



ESA DATALABS

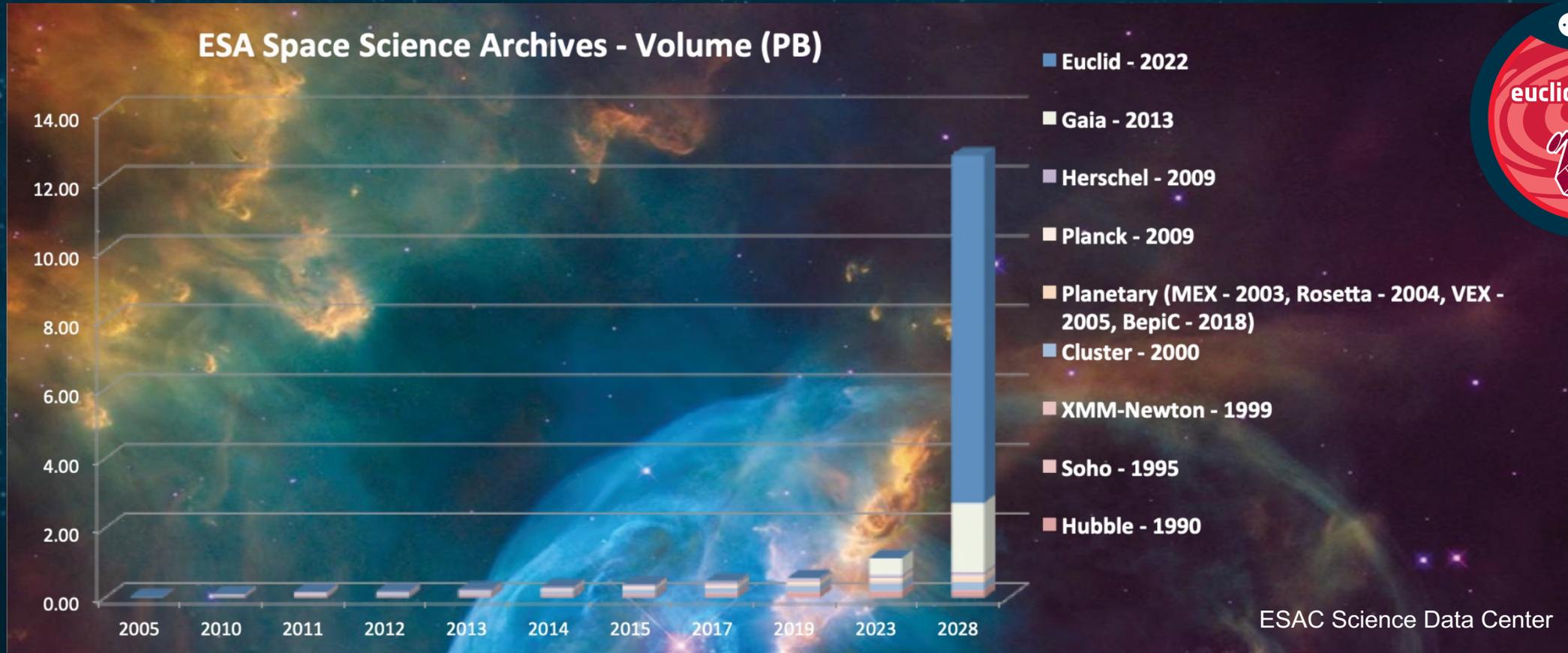
ESA Datalabs

Sandor Kruk

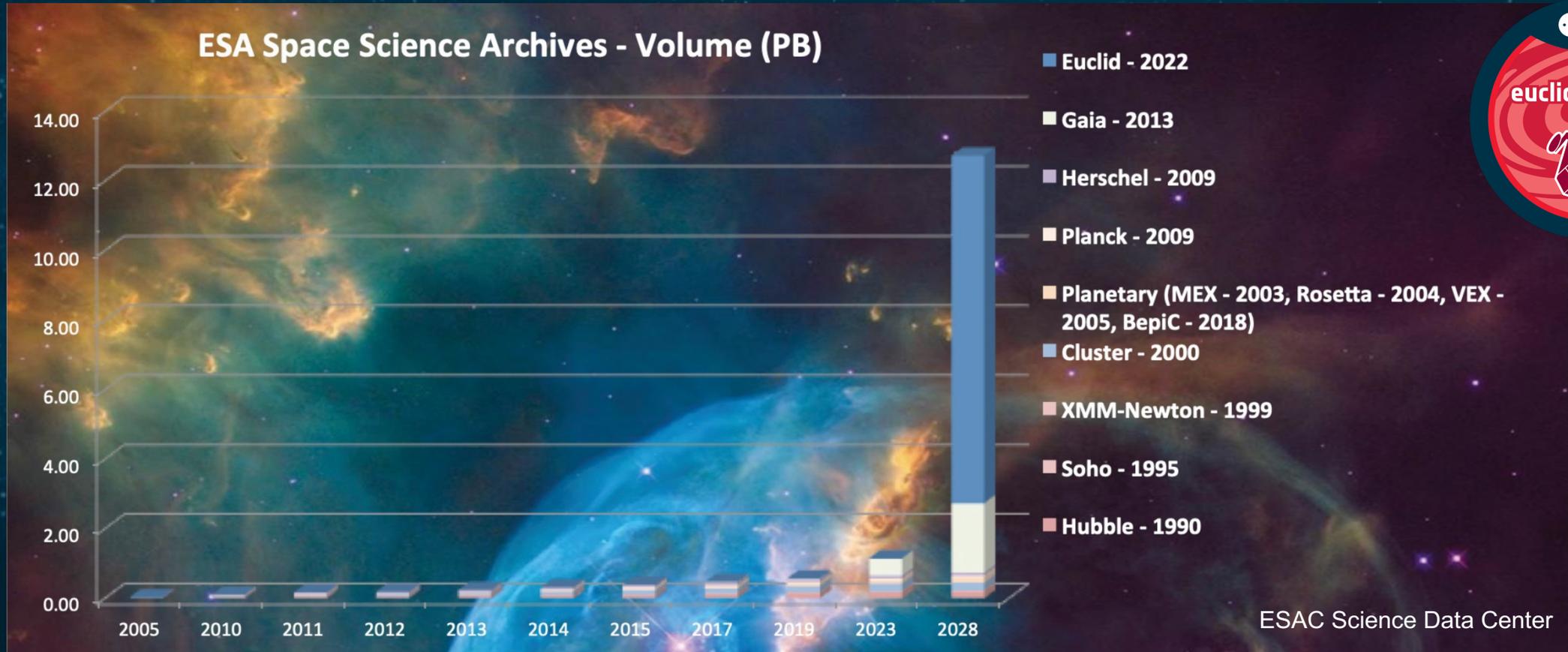
on behalf of the Data Science Team
Archives and Data Science Division
European Space Agency
ESAC, Madrid, Spain

