



ESCAPE

European Science Cluster of Astronomy &
Particle physics ESFRI research Infrastructures

EOSC Activities in Astronomy and Astrophysics. The ESCAPE project

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OUTLINE

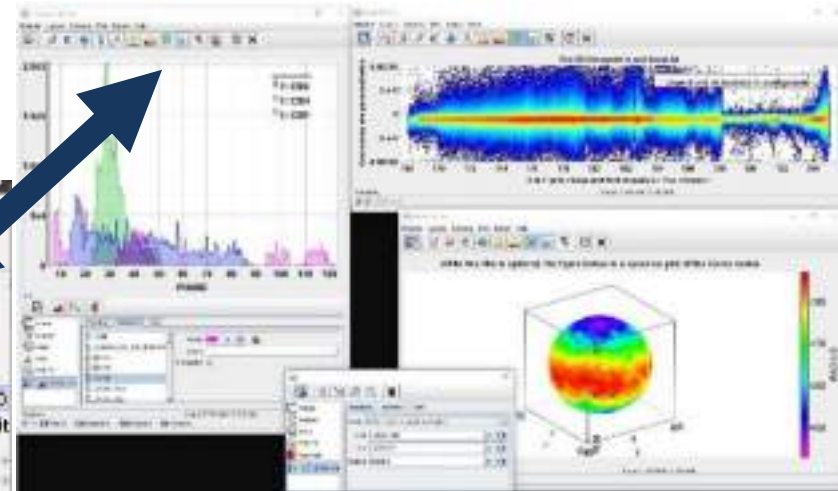
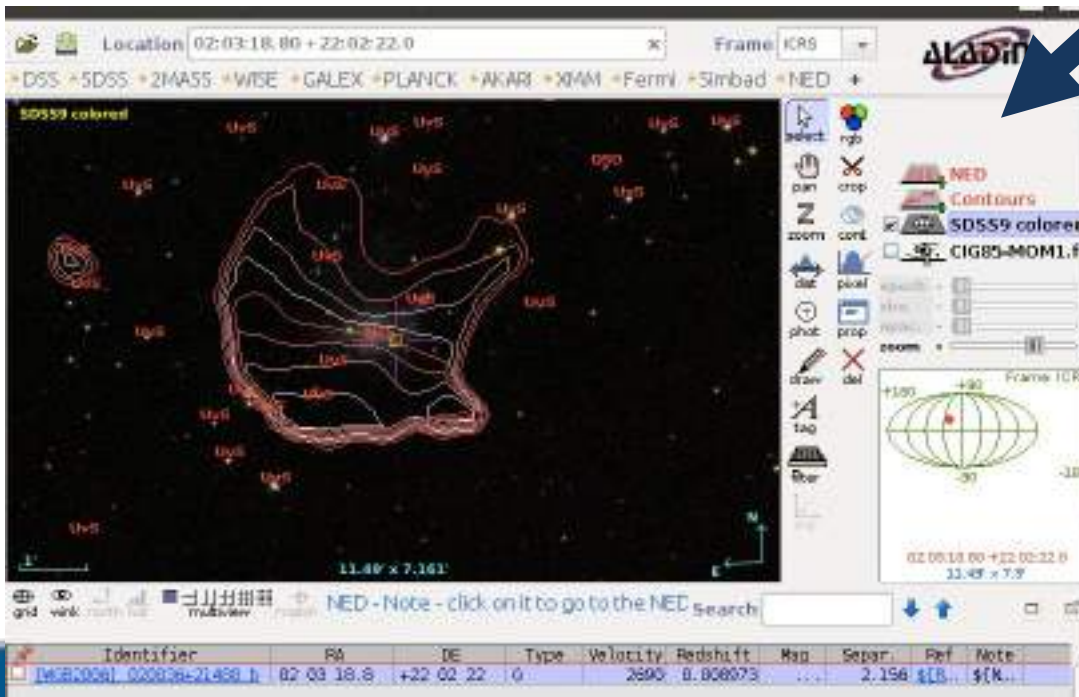
- Highlights of Open Science in A&A before EOSC
- The ESCAPE consortium
- ESCAPE services
 - CEVO
 - DIOS
 - ESAP

