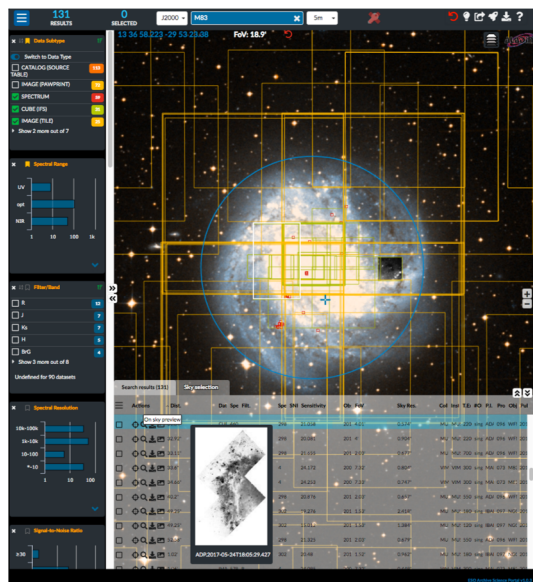




The new Science Portal and the Programmatic Interfaces of the ESO Science Archive

Micol, Arnaboldi, Delmotte, Forchi, Fourniol, Hainaut, Lange, Kahn Ahmed, Mascetti*, Retzlaff, Romaniello, Sisodia**, Spiniello, Steller***, Stoehr, Vera, Zampieri
European Southern Observatory, *Terma Gmbh, **Pactum Gmbh, ***Tekom Gmbh



In June 2018 the new ESO science archive interfaces have become available to the astronomical community. Powerful new features allow a much richer user experience than ever before. Two are the main components: the interactive web access, i.e. the so-called Science Portal, and the VO-based programmatic and tool access.

The ESO Science Portal
<http://archive.eso.org/scienceportal>

The Science Portal is an Angular web application talking to ElasticSearch, based on Luene, via an in-house developed Astros plugin. Graphically, it consists of a top bar, always on, with the most common controls and options, and 3 views:
- the sky view (Aladin Lite, CDS), in the centre,
- the tabular view, at the bottom,
- the aggregation view, on the left
Each of the views can be hidden or expanded to full screen using the arrow buttons.

Left picture Footprints of data products intersecting the specified cone around M83 are displayed in the sky view, superimposed to the DSS-colour HiPS; the tabular component has various controls, e.g. to get to the dataset details, or to display the preview of the data of interest: shown are the resulting 'sky preview' of an image (in the sky view, right of centre), and the 'mouse-hover' preview.

Aggregation view expanded to full-screen to inspect a glance the multi-dimensional query space in terms of up to seventeen one-dimensional distributions. They include physical parameters like sensitivity and signal-to-noise ratio, alongside more 'traditional' ones like programme ID or instrumental setup. Users can easily interact with any list or histogram to add or remove search constraints and to tune queries in an iterative fashion.

Any change of the user's inputs triggers a new query, which results in a new computation, and redrawing, of all the components, for a very dynamical user experience.

In the top bar, the bookmark button can be used to create a bookmark representing the entire page status. That URL can be saved or passed along to colleagues. The broadcast button can be used to broadcast (via SAMP) the table of results to VO-aware tools (e.g. TOPCAT). The social platform button brings you to the ESO Community Forum, our new social platform (see here below).



The direct database and Virtual Observatory access

The Science Portal presents a pre-defined query model, currently only based on the processed data. What if you want to perform more complex queries, or access other kinds of data?

- Q: Do you need to perform complex queries, e.g.:
 - queries with sequences of logical operators (OR, NOT, AND)
 - queries joining different tables, maybe using sophisticated spatial queries?

A: Our new direct database access layer allows that. This has been achieved via the implementation of the Astronomical Query Data Language (AQDL) and some VO protocols: TAP v1.0, DataLink v1.1, SSA v1.1. The spatial capabilities of ADL are fully supported by the adopted DBMS (MS SQL Server) when searching for processed data.

Q: Do you need access to processed data, raw data, ambient data, or even to the scientific catalogs produced by the PIs of ESO programmes?
A: Via TAP, you have access to all those data: use the tap_obs end point for the observed data, and tap_cat for the scientific catalogs. Note: tap_cat is based on SYBASE IQ and does not support the full spatial capabilities.

Q: Do you prefer to access the ESO science archive using a specific tool?
A: The provided layer allows the various VO-aware tools to access the science archive directly, for example: TOPCAT, Aladin, SPLAT-VO.

