Access from visualisation tools to SKA science images and cubes stored in a rucio DataLake through IVOA discovery and access services

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SKA and the SRCnet

- SKA in two words
  - Low and mid frequency radio astronomy project
  - South Africa and Australia
  - International project : Australia, South Africa, Europe, China, Canada
  - First light : end 2024
  - Fully operational 2028
  - 700 Pbytes/year of reduced data
  - SKAO (headquarters Manchester UK) is the international organization building and operating the project and producing the the science data products

SKA and the SRCnet

- The SRCnet is an alliance of national/regional nodes working together for
  - Distributed Data storage
  - Advanced data reduction
  - Currently a dozen of prototyping teams prepare the system : should be working by first light
- 3 teams have been prototyping access and visualisation of data in the context of a DataLake operating Rucio

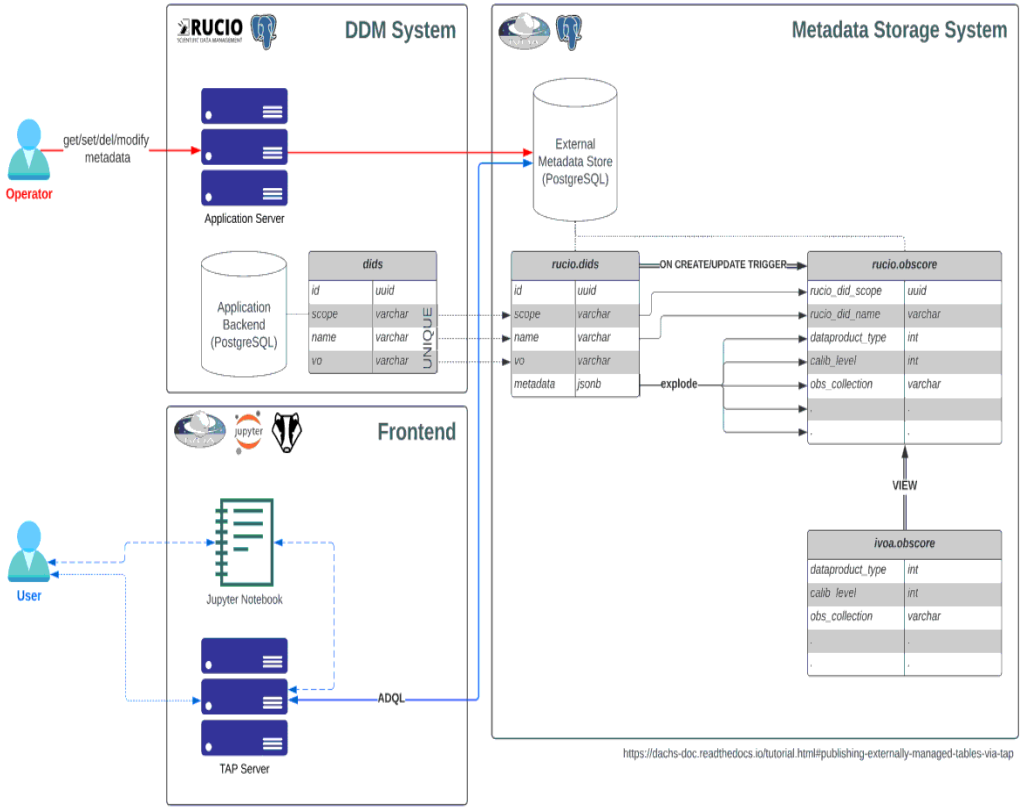
Rucio : dataset storage, metadata management an VO discovery service

- Load datafiles in Rucio storage elements

(here the spanish one)

- Set « ObsCore » metadata for these datasets in the database operated by the SKAO (magenta) team by a set of rucio commands
- ObsTAP/SIA/SCS service (implemented with Dachs) on top of the rucio database + DataLink
- SODA service (developed by orange team) operated on the spanish node (by the coral team)

Rucio : dataset storage, metadata management an VO discovery service



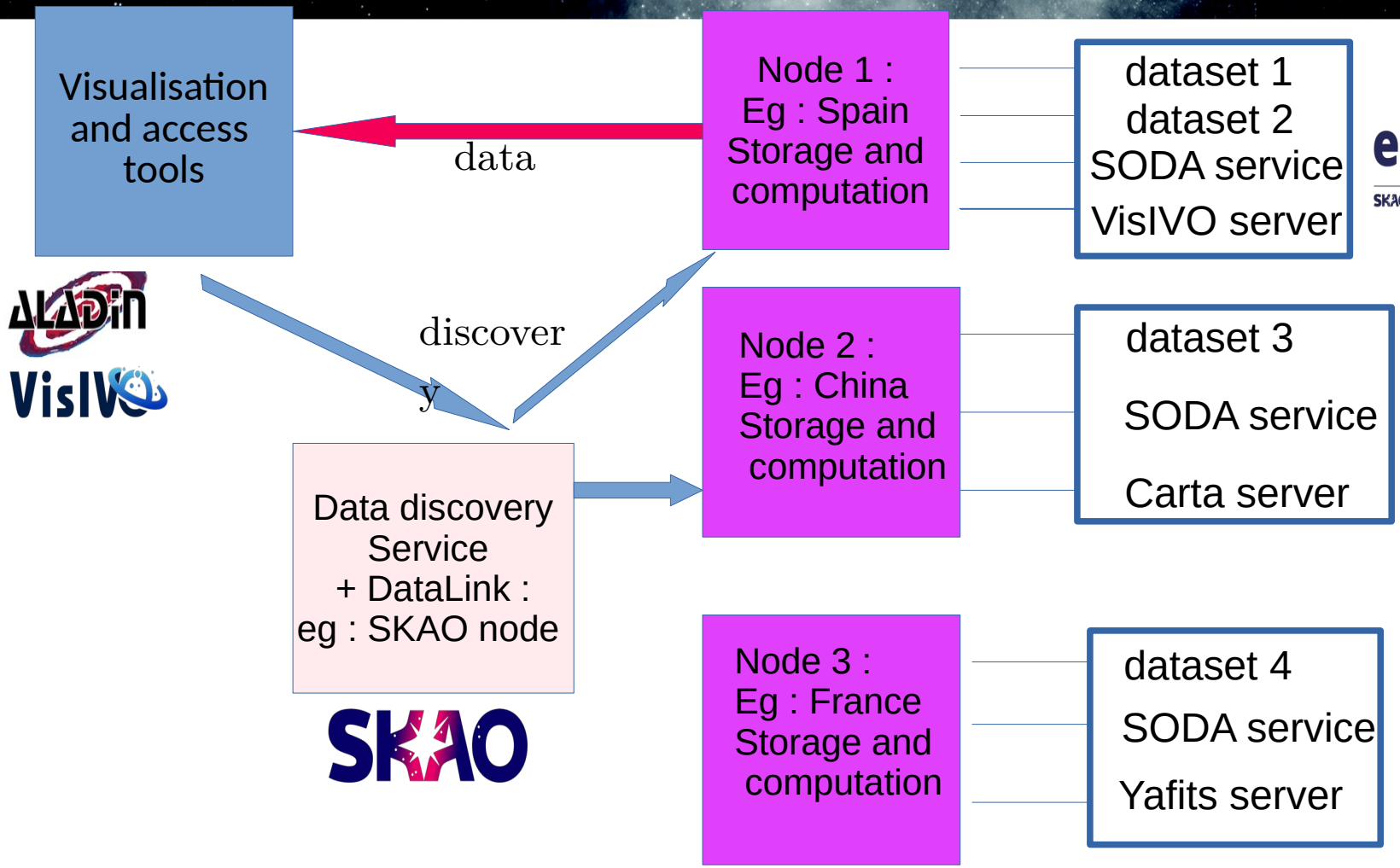
Discovery, access and visualisation of datasets

