The ESCAPE Science Analysis Platform
&
the Simple Application Messaging Protocol

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ESCAPE WP5 Progress Meeting 26-27 October 2020

ESCAPE Science Analysis Platform (ESAP)

ESAP will allow EOSC researchers:

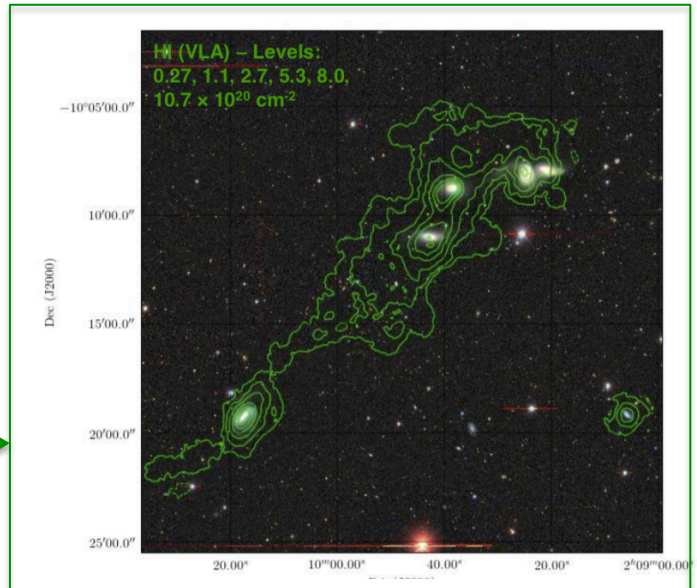
- *to identify and stage existing data collections for analysis,*
- *tap into a wide-range of software tools and packages developed by the ESFRIs,*
- *bring their own custom workflows to the platform,*
- *take advantage of the underlying computing infras. to execute those workflows.*

(From the D5.2 Detailed Project Plan)

SKA use case:

- SKA data sets already stored in the data lake
- Some analysis requires data from external catalogues
  - Examples:
    - Object properties (e.g Galaxy centre, Diameter)
    - Searching for counterparts in other wavelengths →
    - Using single dish data to improve the detection of extended emission

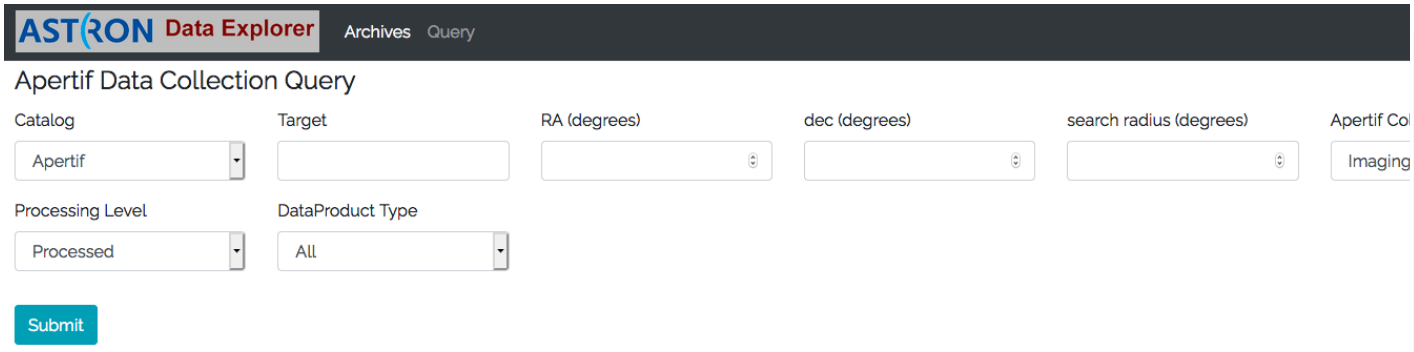
→ Depending on the size, data staging is needed

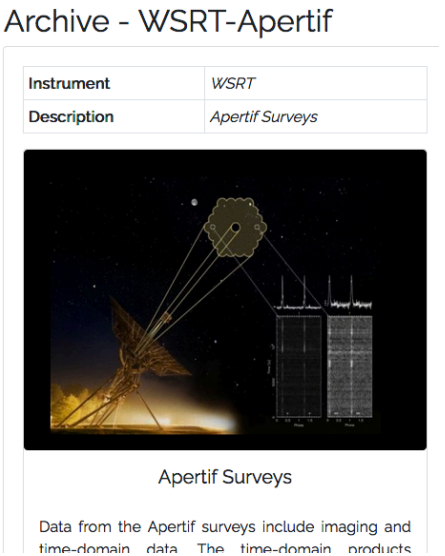


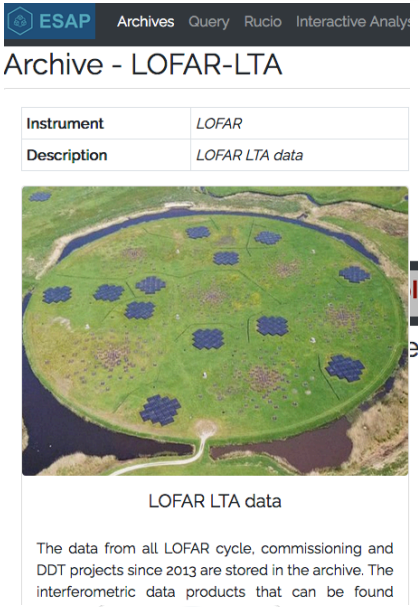
M. Jones+. A&A. 2019. ESCAPE Use case

ESCAPE Science Analysis Platform (ESAP)

