

Spanish Virtual Observatory (SVO)
Centro de Astrobiología CAB (CSIC-INTA)



Instituto
Nacional
de Técnica
Aeroespacial

SVOCat

Publishing Astronomical Catalogues to the Virtual Observatory

A Tool for Web-Based Catalogue Publication

 Version 3.1  April 2025

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What is SVOCAT?



Core Purpose

SVOCAT is an application developed by the **Spanish Virtual Observatory (SVO)** to simplify the publication of astronomical catalogues. It creates both **web interfaces** and **Virtual Observatory services** from a single configuration.



Key feature

Requires **no code writing** and minimal technical expertise. Through a web-based admin interface, astronomers can publish their catalogues to the VO without programming knowledge.



Target Users

Designed for astronomers and data providers who want to share their catalogues with the global community through a web interface and standardized VO protocols, without managing complex server infrastructure.

✓ Main Benefits

- ▶ **No programming required** — web-based configuration
- ▶ **Automatic VO compliance** — ConeSearch, SSAP and DataLink
- ▶ **Dual output** — web page + VO services
- ▶ **Customizable design** — CSS and template editing
- ▶ **Docker deployment** — easy installation

Core Components and Architecture

System Requirements

01

Web Server

Apache HTTP Server (v2.2+)

02

PHP

PHP 5.3+ with MySQL
extensions

03

Database

MySQL 5.1+ or MariaDB

Docker Deployment

Pre-configured Docker images available for simplified deployment:

- opensvo/svocat:web-2.2
- opensvo/svocat:db-2.2

Single command: `docker compose up`

Data Structure

Single Table Model

Catalogue viewed as a single table with multiple columns

Coordinate Requirements

Two columns for **RA and DEC in decimal degrees** (J2000 equinox)
(version available for catalogues without coordinates)

Input Formats

CSV files with comma-separated columns, or existing MySQL table

Web-based configuration

Configuration

Admin User | Project | Mysql database | **Web options** | VO options | Catalogue fields | Photom. Groups | Search options | File Paths | Scripts | VO Registry | Spectra | Links | References | Logout

| WEB page texts | WEB functionalities/menu | Coverage Map | WEB logos |

WEB page texts

There are some texts that we need to include in the web page describing your project. Please write here the adequate content.

- 'Title': The web page title
- 'Subtitle': A short subtitle
- 'Email': A help-desk contact email
- 'Description': A description of the project to show in the homepage. You can use html here.
- 'Acknowledge': A text explaining how to acknowledge the use of this service. To be shown at the end of the homepage.
- 'Fix creation date to': SVOCat will save internally the date when you first created this service but you can override it so that leave it empty to allow SVOCat to handle this.
- 'Fix update date to': SVOCat will save internally the date when you make any change to this service but you override it so that leave it empty to allow SVOCat to handle this.

Title	<input type="text" value="ExCat2"/>
Subtitle	<input type="text" value="an example catalogue with spectra"/>
Email	<input type="text" value="svo-support@cab.inta-csic.es"/>
Description	<p>This site is build as an example to illustrate how to configure SVOCat for a catalogue containing astronomical data, spectra and other associated files. The data used here are a tiny subset of the published spectra in the SpeX Prism Library.</p> <p><p>If presenting or publishing previously published data, be sure to cite the original data reference(s) listed for each spectrum.</p>
Acknowledge	<p>Here you could include some information about how to acknowledge or cite the use of your catalogue.</p>
Fix creation date to	<input type="text"/>
Fix update date to	<input type="text"/>

The screenshot shows the rendered web page for 'ExCat2'. The page title is 'ExCat2' and the subtitle is 'an example catalogue with spectra'. The email address is 'svo-support@cab.inta-csic.es'. The description text is: 'This site is build as an example to illustrate how to configure SVOCat for a catalogue containing astronomical data, spectra and other associated files. The data used here are a tiny subset of the published spectra in the [SpeX Prism Library](http://pono.ucsd.edu/~adam/browndwarfs/spexprism/). If presenting or publishing previously published data, be sure to cite the original data reference(s) listed for each spectrum.' The resources list includes: Data retrieval, News, Documentation, Coverage Map, Credits, and Help-desk. The acknowledge text is: 'Here you could include some information about how to acknowledge or cite the use of your catalogue.' The footer text is: 'This service uses SVOCat by the SVO'. The SVO logo is visible in the top right corner.

