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

SVOCat

Publishing Astronomical Catalogues to the Virtual Observatory

A Tool for Web-Based Catalogue Publication

Version 3.1 April 2025

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Astro-CC Data Provider Forum, Heidelberg, March 2026

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

Technical Foundation

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

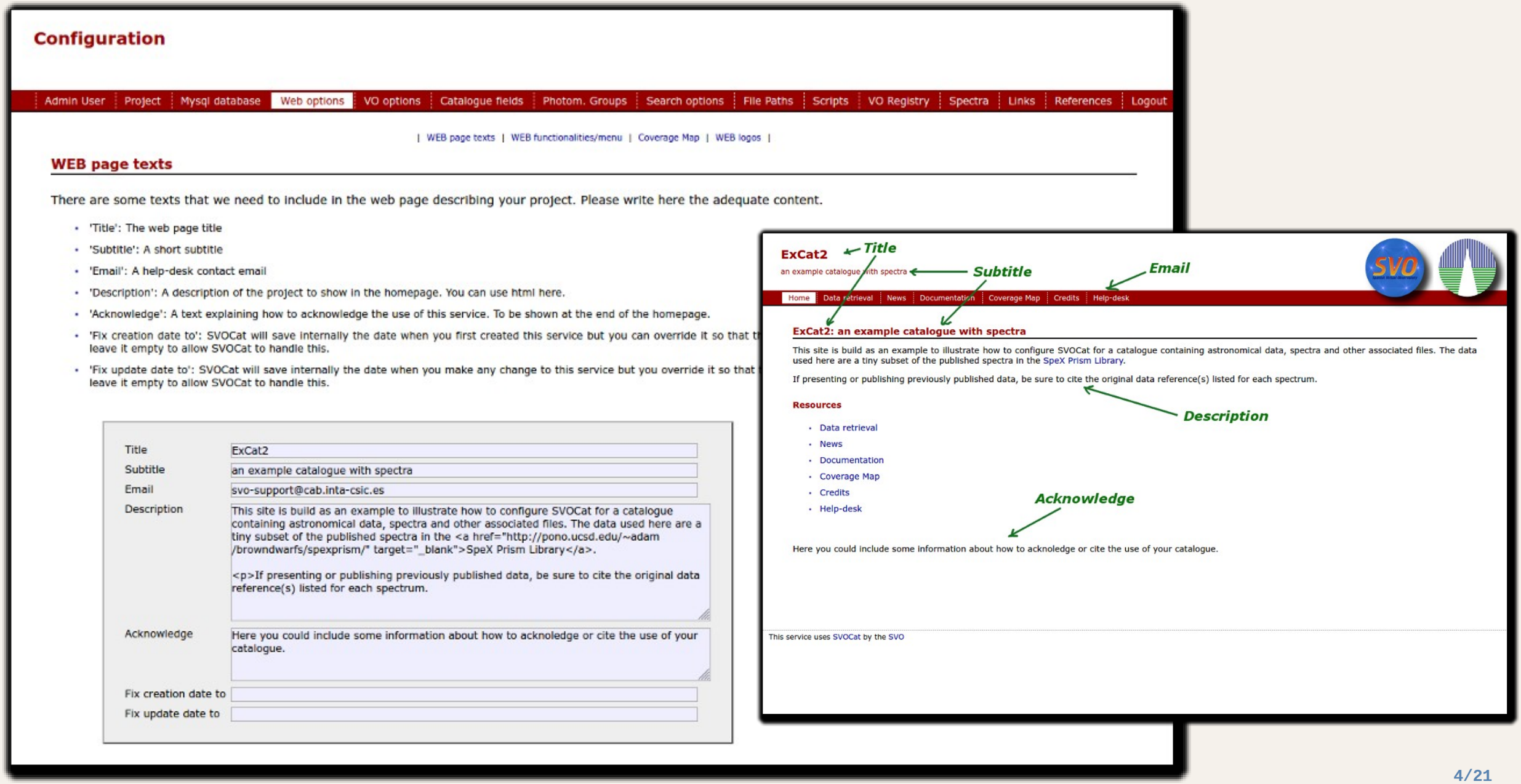
Coordinate Requirements

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



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.SpectralClass			
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								
	---	---	---	---											
	---	---	---	---											
	---	---	---	---											