Highlights of Open Science in A&A before EOSC

International Virtual Observatory Alliance

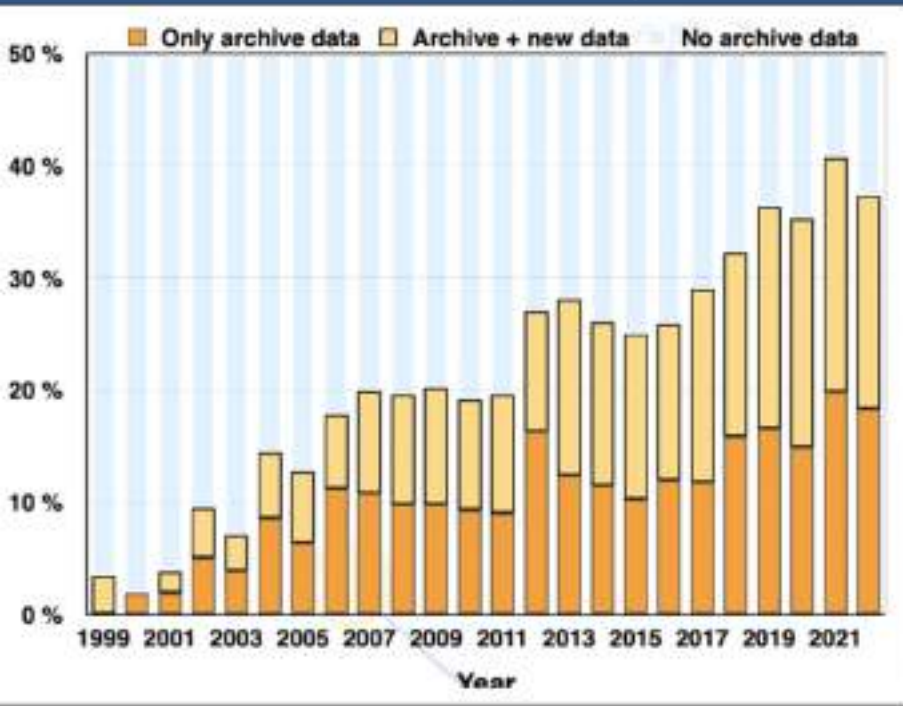


- Bottom-up initiative from 2001
- Pioneer in Open data sharing
- Coordinated in Europe by Euro-VO
 - National VO partners
 - EC Projects: ASTERICS , ESCAPE