Web-based configuration

DB name	Data type	Show	No VO	No sort	CSV Order	Res. Order	Title	Web group	Unit	Description	UCD	UType	Format (Web)	Format (VO)	Phot.Group
RAdeg	double	VERB=1	---	---	1	1	RA			Right Ascension (J2000) (degrees)	POS_EQ_RA_MAIN				
DECdeg	double	VERB=1	---	---	2	2	DEC			Declination (J2000) (degrees)	POS_EQ_DEC_MAIN				
name	string	VERB=1	---	---	3	3	Name			Object Name	ID_MAIN	ssa:Target.Name			
opspty	string	VERB=1	---	---	4	4.1	Sp.Type			Optical spectral type		ssa:Target.Spectral Class			
dateobs	string	VERB=2	---	---	8	4.2	Obs. Date			Original observation date.					
jmag	double	VERB=2	---	---	5	5.1	Jmag		mag	2MASS J magnitude					Jmag
hmag	double	VERB=2	---	---	6	5.2	Hmag		mag	2MASS H magnitude					Hmag
ksmag	double	VERB=2	---	---	7	5.3	Ksmag		mag	2MASS Ks magnitude					Ksmag
ref	string	VERB=1	---	---	9	8	Reference			Reference to the paper where the spectrum was originally published. If presenting or publishing previously published data, be sure to cite the original data reference.					
filename0	string	never	---	---	10		filename0								
	---	---	---	---											
	---	---	---	---											
	---	---	---	---											

The slide features a solid red background with three large, light-red circles. One circle is positioned behind the word 'Features', another is to its right, and a third is in the lower right quadrant of the slide.

Features

What SVOCAT Can Handle



Supported Data Types



Astronomical Coordinates

RA and DEC in decimal degrees (J2000).
Supports cone search queries by position and radius.



Photometry & Magnitudes

Multi-band photometric measurements with magnitude errors, filter information, and zero points.

Integrated with the SVO Filter Profile Service



Spectral Data

1D spectra can be provided both in the web and through SSAP service.



Associated Files

Links to external files: FITS images, data products, documentation, and supplementary materials.

Types: Images, data cubes, PDFs, tar archives



External Links

URLs to related databases, SIMBAD, NED, VizieR, and other astronomical resources.

Examples: Cross-matches, bibliographic references



VO protocols

- ConeSearch
- SSAP
- DataLink

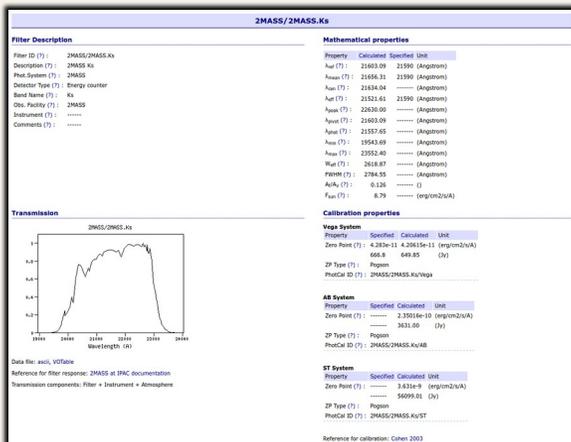
Photometry Configuration

IVOA Photometry Data Model

SVOCAT implements the **IVOA Photometry Data Model** for standardized photometric data description. Each photometric measurement is associated with detailed filter information from the SVO Filter Profile Service.

Benefit: Automatic retrieval of filter transmission curves, effective wavelengths, and bandwidths

Best Practice: Using **SVO FPS** filter IDs automatically populates transmission curves, eliminating manual filter characterization.



