

The ESO Science Archive

Martino Romaniello, Alberto Micol

ESO

Public

The ESO Science Archive: your source of data

INTRODUCTION



ESO's *raison d'être* Then...

“ESO's *raison d'être* is the provision of telescope time [...] the core is the number of nights during which the visiting astronomer has control”

van der Laan 1988, *The Messenger*, 51, 1

ESO's raison d'être ...and now

“The telescopes are operated within an end-to-end process which starts with proposal solicitation and ends with data preservation and publication [...] ESO supports an open data policy”

ESO Optical/Infrared Telescopes Science Operations Policies, 2020, Cou-1847

- ESO Science Archive (today)
- Data processing (tomorrow, but hands-on already today)



Outline for today

The ESO Science Archive

- The ESO Science Archive is **the** access point to your data!

archive.eso.org

- Interactive web access (Martino)
- Direct and scripted database access (Alberto)



archive.eso.org

Science Archive Facility

- Data Portal
- ESO Data
- Hubble Space Telescope Data
- Virtual Observatory Tools
- Catalogues, Plates and DSS
- Tools and Documentation
- Related External Services
- ESO & HST Image Galleries
- News and Updates
- FAQ
- ESO Data Access Policy

Warning!!

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Please be informed that due to measures on COVID-19 pandemic adopted at ESO, Science Operations have been paused at all sites in Chile since 23rd March 2020. [More detail...](#)

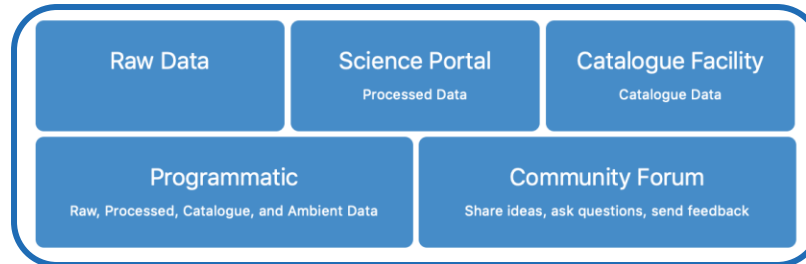
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Browsing the archive does not require authentication. Please [acknowledge the use of archive data](#) in any publication.

There are three main ways to access the archive, varying for content and presentation/interface: the usual Raw Data query form, the innovative Science Portal to browse and access the processed data, and the novel Programmatic and Tools access which permits direct database access to both raw and processed data, and to the ambient condition measurements, also in a scriptable and VO manner. Other query forms are available in the table at the bottom of this page.



Latest News and Updates

- [ESPRESSO commissioning data release \(03 Sep 2020\)](#)
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[More news ...](#)

To browse the archive

Currently, **raw data** and various types of **data products** can be reached via different interfaces:

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LPO Raw Data	Raw data query form (all instruments) Instrument specific query forms Direct retrieval of raw data by file name	All ESO raw data	Various	Many La Silla Paranal instruments
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Interactive access from a browser

- 1. RAW DATA**
- 2. PROCESSED DATA**
- 3. SOURCE CATALOGUES**
- 4. COMMUNITY FORUM**

Interactive access from a browser

1. RAW DATA



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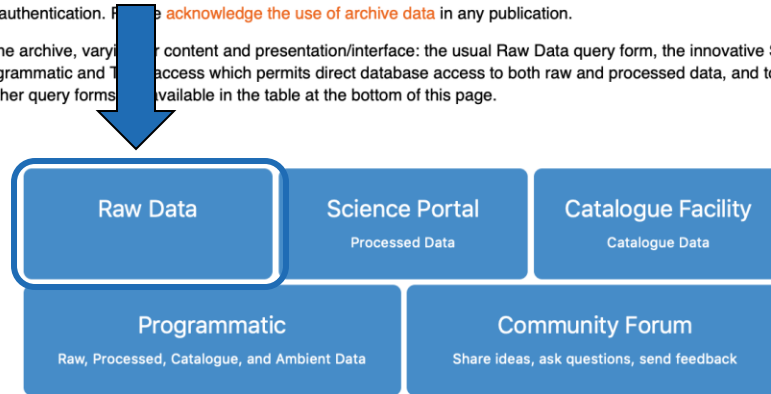
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Raw data

