

The Euclid Archive an overview

Héctor Cánovas Cabrera[1]
(+ Bruno A., Jos de B., Daniela C., and the ESDC Survey team

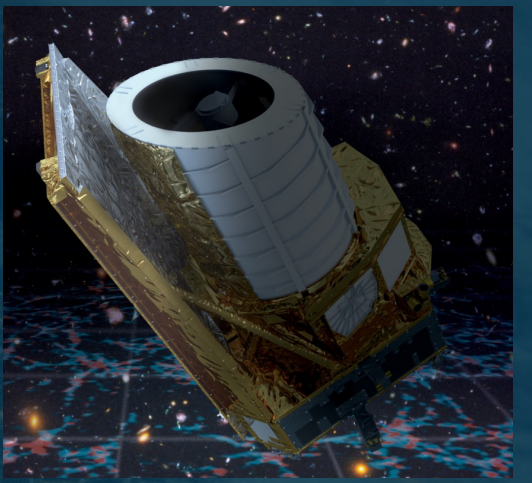
[1]Telespazio UK S.L. for ESA/ESAC

2026-03-11

ESA UNCLASSIFIED – Releasable to the Public

Euclid: What?

- ESA led-mission with contributions from NASA – Core science: **Cosmology**
- Science operations: 6 yr
- Euclid Consortium: >2,000 scientists (~300 institutes across Europe + USA, Canada, Japan).
- 1.2-m-diameter telescope:
  - VIS: the visible-wavelength camera
  - NISP: the Near-Infrared Spectrometer and Photometer.



- 2023-07-01: Launch >> L2 point.
- 2024-02-14: Start of the nominal survey
- 2024-05-23: Early Release Observations (ERO – 1 day of “not-survey” observations)
- 2025-03-19: Quick Data Release 1 (Q1): one pass on each of the three Euclid deep fields (North, South, and Fornax) + data on Lynds Dark Nebula LDN1641 (Orion SFR)
- 2026-06-24: Quick Data Release 2 (Q2): ~1 day of Galactic Centre Bulge Survey (exoplanets / microlensing)
- 2026-10-21: Data Release 1 (DR1)

Euclid: Why?

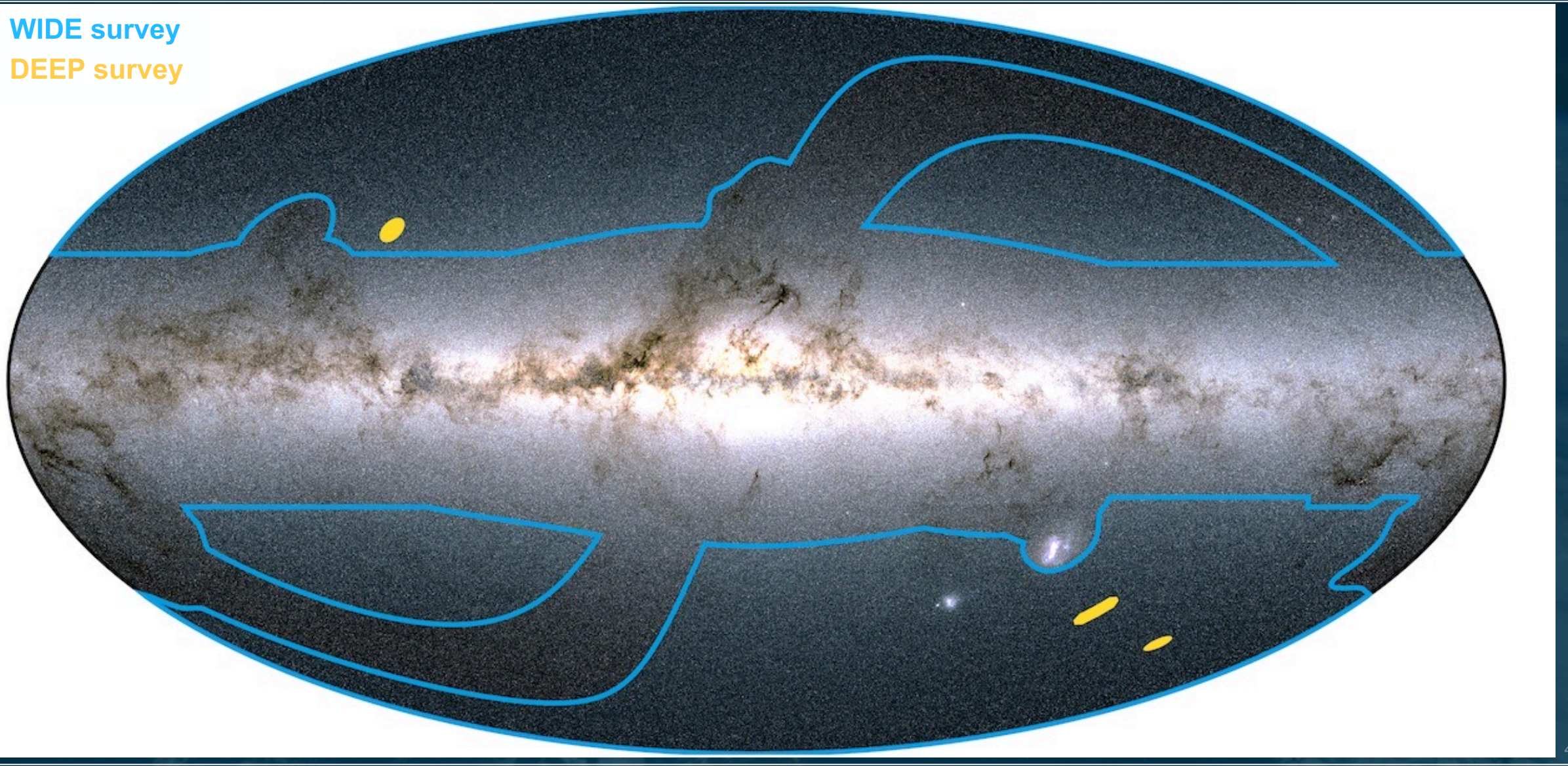
- 1. What is the structure and history of the cosmic web?
- 2. What is the nature of dark matter?
- 3. How has the expansion of the Universe changed over time?
- 4. What is the nature of dark energy?
- 5. Is our understanding of gravity complete?

Legacy science:

- Solar system bodies
- Exoplanets via microlensing
- Time-domain science at various redshifts (e.g. supernovaes)
- Ultra cool dwarf stars (and brown dwarfs)
- … your topic here!

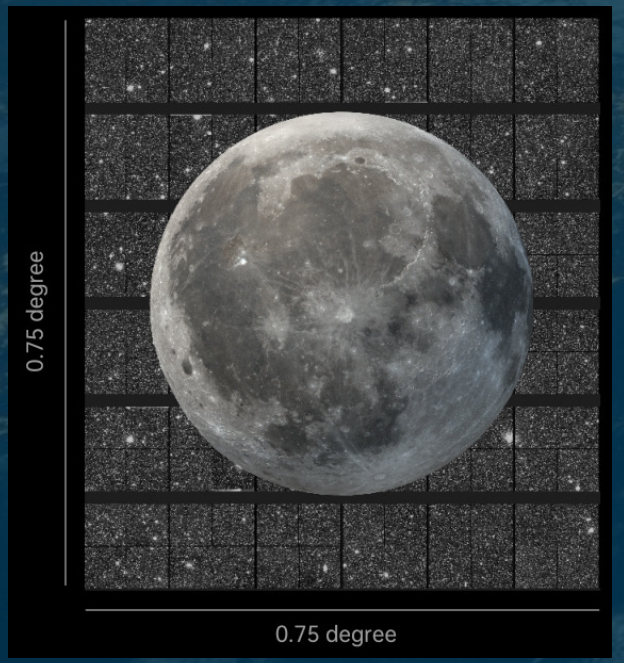
Euclid: How?

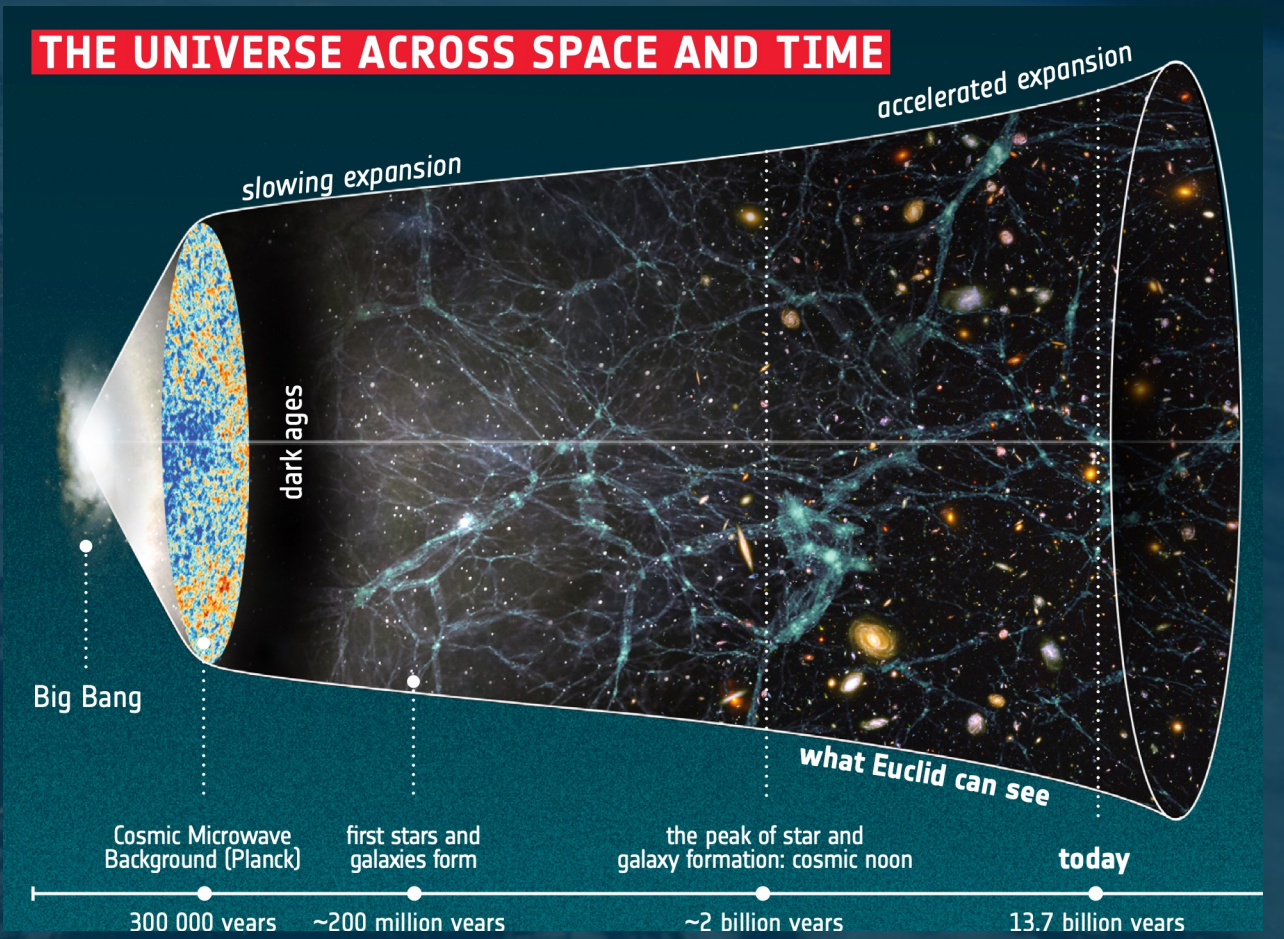
- WIDE survey
- DEEP survey



Euclid: How?

- ~ 1/3 of the Sky
- Sharp images (galaxy shapes)
- Spectroscopy (galaxy redshifts)
- Deep images: ~26.2 mag (for point sources)



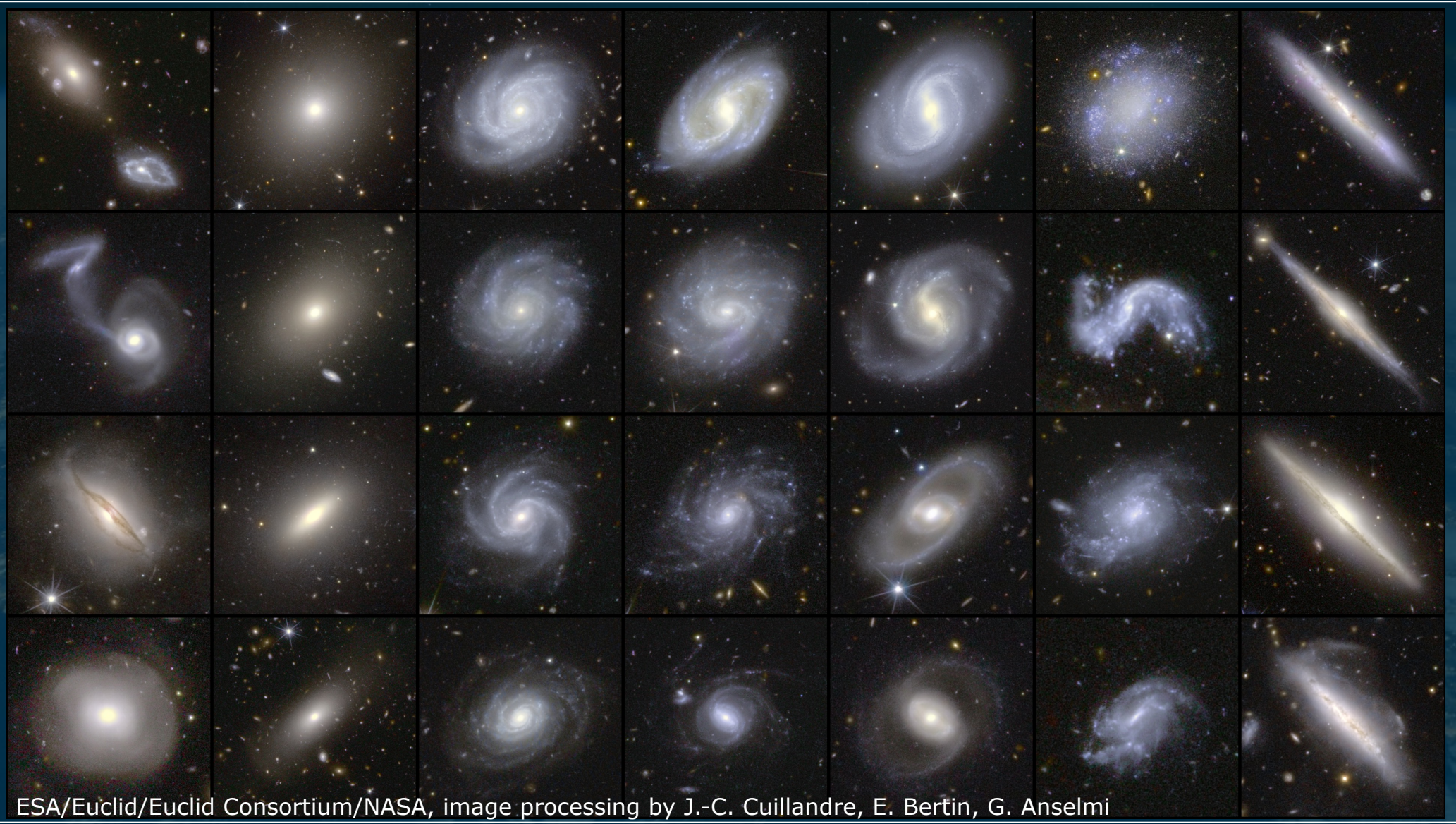


Euclid: How?