- Several steps
  - Data discovery service (ObsCore + API = SCS currently)
  - DataLink service
    - Full retrieval of the data
    - SODA sync and async services close to the data
      - SODA service is developped by INAF from Vialactea project
    - Visualisation servers (VisIVO, CARTA, Yafits) close to the data
    - Recursive Datalink for further advanced discovery facility
  - Visualisation (orange team): VisIVO, Aladin (Desktop, Lite), later : CARTA, Yafits, …

Discovery, access and visualisation of datasets

- Introduction of recursive datalink
  - For advanced discovery
    - Additional documentation
    - Derived data (moment maps, spectral indexes, spectra, etc …)
    - → HiPS of derived data for fast access to region of interest

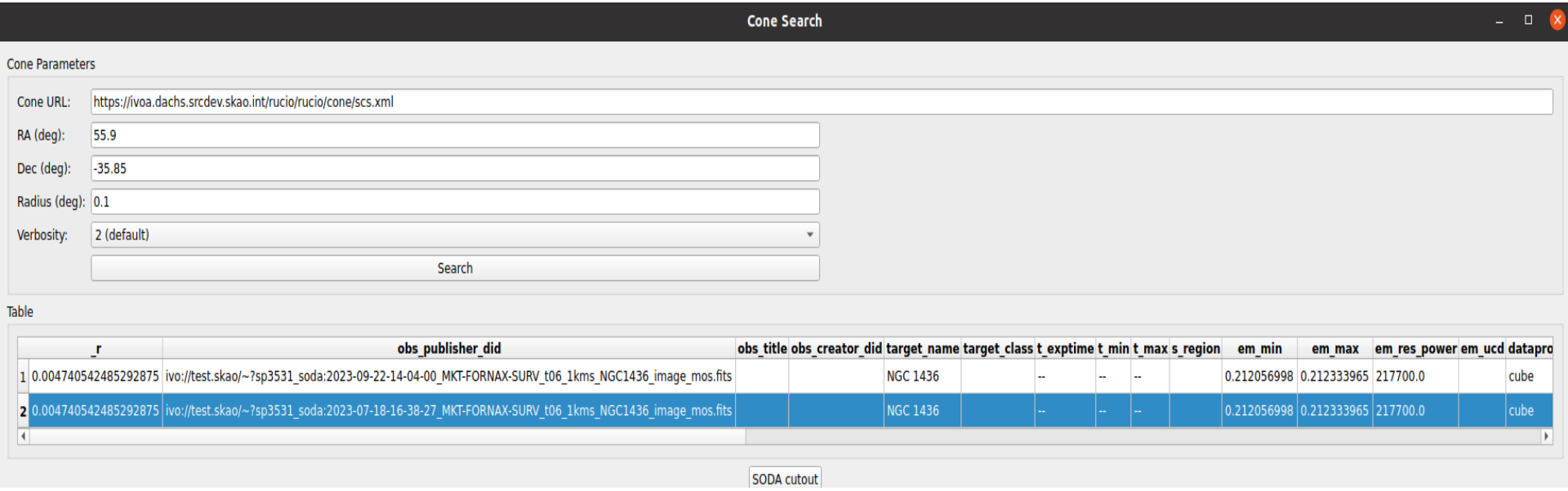
Discovery, access and visualisation of data



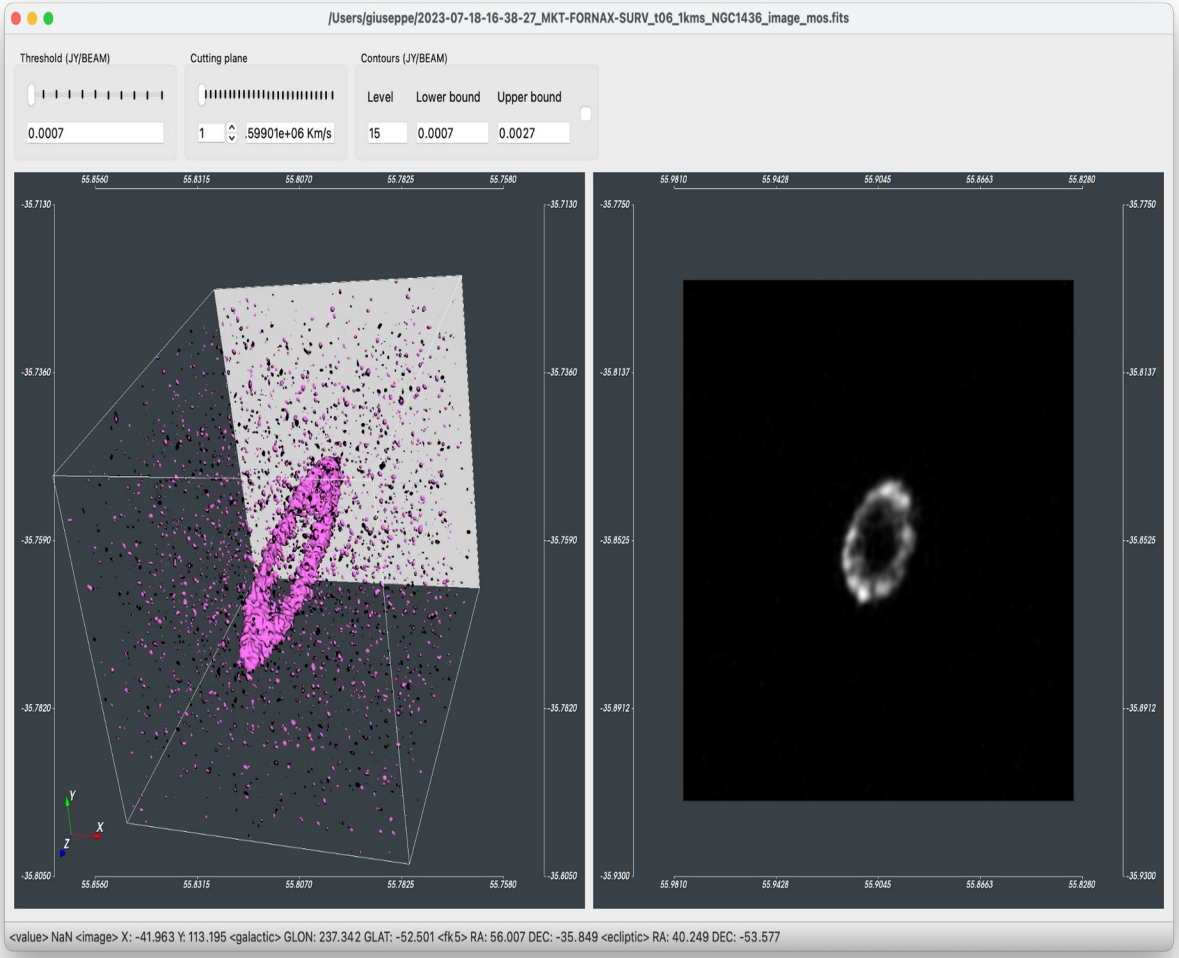
Pathfinder and simulation datasets for the prototype

