



The GTC and Calar Alto Virtual Observatory Archives

E. Solano, J. M. Alacid,
F. Jiménez-Esteban, A. Velasco

Centro de Astrobiología (INTA-CSIC)
Spanish Virtual Observatory

The Spanish Virtual Observatory

<http://svo.cab.inta-csic.es>



Spanish Virtual Observatory

Funded



Home Help Desk

The SVO



The Spanish Virtual Observatory (SVO) officially started in June 2004. Its purpose is to coordinate the VO activities at national level and act as a contact point for the other VO initiatives. The SVO core team is hosted at Centro de Astrobiología (INTA-CSIC).

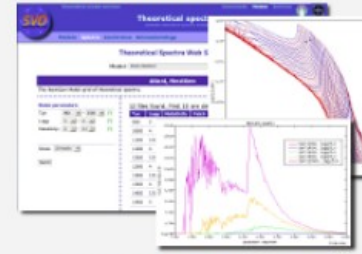
- SVO participants
- VO FAQs

The CAB Scientific Data Centre



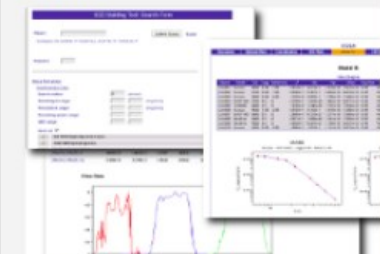
- Calar Alto
- COROT
- DUNES
- DSS-63
- GASPS
- GAUDI
- GTC
- INES
- OMC
- Protostars
- X-exoplanets
- Other archives in the SVO Network

Theoretical Data Server



- Stellar Spectra theoretical models
- Evolutionary Synthesis Models
- Isochrones and evolutionary tracks
- Asteroseismology

Services



- VOSA
- VOSED
- TESELA
- Filter Profile Service

VO Science



Data Mining



Education & Outreach



Miscellanea



Gran Telescopio Canarias (GTC)

- The world's largest optical-infrared telescope (10.4m).
- Location: Canary Islands (Spain).
- Start of scientific operations: May 2009.
- Instrumentation:
 - ✓ **OSIRIS**: Imager (broad-band and narrow-band tunable filters) & spectrograph (long slit and multiobject) in the optical range.
 - ✓ **CANARICAM**: a mid-infrared (7.5 - 25 micron) imager with spectroscopic, coronagraphic, and polarimetric capabilities.



Public Data Archive since Nov. 2011

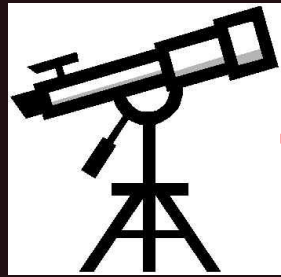
The Calar Alto Observatory



- The largest observatory in continental Europe.
- Location: Almería (Spain).
- Founded in 1973. Three telescopes: 1.23m., 2.2m., 3.5m.
- Different instruments with imaging and spectroscopic capabilities operating in the optical and near-IR regime.

Public Data Archive since Sep. 2011

Data transfer and ingestion



Telescopes
(Almería, La Palma)

RSYNC



Data Centre
(Madrid)

Quality control

- Test File name
- Test Fits Header
- ...