- ~ 1/3 of the Sky (WIDE & DEEP surveys)
- Sharp images (galaxy shapes)
- Spectroscopy (galaxy redshifts)
- Deep images: ~26.2 mag (for point sources)

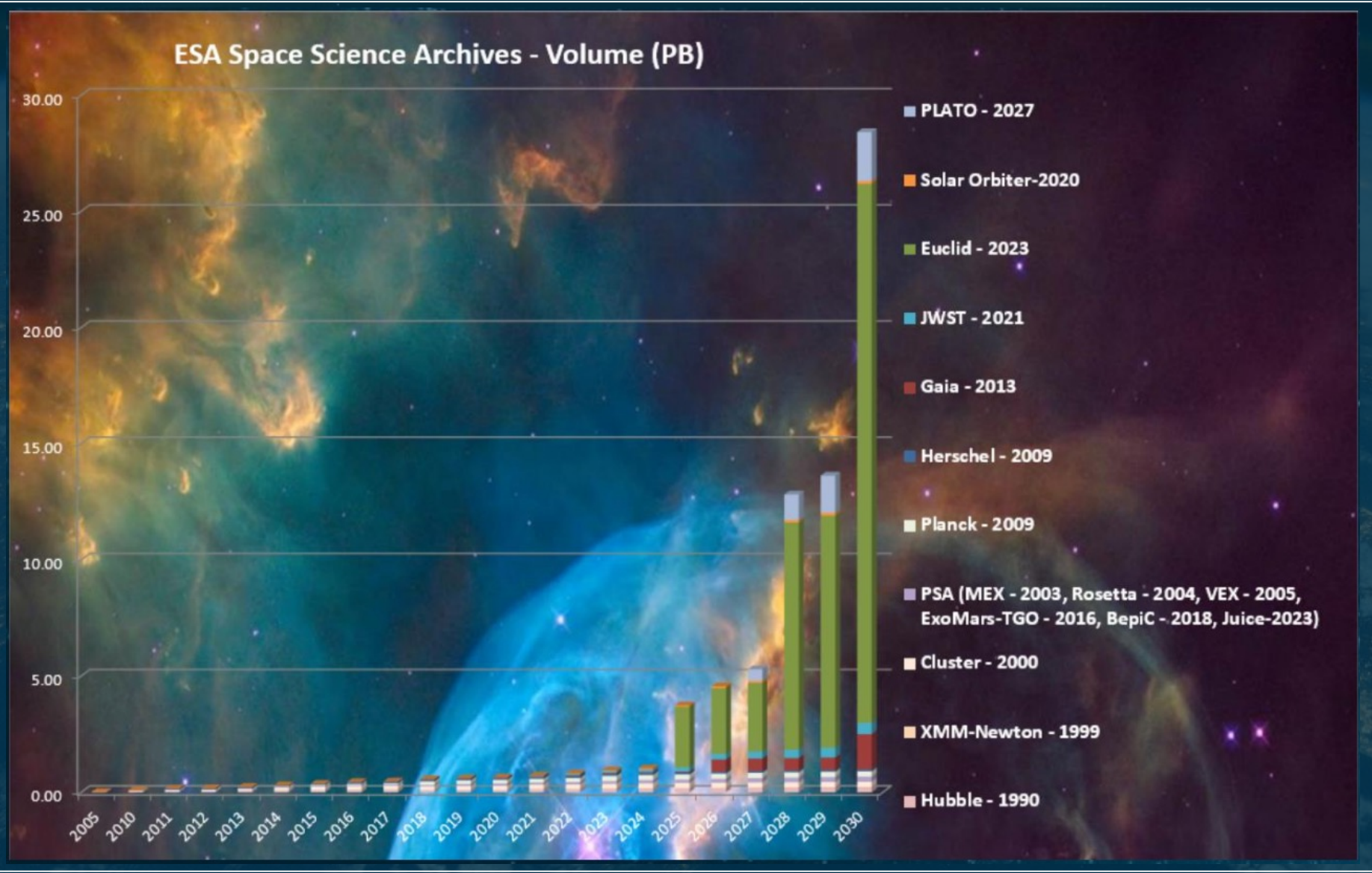
		Euclid	Before Euclid
[1] Deep near-IR imaging: area of sky mapped to 24 mag AB in the near-IR	~13,000	~~>14,500~~ deg^2(~10 deg^2 per day)	13.5 deg^2
[2] Massive galaxy clusters at z>1		~500,000	~1000
[3] High-redshift quasars, z>7		~100	10
[3] High-redshift quasars, z>8		~8	0
[4] Strong gravitational lenses (galaxy scale)		170,000	10,000
[5] High-redshift galaxies (z>6)		~390,000	~400
[6] H-alpha emitters at z>1		~30 million	<10,000
[7] Massive galaxies spectroscopically confirmed at z>1.5		few ×100,000	few × 100

Euclid: How?

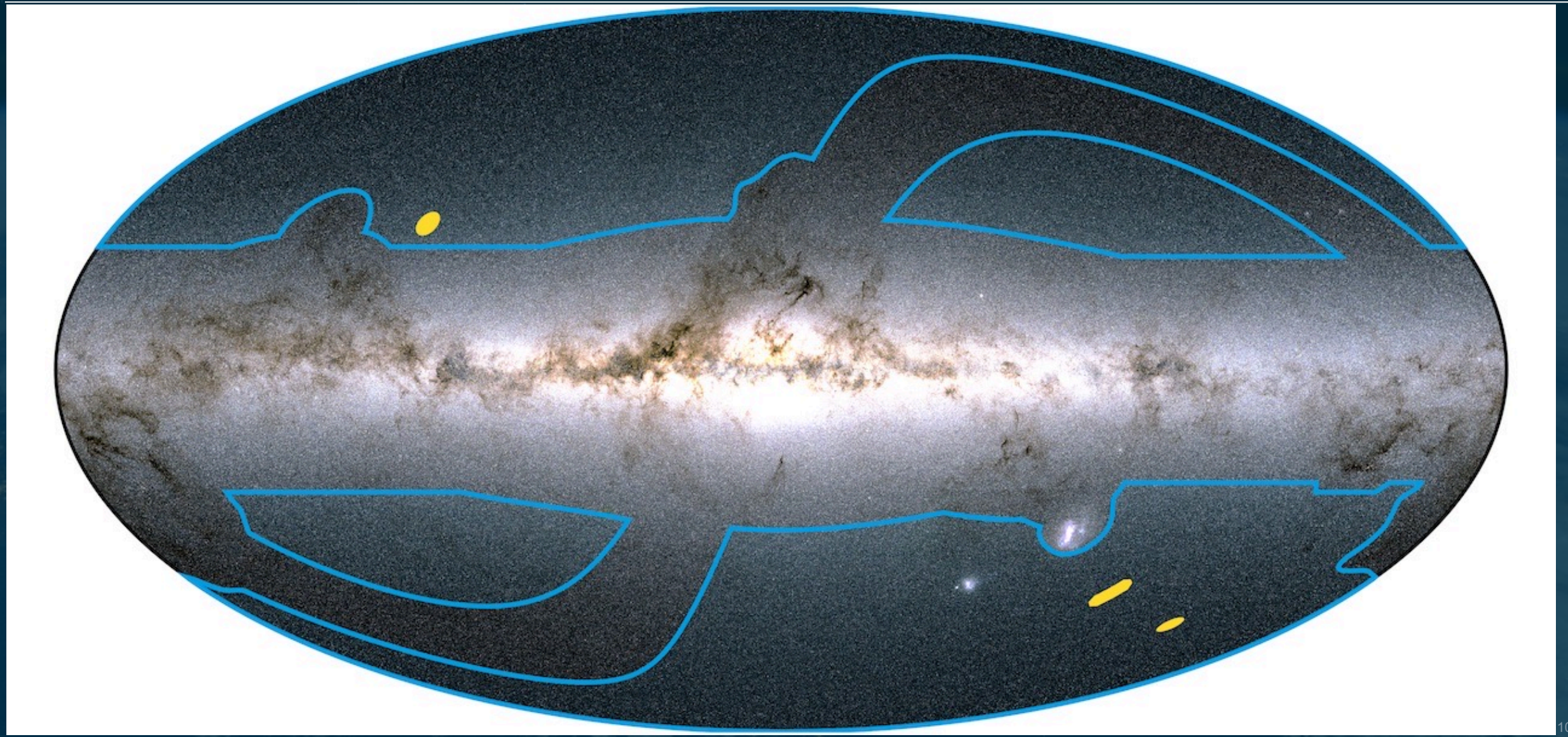


ESA/Euclid/Euclid Consortium/NASA, image processing by J.-C. Cuillandre, E. Bertin, G. Anselmi

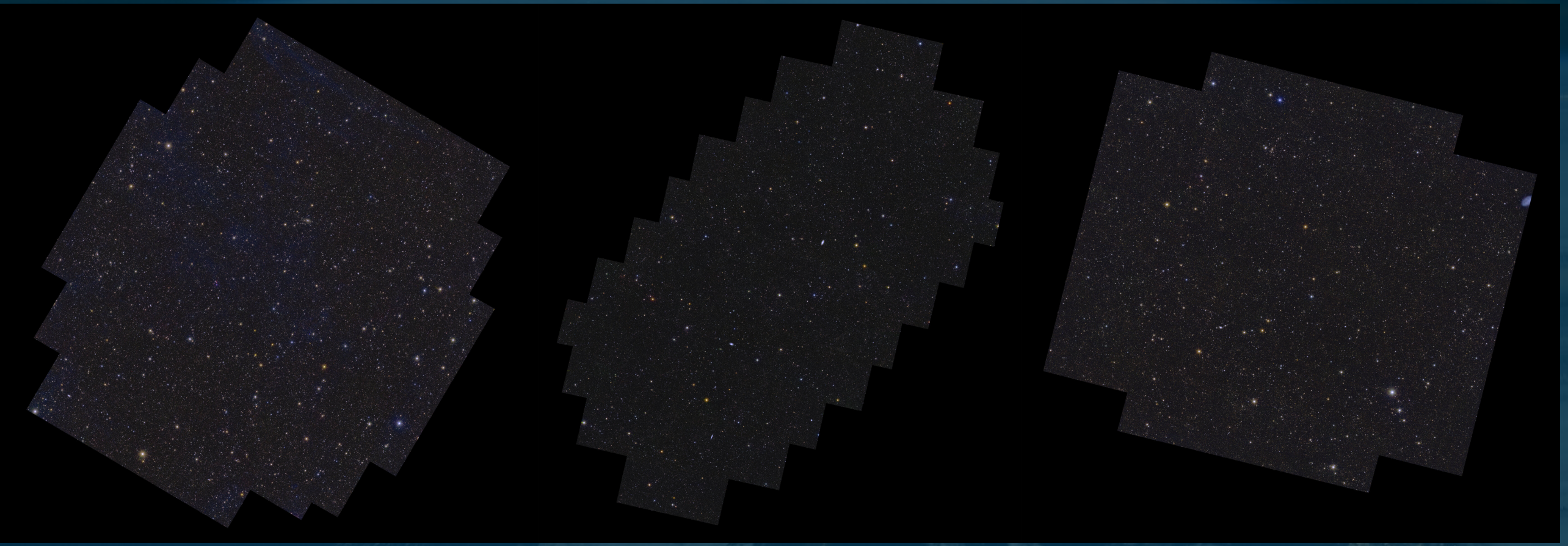
Archiving & Serving Euclid data – A real challenge



Euclid Q1: A single visit of the Euclid Deep Fields



Euclid Q1: A single visit of the Euclid Deep Fields



Euclid Deep Field North
22.9 deg²

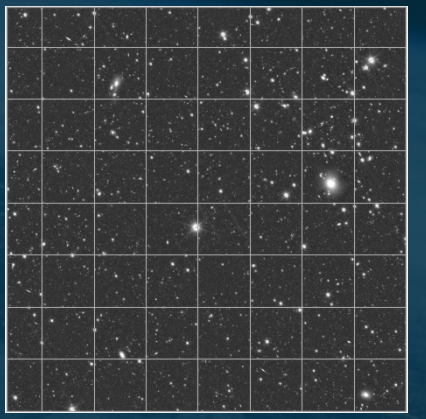
Euclid Deep Field South
28.1 deg²

Euclid Deep Field Fornax
12.1 deg²

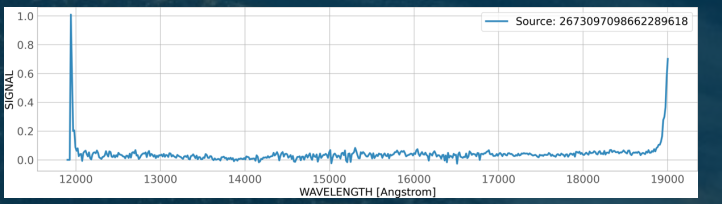
Euclid Q1: A single visit of the Euclid Deep Fields

~ 7 days of observations (~63 deg^2):

- **Images,** auxiliary products, and photometric masks
  - VIS & NISP (YHJ) calibrated frames (individual exposures).
  - MER mosaics (32'x32'):
    - VIS & NISP (YHJ)
    - Ground based ("Euclidised") ugriz
  - LE3 VMPZ