- 16 datasets from
  - MEERKAT
  - ASKAP
  - VLASS
  - LOFAR
  - Apertif
  - + SDC1, SDC2, SDC3
- Various spectral range and resolution, field of view, sizes (up to 40 gigabytes)

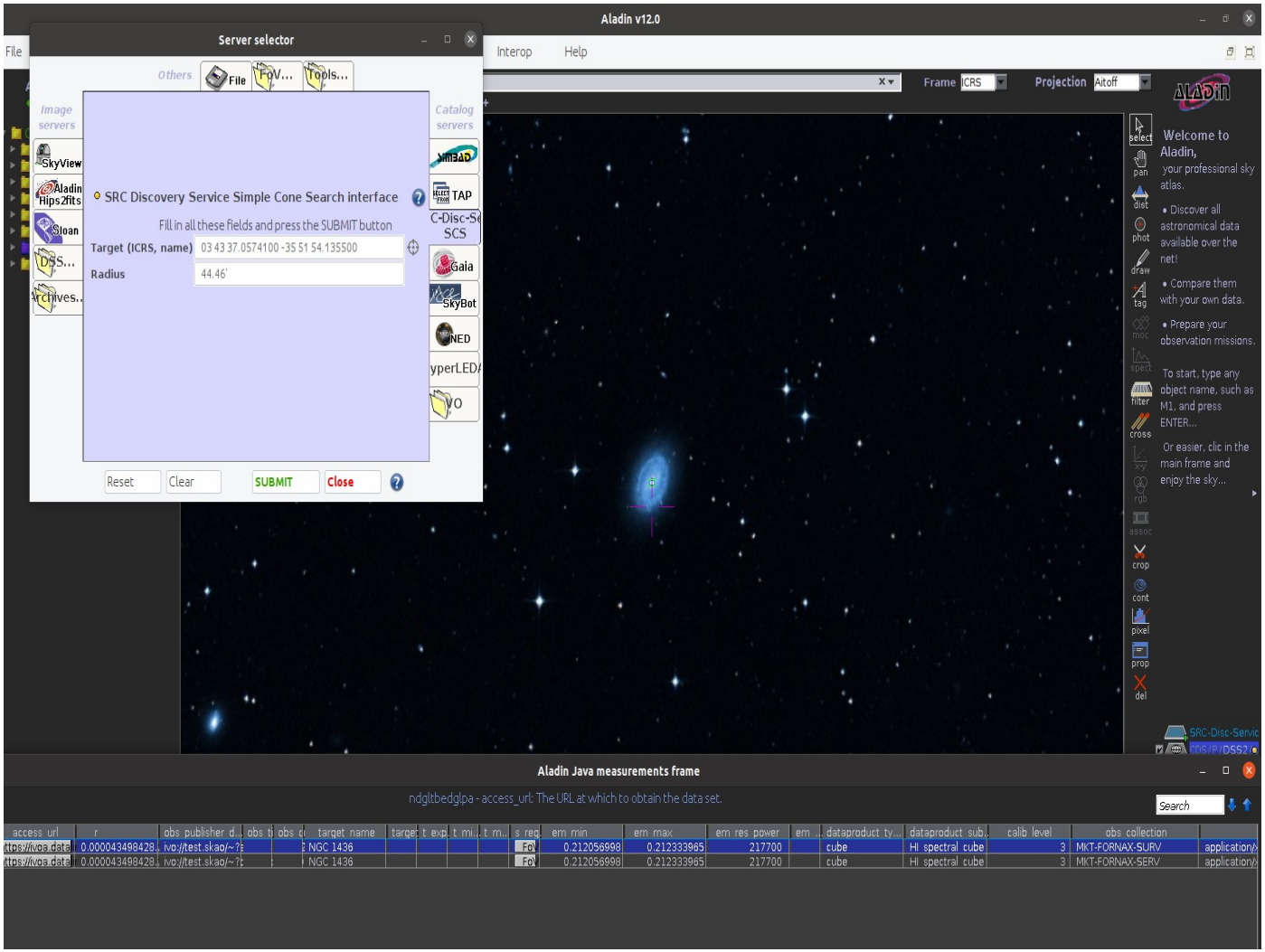
VisIVO Discovery service interface
NGC 1431 Meerkat cube ObsCore



