UCD AND TAP SERVICE FOR SOLAR PHYSICS

Report on work done at Royal Observatory of Belgium

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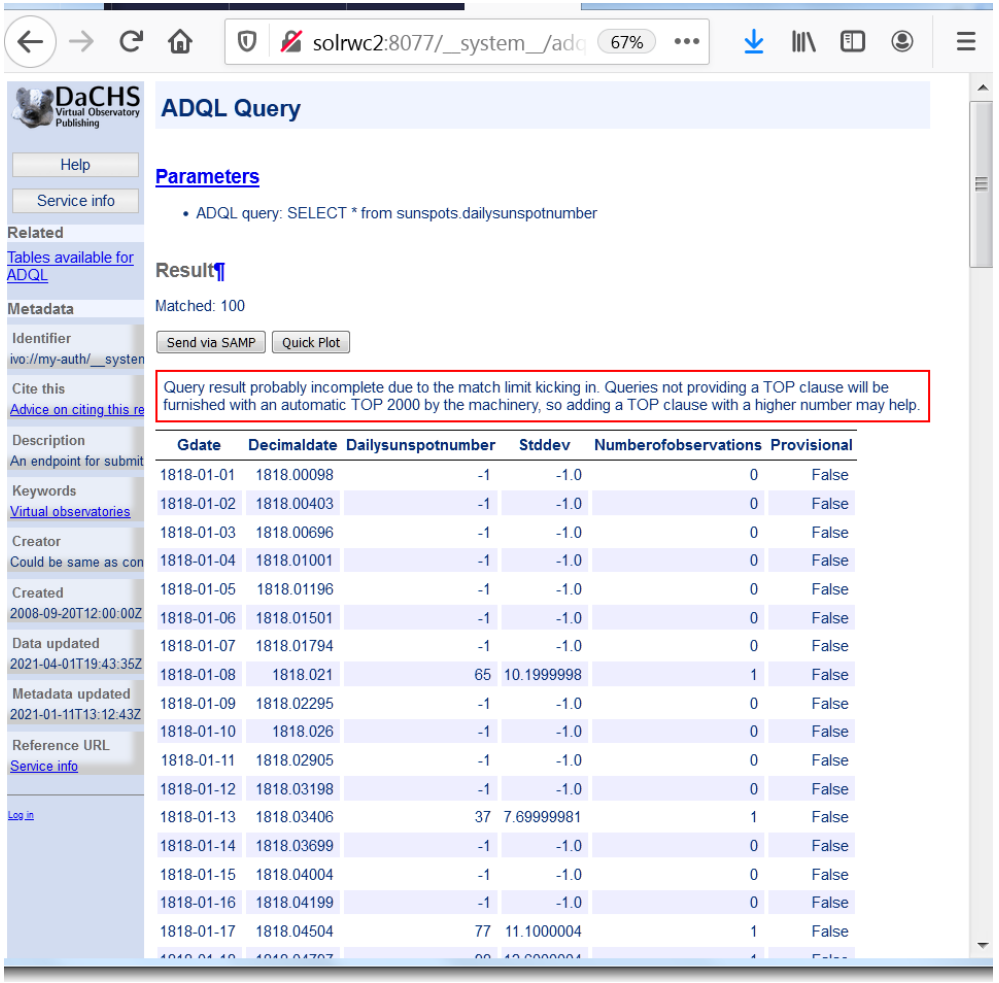
WP4 Tech Forum

Outline

- Tools for Virtual Observatory in solar physics: findability, accessibility, interoperability
  - First trial for installation of a TAP service at ROB
  - SOLARNET virtual observatory (SVO): another way to get access to data
  - How to link a TAP service and SOLARNET VO
  - How to link a TAP service and a solar web browser: Jhelioviewer
- Collaboration between institutes
- UCD in TAP resource descriptor files and in FITS keywords

