

CDS - *an astronomy data centre for reference data*

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Observatoire de Strasbourg, France



LineA Webinar, 16 February 2018

Centre de Données astronomiques de Strasbourg



hosted at the Observatoire
astronomique de Strasbourg,
Université de Strasbourg

Since 1972...

- Collect useful data on objects in electronic form
- Improve them by critical evaluation and combination
- Distribute the results to the international community
- Conduct research using the data

Science Driven:

- *Necessary evolutions to meet the scientific reference service needs of the astronomy community*
- *Innovations to meet challenges and ensure sustainability*
 - *Science is changing, technology is changing*

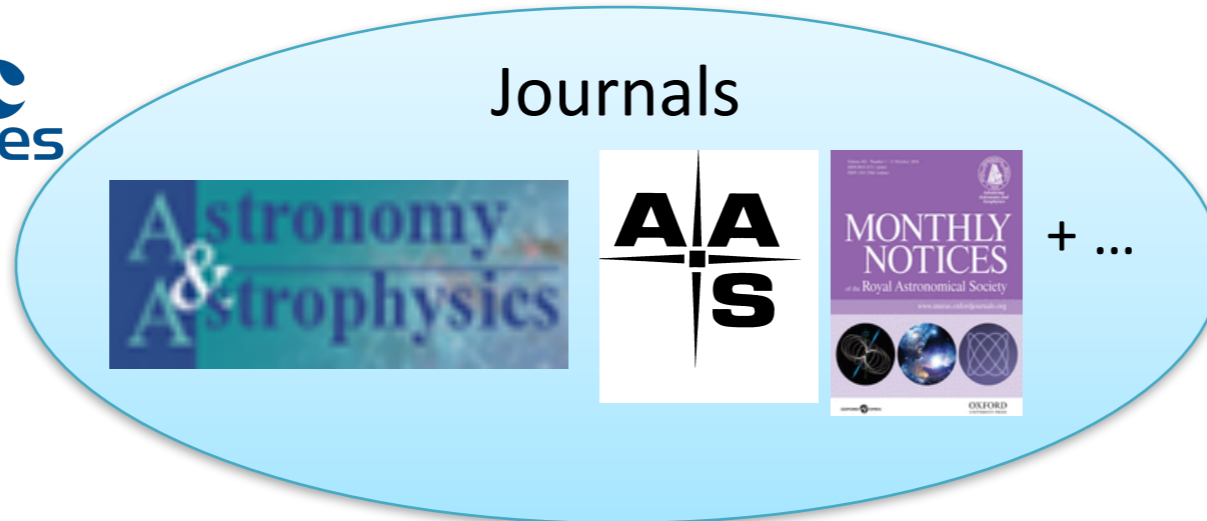
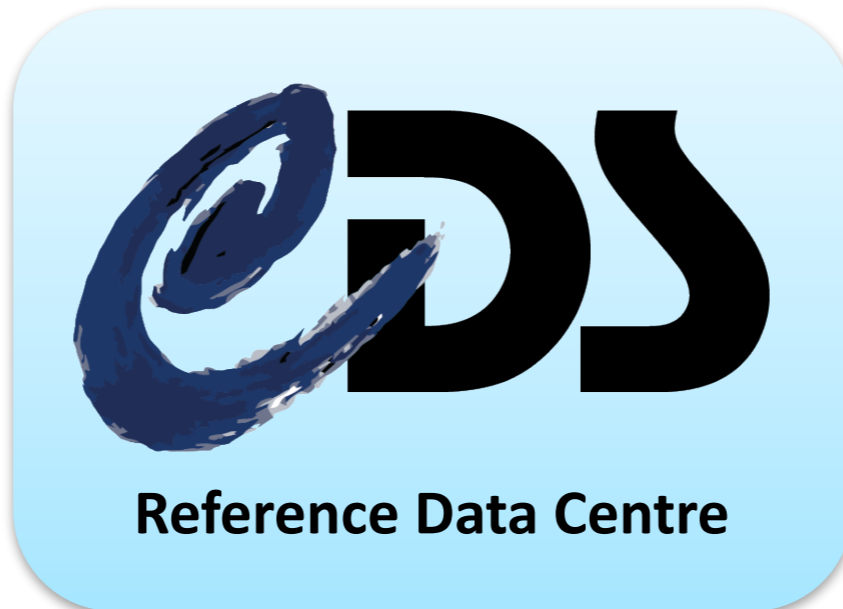
CDS – a part of the global astronomy infrastructure



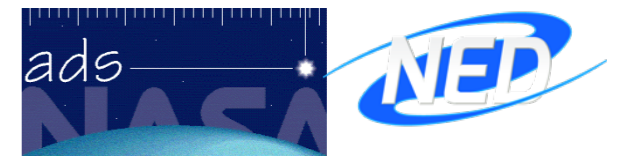
Ground and Space Observatories, Instruments and missions



Archives, Services



Astronomy Data Centres



CADC, MAST, HEASARC, IPAC, + ...

Virtual Observatory



20 members

Data e-Infrastructures



Status

- Supported as a French Research Infrastructure (via CNRS/INSU), plus international partners
 - *serving global community*
- ~38 staff: Scientists, Software Engineers, Documentalists, Admin
- VO-compliant, evolving, collaborative
- Certification - Data Seal of Approval



Reference Data

- From refereed Journals
 - *Astronomical Object IDs, Tables, Science-ready data*
- From major surveys and projects
 - *subsets of the data that make sense to have alongside reference data*
- CDS is for reference data (distinguished from observatory archives or processing data centres)

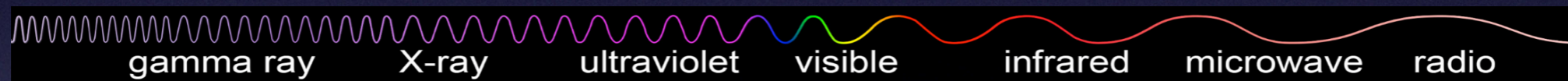
Astronomy

- Publishing and Reference services must evolve because science is constantly changing
- Era of big surveys (but also detailed individual studies)
- Multi-wavelength astronomy, Time Domain astronomy, multi-messenger astronomy coming.

Inter-connected science

- Multi-wavelength, multi-messenger...

messengers: photons, ν , grav. waves, VHE γ



- using multiple instruments/telescopes
- combining data from multiple sources
- more open and collaborative
 - using tools and services that fit the purpose
 - distributed teams/collaborations/projects

CDS services



Astronomical Objects :

IDs, bibliography, measurements (550 k queries/day)



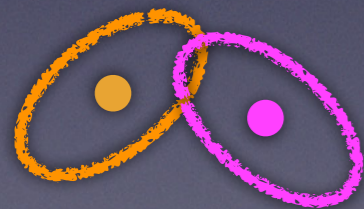
Catalogue Service :

Catalogues, published tables, observation logs, surveys, associated data (300 k q/day)



Visualisation and integration :

images, catalogues, VO portal, All-sky



X-Match : *Catalogue cross-match*



Portal : *Single entry point to all services*

Making information useable

- **Add value** - by homogeneous description of heterogeneous data
- Standardisation - **formats, conventions, V/O protocols**
- Metadata - a level of 'meaning' to the data
- Connections - literature, archives, tools
- Relies on trust - of authors, publishers, data centres, data producers

Interoperability

New Portal - *released 2016*

The screenshot shows the top navigation bar with the CDS logo and menu items: Portal, Simbad, VizieR, Aladin, X-Match, Other, and Help. On the right, there are links for Login, My data, Preferences, and Register. A vertical sidebar on the left contains icons for search, zoom, pan, list, and other functions. The main content area features a large search bar with the placeholder text "Object name or position" and a magnifying glass icon. Below the search bar is a dropdown menu for "J2000" and the text "position :". A link for a "Guided tour" is also visible.

This screenshot shows the search results for "M51". The search bar contains "M51" and the position is given as "13 29 52.698 +47 11 42.93". The results are presented in two columns: "Object (Simbad)" and "Object (NED)".

Property	Simbad	NED
Main ID	M 51	MESSIER 051
Object type	Seyfert 2 Galaxy	Galaxy pair
Morphological type	SABbc	SABc LINER
Magnitudes		
B	9.26	
V	8.36	
R	8.4	
J	6.401	
H	5.653	
K	5.496	

Links for "More info in Simbad" and "More info in NED" are provided at the bottom of each column.

Images

220 HiPS images available 0.20° around 13 29 52.698 +47 11 42.93 :

Wavelength : Gamma-ray X-ray UV Optical Infrared
 Radio Gas-line

Resolution : Low Medium High

Show : All HiPS Most popular My favorites

Filter: iris 10 entries (filtered from 220 total records) continuous update

	title	wavelength	Sky fraction	
★	AKARI Far-infrared All-Sky Survey - color composition WideL/WideS/N60	Infrared	100 %	i
★	AKARI Far-infrared All-Sky Survey - Band N160 (160um)	Infrared	99.88 %	i
★	AKARI Far-infrared All-Sky Survey - Band N60 (65um)	Infrared	99.76 %	i
★	AKARI Far-infrared All-Sky Survey - Band WideL (140um)	Infrared	99.89 %	i
★	AKARI Far-infrared All-Sky Survey - Band WideS (90um)	Infrared	99.76 %	i

★ IRAS-IRIS HEALPix survey, color

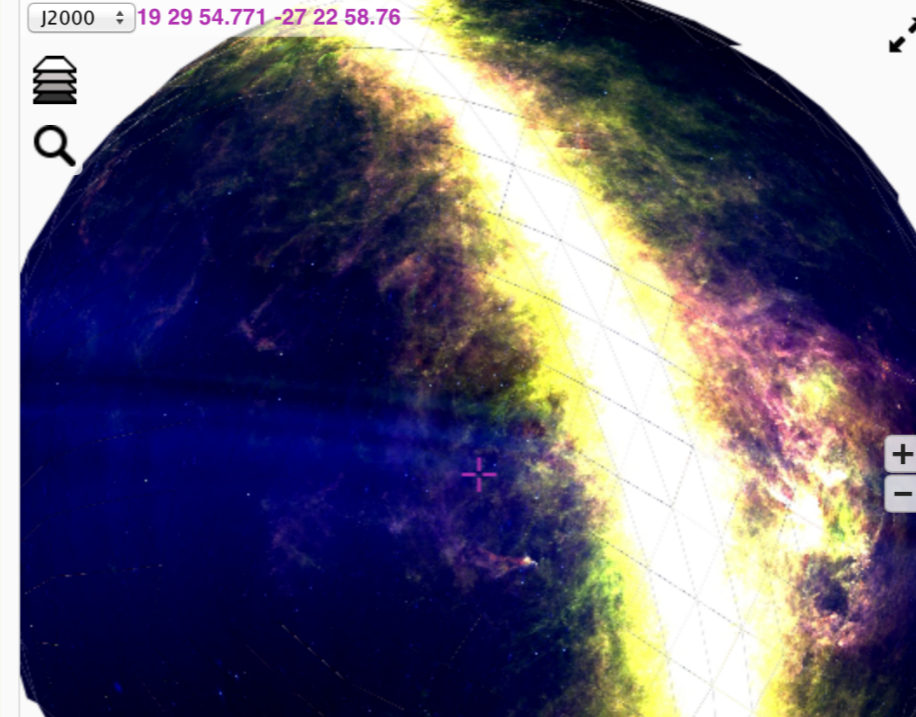
★ IRAS-IRIS BAND 1 - 12um

★ IRAS-IRIS BAND 2 - 25um

★ IRAS-IRIS BAND 3 - 60um

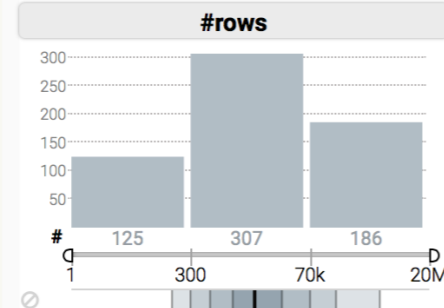
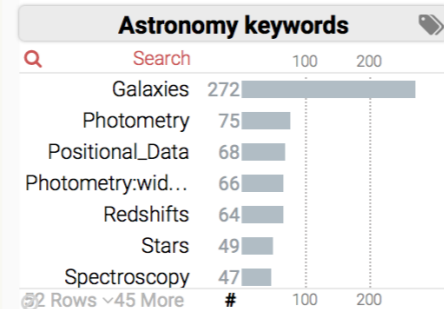
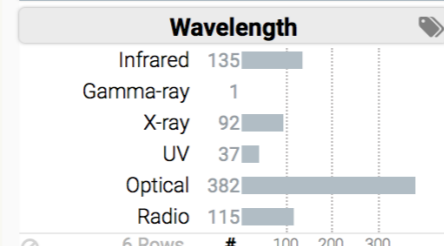
Aladin Lite

IRAS-IRIS HEALPix survey, color



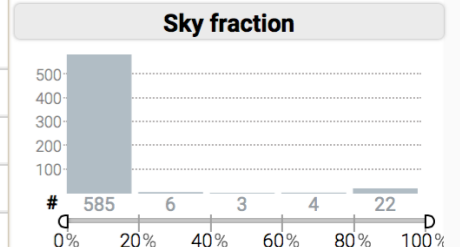
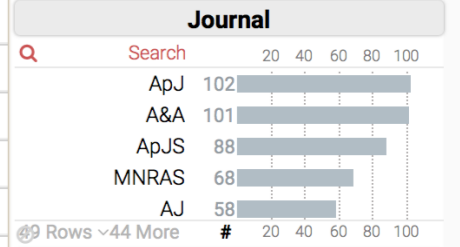
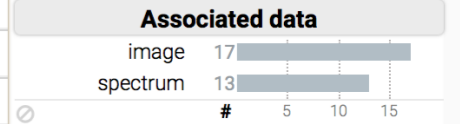
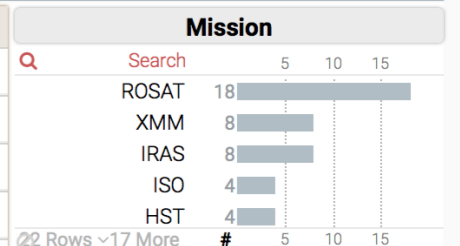
Catalogues

620 VizieR Catalogs within radius 0.20°



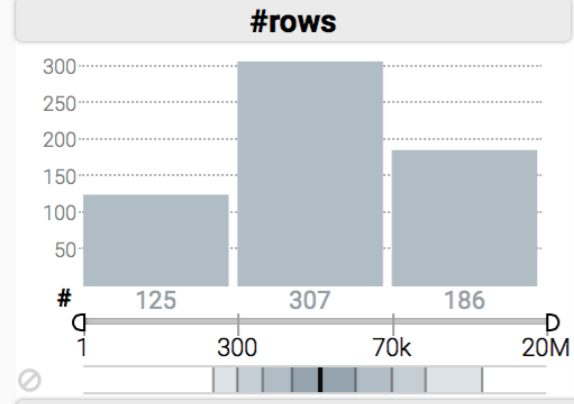
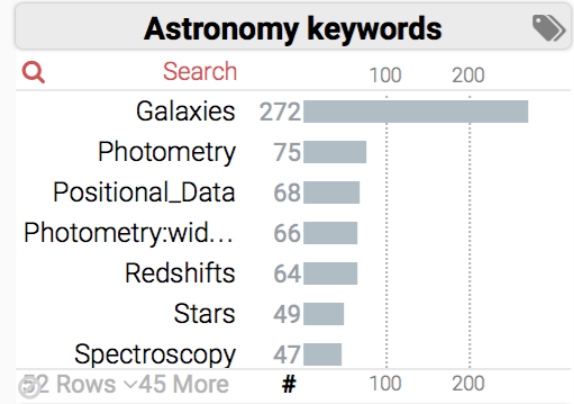
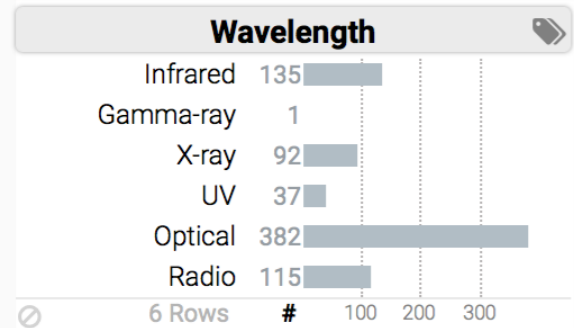
Search: Title

★ The USNO-B1.0 Catalog (Monet+ 2003) i
★ UCAC4 Catalogue (Zacharias+, 2012) i
★ NOMAD Catalog (Zacharias+ 2005) i
★ The Guide Star Catalog, Version 2.3.2 (GSC2.3) (STScI, 2006) i
★ Gaia DR1 (Gaia Collaboration, 2016) (gaia) i
★ Gaia DR1 (Gaia Collaboration, 2016) (tgas) i
★ Gaia DR1 (Gaia Collaboration, 2016) (tgasptyc) i
★ The HST Guide Star Catalog, Version 1.2 (Lasker+ 1996) i
★ VizieR META catalogue (METAobj) i
★ VizieR META catalogue (ReadMeObj) i
★ Carlsberg Meridian Catalog 15 (CMC15) (CMC, 2011) (cmc15) i
★ AllWISE Data Release (Cutri+ 2013) (allwise) i
★ AAVSO Photometric All Sky Survey (APASS) DR9 (Henden+, 2016) (apass9) i
★ UCAC2 Catalogue (Zacharias+ 2004) i
★ Teff and metallicities for Tycho-2 stars (Ammons+, 2006) (tycall) i
★ WISE All-Sky Data Release (Cutri+ 2012) (wise) i
★ The SDSS Photometric Catalog, Release 7 (Adelman-McCarthy+,