Target, Program, and Scheduling Information

Target Name Resolved by SIMBAD

RA **DEC** **J2000**

Search Box **Input**

Output

List of Targets no file selected

Night (YYYY MM(M) DD)

Otherwise give a query range using the following start/end dates:

Start **End**

Program ID

PI CoI

Title

Program Type

SV

Observing Information

Imaging	Spectroscopy	Interferometry	Other
<input type="button" value="ALL"/> <input type="button" value="NONE"/> <ul style="list-style-type: none"> <input type="checkbox"/> EFOSC2/LaSilla <input type="checkbox"/> EMMI/LaSilla <input type="checkbox"/> FORS1/VLT <input type="checkbox"/> FORS2/VLT <input type="checkbox"/> HAWKI/VLT <input type="checkbox"/> GROND/LaSilla <input type="checkbox"/> ISAAC/VLT <input type="checkbox"/> NACO/VLT <input type="checkbox"/> OMEGACAM/VST <input type="checkbox"/> SOFI/LaSilla <input type="checkbox"/> SPHERE/VLT <input type="checkbox"/> SUSI2/LaSilla <input type="checkbox"/> TIMMI2/LaSilla <input type="checkbox"/> VIMOS/VLT <input type="checkbox"/> VIRCAM/VISTA <input type="checkbox"/> VISIR/VLT <input type="checkbox"/> WFI/LaSilla 	<input type="button" value="ALL"/> <input type="button" value="NONE"/> <ul style="list-style-type: none"> <input type="checkbox"/> CES/LaSilla <input type="checkbox"/> CRIRES/VLT <input type="checkbox"/> EFOSC2/LaSilla <input type="checkbox"/> EMMI/LaSilla <input type="checkbox"/> ESPRESSO/VLT <input type="checkbox"/> FEROS/LaSilla <input type="checkbox"/> FORS1/VLT <input type="checkbox"/> FORS2/VLT <input type="checkbox"/> GIRAFFE/VLT <input type="checkbox"/> HARPS/LaSilla <input type="checkbox"/> ISAAC/VLT <input type="checkbox"/> KMOS/VLT <input type="checkbox"/> MUSE/VLT <input type="checkbox"/> NACO/VLT <input type="checkbox"/> SINFONI/VLT <input type="checkbox"/> SOFI/LaSilla <input type="checkbox"/> SPHERE/VLT <input type="checkbox"/> TIMMI2/LaSilla <input type="checkbox"/> UVES/VLT <input type="checkbox"/> VIMOS/VLT <input type="checkbox"/> VISIR/VLT <input type="checkbox"/> XSHOOTER/VLT 	<input type="button" value="ALL"/> <input type="button" value="NONE"/> <ul style="list-style-type: none"> <input type="checkbox"/> AMBER/VLTI <input type="checkbox"/> GRAVITY/VLTI <input type="checkbox"/> MATISSE/VLTI <input type="checkbox"/> MIDI/VLTI <input type="checkbox"/> PIONIER/VLTI <input type="checkbox"/> VINCI/VLTI <p>Polarimetry</p> <input type="button" value="ALL"/> <input type="button" value="NONE"/> <ul style="list-style-type: none"> <input type="checkbox"/> EFOSC2/LaSilla <input type="checkbox"/> FORS1/VLT <input type="checkbox"/> FORS2/VLT <input type="checkbox"/> ISAAC/VLT <input type="checkbox"/> NACO/VLT <input type="checkbox"/> SOFI/LaSilla <input type="checkbox"/> SPHERE/VLT <p>Coronagraphy</p> <input type="button" value="ALL"/> <input type="button" value="NONE"/> <ul style="list-style-type: none"> <input type="checkbox"/> EFOSC2/LaSilla <input type="checkbox"/> NACO/VLT <input type="checkbox"/> SPHERE/VLT <input type="checkbox"/> VISIR/VLT 	<input type="button" value="ALL"/> <input type="button" value="NONE"/> <ul style="list-style-type: none"> <input type="checkbox"/> APICAM/Paranal <input type="checkbox"/> BOL/APEX <input type="checkbox"/> HET/APEX <input type="checkbox"/> LGSF/VLT <input type="checkbox"/> MAD/VLT <input type="checkbox"/> MASCOT/Paranal <input type="checkbox"/> WFCAM/UKIRT <p>Sparse Aperture Mask</p> <input type="button" value="ALL"/> <input type="button" value="NONE"/> <ul style="list-style-type: none"> <input type="checkbox"/> NACO/VLT <input type="checkbox"/> SPHERE/VLT <input type="checkbox"/> VISIR/VLT