- **Spectra** (red grism: 1200-1900 [nm]): ~ 4.3 M sources

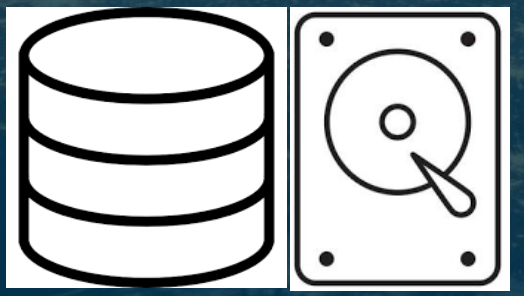


- **Catalogues**: ~30 M sources (including galaxies & QSOs, stars & BDs, and SSO's) x ~470 columns

object_id	right_ascension	declination	segmentation_map_id	segmentation_area	point_like_prob
NA	deg	deg	NA	pix	NA
2648026680670981382	264.80268606943666	67.06613821128079	102159771061215	40	0.0082011452391743466
2648250673670981689	264.82506737383	67.06616899883761	102159771061222	25	0.4075163900852034
2653380218658538261	265.33802182869024	65.85382617218403	102159188022257	23	0.0009129983633818264
2649029347658535028	264.90293471415396	65.85350386317643	102159188022269	51	0.0059066182002425219
2656844234658533232	265.6844234562143	65.85332327876476	102159188022273	138	0.0031175379768246785
2652955774658531990	265.2955774571981	65.85319908278586	102159188022311	35	
2653217876658543912	265.3217875019067	65.85439122682259	102159188022347	55	0.012803394347429276
2657228104658537085	265.7228104617363	65.85370953926297	102159188022353	40	2.085476712901162e-7
2652535844658548878	265.2353584534726	65.85468782110552	102159188022388	349	0.08934585037104
2650470787658545453	265.0470787172814	65.85454531226142	102159188022391	13818	0
2752529349683915698	275.2529349683543624	66.39156983297598	102159491029197	95	0.0001891874708232528
2747681573682808661	274.7681573723405	66.39064123498578	102159491029207	34	0.007864417228261454
2752760662663920875	275.2760662380987	66.39206753610797	102159491029277	19	0.0019220471149310 47
2757264508663915488	275.726450817490 05	66.39154882684655	102159491029283	45	0.0000699960017111152
2751780865663921438	275.17808653258 7	66.3921438153971 8	102159491029297	50	0.0000059308239711395
2751394882663922184	275.1394882185807	66.39221845587804	102159491029323	46	3.8190091800981055e-7
2754498218663924027	275.4498218280448	66.39240273429061	102159491029329	48	0.0005970106578569378
2757627946663914319	275.7627946681504 6	66.39143198957007	102159491029331	671	0.0001790924578636428 2
2722680160662724956	272.2680160328626	66.27249568113885	102159488007329	16	
2713439364662732862	271.3439364569987	66.27328623875763	102159488007332	31	5.8736353558686005e-9
2711022991662728738	271.1022991352006	66.27287382144807	102159488007377	61	0.012652136385440826
2719049667662737865	271.9049667 1311917	66.27378658323636	102159488007379	23	0
2719717766662738867	271.9717766418228	66.2736867 7412546	102159488007423	309	0.0027915048412978 65

The Euclid ESA Archive (basic) structure

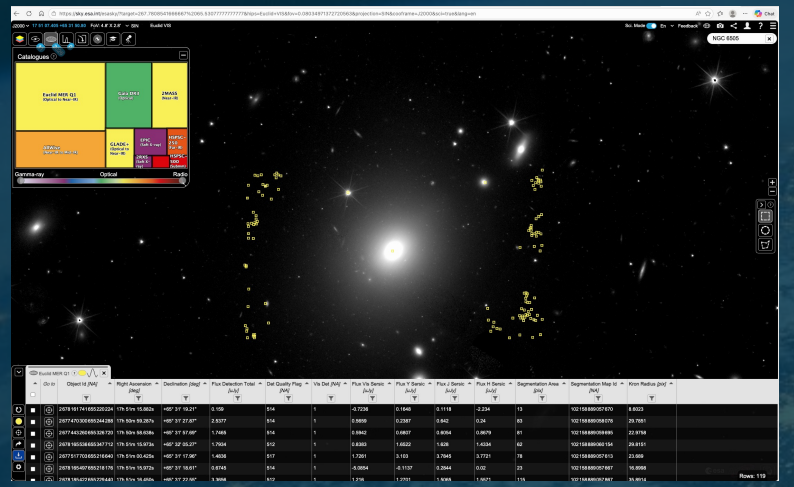
- Catalogues: Greenplum **database** + TAP
- Spectra: Filesystem + DataLink
- Images & Cutouts: Filesystem + SIA



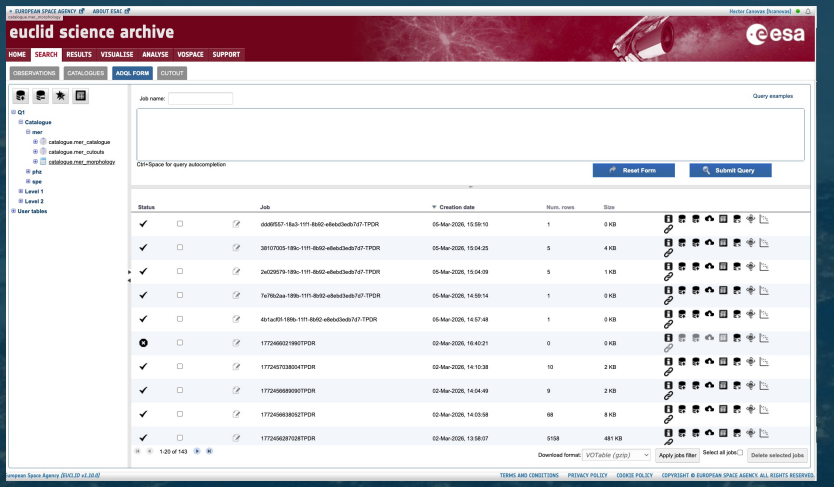
DataLabs: direct access!

The Euclid ESA Archive: multiple interfaces

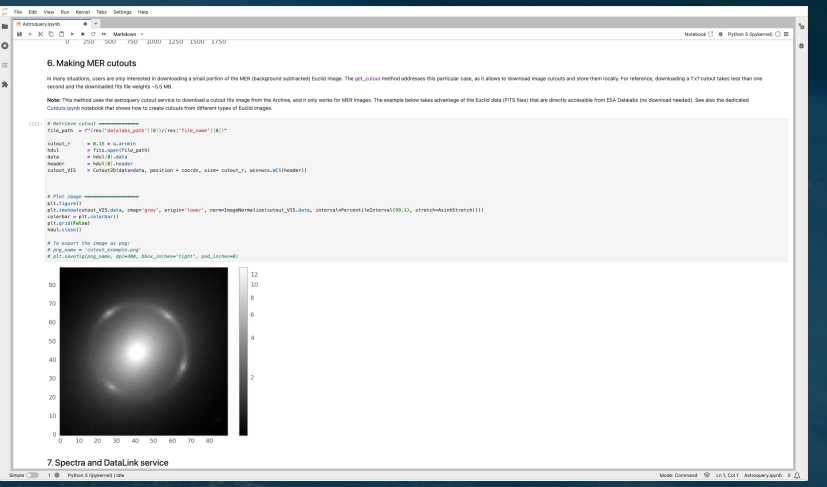
ESASKY



WEB GUI



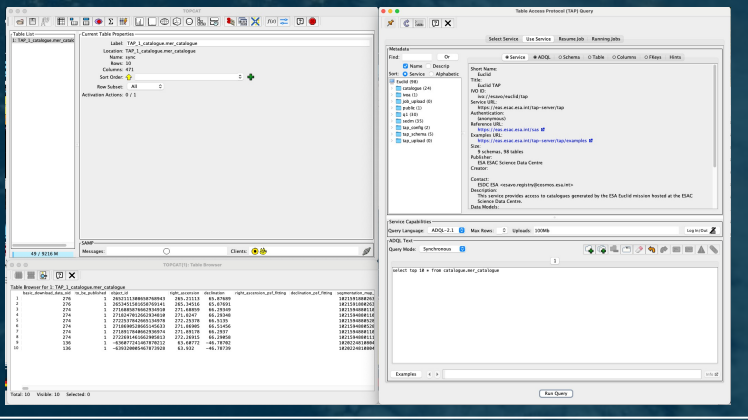
Python / Astroquery



Command line

```
(tutorials_2025) ESAC01113429:programmatic hcanovas$ curl "https://eas.esac.esa.int/sas-dd/data?ID=sedm+267108985263381075 7&RETRIEVAL_TYPE=SPECTRA_RGS" > spectra.fits
```