TAP (for now, not EPN-TAP) service at ROB

- Use of DaCHS software
- First trial on
  - Local archive FITS dataset (EUV image from PROBA2/SWAP)
  - Local archive on sunspot number
  - Local catalog for active regions (continuously updated)
  - External database (D-rap indices, proxy for geomagnetic activity)
- Still a lot to learn



Gdate	Decimaldate	Dailysunspotnumber	Stddev	Numberofobservations	Provisional
1818-01-01	1818.00098	-1	-1.0	0	False
1818-01-02	1818.00403	-1	-1.0	0	False
1818-01-03	1818.00696	-1	-1.0	0	False
1818-01-04	1818.01001	-1	-1.0	0	False
1818-01-05	1818.01196	-1	-1.0	0	False
1818-01-06	1818.01501	-1	-1.0	0	False
1818-01-07	1818.01794	-1	-1.0	0	False
1818-01-08	1818.021	65	10.1999998	1	False
1818-01-09	1818.02295	-1	-1.0	0	False
1818-01-10	1818.026	-1	-1.0	0	False
1818-01-11	1818.02905	-1	-1.0	0	False
1818-01-12	1818.03198	-1	-1.0	0	False
1818-01-13	1818.03406	37	7.69999981	1	False
1818-01-14	1818.03699	-1	-1.0	0	False
1818-01-15	1818.04004	-1	-1.0	0	False
1818-01-16	1818.04199	-1	-1.0	0	False
1818-01-17	1818.04504	77	11.1000004	1	False

First trial with DaCHS, first observations

DaCHS …

- does TAP, but also SIAP/SSA/Obscore
- Seems to be at first designed for archival data
- Is configurable and capable of homogenizing a lot of your data
- Good response time (from first tests)

Still to be learned from our side

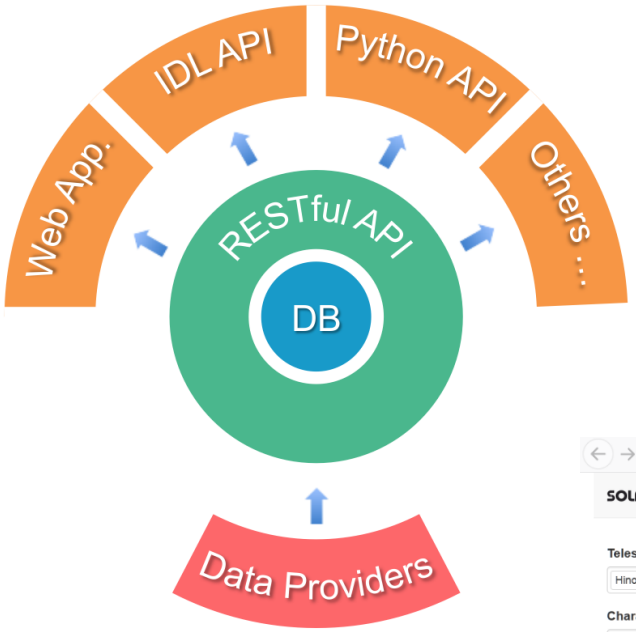
- Homogenization requires homogeneity in the resource descriptors → need to learn how to correctly set those parameters
- Not clear *how/if* it treats importing incremental (i.e. live) data.
- Not clear *how/if* it can collect several databases into one service

Discovery through the VO network

- The resource descriptors immediately give you a documented and standardized service (e.g. TAP)
- ***Aim:*** service must be discoverable through the VO network
- How to improve discoverability for the field of solar physics?

