OSCARS
Open Science Clusters' Action for Research & Society

# Astro-CC Pilot

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## Implemented by

CDS cnrs | INAF Istituto Nazionale di Astrofisica National Institute for Astrophysics | INTA | Universität Heidelberg Zukunft seit 1386 | Observatoire de Paris

Funded by the European Union

OSCARS | Astro-CC

***"Astronomy Open Science Competence Centre – pilot project"***

- OSCARS project Cascading Grant
- 2 yrs, April 2025 – March 2027
- University of Heidelberg, INAF Obs. Trieste, INTA Spain, Obs. Paris.
- 5 partners – 5 events

# Astro-CC and EOSC (European Open Science Cloud)

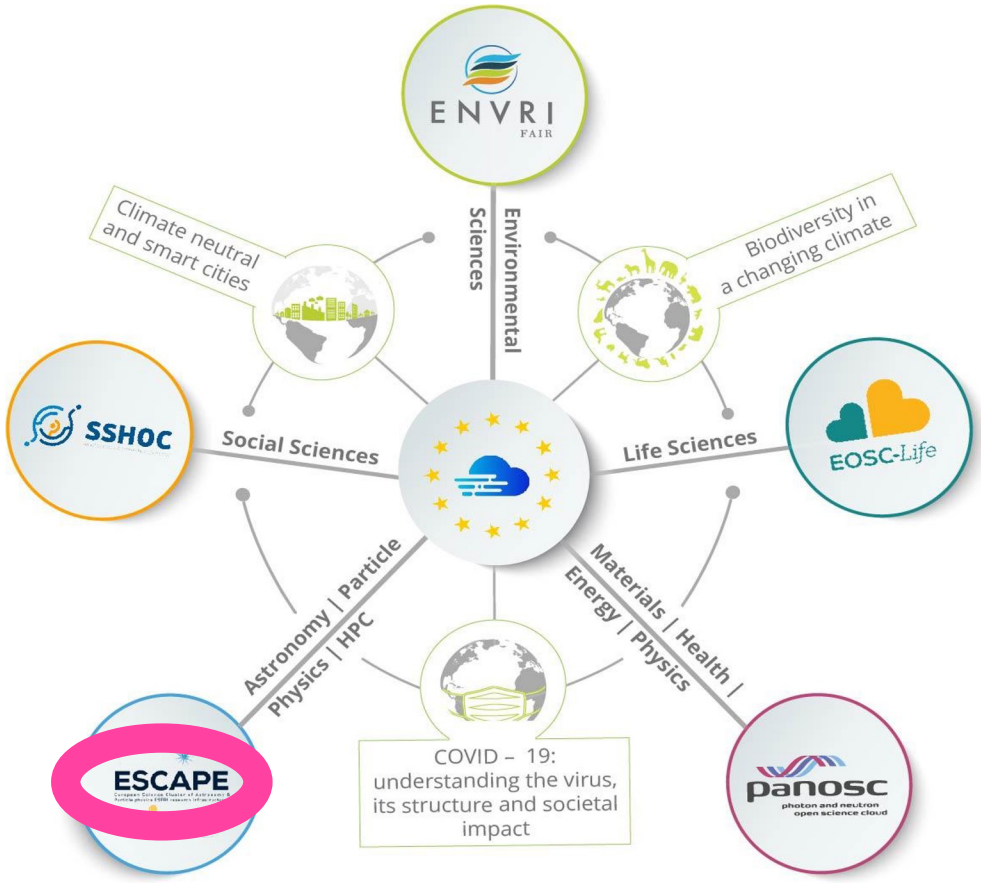
## Connected to Science Cluster: ESCAPE

(**E**uropean **S**cience **C**luster of **A**stronomy & **P**article physics **E**SFRI research infrastructure. 2019-2023

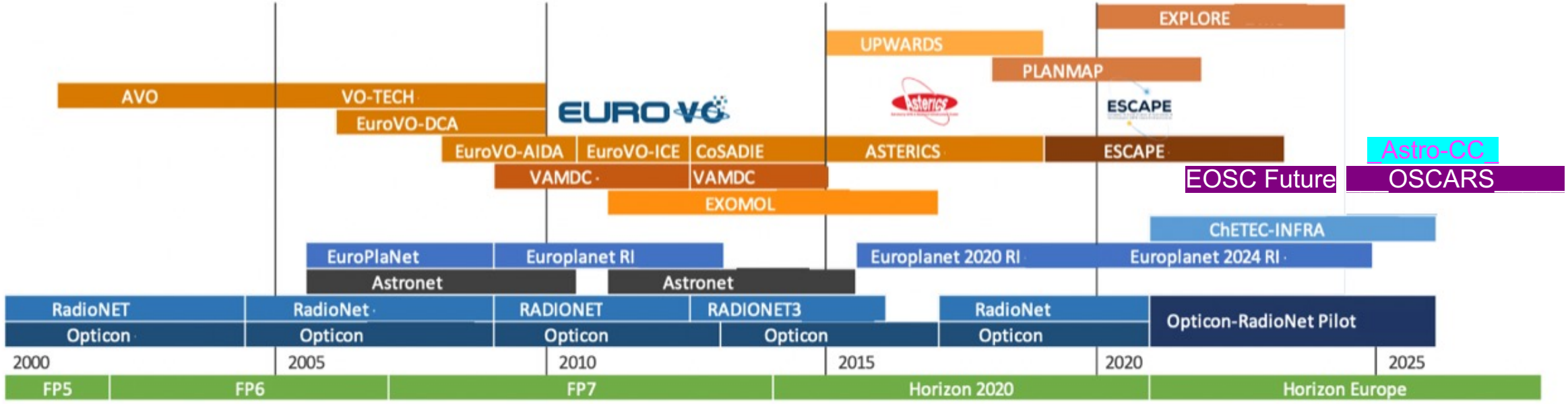
## Astro-CC Pilot project

**Lets us map out and test what is needed for a «Competence Centre**

→ A voice in EOSC development of EOSC.