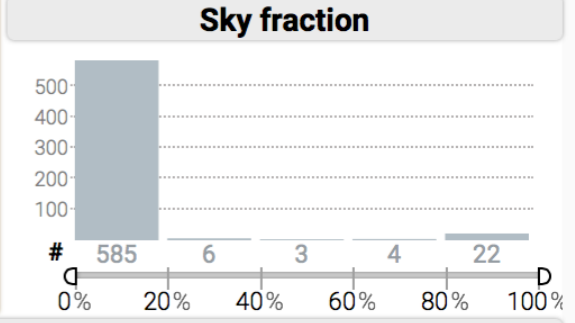
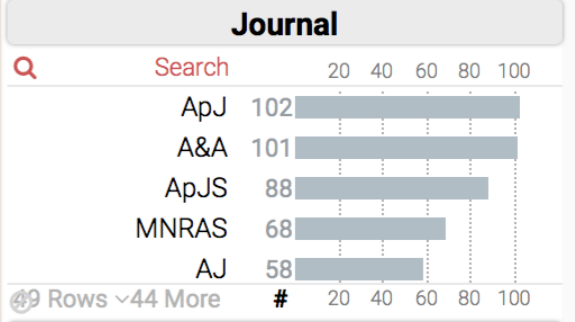
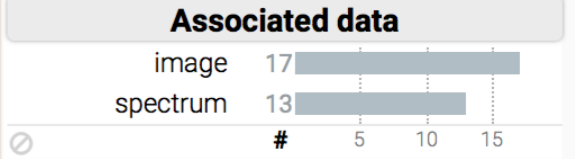
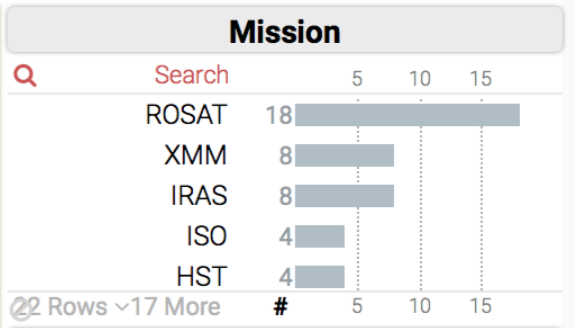
Catalogues

620 VizieR Catalogs within radius 0.20°



Popularity Search: Title

★ The USNO-B1.0 Catalog (Monet+ 2003) i
★ UCAC4 Catalogue (Zacharias+, 2012) i
★ NOMAD Catalog (Zacharias+ 2005) i
★ The Guide Star Catalog, Version 2.3.2 (GSC2.3) (STScI, 2006) i
★ Gaia DR1 (Gaia Collaboration, 2016) (gaia) i
★ Gaia DR1 (Gaia Collaboration, 2016) (tgas) i
★ Gaia DR1 (Gaia Collaboration, 2016) (tgasptyc) i
★ The HST Guide Star Catalog, Version 1.2 (Lasker+ 1996) i
★ VizieR META catalogue (METAobj) i
★ VizieR META catalogue (ReadMeObj) i
★ Carlsberg Meridian Catalog 15 (CMC15) (CMC, 2011) (cmc15) i
★ AllWISE Data Release (Cutri+ 2013) (allwise) i
★ AAVSO Photometric All Sky Survey (APASS) DR9 (Henden+, 2016) (apass9) i
★ UCAC2 Catalogue (Zacharias+ 2004) i
★ Teff and metallicities for Tycho-2 stars (Ammons+, 2006) (tycall) i
★ WISE All-Sky Data Release (Cutri+ 2012) (wise) i
★ The SDSS Photometric Catalog, Release 7 (Adelman-McCarthy+,



SIMBAD

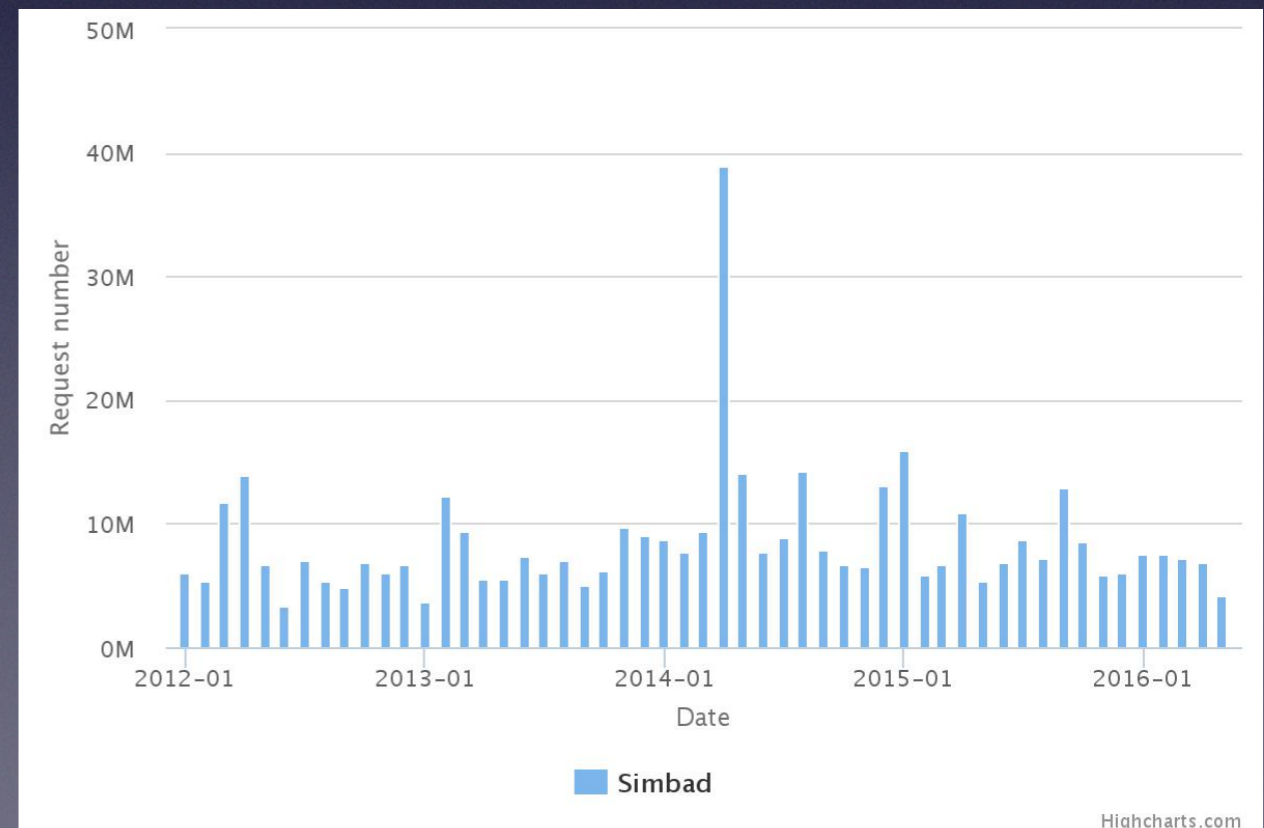
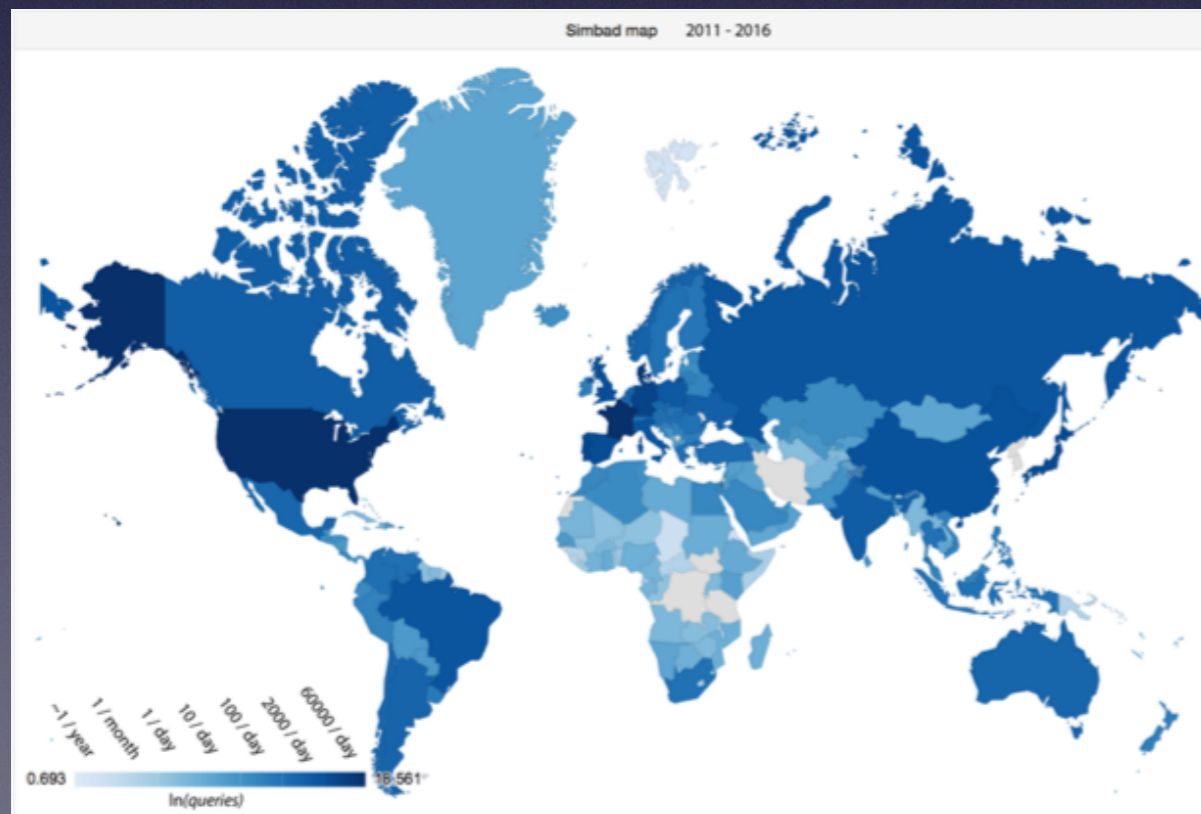


- Database of astronomical objects extracted and curated from the literature
- object types, coordinates, cross-identifications, citations, basic data
- 9.3 million objects, 27 million identifiers, 14 million citation links

- well known via the ‘object name resolver’

Sombrero → 39 59.43185 -11 37 22.9954

- widely used: ~550 000 queries/day in 2017



Vizier



Catalogues, published tables, observation logs, surveys, associated data

- Heterogeneous tables described by standardised metadata
- Curated by professional ‘documentalists’
- Cooperation with major journals and ADS
- Added value - interoperability, usability, services (e.g. X-Match, visualisation, complex queries - ADQL TAP)

Simple query interface

The screenshot displays the VizieR web interface. At the top, a navigation bar includes links for Portal, Simbad, VizieR (selected), Aladin, X-Match, Other, and Help. The VizieR logo is also present in the top right corner. Below the navigation bar, the VizieR title is centered. A large white box contains the VizieR logo and a description: "VizieR provides access to the most complete library of published astronomical catalogues and data tables available on line organized in a self-documented database. Query tools allow the user to select relevant data tables and to extract and format records matching given criteria. Currently, 13348 catalogues are available. [more info](#)".

Below the description, there are three search options:

- Free text search:** A text input field containing "catalogue name, author, ..." and a blue "Find catalogues" button.
- Position:** A text input field containing "position or object name", a numeric input field containing "10", a quote button, a blue "Find catalogues" button, and a "Photometry" button with a small icon.
- Go to the classic form:** A button labeled "Advanced search".

At the bottom, there are three columns of navigation links:

- VizieR:** How to publish my catalog, Help and tutorials, View large catalogs, Rules of usage, Mirrors.
- Other related services:** TAPVizieR, Photometry viewer, CDS cross-match service, VizieR using the batch mode, VO compatibility.
- Simple browsing modes:** By hierarchical organisation, By acronyms or abbreviations, By popularity, Recently entered into VizieR, Catalogs having images, spectra...

Advanced query interface

VizieR Service

[VizieR photometry viewer](#)

Find catalogs among 11959 available

Clear Find...

Expand search

? *Catalog, author's name, word(s) from title, description, etc. e.g.: AGN, Veron, I/239, or bibcodes...*

- ▶ [Search for catalogs by column descriptions \(UCD\)](#) ?
- ▶ [Search for catalogs containing additional data](#)

Search by Position across 12558 tables

Target Name (resolved by [Sesame](#)) or Position: Clear J2000 Target dimension: 2 arcmin Go!

Radius Box size

Wavelength	Mission	Astronomy
Radio	AKARI	Abundances
IR	ANS	Ages
optical	ASCA	AGN
UV	BeppoSAX	Associations
EUV	CGRO	Atomic_Data
X-ray	Chandra	Binaries:cataclysmic
Gamma-ray	COBE	Binaries:eclipsing

[More about VizieR](#) ~ 0 matching catalogs

Browsing modes: [Designation](#), [Acronyms](#), [Favorites](#), [Dates](#), [Image spectra](#), [Kohonen](#)
Or list [the large surveys](#)

Tools related to VizieR

- **new** [Photometry viewer](#) : Plot photometry (sed) including all VizieR
- [TAP VizieR](#) : query VizieR using ADQL (a SQL extension dedicated for astronomy)
- [CDS cross-match service](#) : fast cross-identification between any 2 tables, including VizieR catalogues, SIMBAD

Query interface for single table

Portal Simbad VizieR Aladin X-Match Other Help

VizieR Search Page

Fast Xmatch with large catalogs or Simbad

Simple Target **List Of Targets**

Target Name (resolved by [Sesame](#)) or Position: J2000 2 arcmin

Radius Box size

1. J/ApJS/206/10/table3 CANDELS multiwavelength catalog (Galametz+, 2013) [2013ApJS...206...10G](#) [ReadMe+ftp](#)
[spectrum/SED](#) [Similar Catalogs](#)

J/ApJS/206/10 [Post annotation](#)
 Multiwavelength catalog in the Ultra-Deep Field[spectrum/SED] (35932 rows)

Simple Constraint **List Of Constraints**

Query by **Constraints** applied on Columns (Output Order: + -)

Show	Sort	Column	Constraint	Explain (UCD)
<input type="checkbox"/>	<input type="radio"/>	recno	<input type="text"/>	Record number within the original table (starting from 1) (meta.record)
<input checked="" type="checkbox"/>	<input type="radio"/>	Seq	<input type="text"/>	[1/35932] Source identifier (Note 1) (meta.id)
<input checked="" type="checkbox"/>	<input type="radio"/>	RAJ2000	<input type="text"/> deg	Right Ascension in decimal degrees (J2000) (Note 2) (pos.eq.ra;meta.main)
<input checked="" type="checkbox"/>	<input type="radio"/>	DEJ2000	<input type="text"/> deg	Declination in decimal degrees (J2000) (Note 2) (pos.eq.dec;meta.main)
<input checked="" type="checkbox"/>	<input type="radio"/>	Hlim	<input type="text"/> mag ⁽ⁿ⁾	HST/WFC3 F160W limiting AB magnitude (Note 3) (phot.mag)
<input checked="" type="checkbox"/>	<input type="radio"/>	Q	<input type="text"/>	⁽ⁿ⁾ [0/3] Source reliability, 0=ok (Note 4) (meta.code.qual)
<input checked="" type="checkbox"/>	<input type="radio"/>	CStar	<input type="text"/>	[0/1] CLASS_STAR parameter (1=stellar) (Note 1) (src.class.starGalaxy)
<input checked="" type="checkbox"/>	<input type="radio"/>	SED	<input type="text"/> SED	SED plot from the photometry (meta.ref.url) spectrum/SED
<input checked="" type="checkbox"/>	<input type="radio"/>	uFlux	<input type="text"/> uJy ⁽ⁿ⁾	CFHT/Megacam u band flux density (Note 5) (phot.flux.density;em.opt.U)
<input type="checkbox"/>	<input type="radio"/>	e_uFlux	<input type="text"/> uJy ⁽ⁿ⁾	Uncertainty in uFlux (Note 5) (stat.error)
<input checked="" type="checkbox"/>	<input type="radio"/>	BFlux	<input type="text"/> uJy ⁽ⁿ⁾	Subaru B band flux density (Note 5) (phot.flux.density;em.opt.B)

ALL cols

⁽ⁿ⁾ indicates a possible blank or NULL column

Search Criteria
[Save in CDSportal](#)

Keywords

J/ApJS/206/10/ta...
 Tables

J/ApJS/206/10
 ..table3

Preferences
 max: 50

HTML Table

All columns

Compute

Distance ρ

Position angle θ

Distance (x,y)

Galactic

J2000

B1950

Ecl. J2000

default

Sort by Distance

+ order -

No sort

Position in:


Sexagesimal

Decimal $^{\circ}$


Mirrors

CDS, France

Query result


Portal Simbad **VizieR** Aladin X-Match Other Help 

VizieR Result Page

Send to VO tools 

[Show the target form](#)
[Show constraint information](#)

The 3 columns in *color* are computed by VizieR, and are *not part of the original data*.

