



Multi-dimensional Data Access Prototypes and Next Steps

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Standards and Reference Implementations

IVOA standards process prefers two “reference implementations” for a standard to be proposed

IVOA Document Standards, v. 1.1

- Ensure that adequate experience is gained before formalized in standard
- "In theory, there is no difference between theory and practice. In practice, there is."

Yogi Berra



Multi-dimensional Data Services

- Prototype VO multi-D services in existence prior to Heidelberg Inter-op
 - Various levels of maturity and different foci
 - Heidelberg Inter-op stimulated development of new ones
- Census
 - Canadian Astronomy Data Center Advanced Search
 - Aladin cube access at CDS
 - CALIFA Data Release 1 portal at GAVO
 - Japan VO ALMA Portal
 - Virtual Astronomical Observatory-National Radio Astronomy Observatory service



CADC Advanced Search

Advanced Search – Canadian Astronomy Data Centre

www.cadc-ccda.hia-ihc.nrc-cnrc.gc.ca/en/search/

Canada

Data Collections Other Services **Advanced Search** CANFAR Login

CADC Home > Advanced Search

Advanced Search

Search Results Error ADQL Help

Search Reset

Observation Constraints

- ▶ Observation ID
- ▶ P.I. Name
- ▶ Proposal ID
- ▶ Proposal Title
- ▶ Proposal Keywords

Science and Calibration data

Spatial Constraints

- ▶ Target
- ▶ Pixel Scale
- Do Spatial Cutout

Temporal Constraints

- ▶ Observation Date
- ▶ Integration Time
- ▶ Time Span

Spectral Constraints

- ▶ Spectral Coverage
- ▶ Spectral Sampling
- ▶ Bandpass Width
- ▶ Rest-frame Spectral Coverage
- Do Spectral Cutout

Additional Constraints

Band	Collection	Instrument	Filter	Calibration Level	Data Type	Observation Type
All (8)	All (17)	All (67)	All (2177)	All (5)	All (5)	All (44)
Gamma-ray	BLAST	ACS	OPEN	(1) Raw Standard	catalog	ACQUIRE
Infrared	CFHT	ACISIS	OPEN	(0) Raw Instrument	cube	ALIGN
Millimeter	CFHTMEGAPIPE	AOSC	OPEN	(2) Calibrated	image	BIAS
Optical	CFHTTERAPIX	BLAST	OPEN	(3) Product	Other	COMPARISON
Radio	CFHTWIRWOLF	CBE	#1507	Unknown	spectrum	DARK
UV	CGPS	CFH12K	#1618			DIM
X-ray	DAO	CFH12K MOSAIC	#1620			FLAT
Unknown	DAOPLATES	CFHTIR	#4504			FOCUS



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Search Results Error ADQL Help

Search Reset

Observation Constraints

- ▶ Observation ID
- ▶ P.I. Name
- ▶ Proposal ID
- ▶ Proposal Title
- ▶ Proposal Keywords

Science and Calibration data

Spatial Constraints

▼ Target

Resolve object name to coordinates

SIMBAD

Cyg X-1

OR

Browse...

▶ Pixel Scale

Do Spatial Cutout

Temporal Constraints

- ▶ Observation Date
- ▶ Integration Time
- ▶ Time Span

Spectral Constraints

- ▶ Spectral Coverage
- ▶ Spectral Sampling
- ▶ Bandpass Width
- ▶ Rest-frame Spectral Coverage

Do Spectral Cutout

Additional Constraints

Band	Collection	Instrument	Filter	Calibration Level	Data Type	Observation Type
All (8)	All (2)	All (1)	All (3)	All (1)	All (2)	All (1)
Gamma-ray	CGPS	DRAO-ST	1420 MHz	(2) Calibrated	cube	null
Infrared	VGPS		21 cm		image	
Millimeter			408 MHz			
Optical						
Radio						
UV						
X-ray						
Unknown						

