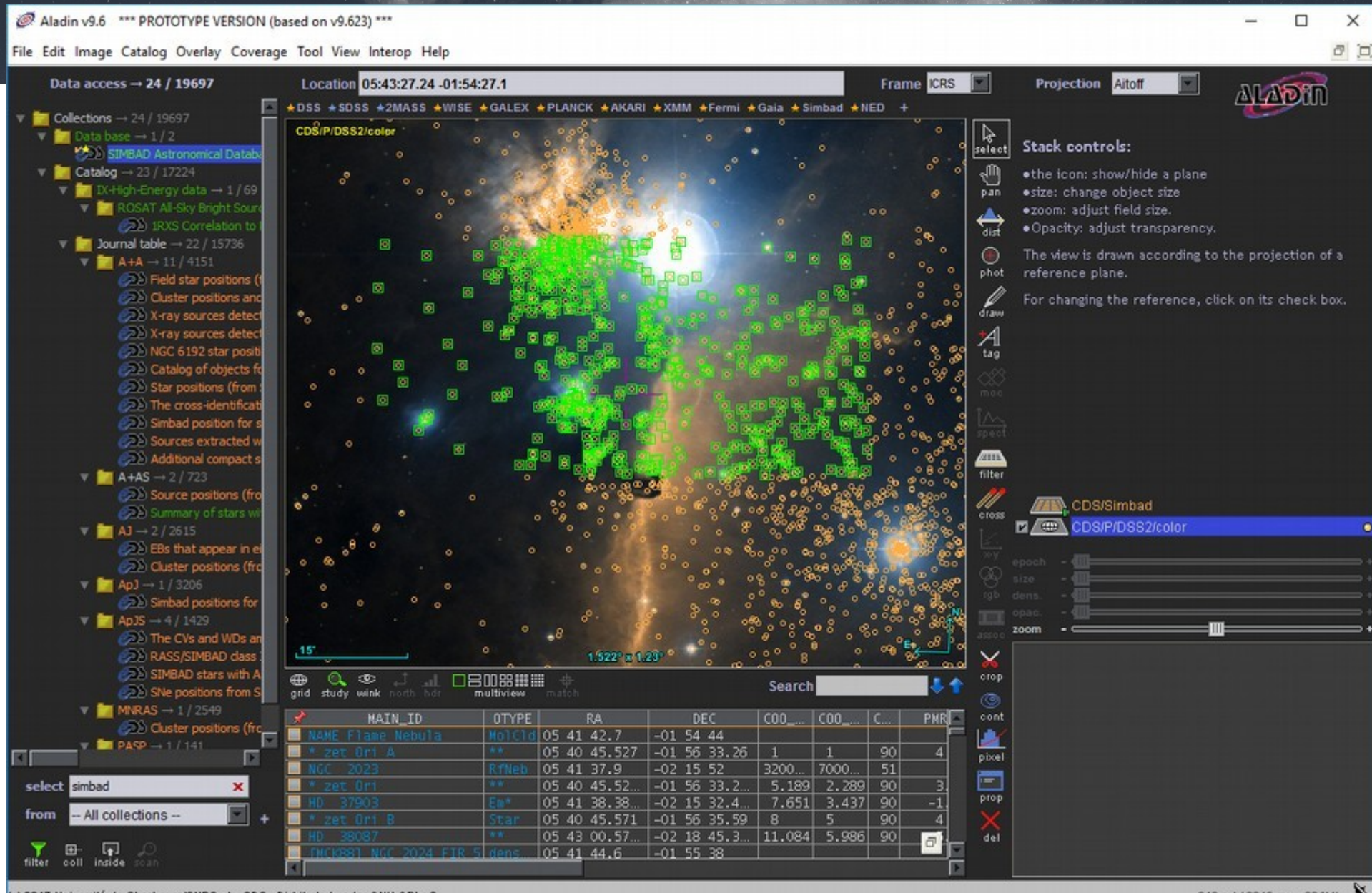
3)Load sources from ARXA catalog **inside this region**

4)Xmatch these sources with MORX catalog

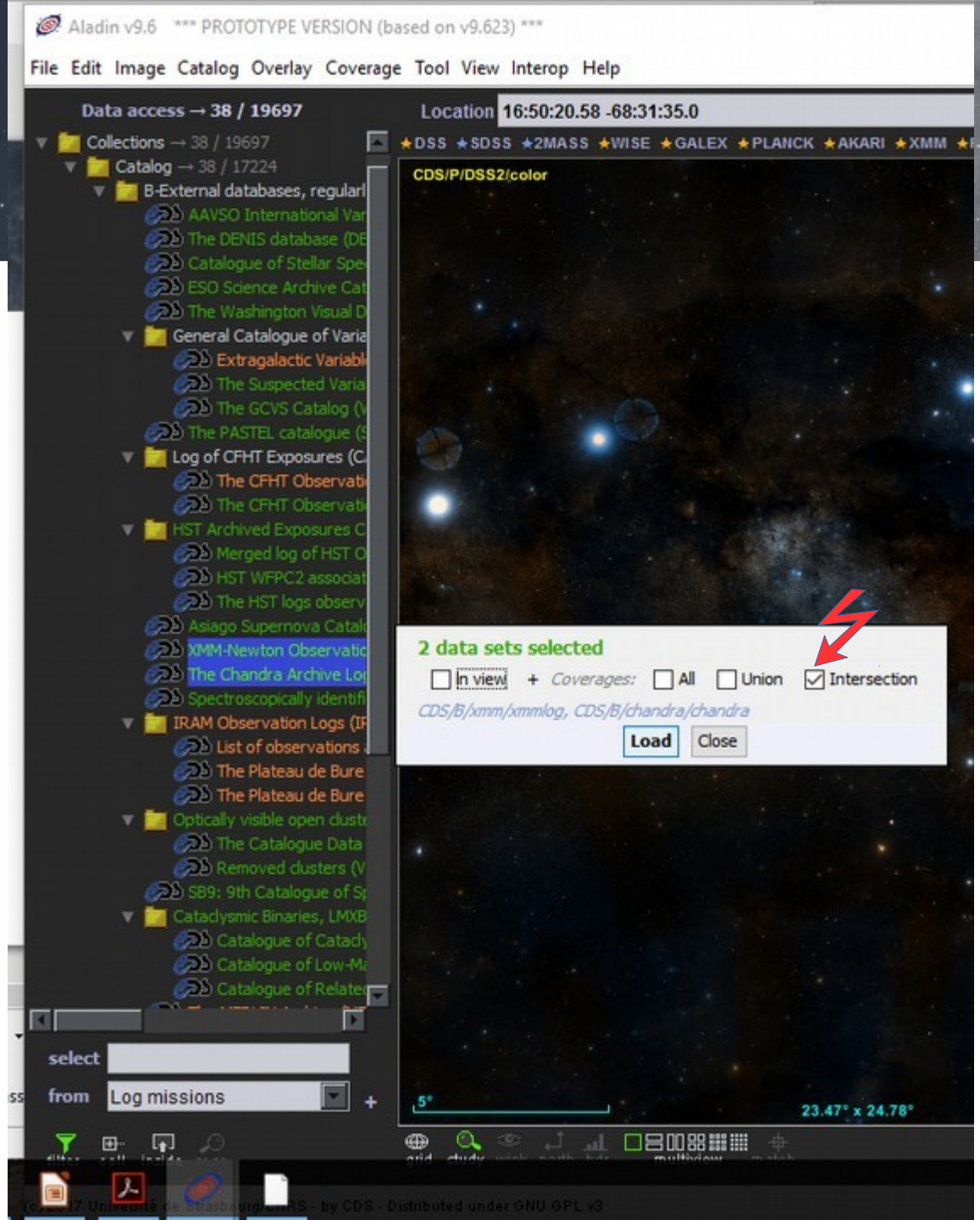
5)Browse XMM,GALEX surveys (HiPS) for each sources