Source: *Batiste Rousseau, Stéphane Énard*

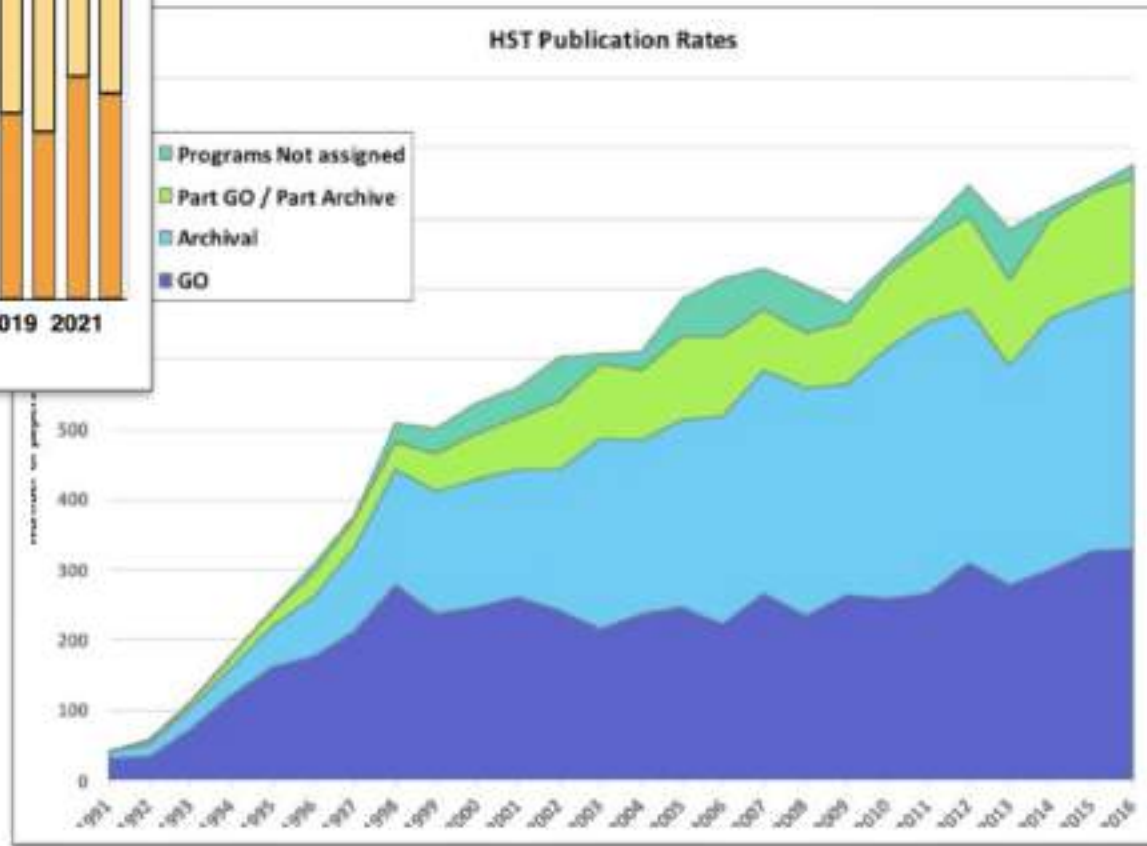
Highlights: Opening A&A data



- Data are preserved in archives
- Published after an embargo period
- Culture of re-using data

Source: M. Romaniello's talk "The VO-Service at ESO". ESO Telescope Bibliography

Enhancing the scientific returns from investments in astronomical infrastructures



Source: 10.1051/epjconf/201818610003

A&A Workflows, Research Objects

Just some examples to show the early engagement of the A&A community with the Open Science



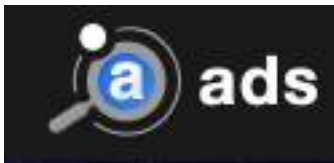
“Astrophysics Source Code Library”. Funded in 1999



FP7-270192 “Advance Workflow Preservation Technologies for Enhanced Science” (2010-2013)



FP7-312579 “Building an European Research Community through Interoperable Workflows and Data” (2012-2014)



Astrophysics Data System by NASA. Linking publications to data



ESCAPE

Consortium:



Source: <https://projectescape.eu/sites/default/files/2022-04-12%20%E2%80%94%20CiMMA%20Webinar.pdf>

- Budget: **15.98 M€**
- From **Feb. 2019** until **Jan. 2023 (extended)**
- Coordinator: **CNRS-LAPP**

ESCAPE SERVICES



Credit: ESCAPE

CEVO - Connecting ESFRI projects to EOSC through the VO framework

- New / Updated standards to support a wider community
- ESFRI data published according to FAIR principles through the VO
- Community training: data providers and scientists
- IVOA Registry into EOSC via EUDAT B2FIND