[J/ApJS/206/10/table3](#) [CANDELS multiwavelength catalog \(Galametz+, 2013\)](#) [2013ApJS...206...10G](#) [ReadMe+ftp](#)
[Post annotation](#) Multiwavelength catalog in the Ultra-Deep Field (35932 rows) [spectrum/SED](#) 

<i>Full</i>	<i>RAJ2000</i>	<i>DEJ2000</i>	recno	Seq	RAJ2000	DEJ2000	Hlim	Q	CStar	SED	uFlux	e	BFlux	e	VFlux	e	RFlux
	"h:m:s"	"d:m:s"			deg	deg	mag				uJy	uJy	uJy	uJy	uJy	uJy	uJy
1	02 16 53.703	-05 16 40.99	1	1	034.2237643	-05.2780530	27.3495	2	0.520	SED	0.0253	0.0079	0.1071	0.0051	0.1962	0.0079	0.2803
2	02 16 53.737	-05 16 40.62	2	2	034.2239039	-05.2779490	27.4093	2	0.600	SED	-0.0163	0.0081	0.0273	0.0053	0.0505	0.0081	0.0621
3	02 16 53.638	-05 16 40.63	3	3	034.2234901	-05.2779525	27.4355	0	0.000	SED	0.0532	0.0065	0.2287	0.0046	0.3859	0.0071	0.5431
4	02 17 03.625	-05 16 39.90	4	4	034.2651053	-05.2777490	27.3034	2	0.010	SED	0.0134	0.0069	0.0613	0.0040	0.0916	0.0077	0.1151
5	02 17 10.888	-05 16 39.53	5	5	034.2953666	-05.2776482	27.2547	0	0.000	SED	6.8024	0.0078	11.7075	0.0047	18.3565	0.0087	25.0891
6	02 17 02.959	-05 16 39.50	6	6	034.2623285	-05.2776390	27.6433	0	0.990	SED	0.1916	0.0062	0.4718	0.0035	0.8439	0.0069	1.0121
7	02 17 05.645	-05 16 38.86	7	7	034.2735198	-05.2774614	27.3550	0	0.000	SED	0.0740	0.0069	0.0789	0.0041	0.0889	0.0075	0.1051
8	02 16 53.877	-05 16 38.58	8	8	034.2244858	-05.2773846	27.7858	1	0.360	SED	-0.0033	0.0063	0.0219	0.0044	0.0398	0.0066	0.0411
9	02 17 09.414	-05 16 38.59	9	9	034.2892250	-05.2773859	27.2079	2	0.910	SED	0.0674	0.0063	0.0898	0.0030	0.0936	0.0054	0.0761
10	02 16 56.187	-05 16 38.52	10	10	034.2341120	-05.2773670	27.7893	0	0.000	SED	0.0418	0.0065	0.1074	0.0030	0.1502	0.0046	0.1491
11	02 16 57.568	-05 16 39.02	11	11	034.2398666	-05.2775057	27.7778	0	0.000	SED	0.0485	0.0064	0.0701	0.0032	0.0826	0.0049	0.1161
12	02 17 08.427	-05 16 38.21	12	12	034.2851117	-05.2772799	27.3177	0	0.000	SED	0.3300	0.0069	0.3761	0.0032	0.3142	0.0070	0.2721
13	02 16 53.647	-05 16 38.11	13	13	034.2235310	-05.2772525	27.8098	0	0.000	SED	-0.0011	0.0072	0.0882	0.0048	0.1671	0.0074	0.2011
14	02 17 19.015	-05 16 38.14	14	14	034.3292298	-05.2772620	27.6179	0	0.080	SED	0.1564	0.0071	0.1824	0.0040	0.1997	0.0074	0.2291
15	02 17 07.748	-05 16 38.46	15	15	034.2822842	-05.2773499	27.3130	0	0.000	SED	0.6138	0.0080	0.7718	0.0037	0.8846	0.0070	0.8031
16	02 16 57.962	-05 16 38.06	16	16	034.2415067	-05.2772375	27.7839	0	0.000	SED	0.1609	0.0065	0.1845	0.0035	0.1899	0.0049	0.1891
17	02 17 10.963	-05 16 39.47	17	17	034.2956798	-05.2776302	27.3381	2	0.010	SED	3.5312	0.0078	6.0261	0.0049	10.3968	0.0092	12.9821
18	02 17 28.040	-05 16 37.73	18	18	034.3668318	-05.2771468	27.3898	2	0.020	SED	-0.0001	0.0063	0.0077	0.0031	0.0017	0.0049	0.0021
19	02 16 54.134	-05 16 37.65	19	19	034.2255569	-05.2771244	27.9561	0	0.010	SED	0.1361	0.0063	0.1382	0.0042	0.0981	0.0062	0.1351
20	02 17 17.256	-05 16 37.55	20	20	034.3219019	-05.2770976	27.2060	2	0.050	SED	0.1590	0.0063	0.2295	0.0031	0.2846	0.0057	0.2741
21	02 17 08.837	-05 16 37.94	21	21	034.2868189	-05.2772051	27.4361	0	0.080	SED	0.1811	0.0077	0.3102	0.0038	0.4060	0.0070	0.3941
22	02 17 26.714	-05 16 37.83	22	22	034.3613081	-05.2771756	27.3226	2	0.400	SED	0.2465	0.0070	0.3366	0.0040	0.3986	0.0066	0.3831
23	02 17 09.849	-05 16 37.60	23	23	034.2910377	-05.2771121	27.7011	0	0.050	SED	0.0243	0.0070	0.0350	0.0034	0.0408	0.0059	0.0431
24	02 16 53.683	-05 16 37.54	24	24	034.2236773	-05.2770947	27.9998	0	0.000	SED	0.0131	0.0072	0.0276	0.0046	0.0504	0.0071	0.0771
25	02 17 20.489	-05 16 37.43	25	25	034.3353705	-05.2770628	27.7102	2	0.530	SED	0.0487	0.0067	0.0612	0.0035	0.0648	0.0058	0.0571
26	02 17 03.703	-05 16 39.29	26	26	034.2654298	-05.2775807	27.6767	2	0.030	SED	0.0155	0.0072	0.0381	0.0042	0.1007	0.0081	0.1481

Search Criteria
[Save in CDSportal](#)
 Keywords
 Tables

Preferences
 max: 50
 HTML Table
 All columns
 Compute
 Distance ρ
 Position angle θ
 Distance (x,y)
 Galactic
 J2000
 B1950
 Ecl. J2000

 Sort by Distance
 + order -
 No sort
 Position in:
 Sexagesimal
 Decimal $^\circ$

Vizier: Multiple Interfaces

Vizier web page, Aladin interface,
CDS Portal, direct URL queries,
Topcat interface, DS9, VO TAP,
VO Cone Search, VizQuery

Vizier TAP service

- web interface
- ADQL checking
- examples
- VO compliant
- Topcat +

tapvizier.u-strasbg.fr/adql/

(among 37,831,197 sources)

catalogues	description	tables
VI/145	ASC Gaia Attitude Star Catalog (Smart, 2015) astronomy : Positional_Data ;	<input type="checkbox"/> VI/137/gum_qso (979315 rows) (positic Gaia Universe Model Snapshot (GUMS) (qua <input type="checkbox"/> VI/137/gum_sn (49814 rows) (positions Gaia Universe Model Snapshot (GUMS) (supe <input type="checkbox"/> VI/145/attitude (8633831 rows) (positic Gaia Attitude Star Catalog (ASC) {\em (8,6: sources)} (\originalcolumnnames)
J/A+A/523/A48	Gaia photometry (Jordi+, 2010) wavelength : optical ; IR ; astronomy : Photometry ; Stars ; Photometry:wide-band ;	<input type="checkbox"/> J/A+A/523/A48/table11 (10328 rows , Magnitudes values for Gaia, Johnson-Cousin Hipparcos and Sloan bands for 2582 combin Teff, logg, [M/H] and 4 absorptions (0,1,3,5, \vizContent{model} <input type="checkbox"/> J/A+A/523/A48/table12 (2582 rows) Computed bolometric corrections in Gaia bai \vizContent{model} <input type="checkbox"/> J/A+A/523/A48/table13 (7746 rows) Computed ratios for interstellar absorption in bands for 2582 combinations of Teff, logg, [absorptions \vizContent{model} (1,3,5)

Showing 1 to 5 of 5 entries [First](#) [Previous](#) [1](#) [Next](#) [Last](#)

Columns and constraints Sky area Unit change of coordinates

* Modify the query with the upper tabs.

Max records all limit [Update query](#)

```

1 -- output format : csv
2 SELECT TOP 100 "I/337/tgas".hip, "I/337/tgas".tycho2_id, "I/337/tgas".source_id, "I/337/tgas".ra, "I/337/tgas".ra_error, "I/337/tgas".parallax, "I/337/tgas".pmRA, "I/337/tgas".pmdec, "I/337/tgas".duplicated_source, "I/337/tgas".phot_g_mean_flux, "
3 FROM "I/337/tgas"
4 WHERE 1=CONTAINS(POINT('ICRS',"I/337/tgas".ra,"I/337/tgas".dec), CIRCLE('ICRS', 56.75, 24.1167, 2.))
5 AND "I/337/tgas".phot_g_mean_mag<7
  
```

Query name Output format [Run](#) [Quickview](#) [Reset](#) [Test](#)

✓ Your query is correct !

List of your TAP queries [Refresh](#) [Abort](#) [Destroy](#) [Properties](#)

name	phase	start	destruction	results
'I/337/tgas'	COMPLETED	Sun Nov 13 14:34:17 CET 2016	Fri Nov 18 14:34:17 CET 2016	download (csv)

Showing 1 to 1 of 1 entries [First](#) [Previous](#) [Next](#) [Last](#)

Favorite tables available to construct queries

* You can not make query on more than two tables.
* Selected tables are automatically stored locally.

catalog	table	
<input checked="" type="checkbox"/> I/337	I/337/tgas (2057050 rows)	🗑️

[Construct your query](#)

[Upload your data](#)

Name File/Url

* to use an uploaded table in the query, you must prefix its name with TAP_UPLOAD (i.e. TAP_UPLOAD.myTable).

Computed ratios for interstellar absorption in bands for 2582 combinations of Teff, logg, [absorptions \vizContent{model} (1,3,5)

catalogues

description

tables

Showing 1 to 5 of 5 entries

First Previous 1 Next Last

Columns and constraints Sky area Unit change of coordinates

* Modify the query with the upper tabs

Max records limit 100

Update query

```
-- output format : csv
2 SELECT TOP 100 "I/337/tgas".hip, "I/337/tgas".tycho2_id, "I/337/tgas".source_id, "I/337/tgas".ra, "I/337/tgas".ra_error, "I/337/tgas".parallax, "I/337/tgas".pmRA, "I/337/tgas".pmdec, "I/337/tgas".duplicated_source, "I/337/tgas".phot_g_mean_flux,
3 FROM "I/337/tgas"
4 WHERE 1=CONTAINS(POINT('ICRS',"I/337/tgas".ra,"I/337/tgas".dec), CIRCLE('ICRS', 56.75, 24.1167, 2.))
5 AND "I/337/tgas".phot_g_mean_mag<7
```

Query name "I/337/tgas"

Output format csv

Run

Quickview

Reset

Test

✓ Your query is correct !

List of your TAP queries

Refresh

Abort

Destroy

Properties

Show all entries

Search:

name	phase	start	destruction	results
'I/337/tgas'	COMPLETED	Sun Nov 13 14:34:17 CET 2016	Fri Nov 18 14:34:17 CET 2016	download (csv)

Showing 1 to 1 of 1 entries

First Previous Next Last

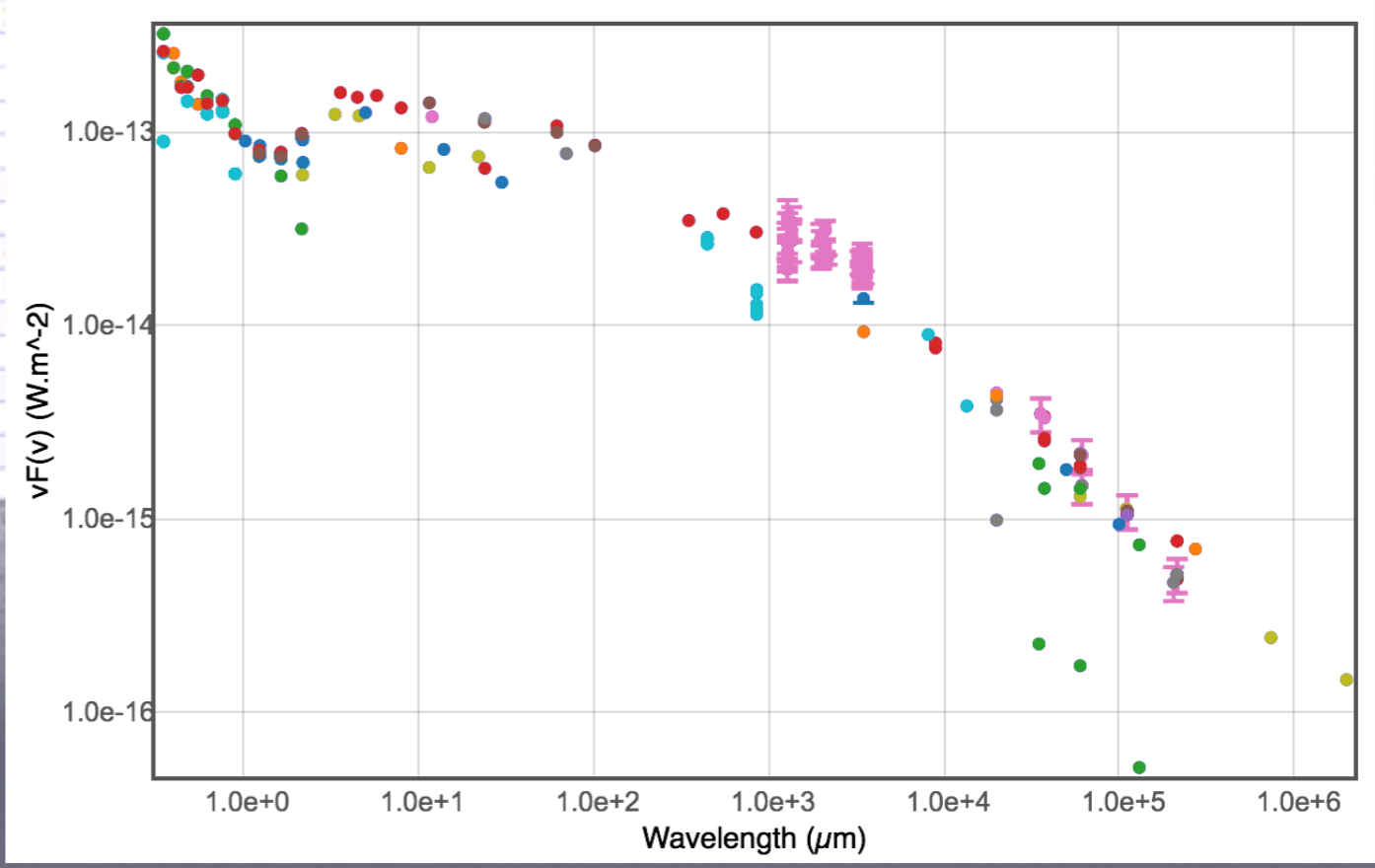
✗ Error:TypeError: undefined is not an object (evaluating 'data.error')

© UDS/CNRS

Contact

Photometry in catalogues

Full	2UCAC	RAJ2000	e	DEJ2000	e	UCmag	No	Nc	pmRA	pmDE	2MASS	Jmag	Kmag
		deg	mas	deg	mas	mag			mas/yr	mas/yr		mag	mag
1	32373958	187.2463827	15	+01.9468434	15	12.43	4	2	-15.7	-7.6	855626345	10.915	10.167
2	32373967	187.3425680	12	+01.9778012	13	10.20	4	8	-3.3	-3.7	855626394	9.533	9.319
3	32543380	187.1322115	15	+02.0783695	15	15.87	2	2	-11.9	-25.0	855619179	13.731	13.435
4	32543381	187.1521298	15	+02.0176656	15	14.90	2	2	-6.6	-3.5	855619179	13.731	13.435
5	32543385	187.1763859	22	+02.0937712	42	15.64	3	2	-10.1	17.1	855619047	13.940	13.168
6	32543388	187.1912221	15	+02.0374417	17								