Date modified: 2014-04-22



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Search Results Error ADQL Help

Product Types

- Science
- Auxiliary
- Preview
- Noise
- Calibration
- Info
- Catalog
- Weight

[Download](#)

RA: 299.59031645, DEC: 35.20160509, COORDSYS: ICRS, SERVICE: Simbad(simbad.u-strasbg.fr)
Download complete query results: [VOTable](#) [CSV](#) [TSV](#)

Query and transfer: 3.345 seconds - Load and render: 0.302 seconds [Manage Column Display](#)

<input type="checkbox"/>	Preview	Collection	Obs. ID	RA (J2000.0)	Dec. (J2000.0)	Start Date	Instrument	Int. Time	Target Name
Filter:				H:M:S	D:M:S	Calendar		Seconds	
<input checked="" type="checkbox"/>		CGPS	MP2_DRAO-ST	20:02:18.91	+36:22:12.8		DRAO-ST		MP2



CADC Advanced Search

Download Manager – Canadian Astronomy Data Centre

www.cadc-ccda.hia-ihc-nrc.gc.ca/en/download

pan virtual observatory alma

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Choose one of the following download methods:

Java Webstart	DownloadManager is launched as a desktop application via Java Webstart. The software is automatically cached on your computer, so subsequent startups are faster.
URL list in a file	<p>Download a text file containing a list of URLs. It can then be used with a script or directly with the <i>wget</i> command. Each line contains an URL or, when URL generation fails, an error message.</p> <p>The <i>wget</i> command to download all the URLs contained the above text file:</p> <pre>% wget --http-user=CADC_USERNAME --http- password=CADC_PASSWORD --content-disposition -i FILE_NAME</pre> <p>Be certain to fill in your own CADC_USERNAME, CADC_PASSWORD and the FILE_NAME to use (default: cadcUrlList.txt) in the appropriate places in that command or you will get an error from <i>wget</i>. See below for more <i>wget</i> options.</p>
URL list on an HTML page	View the list of URLs (one per file) in a Web page and select individual files to download.

Remember my choice of download method (cookies required)

Each download page has a "Choose one of the other download methods" button which, if selected, removes the remembered download choice and returns to this multiple choice page.

Help

wget is not working

The recommended usage above includes the `--content-disposition` option, which is available in *wget* versions 1.12 or later. This option improves the likelihood that saved files will have the correct filenames when downloaded.

Please note that there are many versions of *wget* with a variety of options and syntax. Please consult your local help pages. `wget --help` should



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Aladin

Developments for Cubes

- In-house prototype access
 - Preparing for cubes in Aladin image server, and cubes that will be available in VO
 - Testing implementations of IVOA stds. (SIAv2, DataLink)
- Developing techniques for generalization of all-sky browsing applied to cubes
 - HiPS (HEALPix based) framework for describing data
 - Examples: CGPS, CALIFA cubes, multi- λ data sets



Aladin

Developments for Cubes

Canada Galactic Plane Survey cube in Aladin

- Exploring visualization of large and wide area cubes
- HiPS applied to cubes

The screenshot displays the Aladin v8.1 software interface, which is a BETA VERSION based on v8.103. The main window shows a large, colorful visualization of a Galactic Plane Survey cube, rendered as a long, narrow strip of data across the sky. The visualization is overlaid on a grid of Galactic coordinates. The color scale ranges from dark blue (low intensity) to red (high intensity). The interface includes a top menu bar with options like 'Location', 'Frame' (set to 'ICRS'), and a list of data sources including DSS, SDSS, 2MASS, WISE, GALEX, PLANCK, XMM, Fermi, Simbad, and NED. A right-hand sidebar contains a toolbar with various interaction tools (select, pan, dist, phot, draw, tag, filter, cross, x-y, rgb, assoc, crop, cont, pixel) and a panel for the 'CGPS' cube, showing its properties (epoch, size, opac, zoom) and a small thumbnail of the cube's orientation. The bottom status bar shows the current coordinates (151.8° x 124.6°) and the time (22:59:15.06 +59:47:05.3). The footer indicates the software is distributed under GNU GPL v3.