The image shows a screenshot of the EUDAT B2FIND website. The top navigation bar includes 'DATA CATALOGUE', 'REPOSITORIES', 'COMMUNITIES', and 'FOR PROVIDERS'. Below this, there are sections for 'FOR USERS' and 'ABOUT'. The main content area displays search results for 'ivoa alma', showing '410 datasets found'. A sidebar on the left offers filters for 'Spatial Coverage', 'Temporal Coverage', 'Publication Year', 'Repositories', 'Communities', 'Keywords', 'Credit', 'Instruments', and 'Disciplines'. The right side of the image shows a detailed view of a dataset titled 'ALMaQUEST. IV. ALMA-MaNGA QUEnching & star formation'. This view includes a description of the survey, a list of keywords, and a table of identifiers.

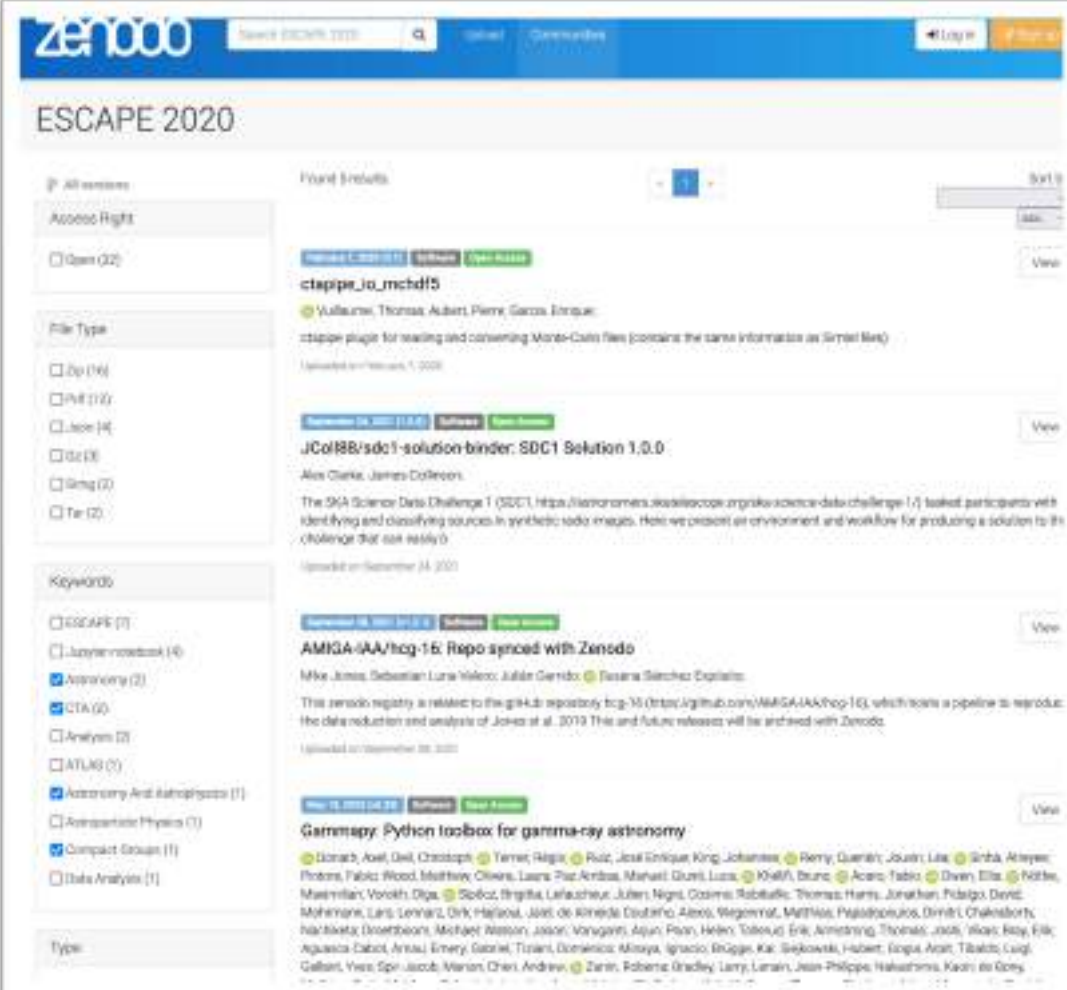
Identifier	Value
DOI	https://doi.org/10.26434/chemrxiv-2020-114
Source	https://www.ivoa.net/documents/2016/06/20160601_14/
Related Identifier	https://www.ivoa.net/documents/2016/06/20160601_14/
Metadata Address	https://www.ivoa.net/documents/2016/06/20160601_14/