Features

What SVOCAT Can Handle

Data Capabilities

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

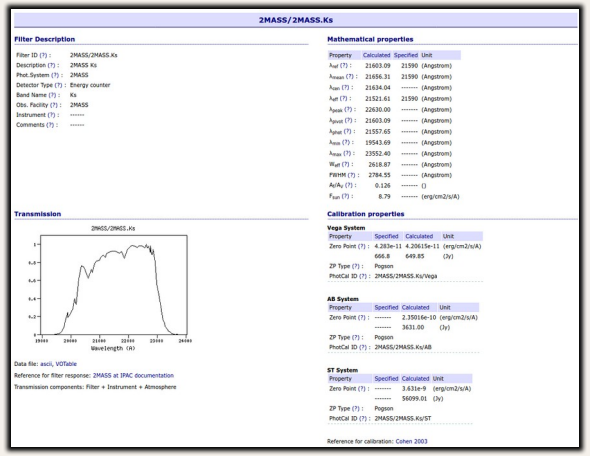
Photometry Configuration

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" ri:Resource envelope will also be added to the final file

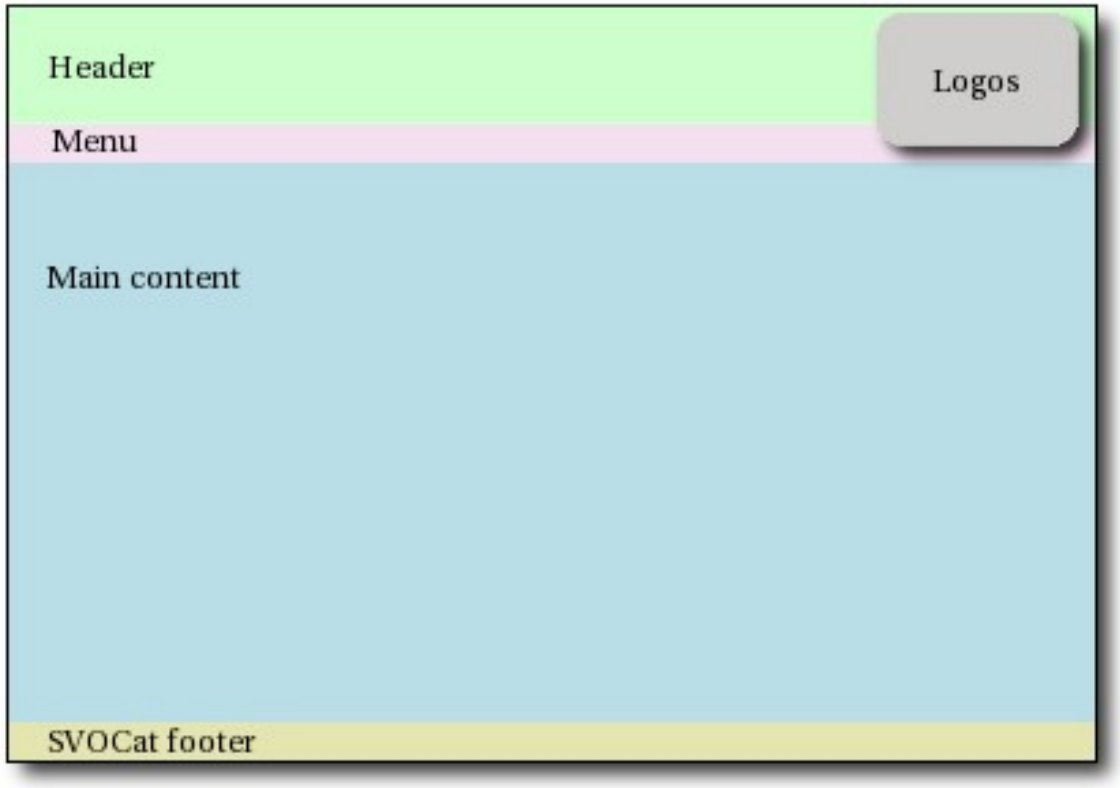
```
<title>An example catalogue (2)</title>
<shortName>ExCat2</shortName>
<identifier>ivo://svo.cab/cat/excat2</identifier>
<curation>
  <publisher ivo-id="ivo://svo.cab">SVO/CAB</publisher>
  <creator>
    <name>SVO</name>
  </creator>
  <contact>
    <name>Enrique Solano</name>
  <email>esm@cab.inta-csic.es</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>
```