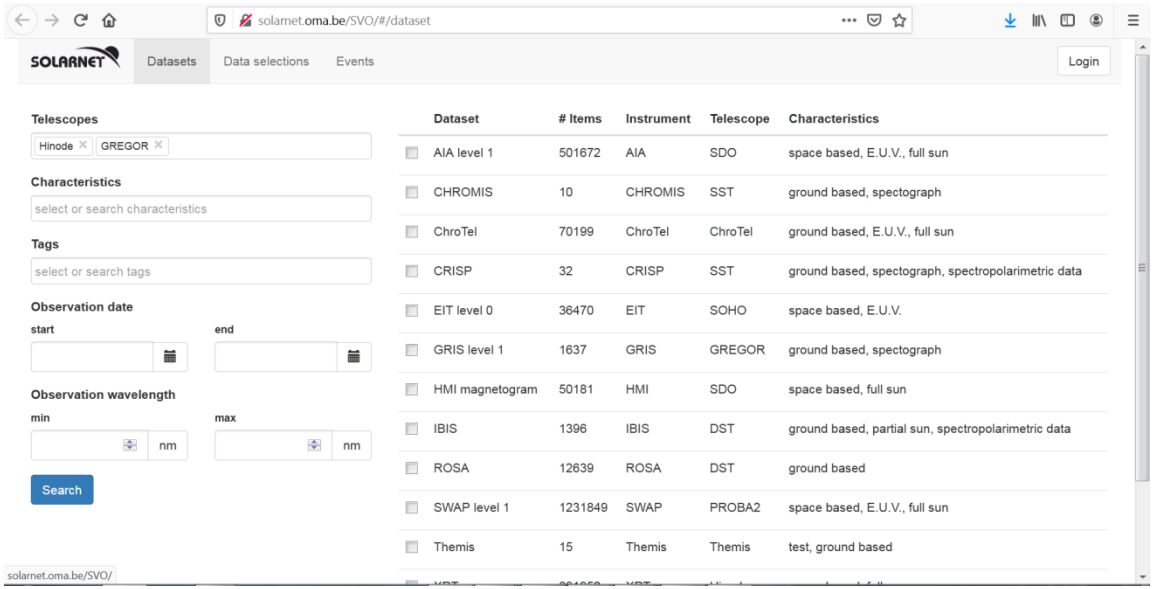
- TAP service for ESAC archive (e.g. Solar Orbiter, PROBA2): researcher go directly to the website
  - There exists a Python library specifically for this TAP service: sunpy-soar
- VESPA: collection of services
- Link with dedicated tools such as SOLARNET Virtual Observatory

Design of SOLARNET VO



- The data is hosted on the servers of the data providers.
- metadata are collected into a central searchable database.
- To interface with the database the RESTful API is used
- Easy to develop new tools that interface with the API (web, idl, python, etc,…)