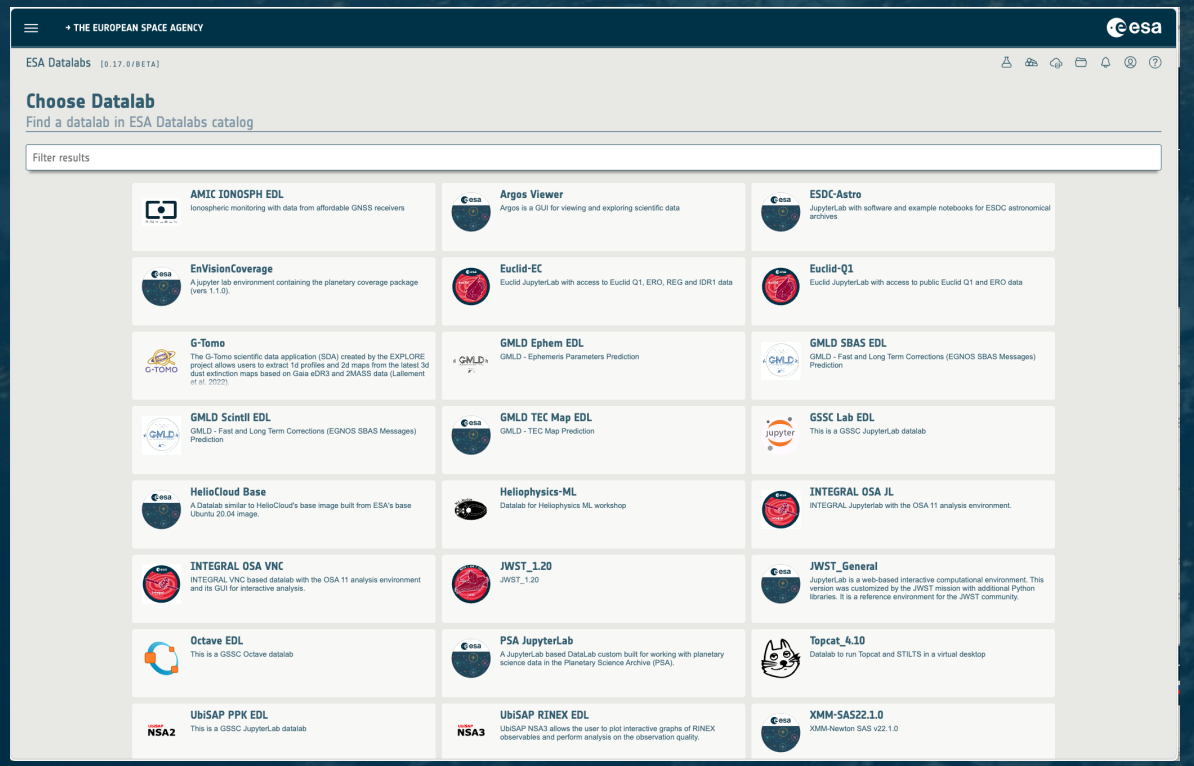
TOPCAT

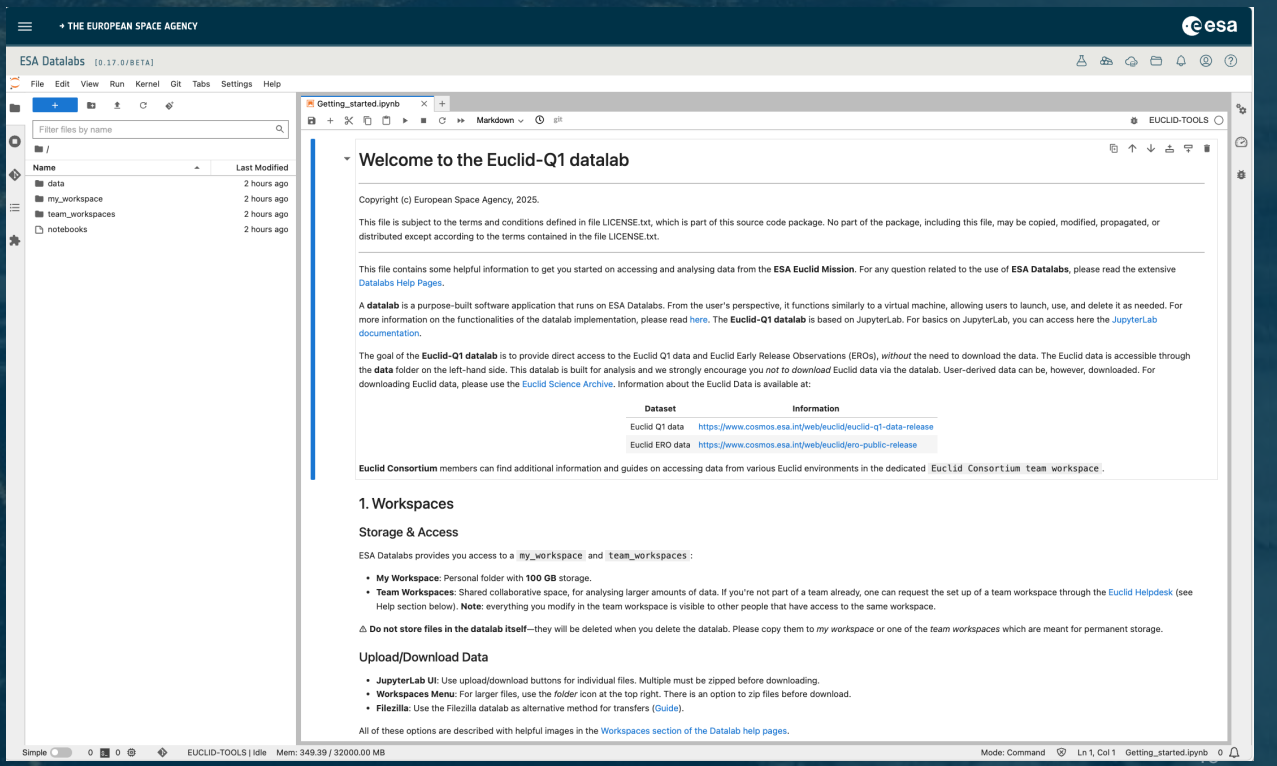


The Euclid ESA Archive & ESA DataLabs

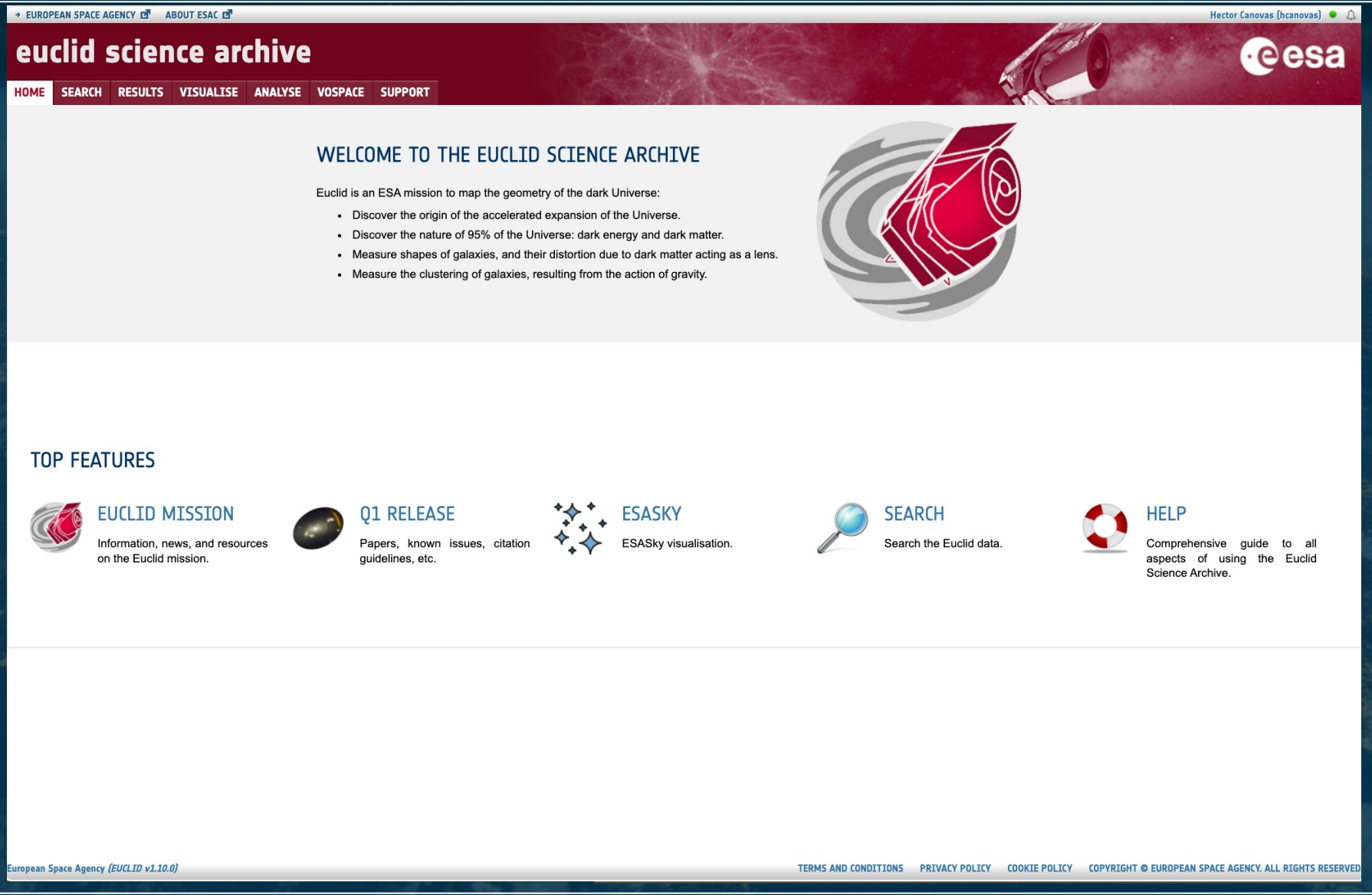
You may think of it like a virtual computer with:

- 100 GB disc space
- 100 GB of shared disc space (“Team space”) << collaborative space!
- 2 x 32 GB RAM
- **direct access** to the Euclid files

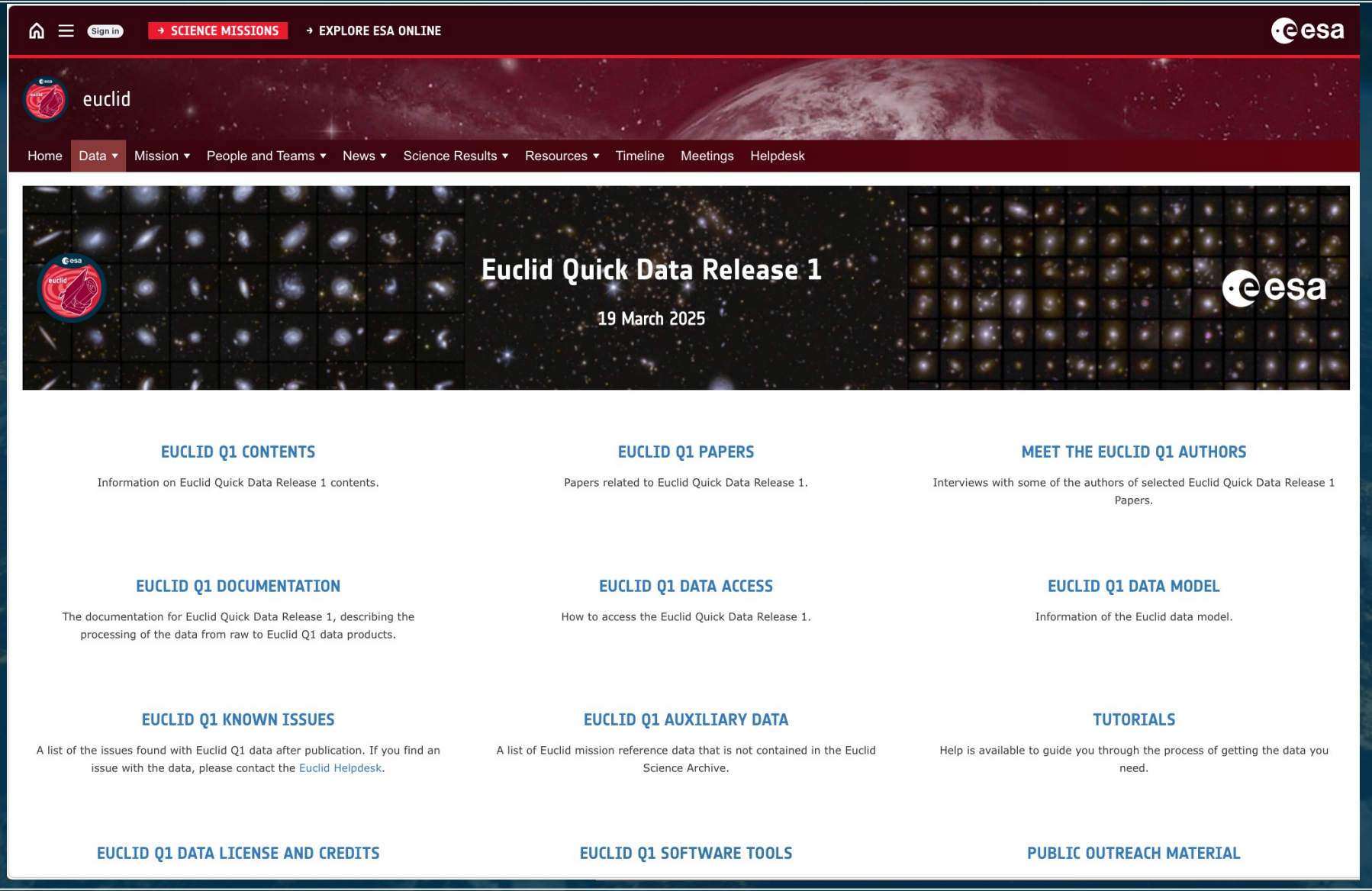




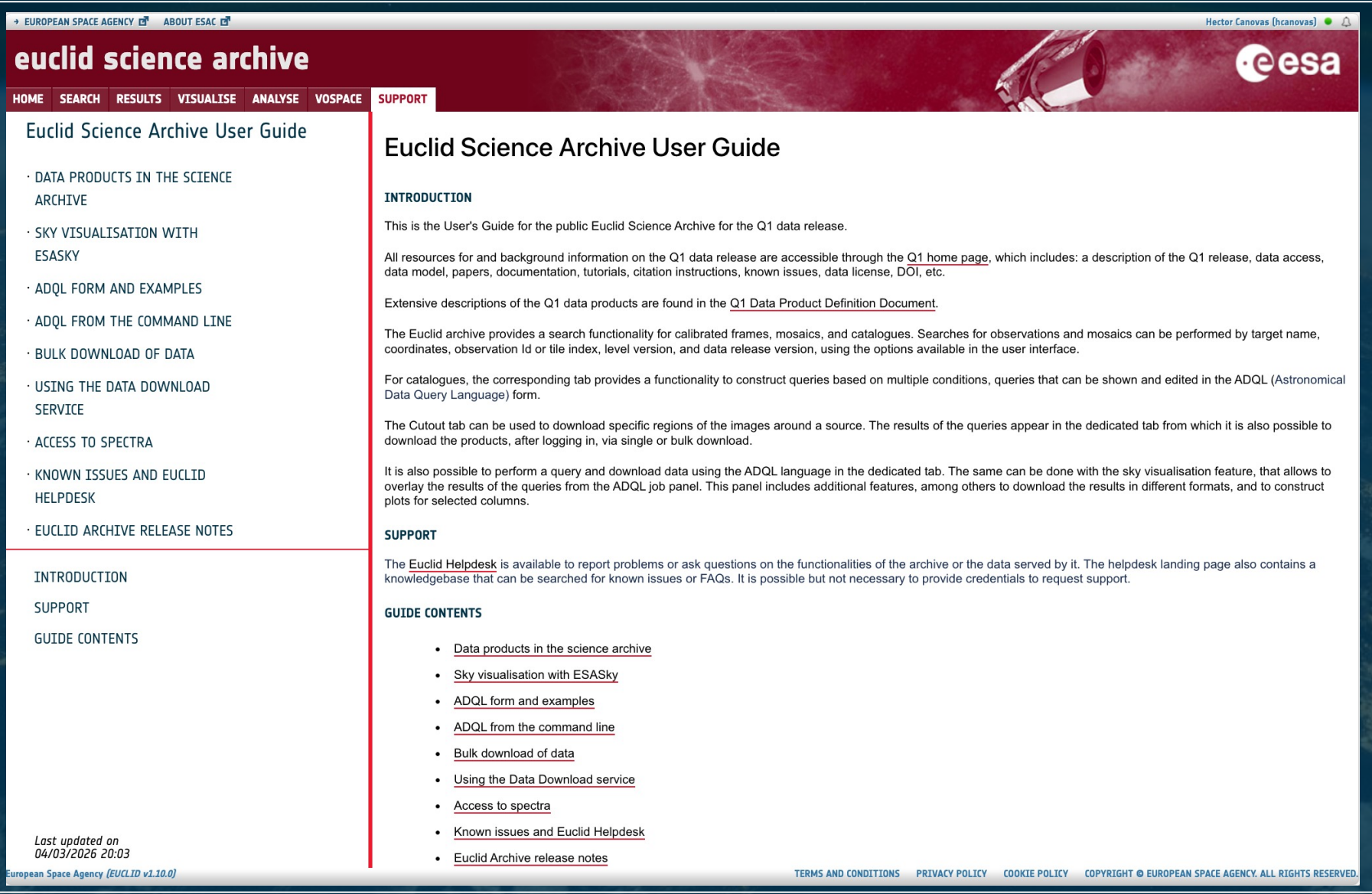
The Euclid ESA Archive WEB Interface (home)



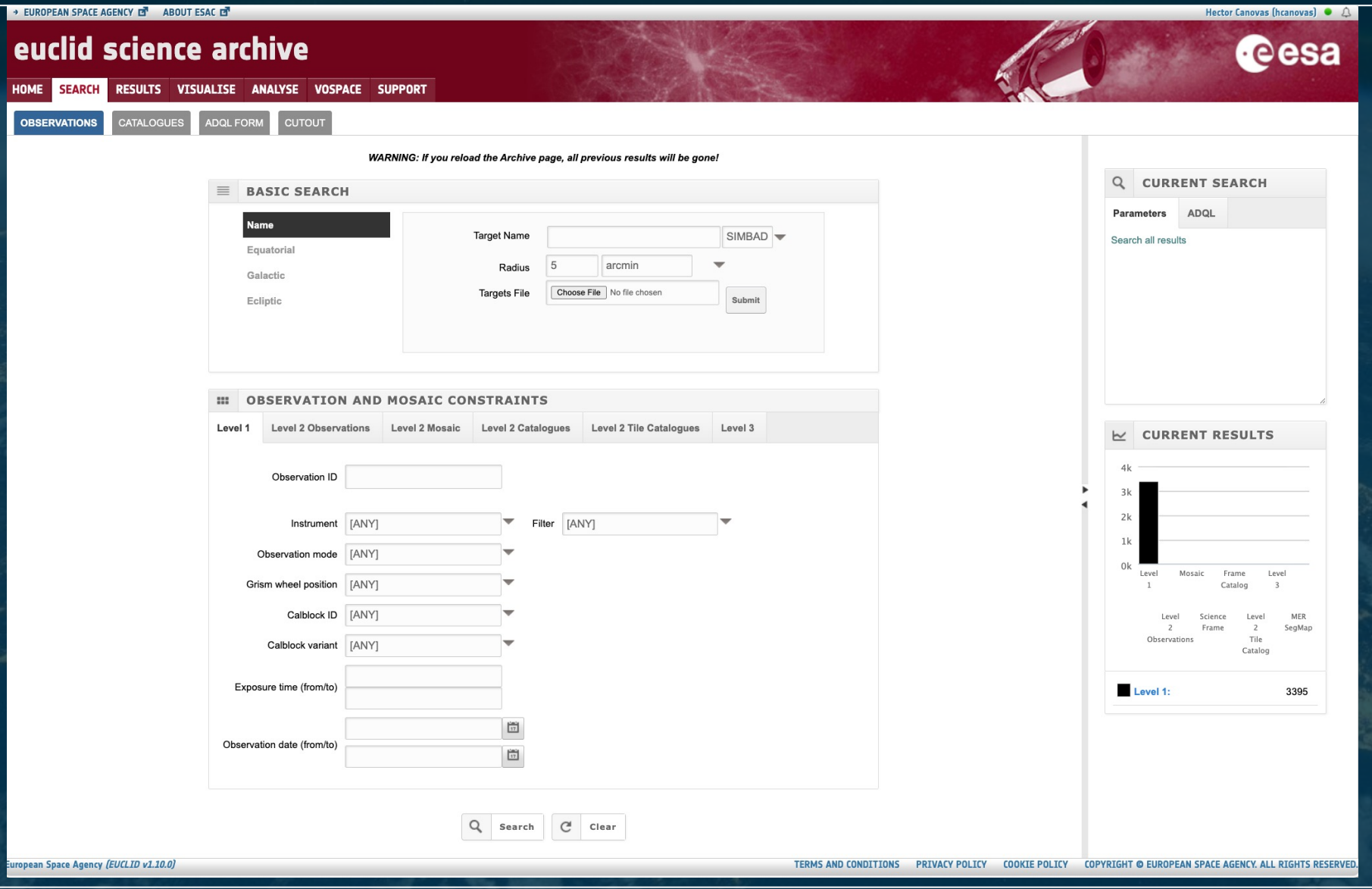
The Euclid ESA Archive WEB Interface (Q1)