INTEGRAL Workshop ESAC
22 October 2024

Increasing data volumes in the ESA Science Archives



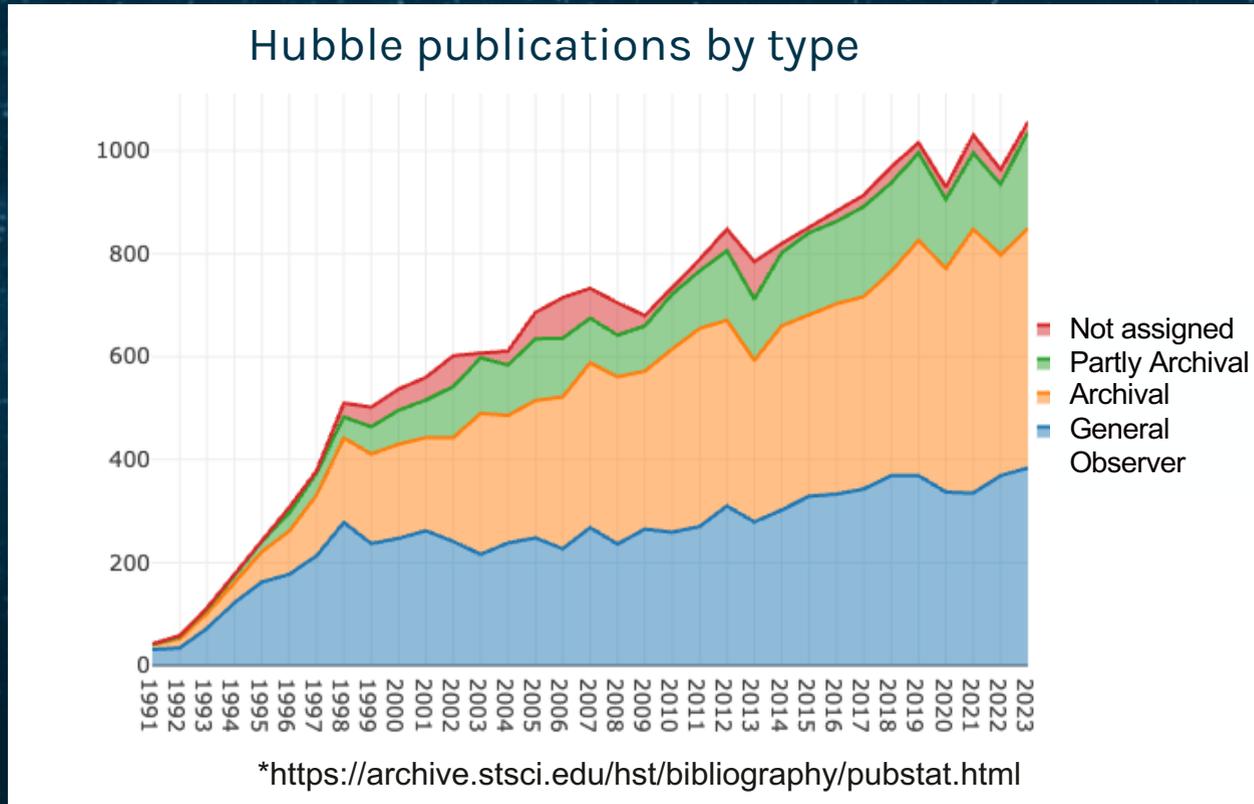
Increasing data volumes in the ESA Science Archives



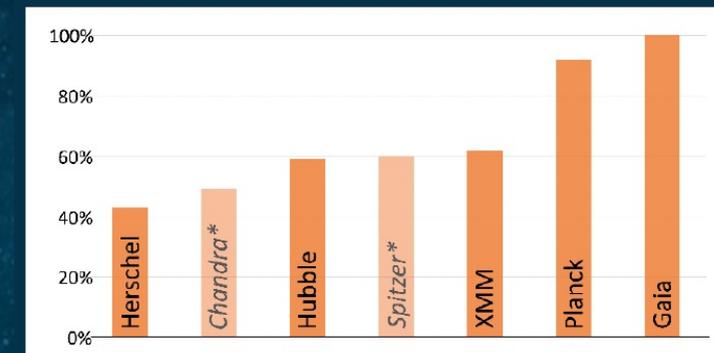
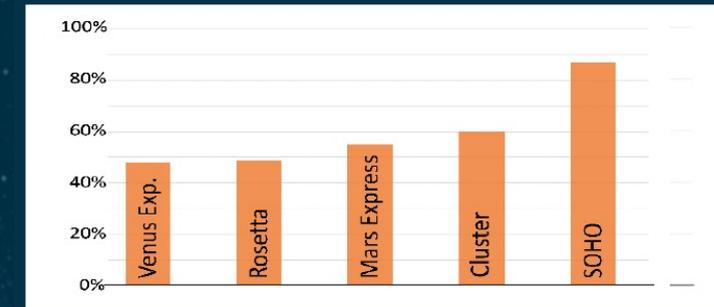
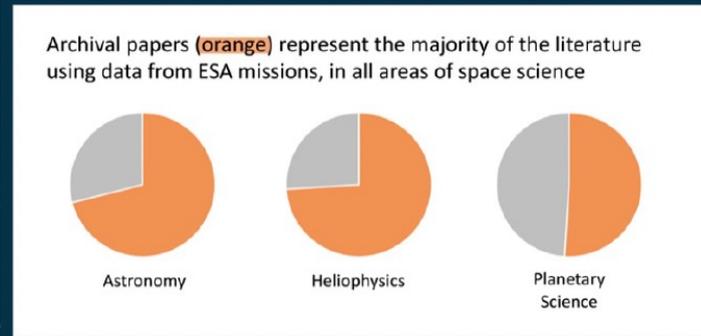
From bringing the data to the user

To bringing the user to the data

Increasing importance of archival research



Hubble Space Telescope publications statistics



de Marchi & Parmar, 2024

ESA Datalabs is available as "Public Moderated Beta"
If you wish to apply for access, please [submit your request here](#).