6)Query ROSAT GAVO TAP **service** for one of them

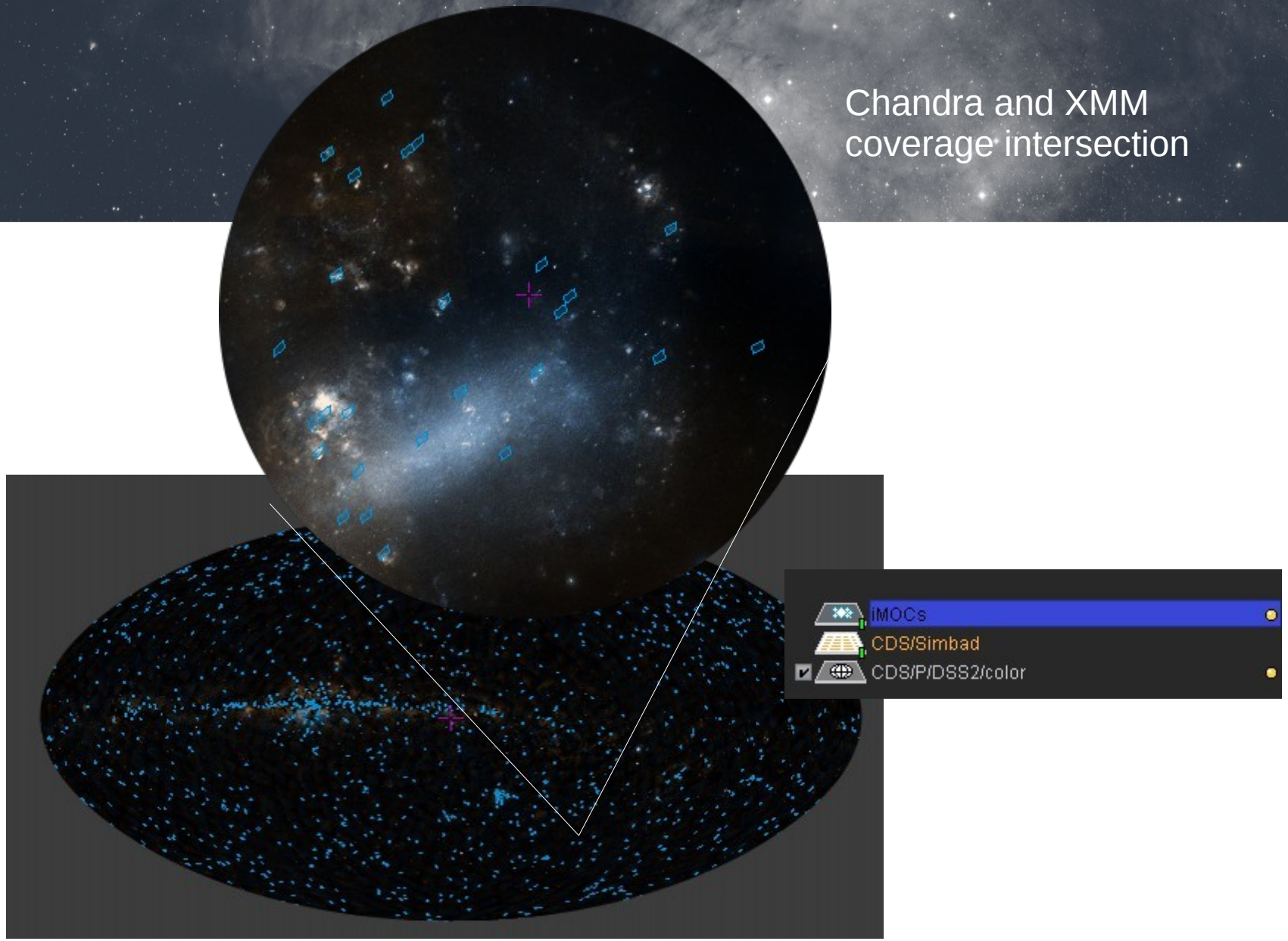
Simbad over DSS color HiPS



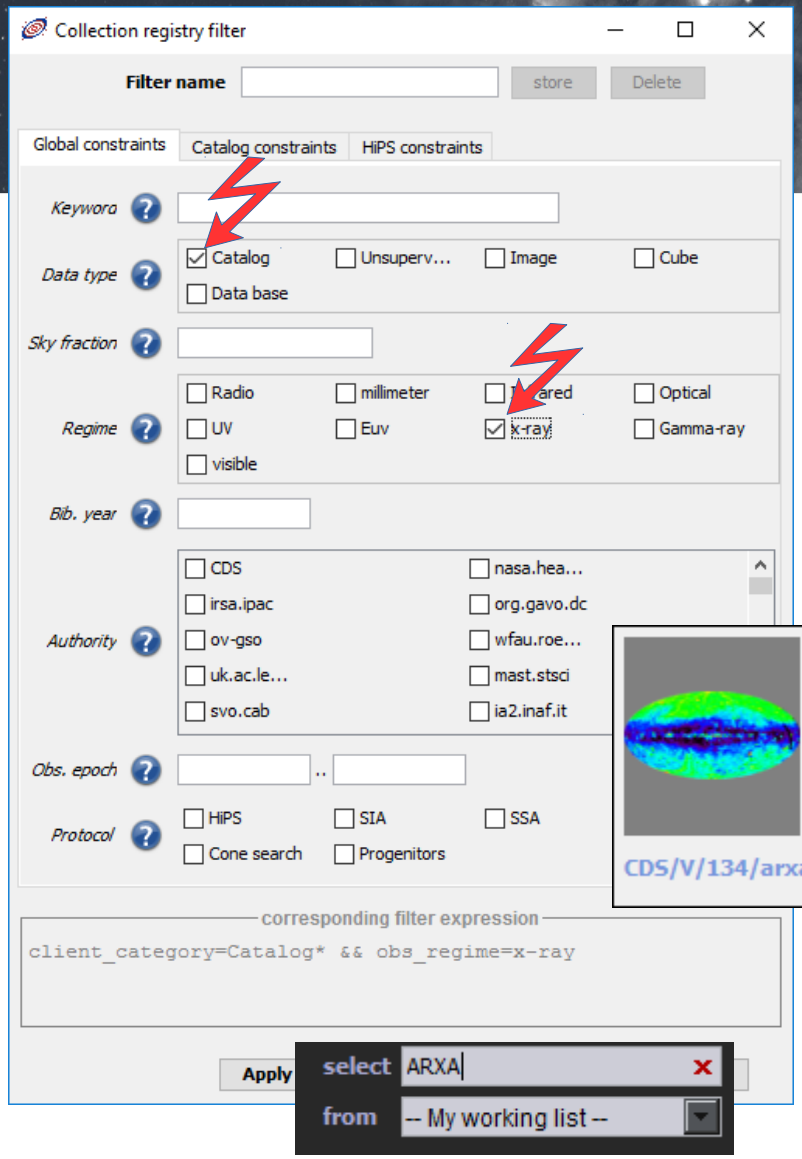
Query the region simultaneously observed by Chandra & XMM