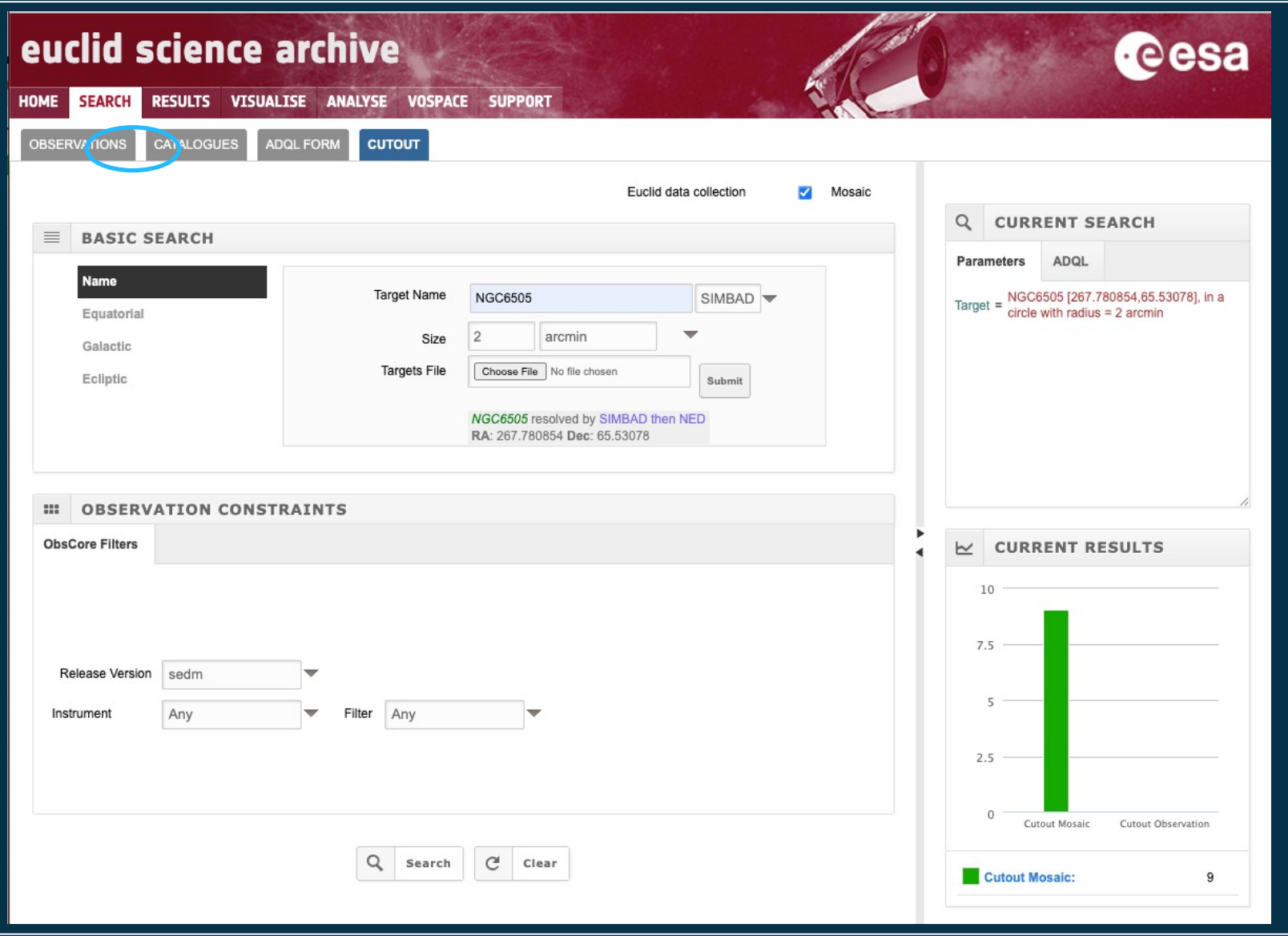
The Euclid ESA Archive WEB Interface (HELP!)



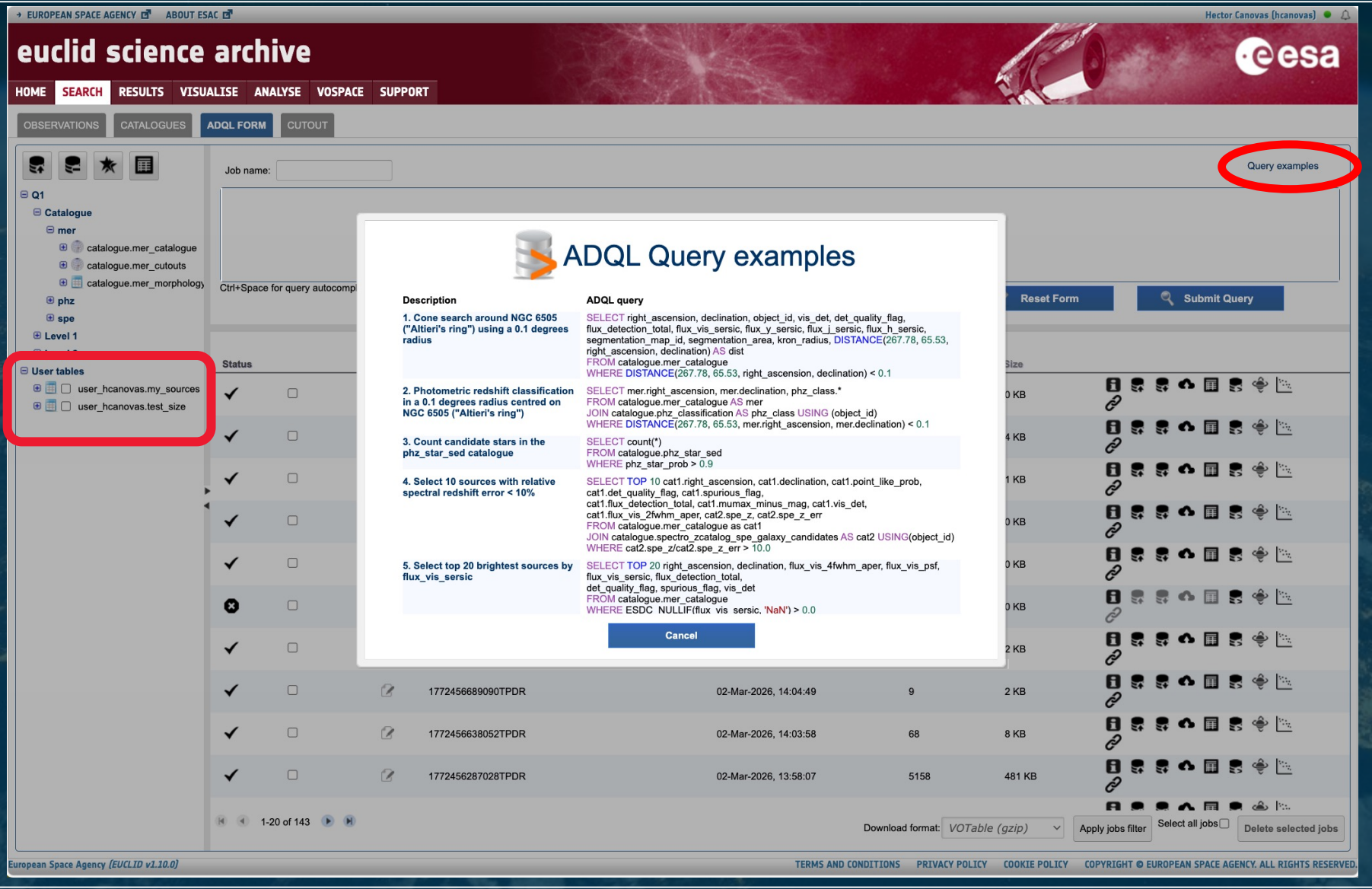
The Euclid ESA Archive WEB Interface (images)



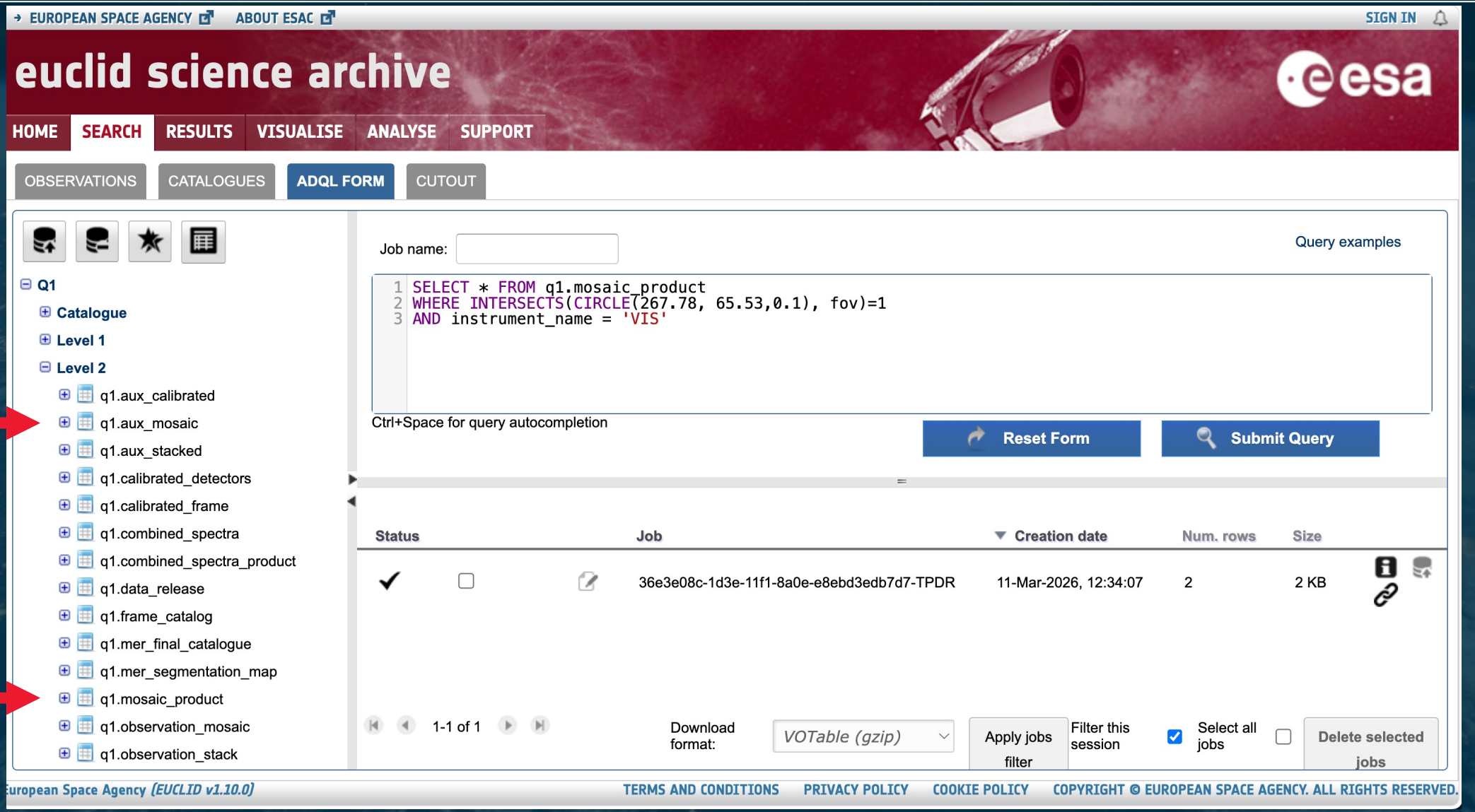
The Euclid ESA Archive WEB Interface (cutouts)



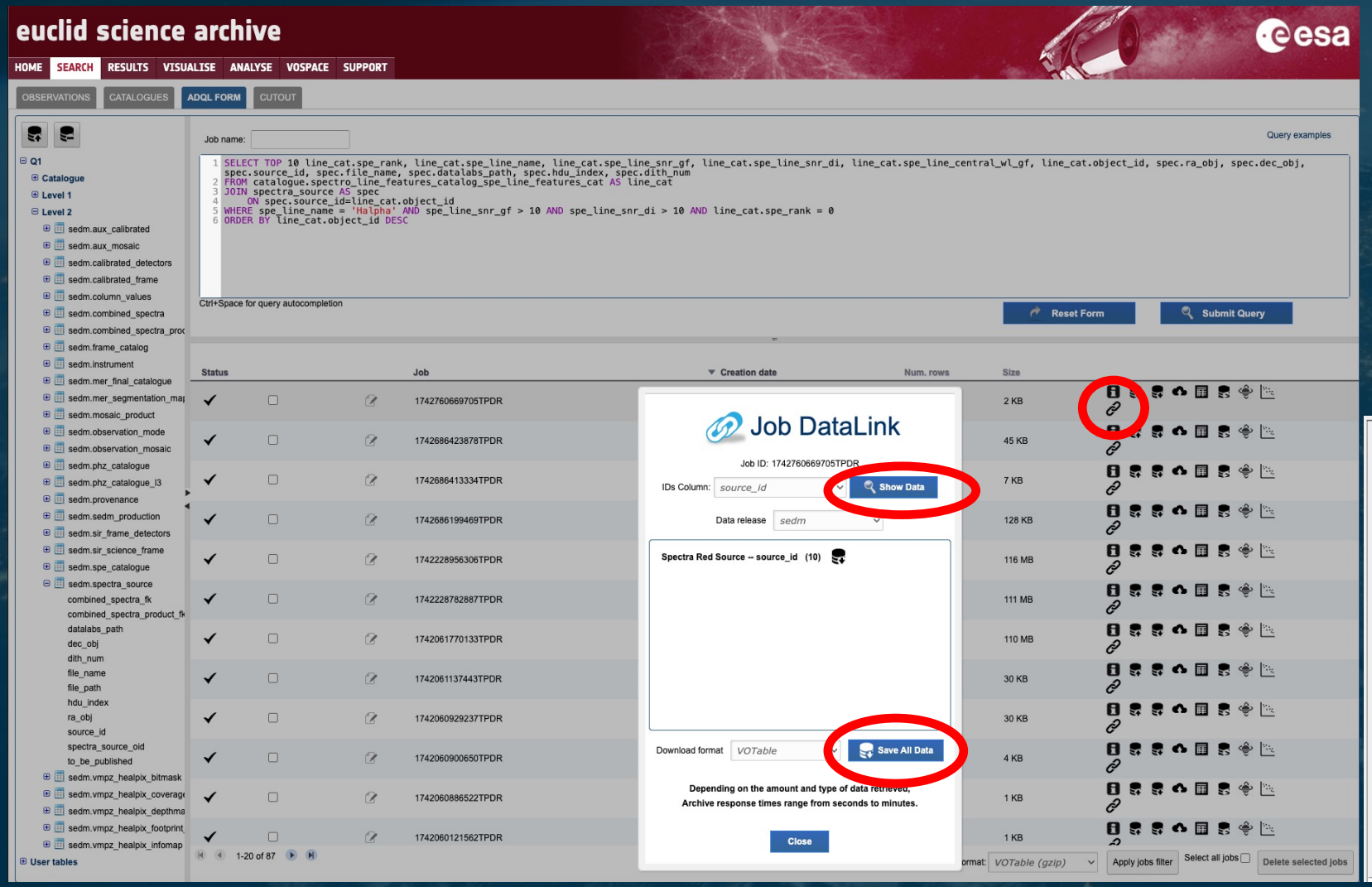
The Euclid ESA Archive WEB Interface (catalogues)