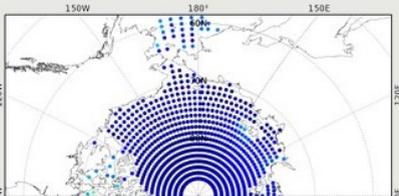


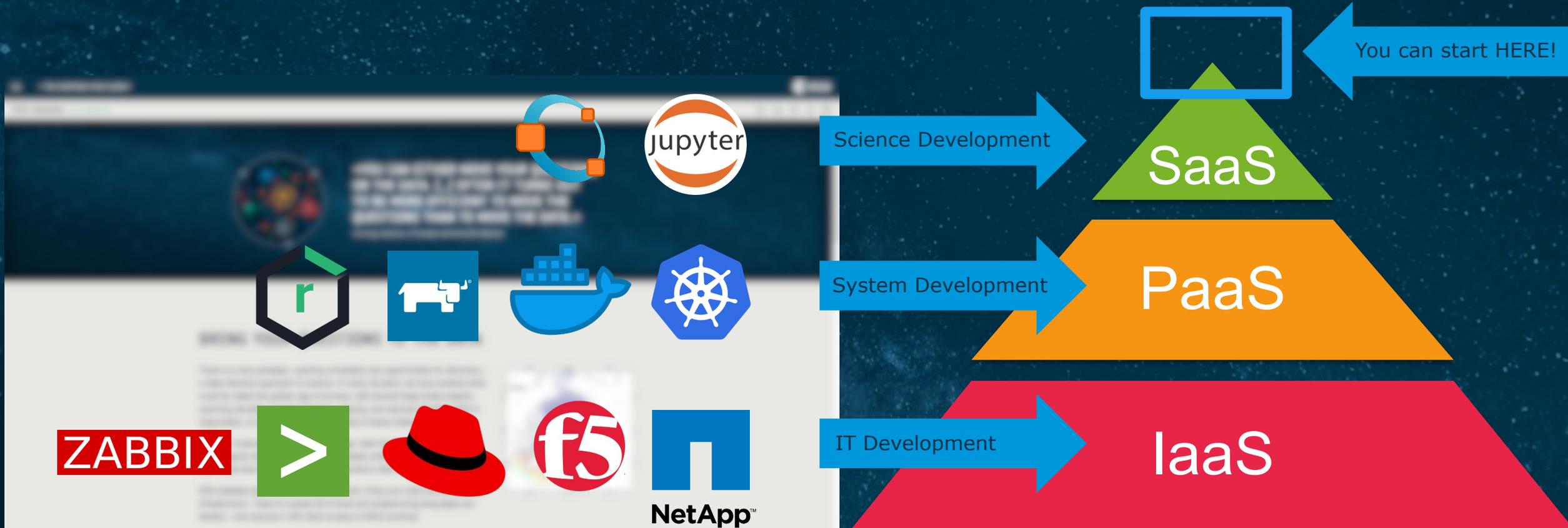
«YOU CAN EITHER MOVE YOUR QUESTIONS OR THE DATA. [...] OFTEN IT TURNS OUT TO BE MORE EFFICIENT TO MOVE THE QUESTIONS THAN TO MOVE THE DATA.»