Filter Properties Configured

- ✓ **Filter ID**
SVO FPS filter name (e.g., "SDSS/r", "2MASS/J")
- ✓ **Value Type**
Magnitude or flux (flux density)
- ✓ **Magnitude Type**
Pogson (standard), asinh, or linear
- ✓ **Zero Point**
In erg/cm²/s/Å for custom filters
- ✓ **ZP System**
Vega, AB, or ST magnitude system

Registration in the VO Registry

And this is the file that will be saved as work/registry.xml so that you can upload it to the registry

You can edit it if you want before saving

Take into account that the content shown here is generated on the fly from your configuration, it is not showing the actual content of the file.
Take into account too that a "not so friendly" rl:Resource envelope will also be added to the final file

```
<title>An example catalogue (2)</title>
<shortName>ExCat2</shortName>
<identifier>ivo://svo.cab/cat/excat2</identifier>
<curation>
  <publisher ivo-id="ivo://svo.cab">SVO/CAB</publisher>
  <creator>
    <name>SVO</name>
  </creator>
  <contact>
    <name>Enrique Solano</name>
    <email>esm@cab.inta-csic.es</email>
  </contact>
</curation>
<content>
  <subject>Stars</subject>
  <description>An example catalogue (2)</description>
  <referenceURL>http://svo2.cab.inta-csic.es/vocats/excat2/documentation.php</referenceURL>
  <contentLevel>Research</contentLevel>
</content>
<capability standardID="ivo://ivoa.net/std/VOSI#availability">
  <interface xsi:type="vs:ParamHTTP">
    <accessURL use="full">
      http://www.mylab.com/catalogues/excat2/availability/
    </accessURL>
  </interface>
</capability>
<capability standardID="ivo://ivoa.net/std/VOSI#capabilities">
  <interface xsi:type="vs:ParamHTTP">
    <accessURL use="full">
      http://www.mylab.com/catalogues/excat2/capabilities/
    </accessURL>
  </interface>
</capability>
```