OSSR – Open-Source Scientific Software and Service Repository

- Curated Zenodo community:
- <https://zenodo.org/communities/escape2020>
- Integrated with several tools to enable a complete software life-cycle

e.g

Integration with ESAP for software execution (next slides)



The screenshot displays the Zenodo website interface. At the top, the Zenodo logo is visible on the left, and search, login, and community links are on the right. The main heading is 'ESCAPE 2020'. Below this, there are filters for 'All versions', 'Access Right' (with 'Open (32)' selected), and 'File Type' (listing various file formats like DoI, PDF, JSON, etc.). A 'Keywords' section lists terms like 'ESCAPE (1)', 'Jupyter notebook (4)', 'Astronomy (2)', 'CTA (0)', 'Analysis (2)', 'ATLAS (1)', 'Astronomy And Astrophysics (1)', 'Astroparticle Physics (1)', and 'Compact Groups (1)'. The 'Type' filter is also present. The search results list several items:

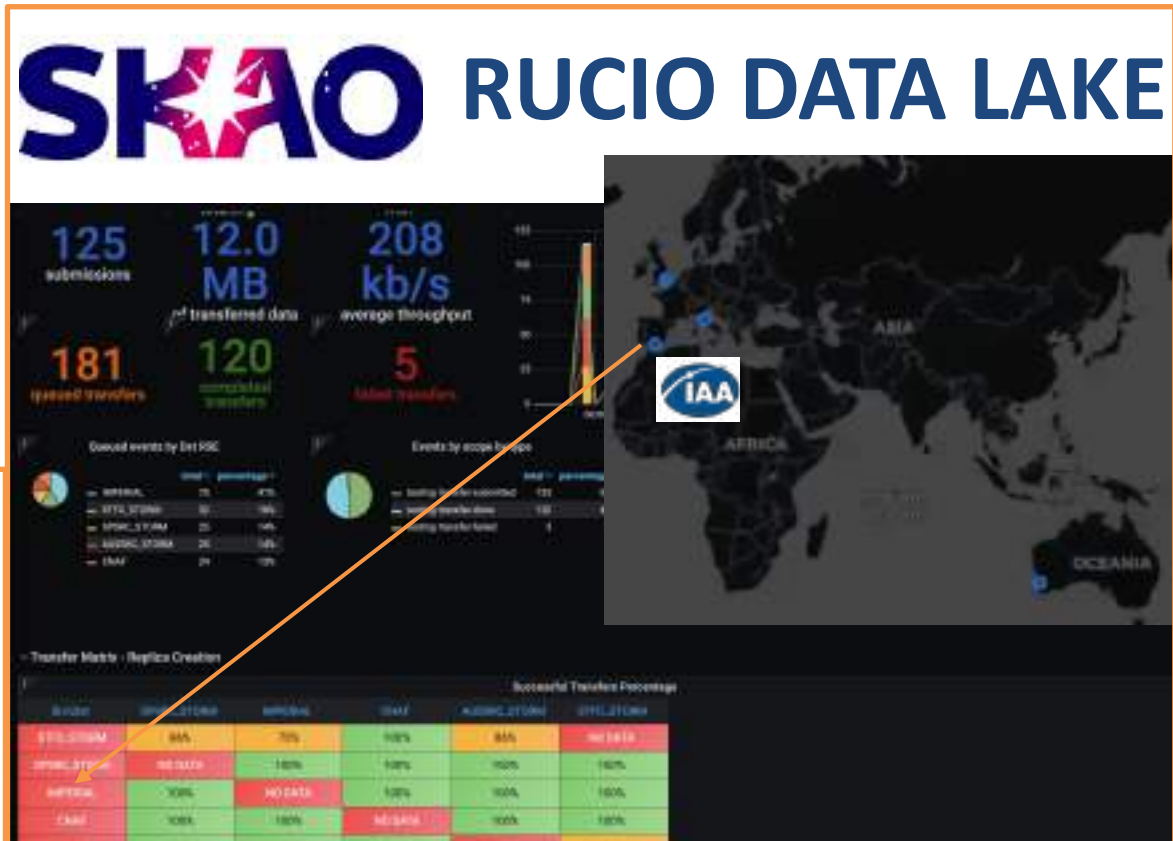
- ctape_io_mchd15** by Vučković, Thomas; Aubert, Pierre; Garcia, Enrique. Description: ctape plugin for reading and converting Mongo-Cahn files (contains the same information as Smallfile). Updated on November 1, 2020.
- JCOBB/sdc1-solution-binder: SDC1 Solution 1.0.0** by Alice Clarke, James Doleiron. Description: The SKA Science Data Challenge 1 (SDC1, https://astronomers.skatelescope.org/ska-science-data-challenge-1/) tasked participants with identifying and classifying sources in synthetic radio images. Here we present an environment and workflow for producing a solution to the challenge that can easily be... Updated on September 24, 2020.