VizieR Photometry viewer

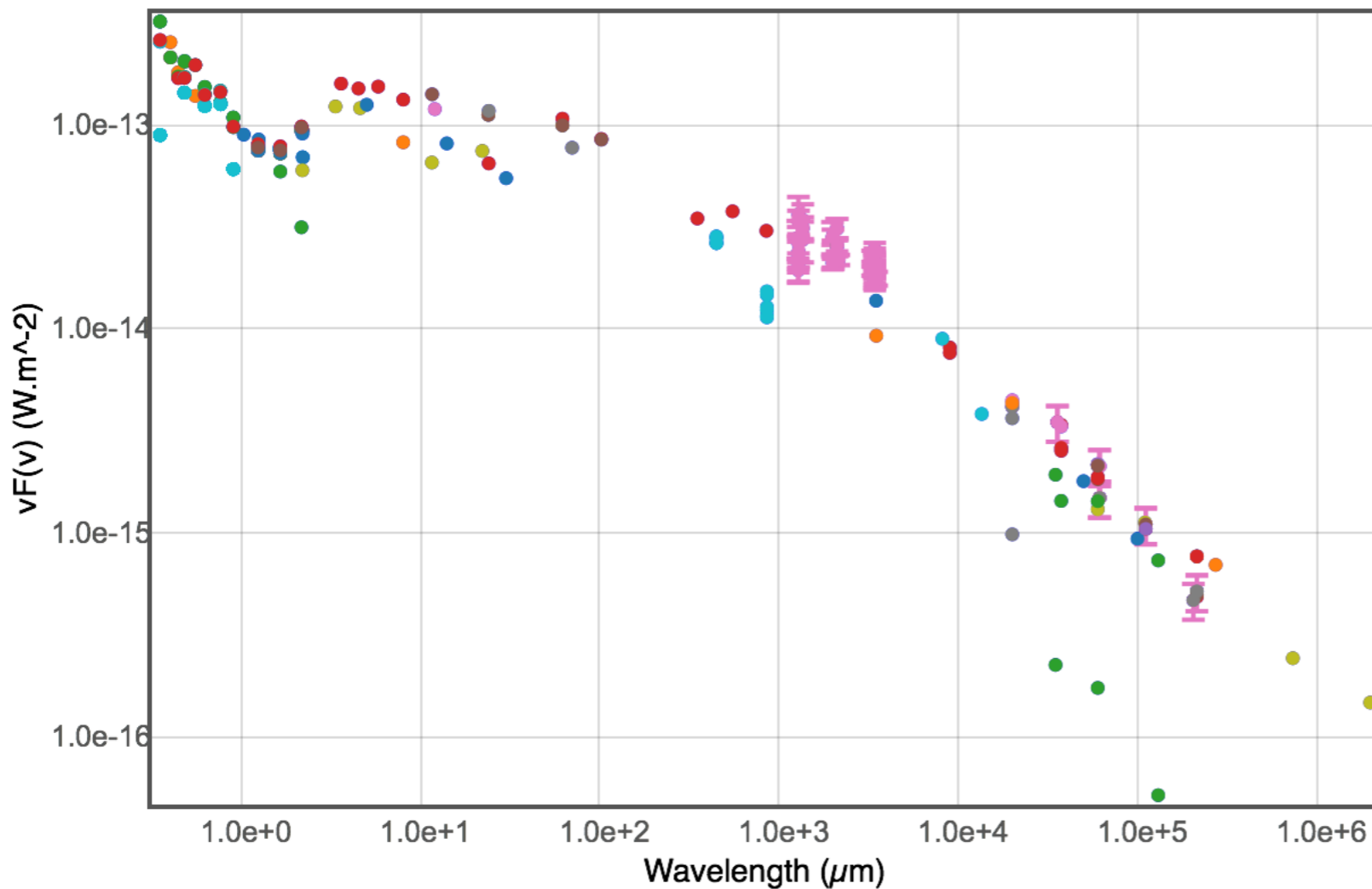
[share +](#)

Target
Radius (in arcsec)

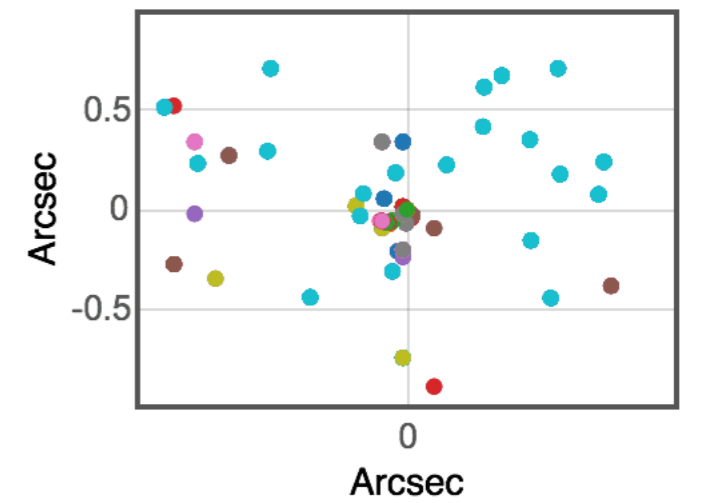
submit



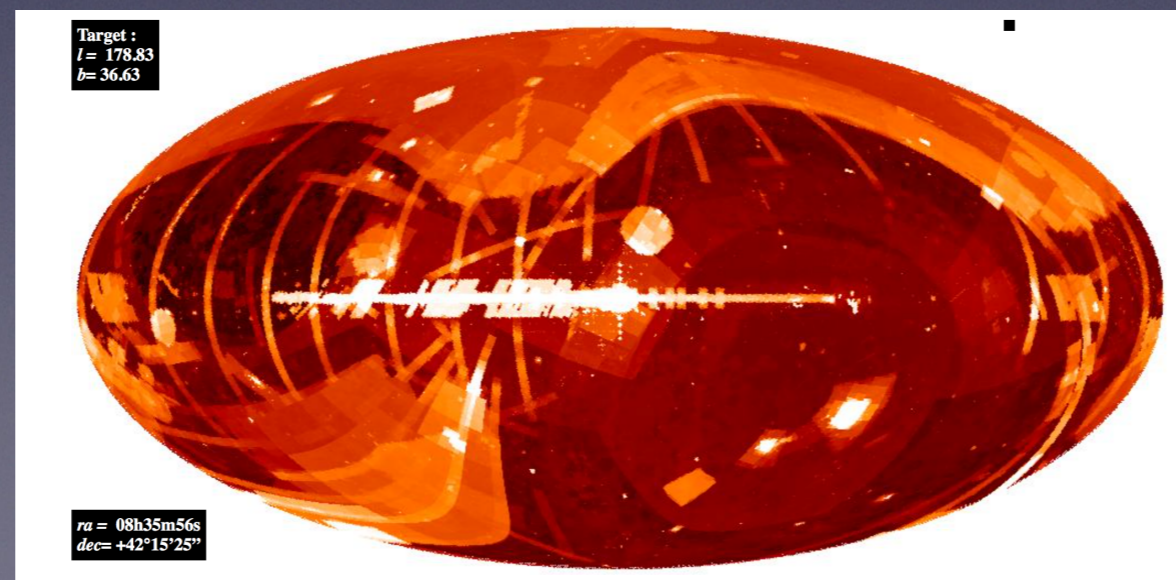
3c273 (12 29 6.695+02 03 8.662),
radius : 1 arcsec



Mouse position:
Wavelength :
2.96e+3 μm
Frequency :
1.01e+2 GHz
Energy :
4.18e-4 eV
Flux density or F(ν) :
5.70e+2 Jy
νF(ν) :
5.77e-13 W.m⁻²
F(λ) :
1.95e+4 erg.s⁻¹.cm⁻².μm⁻¹



- ~17,000 catalogues, containing 30,000 tables
- ~1200 new catalogues per year
- total of ~21 billion rows
- ~300,000 queries per day (working to decrease this by making queries 'smarter')









Vizier 'associated data'

- Science ready data 'associated' with a journal publication
- Catalogues/tables
 - Time-series
 - Spectra
 - Images

[B/corot/astero](#) [CoRoT observation log Release 13 \(CoRoT, 2009-2014\)](#)
[Post annotation](#) Stars observed in the bright star mode (155 rows)

start AladinLite

<u>Full</u>	<u>RAJ2000</u> "h:m:s"	<u>DEJ2000</u> "d:m:s"	<u>Img</u>	<u>date1</u> s	<u>date2</u> s	<u>CoRoT</u>
<u>1</u>	06 54 24.72	-01 07 37.1		2007-01-31	2007-04-02	116
<u>2</u>	06 55 54.24	-01 35 07.3		2007-01-31	2007-04-02	214
<u>3</u>	06 51 51.84	-02 10 33.7		2007-01-31	2007-04-02	223
<u>4</u>	06 50 49.92	-00 32 27.2		2007-01-31	2007-04-02	20
<u>5</u>	06 54 44.64	-02 07 23.2		2007-02-06	2007-04-02	263
<u>6</u>	06 53 02.88	-01 53 01.1		2007-02-06	2007-04-02	187

- evolving very quickly with '*data publication*' efforts
(indexation via bibcodes and DOIs in preparation)

Search associated data among the VizieR catalogues

This web page is an access to the [VizieR](#) Associated data (images, spectra, timeseries, SED) which comes from publications. This tool is the result of the documentation assigned by the authors of the catalogues (in particular by A&A authors) and supervised by the CDS documentalist team (see [the VizieR ingestion tool](#)).



VO compatibility

The meta-data and the search engine are built according to the [VO](#) framework ([SIA](#), [SSA](#), [ObsTAP](#)) and can so be queried by VO softwares. The data are gathered with the [Saada](#) engines, and the VO data model [ObsCore](#) has been chosen for the documentation.



Simple search

[ObsTAP Query](#)

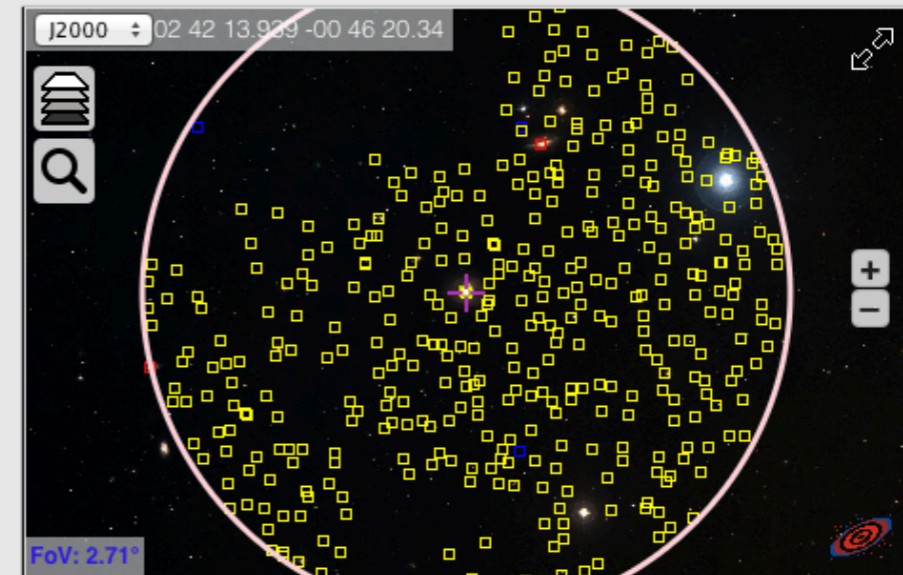
radius

Search by spectral band :

Search by time data : (MJD)

Search by catalog/Identifier:

Spectrum / Time series Image

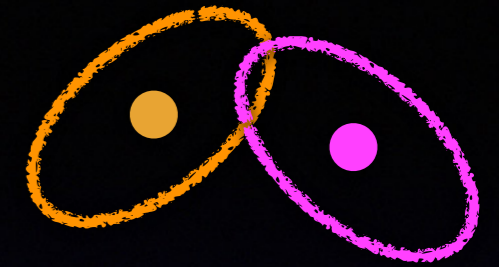


Show 10 entries

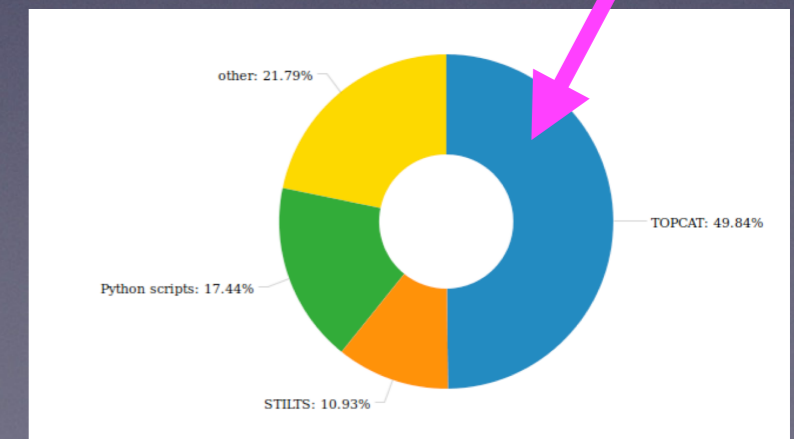
500 entries

Preview	Target	Data collection	Ra	Dec	Band min (nm)	Band max (nm)	Begin time (MJD)	End time (MJD)	Facility	
	NGC1055	J/A+A/569/A91	40.437	0.443	315.000	390.000			SDSS	<input type="button" value="Download"/> <input type="button" value="Search"/> <input type="button" value="Header"/>
	NGC1068	J/A+A/569/A91	40.670	-0.013	315.000	390.000			SDSS	<input type="button" value="Download"/> <input type="button" value="Search"/> <input type="button" value="Header"/>

CDS X-Match



- Positional 2 table cross-match
 - epoch and proper motion taken into account where possible
 - cross-match done in J2000
- 17,000 Vizier cats, & SIMBAD, & upload
- Fast big catalogue matching:
 - *SDSS vs. 2MASS in ~6 minutes*
- Web interface
- HTTP API



Aladin

Aladin v7.0

Location Clear Frame ICRSd

Allsky opt Allsky IR DSS Simbad NED PPMX 2MASS

SDSS colored Chandra/Hubble/Spitzer X-ray/Visible/Infrared Image of M82

select pan zoom dist phot draw tag filter cross rgb assoc crop cont mglss pixel prop del

FoV_U3NK0201
FoV_bandpass_
All
Simbad
Chandra/Hubb
Fold
Filter4
Simbad~1
FoV_hst_0644
The Heart Sta
SDSS colored

om 1/8x

10.74' x 8.72'

8.067' x 8.977' 8.067' x 8.977'

grid north multiview match [View A1] - SDSS colored Search

(c) 2010 UDS/CNRS - by CDS - Distributed under GNU GPL v3 0 sel / 1082 src 823Mb

Access to data via Aladin

Server selector

Others

Image servers

- Aladin images
- SkyView
- UKIDSS
- Sloan
- DSS...
- VLA...
- Archives...
- Others...

VizieR catalog service ?

Specify a target, and a catalog name or identification...

Target (ICRS, n..03 46 23.85 +23 55 39.5)

Catalog Radius 3.627° All columns Whole catalog

... don't know which catalog ? Select the potentially interesting ones with words/keywords !

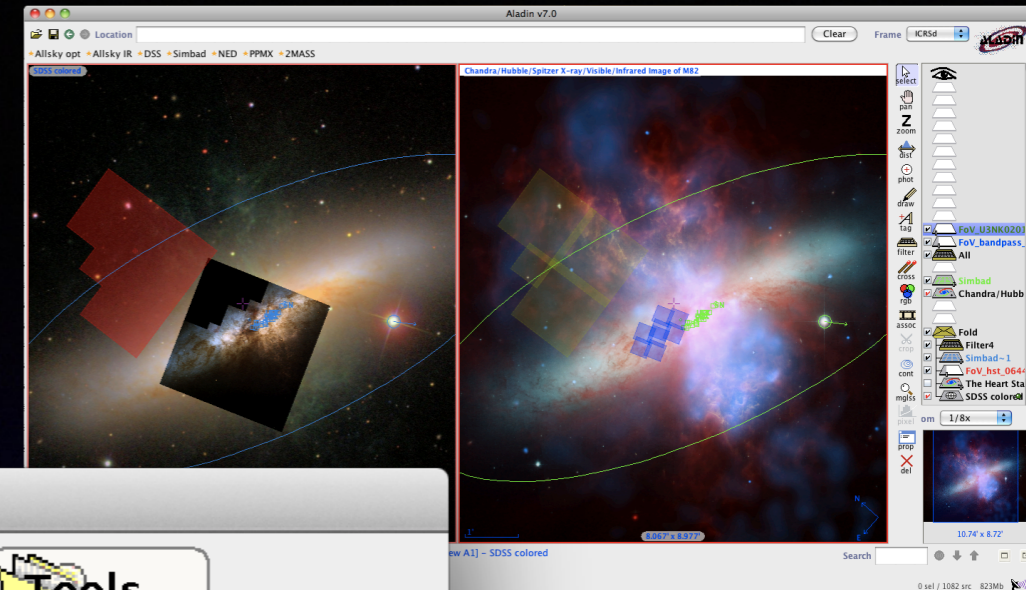
Author, free text...:

Wavelength	Mission	Astronomy
Radio	AKARI	Abundances
IR	ANS	Ages
optical	ASCA	AGN
UV	BeppoSAX	Associations
EUV	CGRO	Atomic_Data
X-ray	Chandra	Binaries:cataclysmic
Gamma-ray	COBE	Binaries:eclipsing
	Copernicus	Binaries:spectroscopic
	CoRoT	

Catalog servers

- All VizieR
- Surveys
- Missions
- SIMBAD
- NED
- SkyBot
- Gaia
- Others..

?



