#### Radio Astronomy projects in ESCAPE and Virtual Observatory

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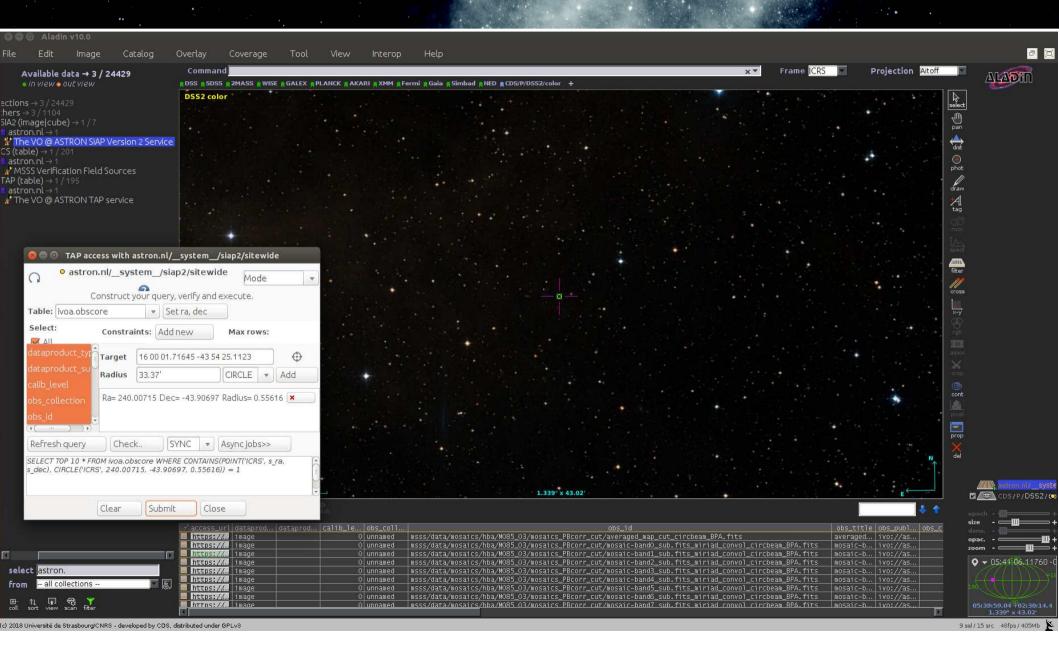
#### **ESCAPE**

- European science cluster for astronomy and particle physics ESFRI:
  H2020 funded project
- ESCAPE is federated with other projects within the frame of EOSC (european open science cluster)
- ESCAPE work packages :
  - WP2 : data and computing cluster (Data Lake)
  - WP3 : free software repository for astronomy and particle physics
  - WP5 : science platforms
  - WP6 : outreach/citizen science
- WP4 (led by CDS): linking ESFRI projects to EOSC using VO framework

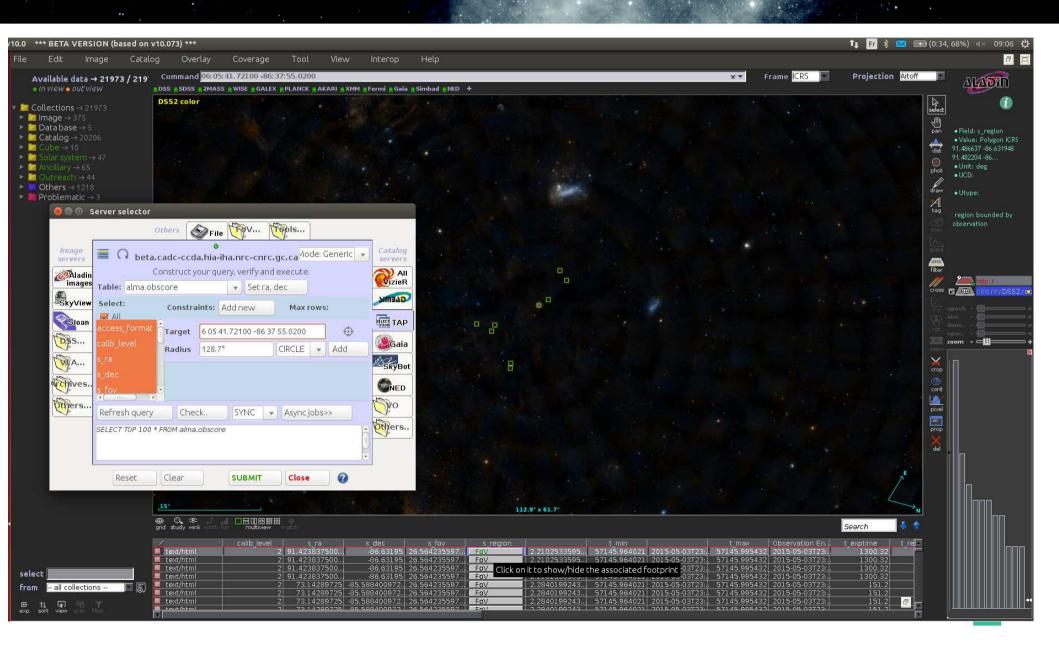
# ESCAPE radio astronomy projects

- LOFAR (Astron)
  - Low Frequency Array (10-250 Mhz)
  - SIA2 / ObsTAP services for 2 D images
- JIVE
  - Joint Infrastructure for VLBI ERIC (european research infrastructure consortium)
  - Hosted by Astron.
- SKAO
  - VO technology integrated in SKA Data distribution policy
  - Future developemts towards SKA regional center
- ALMA (science Archive -ESO)
  - Using VO technology (AladinLite, ESA Sky)
  - ObsTAP and SIA2 services available for science data