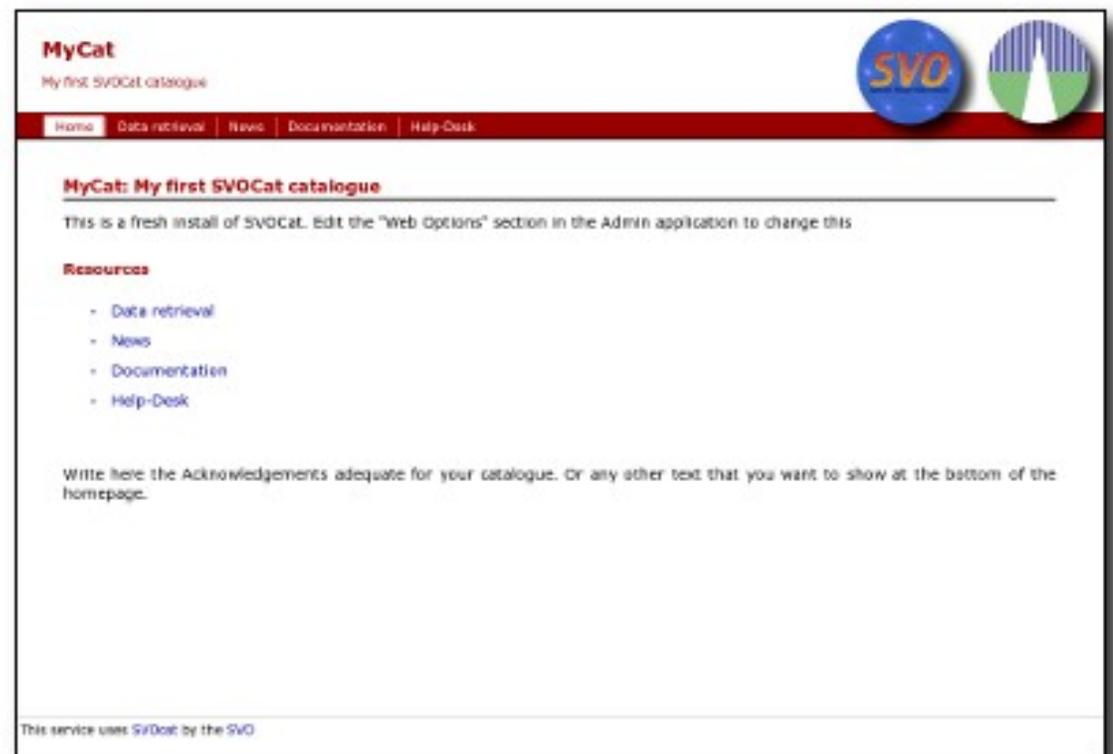
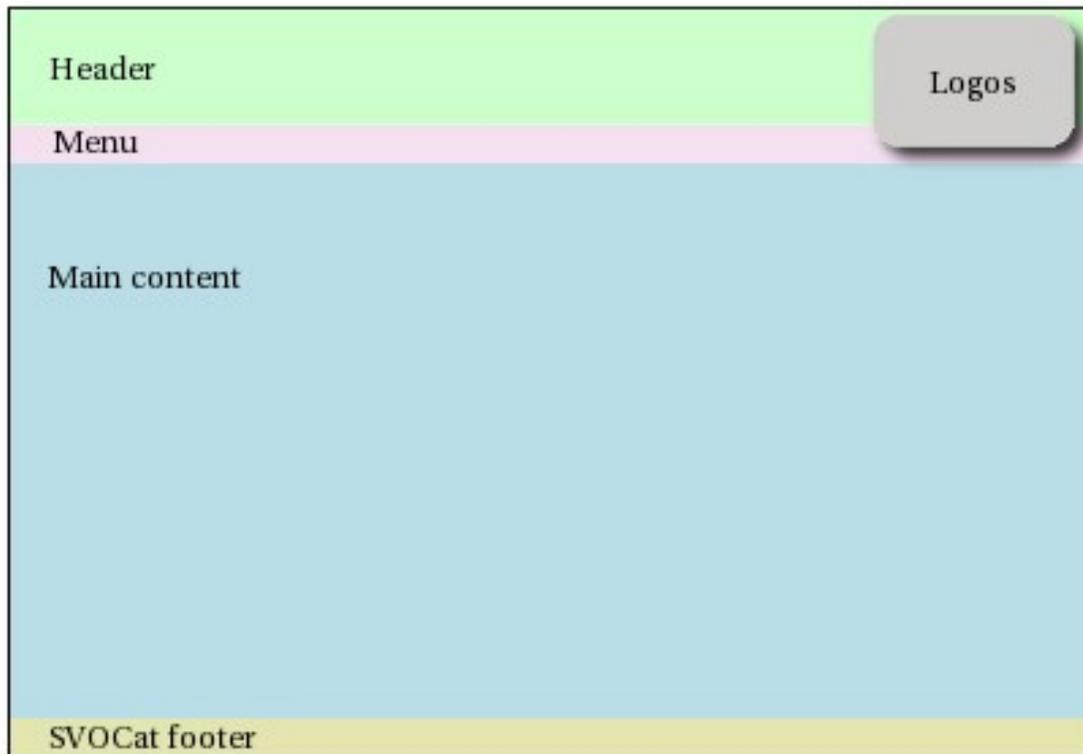
Continue

Web design



Appearance

Colors, fonts, logos, etc... can be modified by changing a simple CSS file.



Example Implementation

Example Catalogue: excat2

About excat2

The example catalogue included with SVOCAT is based on a subset of the **SpeX Prism Spectral Library**. It demonstrates key SVOCAT features with a manageable dataset.

10

Rows

10

Columns

10

Spectra

<http://svocats.cab.inta-csic.es/SVOCat/SVOCat2.2-excat2/index.php>

CSV File Structure

Radeg,DECdeg,name,opspty, jmag,hmag,ksmag,dateobs,ref,filename0

MySQL Table Schema

```
CREATE TABLE excat2(  
  id INT(11) NOT NULL AUTO_INCREMENT,  
  RAdeg DOUBLE DEFAULT NULL,  
  DECdeg DOUBLE DEFAULT NULL,  
  name CHAR(25),  
  opspty CHAR(12),  
  jmag DOUBLE,  
  hmag DOUBLE,  
  ksmag DOUBLE,  
  dateobs CHAR(12),  
  ref CHAR(5),  
  filename0 CHAR(25),  
  PRIMARY KEY (id),  
  KEY idx_ra (RAdeg),  
  KEY idx_dec (DECdeg),  
  KEY idx_opspty (opspty)  
 ) ENGINE=MyISAM;
```

Field Descriptions

- **RAdeg/DECdeg:** Coordinates (°)
- **opspty:** Spectral type
- **dateobs:** Observation date
- **name:** Object identifier
- **jmag/hmag/ksmag:** 2MASS photometry
- **filename0:** Spectrum filename

Example Implementation

Example Catalogue: excat2

ExCat2
an example catalogue with spectra

[Home](#) | [Data retrieval](#) | [News](#) | [Documentation](#) | [Coverage Map](#) | [Credits](#) | [Help Desk](#)

RA (?)