# Euro-VO projects and other *'networks'* timeline




_Astro-CC_

EOSC Future _OSCARS_

# EOSC as a key enabler of Europe's research and digital strategies

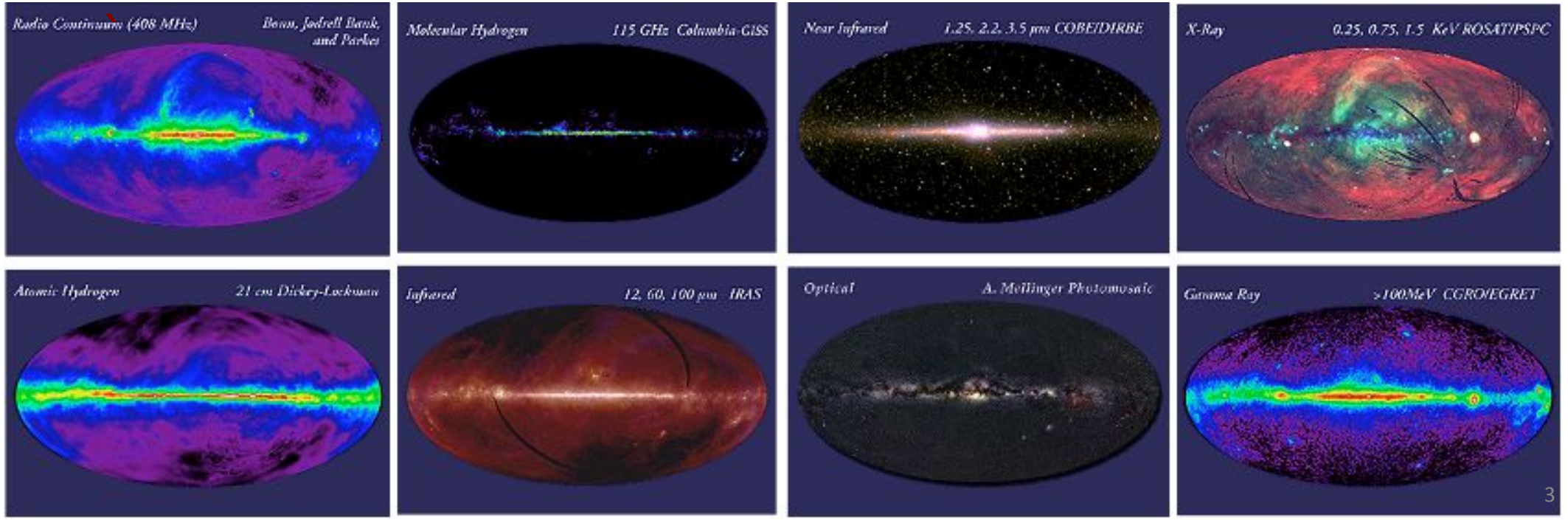
EOSC anchored in key EU strategies adopted over the past year

- **European Research Area Policy Agenda 2025-2027**
  - Structural policy on 'enabling open science via sharing and re-use of data, including through the European Open Science Cloud'
- **European Strategy on Research & Technology Infrastructures**
  - EOSC to support maximising the potential of digitalisation and AI for infrastructures
- **European Strategy for AI in science**
  - EOSC to support uptake of AI in science by pooling AI-ready data and linking with AI Factories

# What Is The Virtual Observatory?

"A multi-wavelength digital sky that can be searched, visualized, and analyzed in new and innovative ways."