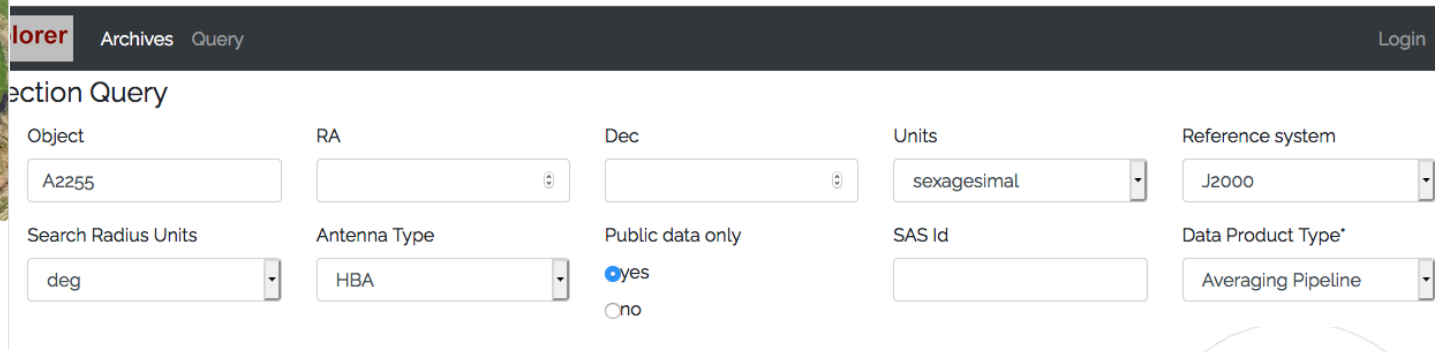
http://sdc.astron.nl/esap-gui/archives







Each catalogue is queried using different search parameters



Accessing VO catalogues

IVOA standards/protocols:

- Facilitate Astronomy data/tools interoperability
- Enable homogeneous access to different archives

Main VO protocols for accessing data:

- Cone Search
  - data in a sky region (RA,DEC, Radius)
- Simple Image Access (SIA)
  - Multi-D image datasets
- Table Access Protocol (TAP)
  - Accessing table data

→ VO services are registered in the IVOA Registry

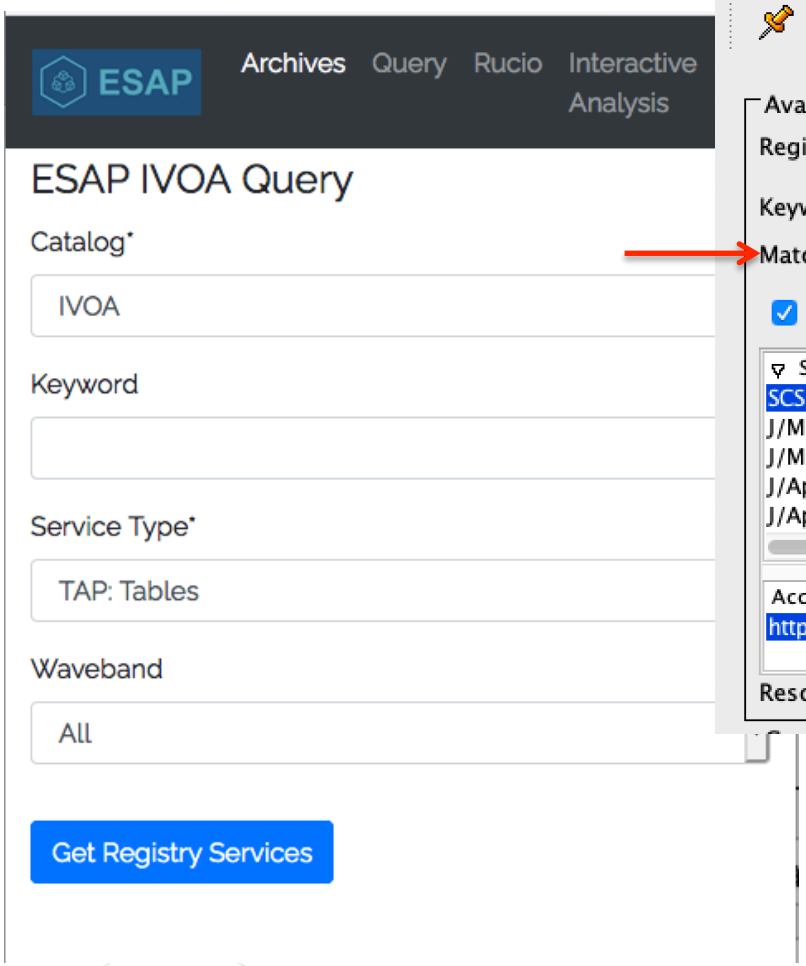
Tools for querying VO catalogues

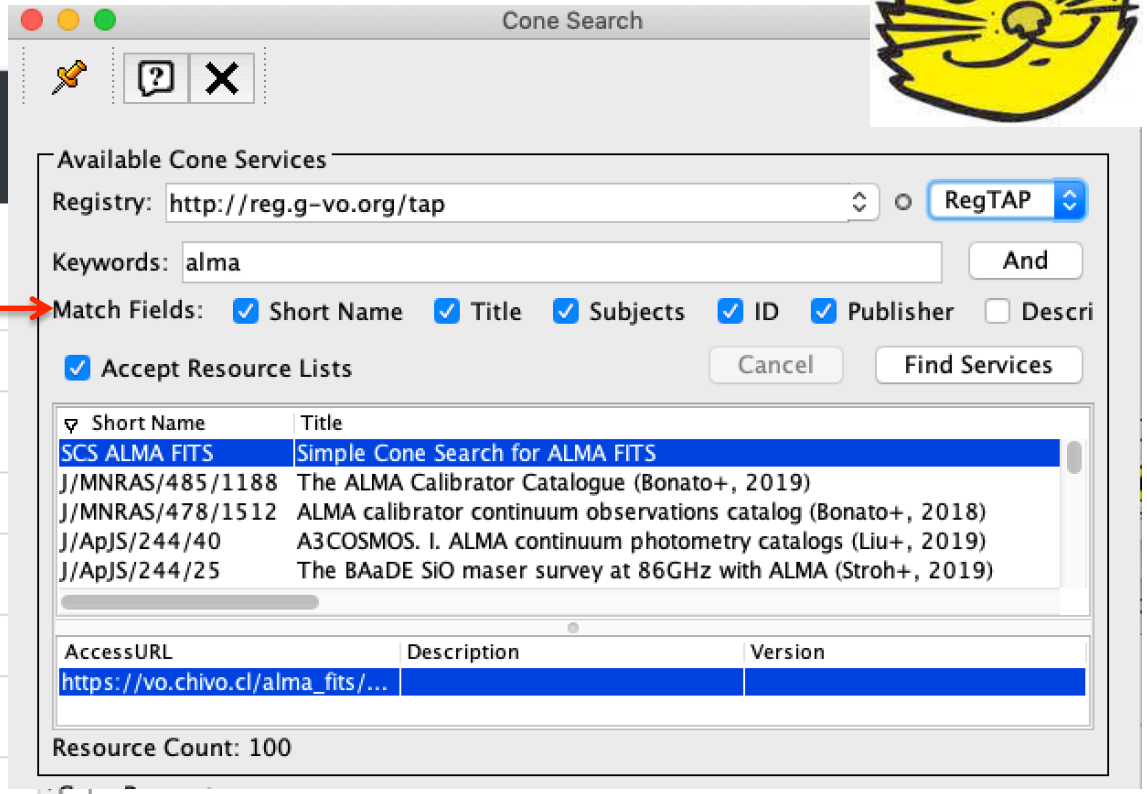
Functionalities designed to enhance:

- Service discovery

TOPCAT

Published in 2003



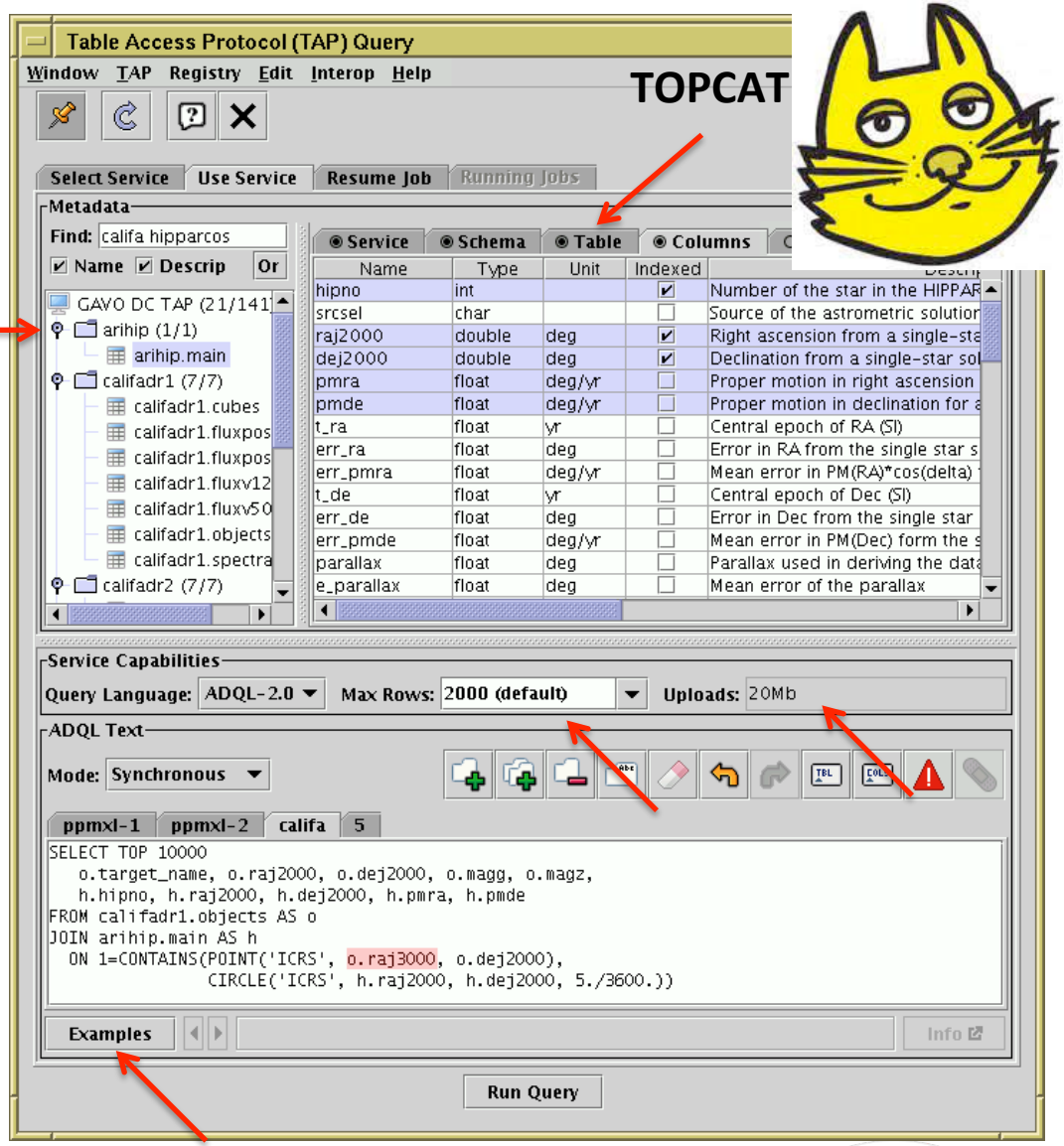


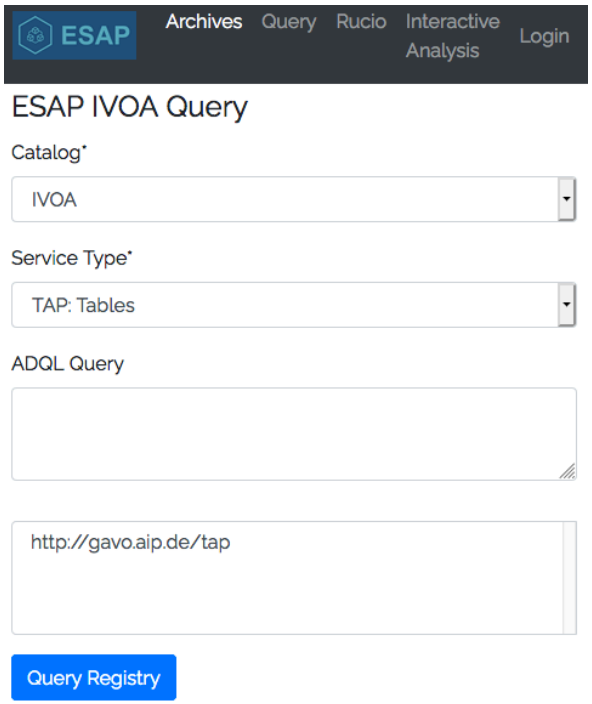
Tools for querying VO catalogues

Functionalities designed to enhance:

- Service discovery

- Data discovery

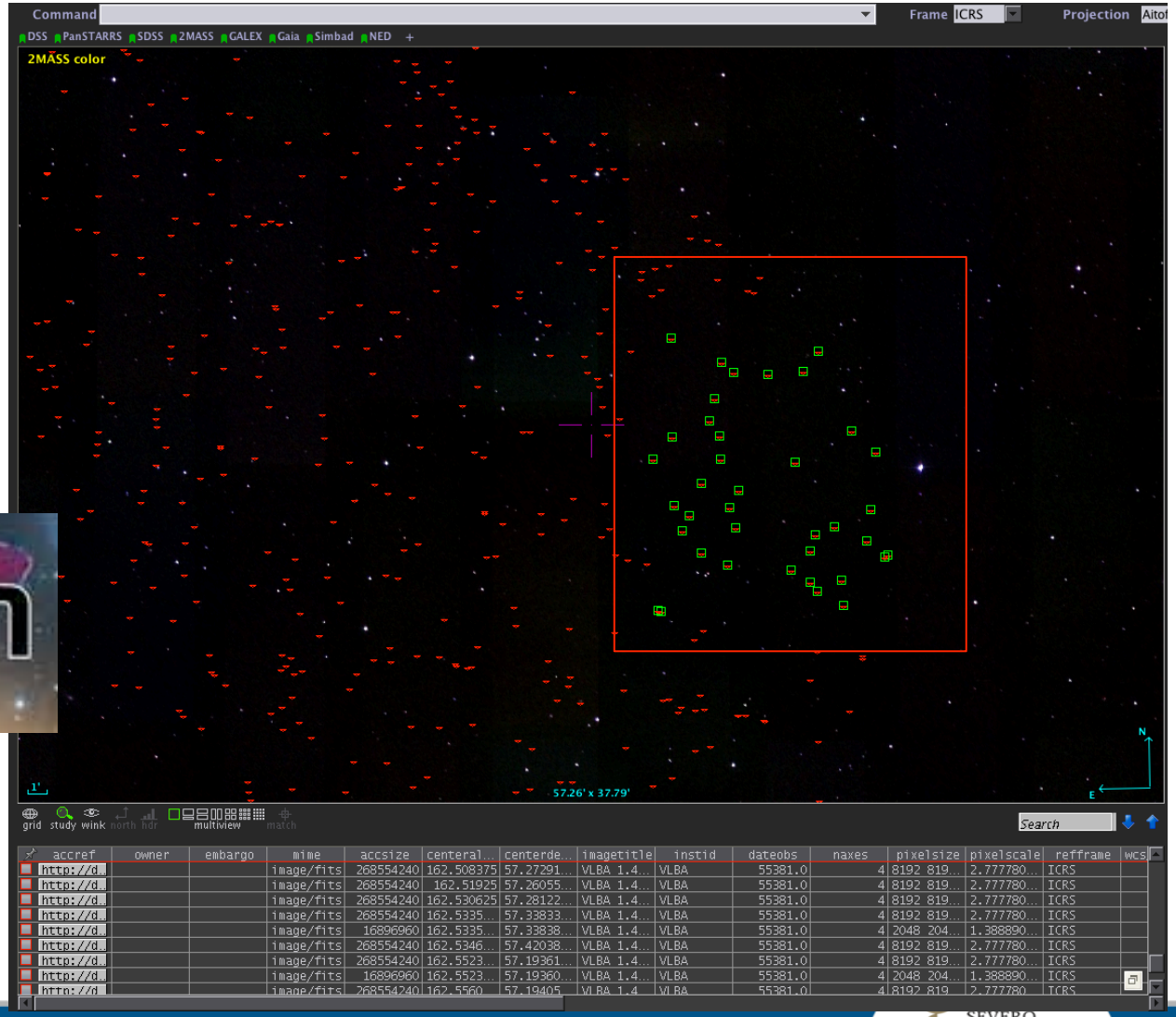




Tools for querying VO tools

Functionalities designed to enhance:

- Service discovery
- Data discovery
- Data identification



ALADIN

Published in 2000

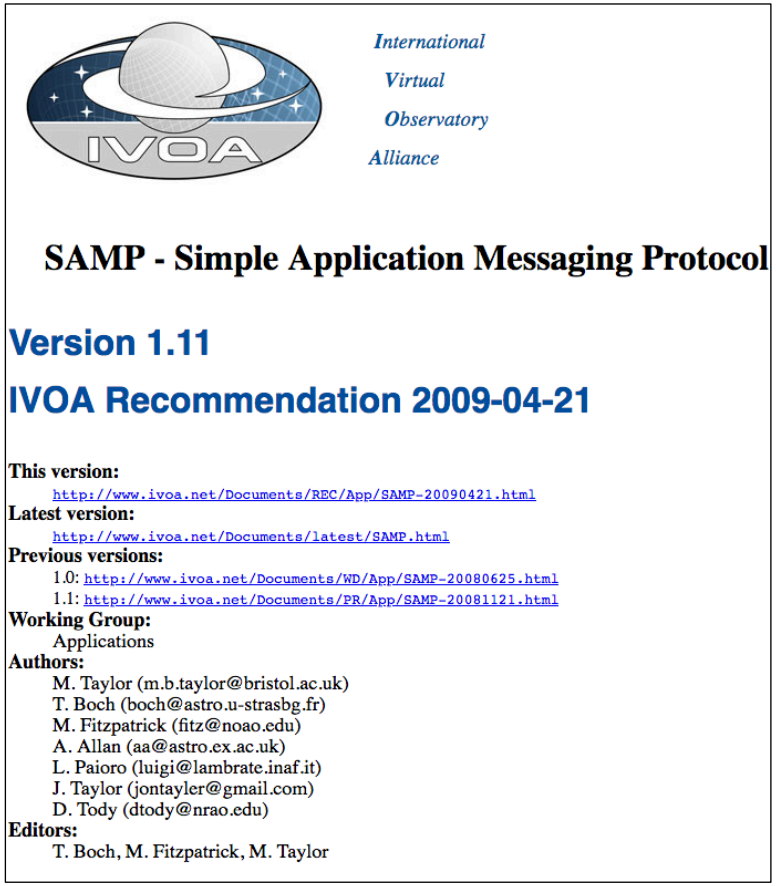
Leveraging VO tools

→If we can send the result data from these VO to ESAP, we will

- benefit from the potential of their functionalities to discover/identify data
- Open ESAP to the VO community (multi-wavelength)
- Avoid reinventing the wheel