DEC (?)

Radius (?)

Search

all results | default verb. | (Maximum Search Radius allowed: 180 degrees)

Don't use coordinates as search criterion

Hide additional search fields

Magnitude ranges (?)

---	:	---
---	:	---
---	:	---

Color ranges (?)

---	:	---
---	:	---
---	:	---

Sp. Type (?)

[Objects with L8 spectral type](#)

9 data found.

RA (deg)	DEC (deg)	RA (hh:mm:ss)	DEC (hh:mm:ss)	Name (?)	Spectra (?)	All links (?)	Sp. Type (?)	Obs. Date (?)	Jmag (mag)	Hmag (mag)	Ksmag (mag)	Reference (?)
52.177750	23.034778	03:28:42.66	23:02:05.20	2MASS J0328426+230205	VOT ASCII	Links	L8	2006 Dec 23	16.693	15.547	14.916	Burgasser et al. 2008
126.332021	21.264478	08:25:19.68	21:15:52.12	2MASS J0825196+211552	VOT ASCII	Links	L7.5	2005 Mar 23	15.1	13.792	13.028	Burgasser et al. 2010
271.816398	50.258801	18:07:15.94	50:15:31.68	2MASS J1807159+501531	VOT ASCII	Links	L1.5	2003 Aug 12	12.934	12.127	11.602	Burgasser et al. 2008
314.475392	-2.875072	20:57:54.09	-02:52:30.26	2MASS J2057540-025230	VOT ASCII	Links	L1.5	2003 May 23	13.121	12.268	11.724	Burgasser et al. 2004
47.749458	16.804333	03:10:59.87	16:48:15.60	2MASSW J0310599+164816	VOT ASCII	Links	L8	2005 Dec 31	16.025	14.932	14.312	Burgasser 2007
142.390208	34.497986	09:29:33.65	34:29:52.75	2MASSW J0929336+342952	VOT ASCII	Links	L8	2008 Jan 09	16.601	15.44	14.644	Burgasser et al. 2010
226.948721	-16.460728	15:07:47.69	-16:27:38.62	2MASSW J1507476-162738	VOT ASCII	Links	L5	2003 Aug 12	12.83	11.895	11.312	Burgasser 2007
248.121308	19.077975	16:32:29.11	19:04:40.71	2MASSW J1632291+190441	VOT ASCII	Links	L8	2003 May 22	15.867	14.612	14.003	Burgasser et al. 2004
322.686004	-8.755703	21:30:44.64	-08:45:20.53	2MASSW J2130446-084520	VOT ASCII	Links	L8					

Name: 2MASSW J1632291+190441

Available links

Spectrum (VOTable) : VOTable (application/x-votable+xml)

Spectrum (ASCII) : ASCII (text/plain)

Spectrum (Plot preview) : PNG (image/png)

SIMBAD : SIMBAD (text/html)

Reference : Burgasser et al. (2004) A3, 127, 2856 (text/html)

Reference : SpeX Prism Library web page. (text/html)

Download all results as VOTable or CSV file

You can send these results to other VO Applications if they are already open in your computer. Maybe you can also send them to [Aladin](#).

This service uses SVOcat by the SVO

ExCat2
an example catalogue with spectra

[Home](#) | [Data retrieval](#) | [News](#) | [Documentation](#) | [Coverage Map](#) | [Credits](#) | [Help Desk](#)

Coverage Map

AITOFF projection. [Click to see an enlarged view.](#)

Cartesian projection. [Click to see an enlarged view.](#)

MOC resolution: 3.665° (moc order=4)

[Download MOC fits file](#)

You can send this Coverage Map to other VO Applications (in particular Aladin) if they are already open in your computer.

Images created with Aladin.
MOC file created with Stilts.