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	10	10
Rows	Columns	Spectra

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

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;
```

CSV File Structure

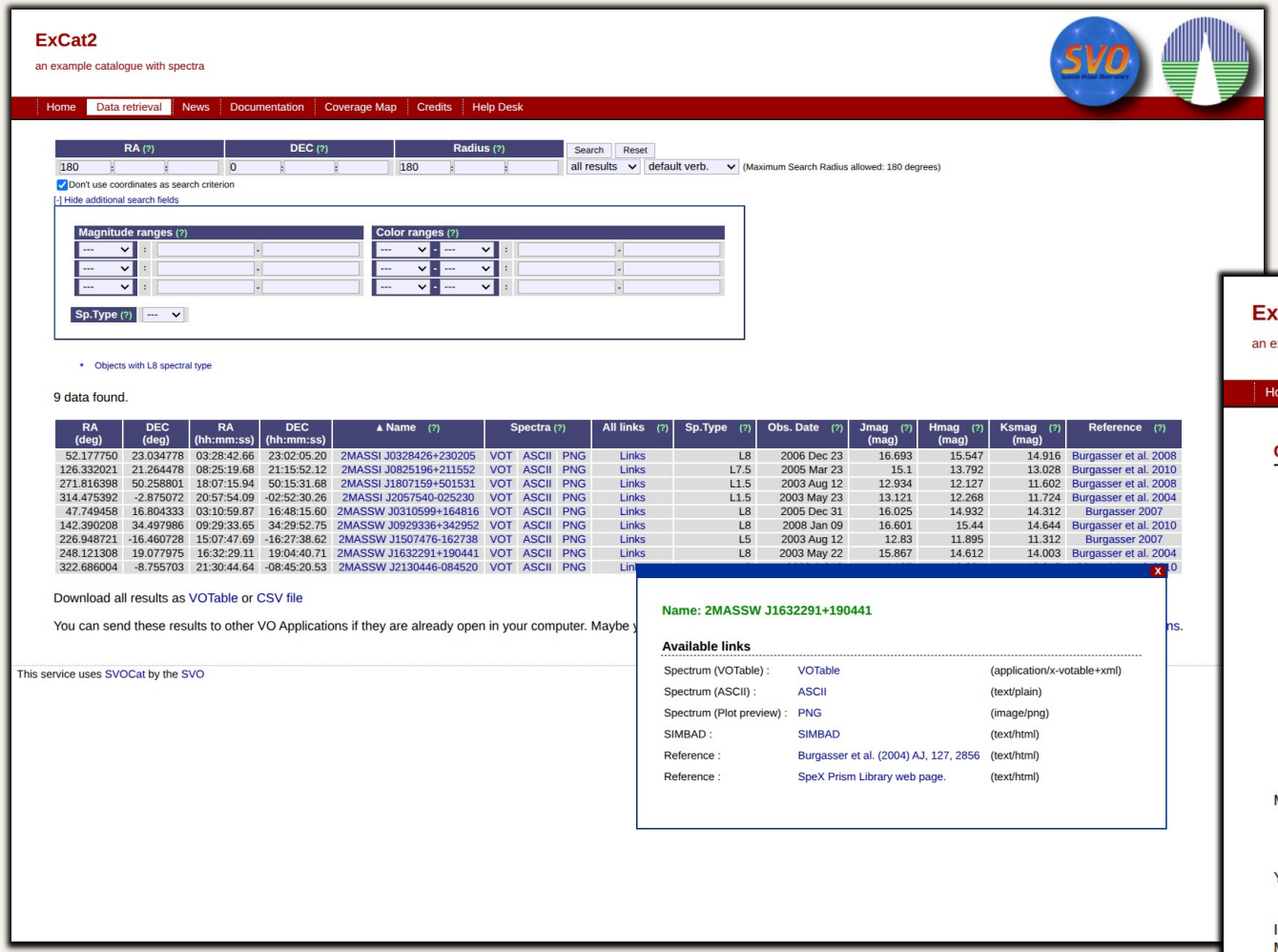
```