Aladin - v1.0 released

The screenshot displays the Aladin v9.6 software interface, which is a prototype version based on v9.621. The main window shows a star field with a highlighted star, **52 Cyg**, with the following details:

- Type: Star
- Mag: 5.29
- by Simbad

The interface includes a menu bar (File, Edit, Image, Catalog, Overlay, Coverage, Tool, View, Interop, Help) and a toolbar with various icons for navigation and analysis. The main display area shows a star field with a highlighted star and a zoomed-in view of the star's position. The zoomed-in view shows the star's position in the sky, with a red dot indicating its location and a green crosshair indicating its position. The zoomed-in view also shows the star's position in the sky, with a red dot indicating its location and a green crosshair indicating its position.

The interface also includes a toolbar with various icons for navigation and analysis, and a status bar at the bottom showing the current location and zoom level.

Location: 20:45:34.86 +30:41:39.4
Frame: ICRS
Projection: Aitoff

Tools: select, pan, dist, phot, draw, tag, moc, spect, filter, cross, xy, rgb, assoc, zoom, crop, cont, pixel, prop, del

Layers: CDS/P/DSS2/color

Epoch, size, dens., opac., zoom sliders

Grid, study, wink, north, hdr, multiview, match

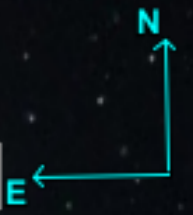
22.13' x 18.55'

20:45:27.95 +30:41:42.0
22.13' x 18.55'



30'

2.449° x 1.7°



Data access

- Collections → 19589
 - Image → 301
 - Data base → 2
 - SIMBAD Astronomical Database**
 - The NASA/IPAC Extragalactic Database
 - Catalog → 17184
 - I-Astrometric Data → 254
 - Gaia DR1 (Gaia Collaboration)
 - GaiaSource data
 - TGAS: Subset of Gaia DR1
 - Cepheid stars identification
 - Auxiliary Quasar Solution
 - RRLyrae stars identification
 - TGAS supplement with Hipparcos
 - The USNO-B1.0 Catalogue
 - UCAC4 Catalogue
 - NOMAD Catalogue
 - The PPMXL Catalogue
 - The USNO-A2.0 Catalogue
 - The Tycho-2 Catalogue (Høg et al.)
 - The Guide Star Catalog, Version 2
 - The Initial Gaia Source List
 - The GSC 2.2 Catalogue
 - XPM Catalog of positions and proper motions
 - The Hipparcos and Tycho Catalogues
 - The HST Guide Star Catalogue
 - PPMX Catalog of positions and proper motions
 - All-sky Compiled Catalogue of Stars
 - UCAC2 Catalogue
 - SAO Star Catalog J2000 (Seymour et al.)
 - Hipparcos, the New Reduction
 - Tycho Input Catalogue, Revised
 - The AC 2000.2 Catalogue
 - The ACT Reference Catalogue
 - The Tycho Reference Catalogue
 - URAT1 Catalog (Zacharias et al.)

Location **X** Frame **ICRS** Projection **Aitoff**

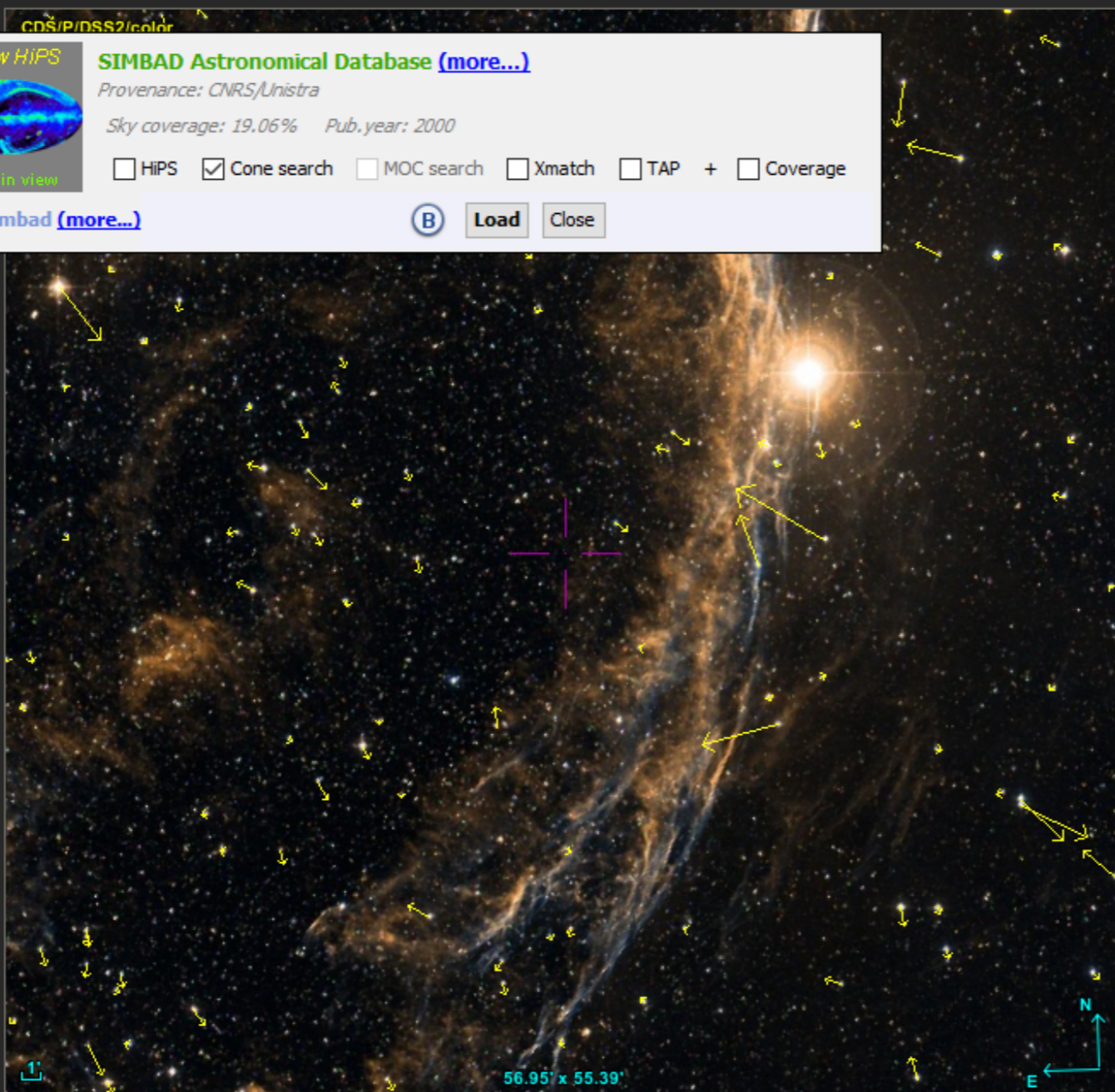
DSS
 SDSS
 2MASS
 WISE
 GALEX
 PLANCK
 AKARI
 XMM
 Fermi
 Gaia
 Simbad
 NED
 +

New HIPS **SIMBAD Astronomical Database (more...)**

Provenance: CNRS/Unistra
Sky coverage: 19.06% Pub. year: 2000

HIPS
 Cone search
 MOC search
 Xmatch
 TAP
 +
 Coverage

CDS/Simbad (more...) **(B)** **Load** **Close**



Mouse controls:

- Left: source selection.
- Middle: quick panning.
- Right: contrast adjustment.
- Wheel: quick zoom on the reticle.
- Simple-clip: move the reticle.
- Double-clip: re-center.

Let your mouse pointer on an object for discovering associated Simbad data.

select
 pan
 dist
 phot
 draw
 tag
 moc
 spect
 filter
 cross
 x-y
 rgb
 assoc
 crop
 cont
 pixel
 prop
 del

Filter0

- CDS//337/gaia
- CDS/P/DSS2/color

J2000 - +
 size - +
 dens. - +
 opac. - +
 zoom - +

Frame: ICRS

+90
-180
-90
+180

20:46:37.76 +30:34:07.6
56.95' x 55.39'

select

from **-- All collections --**

filter
 coll
 inside
 scan

grid
 study
 wink
 north
 hdr
 multiview
 match

Aladin Lite

Portal Simbad Vizier Aladin X-Match Other Help

ALADIN

Aladin Lite

Target:

J2000 05 45 30.655 -01 29 5.16

Surveys:

- DSS2 ✓
- Fermi
- GALEXGR6/AIS
- DSS2/red
- DSS2/blue
- SDSS9
- Mellinger
- 2MASS
- allWISE

FoV: 3°

□ Aladin



- **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 Lite API example

AAS225 demonstration

[Aladin Lite](#) / [Documentation](#) / [API](#) / [Examples](#) / AAS225 demonstration

SDSS DR9 band r image of APG 240 pair of galaxies, with an overlaid HST image and a WFPC2 footprint.

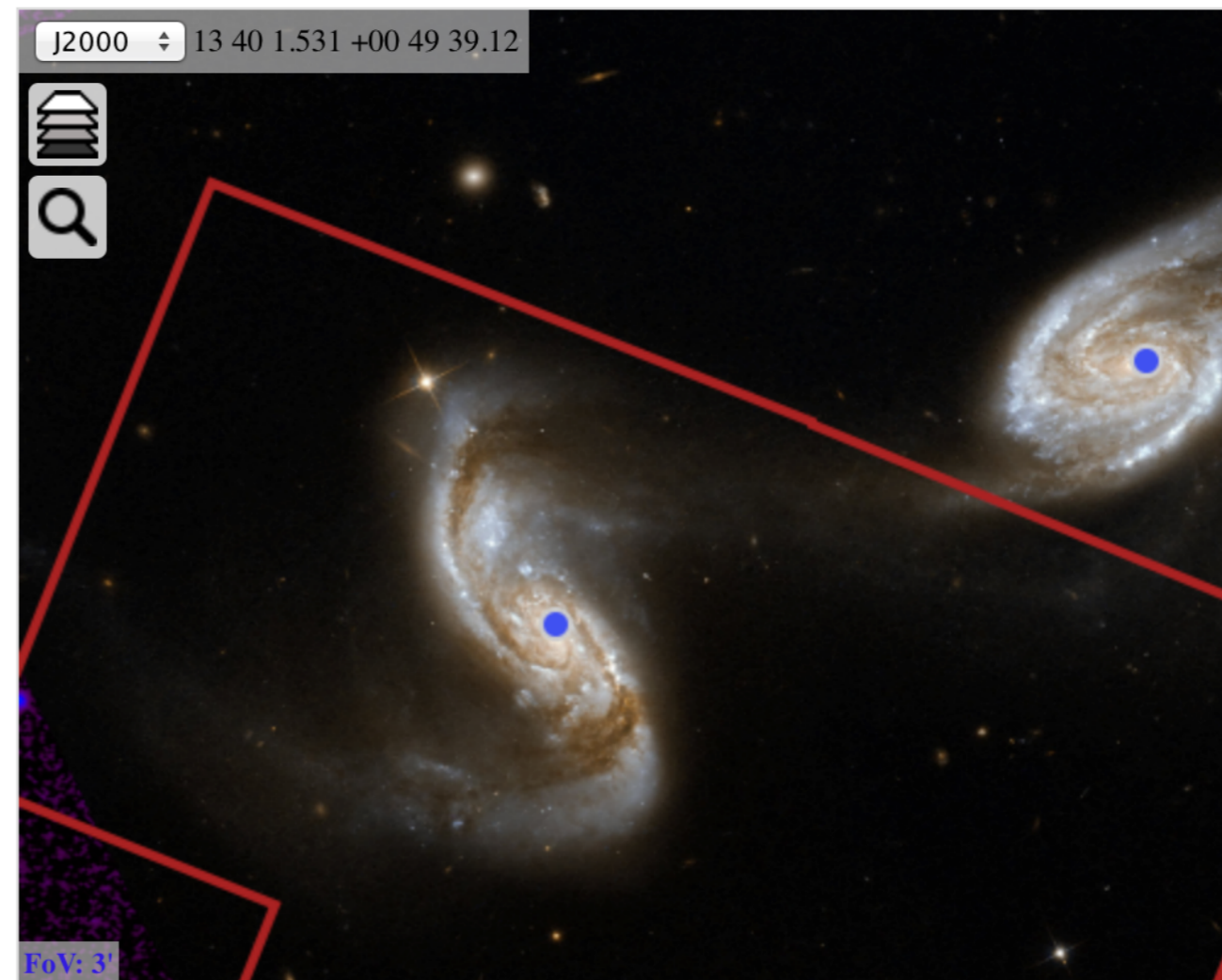
Javascript

```
var aladin = A.aladin('#aladin-lite-div', {fov:0.15, tar
aladin.setBaseImageLayer(aladin.createImageSurvey('SDSS-
aladin.getBaseImageLayer().getColorMap().update('rainbow
var simbad = A.catalog({name: 'Simbad', sourceSize: 16,
aladin.addCatalog(simbad);
simbad.addSources([A.marker(204.97010833333336, 0.840016

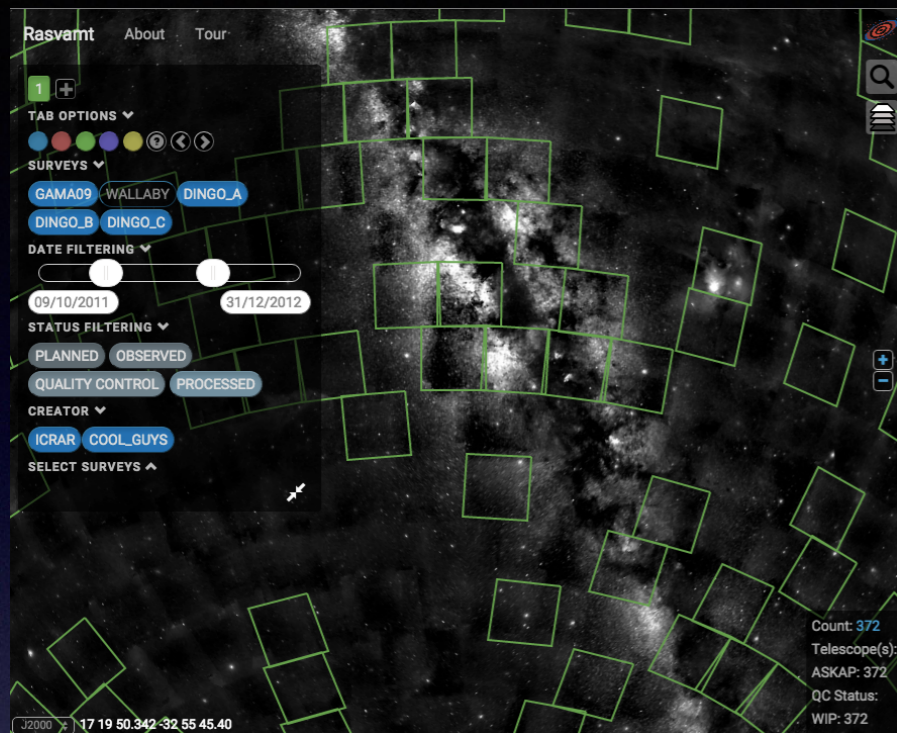
var overlay = A.graphicOverlay({color: '#aa2222', lineW
aladin.addOverlay(overlay);

overlay.addFootprints(A.polygon([[204.970214, 0.81206],
aladin.displayJPG('http://images.ipac.caltech.edu/stsci/
```

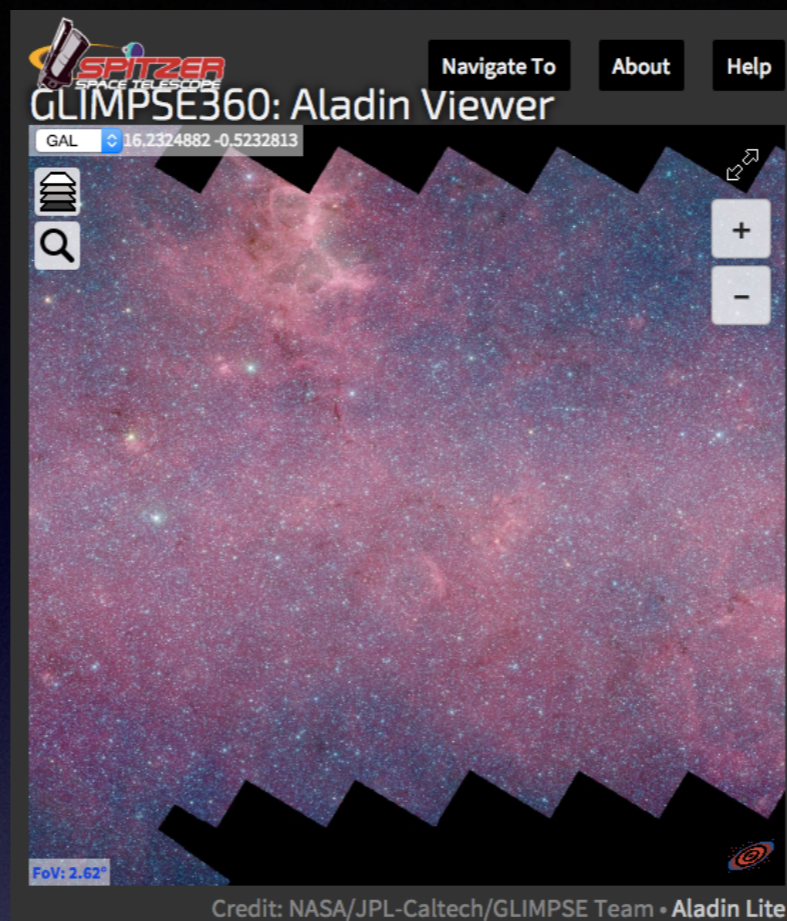
Result



Radio Astronomy Survey Visualisation Monitoring Tool (ICRAR)