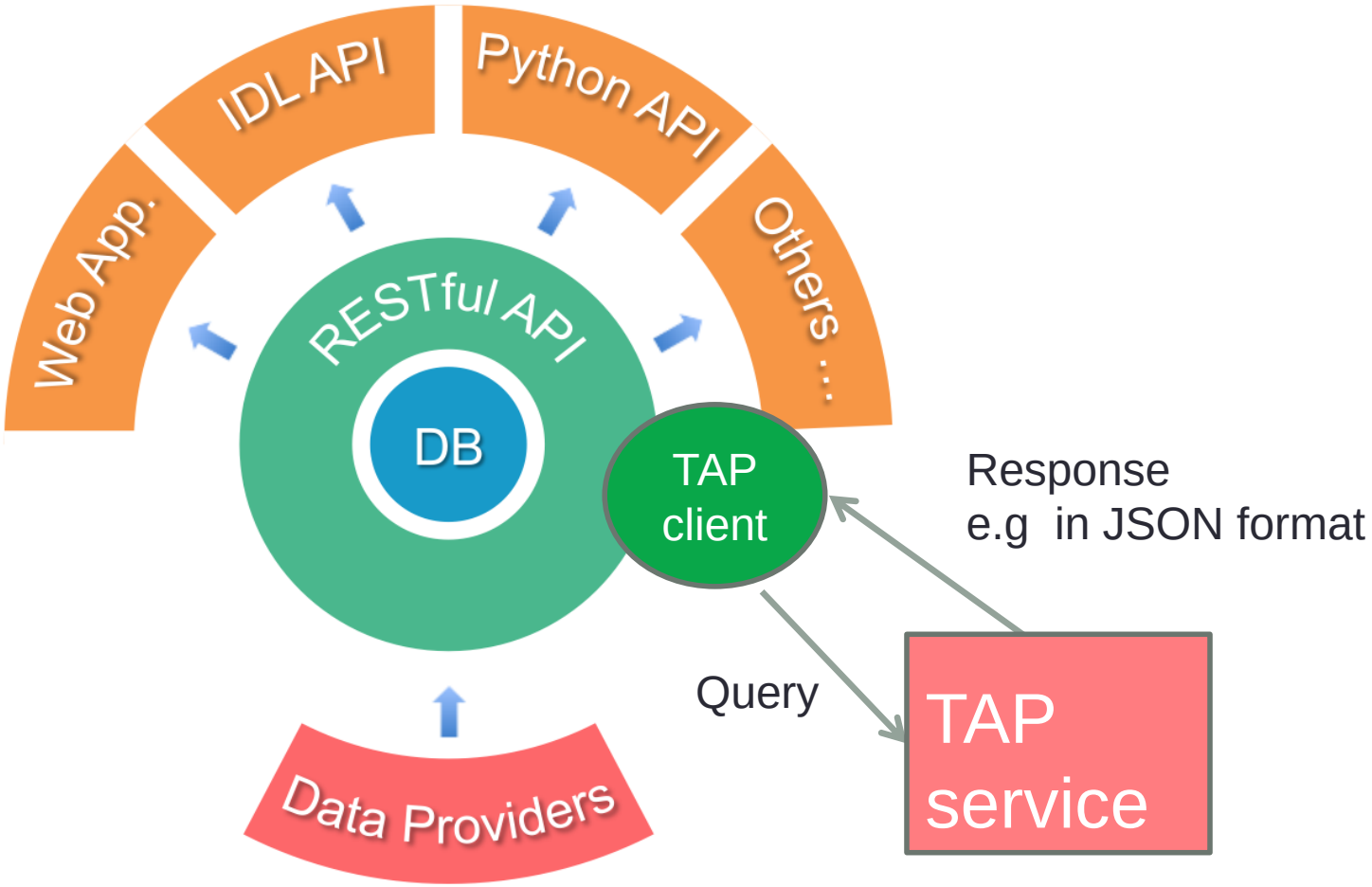
Data providers: including high resolution telescope, later on EST data