VO
Protocols



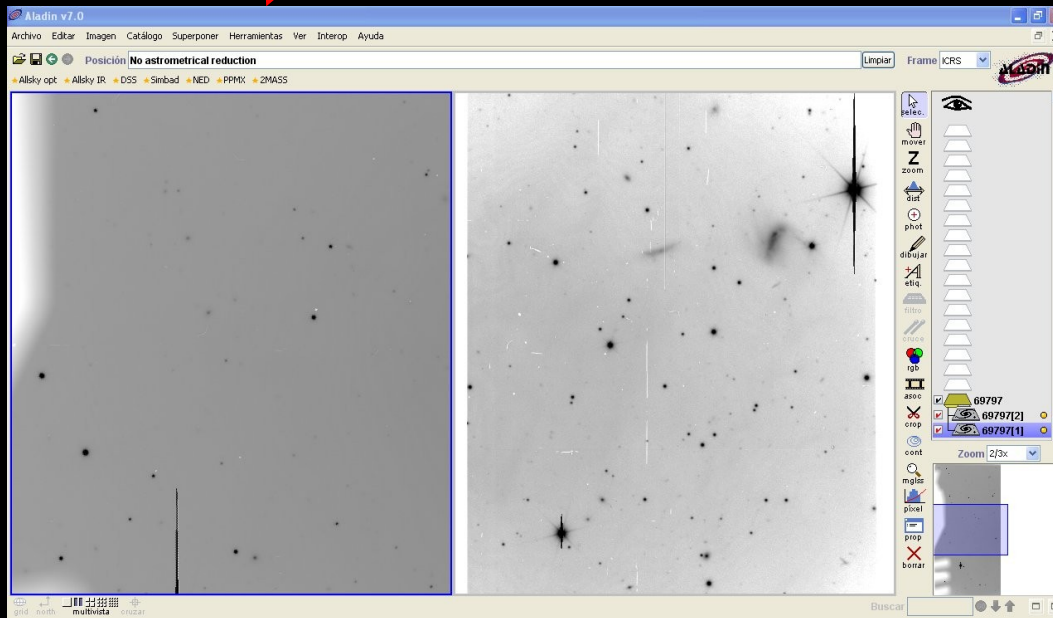
Metadata



Data

What to publish? GTC / OSIRIS

Imaging	Spectroscopy	Multi-Object
Broad Band Imaging	LongSlit Spectroscopy	Multi-Object Spectroscopy (MOS)*
Narrow Band Imaging: Tunable Filters	Fast Spectroscopy*	Nod+shuffle*
Fast Photometry		Micro-shuffle*
		λ -sorting*
*Observing mode not yet commissioned		



What to publish? GTC / OSIRIS

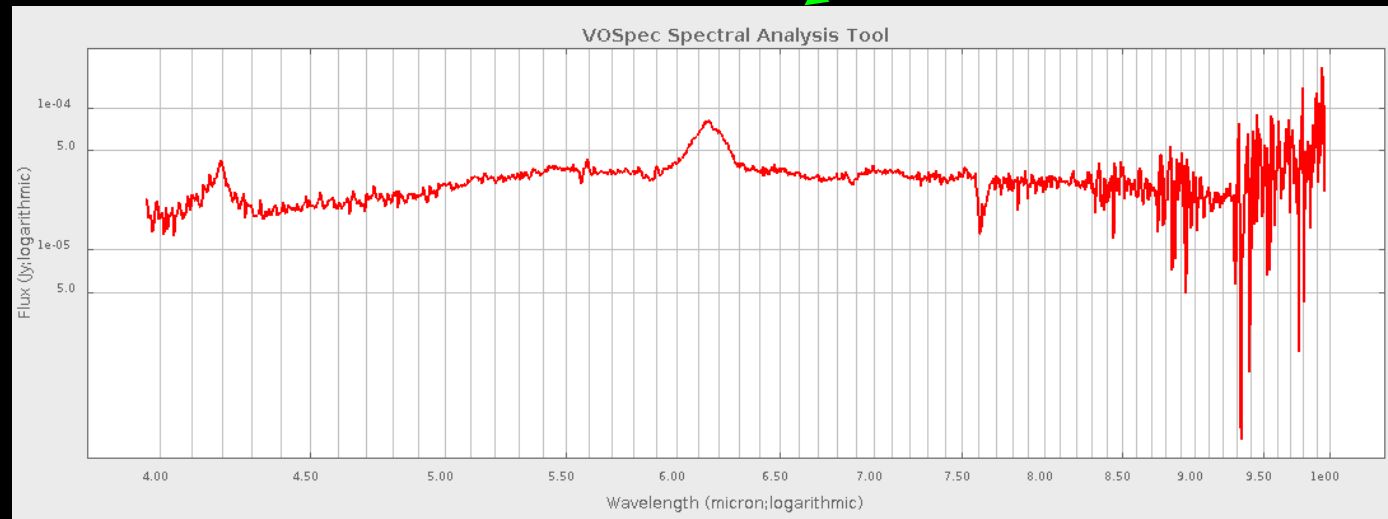
Imaging	Spectroscopy	Multi-Object
Broad Band Imaging	LongSlit Spectroscopy	Multi-Object Spectroscopy (MOS)*
Narrow Band Imaging: Tunable Filters	Fast Spectroscopy*	Nod+shuffle*
Fast Photometry		Micro-shuffle*
		λ -sorting*
*Observing mode not yet commissioned		



SIAP
(not yet implemented)