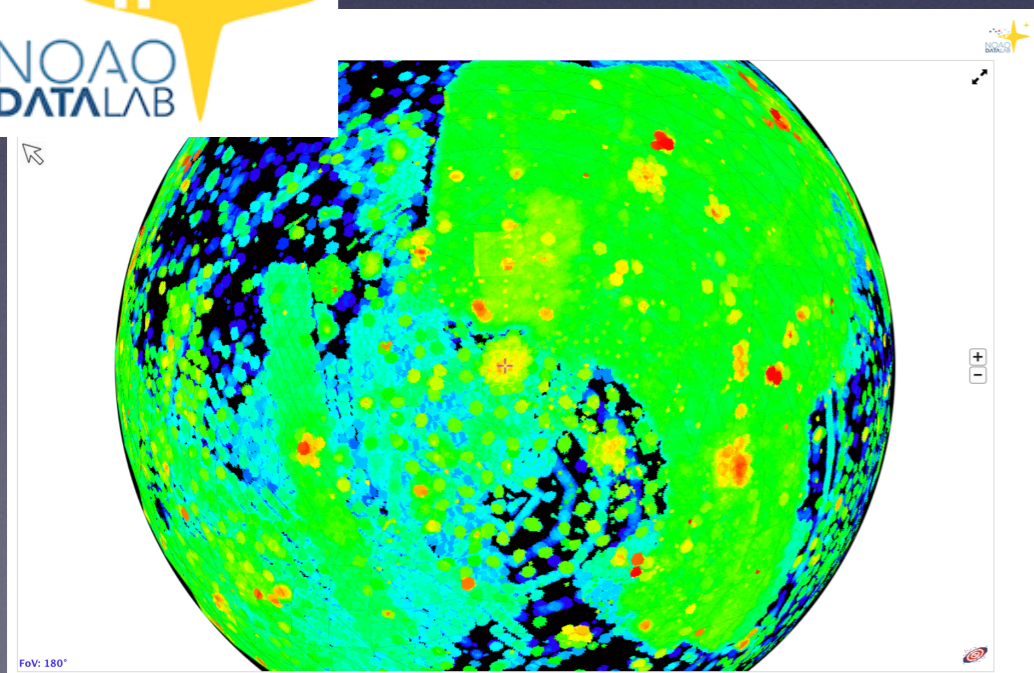


Spitzer GLIMPSE 360



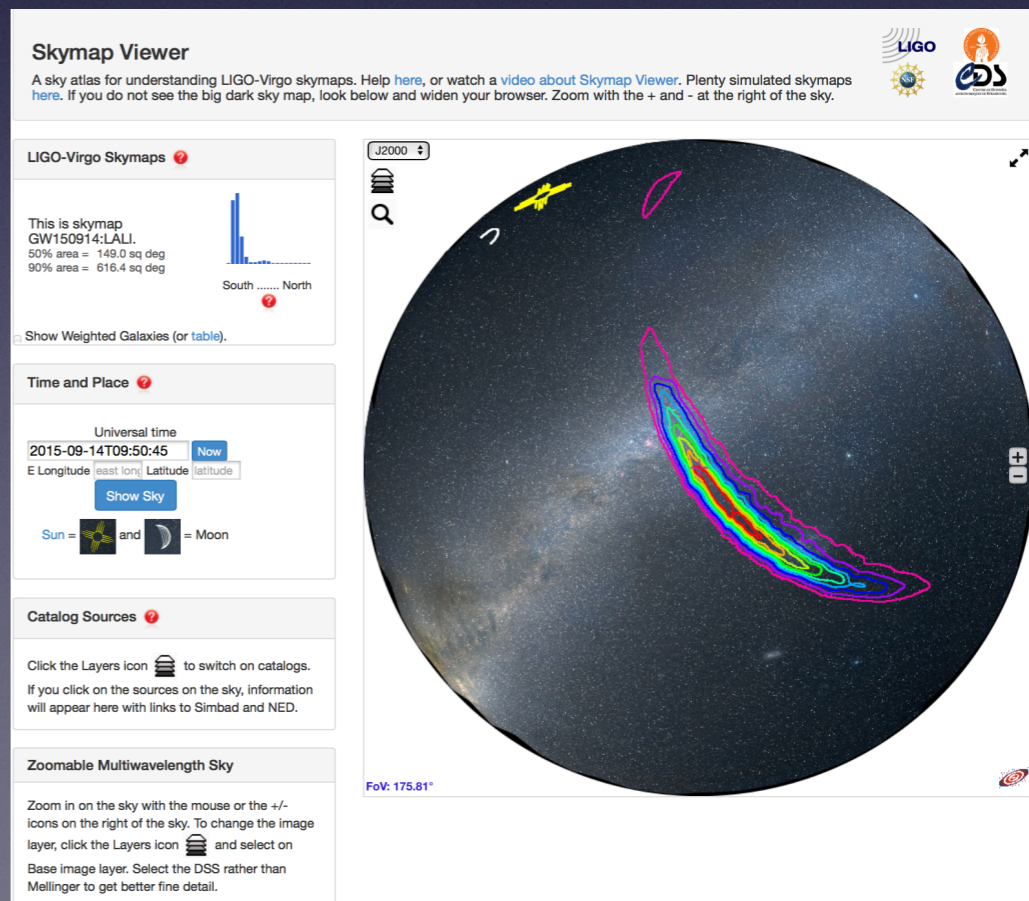
Aladin Lite
implementations

NOAO Datalab



LIGO

Skymap Viewer



ESA Sky - built on Aladin Lite

J2000 14 03 48.935 +54 17 25.47

Search...

Upload target list

Skies

- INTEGRAL
- XMM-Newton
- HST
- ISO
- AKARI
- Herschel
- Planck
- Others

Colour Map

- Native
- Grayscale
- Reverse

P/SDSS9/color

- P/Fermi/color
- P/GALEXGR6/AIS/color
- P/DSS2/color
- P/DSS2/red
- P/SDSS9/color
- P/SuperCOSMOS/Ha
- P/VTSS/Ha
- P/Mellinger/color
- P/Finkbeiner
- P/2MASS/color
- AIWISSE-color
- P/IRIS/color

M33

M51

M83

M91

M95

M99

M100

M101

NGC 300

NGC 1300

NGC 1365

NGC 2997

NGC 3184

NGC 4013

NGC 4725

NGC 6744

NGC 6946

NGC 7479

Data Panel

HST XMM-OM(UV) XMM-Newton Herschel ISO

ESA Observations

Instrument	X-Ray	UV	Visible	IR/Radio
XMM-Newton	~10	~10	~10	~10
XMM-OM(UVB)	~10	~10	~10	~10
HST	~10	~10	~1000	~10
ISO	~10	~10	~10	~10
Herschel	~10	~10	~10	~10

ESA Catalogues

Instrument	Gamma	X-Ray	UV	Visible	IR/Radio
INTEGRAL	~10	~10	~10	~10	~10
XMM Slew	~10	~10	~10	~10	~10
3XMM EPIC	~10	~10	~10	~10	~10
XMM OM	~10	~10	~10	~10	~10
Tycho-2	~10	~10	~10	~100000	~10
HSC	~10	~10	~10	~10	~10
PGSS	~10	~10	~10	~10	~10
PCSS	~10	~10	~10	~10	~10
PSZ	~10	~10	~10	~10	~10

Download

FoV: 27.49'

Open data

esa

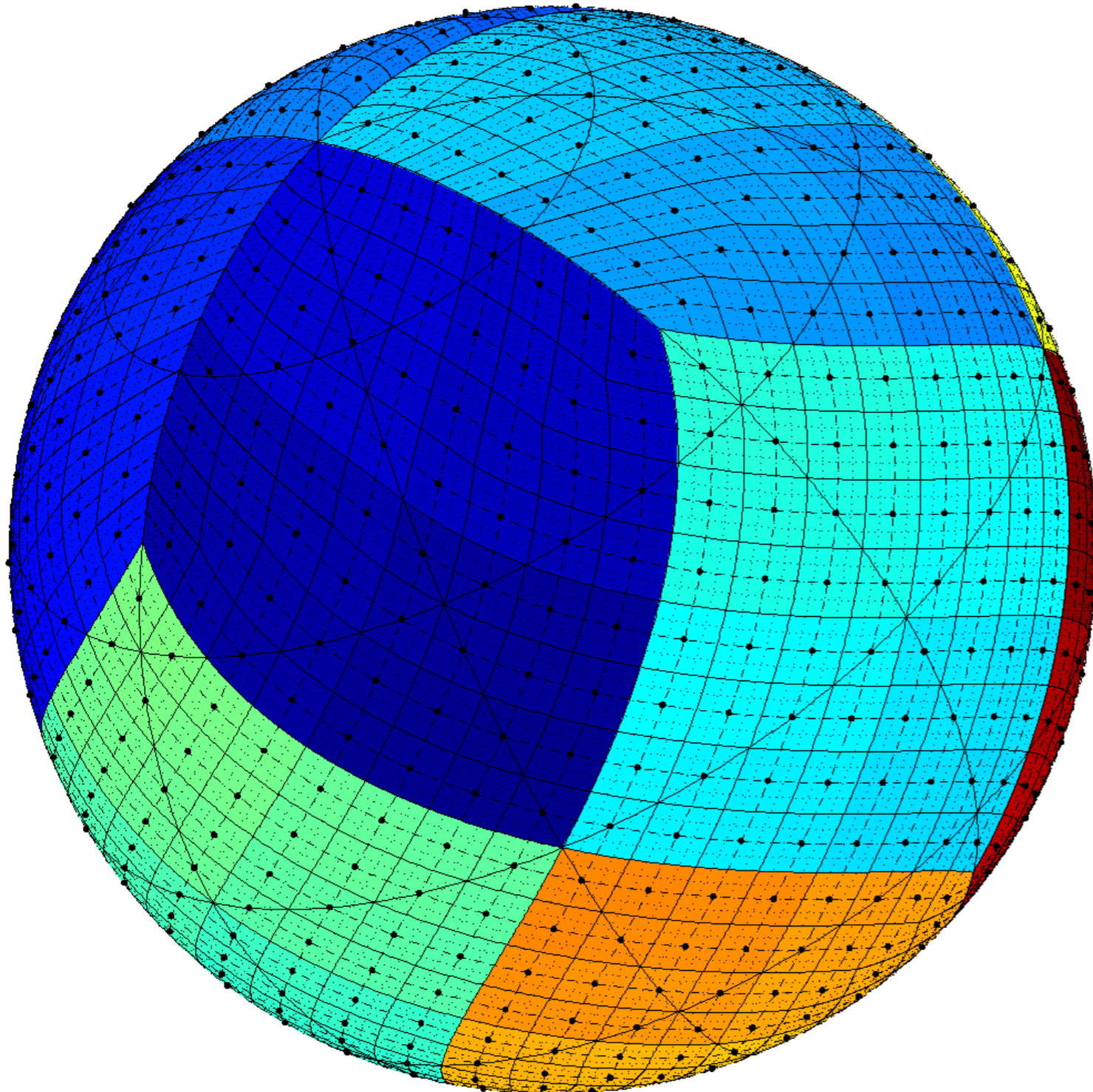
Recent developments

- **Hierarchical representation** of large image surveys, catalogues and cubes - **a structuring development at CDS**
- **Coverage maps** open up new possibilities for manipulating surveys and catalogues
 - ➔ new interactions between images, cubes and catalogues

HiPS: **H**ierarchical **P**rogressive **S**urveys

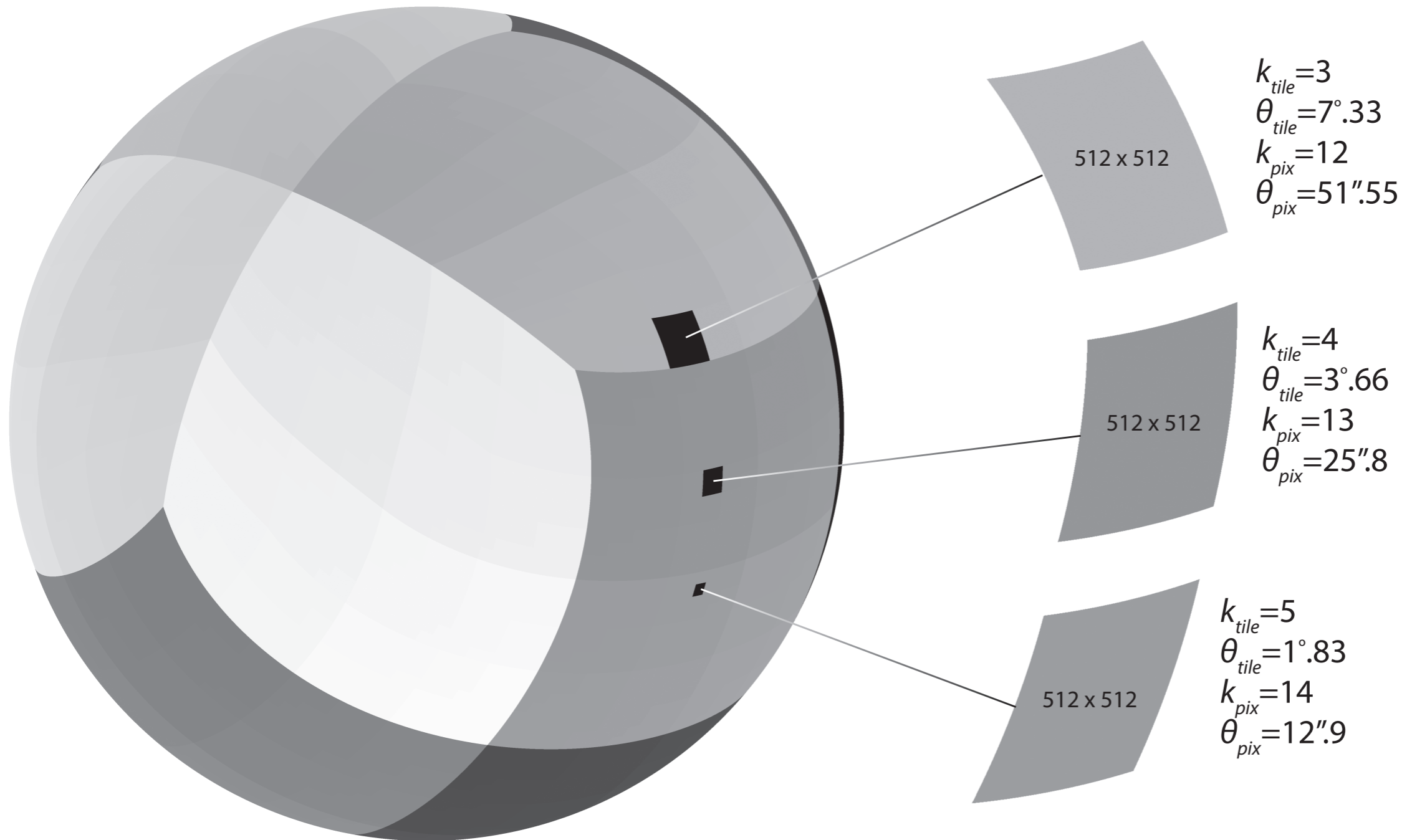
- Multi-resolution HEALPix data structure for
 - *Images*
 - *Catalogues*
 - *3-dimensional data cubes*
- Conserves scientific data properties alongside visualisation considerations (*FITS & png/jpeg*)
- Mechanisms for links to original data
- Implemented for ~300 data sets and growing


□ HEALPix*



- 12 quadrilateral pixels
- 2x2 division at each level
- Equal area
- Iso-latitude
- Nested index scheme encodes inheritance
- Libraries

□ HiPS – Tiles and Pixels



k	$N_{side} = 2^k$	N_{pix}	θ_{pix}	$k_{tile,512}$	$N_{tile,512}$	$\theta_{tile,512}$	
0	1	12	58°6		----- Tiles -----		
1	2	48	29°3				
2	4	192	14°7				
3	8	768	7°33				
4	16	3072	3°66				
5	32	12,288	1°83				
6	64	49,152	55'0				
7	128	196,608	27'5				
8	256	786,432	13'7				
9	512	3,145,728	6'87	0	12	58°6	- WMAP
10	1024	12,582,912	3'44	1	48	29°3	
11	2048	50,331,648	1'72	2	192	14°7	- PLANCK HFI
12	4096	201,326,592	51''5	3	768	7°33	- IRAS
13	8192	805,306,368	25''8	4	3072	3°66	
14	2^{14}	3.22×10^9	12''9	5	12288	1°83	- NVSS
15	2^{15}	1.29×10^{10}	6''44	6	49152	55'0	
16	2^{16}	5.15×10^{10}	3''22	7	196608	27'5	- SCUBA
17	2^{17}	2.06×10^{11}	1''61	8	786432	13'7	
18	2^{18}	8.25×10^{11}	0''81	9	3,145,728	6'87	- DSS
19	2^{19}	3.30×10^{12}	0''40	10	12,582,912	3'44	- SDSS
20	2^{20}	1.32×10^{13}	0''20	11	50,331,648	1'72	
21	2^{21}	5.28×10^{13}	0''10	12	201,326,592	51''5	- CFHTLS
22	2^{22}	2.11×10^{14}	50.3 mas	13	805,306,368	25''8	
23	2^{23}	8.44×10^{14}	25.1 mas	14	3.22×10^9	12''9	- HST ACS
24	2^{24}	3.38×10^{15}	12.6 mas	15	1.29×10^{10}	6''44	
25	2^{25}	1.35×10^{16}	6.30 mas	16	5.15×10^{10}	3''22	