This service uses SVOcat by the SVO

12/21

External User Deployments

Real-World Applications



ALHAMBRA Survey: Multi-Band Photometric Catalogue

Survey Overview

ALHAMBRA (Advanced Large Homogeneous Area Medium Band Redshift Astronomical) is a photometric survey designed to trace cosmic evolution and variance.

Sky Coverage
~4 deg²

SVOCAT Implementation

- ✓ Multi-band photometry groups
- ✓ Photometric redshift search
- ✓ Morphological classification flags

svocats.cab.inta-csic.es/alhambra/

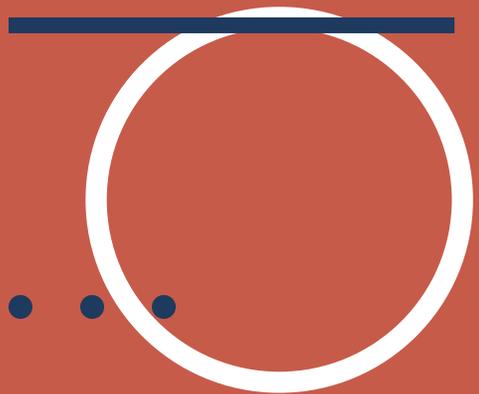
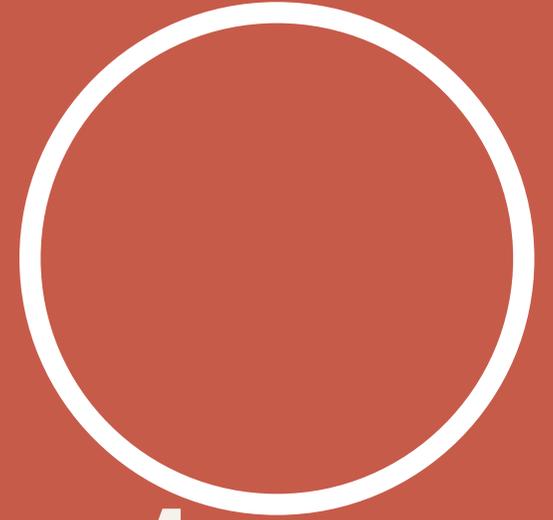
The screenshot displays the ALHAMBRA Survey web interface. At the top, there are logos for ALHAMBRA SURVEY, SVO (Small Volume Observatory), and a telescope icon. A navigation bar includes links for Home, Data retrieval, News, Documentation, Coverage Map, and Help-Desk. Below this is a search interface with input fields for RA (37.0), DEC (1.0), and Radius (2), along with search and reset buttons. A dropdown menu shows '10 results' and 'default verb.'. A note indicates '(Maximum Search Radius allowed: 2 degrees)'. Below the search fields, it says 'First 10 results shown (75594 found)'. A table of search results is shown with columns: Δ (arcsec), RA (deg), DEC (deg), RA (hh:mm:ss), DEC (hh:mm:ss), objID (?), F814W (?), F814W (?), dF814W (?), Stellar_Flag (?), zb_1 (?), tb_1 (?), and Odds_1 (?). A tooltip for the 'dF814W' column is visible, showing 'Filter: CAHA/ALHAMBRA.F814W', 'Magnitude type: ppgson', and 'Zero Point type: AB'. At the bottom of the interface, there are logos for various institutions including IEEC, Observatorio Astronómico Nacional, and others. A footer note states 'This service uses SVOCat by the SVO' and a link to the 'SVO Privacy Policy' is provided.

References

[Show highlights](#) [Show abstracts](#) [Hide Sidebars](#) [Go To Bottom](#)