Radeg,DECdeg,name,opspty, jmag,hmag,ksmag,dateobs,ref,filename0
```

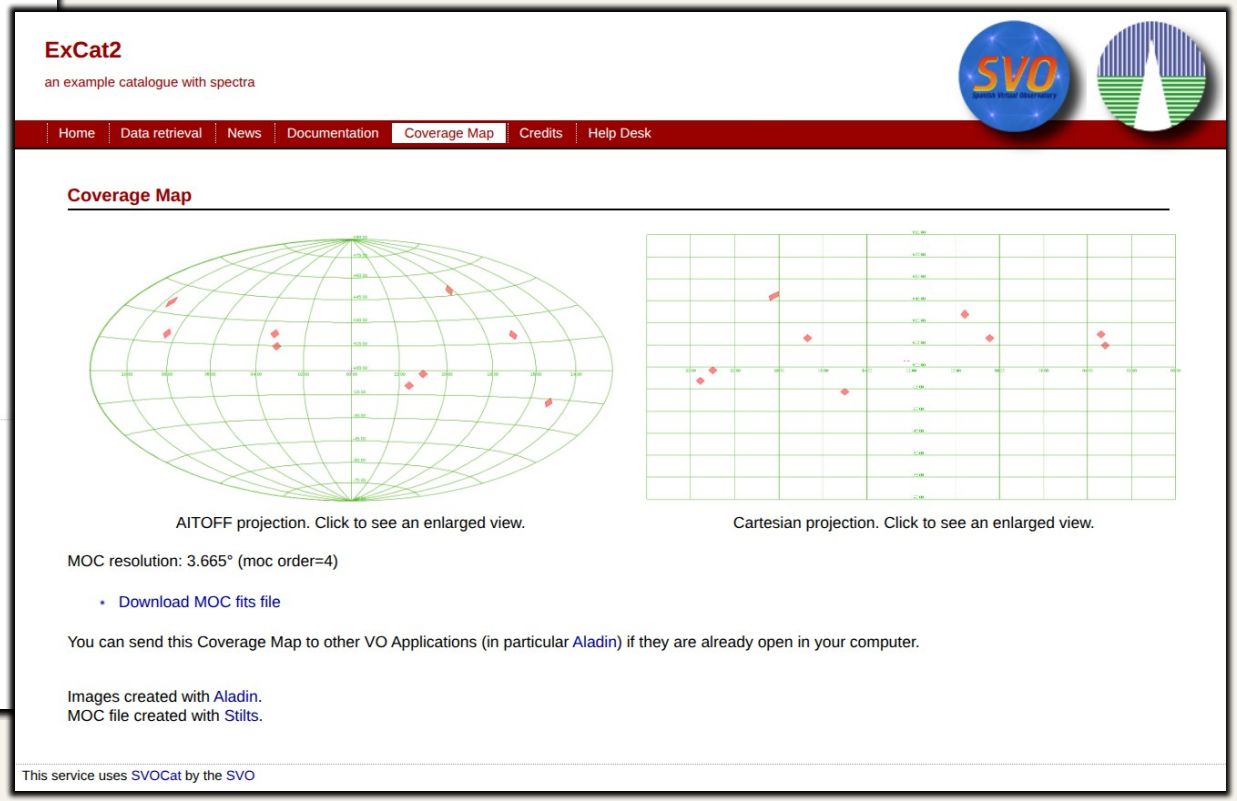
Field Descriptions

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

Example Implementation

Example Catalogue: excat2





External User Deployments