What to publish? GTC / OSIRIS

Imaging	Spectroscopy	Multi-Object
Broad Band Imaging	LongSlit Spectroscopy	Multi-Object Spectroscopy (MOS)*
Narrow Band Imaging: Tunable Filters	Fast Spectroscopy*	Nod+shuffle*
Fast Photometry		Micro-shuffle*
		λ -sorting*
*Observing mode not yet commissioned		

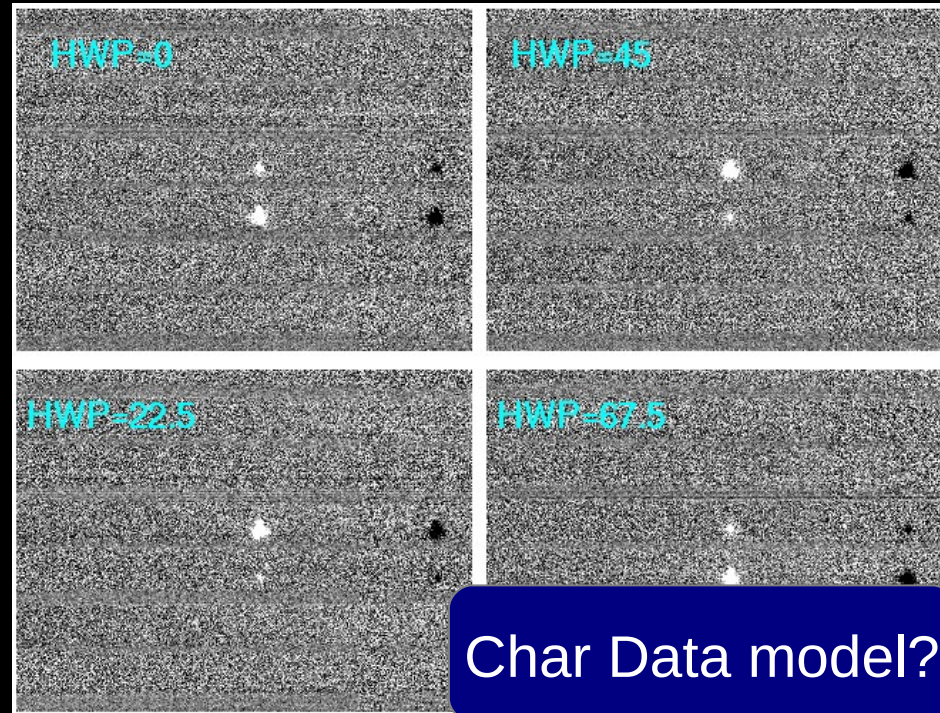
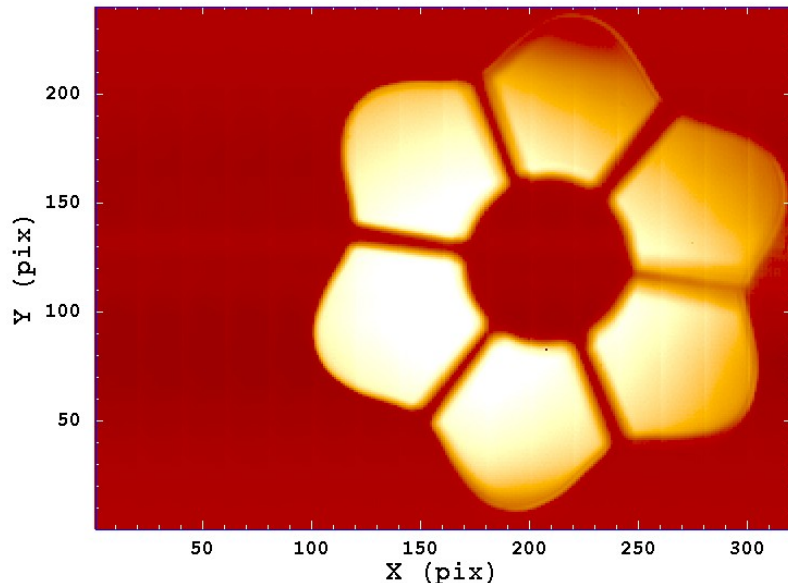


SSAP
(not yet implemented)

What to publish? GTC / Canaricam

Imaging	Spectroscopy*
Coronagraphy**	Polarimetry
<p>* Only low resolution spectroscopy at 10 and 20 micron is offered. High resolution spectroscopy is not offered.</p> <p>** Not offered</p>	