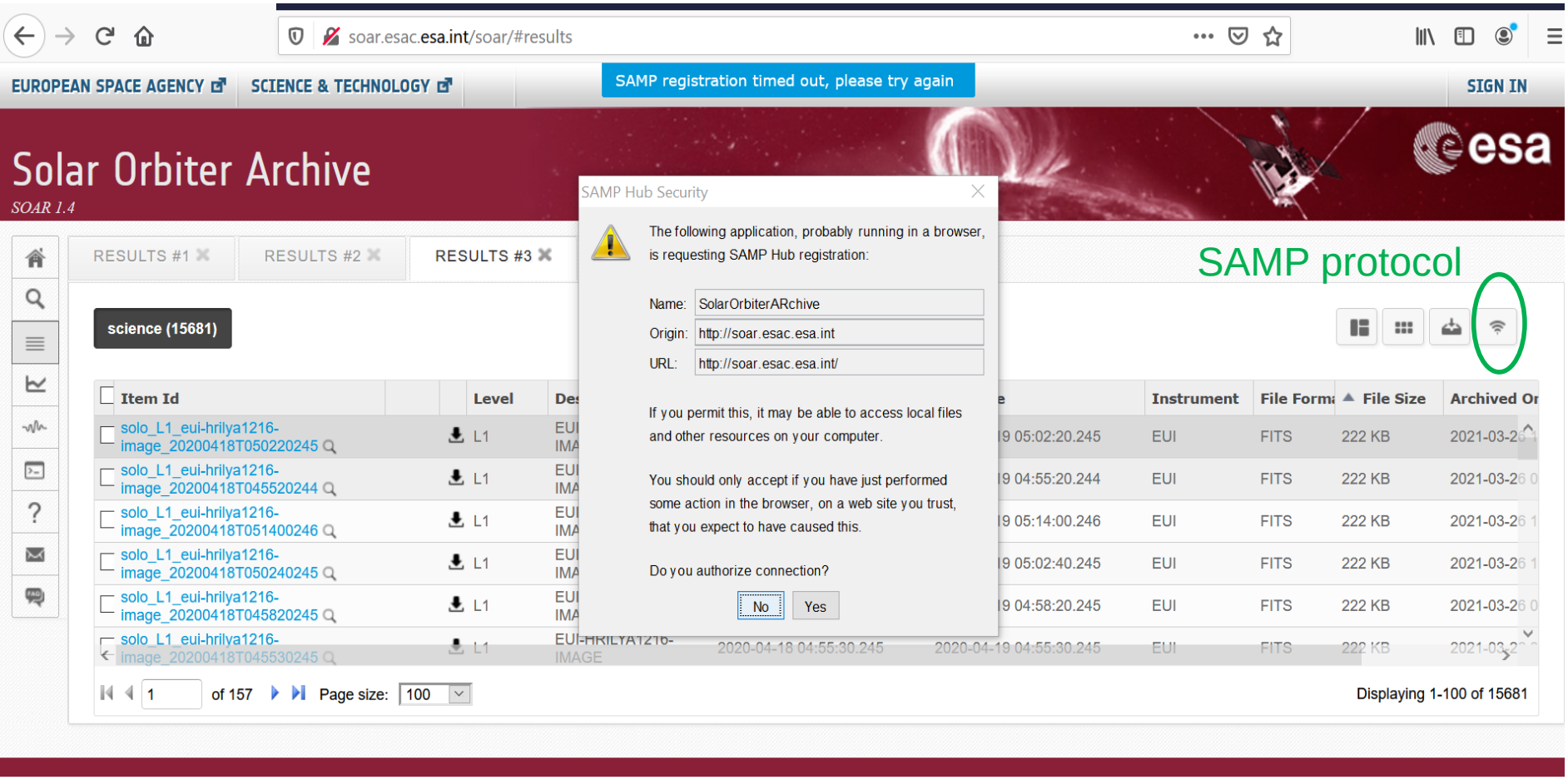
VSO (US) versus SOLARNET VO (EU)

- VSO has a similar architecture
- They support RESTful protocol, but also SOAP and recently TAP
- (Communication from Ed Mansky, working on VSO): *In the case of **TAP queries sent to ESA**, we construct the full query following the documentation provided by ESA, and then parse the **JSON results** into our Perl hash to allow easy **combination with SOAP and/or REST results** from other Data Providers. The TAP service provided by ESA is basically a RESTful service.*
- → Idea is to do a similar link within the SOLARNET VO