→ Is this possible? Yes! Using SAMP

SAMP in a Nutshell



International Virtual Observatory Alliance

SAMP - Simple Application Messaging Protocol

Version 1.11

IVOA Recommendation 2009-04-21

This version:
http://www.ivoa.net/Documents/REC/App/SAMP-20090421.html
Latest version:
http://www.ivoa.net/Documents/latest/SAMP.html
Previous versions:
1.0: http://www.ivoa.net/Documents/WD/App/SAMP-20080625.html
1.1: http://www.ivoa.net/Documents/PR/App/SAMP-20081121.html
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Applications
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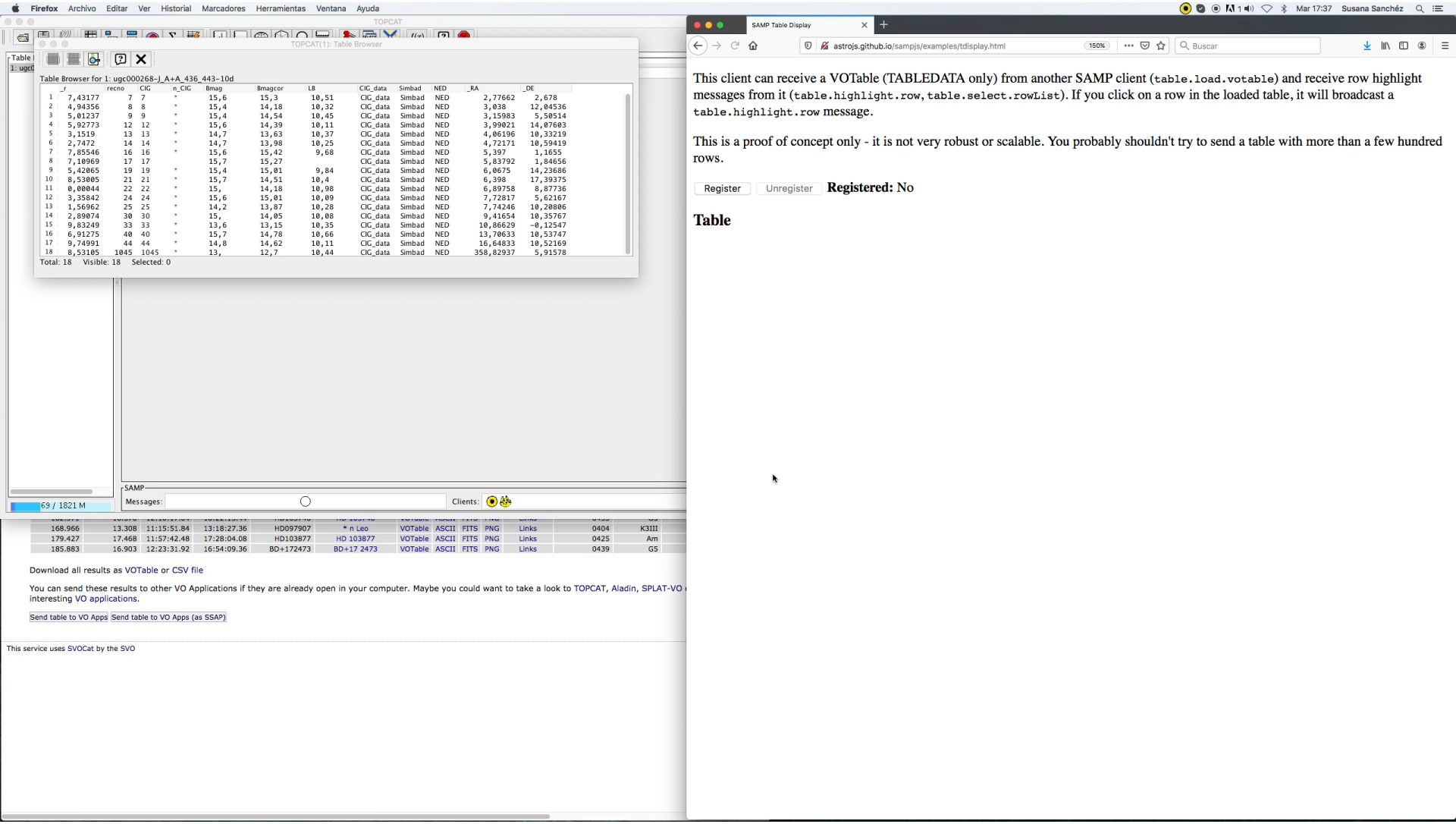
"SAMP is a messaging protocol that enables astronomy software tools to interoperate and communicate. "

→ Astronomy tools are highly specialised (wavelength / observatory / field)