*- Pepi Fabbiano*



# A visual example of FAIR data in the VO

## NGC 4039 - an interacting galaxy

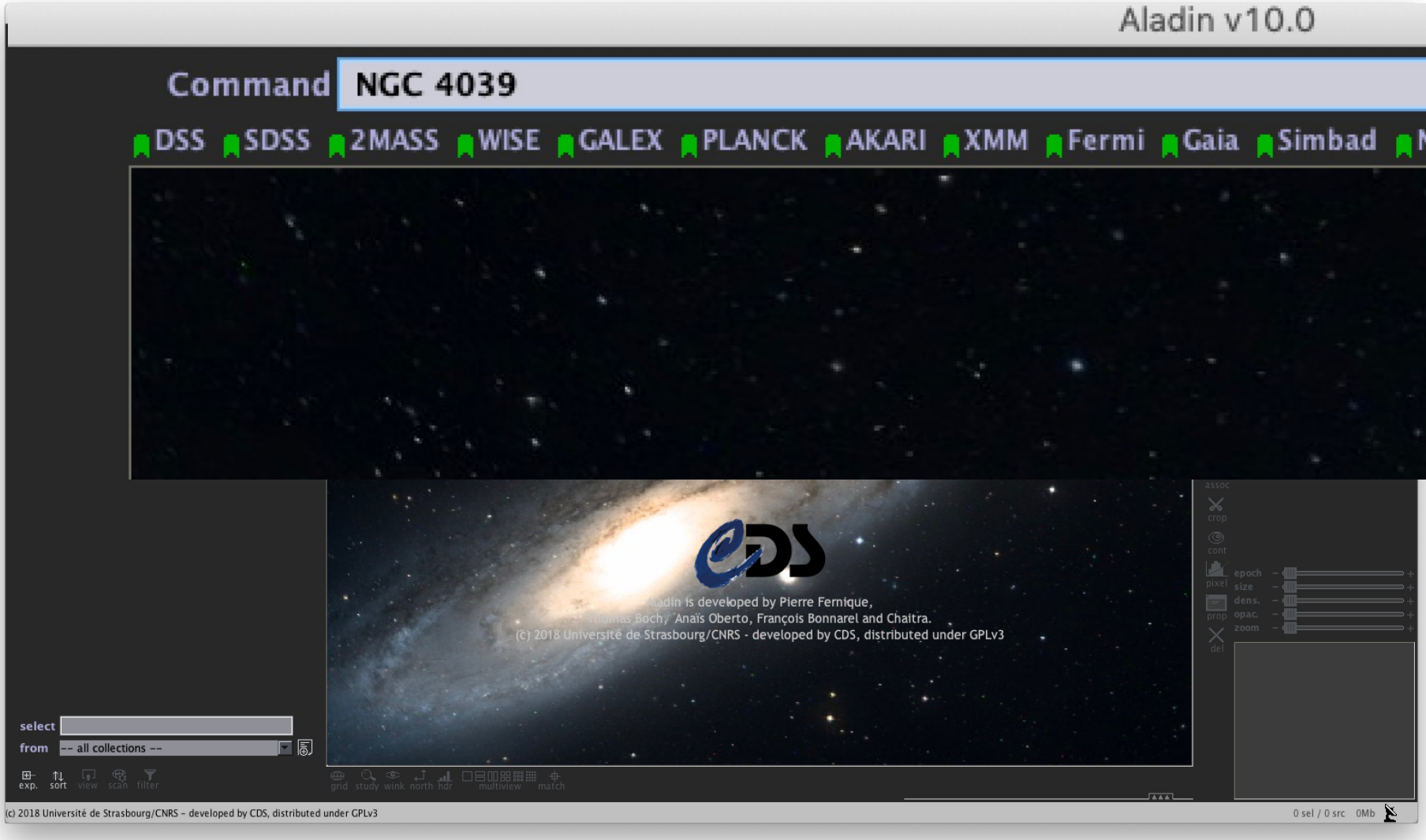
**F**ind the data available

**A**ccess the data

**I**nteroperable use of the data with other data

**R**e-use the data

# Findable


Aladin v10.0
Command
NGC 4039
DSS
SDSS
2MASS
WISE
GALEX
PLANCK
AKARI