Real-World Applications

External Deployment 01

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.

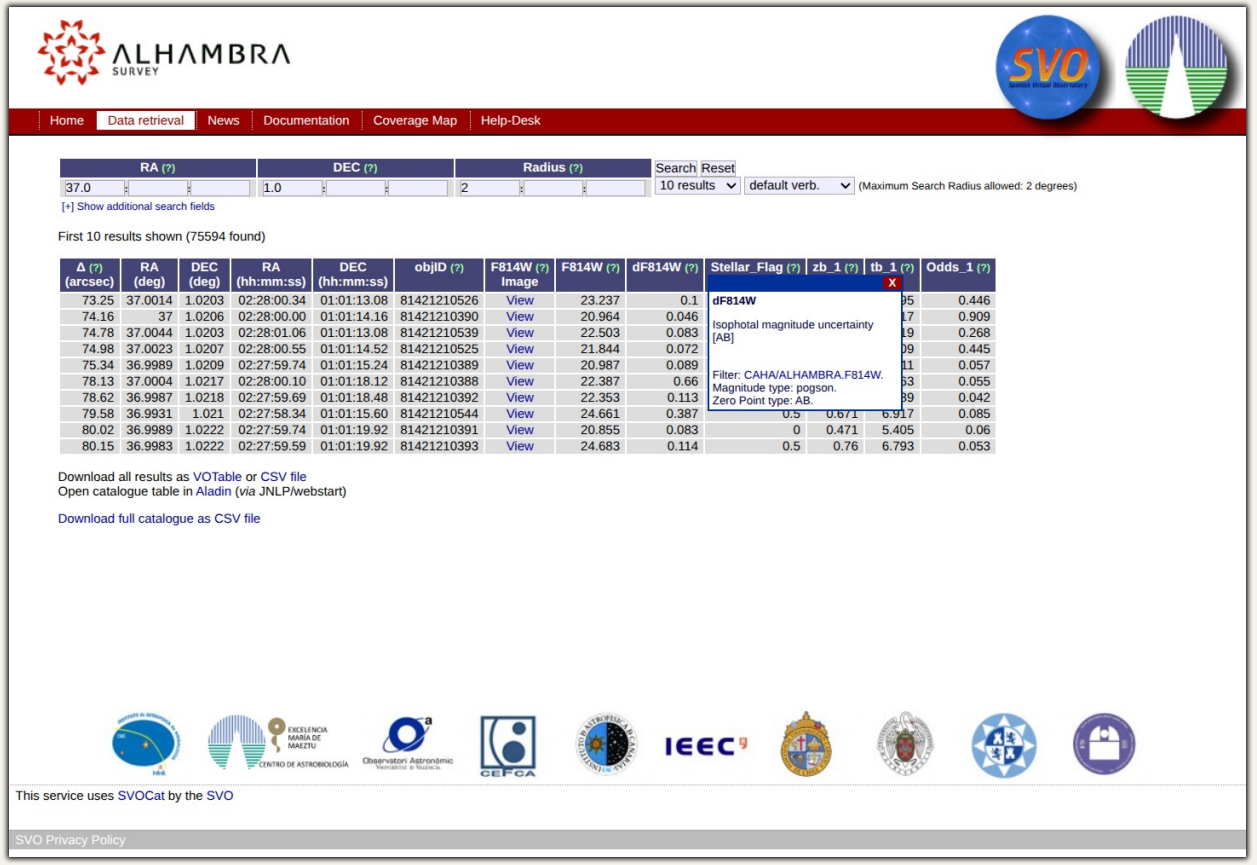
Sky Coverage

~4 deg²

SVOCAT Implementation

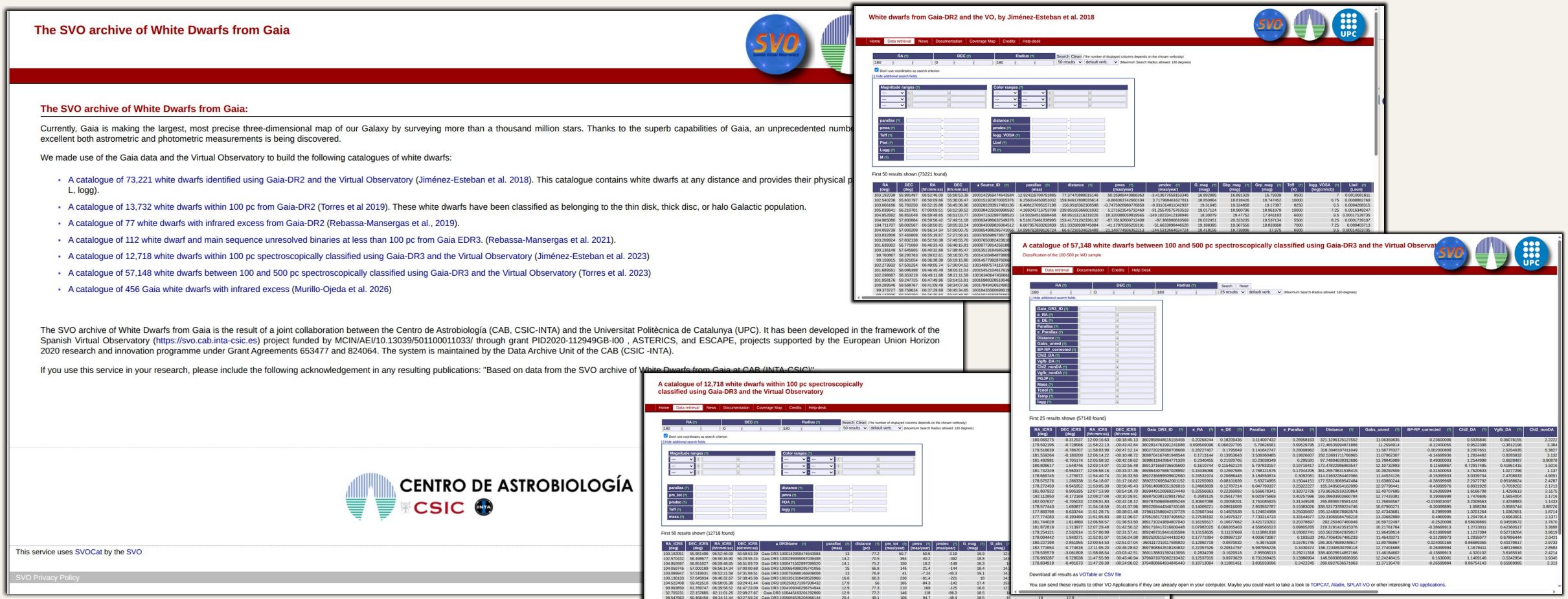
- ✓ Multi-band photometry groups