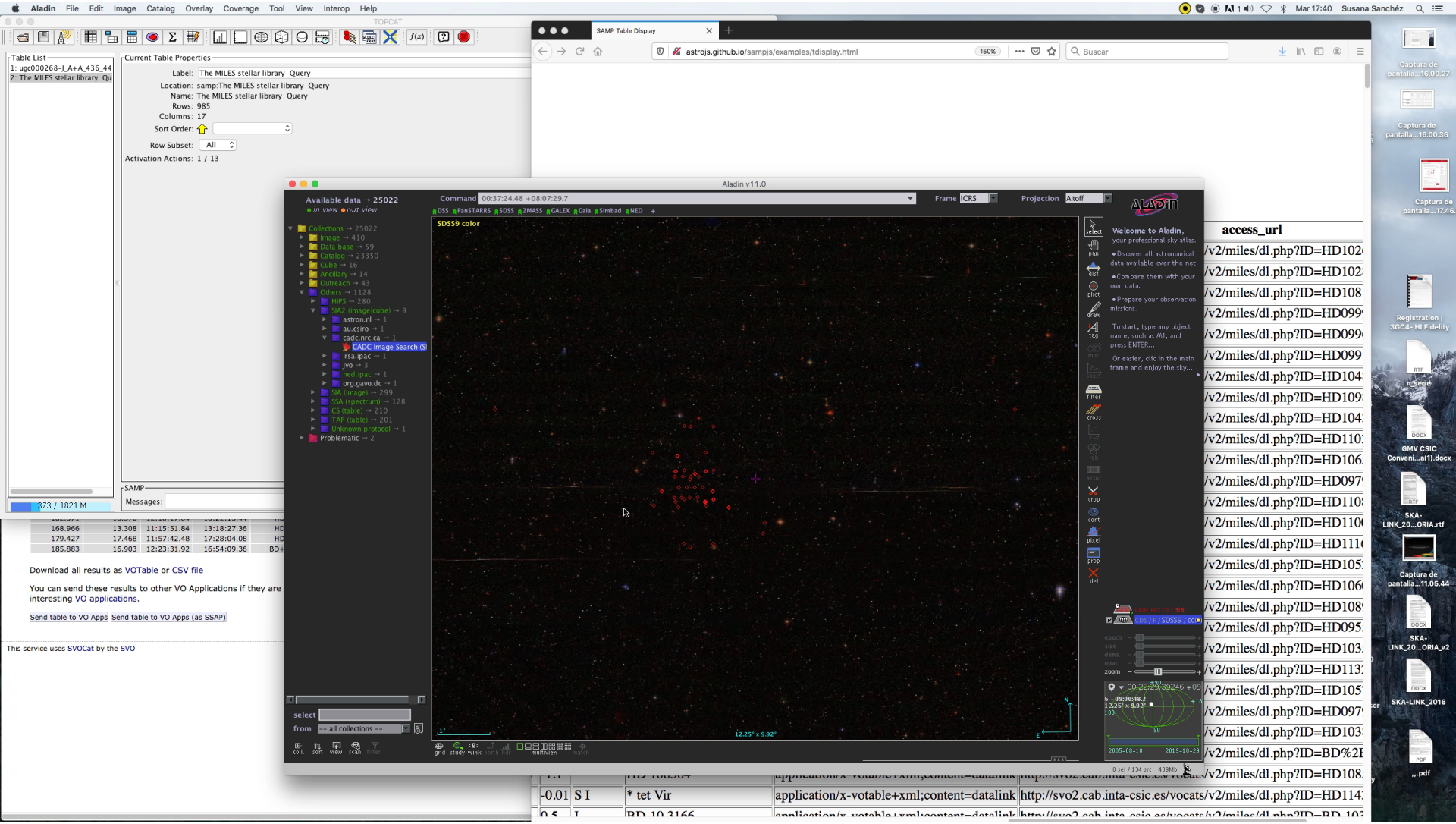
→ Building a *monolithic* tool fulfilling all the requirements of all users is impractical

→ Multi-wavelength studies require data interoperability and also tool interoperability