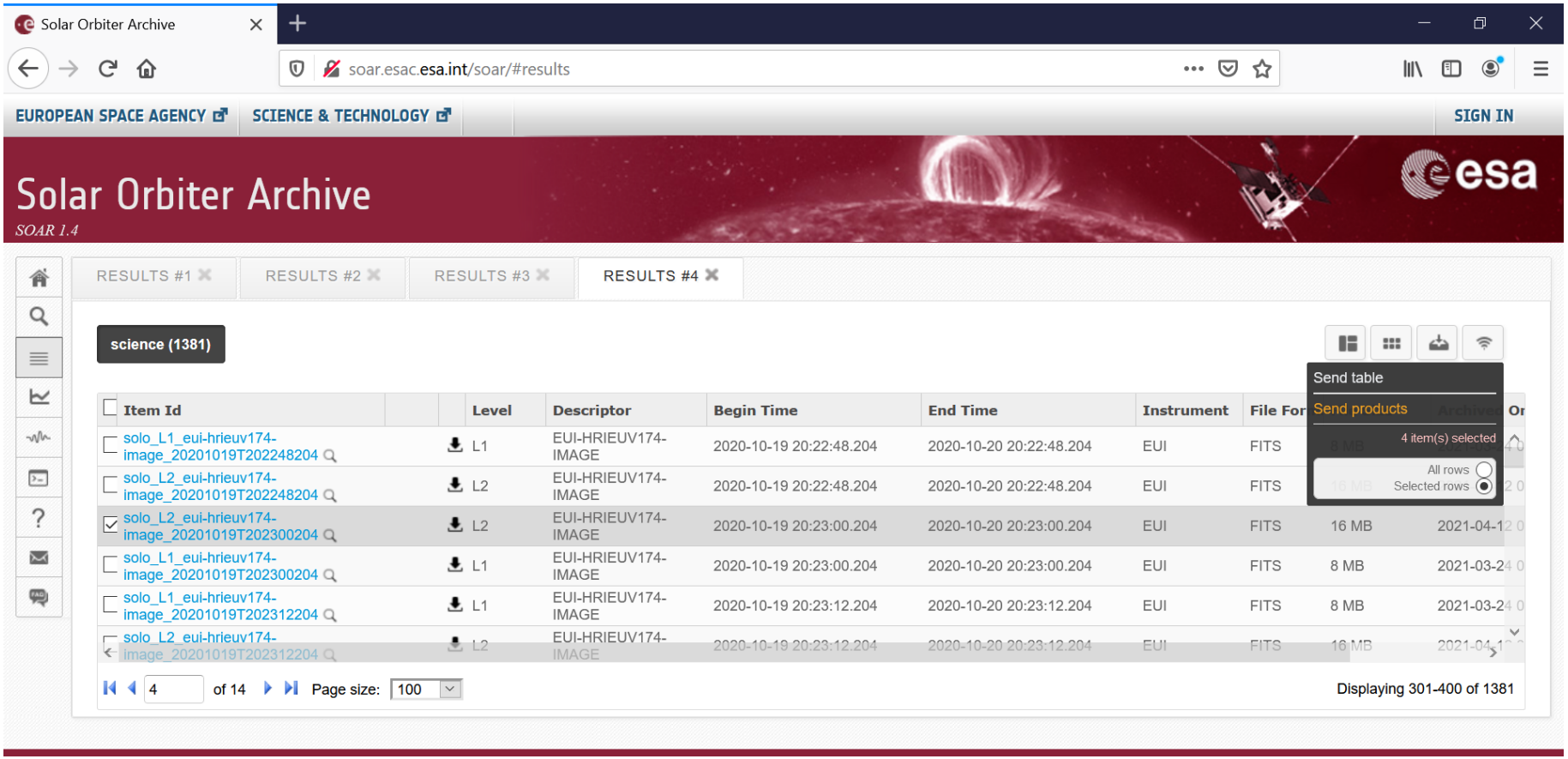
Aim: Beside the RESTful API, add a TAP client to query a TAP server