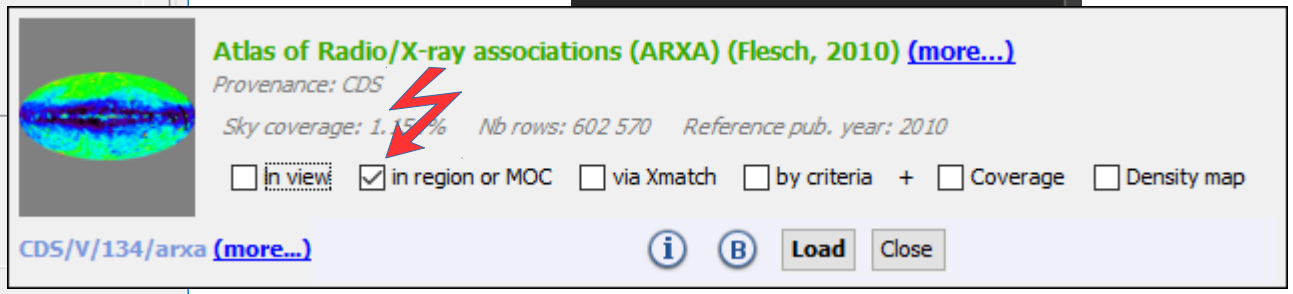


Chandra and XMM coverage intersection

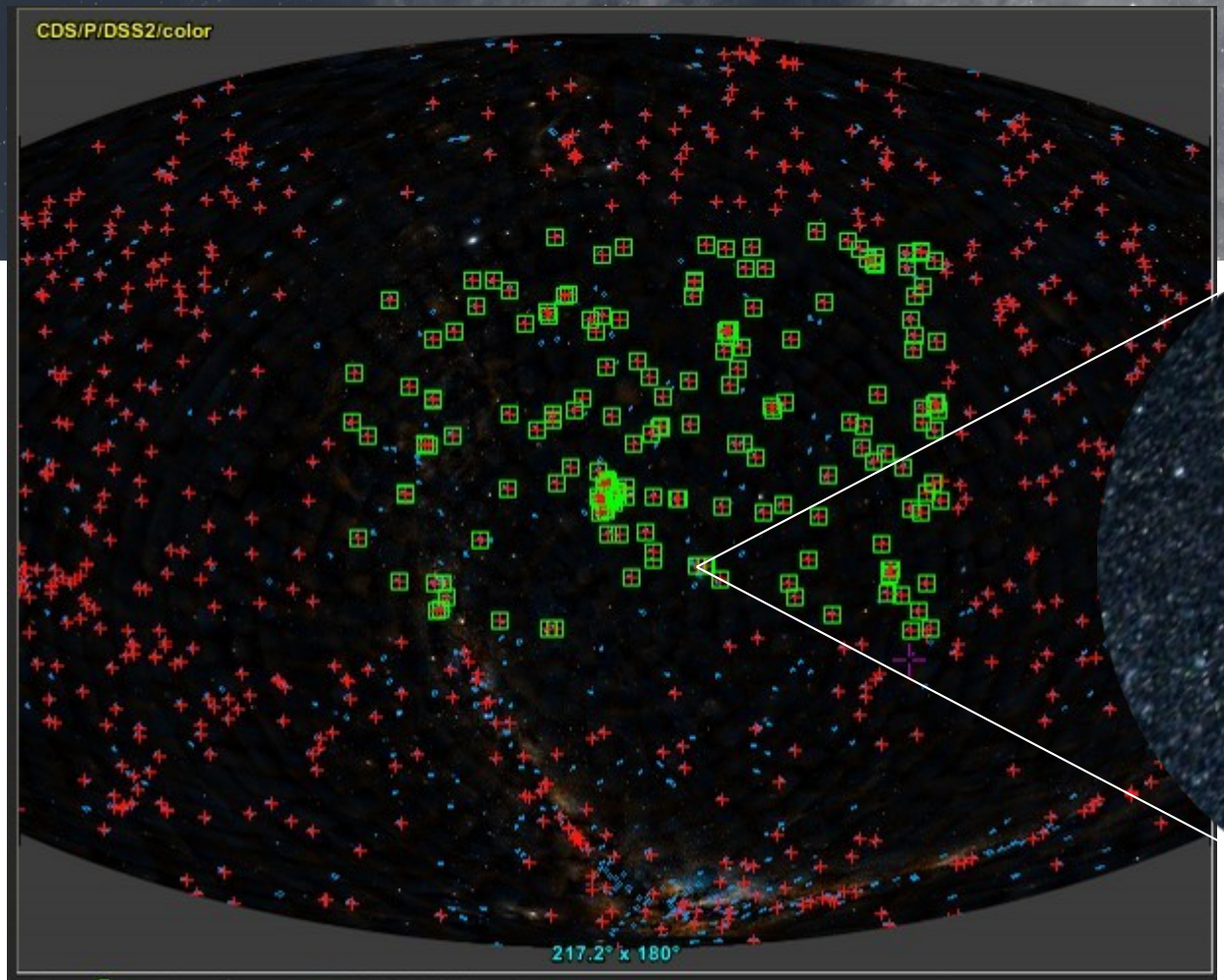


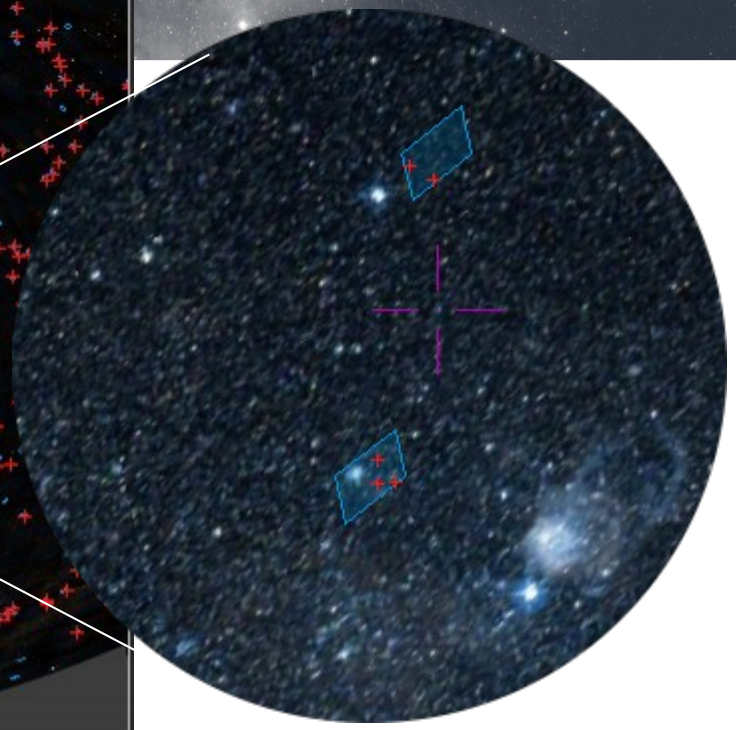
Access Data Tree filtering: Catalog only + X regime => query by region