Category

- SCIENCE
- CALIB
- ACQUISITION

Data Product Info

Type

User defined input:

Mode

User defined input:

Dataset ID

Orig Name

Release Date

OB Name

OB ID

TPL START

Instrumental Setup

TPL ID

Exptime

Filter

Grism

Grating

Slit

Instrument & Mode

Interactive access from a browser

2. PROCESSED DATA: THE ARCHIVE SCIENCE PORTAL



archive.eso.org

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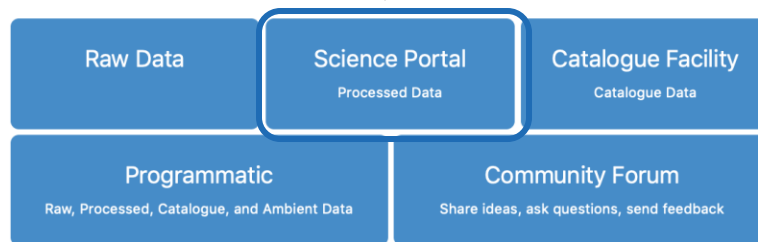
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The Archive Science Portal

3071357 DATASETS 0 SELECTED J2000 Target Radius Spat.Rel.

15 58 22.035 -14 09 58.71 FoV: 175.69°

Observatory

- La Silla Paranal APEX 2778228
- ALMA 293129

Data Type

Switch to Data Subtype

- SPECTRUM 1742414
- IMAGE 659007
- CATALOG 392976
- CUBE 273938
- VISIBILITY 3022

Spectral Range

Undefined for 26 datasets

Filter/Band

- Ks 435147
- I 292015

Datasets Skyselection

Actions	Data Type	Spec.Range	Spec.Res.	SNR	Sens.(AB mag)	Obs.Date	FoV
<input type="checkbox"/>	CUBE	475-935.2 nm	3027	23.426		2020-03-22 08:00:58	1.52'
<input type="checkbox"/>	CUBE	475-935 nm	3027	23.842		2020-03-21 06:02:52	1.51'
<input type="checkbox"/>	CUBE	475-935 nm	3027	24.399		2020-03-20 01:37:03	1.52'
<input type="checkbox"/>	CUBE	475-935.2 nm	2595	58.414		2020-03-17 08:04:27	16.1"
<input type="checkbox"/>	CUBE	475-935.2 nm	2595	57.865		2020-03-17 07:13:51	16"
<input type="checkbox"/>	CUBE	475-935 nm	3027	23.834		2020-03-17 01:15:16	1.53'

ESO Archive Science Portal v2.0.2



The Archive Science Portal





The Archive Science Portal

- Allows to mix and match data from different origins and wavelengths
- Identify data based on their properties for genuinely new science cases