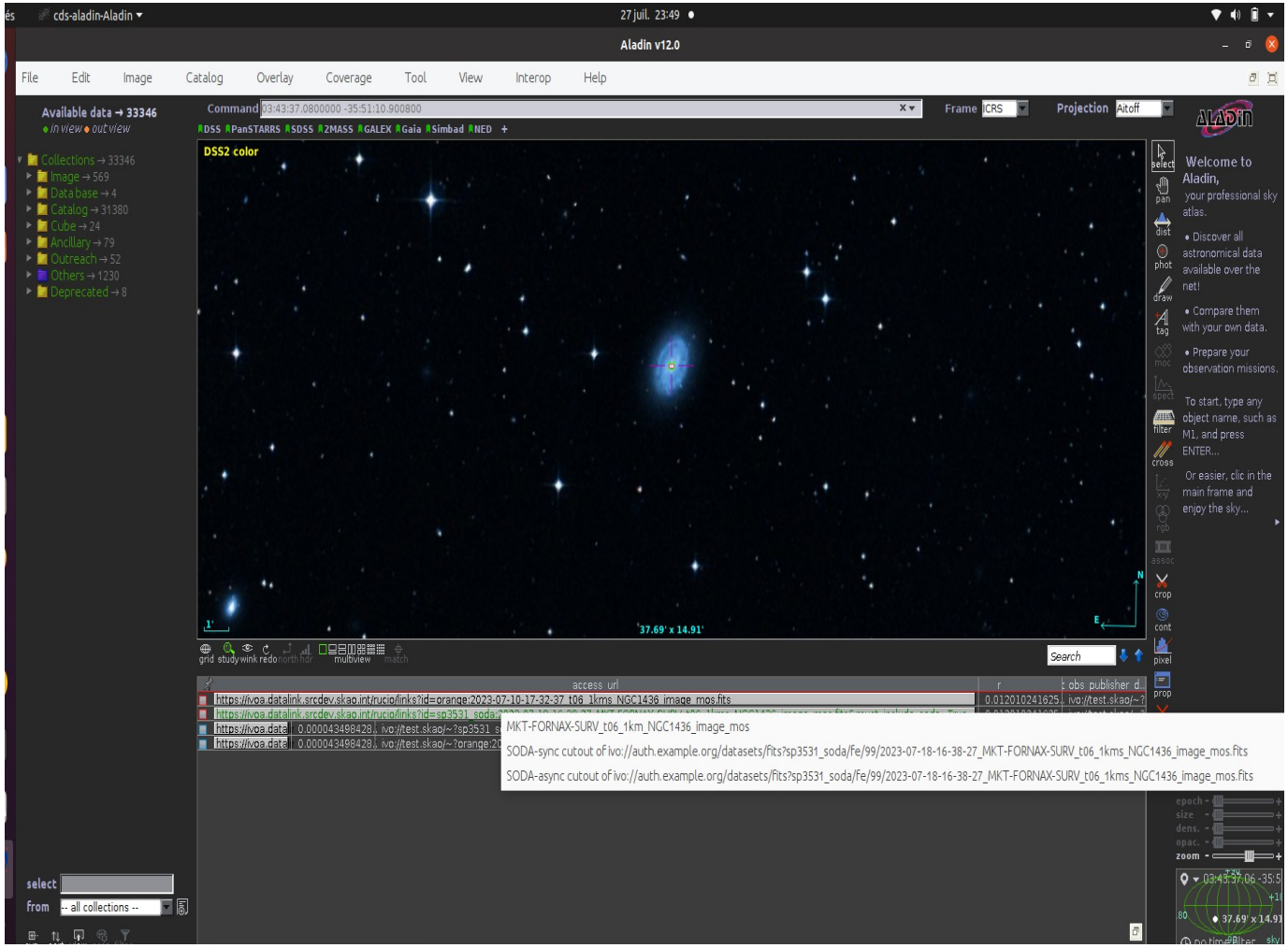
VisIVO
NGC 1431 Meerkat cutout display



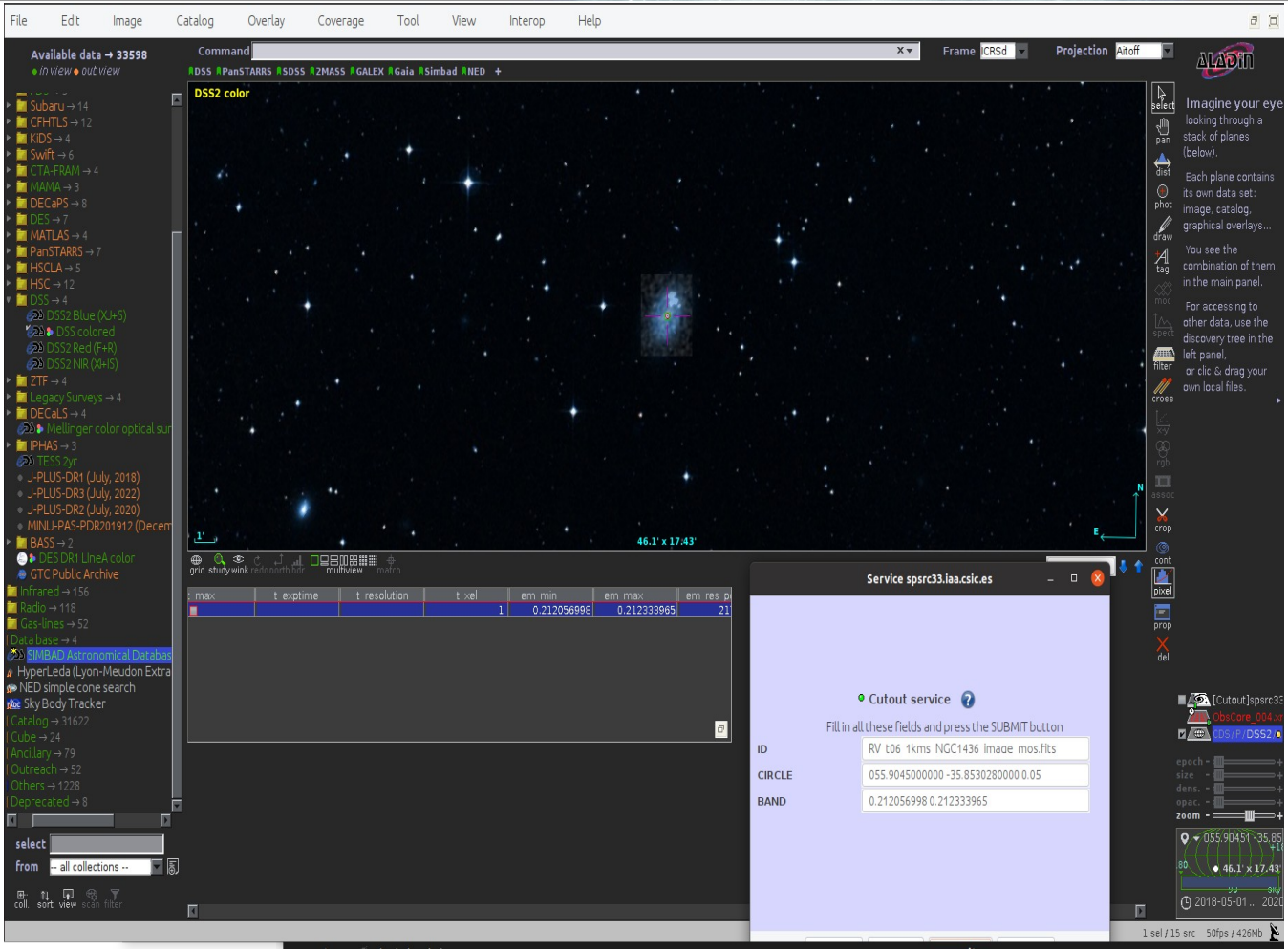
Aladin Desktop querying the service around NGC 1436
ObsCore response : Meerkat Fornax survey cube found



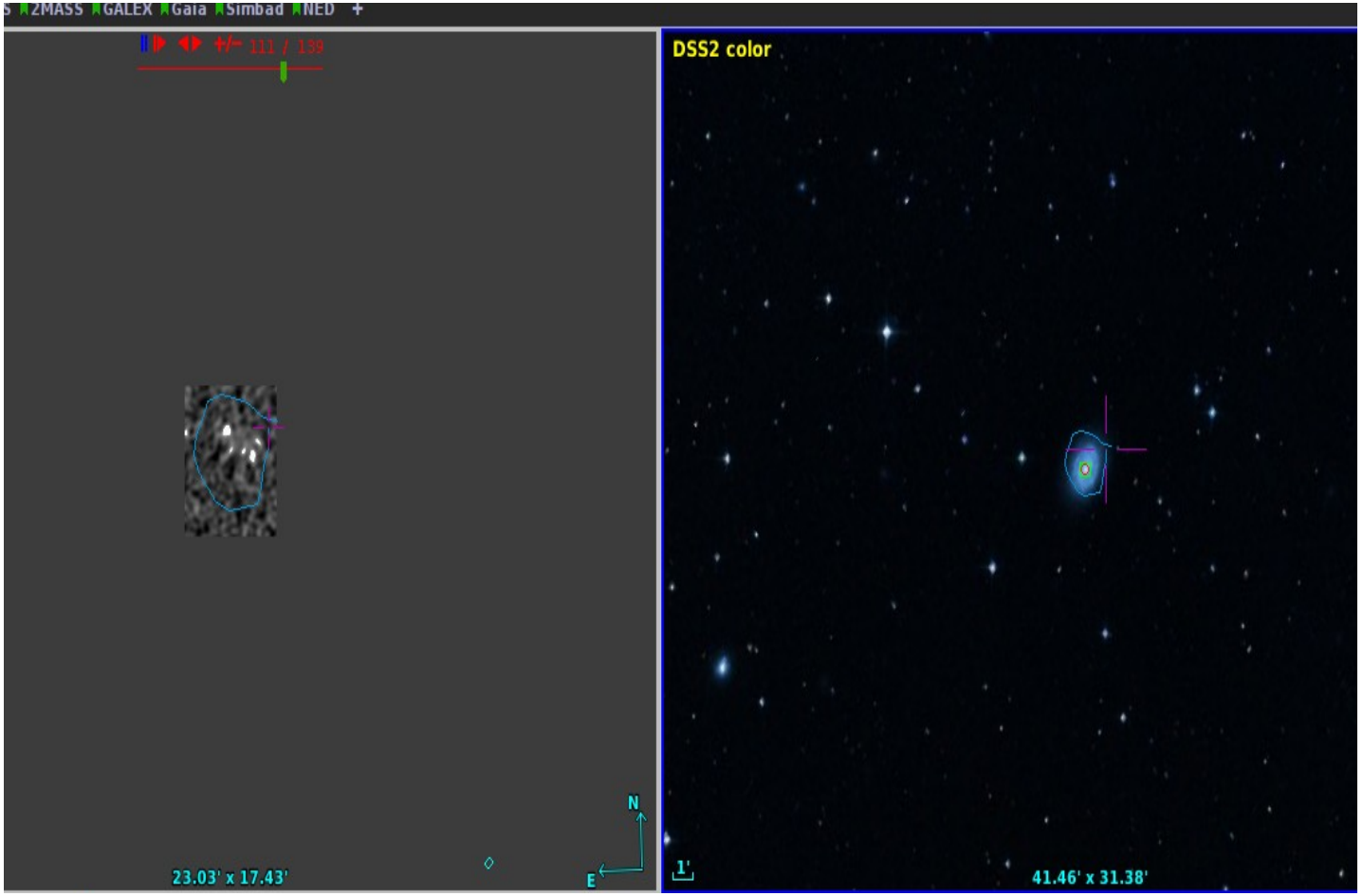
AladinDesktop querying the service around NGC 1436 – DataLink response