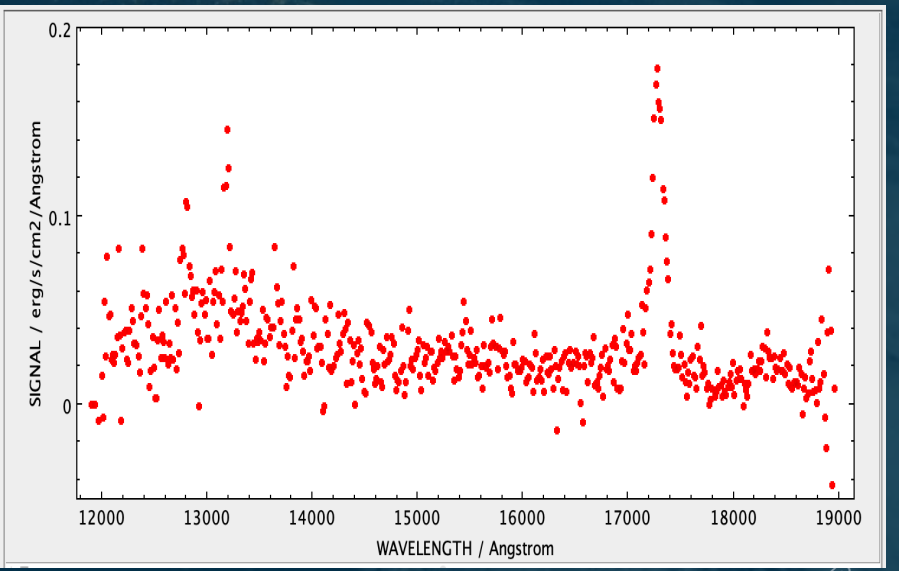


The Euclid ESA Archive WEB Interface (FITS files)

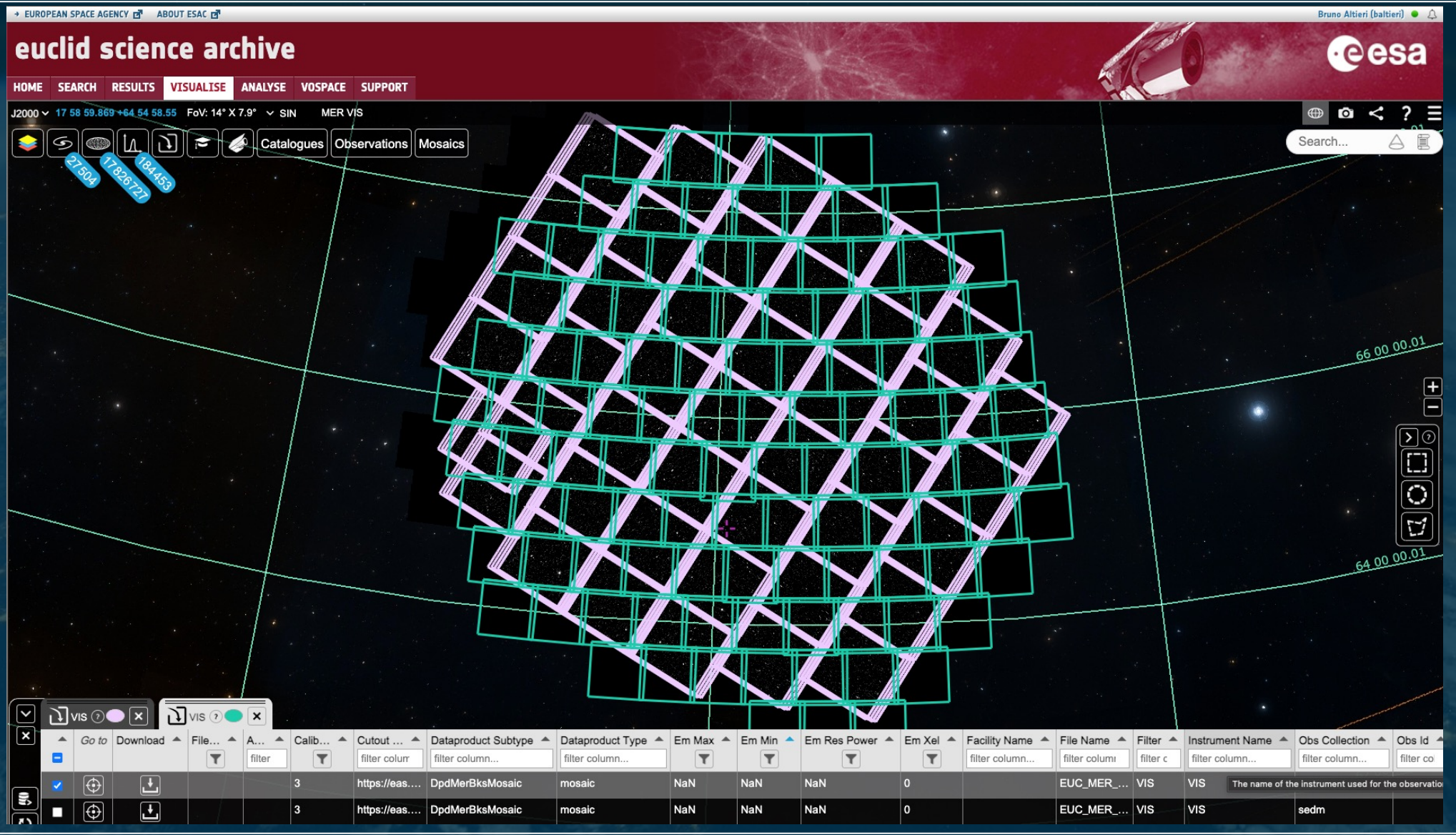


The Euclid ESA Archive WEB Interface (Spectra)

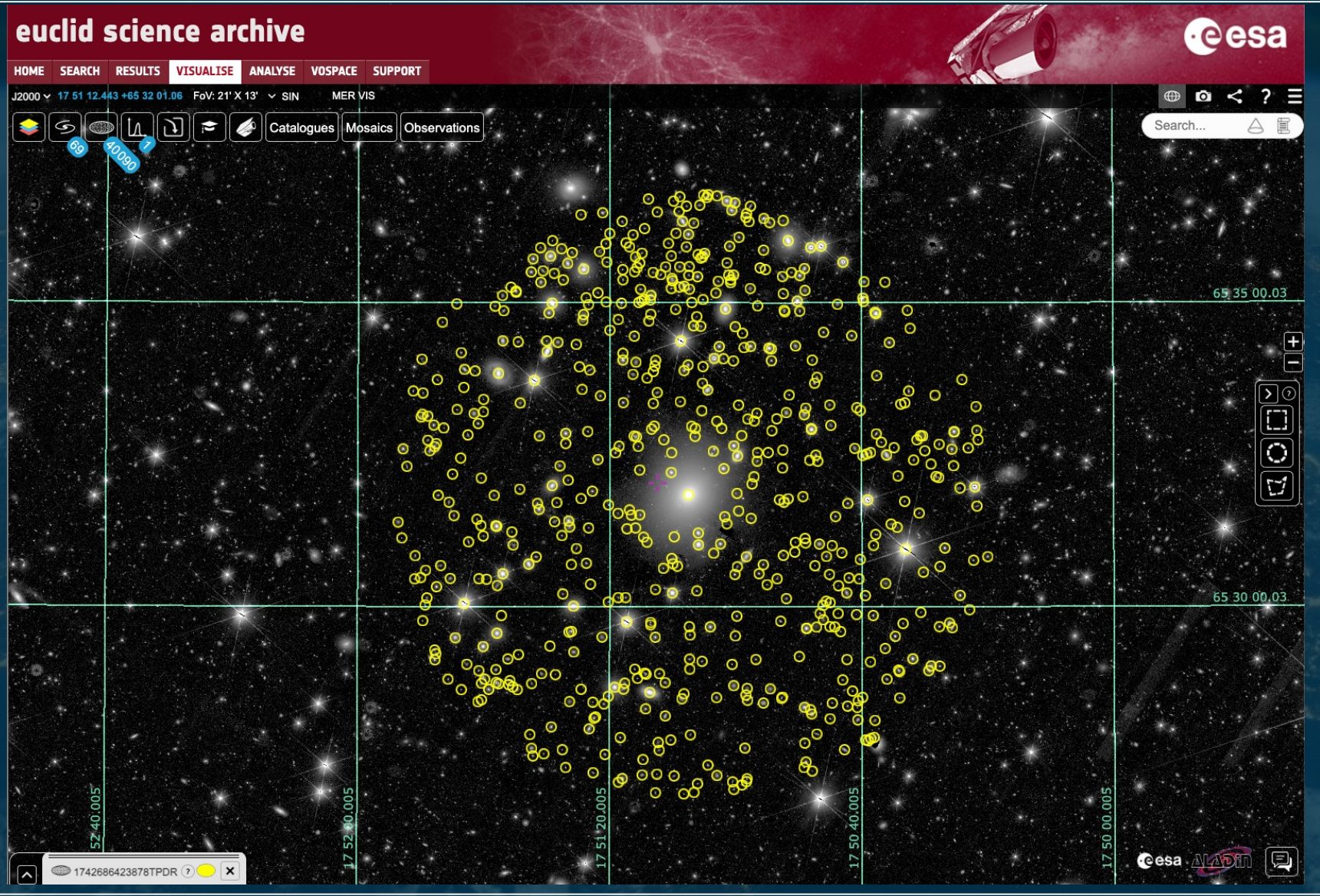




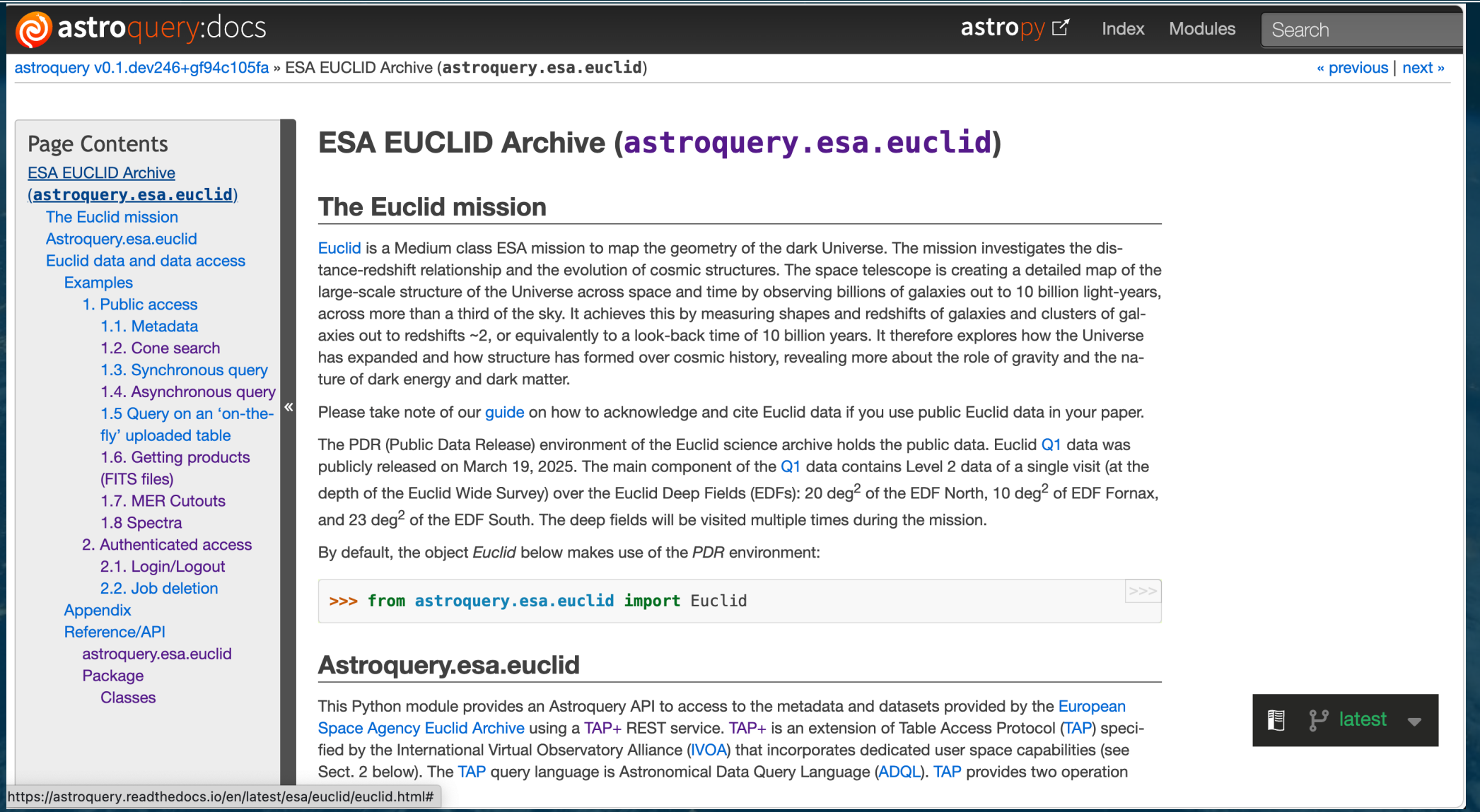
The Euclid ESA Archive WEB Interface (ESASky)



The Euclid ESA Archive WEB Interface (ESASky)



Python: Astroquery.Euclid



astroquery:docs astropy Index Modules Search

astroquery v0.1.dev246+gf94c105fa » ESA EUCLID Archive (**astroquery.esa.euclid**) « previous | next »

Page Contents

ESA EUCLID Archive (**astroquery.esa.euclid**)
- The Euclid mission
- Astroquery.esa.euclid
- Euclid data and data access
  - Examples
    - 1. Public access
      - 1.1. Metadata
      - 1.2. Cone search
      - 1.3. Synchronous query
      - 1.4. Asynchronous query
      - 1.5 Query on an 'on-the-fly' uploaded table
      - 1.6. Getting products (FITS files)
      - 1.7. MER Cutouts
      - 1.8 Spectra
    - 2. Authenticated access
      - 2.1. Login/Logout
      - 2.2. Job deletion
  - Appendix
  - Reference/API
    - astroquery.esa.euclid
    - Package
      - Classes

ESA EUCLID Archive (astroquery.esa.euclid)

The Euclid mission

Euclid is a Medium class ESA mission to map the geometry of the dark Universe. The mission investigates the distance-redshift relationship and the evolution of cosmic structures. The space telescope is creating a detailed map of the large-scale structure of the Universe across space and time by observing billions of galaxies out to 10 billion light-years, across more than a third of the sky. It achieves this by measuring shapes and redshifts of galaxies and clusters of galaxies out to redshifts ~2, or equivalently to a look-back time of 10 billion years. It therefore explores how the Universe has expanded and how structure has formed over cosmic history, revealing more about the role of gravity and the nature of dark energy and dark matter.