- AMIGA-IAA/hcg-16: Repo synced with Zenodo** by Mike Jones, Sebastian Luna-Velez, Julian Gerardo, Jessica Sanchez-Expósito. Description: This zenodo registry is related to the github repository hcg-16 (https://github.com/AMIGA-IAA/hcg-16), which hosts a pipeline to reproduce the data reduction and analysis of Jones et al., 2019. This and future releases will be archived with Zenodo. Updated on September 20, 2020.
- GammaPy: Python toolbox for gamma-ray astronomy** by Ulrich, Axel; Ouel, Christophe; Yarnik, Rigis; Ruiz, José Enrique; King, Johannes; Perry, Quentin; Joshi, Lita; Sinha, Atayen; Pridem, Fabio; Wood, Matthew; Oliver, Laura; Paz-Ambro, Manuel; Guzmán, Luis; Kharif, Bruno; Acaro, Fabio; Divan, Elita; Köhler, Maximilian; Vorokh, Dima; Sobol, Brigitte; Lefebvre, Julien; Nigri, Cosimo; Robitaille, Thomas; Harris, Jonathan; Pálaga, David; Mihomiro, Lars; Lennarz, Dirk; Hajdú, János; de Almeida, Douglas; Alencar, Wegmann; Mathias, Pappalopoulos; Dimitri, Chakraborty; Bartkova, Dorethea; Michael, Watson; Jovan, Vargyas; Agujar, Pinar; Helen, Tobias; Erik, Armstrong; Thomas, Jack; Akar, Bay; Erik, Agustín; Cabot, Anna; Emery, Gabriel; Tiziani, Domenico; Minaya, Ignacio; Brüggel, Kai; Siekowitz, Hubert; Gogus, Arsen; Tibaldo, Luigi; Gallart, Vera; Spruiell, Jacob; Varian, Chris; Andrew, Zarin; Roberts, Bradley; Larry, Larain; Jean-Philippe, Hachisima; Kachi, de Gony...

DIOS – Data Infrastructure for Open Science

Distributed data infrastructure capable of managing Exa-scale data



- Data manager and orchestrator
- Data transfer
- Auth/Authz/IM



ESCAPE DL architecture applied to implement a Data Management System prototype for the SKA Regional Centre Network

ESAP – ESFRI Science Analysis Platform

Toolkit for building custom science platform.