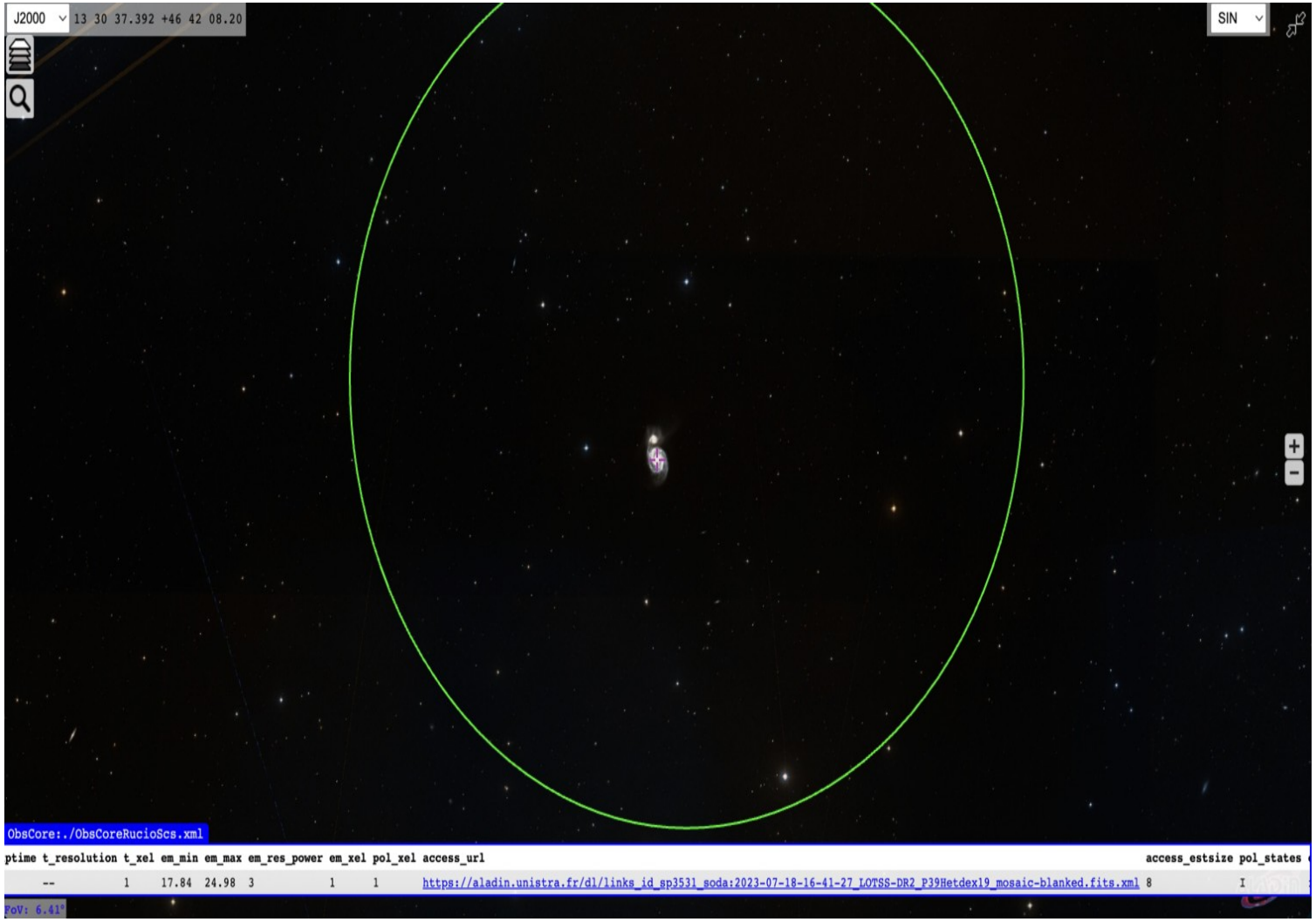
AladinDesktop querying the service around NGC 1436 – SODA interface