- ✓ Photometric redshift search
- ✓ Morphological classification flags

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



External Deployment 02

The SVO archive of White Dwarfs from Gaia



References

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Feedback and Future Improvements

Community Insights

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

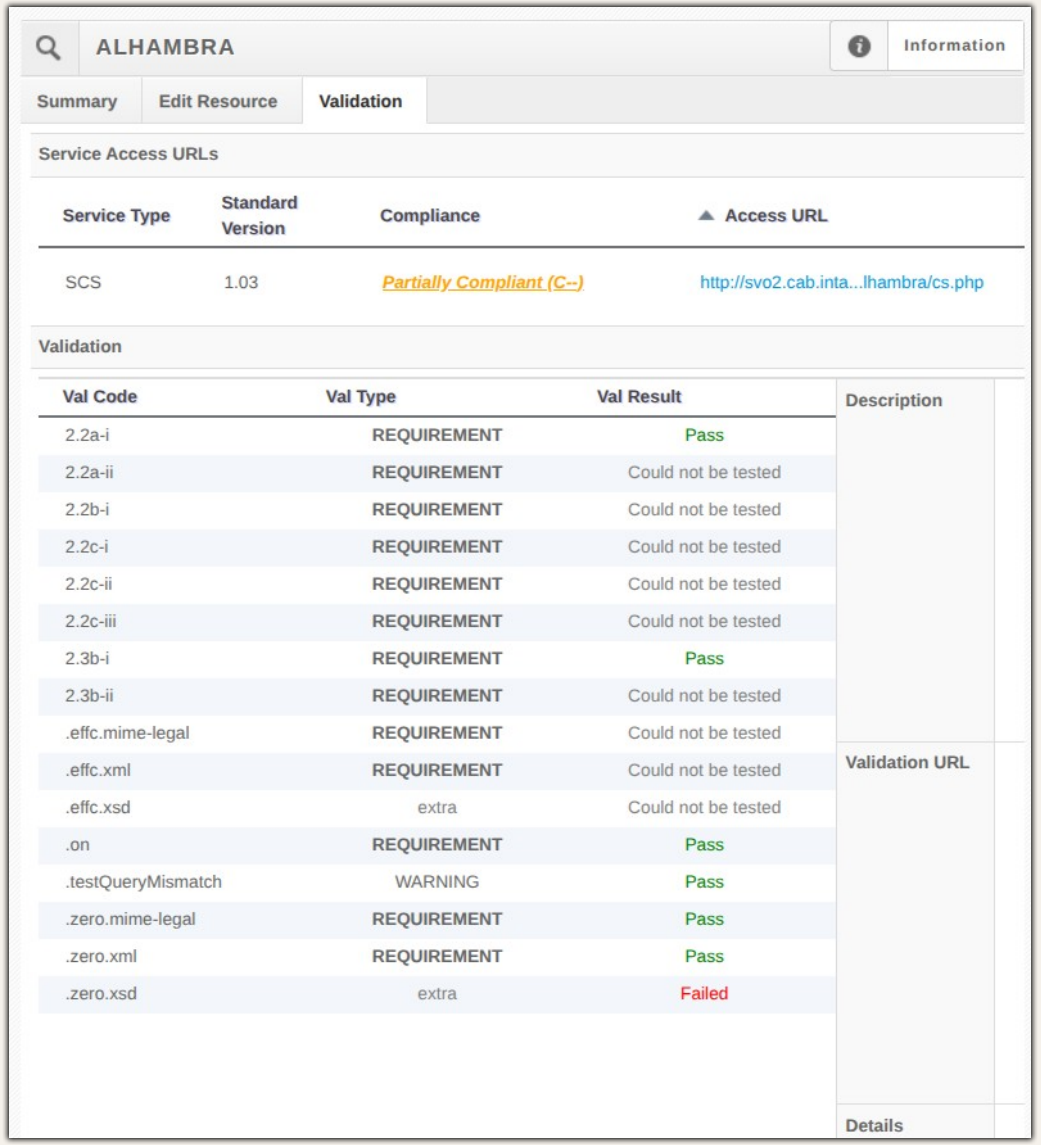
Input data formatting
Data must be adapted to the needs of MySQL import.

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.