- 2024A&A...688A..45M 2024/08   
[Exoplanets-A: A virtual observatory database for host stars and planetary systems. The effect of XUV on planet atmospheres](#)
Morales-Calderón, M.; Joyce, S. R. G.; Pye, J. P. *and 12 more*
- 2023MNRAS.521.3127C 2023/05   
[The Calar Alto CAFOS direct imaging first data release](#)
Cortés-Contreras, M.; Solano, E.; Alonso-Hernández, J. *and 3 more*
- 2021A&A...650A.182G 2021/06 *cited: 79*   
[Homogeneous study of Herbig Ae/Be stars from spectral energy distributions and Gaia EDR3](#)
Guzmán-Díaz, J.; Mendigutía, I.; Montesinos, B. *and 6 more*
- 2018A&A...611A..41R 2018/03 *cited: 12*   
[THROES: a caTalogue of HeRschel Observations of Evolved Stars. I. PACS range spectroscopy](#)
Ramos-Medina, J.; Sánchez Contreras, C.; García-Lario, P. *and 3 more*
- 2015MNRAS.453.3685M 2015/11 *cited: 12*   
[Shapley Supercluster Survey: construction of the photometric catalogues and i-band data release](#)
Mercurio, A.; Merluzzi, P.; Busarello, G. *and 10 more*
- 2015A&C....11..181G 2015/06 *cited: 13*   
[Euro-VO-Coordination of virtual observatory activities in Europe](#)
Genova, Françoise; Allen, Mark G.; Arviset, Christophe *and 4 more*

Feedback and Future Improvements



User Feedback and Success Stories

Key Strengths

 **Ease of Deployment**
Web-based configuration eliminates need for programming expertise

 **Automatic VO Compliance**
Built-in IVOA ConeSearch standard implementation

 **Flexible Customization**
CSS styling and template editing for unique branding

 **Docker Convenience**
Containerized deployment simplifies installation

Challenges Identified

Input data formatting
Data must be adapted to the needs of MySQL import.

Manual columns setup
Although it is web-based, population of catalogue fields can be tedious if many fields have to be configured.

Future Improvements and Enhancements

Protocol Support

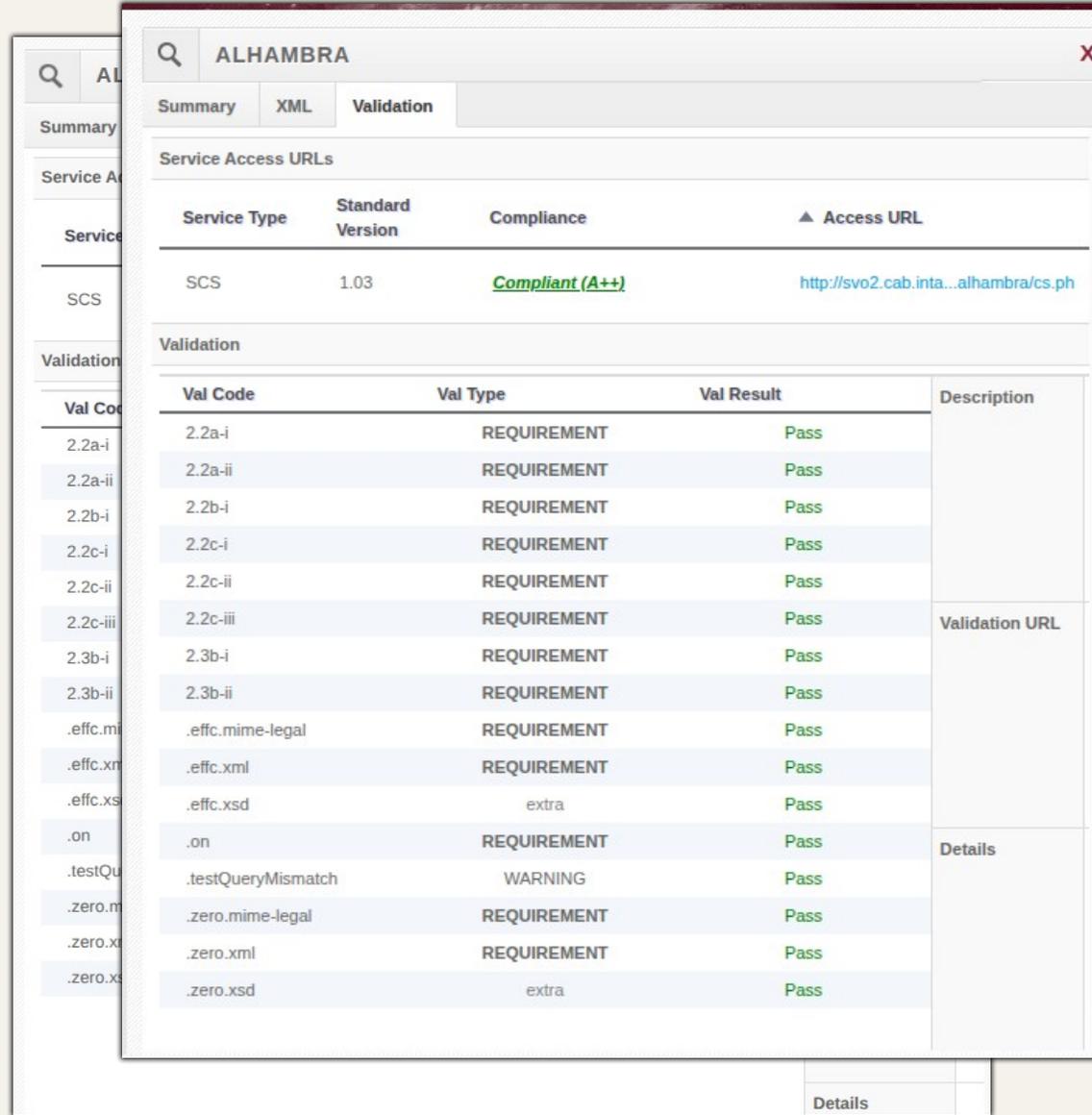
- ▶ Fix VO validation issues.
- ▶ Update of VO protocols to more recent recommendations.