Aladin v8.1 *** BETA VERSION (based on v8.162) ***

Location Frame

IRIS colored

14:00 12:00 10:00

-30:00 -30:00

15° 134° x 108.6°

grid wink north multiview match

Search

0 sel / 0 src 66fps / 288Mb

Frame: ICRS

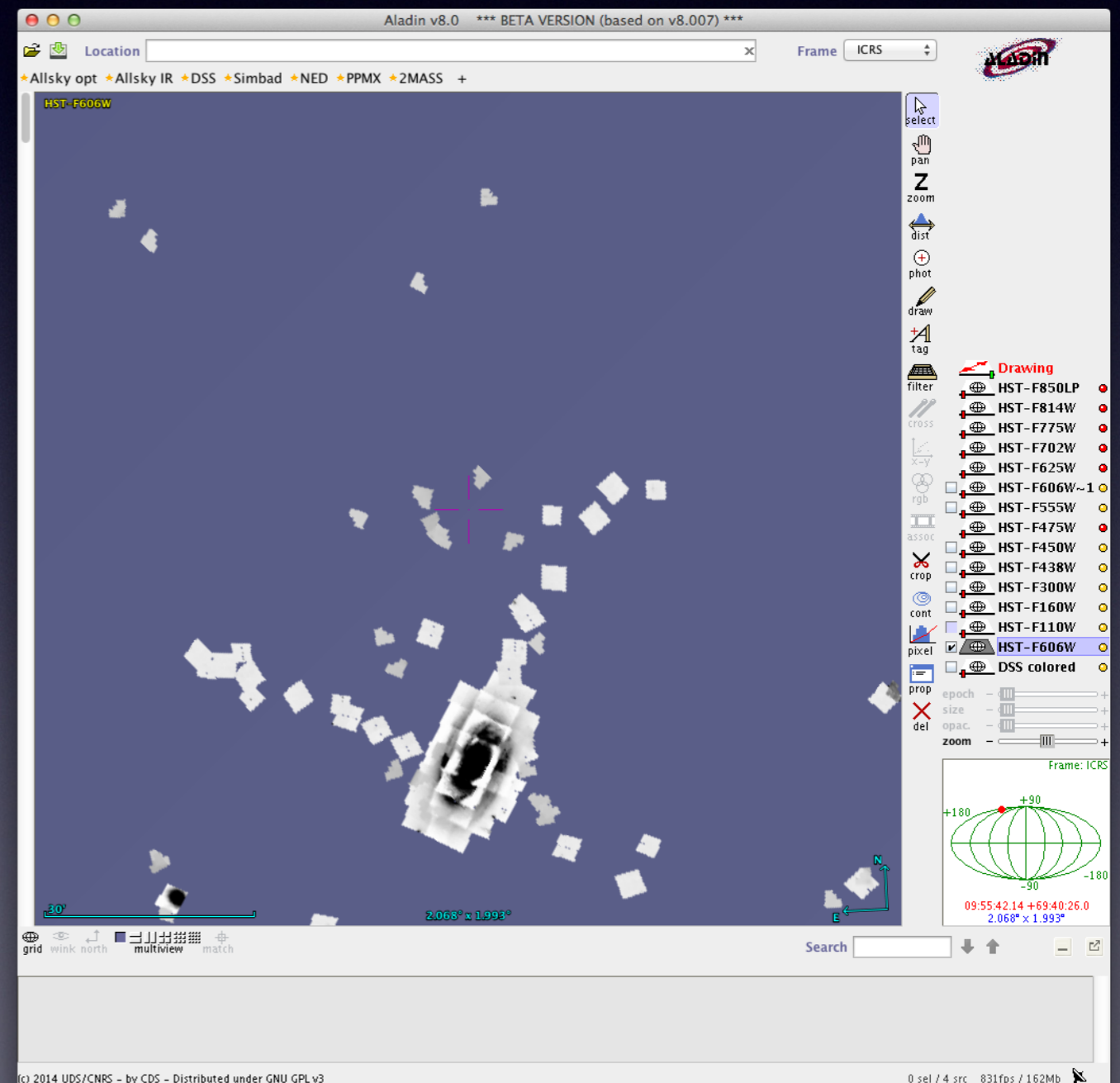
epoch size dens. opac. zoom

HST-F606W r3
 IRIS colored
 AIIWISE W1 (3.4u)
 AIIWISE color
 PHAT F475W
 HST-F555W r3

05:38:03.22 -69:14:27.9
134° x 108.6°

Use an archive as a survey

- HiPS of the WFPC2 HST archive images (filter by filter)

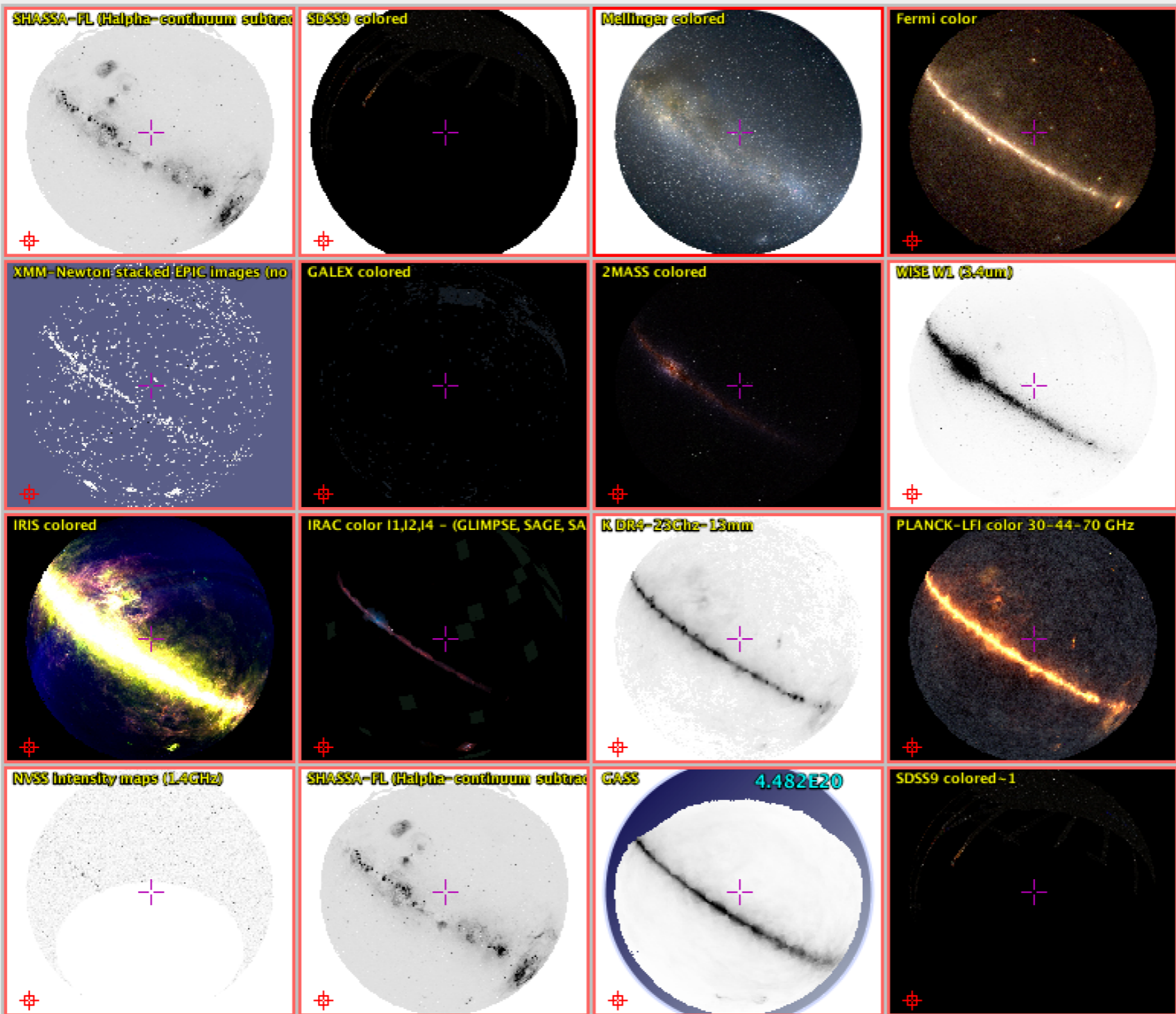


Location

Frame ICRS



★ Allsky opt ★ Allsky IR ★ DSS ★ Simbad ★ NED ★ PPMX ★ 2MASS +



select
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zoom
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phot
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tag
filter
cross
x-y
rgb
assoc
crop
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pixel
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- IRIS colored
- WISE W1 (3.4um)
- 2MASS colored
- GALEX colored
- XMM-Newton
- Fermi color
- Mellinger colored
- SDSS9 colored
- GASS
- SHASSA-FL (Alpha-continuum subtracted)
- NVSS intensity maps (1.4GHz)
- PLANCK-LFI color 30-44-70 GHz
- K DR4-23GHz-15mm
- IRAC color I1,I2,I4 - (GLIMPSE, SAGE, SAFARI)
- IRIS colored
- WISE WL (3.4um)
- 2MASS colored
- GALEX colored
- XMM-Newton
- Fermi color
- Mellinger colored
- SDSS9 colored

epoch -

size -

opac. -

zoom -

Frame: ICRS

15:13:19.48 -44:40:43.2
180° x 180°

grid wink north multiview match

[View B2] - GALEX colored

Search

↓ ↑





- Fermi
- EGRET
- XMM
- INTEGRAL
- RASS
- GALEX
- DSS
- SDSS
- CFHTLS
- HST
- 2MASS
- ULTRAVISTA
- WISE
- ALLWISE
- DIRBE
- IRIS
- GLIMPSE360
- SPITZER
- AKARI
- SCUBA
- BGPS
- WMAP
- PLANCK
- NVSS
- CHIPASS
- SUMSS
- DWINGELOO
- HASLAM408
- VLSSR
- WENSS
- SHS
- SHASSA
- VTSS
- GASS
- CGPS
- GALFA
- CALIFA
- MUSE
- HARP/JCMT
- Gaia GUMS
- SIMBAD
- GOODS
- PHAT

Aladin v8.1 *** BETA VERSION (based on v8.162) ***

Location Frame ICRS

DSS SDSS 2MASS WISE GALEX PLANCK AKARI XMM Fermi Simbad NED +

-40026.679 m/s

+90:00
+75:00
+60:00
+45:00
+30:00
+15:00
00:00
06:00 04:00

180° x 150.5°

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Imagine your eye looking through a stack of planes.
Each plane contains its own data set: image, catalog, graphical overlays...
You see the combination of them.
Use File->Open for discovering all other data, or clic & drag your own files.

GALFA-HI

epoch
size
dens.
opac.
zoom

Frame: ICRS
+180
+90
-90
-180
01:53:59.77 +23:33:10.9
180° x 150.5°

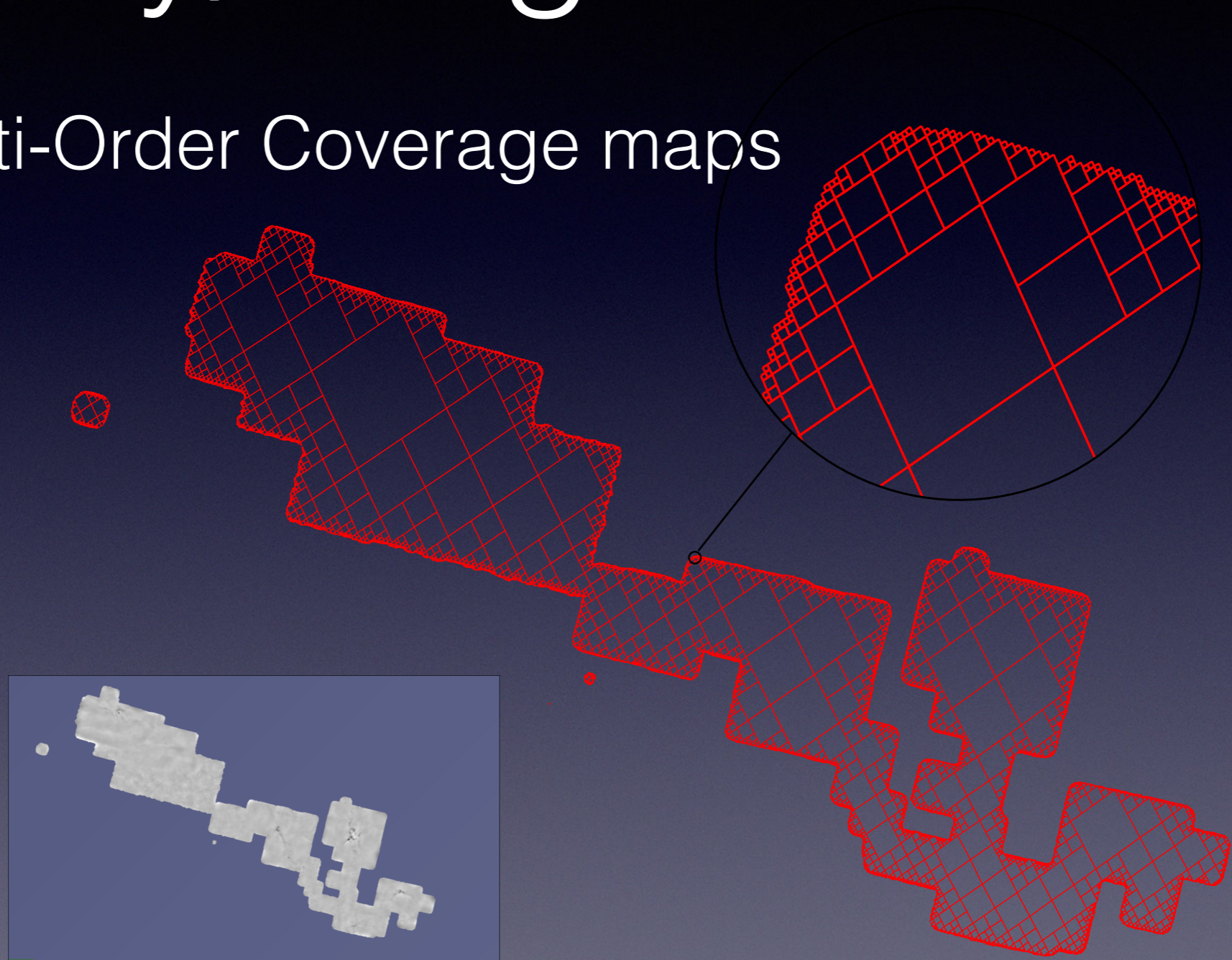
grid wink north multiview match

Search

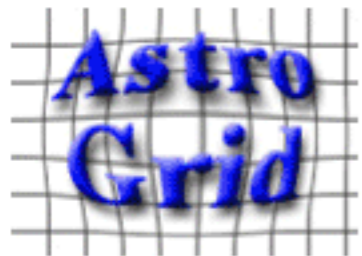
0 sel / 0 src 250fps / 5739Mb

Survey/image outlines

- MOC: Multi-Order Coverage maps

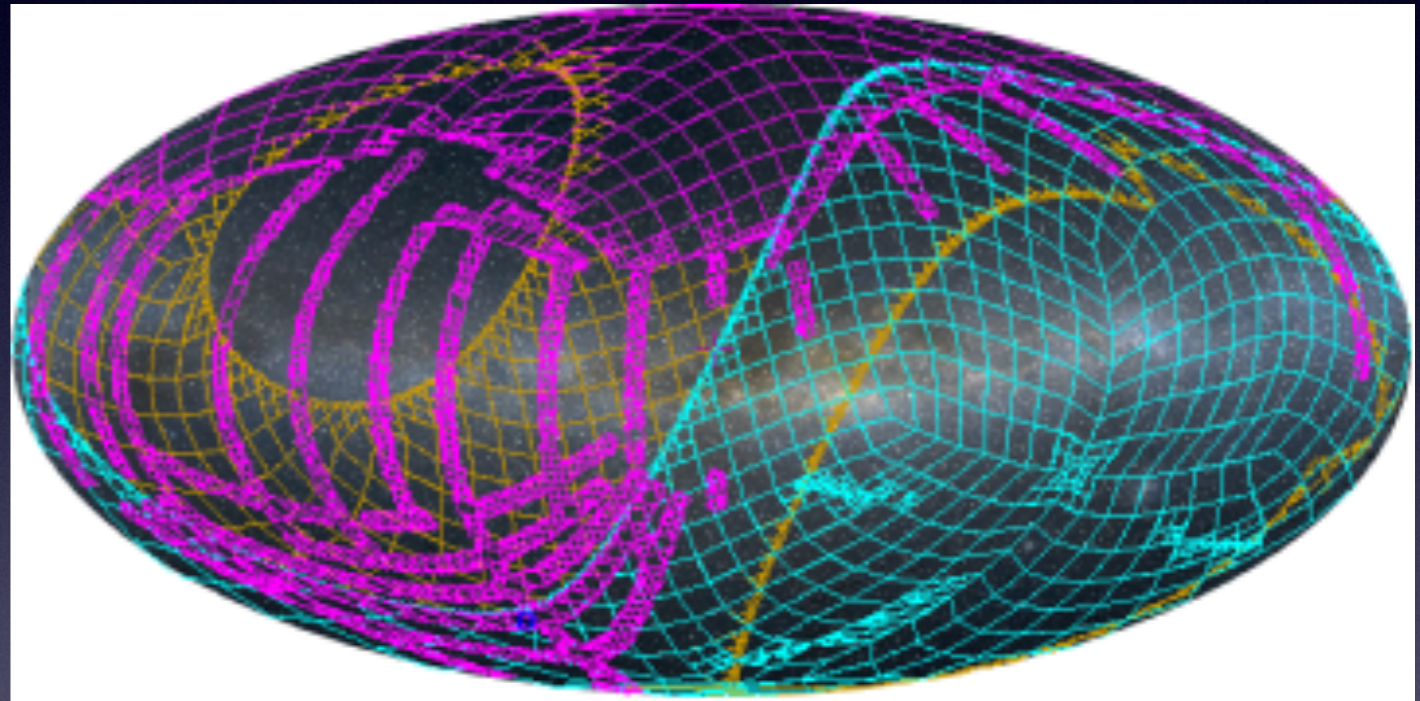


IVOA Recommendation, Python library: MOCpy



- Comparing coverage of 1000s of data sets
- Intersection/union/complement trivial