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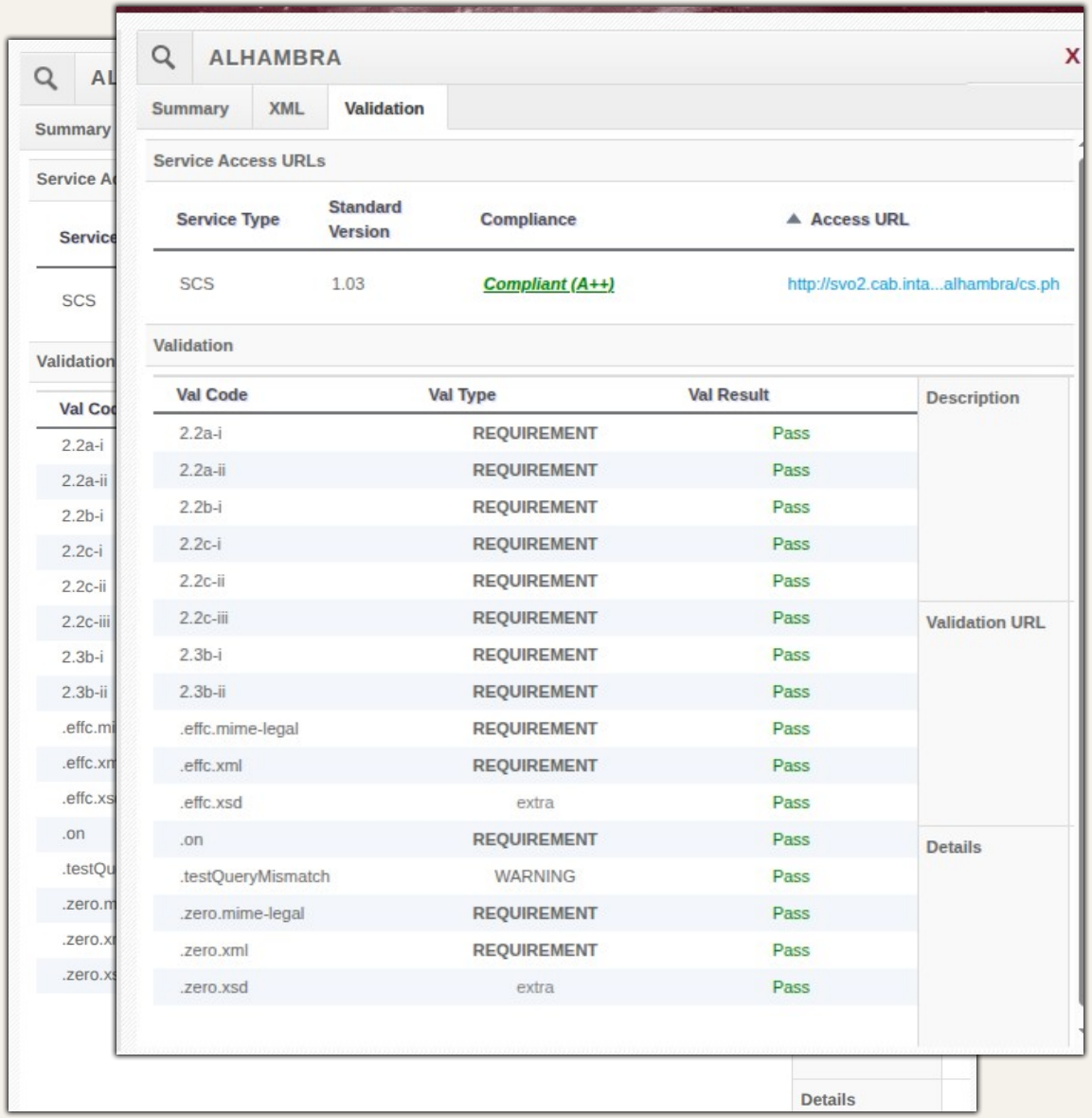

Thanks

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

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MICIU/AEI/10.13039/501100011033 and by ERDF/EU