Jim Gray, eScience: A Transformed Scientific Method

BRING YOUR QUESTIONS TO THE DATA

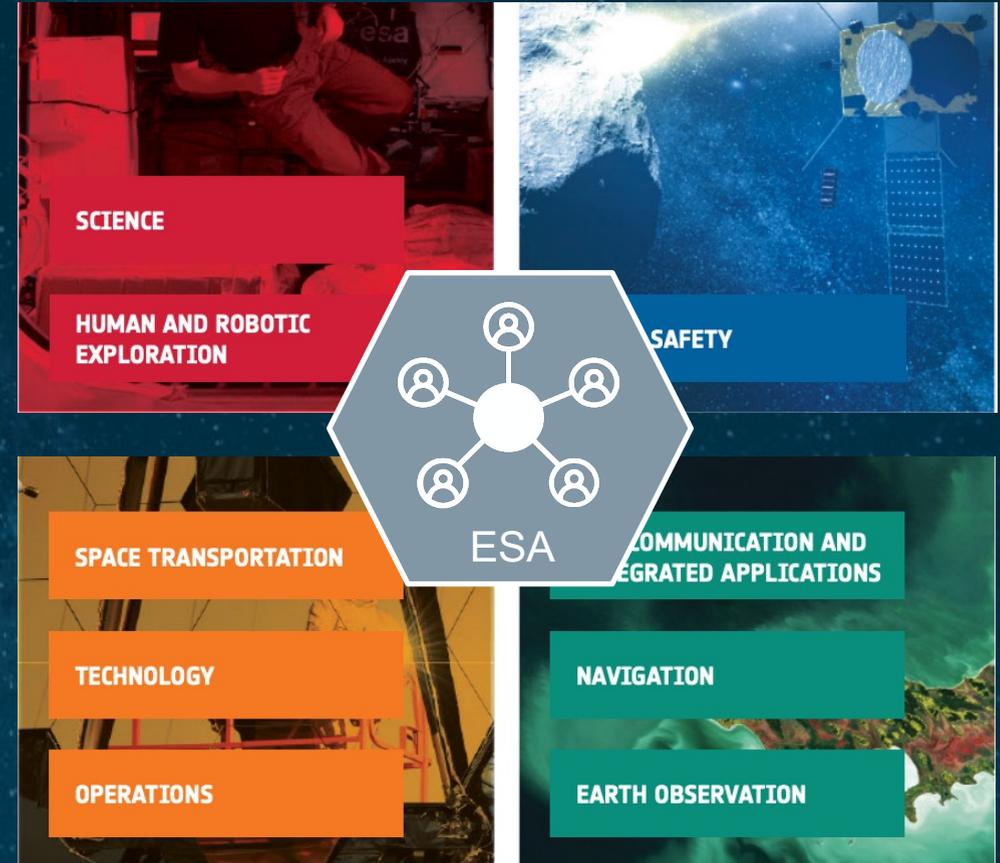
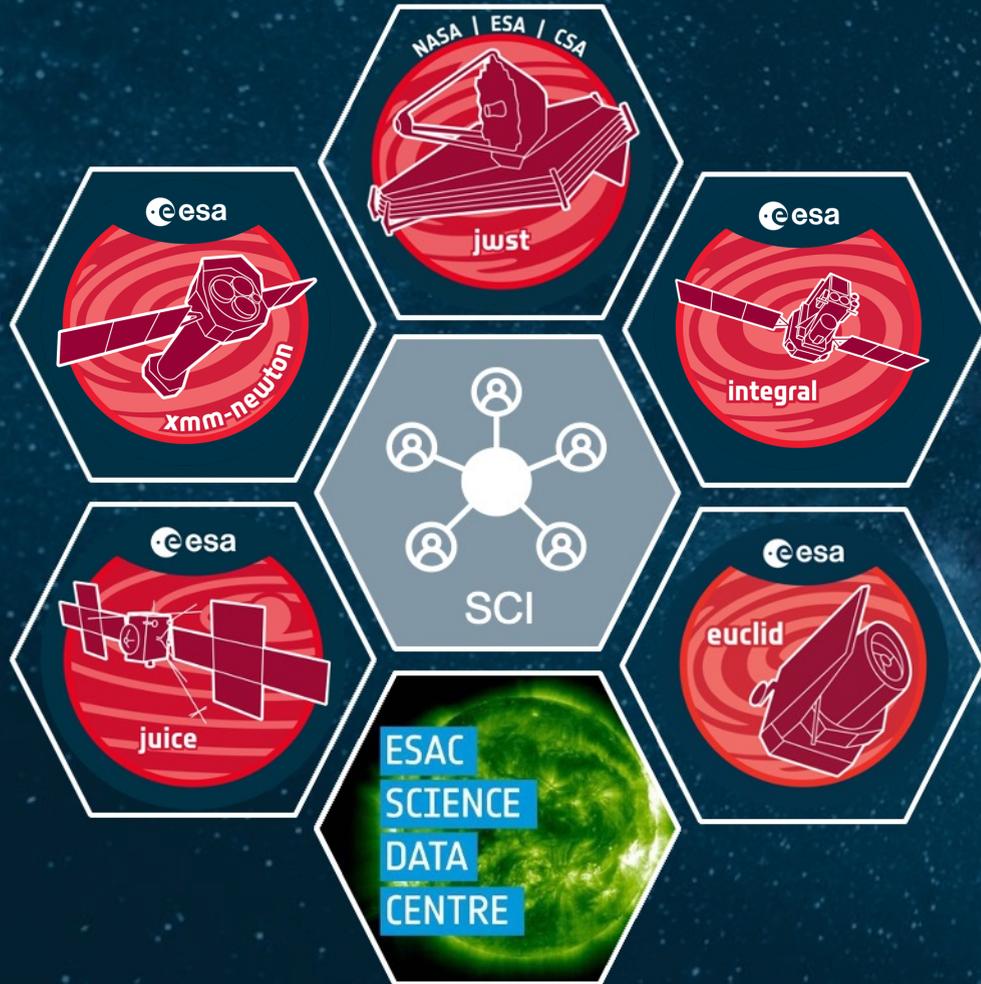
There is a new paradigm, opening completely new opportunities for discovery – a data-intensive approach to science. In many domains, we have entered what could be called the golden age of surveys, with several large-scale projects, spanning decades, between finished, ongoing, and planned activities. ESA is responsible, or is a major partner, in several of these initiatives.