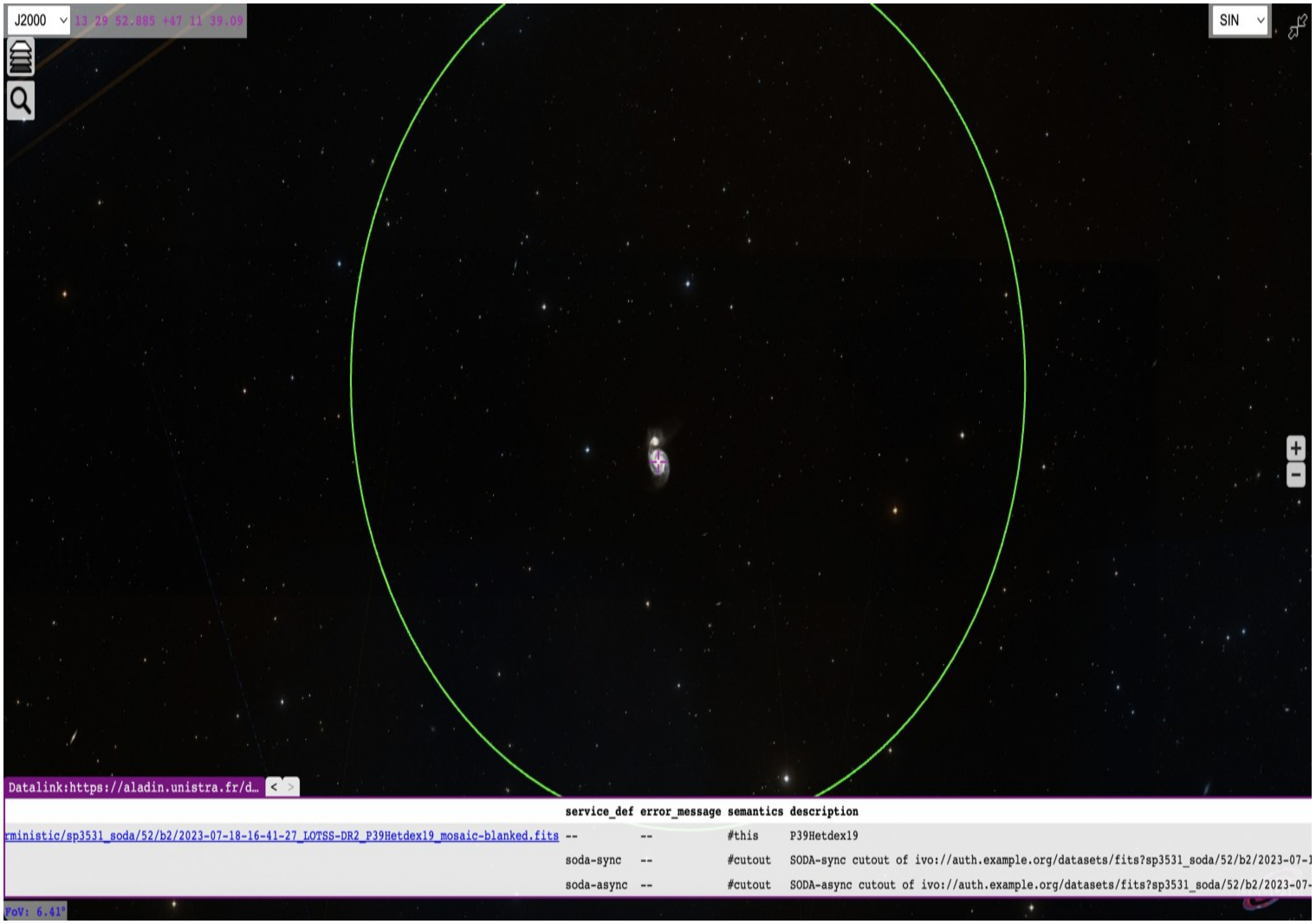
AladinDesktop querying the service around NGC 1436 – SODA result - channel 111



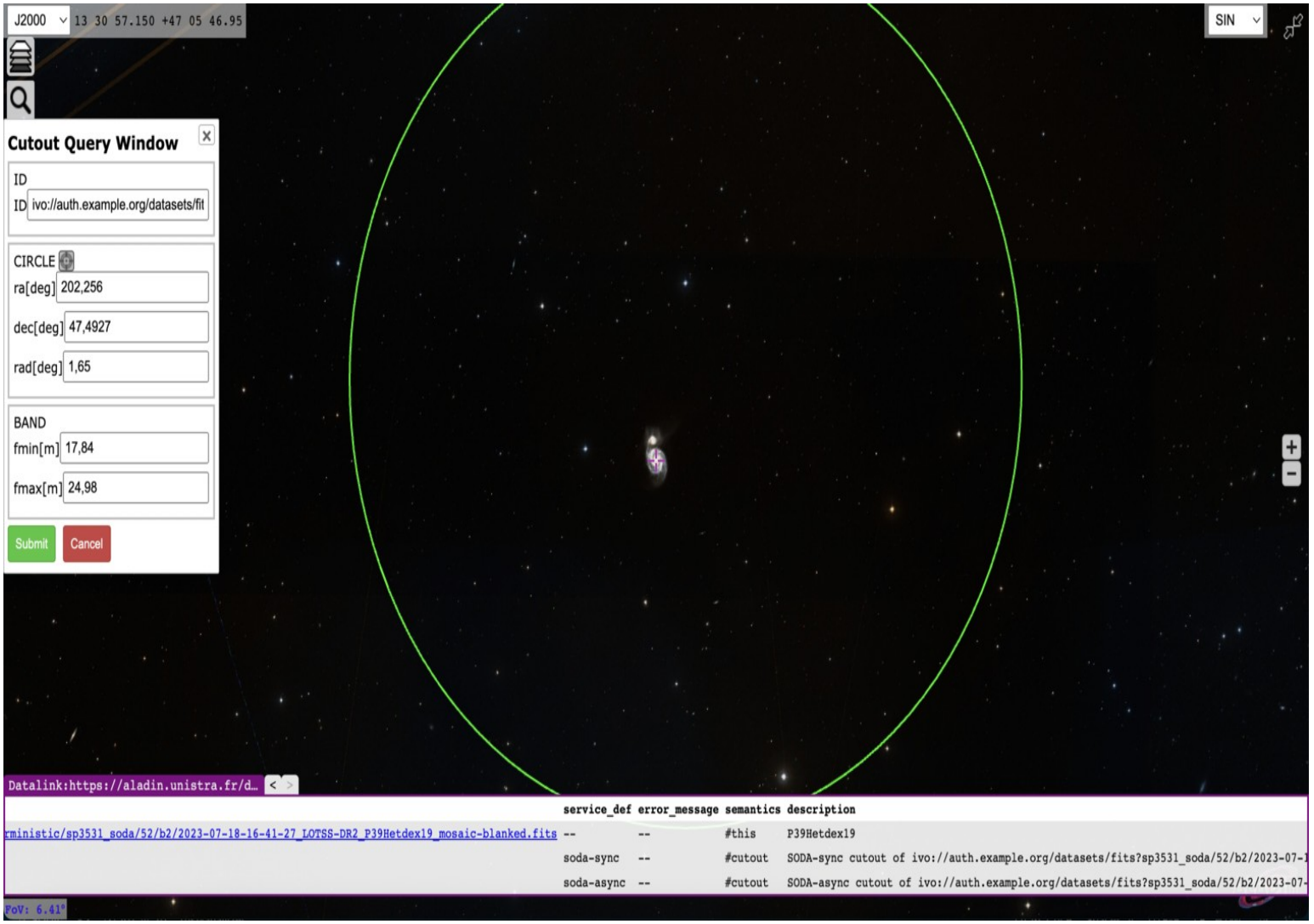
AladinLite ObscOre result for M51 : LOFAR continuum image found