ARXA sources inside the region

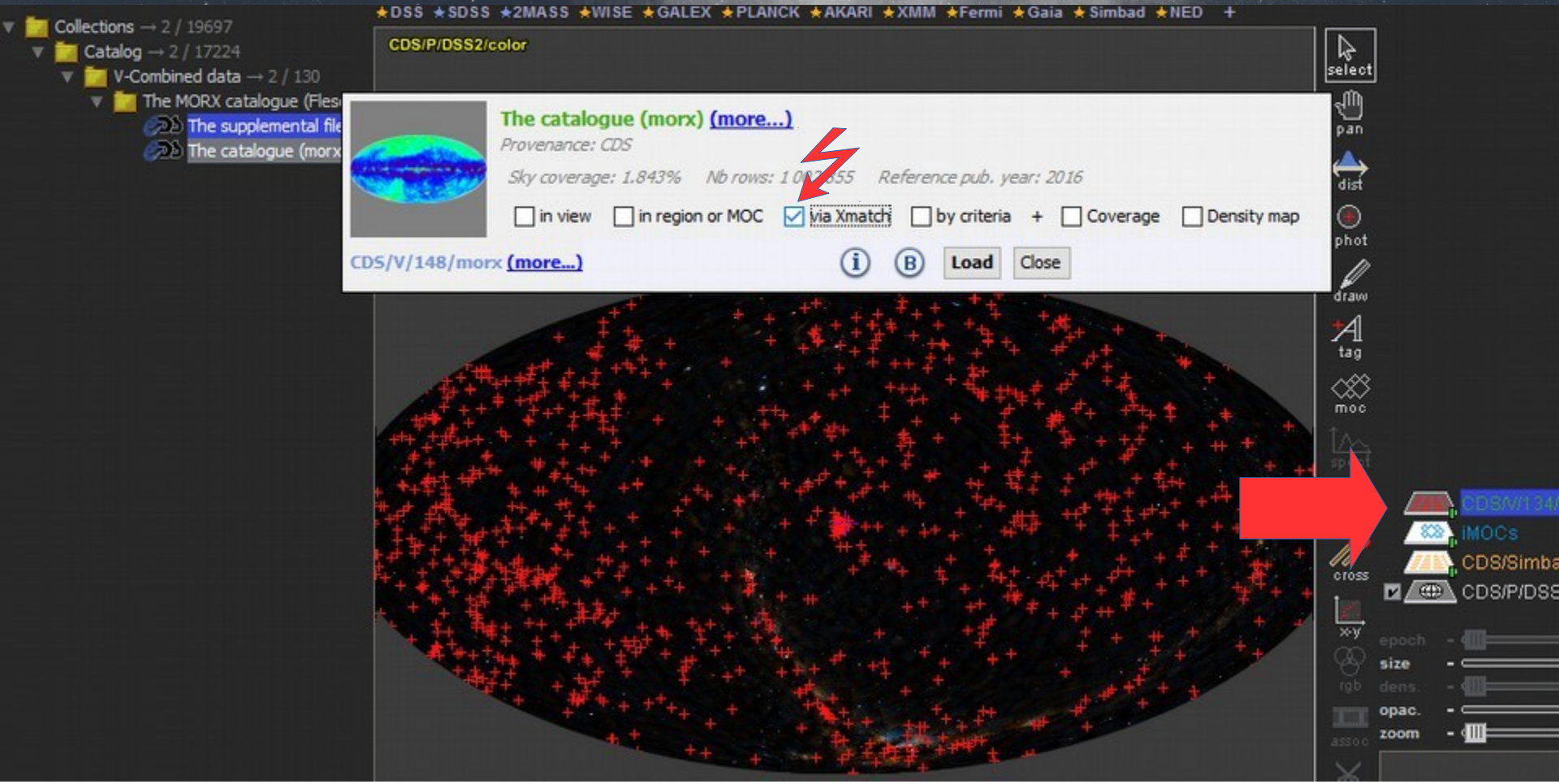




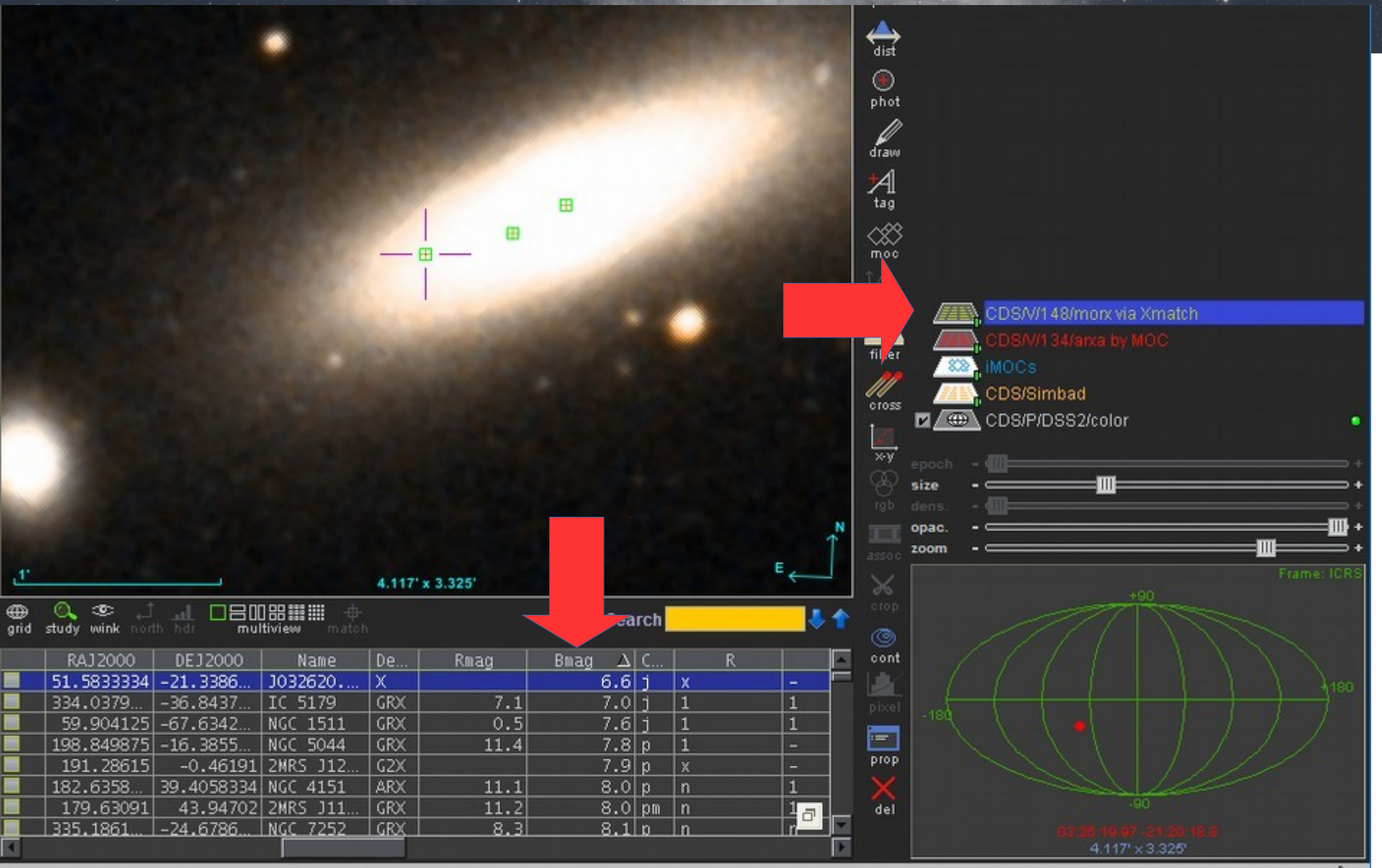
grid study wink north hdr multiview match Search

RAJ2000	DEJ2000	Name	Cl	Rmag	Bmag	z	p...	p...	p...	QO	Rad	X
23 56 58.6	-34 45 16		X	18.8	20.1	NaN	13	75	1	QO	Rad	X
23 56 59.2	-34 45 37		X	18.8	19.1	NaN	70	10	1	QO	Rad	X
23 57 00.0	-34 44 49		X	19	20.3	NaN	45	29	4	QO	Rad	X
23 57 00.8	-34 45 34	ESO 349-10	GRX	9.2	9.4	0.049	6	87	6	QO	Rad	X
23 57 02.4	-34 45 21		X	17	18.3	NaN	27	58	0	QO	Rad	X
23 58 56.8	-55 26 21		X	19.3	21.9	NaN	22	71	1	QO	Rad	X
23 58 58.9	-55 26 35		X	NaN	22.8	NaN	88	5	1	QO	Rad	X
23 59 00.1	-55 27 30	NGC 7796	GX	4.1	8.5	0.011	0	10	47	QO	Rad	X
23 59 07.9	-30 37 40	1H 2351-...	BRX	16.8	17.9	0.165	24	72	0	QO	Rad	X