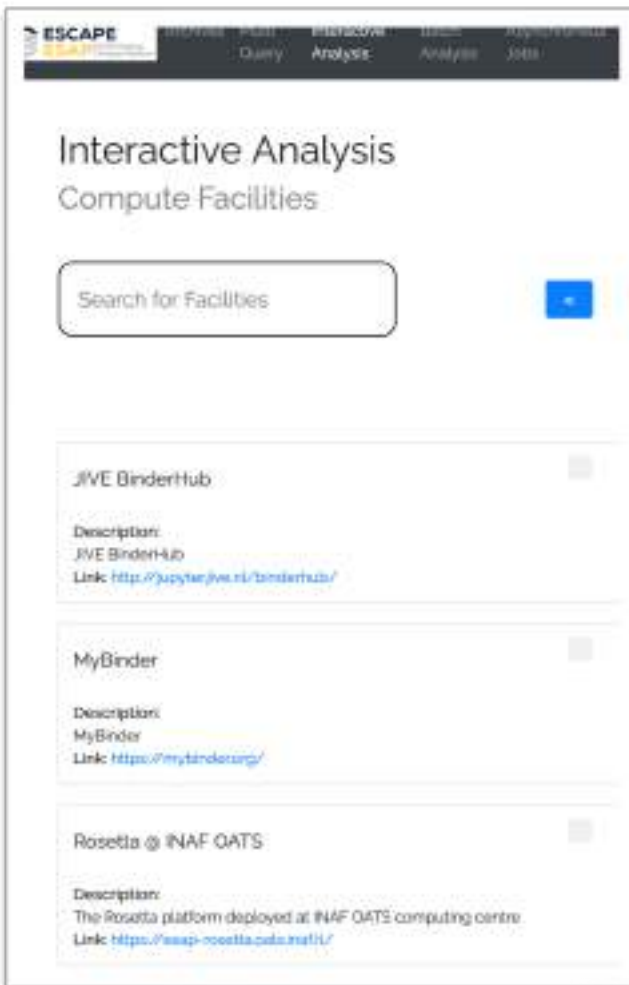
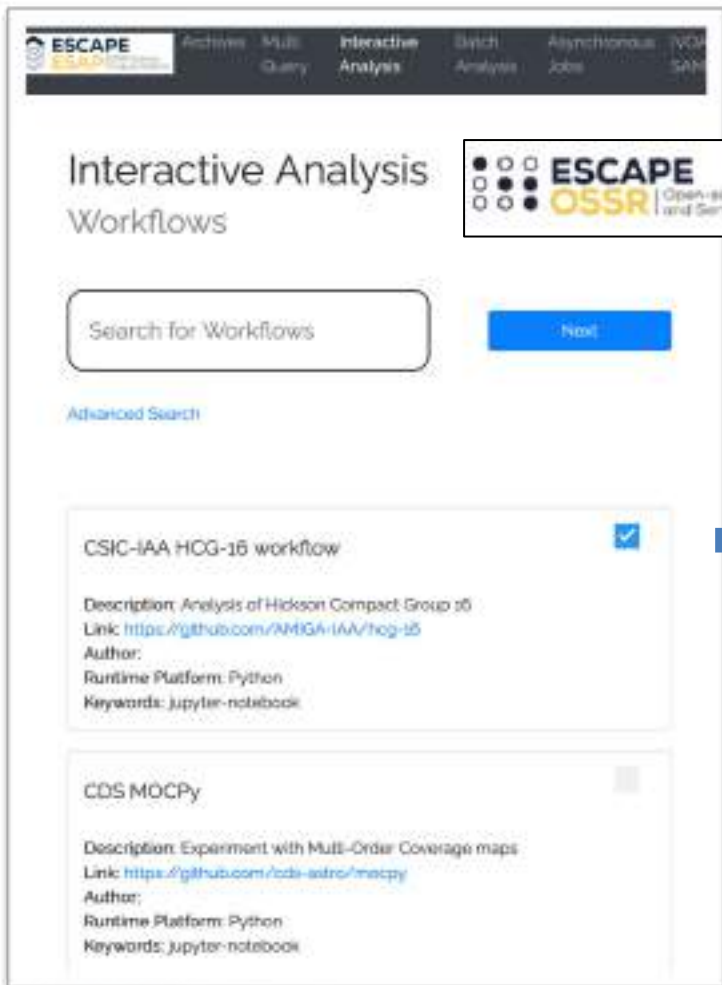
- Integration of catalogue services
- Upload of data from the VO ecosystem (SAMP)
- Data orchestration among different services