Q: Do you need to script your repetitive queries to the ESO science archive?
A: You now script your access using externally-developed common software libraries and packages, e.g. pyvo (python), stits (java).

Q: Are you an astronomer that wishes to perform some TAP queries?
A: You are a developer that wishes to programmatically interact with the ESO science archive?

Do you want to learn how to?
A: A dedicated page demonstrates how to access programmatically or via tools the new ESO science archive interfaces. Extensive documentation is provided in terms of practical examples (AQDL queries, Python pyvo scripts, how to submit/manage asynchronous queries, etc.), which you can use, customize, and adapt to your specific needs.
<http://archive.eso.org/programmatic/>
All VO end points and services are registered at the <http://registry.euro-vo.org/> under the ivo://eso.org/ authority. All VO IDs are of the form: ivo://eso.org/

Science Portal: In this first release, processed data from the La Silla Paranal Observatory (LPO) are supported. Future plans include expanding the support to ALMA processed data, and raw data from the LPO. It is planned that these new access points will gradually replace the current ones for La Silla Paranal data, while ALMA will keep maintaining a dedicated, separate access.

Programmatic Layer: New functionalities and VO standards will be implemented in the next release, for example: SODA to support a to-be-developed cutoff service, the TAP_UPLOAD feature, etc.

 amicol@eso.org

The ESO Community Forum

<https://esocommunity.userecho.com/>

can be used to share ideas, ask questions on both the Science Portal and the Programmatic components.



Science Archive Programmatic and Tools Access

The purpose of this page is to help you to learn:

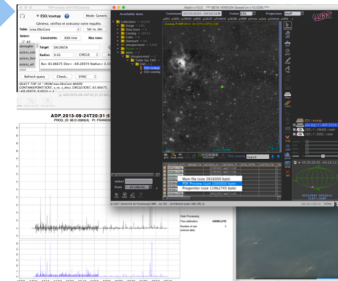
1. how to compose URLs to interact with the different ESO science archive services, either programmatically or via tools;
2. how to construct queries to interrogate the various database tables of the ESO science archive, using AQDL and TAP;
3. how to put it all together and script your access to the ESO science archive, using the pyvo python module.

If some terms in this page are not familiar to you, please read the overview page first.

In this page: [parent click here to read the page description...](#)

Example of a TAP/AQDL query to ESO (ObsCore)

executed directly from within a tool (Aladin, CDS, top left); the resulting footprints are displayed within Aladin; the table shows the query results, a pull down menu generated from a DataLink query for the chosen record shows various download options; the user decided to display the PDF preview of a spectrum (bottom left)



This page is organized in 7 tabs. You'll have to click on a tab to see its content:

In the Query I TAP service tab you can learn how to write and execute a query to the ESO databases. Queries must be written in the Astronomical Query Data Language (AQDL) to learn the AQDL syntax, a subsection menu (Choose a query...) provides you some pre-processed query examples; you can modify them as well, add/delete them, and/or execute them. Queries can be saved either synchronously, or, for more complex and slower queries, they can be saved asynchronously. The link to the ESO TAP Query Manager is provided, to allow you to learn how to control the ESO asynchronous jobs. Detailed characteristics are provided in help formatting/awaresign/compatibility manual, in which case the query validator and the provided query examples are not guaranteed to work.

In the Query I TAP service tab you can learn how to configure your VO-aware tools (TOPCAT and ALADIN) to make use of the new ESO interfaces; in a second stage, when the ESO VO interfaces will have been registered in the EUROVO registry, the tools will be already aware of the ESO interfaces; if that is not the case you can check it at any time the status of the job, when the job is successfully completed, you can fetch the data.

In the Query I TAP service tab you can learn how to interact with the ESO Science Archive at the level of an individual dataset, recognized by its unique identifier (ID). Once you provide an ID, by clicking on the provided button you can get to its preview, metadata (associated), or download the main science file and/or its associated file (dataset), etc. with the checkbox Show URL, only activated, the active's URL is only displayed, and not actually returned, so it allows you to learn how you can construct the various service URLs for an acquisition or via tools.

The VO standards and software tools that the astronomical and software teams only with the ESO programme and tool access is based. Links to the standards are provided. Links to the software libraries available on GitHub are provided.

The Change Log tab lists all the changes to the programmatic and tool interfaces that could affect your projects or anyone your way of accessing the ESO science archive via TAP, SAMP or via one of the URLs specified in the Learn dataset table. Keep an eye on it to make sure you are up-to-date with the new releases and still following/interacting with the ESO Science Archive.