Xmatching ARXA sources with MORX catalog

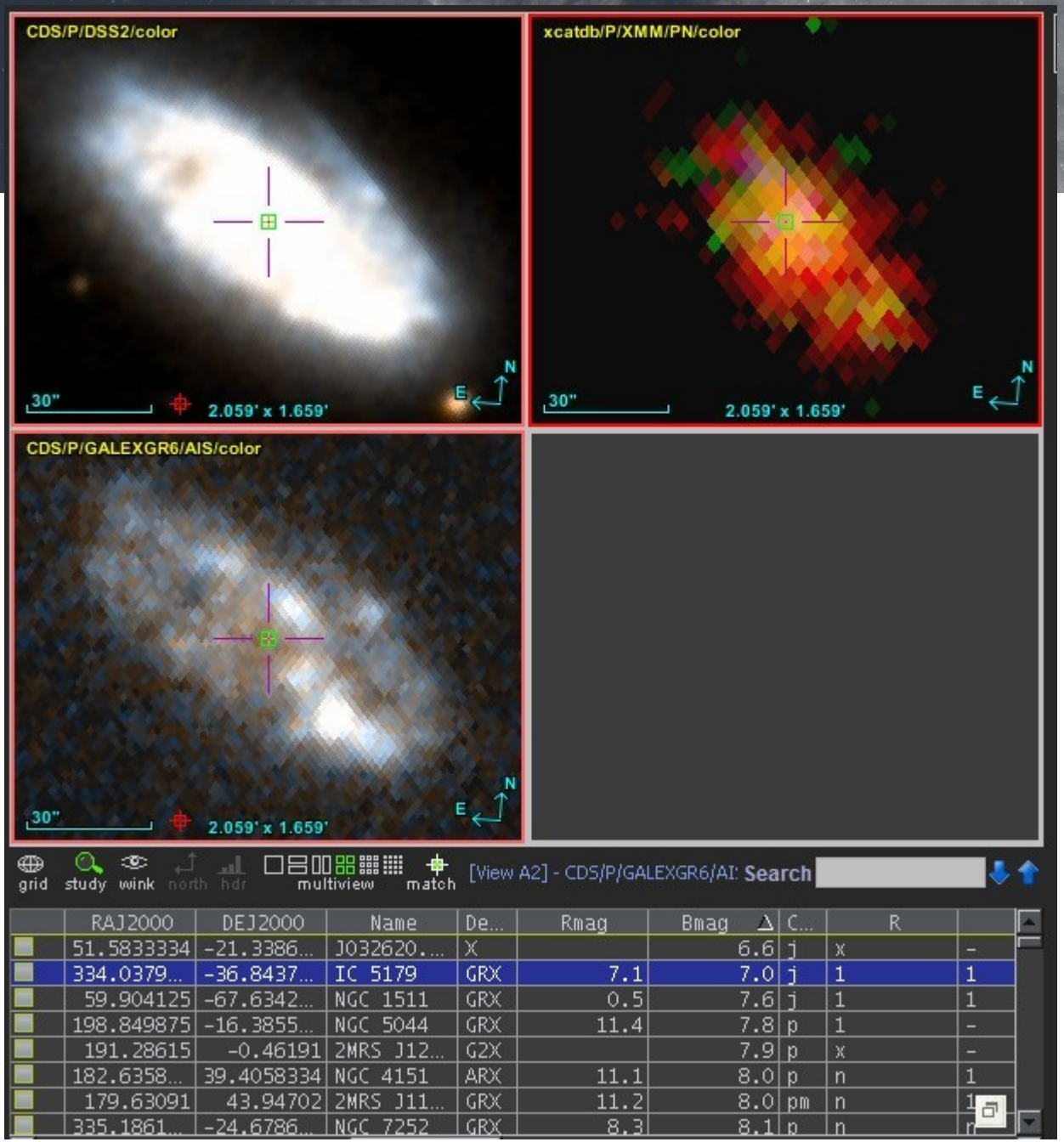


Resulting tables, sorted by magnitude



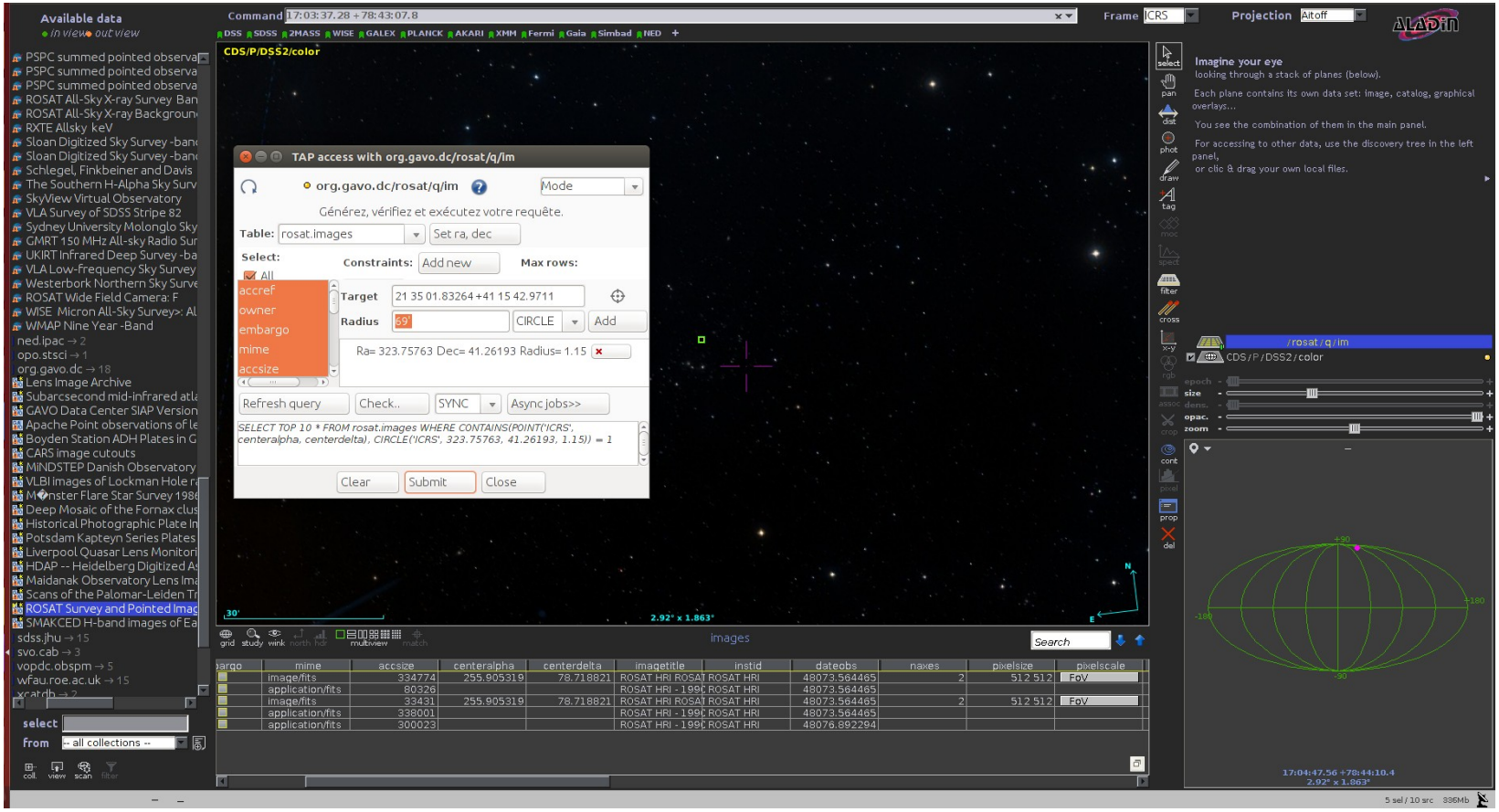
RAJ2000	DEJ2000	Name	De...	Rmag	Bmag	C...	R	
51.5833334	-21.3386...	J032620....	X		6.6	j	x	-
334.0379...	-36.8437...	IC 5179	GRX	7.1	7.0	j	1	1
59.904125	-67.6342...	NGC 1511	GRX	0.5	7.6	j	1	1
198.849875	-16.3855...	NGC 5044	GRX	11.4	7.8	p	1	-
191.28615	-0.46191	2MRS J12...	G2X		7.9	p	x	-
182.6358...	39.4058334	NGC 4151	ARX	11.1	8.0	p	n	1
179.63091	43.94702	2MRS J11...	GRX	11.2	8.0	pm	n	1
335.1861...	-24.6786...	NGC 7252	GRX	8.3	8.1	p	n	r