Please take note of our guide on how to acknowledge and cite Euclid data if you use public Euclid data in your paper.

The PDR (Public Data Release) environment of the Euclid science archive holds the public data. Euclid Q1 data was publicly released on March 19, 2025. The main component of the Q1 data contains Level 2 data of a single visit (at the depth of the Euclid Wide Survey) over the Euclid Deep Fields (EDFs): 20 deg^2 of the EDF North, 10 deg^2 of EDF Fornax, and 23 deg^2 of the EDF South. The deep fields will be visited multiple times during the mission.

By default, the object *Euclid* below makes use of the *PDR* environment:

```
>>> from astroquery.esa.euclid import Euclid
```

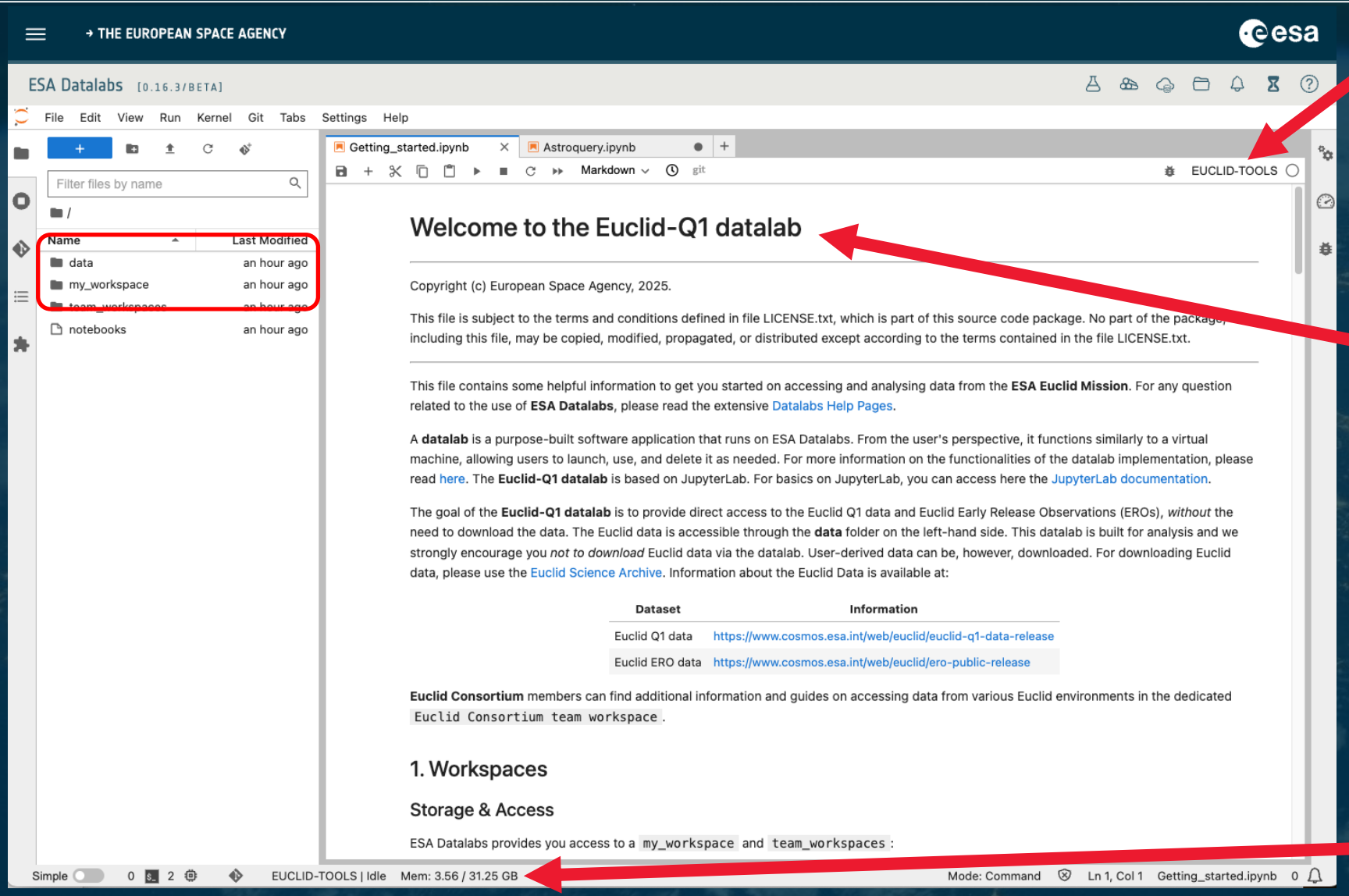
Astroquery.esa.euclid

This Python module provides an Astroquery API to access to the metadata and datasets provided by the European Space Agency Euclid Archive using a TAP+ REST service. TAP+ is an extension of Table Access Protocol (TAP) specified by the International Virtual Observatory Alliance (IVOA) that incorporates dedicated user space capabilities (see Sect. 2 below). The TAP query language is Astronomical Data Query Language (ADQL). TAP provides two operation

latest

https://astroquery.readthedocs.io/en/latest/esa/euclid/euclid.html#

ESA DataLabs

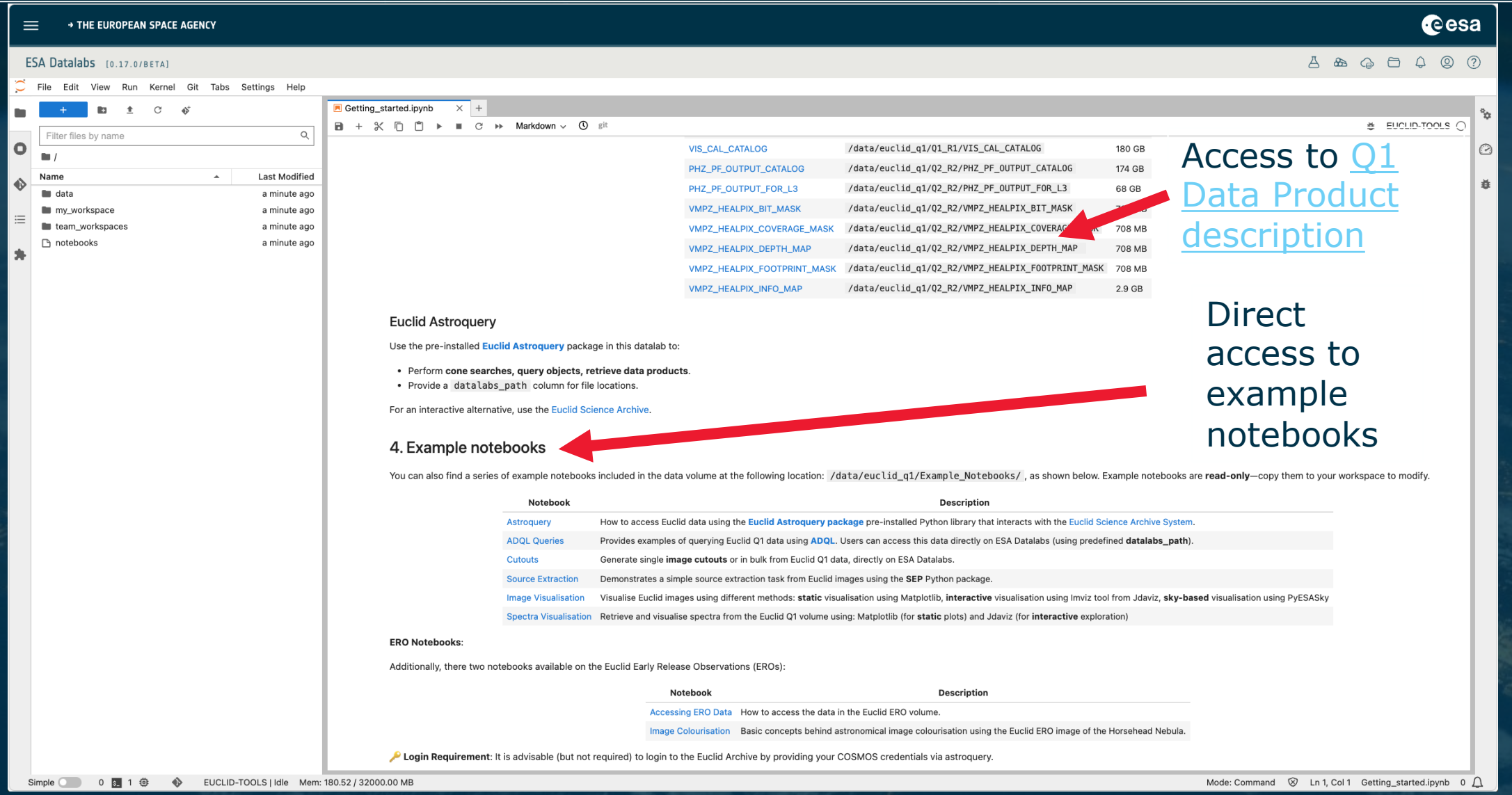


Dedicated (Python) kernel

"Welcome" page with info & access to documentation & tutorials (notebooks)

Resource monitoring

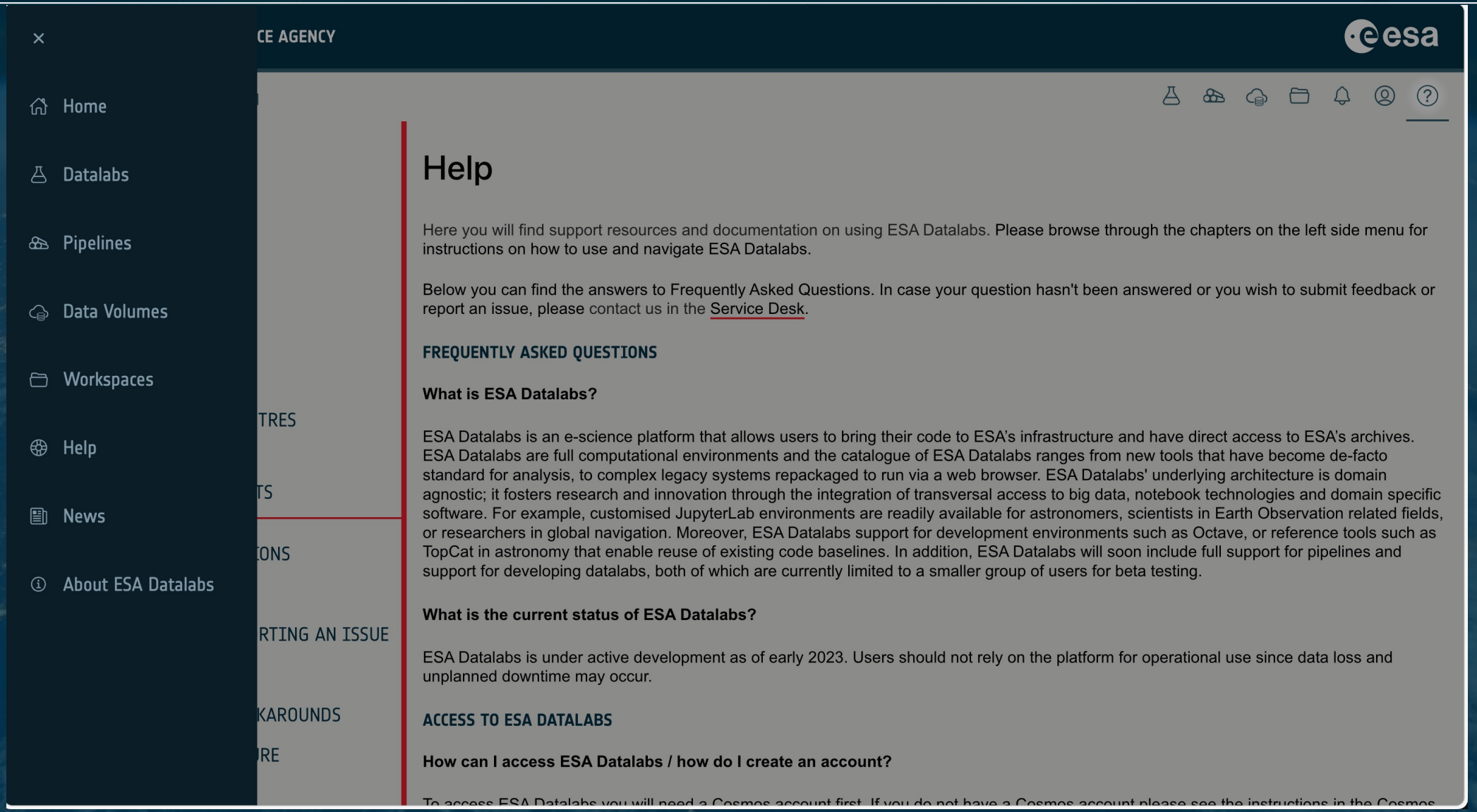
ESA DataLabs



Access to Q1 Data Product description

Direct access to example notebooks

ESA DataLabs



ESA DataLabs

→ THE EUROPEAN SPACE AGENCY

ESA Datalabs [0.17.0/BETA]

File Edit View Run Kernel Git Tabs Settings Help

Filter files by name

/ ··· / euclid_q1 / Example_Notebooks /

Name	Last Modified
excercises	3 months ago
ADQL_examples.ipynb	14 days ago
Astroquery.ipynb	14 days ago
cutout_utils.py	11 days ago
Cutouts.ipynb	14 days ago
ERO_data_access.ipynb	14 days ago
ERO_image_colourisation.ipynb	14 days ago
Getting_started.ipynb	14 days ago
Image_visualisation.ipynb	14 days ago
LICENSE.txt	4 months ago
Source_extraction.ipynb	14 days ago
Spectra_visualisation.ipynb	14 days ago