“The tools we use have a profound influence on our thinking habits, and, therefore, on our thinking abilities” Edsger W. Dijkstra (Turing award)

A Platform Designed to Boost Access to Data



→ THE EUROPEAN SPACE AGENCY


ESA Datalabs [0.3.0/BETA]

File Edit View Run Kernel Git Tabs Settings Help

Filter files by name

Name	Last Modified
/	
data	7 hours ago
my_workspace	7 hours ago
notebooks	7 hours ago
team_workspaces	seconds ago

Moon-coverage_0.8.0-JUIC ● PanGaia_VN_Edition.ipynb X

Markdown git

Overview

PanGaia simplifies the access, exploration, and clustering analysis of the Gaia DR2 [catalogue](#). This toolkit has been developed with the aim to facilitate the research of astromers who are *familiar* with the Gaia archive and that are interested in Star Formation. However, because of its design and capabilities PanGaia might be useful for a broad audience of researchers interested in exploring large astrometric catalogues. This code closely follows the analysis described by [Canovas et al. 2019](#), where more than 150 potential new members of the ρ -Ophiuchus Star Forming Region were identified using Machine Learning algorithms applied to the Gaia DR2.

PanGaia in a Nutshell:

- Data Access:** An [ADQL](#) cone-search (e.g. [link](#)) in the Gaia DR2 archive is performed using the [astroquery.gaia](#) package. Several extra columns are added to the queried table (like e.g. the distance, computed as the inverse of

My Workspace

Team Workspaces

THE EUROPEAN SPACE AGENCY

Data Volume Catalog

Domain

- Space Science (1)

Euclid

Euclid ERO
The Euclid Early Release Observations (ERO), led by the Euclid Science Team and ESA, showcase the Euclid mission's capabilities, focusing on legacy science. ERO DR3 includes image stacks and validation catalogues for 16 fields from six selected projects. Detailed dataset information is available <https://www.cosmos.esa.int/web/euclid/ero-data-release>

Perseus Cluster



Horsehead Nebula



IC432



Euclid's Early Release Observations
Credit: ESA/Euclid/Euclid Consortium/NASA, image processing by J.-C. Cuillandre (CEA Paris-Saclay), G. Anselmi