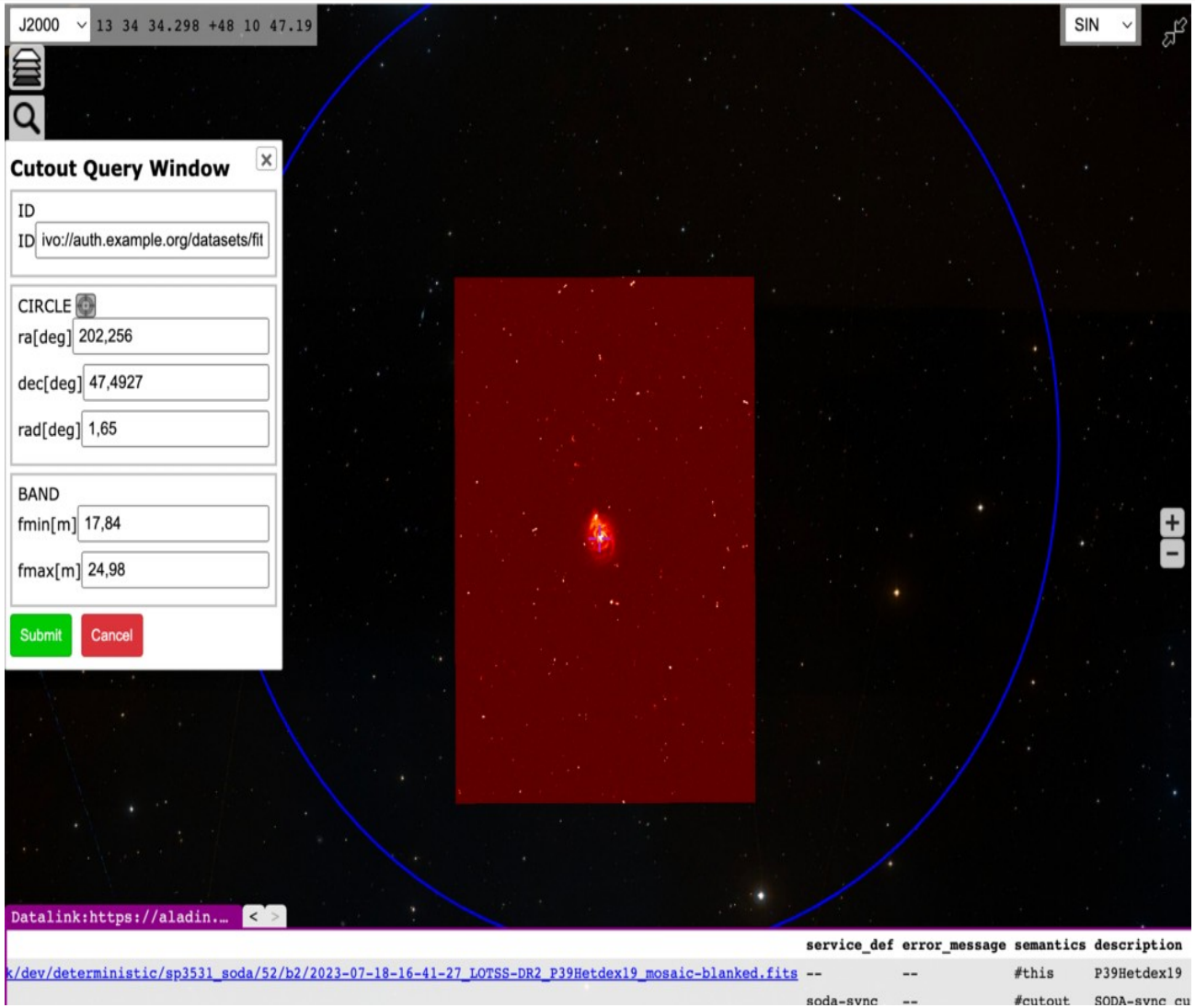
AladinLite ObsCore result for M51 : DataLink response