Generate X and UV thumbnail images for each source

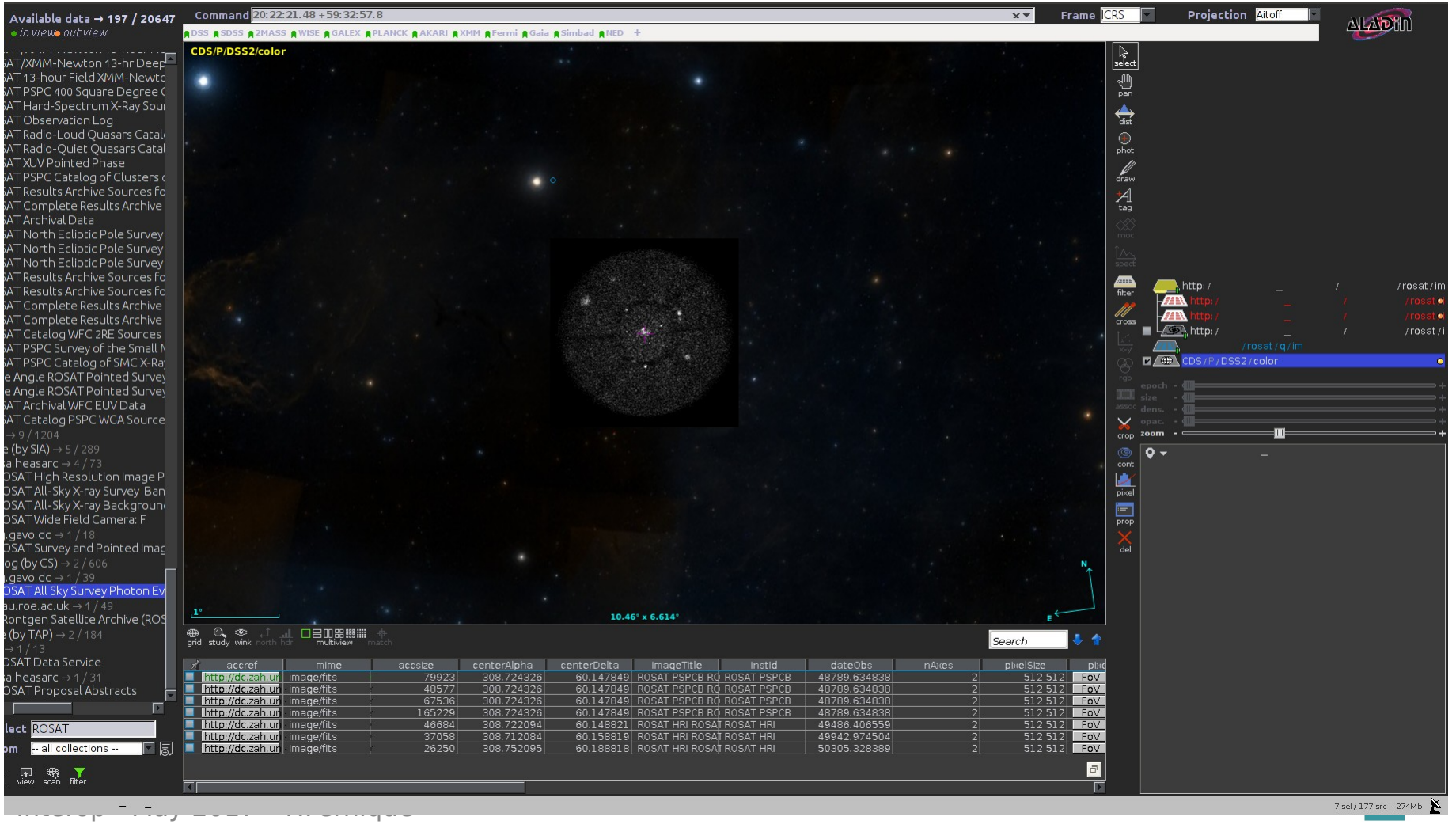


	RAJ2000	DEJ2000	Name	De...	Rmag	Bmag △	C...	R	
	51.5833334	-21.3386...	J032620....	X		6.6	j	x	-
	334.0379...	-36.8437...	IC 5179	GRX	7.1	7.0	j	1	1
	59.904125	-67.6342...	NGC 1511	GRX	0.5	7.6	j	1	1
	198.849875	-16.3855...	NGC 5044	GRX	11.4	7.8	p	1	-
	191.28615	-0.46191	2MRS J12...	G2X		7.9	p	x	-
	182.6358...	39.4058334	NGC 4151	ARX	11.1	8.0	p	n	1
	179.63091	43.94702	2MRS J11...	GRX	11.2	8.0	pm	n	1
	335.1861...	-24.6786...	NGC 7252	GRX	8.3	8.1	p	n	n

TAP query on ROSAT image catalog



ROSAT image


Available data → 197 / 20647
Command
20:22:21.48 +59:32:57.8
Frame
ICRS
Projection
Aitoff
ALADIN
CDS/P/DSS2/color
10.46° x 6.614°
Search
accref
mime
accsize
centerAlpha
centerDelta
imageTitle
instId
dateObs
nAxes
pixelSize
image/fits
ROSAT PSPCB RQ
ROSAT PSPCB
ROSAT HRI
ROSAT HRI RQSAT
-- all collections --
ROSAT

Aladin V10 for large projects

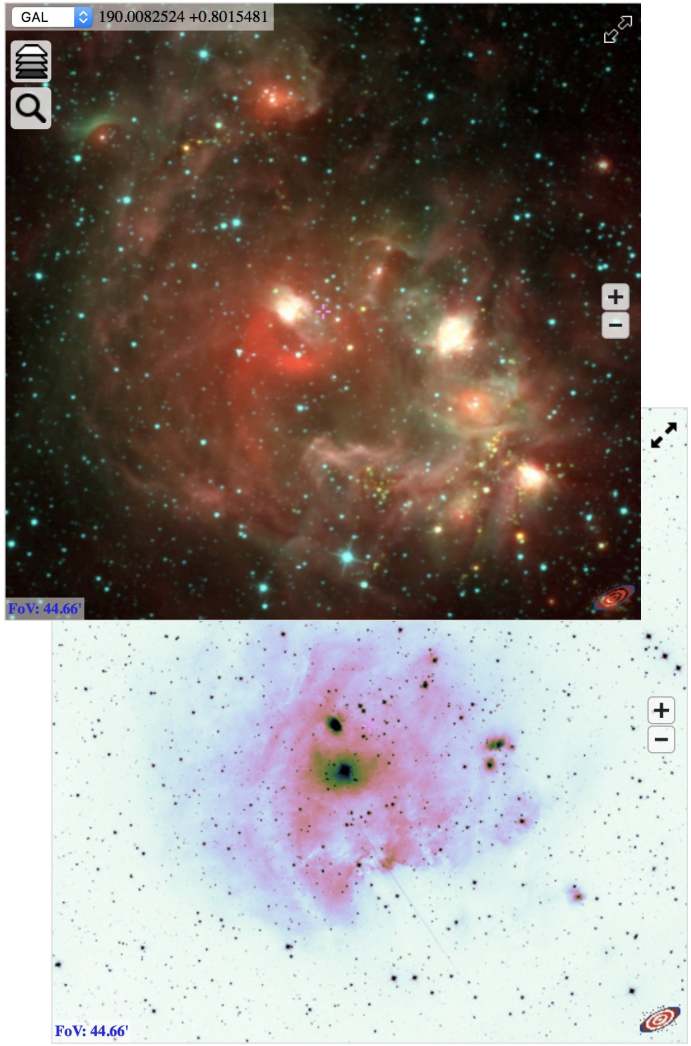
- Projects data in HipS will appear in discovery tree
- You can distribute your own HiPS and keep responsability
- Query by MOC, CDS x-match available in Aladin
- Services in all kind of VO protocols can be queried from the discovery tree

Aladin Lite

Current status, ongoing developments

Aladin Lite:
A HiPS visualizer

- Interactive HiPS visualizer in the browser
- 300+ available HiPS can be visualized in Aladin Lite
- JPG or PNG tiles
  FITS tiles not supported (yet?)
- Support for color maps
- No native support for FITS image display
  - FITS file is first converted to HiPS server-side



Easy embedding

Choose options:

Width	600	px
Height	400	px
Image survey	DSS colored	
Initial location	M 81	
Initial FoV	0.3	degrees

Then copy/paste the following code in your page:

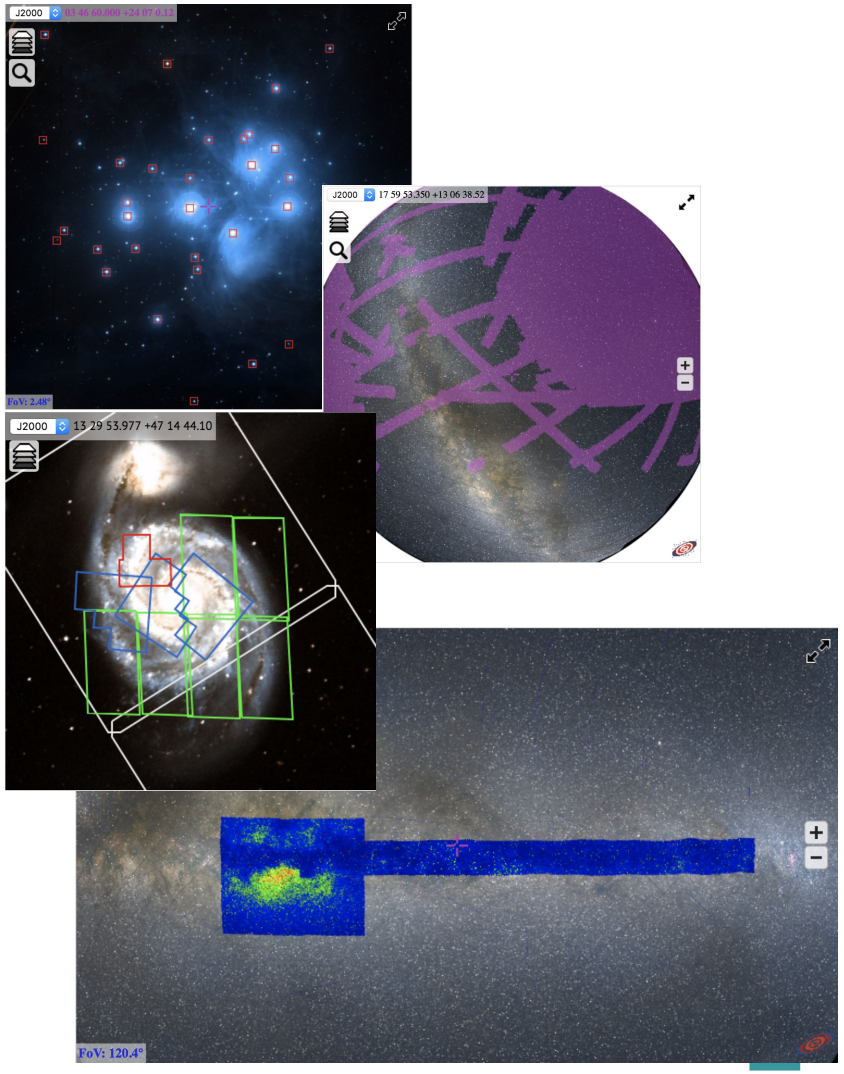
```
<!-- include Aladin Lite CSS file in the head section of your page -->
<link rel="stylesheet" href="//aladin.u-strasbg.fr/AladinLite/api/v2/latest/aladin.min.css" />

<!-- you can skip the following line if your page already integrates the jQuery library -->
<script type="text/javascript" src="//code.jquery.com/jquery-1.9.1.min.js" charset="utf-8"></script>

<!-- insert this snippet where you want Aladin Lite viewer to appear and after the loading of jQuery -->
<div id="aladin-lite-div" style="width:600px;height:400px;"></div>
<script type="text/javascript" src="//aladin.u-strasbg.fr/AladinLite/api/v2/latest/aladin.min.js" charset="utf-8"></script>
<script type="text/javascript">
    var aladin = A.aladin('#aladin-lite-div', {survey: "P/DSS2/color", fov:0.3, target: "M 81"});
</script>
```