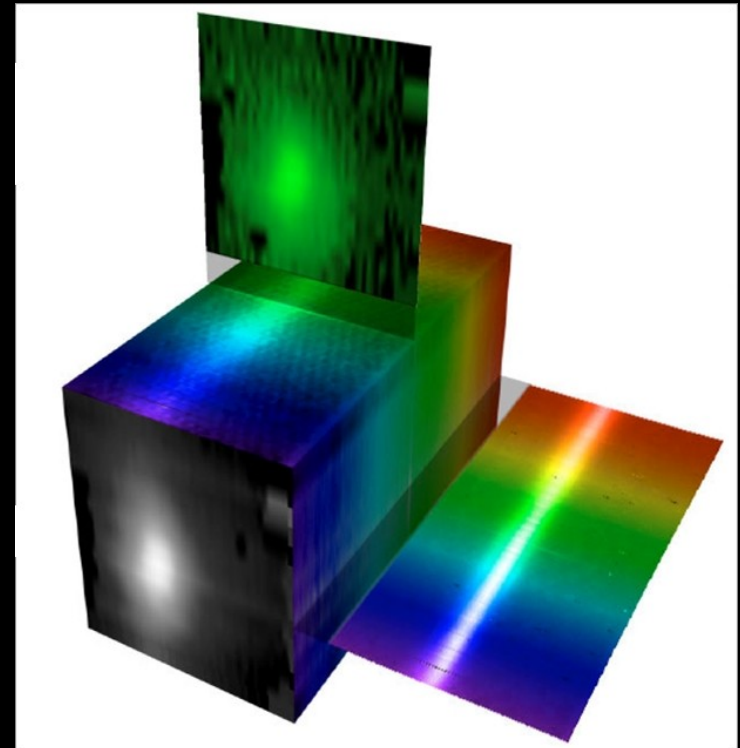
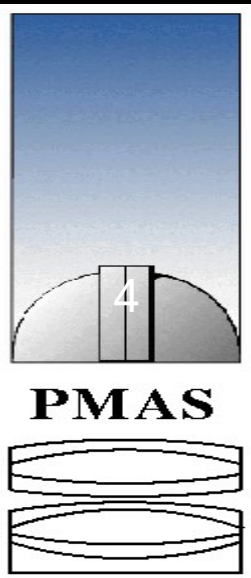
Rose petal Lyot stop



Char Data model?

What to publish? Calar Alto

3.5m Telescope	2.2m Telescope	1.2m Telescope
Overview on FOV sizes and spectral resolutions		
Instruments		
LAICA (I)	BUSCA (I)	CCD Camera (I)
MOSCA (I+S)	CAFOS (I+S)	
PMAS (S)	AstraLux (I)	
TWIN (S)	CAFE (S)	
OMEGA-2000 (I)	MAGIC (I+S)	
OMEGA-Cass (decommissioned)		
blue: optical, red: NIR, I = imaging, S = spectroscopy		



What to publish? Calar Alto

The screenshot shows two windows from a software interface. The top window is titled "Table Access Protocol (TAP) Query" and has a menu bar with "File", "Deletion", "Columns", "Registry", "Interop", and "Help". Below the menu bar are icons for a pin, refresh, help, and close. The window contains tabs for "Select Service", "Enter Query", "Resume Job", and "Running Jobs". The "Enter Query" tab is active, showing "Table Metadata" for "Service: GAVO Data Center TAP service (112 tables)". The selected table is "califadr1.cubes" with the description "Metadata for the CALIFA data cubes as delivered". A "Columns:" table is visible below the metadata.

Name	Data Type
califa_id	int
obs_id	char
obs_title	char
obs_publisher_did	char
target_name	char
t_exptime	float
t_min	double
t_max	double

The bottom window is titled "TOPCAT(2): Table Browser" and has a menu bar with "File", "Subsets", and "Help". It shows a table titled "Table Browser for 2: TAP_2_califadr1.cubes,califadr1.objects".

	target name	califa_id	setup	accref	flag re...	cal sn me...	hub
1	NGC6150	835	V500	http://dc.zah.uni-heidelberg.de/getproduct/cal...	0	42,8934	E
2	NGC7194	881	V500	http://dc.zah.uni-heidelberg.de/getproduct/cal...	0	45,1532	E
3	NGC6146	832	V500	http://dc.zah.uni-heidelberg.de/getproduct/cal...	0	43,5375	E
4	NGC6173	840	V500	http://dc.zah.uni-heidelberg.de/getproduct/cal...	0	31,7709	E
5	NGC6411	859	V500	http://dc.zah.uni-heidelberg.de/getproduct/cal...	0	45,5222	E
6	UGC05771	341	V500	http://dc.zah.uni-heidelberg.de/getproduct/cal...	0	30,1138	E

Direct VO access to CALIFA spectra using SSAP

Individual spectra from the cubes are exposed via SSAP; the service's IVORN is `ivo://org.gavo.dc/califa/q/s`. User friendly clients are [splat](#) or [VOSpec](#) as examples.