AladinLite – SODA interface for M51 LOFAR image

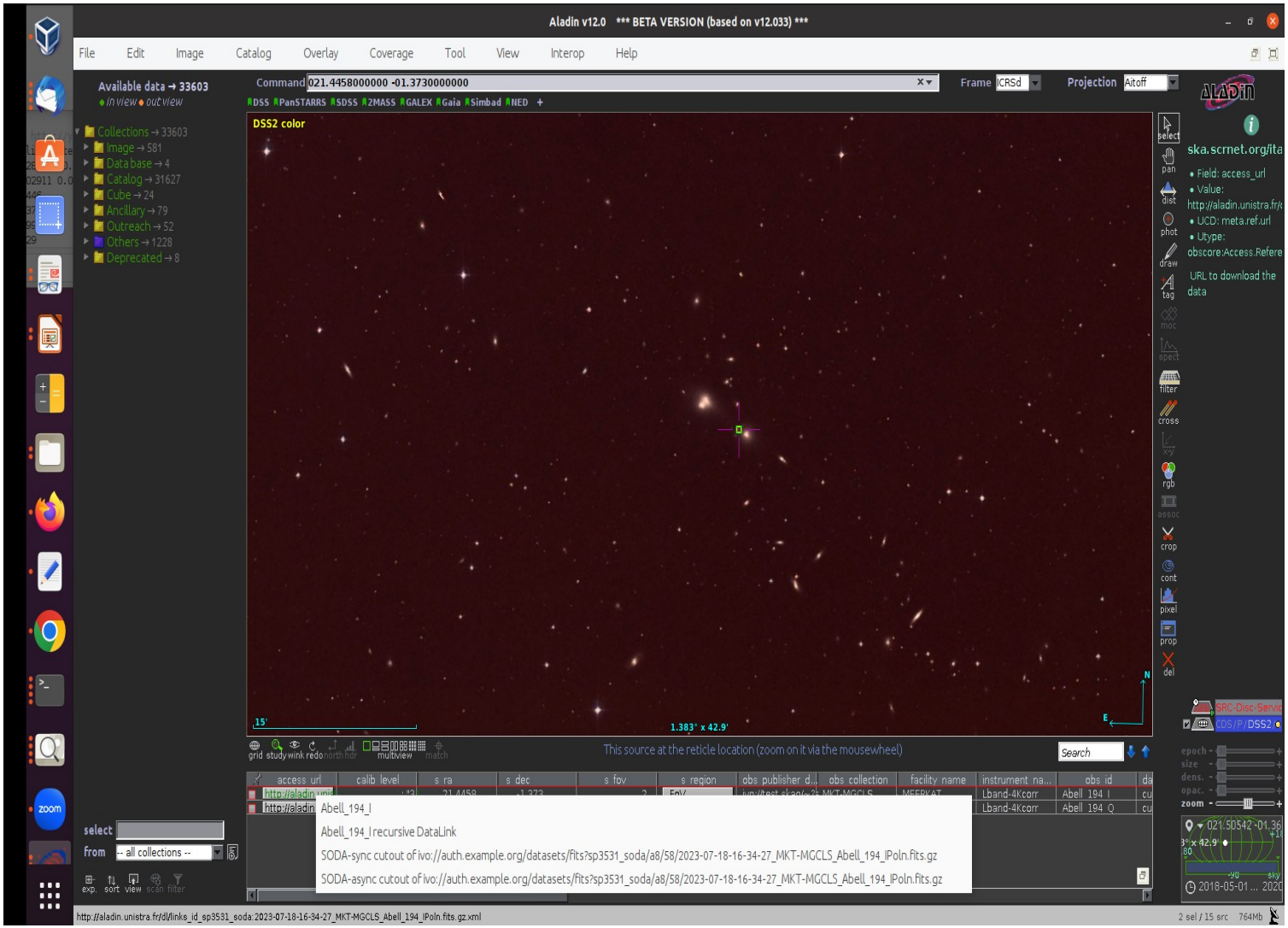


AladinLite –
M51 LOFAR cutout image overlayed on top of DSS



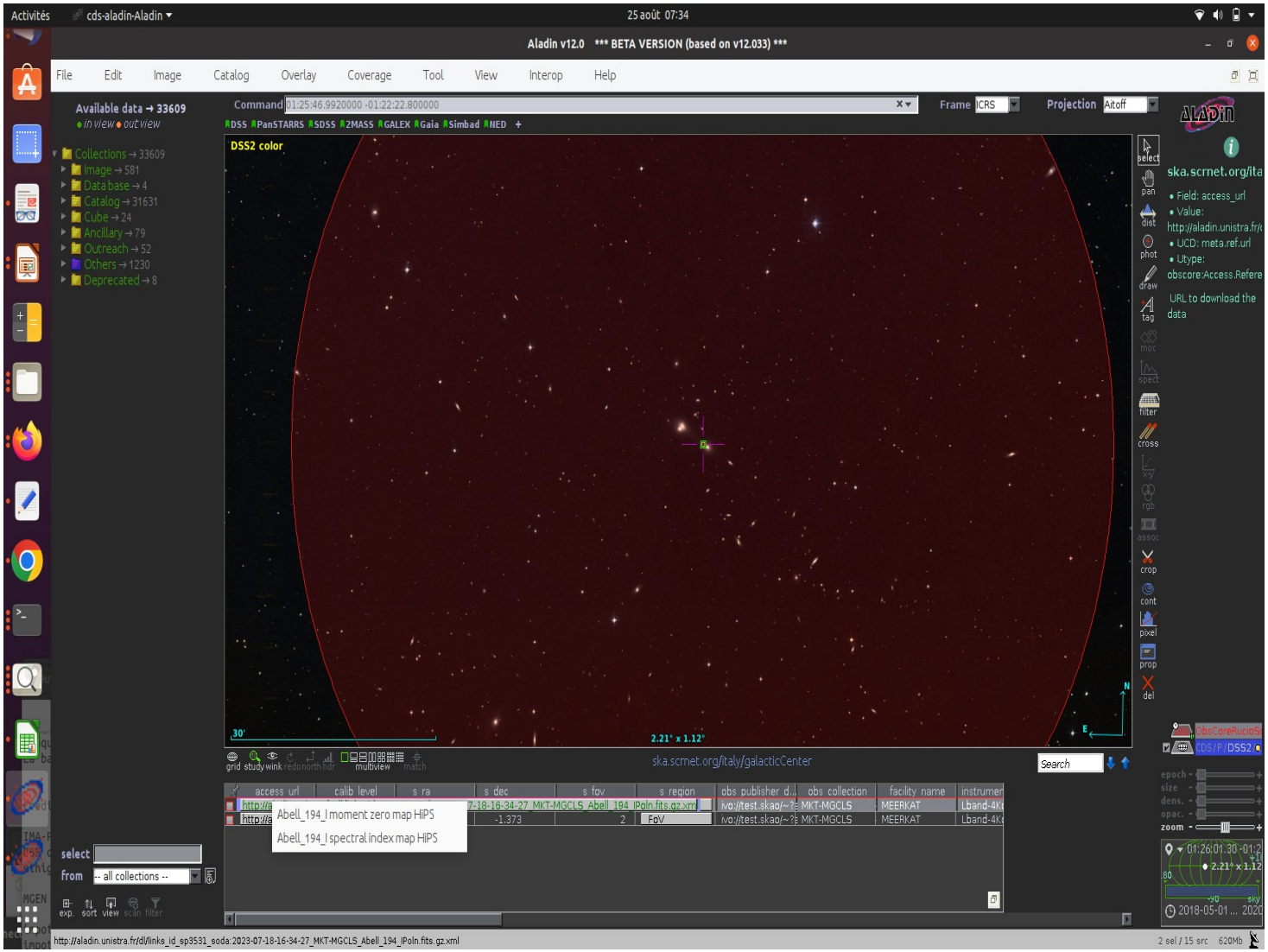
Abell 194 datasets discovery

(see recursive DataLink link)

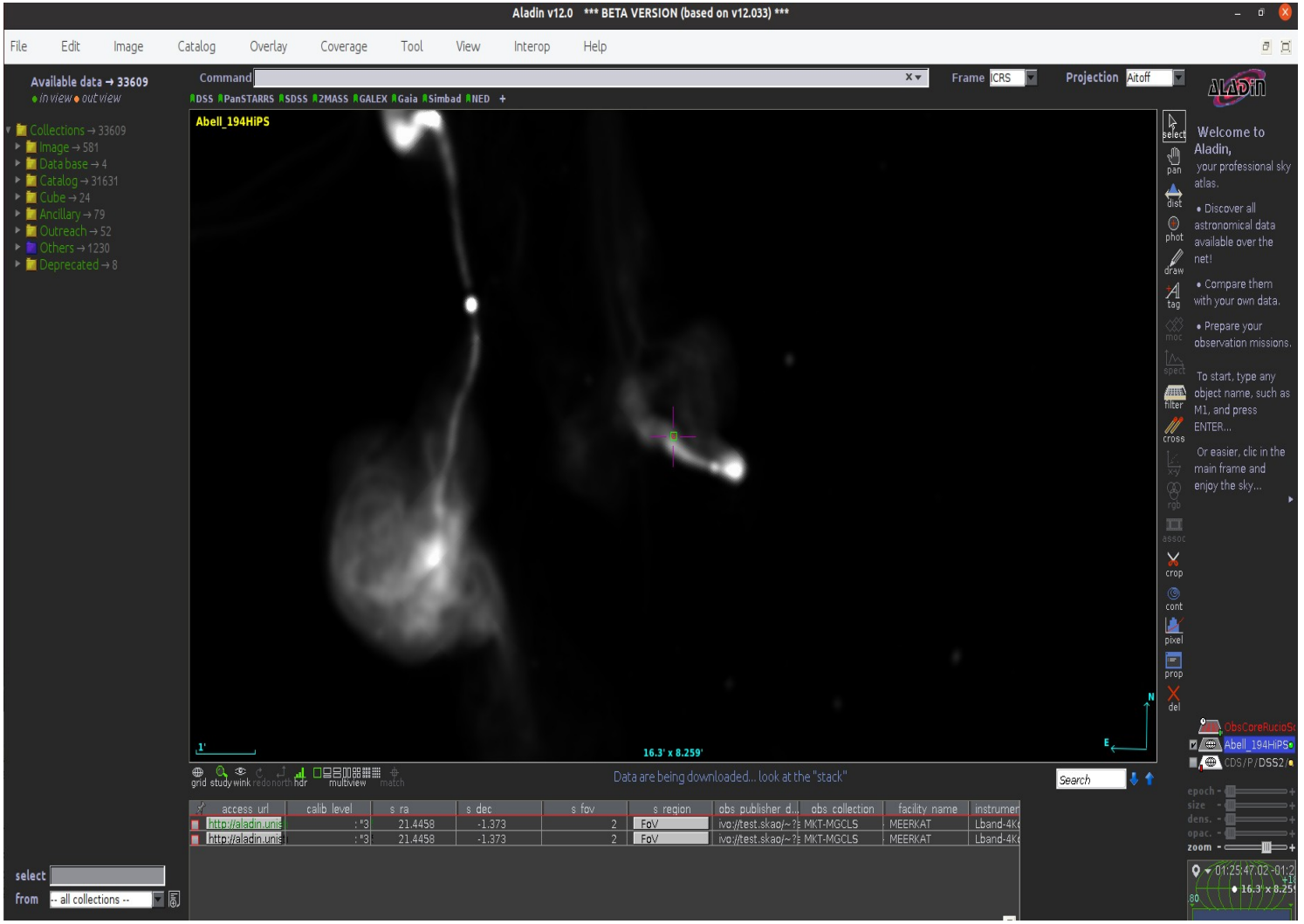


Abell 194 recursive DataLink

(moment 0 and spectral index HiPS links)



Abell 194 moment 0 HiPS



Abell 194 spectral index HiPS