- Catalogue coverage
 - ~17000 (Vizier)
- MOC Server powers the CDS Portal



- Queries based on coverage and catalogues
 - e.g. Veron quasars in HST, XMM and SDSS images

Hierarchical views of Catalogues

- Same idea: *HiPS Catalogue*. Important when dealing with/visualizing 10^6 , 10^7 , 10^8 + catalogues
- Allows zooming into large or deep catalogue
- HiPS catalogues - provide progenitor links to HiPS images
- Hierarchy can be defined in different ways - brightness, parallax, local density
- e.g. SIMBAD progressive Survey (hierarchy based on size of object and number of citations)

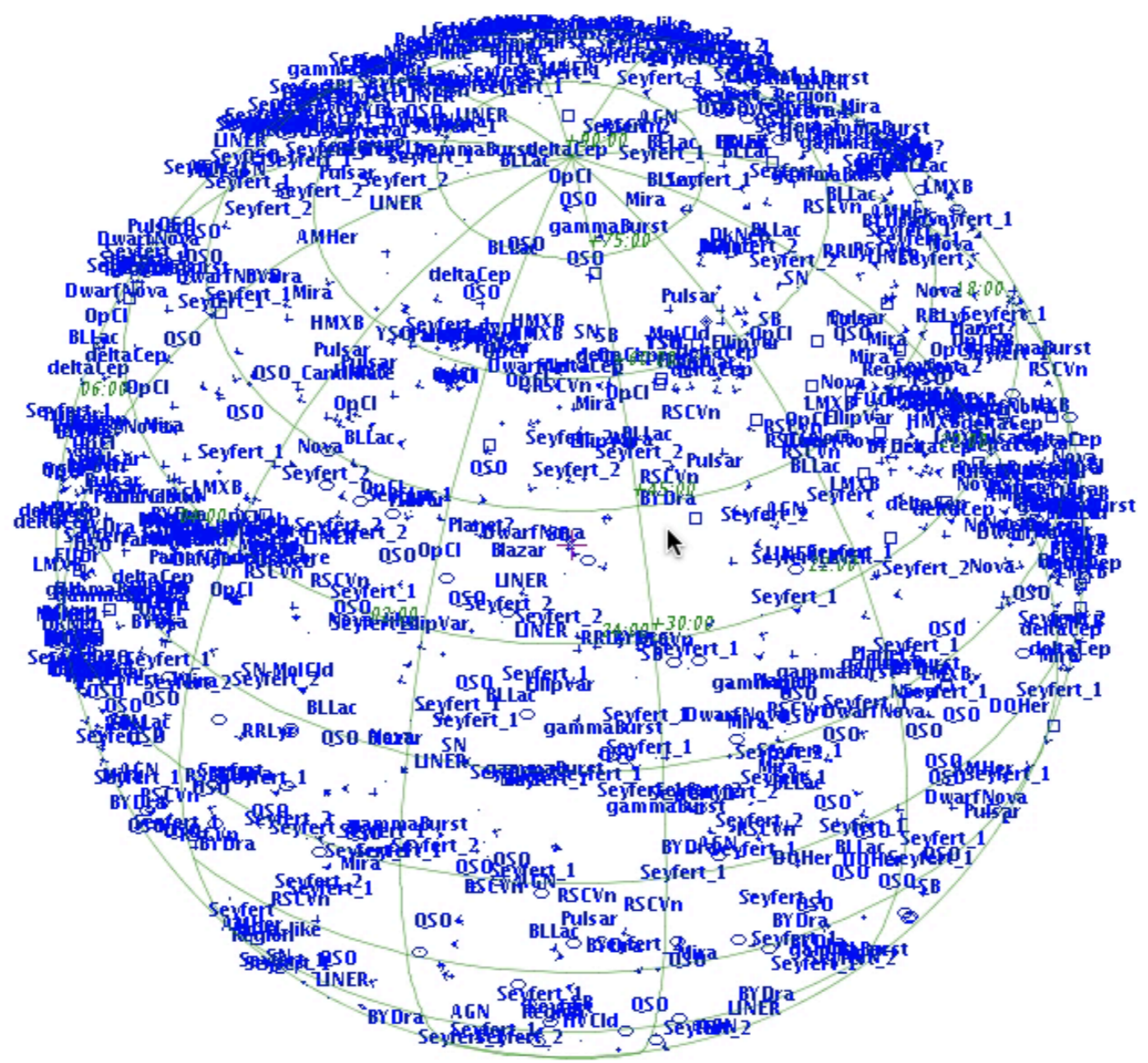
Location x

Frame ICRS



Allsky opt Allsky IR DSS Simbad NED PPMX 2MASS +

Simbad



180° x 180°

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cross
x-y
rgb
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J2000
size
opac.
zoom
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prop
del

Frame: ICRS

00:42:44.33 +41:16:07.5
180° x 180°

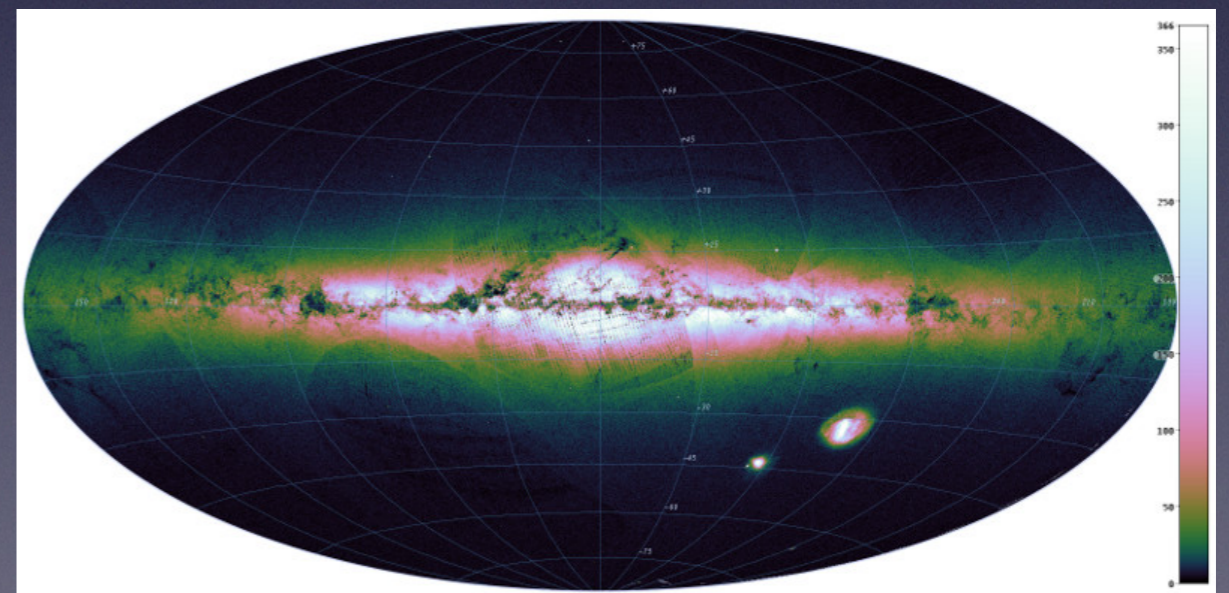
grid wink north multiview match

Search ↓ ↑

bringing it all together: e.g. Gaia DR1 CDS

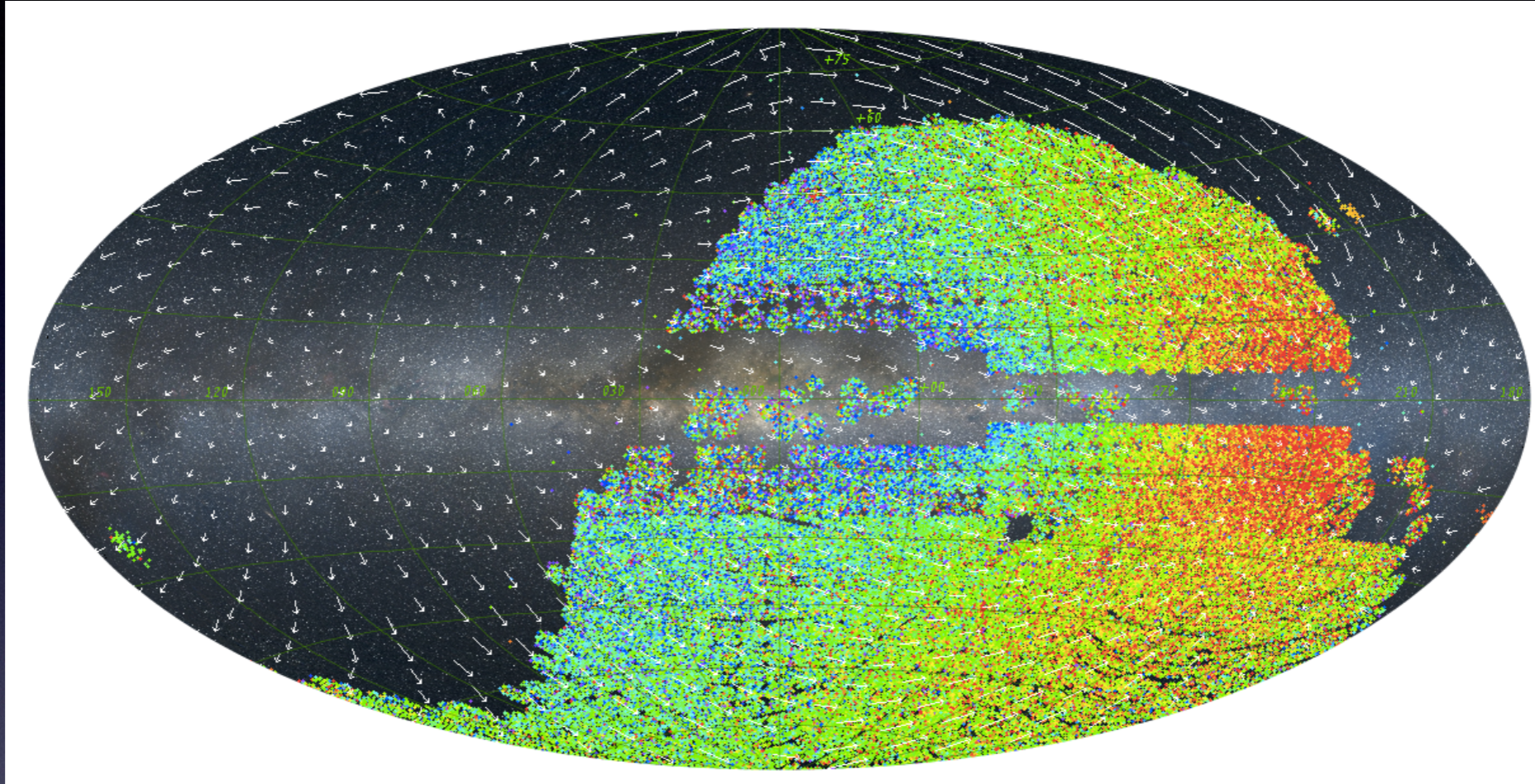
Gaia DR1 at CDS:

- DPAC partner
- VizieR
- TAPVizieR
- Cross-Match Service
- Aladin
- HiPS catalogue



Density Map of 1 billion Gaia sources

TAP, HEALPix, Aladin...



```
SELECT avg(RAJ2000) as ra, avg(DEJ2000) as dec, avg(HRV) as HRV,  
healpix(RAJ2000, DEJ2000, 7) as h  
FROM "III/272/ravedr4"  
group by h
```

```
SELECT avg(ra) as ra, avg(dec) as dec, avg(pmra) as pmra, avg(pmdec) as  
pmdec, healpix(ra, dec, 3) as h  
FROM "I/337/tgas"  
group by h
```

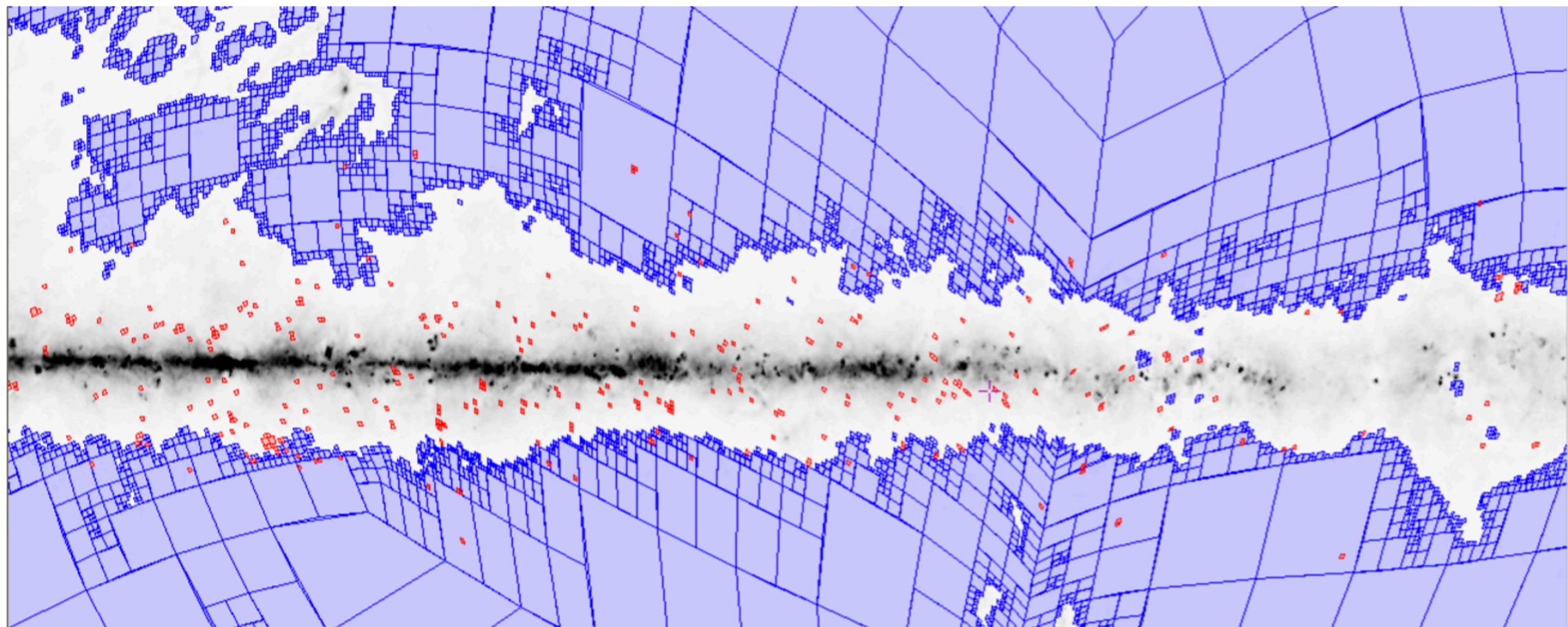

Advanced usage of HiPS and MOCs

Exploring large catalogs within non-trivial spatial coverage, defined by brightness cuts and/or the availability of additional data sets

Thomas Boch and Caroline Bot, CDS

Detecting the Unexpected, Discovery in the Era of Astronomically Big Data

Space Telescope Science Institute, February 27 — March 2, 2017



in conclusion...

- Science driven data centre providing services for reference data
- Getting ready for era of Big Data
- Contributing to, and compliant with VO
- Interoperability via IVOA, collaborations and shared tools and infrastructure

thanks

Links

- CDS: <http://cds.unistra.fr>
- CDS Portal: <http://cdsportal.unistra.fr>
- Hierarchical Progressive Surveys
 - *Fernique et al. 2015, A&A 578, 114*
 - HiPS on CDS web pages: <http://aladin.u-strasbg.fr/hips>
- Aladin <http://aladin.u-strasbg.fr/AladinDesktop/>
- Aladin Lite <http://aladin.u-strasbg.fr/AladinLite/>
- HiPS generation tools: <http://aladin.u-strasbg.fr/hips/#tools>