Extensive tutorials to use these tools are available on the homepages of those projects. The most convenient way to access CALIFA spectra is to just enter one of the target galaxy names or a specific coordinate in an all-VO search. For deeper analysis you should note, however, that the individual spectra obtained in this way are **not statistically independent** of each other.

What to publish? Advanced data products

Benefits

- ❑ Facilitates the scientific exploitation of GTC and Calar Alto data.
 - ❑ Enhances the value of the archive.
 - ❑ Provides a higher visibility of scientific results.
- ✓ **ADS: refereed papers (keyword in the abstract):**
- SDSS : 3470
 - 2MASS: 1569
 - WISE: 223
 - UKIDSS: 179

High-level data products

Catalogues. ✓

Stacked images, mosaics,...



Taking advantage of VO (I)

Aladin v7.5 📧 🔋 📶 🔊 14:56 laeff ⚙️

File Edit Image Catalog Overlay Tool View Interop Help

📁 📄 🔄 📍 Location x Frame ICRS ▾

★Optical ★IR ★UV ★Radio ★DSS ★Simbad ★NED

Calar Alto

30" 2.676' x 1.413'

2MASS.J.990807N_J10460267

30" 2.676' x 1.413'

POSSII.J-DSS2.879

30" 2.676' x 1.413'

J_UKIDSS

30" 2.676' x 1.413'

Aladin

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

2MASS-PSC

- Calar Alto
- J_UKIDSS
- POSSII.J-DSS2.8
- 2MASS.J.990807

size - +

op... - +

zoom - +

13.82' x 13.82'

[View A1] - Calar Alto

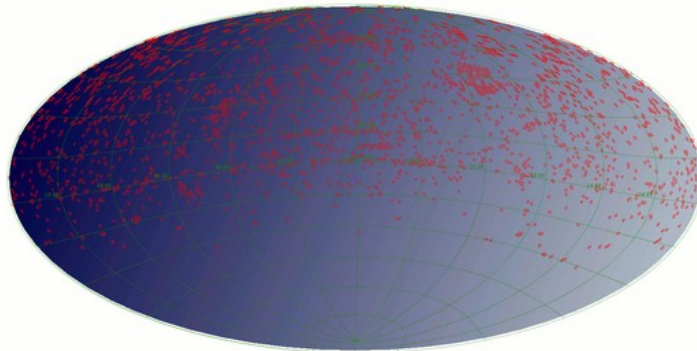
Search ⏴ ⏵ 📄 📁

Taking advantage of VO (II)

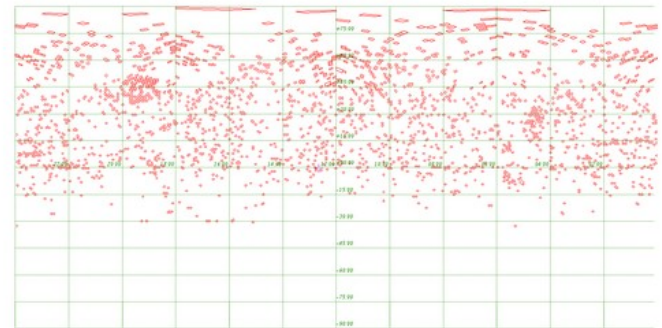


Calar Alto Archive: Search Form

CAHA footprint MOC:



[Aitoff \(click to see an enlarged view\)](#)



[Cartesian \(click to see an enlarged view\)](#)

[View MOC in Aladin \(use Beta version of Aladin\)](#)

[Download MOC](#)

Taking advantage of VO (III)