Aladin

Developments for Cubes

CALIFA cubes in Aladin

- Exploring techniques for browsing for cube data
- Interoperability with cube visualizers via SAMP envisaged

Aladin v8.1 *** BETA VERSION (based on v8.103) ***

File Edit Image Catalog Overlay Coverage Tool View Interop Help

Location 057.48176 +85.58532

DSS SDSS ZMASS WISE GALEX PLANCK XMM Fermi Simbad NED +

Middle: quick panning. Right: constrain adjustment. Wheel: quick zoom on the reticle. Simple-clip: move the reticle. Double-clip: re-center.

CALIFA V500 3.44" x 2.282"

RAJ2000	DEJ2000	id	access	FoV
142.54223	7.90358	IC0540	original cube	FoV
184.76215	8.85726	IC0776	original cube	FoV
207.87804	14.09332	IC0944	original cube	FoV

(c) 2014 UDS/CNRS - by CDS - Distributed under GNU GPL v3

100 sel / 100 str 101 views 11fps / 222Mb



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CALIFA Data Release 1

CALIFA 1st DATA RELEASE | CALIFA SURVEY

www.caha.es/CALIFA/public_html/?q=content/califa-dr1

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CALIFA SURVEY

Calar Alto Legacy Integral field spectroscopy Area survey

Home Observed Objects News Publications Members' Page Editors Page Next Events

- ▶ CALIFA Summary
- ▶ CALIFA DR1
- ▶ CALIFA Red Book
- ▶ CALIFA Collaboration
 - Members
 - Structure
 - Publications
- ▶ News
 - News
 - Next Events
- ▶ CALIFA Sample
 - Observed Objects Up-to-Date
 - SDSS Poststamps: Obs. Sample
 - SDSS poststamps: Full sample
- ▶ CALIFA Meetings
 - 7th Busy Week
 - 6th Busy Week
 - 5th Busy Week

CALIFA 1st DATA RELEASE

NGC6125	NGC1349	NGC4003	NGC5406	UGC07012
Flux 10-16 erg/s/cm/arcsec ² /Å 4.000 4.100 4.200 4.300 4.400 4.500 4.600 4.700	velocity km/s 100 107 114 121 128 135 142 149	log(Age/Gyr) 0.00 1.04 2.07 3.11 4.15 5.19 6.23 7.27	Flux 10-16 erg/s/cm/arcsec ² 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5	

Find: rut Next Previous Highlight all Match case Phrase not found



CALIFA DR1 VO Access

GAVO Data Center Web Interface to the Relational Registry

dc.zah.uni-heidelberg.de/wirrr/q/ui/fixed

Web Interface to the Relational Registry

Text Fields: match califa Info

Items displayed per page: 20 Offset: 0 items Run Query

Query History

- ▶ CALIFA DR tables
- ▶ CALIFA spectra [SSA](#) [WEB](#)
- ▶ O3N2 and N2 abundance [WEB](#) [WEB](#) [SCS](#)
indicators revisited (Marino+, 2013)

Connect to SAMP hub

Access to data provided through standard VO interfaces

- ObsCore
- TOPCAT
- SSAP
- TAP
- ...



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JVO ALMA Portal

Safari File Edit View History Bookmarks Window Help ALMA Archive

jvo.nao.ac.jp/portal/alma/archive.do

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=> Location: Top Page > ALMA > ALMA Archive

ALMA Archive

Using the data for publication

The following statement should be included in the acknowledgment of papers using the ALMA datasets obtained from the JVO portal:

"This paper makes use of the following ALMA data: ADS/JAO.ALMA#<Project code>. ALMA is a partnership of ESO (representing its member states), NSF (USA) and NINS (Japan), together with NRC (Canada) and NSC and ASIAA (Taiwan), in cooperation with the Republic of Chile. The Joint ALMA Observatory is operated by ESO, AUI/NRAO and NAOJ."