SAMP in action

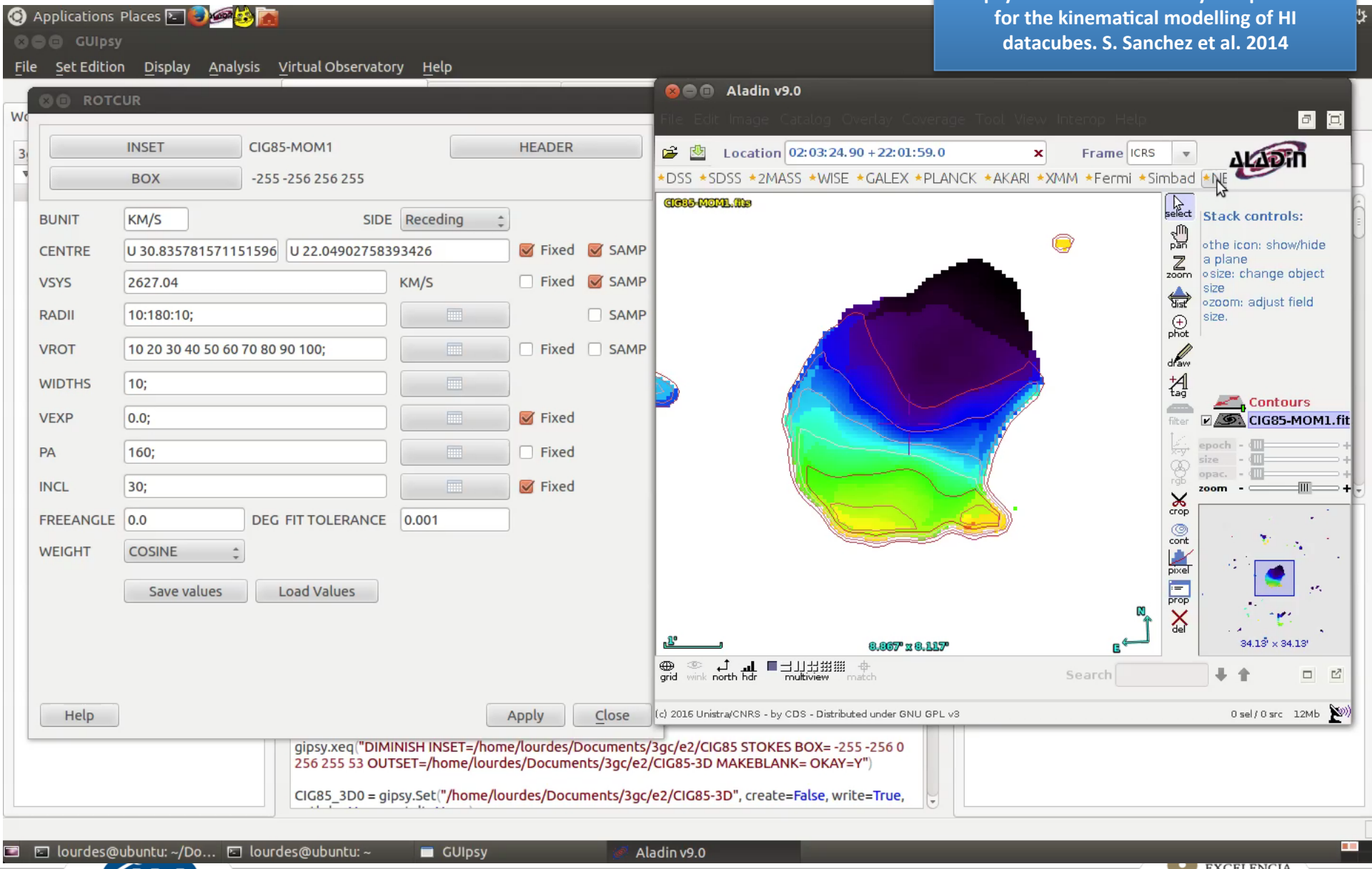


SAMP in action

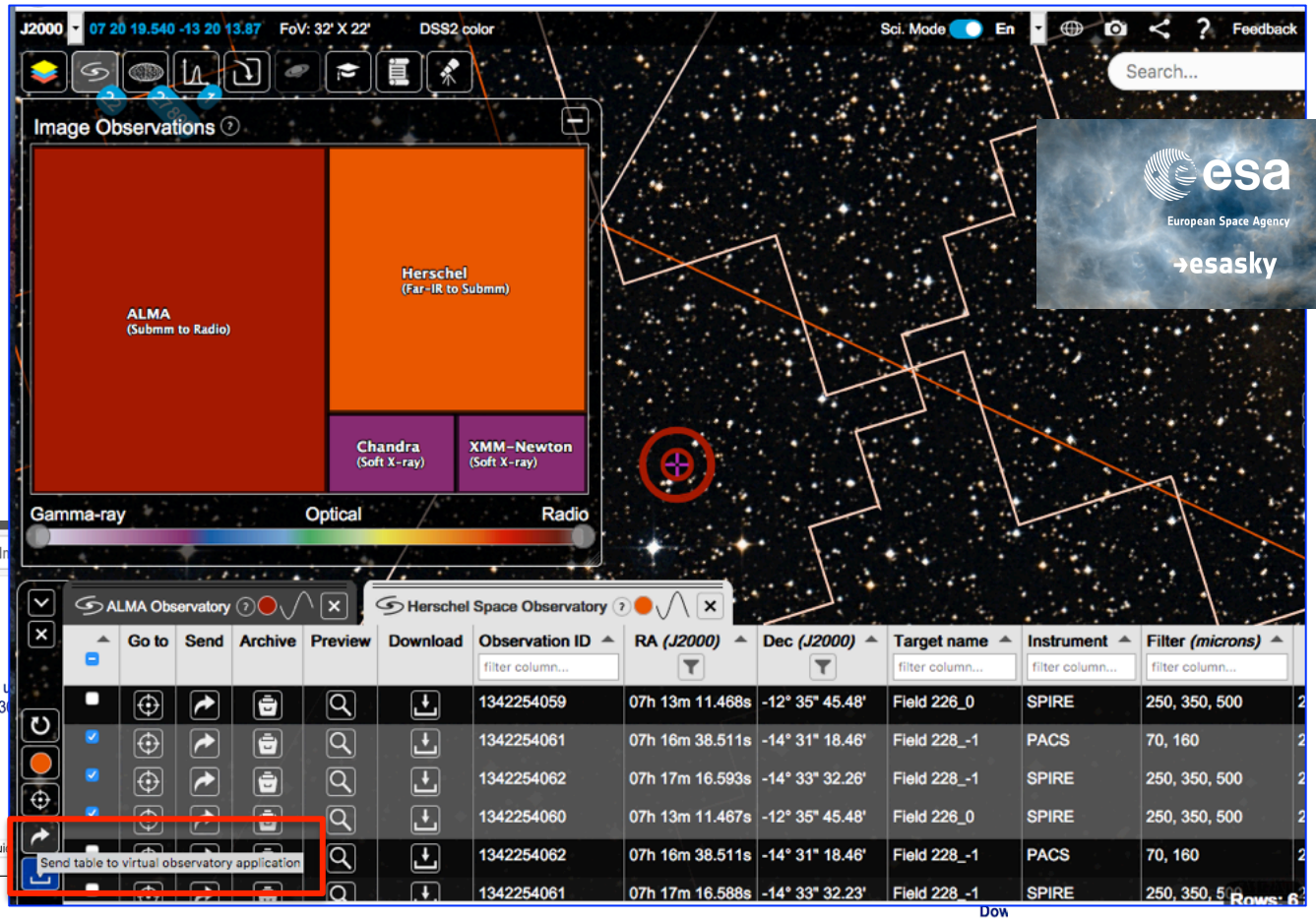


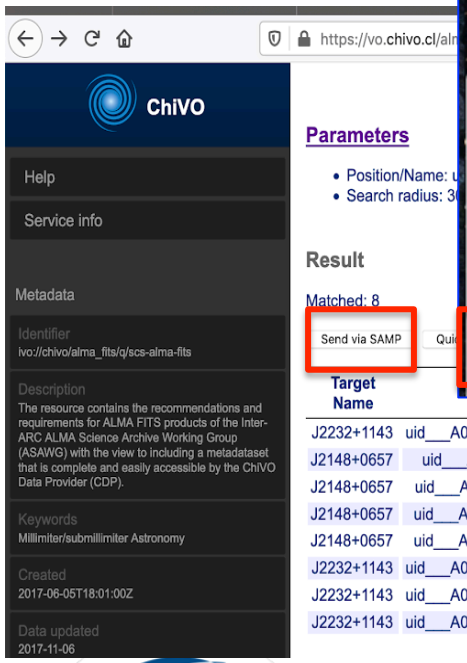
SAMP in action

GUipsy A Virtual Observatory compliant tool for the kinematical modelling of HI datacubes. S. Sanchez et al. 2014



Examples of services using SAMP





Target Name											
J2232+1143	uid___A001_X12b_X23b.J0010+1058_ph.spw17.I.fits	2.62919	10.9749	A001_X12b_X23b	4.0	300;300;1;1	2225140.0	-5440310.0	-2481030.0	c
J2148+0657	uid___A001_X13e_X55.J0010+1058_ph.spw9.I.fits	2.62919	10.9749	A001_X13e_X55	4.0	300;300;1;1	2225140.0	-5440310.0	-2481030.0	c
J2148+0657	uid___A001_X13e_X55.J0010+1058_ph.spw11.I.fits	2.62919	10.9749	A001_X13e_X55	4.0	300;300;1;1	2225140.0	-5440310.0	-2481030.0	c
J2148+0657	uid___A001_X13e_X55.J0010+1058_ph.spw13.I.fits	2.62919	10.9749	A001_X13e_X55	4.0	300;300;1;1	2225140.0	-5440310.0	-2481030.0	c
J2148+0657	uid___A001_X13e_X55.J0010+1058_ph.spw15.I.fits	2.62919	10.9749	A001_X13e_X55	4.0	300;300;1;1	2225140.0	-5440310.0	-2481030.0	c
J2232+1143	uid___A001_X12b_X23b.J0010+1058_ph.spw23.I.fits	2.62919	10.9749	A001_X12b_X23b	4.0	300;300;1;1	2225140.0	-5440310.0	-2481030.0	c
J2232+1143	uid___A001_X12b_X23b.J0010+1058_ph.spw21.I.fits	2.62919	10.9749	A001_X12b_X23b	4.0	300;300;1;1	2225140.0	-5440310.0	-2481030.0	c
J2232+1143	uid___A001_X12b_X23b.J0010+1058_ph.spw19.I.fits	2.62919	10.9749	A001_X12b_X23b	4.0	300;300;1;1	2225140.0	-5440310.0	-2481030.0	c