XMM
Fermi
Gaia
Simbad
NED
+
Aladin is developed by Pierre Fernique,
Thomas Boch, Anaïs Oberto, François Bonnarel and Chaitra.
(c) 2018 Université de Strasbourg/CNRS - developed by CDS, distributed under GPLv3
select
from
-- all collections --
exp.
sort
view
scan
filter
grid
study
wink
north
hdr
multiview
match
assoc
crop
cont
pixel
prop
del
epoch
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dens.
opac.
zoom
(c) 2018 Université de Strasbourg/CNRS - developed by CDS, distributed under GPLv3
0 sel / 0 src
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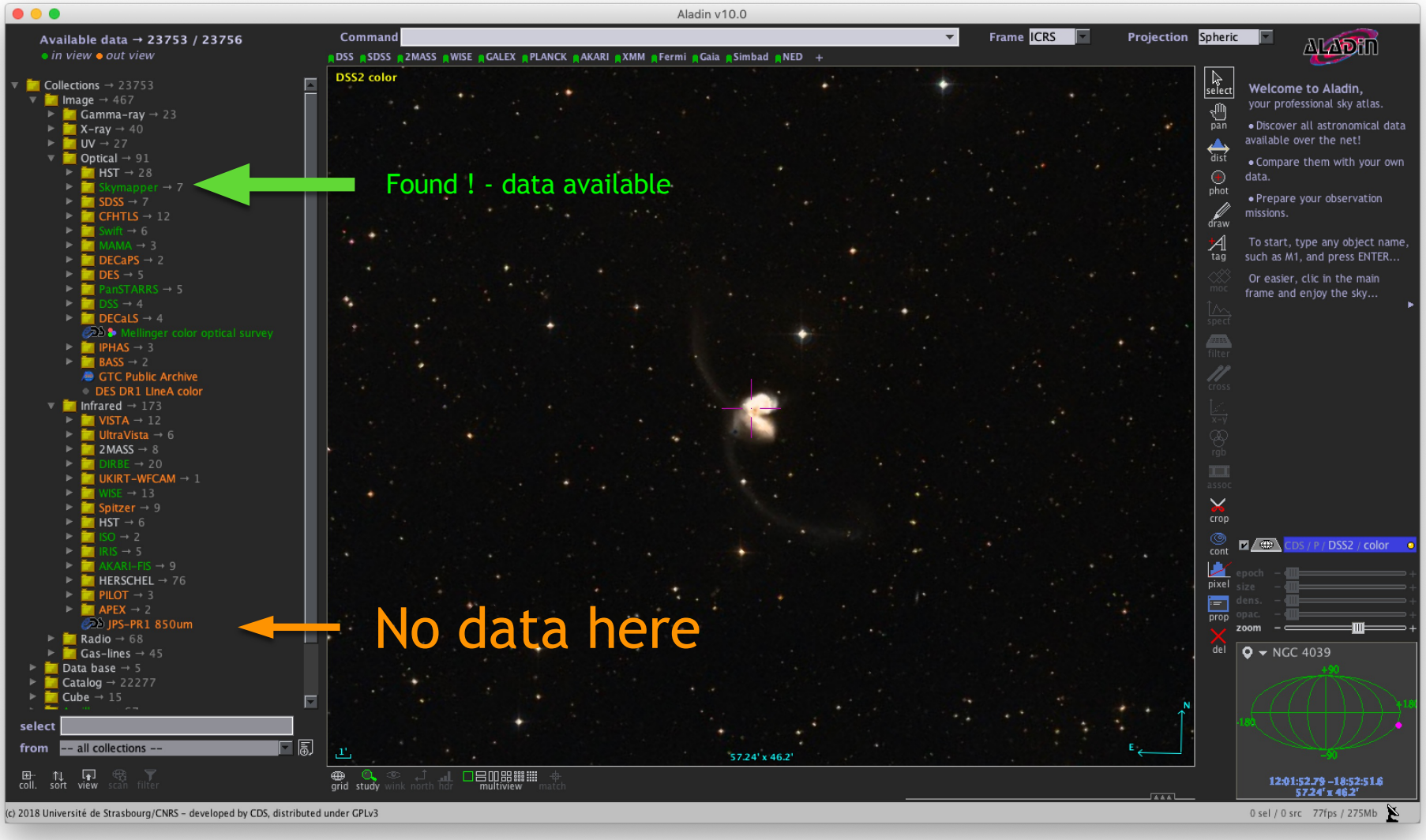
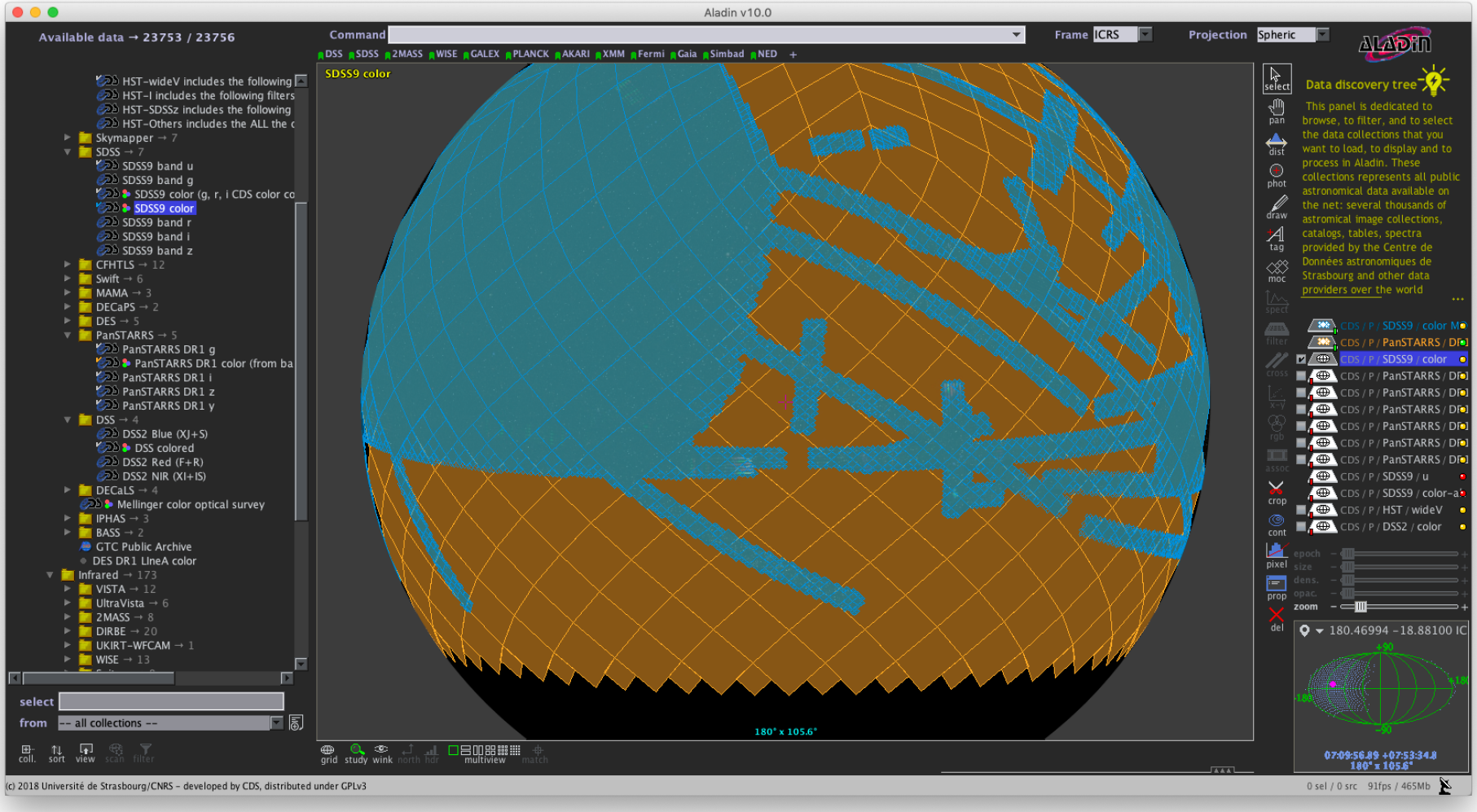
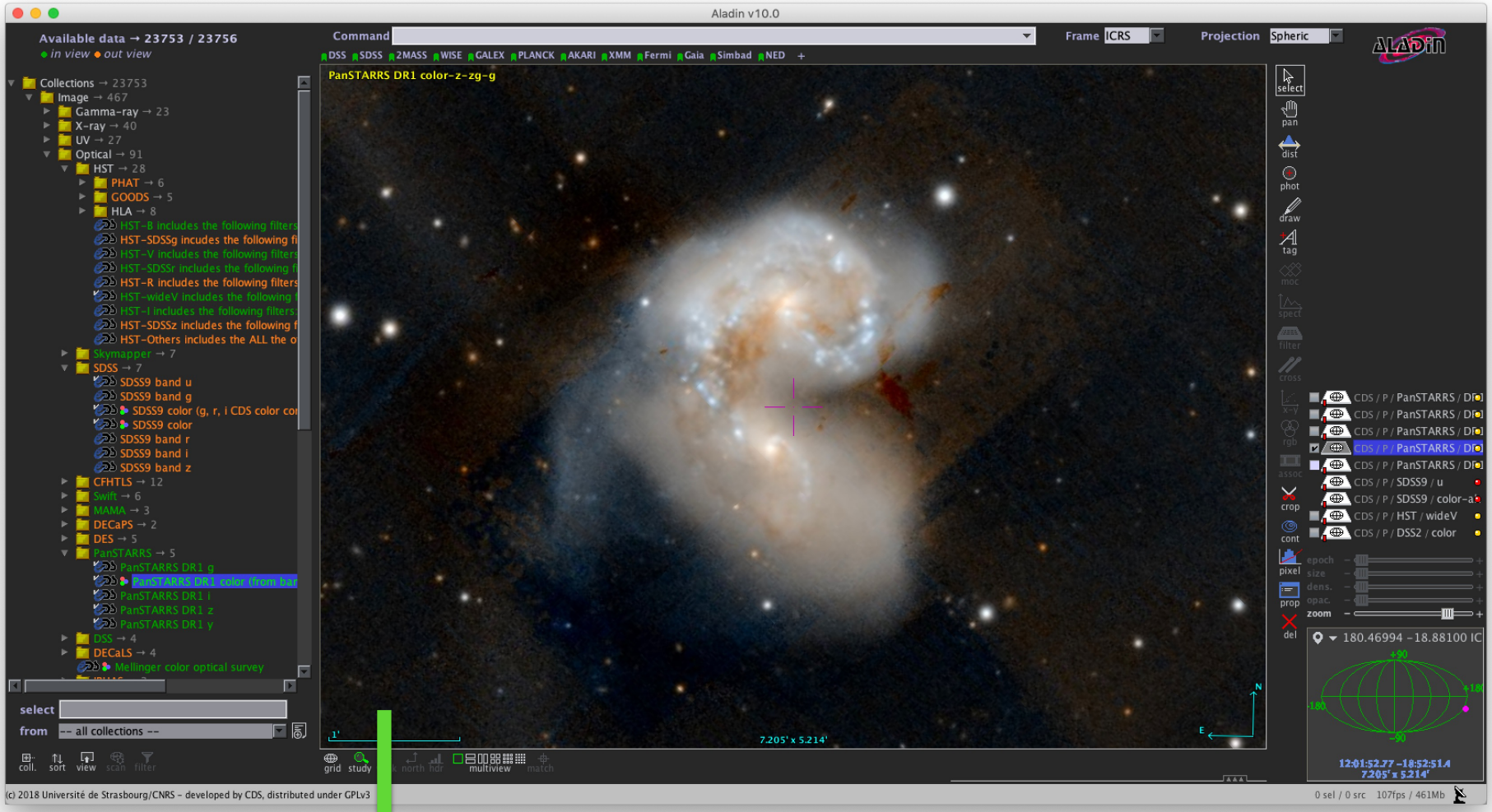