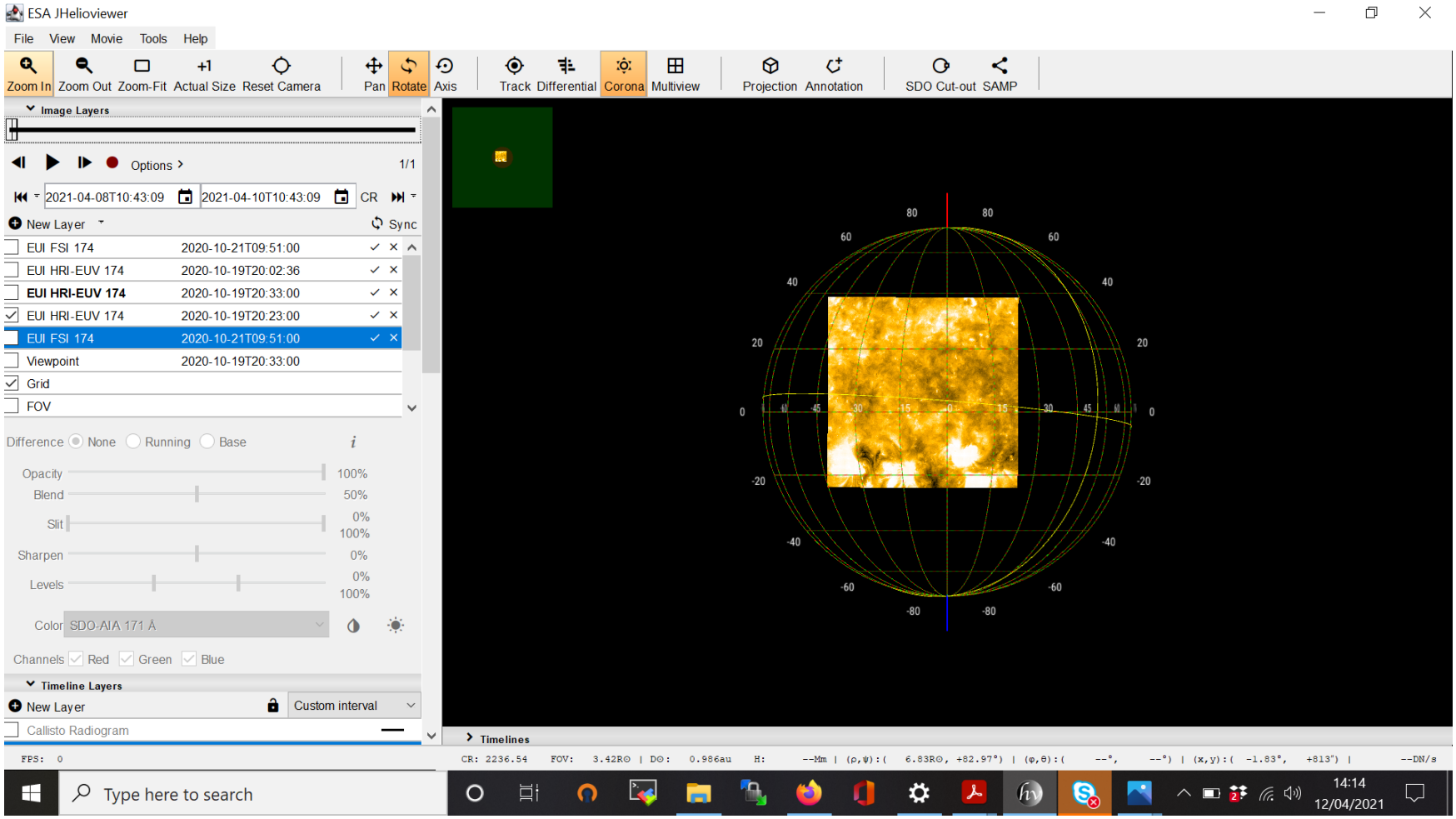
Link between TAP and JHelioviewer, via SAMP protocol



Data transfer (Jhelioviewer must be running)