The screenshot displays the ESAP interface. On the left, there are three service tiles: WSRT-Apertif (Apertif Surveys), ASTRON VO (ASTRON Virtual), and Zooniverse. The main area shows the 'ASTRON Data Explorer' interface with a query form for 'ASTRON VO Data Collection Query'. The query parameters are: Catalog: ASTRON_VO, Target: (empty), RA (degrees): (empty), Dec (degrees): (empty), search radius (degrees): (empty). The 'Astron-VO Collections' dropdown is set to 'lobs-drt'. A 'Submit' button is visible. Below the query form, the 'Query results for ASTRON_VO' are shown in a table with 3 rows and 10 columns. The table includes columns for Basket, Collection, RA, Dec, fov, DataProduct Type, Calibration Level, Size, and Link to data.

Basket	Collection	RA	Dec	fov	DataProduct Type	Calibration Level	Size	Link to data
<input checked="" type="checkbox"/>	lobs-drt	170.4	407	31	image	3	48.5 MB	Download data
<input checked="" type="checkbox"/>	lobs-drt	170.4	407	32	image	3	430.5 MB	Download data
<input checked="" type="checkbox"/>	lobs-drt	172.6	476	33	image	3	53	Download data

ESAP – ESFRI Science Analysis Platform

- Load software from the OSSR catalogue
- Interactive data analysis through BinderHub services



The image illustrates the workflow of the ESAP platform. On the left, the 'Interactive Analysis Workflows' page shows a search for workflows. A blue arrow points from the 'CSIC-IAA HCG-16 workflow' entry to the 'Interactive Analysis Compute Facilities' page on the right. The 'Compute Facilities' page shows a search for facilities and a list of results including JIVE BinderHub, MyBinder, and Rosetta @ INAF OATS.

ESCAPE OSSR Open-source Scientific Software and Service Repository

Interactive Analysis Workflows

Search for Workflows

Advanced Search

CSIC-IAA HCG-16 workflow

Description: Analysis of Hickson Compact Group 16
Link <https://github.com/AMIGA-IAA/hcg-16>
Author:
Runtime Platform: Python
Keywords: jupyter-notebook

CDS MOCPy

Description: Experiment with Multi-Order Coverage maps
Link <https://github.com/cds-astro/mocpy>
Author:
Runtime Platform: Python
Keywords: jupyter-notebook

Interactive Analysis Compute Facilities

Search for Facilities

JIVE BinderHub

Description: JIVE BinderHub
Link <http://jupyter.jive.es/binderhub/>

MyBinder

Description: MyBinder
Link <https://mybinder.org/>

Rosetta @ INAF OATS

Description: The Rosetta platform deployed at INAF OATS computing centre.
Link <https://esap-rosetta.cda.mnl.it/>

THANK YOU!



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References:

- [The ESCAPE project: Data Lake and Science Platform](#), Y. Grange, K. Kliffen, J. Swinbank
- [CEVO achievements and outlook](#), M. Allen
- The ESAP GUI: <https://sdc-dev.astron.nl/esap-gui/>