Aladin v10.0
Found ! - data available
No data here
DSS2 color
Welcome to Aladin,
your professional sky atlas.
• Discover all astronomical data available over the net!
• Compare them with your own data.
• Prepare your observation missions.
To start, type any object name, such as M1, and press ENTER...
Or easier, clic in the main frame and enjoy the sky...
(c) 2018 Université de Strasbourg/CNRS – developed by CDS, distributed under GPLv3

# …based on standardised indexing of the sky

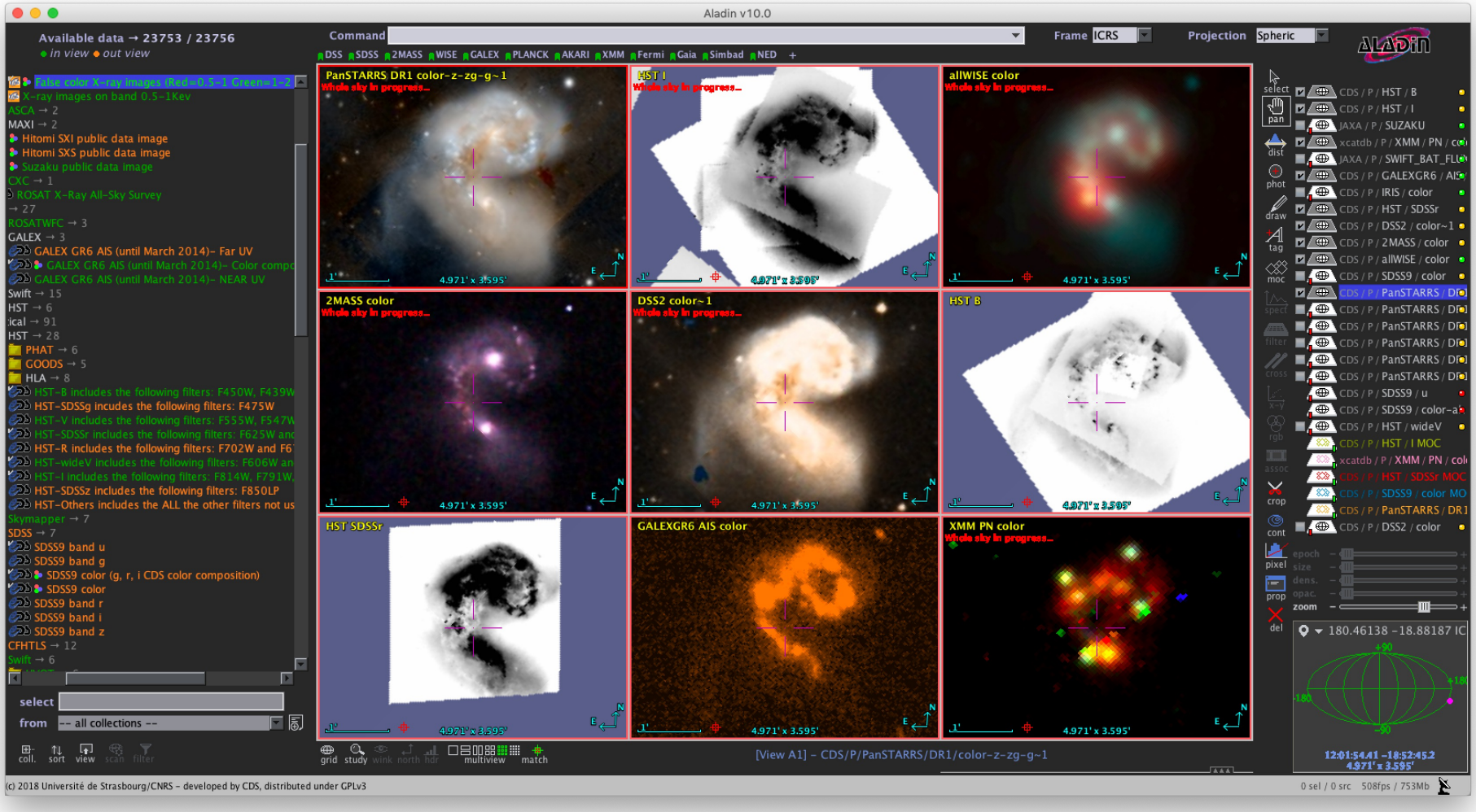


# Accessible




Download in science/visualisation formats

# Interoperable



# Reusable

## Services for extracting :cut-outs of the data for re-use

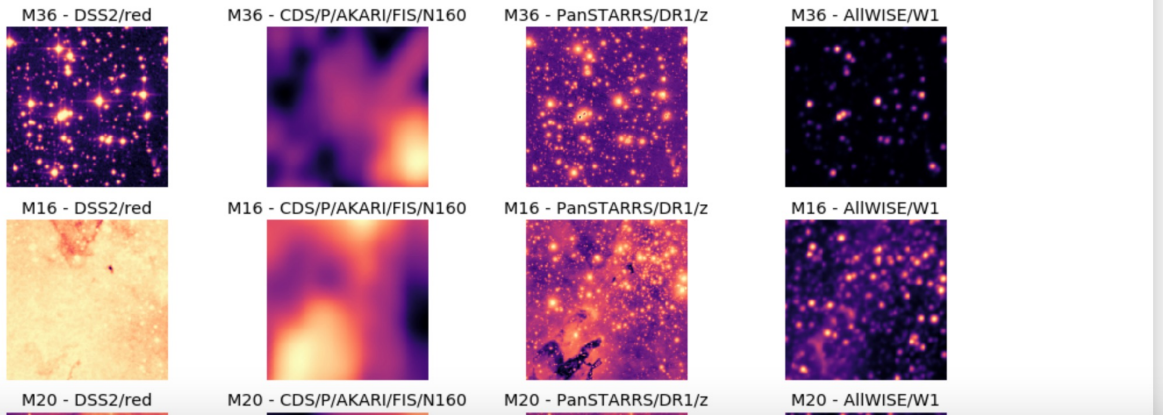
- Cut-ou

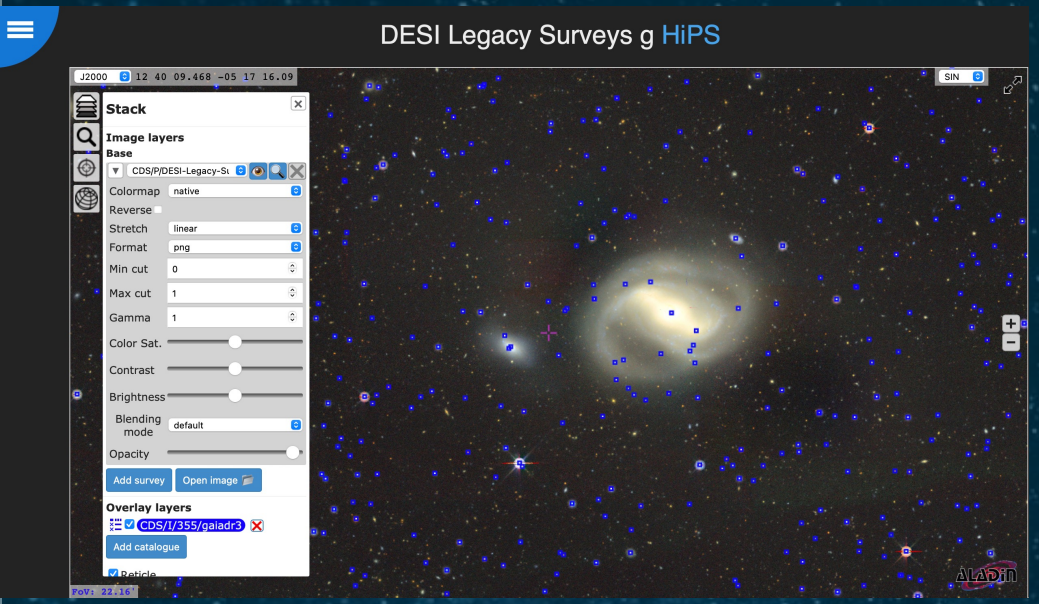
jupyter hips2fits (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3