Overlays: catalogues, footprints

- **Catalogues**
  - From URL
  - Progressive catalogues (HiPS)
  - programmatically
- **MOCs** (coverage maps)
  - From URL
  - From a list of HEALPix pixels
- **Footprints** (polygons and circles)
  - From STC-S description
  - programmatically
- **Image HiPS**
  - Overlay another HiPS on the base layer



Javascript API

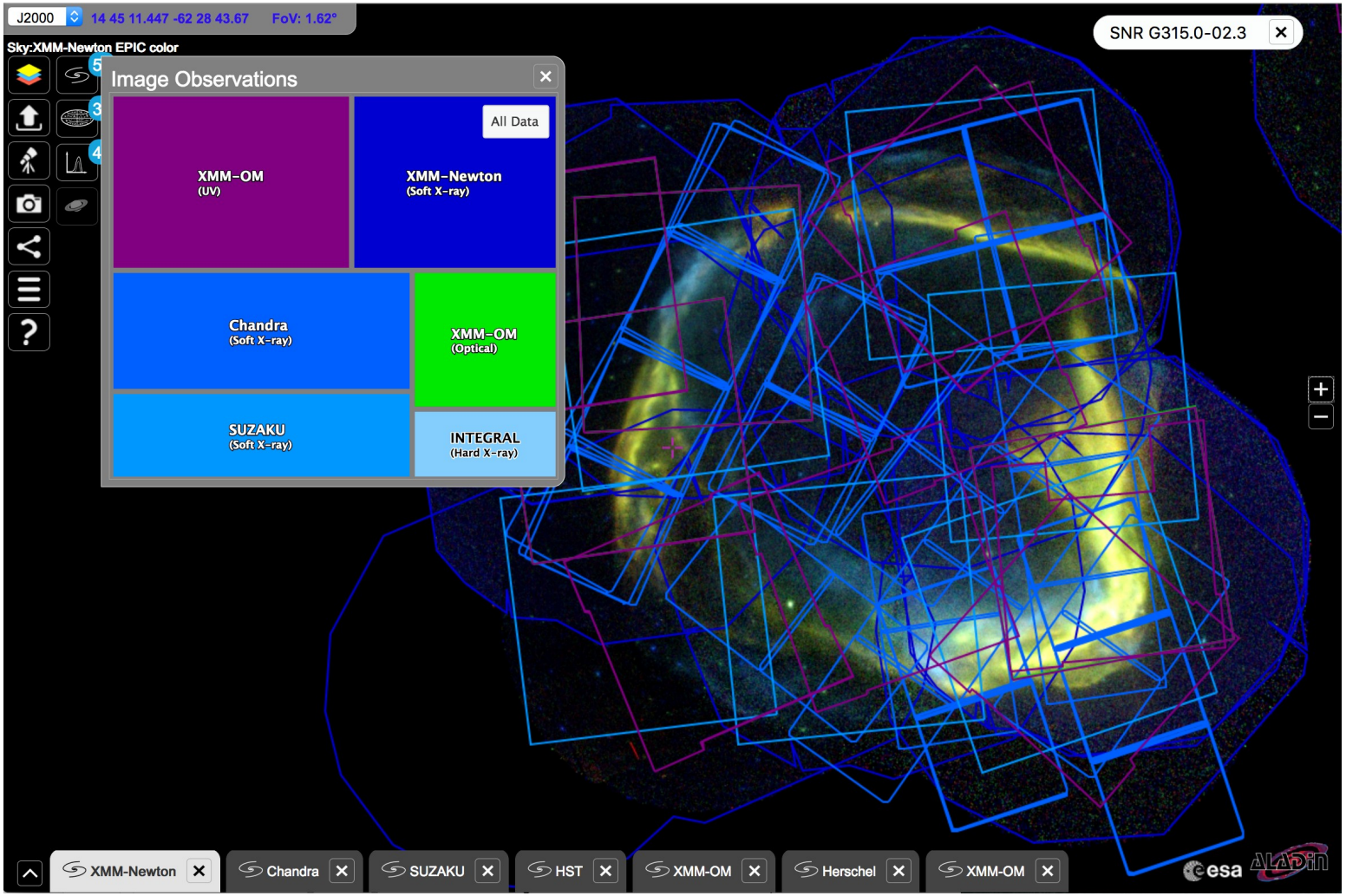
- API allows to control Aladin Lite and make it a component of a larger application

- http://aladin.unistra.fr/AladinLite/doc/API/
  Examples of API usage at
  http://aladin.unistra.fr/AladinLite/doc/API/examples/

Who uses Aladin Lite?

- (*) ESASky
- (*) ESO Phase3 archive search interface
- (*) Gaia archive visualization interface
- (*) LIGO Skymap viewer
- (*) ARCHES Walker
- (*) MOPRA pointing
- (*) JUDO2
- Akari explore tool
- Cassis atlas of Spitzer spectra
- (*) GLIMPSE 360
- (*) CADE
- (*) ADS All Sky Survey
- Maser DB
- Webb Deep-Sky Society
- Galaxy of interactive stars
- (*) Gamma-Sky
- eHST
- DACE
- http://www.tauceti.caltech.edu/kunal/cgi-bin/batch_marshal.py
- UWISH2
- Olimpiadi italiane di astronomia
- ICRAR What's up
- NOAO Data Labs
- Planck Legacy archive
- SkyWatch
- EXOSS Citizen Science
- Giraffe archive
- (*) Astrodeep
- (*) XMM X-Class
- Clusterix SVO
- BlackCAT
- GALAH
- XMM Newton at IRAP
- Subaru Suprime cam
- Skymapper Skyviewer
- SETIquest
- ARI Gaia page
- LEDA : exemple
- (*) ALMA Science Archive
- IRAP RR Lyr Database
- Gaia Follow-Up Network for Solar System Objects
- Gaia Alerts

ESA Sky


J2000
14 45 11.447 -62 28 43.67
FoV: 1.62°
Sky:XMM-Newton EPIC color
SNR G315.0-02.3
Image Observations
All Data
XMM-OM
(UV)
XMM-Newton
(Soft X-ray)
Chandra
(Soft X-ray)
XMM-OM
(Optical)
SUZAKU
(Soft X-ray)
INTEGRAL
(Hard X-ray)
XMM-Newton
Chandra
SUZAKU
HST
XMM-OM
Herschel
XMM-OM
esa
ALADIN