Computing & Data Colocation: Accessing Data Volumes



→ THE EUROPEAN SPACE AGENCY

ESA Datalabs [0.9.0/BETA]

File Edit View Run Kernel Git Tabs Settings Help

Filter files by name

/ ... / 591 / 54 /

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Launcher

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j59154010_drc.jpg

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10



ESA Datalabs Catalogue: Interactive Analysis



Choose Datalab

Find a datalab in ESA Datalabs catalog

Filter results

 Demoda A simple demo jupyterlab datalab	 Euclid_test This is a JupyterLab demo datalab	 G-Tomo The G-Tomo scientific data application (SDA) created by the EXPLORE project allows users to extract 1d profiles and 2d maps from the latest 3d dust extinction maps based on Gaia eDR3 and 2MASS data (Lallement et al. 2022).	 GODOT JupyterLab GODOT is an ESA/ESOC flight dynamics software. This a customization of JupyterLab in order to use GODOT via the Python interface.	 INTEGRAL OSA JL INTEGRAL Jupyterlab with the OSA 11 analysis environment.
 INTEGRAL OSA VNC INTEGRAL VNC based datalab with the OSA 11 analysis environment and its GUI for interactive analysis.	 JWST_General JupyterLab is a web-based interactive computational environment. This version was customized by the JWST mission with additional Python libraries. It is a reference environment for the JWST community.	 NCTEST Test	 PSA JupyterLab A JupyterLab based DataLab custom built for working with planetary science data in the Planetary Science Archive (PSA).	 Pyxel datalab Pyxel is a novel, open-source, modular Python software framework designed to host and pipeline models (analytical, numerical, statistical) simulating different types of detector effects on images produced by Charge-Coupled Devices (CCD), Monolithic, and Hybrid CMOS imaging sensors.
 TESTMOD1 INTEGRAL Jupyterlab with the OSA 11 analysis environment.	 XMM-SAS21.0.0 XMM-Newton SAS v21.0.0	 YPE24-Euclid Jupyterlab datalab for the YPE Euclid workshop	 YPE_Galaxy_Class Jupyterlab Datalab for the Galaxy classification workshop at YPE2024	 aladin Aladin is an interactive sky atlas allowing the user to visualize digitized astronomical images or full surveys, superimpose entries from astronomical catalogues or databases, and interactively access related data and information from the <i>Simbad</i> database, the <i>VizieR</i> service and other archives for all known astronomical objects in the field.
 filezilla FileZilla	 fv FV - An image display and visualization tool for astronomical data	 jl-esdc-astro JupyterLab with software and example notebooks for ESDC astronomical archives	 jl-esdc-hello JupyterLab is a web-based interactive computational environment for creating notebook documents that allow programming in different languages. This version was customized by the ESDC with additional Python libraries to be a reference environment for Heliophysics research.	 jl-euclid Euclid JupyterLab
 jl-euclid-c11g Euclid Commissioning JupyterLab	 jl-gaia Datalab based on JupyterLab, customized by the Gaia mission with additional Python libraries and other tools to explore the Gaia DR3 catalogue.	 jl-gssc GSSC JupyterLab	 jl-herschel Herschel JupyterLab	 jl-juice JupyterLab with JUICE planetary coverage tool (1.0.0).
 jl-pangaia PanGaia JupyterLab	 jl-pipeman Jupyter lab with pipeman python library.	 jl-pyhc-test Testing pyhc environment	 jl-spice SPICE JupyterLab by the SPICE information system with additional Python libraries complementing some SPICE applications. It is a reference environment >	 jl-xmm-sas Jupyterlab XMM SAS
 jl_democonf This is a JupyterLab demo datalab	 jupyterlab Plain JupyterLab for demonstration of basic functionality.	 jwst Jupyterlab JWST	 jwst-gto-miri Jupyterlab JWST Miricle	 jwst-high-mem copy of Jupyterlab JWST, high memory version for internal use