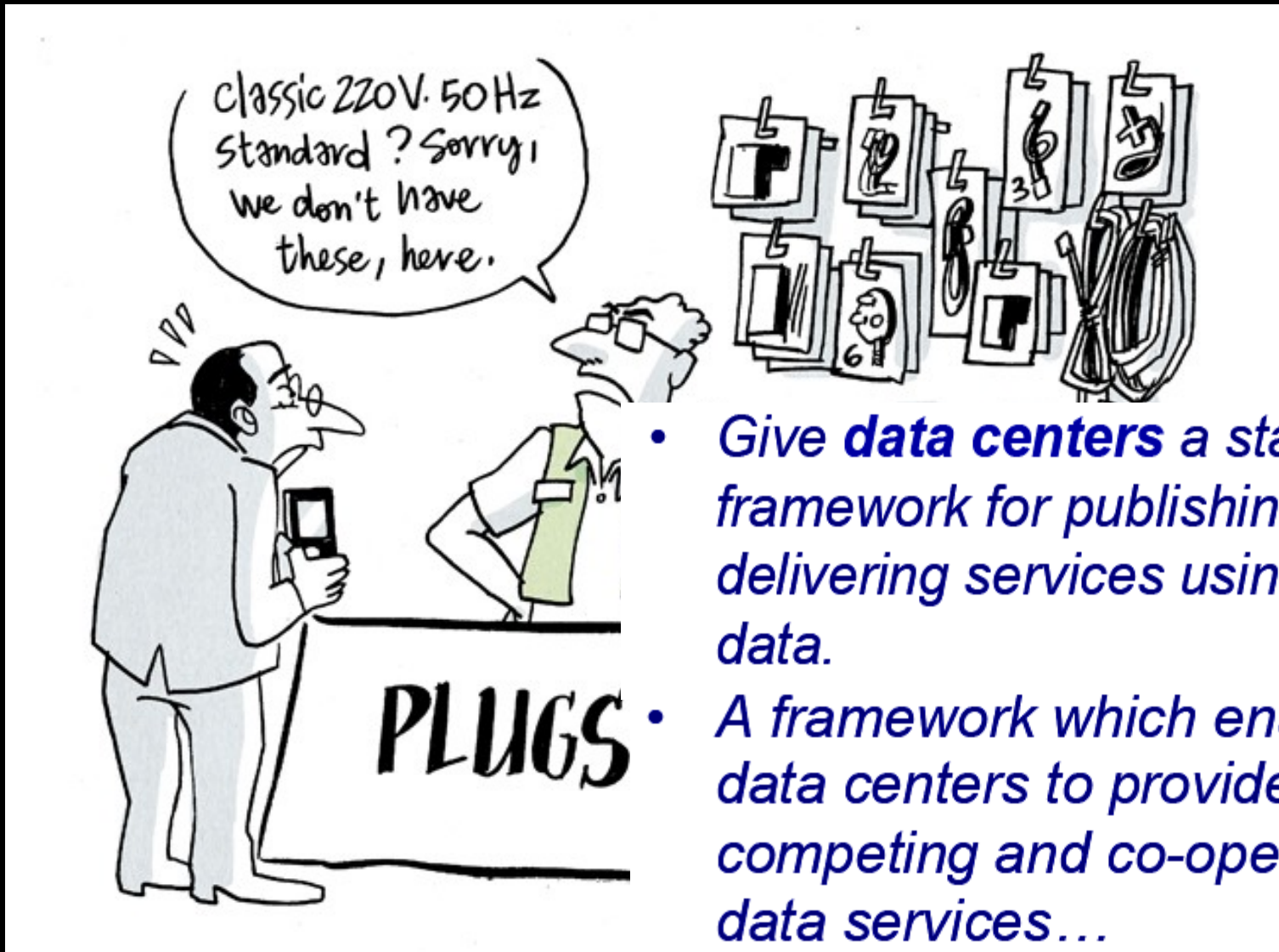


*International
Virtual
Observatory
Alliance*

IVOA DataLink Protocol Version 1.0