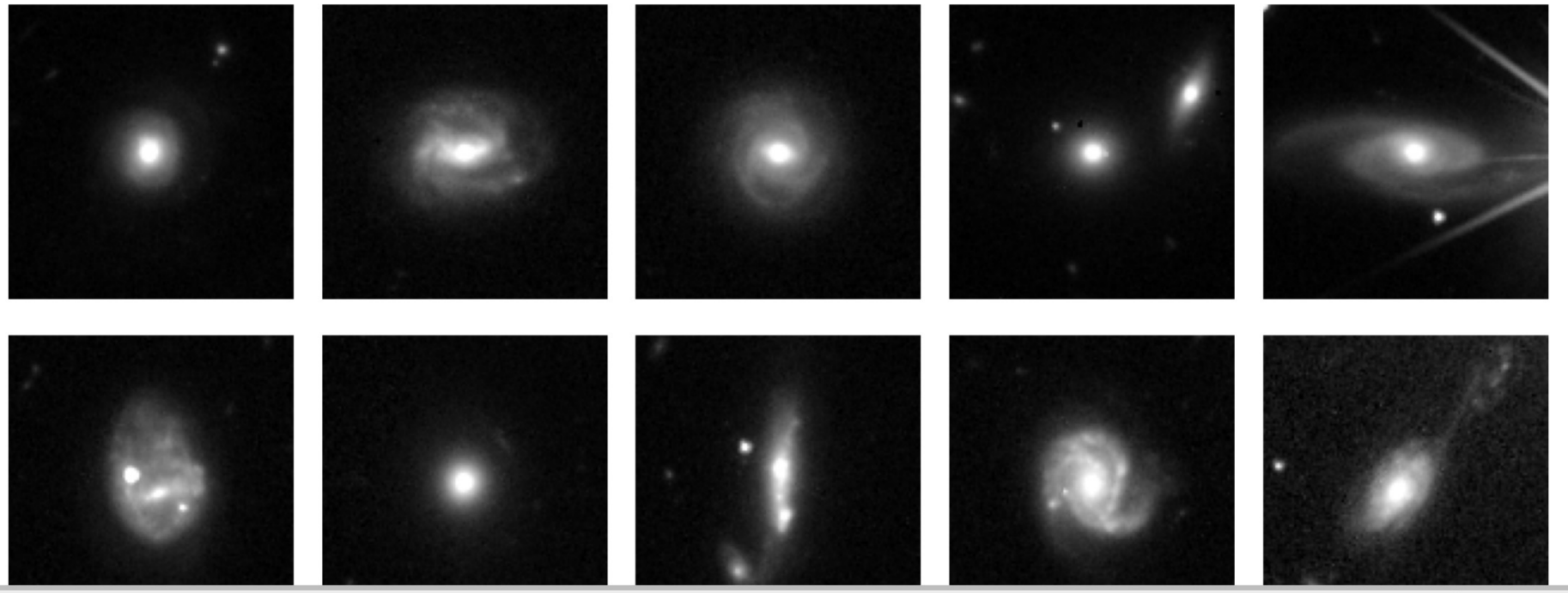
Getting_started.ipynb | Cutouts.ipynb

Markdown git EUCLID-TOOLS

Here we take a quick look at some of the cutouts we have made

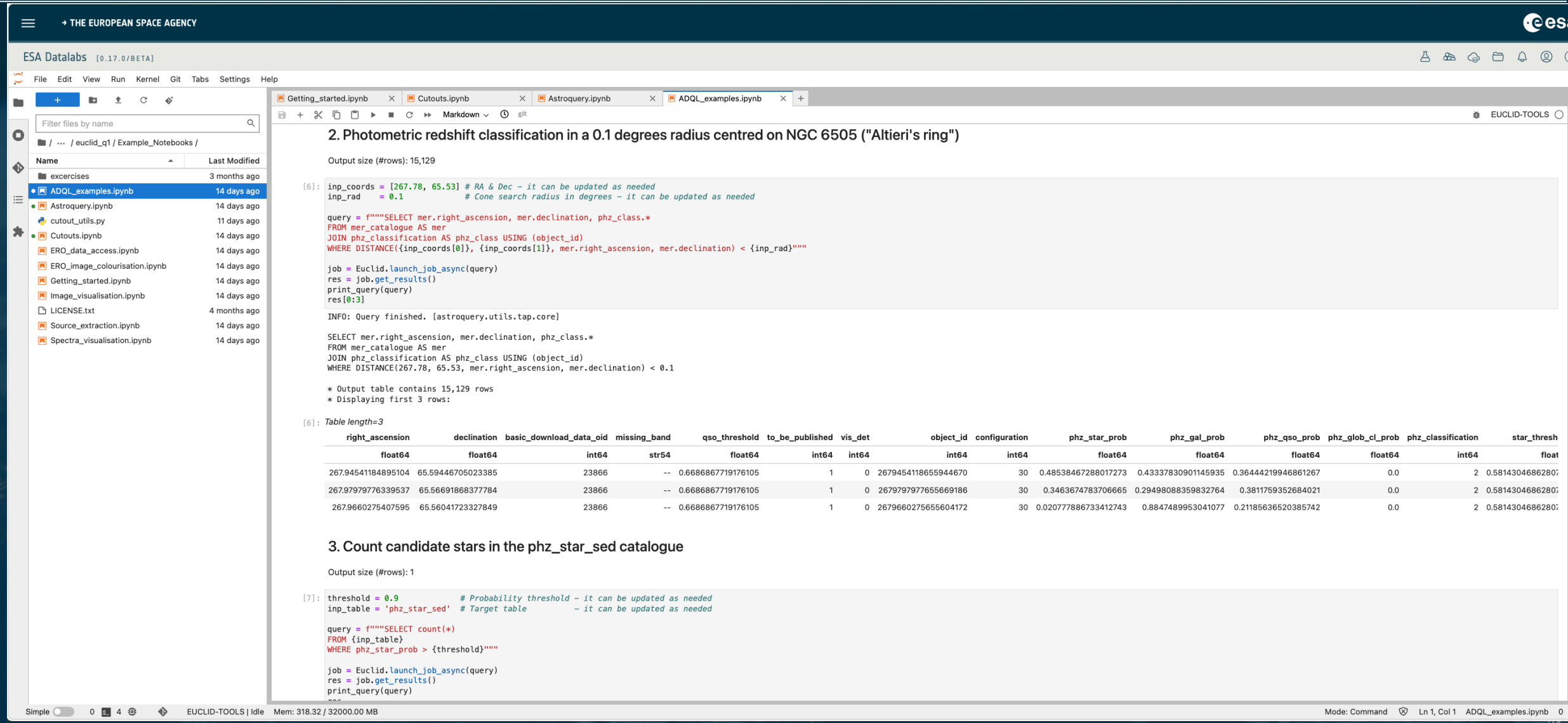
[14]:
```
#showing 10 of the cutouts
files = sorted(glob.glob(cutout_folder + "*MOSAIC-VIS*.fits")) #for mosaic VIS files
# files = sorted(glob.glob(cutout_folder + "*MOSAIC-NIR*.fits")) #for mosaic NISP files

_, axes = plt.subplots(2, 5, figsize=(25, 10))
plt.subplots_adjust(wspace=0.1, hspace=0.1)
for ax, img_path in zip(axes.flatten(), files):
    image_data = fits.getdata(img_path, ext=0)
    ax.imshow(image_data, cmap='gray', origin='lower', norm=ImageNormalize(image_data, interval=PercentileInterval(99.5), stretch=AsinhStretch()))
    ax.axis("off")
```

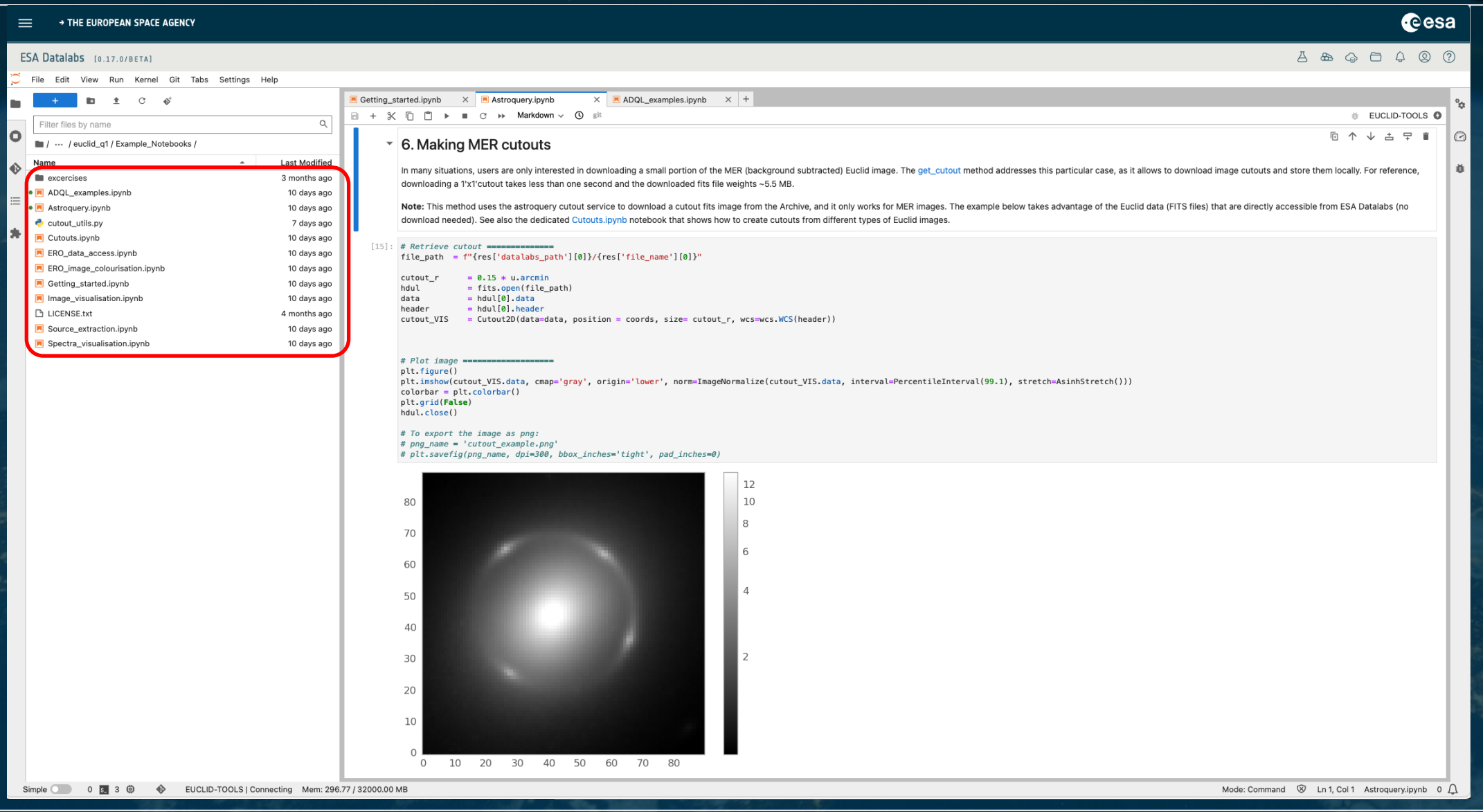


Simple 0 2 EUCLID-TOOLS | Idle Mem: 224.10 / 32000.00 MB Mode: Command Ln 1, Col 1 Cutouts.ipynb 0

ESA DataLabs

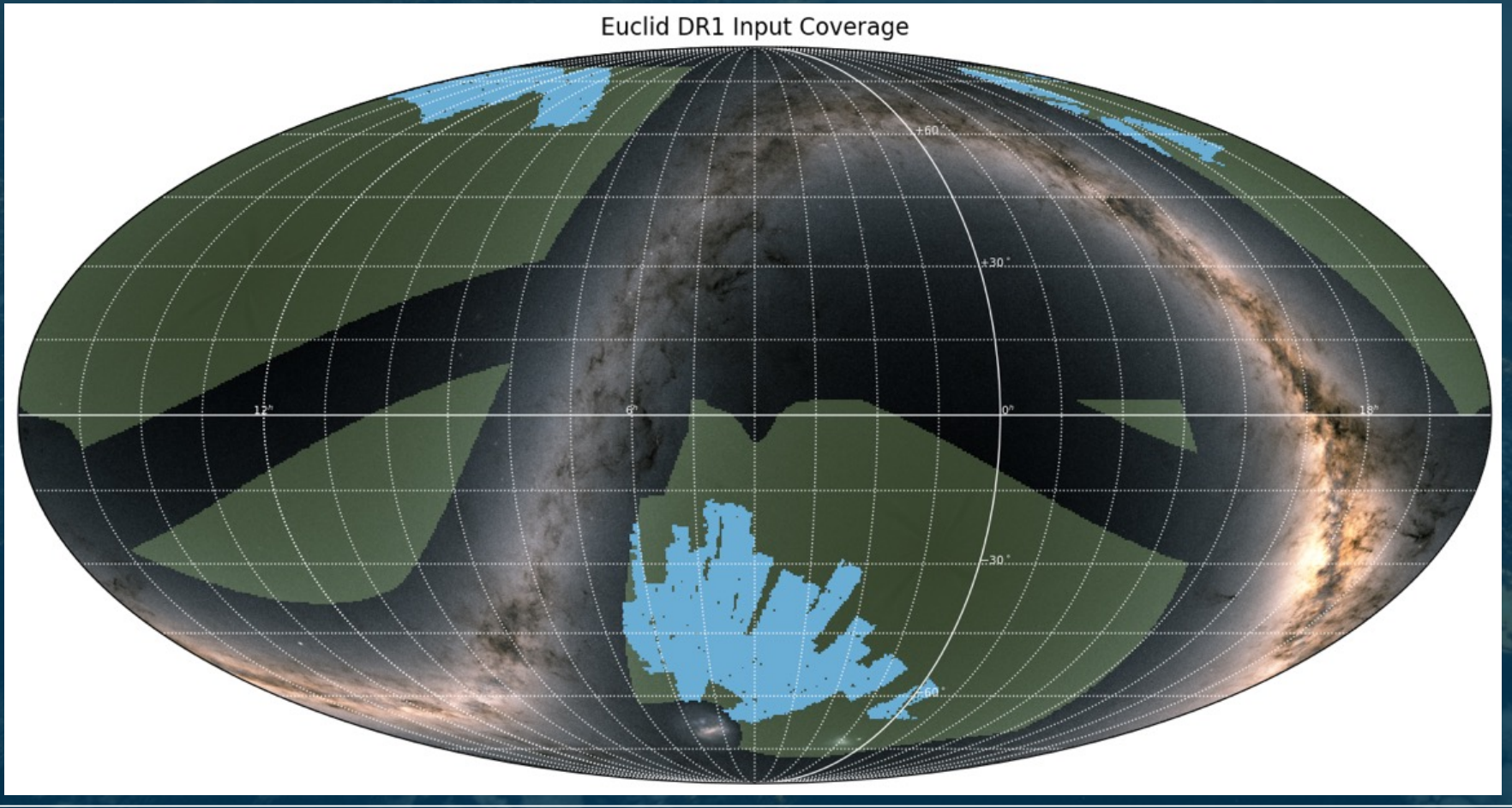


ESA DataLabs



Euclid DR1 and beyond

- **Green**: (final) WIDE Survey
- **Blue**: observations intended for DR1 processing (inclusion in DR1 is not guaranteed). Expected coverage ~1,900 degrees^2 (VS. 63 degrees^2 for Q1).



Don’t panic and ask for

HELP!

and/or

Read the Docs!