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filezilla FileZilla	fv FV - An image display and visualization tool for astronomical data	jl-esdc-astro JupyterLab with software and example notebooks for ESDC astronomical archives	jl-esdc-hello JupyterLab is a web-based interactive computational environment for creating notebook documents that allow programming in different languages. This version was customized by the ESDC with additional Python libraries to be a reference environment for Heliophysics research.	jl-euclid Euclid JupyterLab
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jl-pangaia PanGaia JupyterLab	jl-pipeman Jupyter lab with pipeman python library.	jl-pyhc-test Testing pyhc environment	jl-spice SPICE JupyterLab by the SPICE information system with additional Python libraries complementing some SPICE applications. It is a reference environment >	jl-xmm-sas Jupyterlab XMM SAS
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ESA Datalabs [0.13.0/BETA]



HELP

- Introduction
- Login to ESA Datalabs
- Logout from ESA Datalabs
- > Datalabs
 - Data Volumes
 - Workspaces
- > Pipelines
 - Using multiple Data Centres in ESA Datalabs
 - Service Desk and contacts

- > FREQUENTLY ASKED QUESTIONS
- > ACCESS TO ESA DATALABS
- > ASKING FOR HELP OR REPORTING AN ISSUE
- > USING ESA DATALABS
- > COMMON ISSUES AND WORKAROUNDS
- > SECURITY AND ARCHITECTURE

Last updated on
18/06/2024, 14:34

HELP

Here you will find support resources and documentation on using ESA Datalabs. Please browse through the chapters on the left side menu for instructions on how to use and navigate ESA Datalabs.

Below you can find the answers to Frequently Asked Questions. In case your question hasn't been answered or you wish to submit feedback or report an issue, please contact us in the [Service Desk](#).

FREQUENTLY ASKED QUESTIONS

WHAT IS ESA DATALABS?

ESA Datalabs is an e-science platform that allows users to bring their code to ESA's infrastructure and have direct access to ESA's archives. ESA Datalabs are full computational environments and the catalogue of ESA Datalabs ranges from new tools that have become de-facto standard for analysis, to complex legacy systems repackaged to run via a web browser. ESA Datalabs' underlying architecture is domain agnostic; it fosters research and innovation through the integration of transversal access to big data, notebook technologies and domain specific software. For example, customised JupyterLab environments are readily available for astronomers, scientists in Earth Observation related fields, or researchers in global navigation. Moreover, ESA Datalabs support for development environments such as Octave, or reference tools such as TopCat in astronomy that enable reuse of existing code baselines. In addition, ESA Datalabs will soon include full support for pipelines and support for developing datalabs, both of which are currently limited to a smaller group of users for beta testing.

WHAT IS THE CURRENT STATUS OF ESA DATALABS?

ESA Datalabs is under active development as of early 2023. Users should not rely on the platform for operational use since data loss and unplanned downtime may occur.

ACCESS TO ESA DATALABS

HOW CAN I ACCESS ESA DATALABS / HOW DO I CREATE AN ACCOUNT?

To access ESA Datalabs you will need a Cosmos account first. If you do not have a Cosmos account please see the instructions in the [Cosmos FAQ](#). Usually, a Cosmos account is provided because your institution/company is part of a collaboration. If you know the credentials of your Cosmos account, you must first self-register using the [ESA Datalabs Self-Registration](#) tool. If you wish to recover your Cosmos account credentials read the FAQ item on recovering Cosmos credentials.

ESA DATALABS ASKS FOR A COSMOS ACCOUNT. WHAT IS A COSMOS ACCOUNT AND HOW DO I GET ONE?

Cosmos offers the single sign-on service that provides access to several secure ESA websites and services. If you do not have a Cosmos account please see the instructions in the [Cosmos FAQ](#). Usually, a Cosmos account is provided because your institution/company is part of a collaboration.

ESA Datalabs Community – Today



1200 Registered users

950 Beta Users

60 daily users

- ESA Datalabs Hackathon, Jan 2025
- NLP for Space Science Workshop, Sep 2024
- .Astronomy 13, ESAC 23-26 April 2024
- Masterclass on JWST, ESAC 12 Dec 2023
- JWST Summer School, Heidelberg 4 - 8 Sept 2023
- Euclid Workshop, Copenhagen 21 - 22 Jun 2023
- ESA Datalabs Workshop, ESAC 24 - 25 Nov 2022