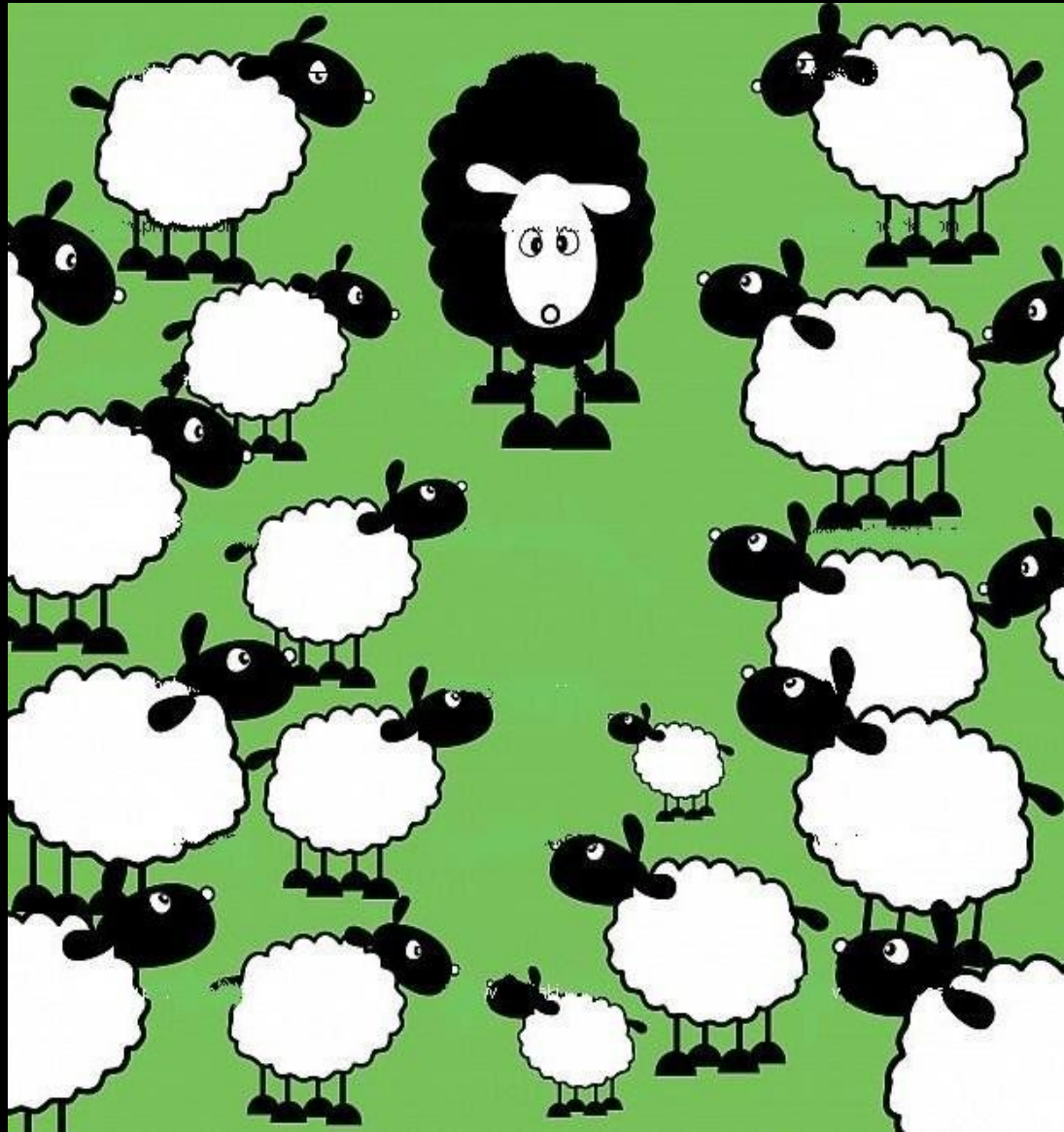
IVOA Note May 3, 2013

Why to publish in the VO?