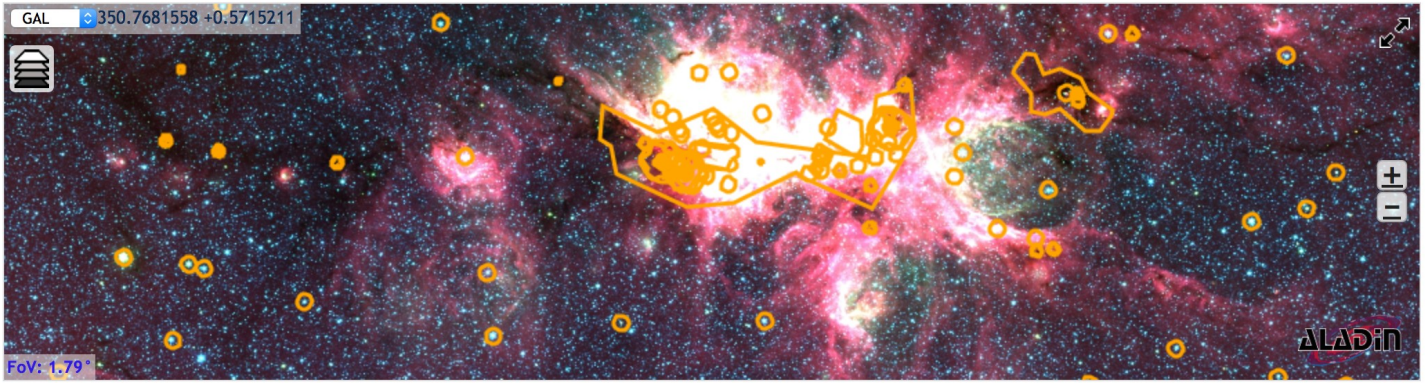
ALMA

ALMA Science Archive Query

Query Form | Results Table

Submit download request

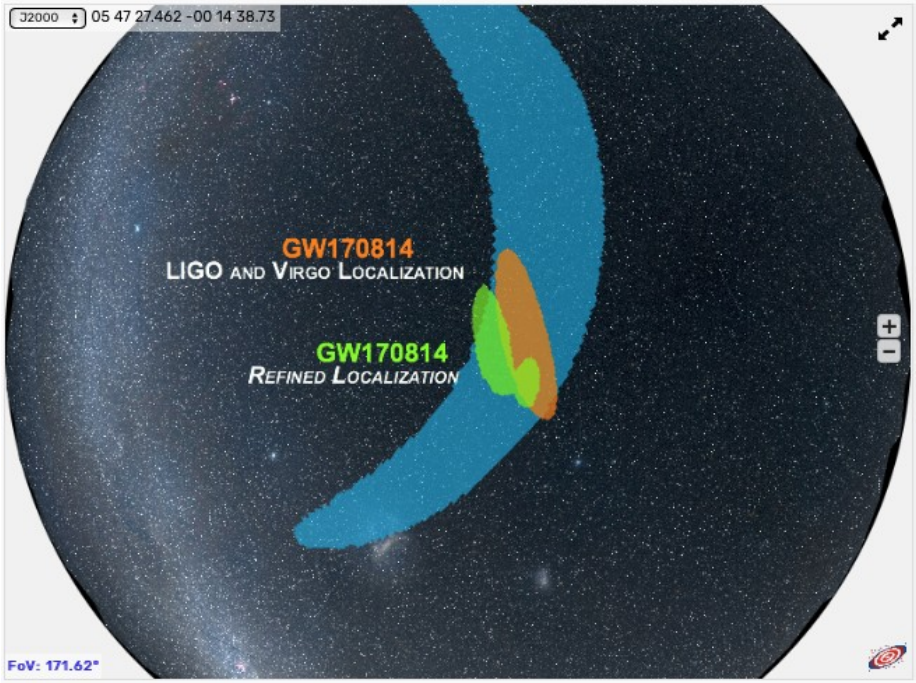
Close Viewer | Results Bookmark | Export Table | Results Help



More columns | Showing 19687 of 19687 rows.

	Project code	Source name	RA	Dec	Band	Integration	Release date
Filter:			H:M:S	D:M:S		seconds	
	2011.0.00191.S	Fomalhaut b	22:57:38.68	-29:37:12.6	7	8709.120	2012-12-06
	2011.0.00101.S	GRB021004	00:26:54.68	+18:55:41.6	7	3749.760	2012-12-06
	2011.0.00131.S	R Scl	01:26:58.08	-32:32:36.4	7	738.319	2012-12-06
	2011.0.00397.S	J030427.53-310838.3	03:04:27.53	-31:08:38.3	7	90.720	2012-12-20
	2011.0.00397.S	J030629.21-335331.5	03:06:29.21	-33:53:31.5	7	90.720	2012-12-20
	2011.0.00397.S	J035448.24-330827.2	03:54:48.24	-33:08:27.2	7	90.720	2012-12-20
	2011.0.00397.S	J040403.61-243600.1	04:04:03.61	-24:36:00.1	7	90.720	2012-12-20

VIRGO



Using the skymap

Click on the various options below to display information relating to each detection.

Detection	Sky localisation	Label	Pop-up info
GW170814 - L1/H1 only	☑	☐	☐
GW170814 - L1/H1/V1	☑	☑	☐
GW170814 - refined skymap	☑	☑	☐
GW150914	☐	☐	☐
GW151226	☐	☐	☐
GW170104	☐	☐	☐

Backgrounds

If you want to see the extension of these sky regions through the constellations you can select an artistic background image ○ **Constellations.**

You can also select various background images at different wavelengths, combining the electromagnetic data with the gravitational-wave information: ◉ **Mellinger (default)** ○ **WISE** ○ **2MASS** ○ **DSS color** ○ **XMM** ○ **Fermi**

Latest developments (available in beta version)

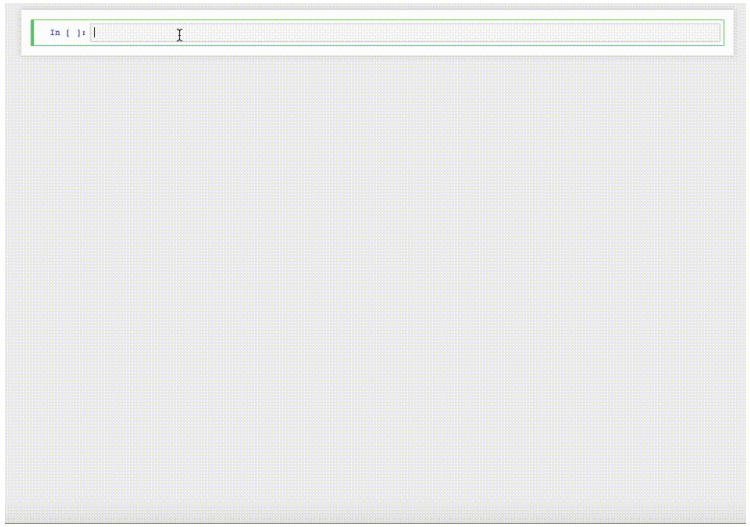
- New listeners available:
  - `positionChanged`
  - `zoomChanged`
  - `click`
  - `mouseMove`
- Improvements in MOC display performance
- Density maps of all VizieR tables available as HiPS
- *ipyaladin*
  - Jupyter widget for integration of Aladin Lite in Python notebooks

ipyaladin

- **A Jupyter widget for Aladin Lite**
- Features
  - Easy integration of Aladin Lite in Python notebooks
  - Control of field of view (target, zoom level, HiPS to display)
  - Linked views
  - Overlay VOTable, Astropy Tables, MOCs
  - Register callbacks triggered by action in widget view

```
In [4]: import ipyaladin.aladin_widget as ipyal

In [5]: aladin = ipyal.Aladin(target='orion', fov=4)
        aladin
```



Ongoing developments (work in progress)

- Mirror management
- HTTPS support
  - Sesame, SIMBAD, HiPS tiles available in HTTPS
  - Still missing: HTTPS access to VizieR catalogues
- Footprints selection (ESASky/ESAC development)
- STC-S parsing improvement
- Mobile devices support (pinch to zoom)

- Source code on *github*
  - In a first time, contribution welcome from *close partners*
  - Currently released under GPL3 license

Aladin Lite for large projects

- As an Implementor :
  - Use Aladin Lite in you service web page in addition to your own functionalities
- As a Developer :
  - Add you own Aladin Lite code to the software to add more integrated functionality,
  - but please keep in touch with Aladin Lite developer (Thomas)