Run Code

```
i = 0
for obj in objects:
    for hips in hips_list:
        axs[i].set_axis_off()

        axs[i].set_title('{} - {}'.format(obj, hips))
        sc = SkyCoord.from_name(obj)
        ra = sc.icrs.ra.deg
        dec = sc.icrs.dec.deg
        url = 'http://alasky.u-strasbg.fr/hips-image-services/hips2fits?hips={}&width={}&height={}&fov={}&projection=TA

        hdu = fits.open(url)

        hdu.writeto('{}-{}.fits'.format(obj, hips.replace('/', '_')), overwrite=True)
        im = hdu[0].data
        norm = ImageNormalize(im, interval=MinMaxInterval(),
                              stretch=AsinhStretch())
        axs[i].imshow(im, cmap='magma', norm=norm, origin='lower')

        i += 1
```

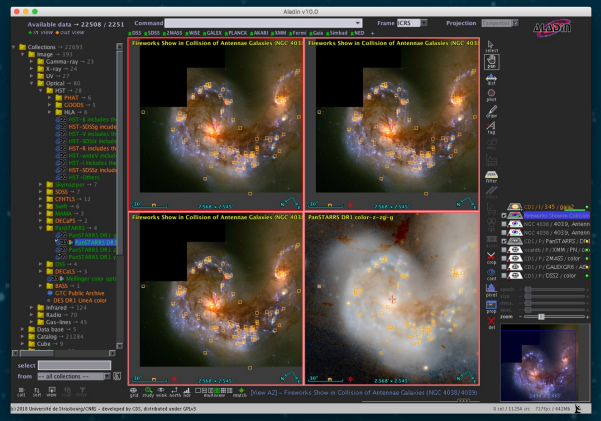


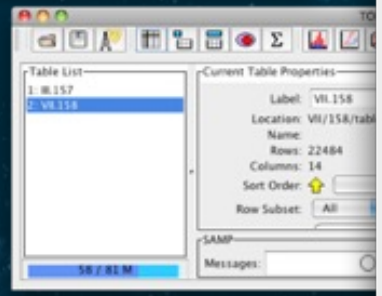


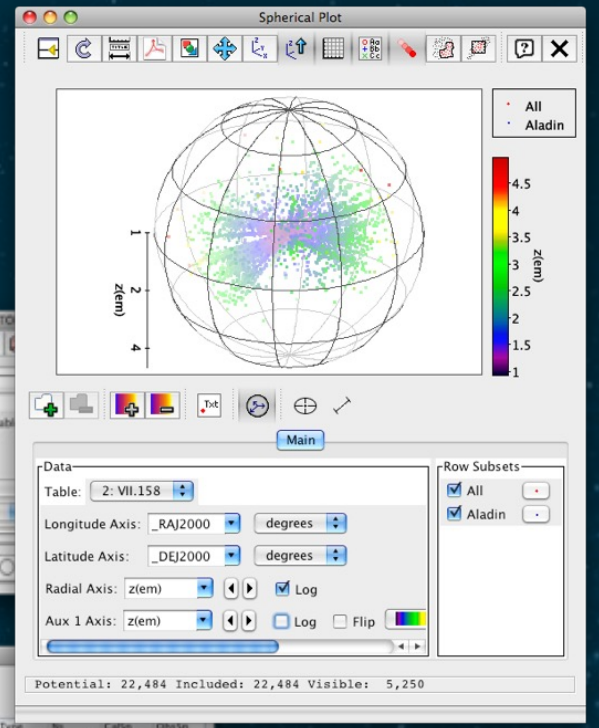

Access to PB-scale all-sky data

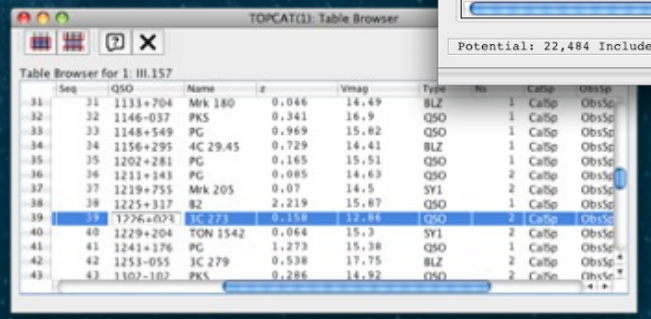
```
In [ ]:
from ipyaladin import Aladin
a = Aladin(target='18 55 24.508 +04 29 46.72', survey='P/Mellinger/color', fov=180)
a

In [ ]:
a.add_moc_from_URL('http://alasky.u-strasbg.fr/footprints/tables/vizier/V_139_gls2/MOC', {'opacity': 0.4, 'color':

In [ ]:
a.survey = 'P/GALEXGR6/AIS/color';a.target = 'M101';a.fov = 0.3

In [ ]:
nloadTable&outputFormat=vot&filename=vizier_M101_II_328_allwise_20190322', {'color': 'red', 'onClick': 'showTable'})
```