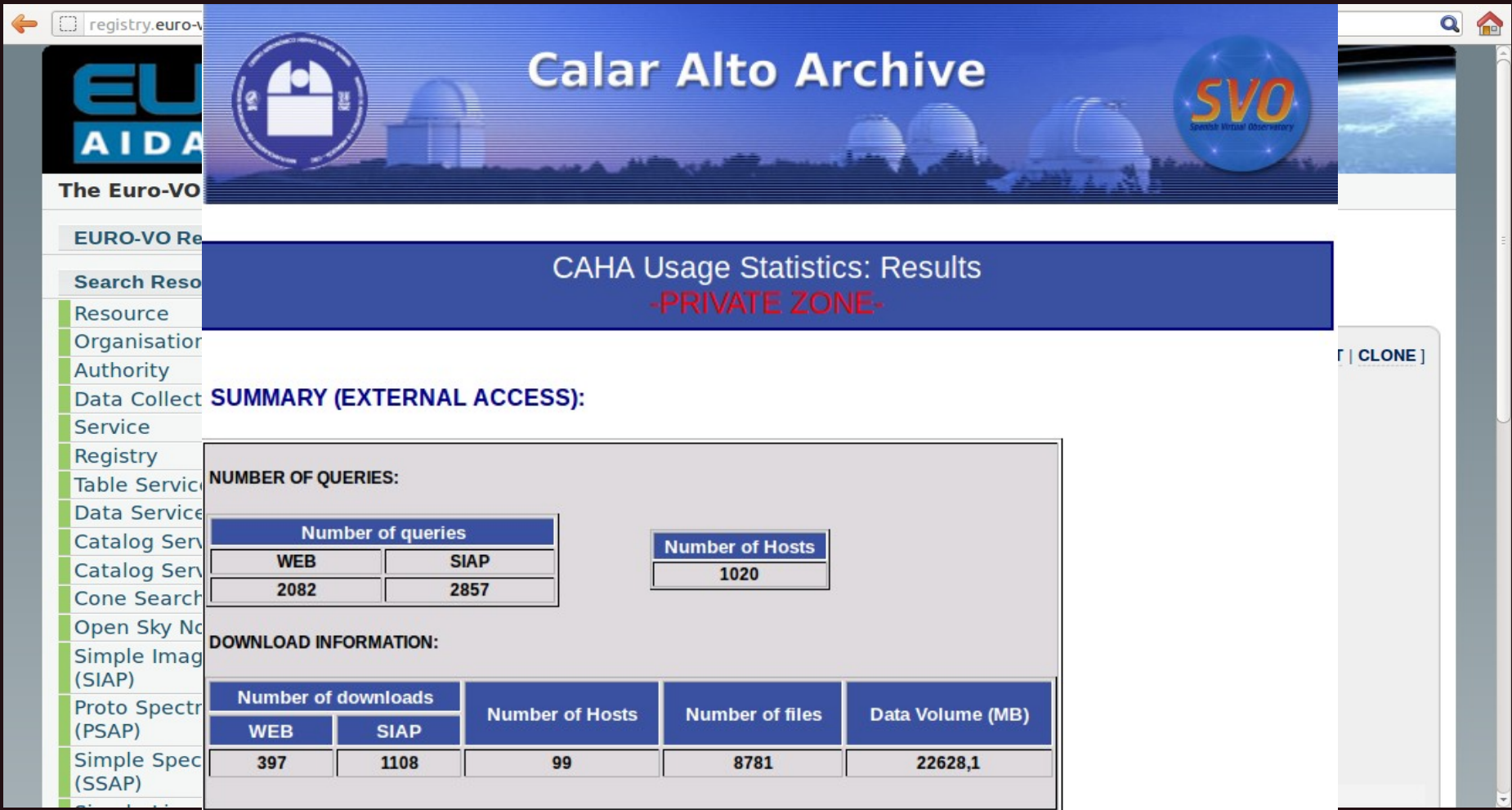
- Give **data centers** a standard framework for publishing and delivering services using their data.
- A framework which enables data centers to provide competing and co-operating data services...

Why to publish in the VO?



Virtual Observatory services

VO-compliance: CAHA → other archives + VO tools



The screenshot shows the Calar Alto Archive website interface. At the top, there is a banner with the Calar Alto Archive logo, the text "Calar Alto Archive", and the SVO (Spanish Virtual Observatory) logo. Below the banner, a blue bar displays "CAHA Usage Statistics: Results" and "-PRIVATE ZONE-". A sidebar on the left lists various services under "The Euro-VO" and "EURO-VO Re". The main content area features a "SUMMARY (EXTERNAL ACCESS):" section with two tables. The first table, "NUMBER OF QUERIES:", shows 2082 queries from WEB and 2857 from SIAP, with 1020 unique hosts. The second table, "DOWNLOAD INFORMATION:", shows 397 downloads from WEB and 1108 from SIAP, with 99 unique hosts, 8781 files, and 22628.1 MB of data volume.

CAHA Usage Statistics: Results
-PRIVATE ZONE-

SUMMARY (EXTERNAL ACCESS):

NUMBER OF QUERIES:

Number of queries		Number of Hosts
WEB	SIAP	1020
2082	2857	

DOWNLOAD INFORMATION:

Number of downloads		Number of Hosts	Number of files	Data Volume (MB)
WEB	SIAP			
397	1108	99	8781	22628,1