You can find the project code (e.g. 2011.0.01234.S) on the dataset info page where you download the data.

Please also include the following sentence on the title page as a footnote to the title or in the acknowledgment of the paper.

"[Part of] the data are retrieved from the JVO portal (<http://jvo.nao.ac.jp/portal>) operated by the NAOJ"

Target Name	Project Code	Coords	Desktop Viewer
Sort by: <input checked="" type="radio"/> target <input type="radio"/> coordinates <input type="button" value="Update"/>			
#	Target Name	Coords	# of Data
1	2MASS_0444+2512	04h44m27.149158 +25d12m16.13999	3
2	30 Doradus	05h38m47.434695 -69d04m42.31289	16
3	a1689	13h11m29.549007 -01d20m24.45504	3
4	Abell 1664	13h03m42.423355 -24d14m44.36999	4
5	Abell 1835	14h01m02.082818 +02d52m43.00201	4
6	ADFS01	04h42m55.832390 -53d45m06.20523	24
7	AGN1	22h17m36.518666 +00d16m22.77001	1
8	AGN2	22h17m39.048667 +00d13m29.97001	1
9	AGN3	22h17m09.648667 +00d18m00.56999	1
10	AGN4	22h17m20.248668 +00d20m18.97001	1
11	AGN5	22h17m35.868667 +00d15m58.97002	1
12	AGN6	22h17m59.198666 +00d15m29.27002	1
13	AGN7	22h17m16.168666 +00d17m45.66998	1
14	AGN8	22h17m32.008666 +00d16m55.47000	1
15	am0318-230	03h20m40.374374 -22d55m53.59879	2
16	am0612-373	06h13m47.631562 -37d40m36.81919	2
17	am0956-282	09h58m46.276202 -28d37m19.56158	2
18	am1158-333	12h01m20.693064 -33d52m35.60959	2
19	am1255-430	12h58m08.032078 -43d19m47.34998	2
20	am1300-233	13h02m52.379606 -23d55m17.99839	2
21	am1419-263	14h22m06.676075 -26d51m27.18079	2
22	am2038-382	20h41m13.897447 -38d11m36.68039	2



JVO ALMA Portal

Safari File Edit View History Bookmarks Window Help
ALMA Archive : Target Info
jvo.nao.ac.jp/portal/alma/archive.do?action=target.info&target=TW+Hya&sortBy=target
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ALMA Archive : Target Info

Target Name: TW Hya

#	dataset id	ra/dec (J2000)	size (arcmin ²)	band	freq. range (GHz)	data type	3rd axis	Cube size (XxYxF) ?	image resol (arcsec)	freq. resol (MHz)	obs date	original fits name
1	ALMA01001595	11h01m51.8-34d42m17	0.50x0.50	Band7	372.286 -- 372.631	intensity cube	frequency	300x300x1x1	0.10	234.375	2012-11-19	TWHya.continuum.fits
2	ALMA01001596	11h01m51.8-34d42m17	0.50x0.50	Band7	372.664 -- 372.676	intensity cube	frequency	300x300x20x1	0.10	.622	2012-11-19	TWHya.N2H+.fits
3	ALMA01001726	11h01m51.8-34d42m17	0.27x0.27	Band7	345.770 -- 345.785	intensity cube	frequency	400x400x200x1	0.04	.030	2012-11-20	TW_Hya.fits



JVO ALMA Portal

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ALMA Archive : Dataset Info

jvo.nao.ac.jp/portal/alma/archive.do?action=dataset.info&datasetId=ALMA01001596

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=> Location: Top Page > ALMA > Archive > Target Info > Dataset Info