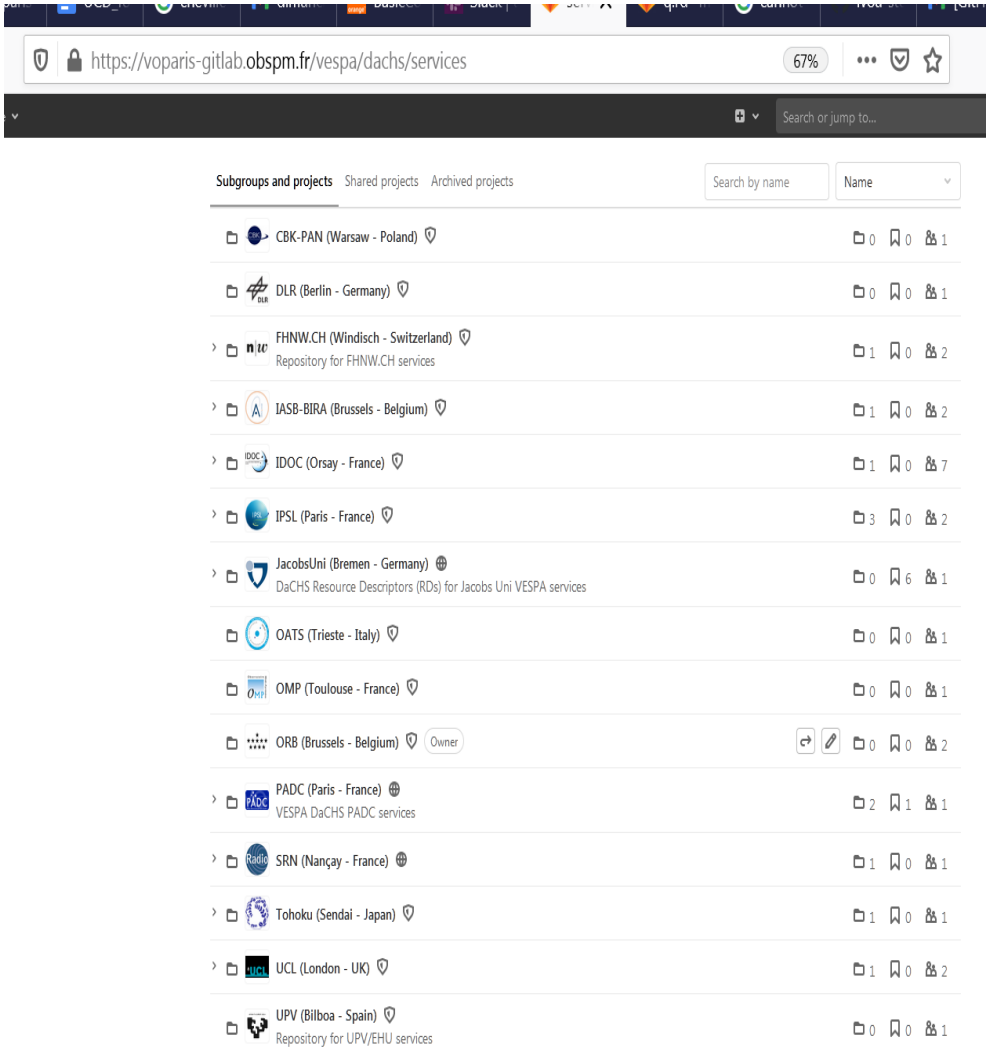


Within JHV: data available as a new layer



Collaboration between institutes

- The owner of a VESPA service may put its description file in https://voparis-gitlab.obspm.fr (after authorization by Baptiste)
- Homogenization/ discussion about:
  - resource descriptor content
  - UCD within resource descriptor



Why UCD ?

- Support for interoperability, e.g. support for cross-column, or even cross-catalog search in SOLARNET VO
- Not as complete as a data model, but it is a start
- Reference :
  - http://cdsweb.u-strasbg.fr/UCD/ (UCD1+, 2018)
  - https://github.com/ivoa-std/UCDList/blob/master/ucd-list-1_4.txt (Nov 2019)
  - Extension for planeto and heliophysics: https://wiki.ivoa.net/internal/IVOA/PlanetaryUCD/SolarSystemUCD-V05.pdf (also available on zenedo)

Work done with UCD: review of:

- FITS keywords: link between main FITS keywords & UCD
- HEK catalog: no UCD at the moment in the HEK, first attempt to propose UCD
- HFC1 catalog: UCD in resource descriptor (from the VESPA github repository) : agreement on same combinaison of UCD to use for a quantity
  - Ex: Chain code of a solar feature, could be characterized by
    - *pos.outline* or by *src.morph*
- → Request for new UCD , complement to assessment study of 2014
- → Discussion group needed on
  - https://github.com/ivoa-std/UCDList