# LOFAR ObsTAP service

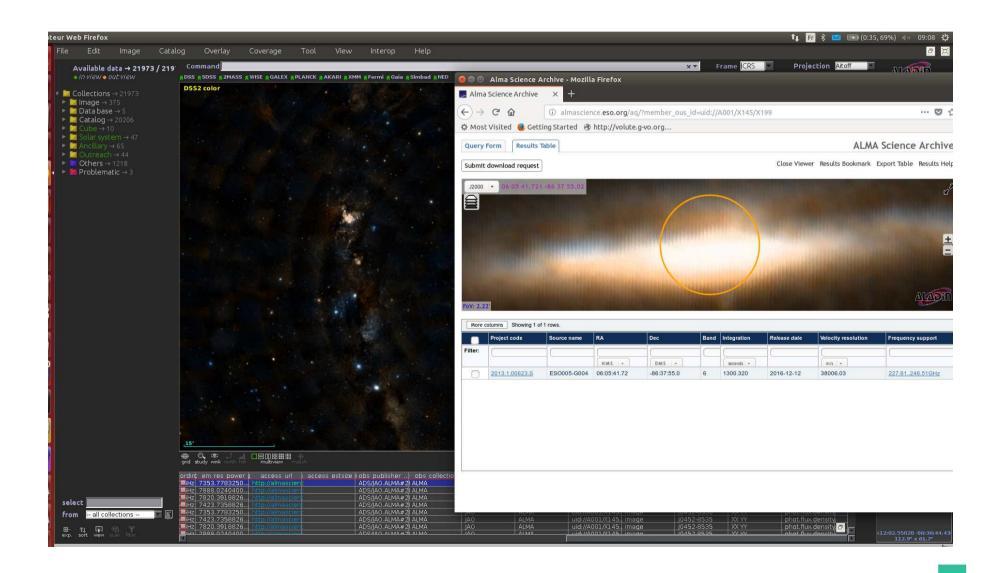


## ALMA science archive ObsTAP service within Aladin



#### ALMA science archive

url in ObsCore response is pointing towards the science archive native interface in the browser



### LOFAR plans for VO services as discussed at ESCAPE tech Forum 02/2020

- Discovery and Access for Science data
  - Extend service to data cubes, APERTIF,
    Westerborck data
    - Access: Full retrieval at the moment.
    - SODA services could be useful for APERTIF in the future ?
- See Yan Grange slides for status

### JIVE plans for VO services as discussed at ESCAPE tech Forum 02/2020

- Advanced discovery and access of visibility data
  - Coarse grain discovery of Visibility data with ObsTAP (in collaboration with LOFAR/ASTRON) Could work well. To be experimented
  - Provide processing on the ESCAPE Science Platform through Jupiter Notebooks
  - Store parameters used in the processing for further reprocessing
  - Possibility to modify some of them if science result not satisfactory and loop.
  - Provenance
    - calibration of visibility data
    - Instrumental provenance will require a model extension
  - Experiment UWS for staging
- See Mark Kettenis slides for status

### ALMA plans for VO services as discussed within the frame of WP4 detailed plan

- Usage of VO standards
  - ObsCore/ObsTAP +SIA2
  - DataLink
  - SODA
  - HiPS via AladinLite
- The implementation of VO services with ALMA data will provide feedback on the VO standards

#### SKA plans for VO services as discussed within the frame of WP4 detailed plan

- Usage of VO standards
  - Explore ObsCore to describe science data
  - Provenance of datasets
  - TimeSeries: uprising VO standards
  - Create HiPS for simulated images
  - Explore Authentication & Authorisation of services

# CDS plans: a visibility data discovery and access prototype

- An internship student (A.Egner) at CDS working with K.Lutz, Y.Stein, M.Louys, F.Bonnarel
  - Subset of visibility data / various provenance / measurement sets
  - Store MS metadata (casa listobs command) into a database.
  - Map to ObsCore.
  - Add new datasets
  - Finer description. Two possibilities
    - Add Related metadata features
      - uv coverage, beam plot, etc. linked via DataLink
      - Related instrumental configuration : antennas, etc..
    - Additional metadata columns for visibility data description in collaboration with ASTRON/LOFAR/JIVE
      - Extra free columns in Obscore or propose a standard extension ?
- Extend collaboration with Nancay/ NENUFAR

#### In addition:

- Italian radio astronomy groups testing ObsCore, Caom and SODA (INAF)
- Collaborations between the various projects and VO expertise centers
- Collaboration with other ESCAPE WP = science platform, software repository, DataLake
- Participation of european radio astronomy projects to IVOA Radio Astronomy Interest Group