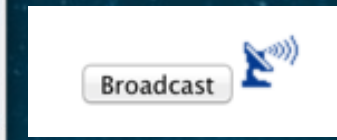
# VO interoperability –








**Virtual Research Environment of:**
**Services, apps, notebooks, platforms, APIs, …**

# EOSC EU Node


~ 4000 users

**Services to researchers**

- Manage research workflows
- Collaborate with Peers
- Discover research products

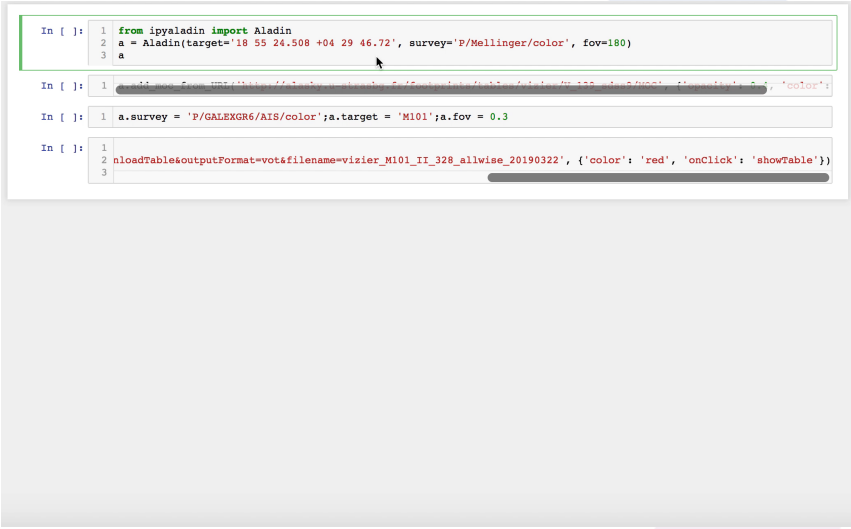
Provision of **federating capabilities**

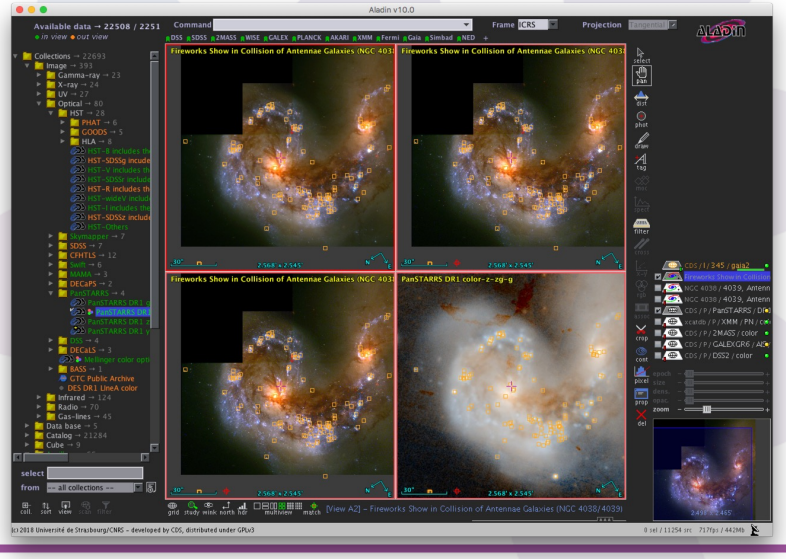
- Authentication & Authorisation
- Catalogues, registry services
- Monitoring, accounting (‘credits’)
- Helpdesk
- …

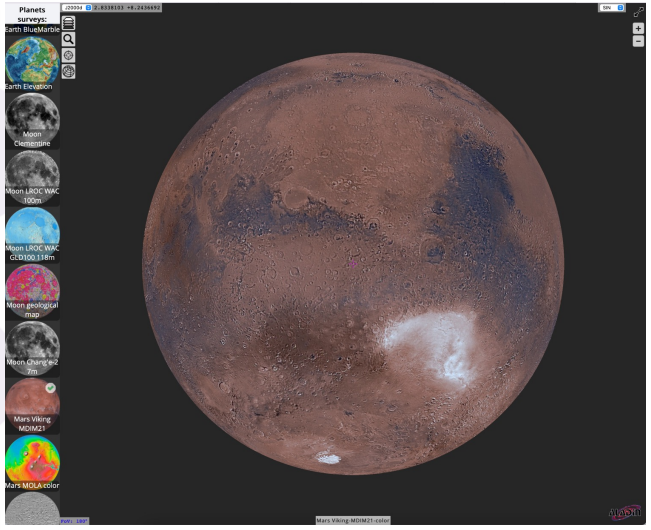
# CHALLENGE ADDRESSED

## What problem(s) are you going to solve?

- Accelerating Open Science in Astronomy by use of standards.
- Widening the scope beyond the ESCAPE partners to include planetary science and space weather.



## What are you planning to do to solve the problem?

- Organising Astronomy Open Science **“Competence Centre events”**

- The planned events are:
- **Data Provider Forum** – to share experience on implementing interoperability.
- **2 Technology Forums** – for the cooperation and development of the underlying data sharing frameworks.
- **2 Scientific Training events** – Ph.D and ECRs to exploit the system for their scientific research

## What will be the results and how do you plan to make them available to the broader community?

- **Data providers** (ESFRI, RIs, projects) gain skills in the implementation of interoperability standards and tools.
- **Developers** of services cooperate on the use of standards and tools.
- **Ph.D & ECR** are supported for use of new innovative services for their own research.

- European results taken to international level at International Virtual Observatory Alliance (IVOA).
- Visibility at European Astronomical Society conferences.