ALMA Archive : Dataset Info

Summary | Binning Data | Desktop Viewer | Using the data

<ul style="list-style-type: none"> Target TW Hya Coord. (RA/DEC J2000) 11h01m51.8-34d42m17 Image Size (arcmin2) 0.50x0.50 Band Name Band7 Freq. Range. (GHz) 372.664 -- 372.676 Cube Pix ? 300x300x20x1 3rd(4th) Axis frequency 	<ul style="list-style-type: none"> Dataset ID ALMA01001596 Date of Observations 2012-11-19 Image Resol. (arcsec) 0.10 Data Type intensity cube Spectrum Resol. (MHz) .622 Original Filename TWHya.N2H+.fits Project Code 2011.0.00340.5
---	---

data id	image	spect	file size (byte)	Download	Web QL	Readme
ALMA01001596			7,323,840	Download	Web QL	Readme



JVO ALMA Portal

ALMAWebQL ...A web-based browser for ALMA data cubes

Quick Look System for ALMA VO Service

jvo.nao.ac.jp/portal/alma/archive.do?action=dataset.info&datasetId=ALMA01001596

Apple JPL UMS Mail JPL Maps

Data Information

• Data Set ID	• Object Name	• R.A.	• Dec.	• Observation Date (UTC)
ALMA01001596	TW Hya	11h01m51.86s	-34d42m18.216s	2012-12-19T00:05:30.001Z

Main **(Integrated Intensity Map)** **(Spectrum)**

Resolution : Enumerate...

Zoom : Enumerate...

Select Sub-region

Log Scale
 Coordinate Grid

Res. : 1.600 asec/pix
Zoom : x1
R.A. : 11h01m51.86s
Dec. : -34d42m19.816s

Resolution : Enumerate...

Frequency Range :

Back to Pan Mode

Temperature
 Log Scale

Res. : 2.486 MHz/ch
372.667 GHz



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VAO-NRAO Simple Image Access Protocol v. 2 Prototype



National Radio Astronomy Observatory



Friday, May 9, 2014

SIAPV2 Prototype Service

(NRAO VLA FIRST Survey)

Query Parameters (Debug) ():

POS ("ra,dec" in degrees):	<input type="text" value="180.0,1.0"/>	SIZE (decimal degrees):	<input type="text" value="5.0"/>
BAND (meters):	<input type="text" value="1.0E-8/5.0"/>	TIME (ISO time):	<input type="text" value="1990-07-04/2014"/>
POL (state, "any", "stokes"):	<input type="text"/>	MODE ("archivalcutoutmatch"):	<input type="text" value="archival"/>
TYPE ("image", or "cube"):	<input type="text"/>	SUBTYPE (archive-specific):	<input type="text" value="SDM.BDF"/>
SPECRES (min spectral resolution):	<input type="text"/>	SPECRP (min spectral respower):	<input type="text"/>
COLLECTION (e.g., "alma,jvla"):	<input type="text"/>	ASTCALIB (e.g., "absolute"):	<input type="text"/>
PUBDID (dataset ID):	<input type="text"/>	MAXREC:	<input type="text"/>

Image Data Collections:

Null/Echo Test VAO Cube Project Test Data

Output Data Formats:

All available formats FITS image Graphics image

Query Response Format:

VOTable Text CSV

Please direct [feedback and/or questions](#) concerning the DALServer toolkit to the author.

Also
developing
VO interface
integrated
into CASA
viewer



Multi-dimensional Data Services

- Diverse set of prototypes and operational services in place
 - Data Access Layer and Simple Image Access Protocol v.2
 - Table Access Protocol (TAP) + Observation Core Components (ObsCore)
 - Simple Spectral Access Protocol (SSAP)
 - DataLink
- Varying levels of “transportability”
 - Can Project X make use of the code base for itself?
 - Following session, “Code Bases and Repositories,” also relevant
- Next steps and VO-Project boundaries
 - *Cutouts*
 - Visualization
 - Higher level functions applied to data
Smoothing, translations, moments, ...