Web SAMP & HTTPS problem

M. B. Taylor. 2019. https://arxiv.org/pdf/1912.00917.pdf

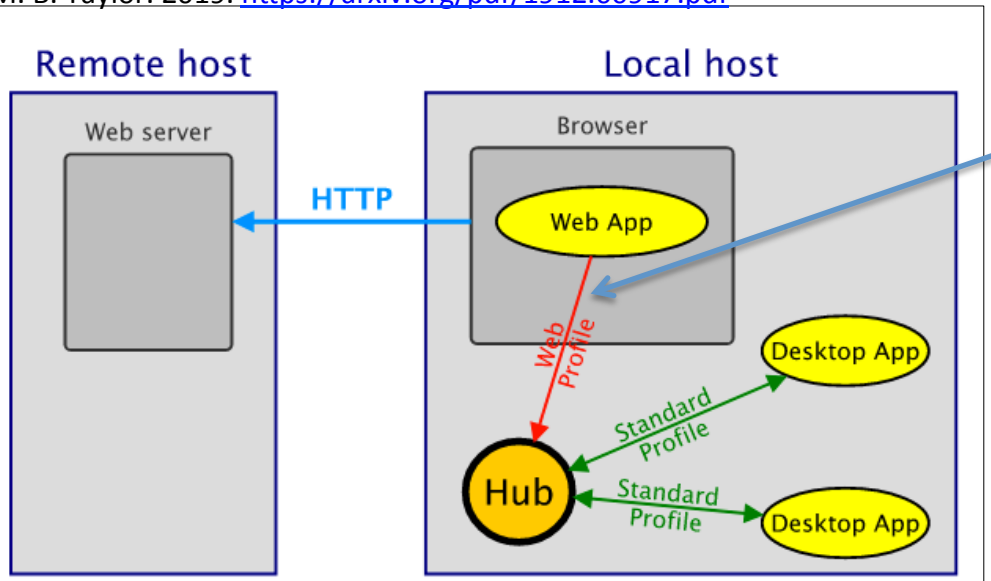


Figure 1. Desktop communications using SAMP, including both desktop and browser-based SAMP clients.

The problem:

- URL http://localhost:21012/ (XMLHttpRequest API).
- If the Web App is served from HTTPS, browsers will complain: "Mixed Active Content"

This is being solved with a New WC3 recommendation (2016):

- Any URL whose host is the loopback address or "Localhost" does not count as mixed content
- The problem will be solved (without any change in SAMP or in Web App) as long as browsers adopt this WC3 recommendation.

Browser	Version	OS	Works out of the box?	Reporter
Chrome	77	Ubuntu	yes	
Chromium	78.0	Ubuntu	yes	
Chromium	85.0	Ubuntu	yes	
Firefox	70.0.1	OSX Mojave	yes	Felix Stoehr
Firefox	70.0	Ubuntu	no	Felix Stoehr
Firefox	59	RHEL6	no	Mark Taylor
Firefox	70.0.1	Ubuntu	no	Mark Taylor
Firefox	81.0	Ubuntu	yes	Mark Taylor
Firefox Nightly	75.0 (64-bit)	GUIX	yes	Hugo Buddelmeijer
Chrome	85.0	MacOS 10.13.6	yes	Thomas Boch
Firefox	81.0	MacOS 10.13.6	yes	Thomas Boch
Safari	13.1.2	MacOS 10.13.6	no	Thomas Boch
Chrome	85.0	Fedora 31	yes	Marco Molinaro
Firefox	80.0	Fedora 31	yes	Marco Molinaro
Chrome	85.0.	MacOS 10.11.3	yes	Susana Sánchez Expósito
Firefox	78.2	MacOS 10.11.3	yes	Susana Sánchez Expósito
Safari	9.0.3	MacOS 10.11.3	No	Susana Sánchez Expósito
Firefox	81.0	MacOS 10.14.6	Yes	Susana Sánchez Expósito
Chrome	85.0	MacOS 10.14.6	Yes	Susana Sánchez Expósito
Safari	13.1	MacOS 10.14.6	No	Susana Sánchez Expósito
Firefox	81.0(64 bits)	Ubuntu 20.04.1 LTS	yes	Regis Haigron
Firefox	80	Windows 10	yes	Regis Haigron
Firefox	81.0(64 bits)	Ubuntu 18.04.1 LTS	yes	Pierre Le Sidaner
Chrome	86.0.4240.75	Ubuntu 18.04.1 LTS	Yes	Pierre Le Sidaner
Vivaldi	3.3.2022.47	Ubuntu 18.04.1 LTS	Yes	Pierre Le Sidaner
Chrome	84.0.4147.125	MacOS 10.12.5	Yes	Juan Carlos Segovia
Safari	10.1.1	MacOS 10.12.5	No	Juan Carlos Segovia
Firefox	75.0	MacOS 10.12.5	Yes	Juan Carlos Segovia
Chrome	57.0	MacOS 10.12.6	Yes	Alcione Mora
Safari	11.0.2	MacOS 10.12.6	Yes	Alcione Mora
Firefox	69.0	MacOS 10.12.6	Yes	Alcione Mora
Chrome	86.0	MacOS 10.14.6	Yes	Hector Canovas
Safari	12.1.2	MacOS 10.14.6	No	Hector Canovas
Firefox	81.0.1	MacOS 10.14.6	No	Hector Canovas
Edge	86.0	Windows 10.0	Yes	Mark Taylor
Chrome	86.0.4240.80	MacOS 10.13.6	Yes	Tom Donaldson
Firefox	81.0.2	MacOS 10.13.6	Yes	Tom Donaldson
Safari	13.1.2	MacOS 10.13.6	No	Tom Donaldson

https://wiki.ivoa.net/twiki/bin/view/IVOA/WebSampHttps

It looks promising !

!!??!!

Conclusions

- SAMP is an opportunity to open ESAP to the IVOA community
- Depending on the use case, SAMP is more than a “nice-to-have” functionality
- The HTTPS problem is being solved (not for all browser)
- Your opinion?