ALHAMBRA				Information
Summary	Edit Resource	Validation		
Service Access URLs				
Service Type	Standard Version	Compliance	▲ Access URL	
SCS	1.03	<i>Partially Compliant (C-)</i>	http://svo2.cab.inta...lhambra/cs.php	
Validation				
Val Code	Val Type	Val Result	Description	
2.2a-i	REQUIREMENT	Pass	Validation URL	
2.2a-ii	REQUIREMENT	Could not be tested		
2.2b-i	REQUIREMENT	Could not be tested		
2.2c-i	REQUIREMENT	Could not be tested		
2.2c-ii	REQUIREMENT	Could not be tested		
2.2c-iii	REQUIREMENT	Could not be tested		
2.3b-i	REQUIREMENT	Pass		
2.3b-ii	REQUIREMENT	Could not be tested		
.effc.mime-legal	REQUIREMENT	Could not be tested		
.effc.xml	REQUIREMENT	Could not be tested		
.effc.xsd	extra	Could not be tested		
.on	REQUIREMENT	Pass		
.testQueryMismatch	WARNING	Pass		
.zero.mime-legal	REQUIREMENT	Pass		
.zero.xml	REQUIREMENT	Pass		
.zero.xsd	extra	Failed		
			Details	

Future Improvements and Enhancements

Protocol Support

- ▶ Fix VO validation issues.
- ▶ Update of VO protocols to more recent recommendations.



The screenshot displays the ALHAMBRA web application interface. The main window is titled "ALHAMBRA" and has tabs for "Summary", "XML", and "Validation". The "Validation" tab is active, showing a table of validation results. The table has columns for "Val Code", "Val Type", "Val Result", and "Description". The "Val Result" column shows "Pass" for all entries. The "Description" column has a "Validation URL" section for the first few rows and a "Details" section for the last few rows.

Val Code	Val Type	Val Result	Description
2.2a-i	REQUIREMENT	Pass	Validation URL
2.2a-ii	REQUIREMENT	Pass	
2.2b-i	REQUIREMENT	Pass	
2.2c-i	REQUIREMENT	Pass	
2.2c-ii	REQUIREMENT	Pass	
2.2c-iii	REQUIREMENT	Pass	
2.3b-i	REQUIREMENT	Pass	Details
2.3b-ii	REQUIREMENT	Pass	
.effc.mime-legal	REQUIREMENT	Pass	
.effc.xml	REQUIREMENT	Pass	
.effc.xsd	extra	Pass	
.on	REQUIREMENT	Pass	
.testQueryMismatch	WARNING	Pass	Details
.zero.mime-legal	REQUIREMENT	Pass	
.zero.xml	REQUIREMENT	Pass	
.zero.xsd	extra	Pass	



Thanks

<https://svo.cab.inta-csic.es/docs/index.php?pagename=Projects/SVOCat/Documentation>



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