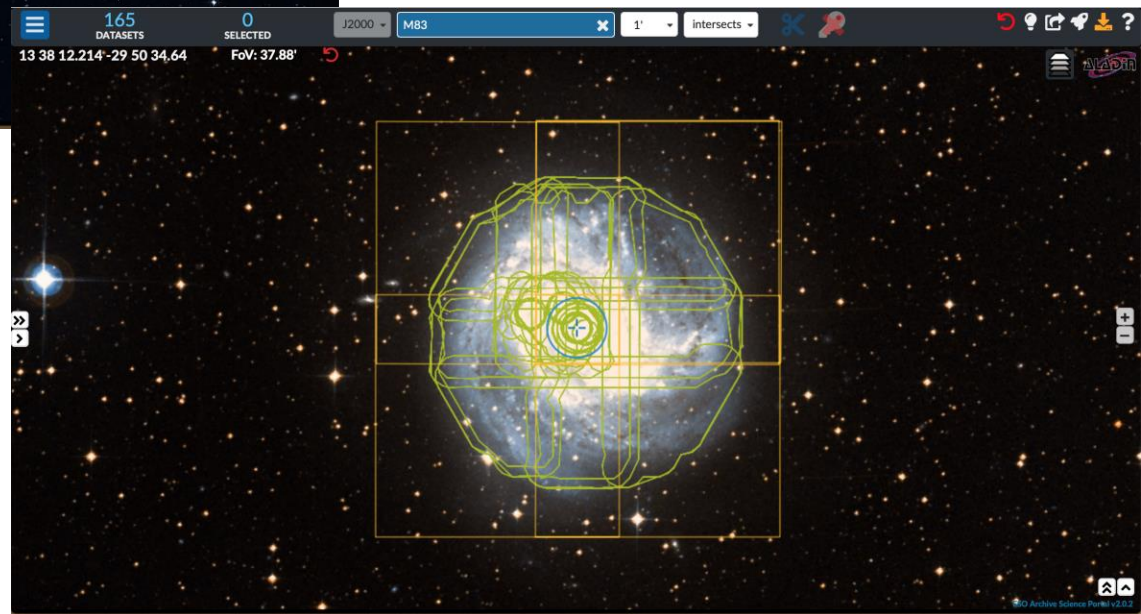
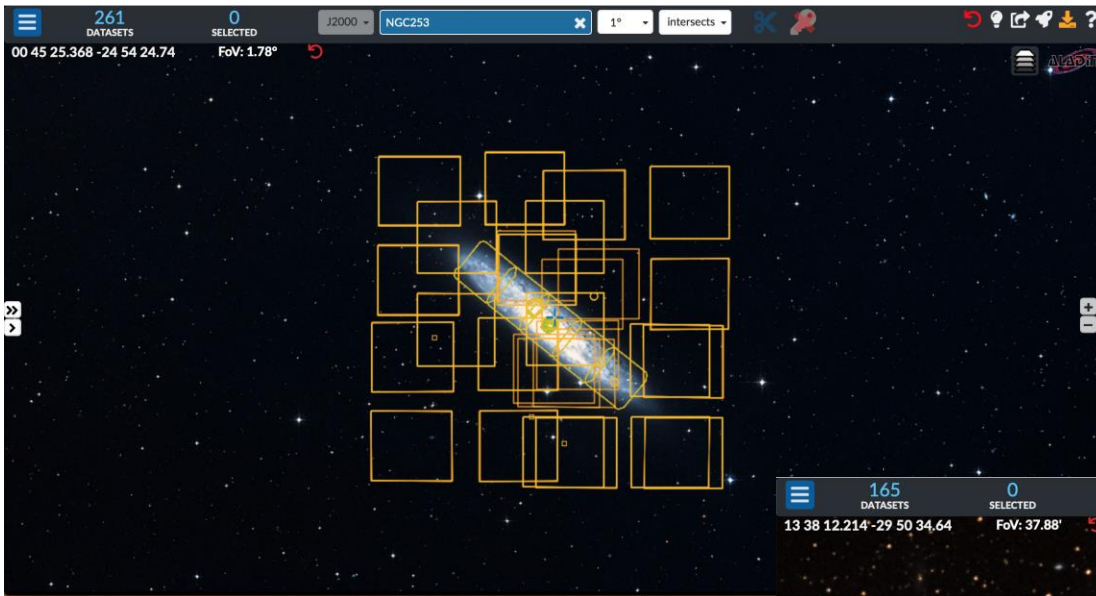


Interactive access from a browser

ARCHIVE SCIENCE PORTAL: CONTENT



La Silla Paranal *and* ALMA data



Types of processed data

- Images
- Spectra
- Cubes
- Flux maps
- Visibilities
- Source catalogues
- Light curves



VHS: the VISTA Hemisphere Survey

458782 DATASETS 0 SELECTED J2000 Target Radius Spat.Rel. 17 09 9.561 -39 35 16.64 FoV: 180°

The whole Southern Hemisphere in the infrared

ESO Archive Science Portal v2.0.2



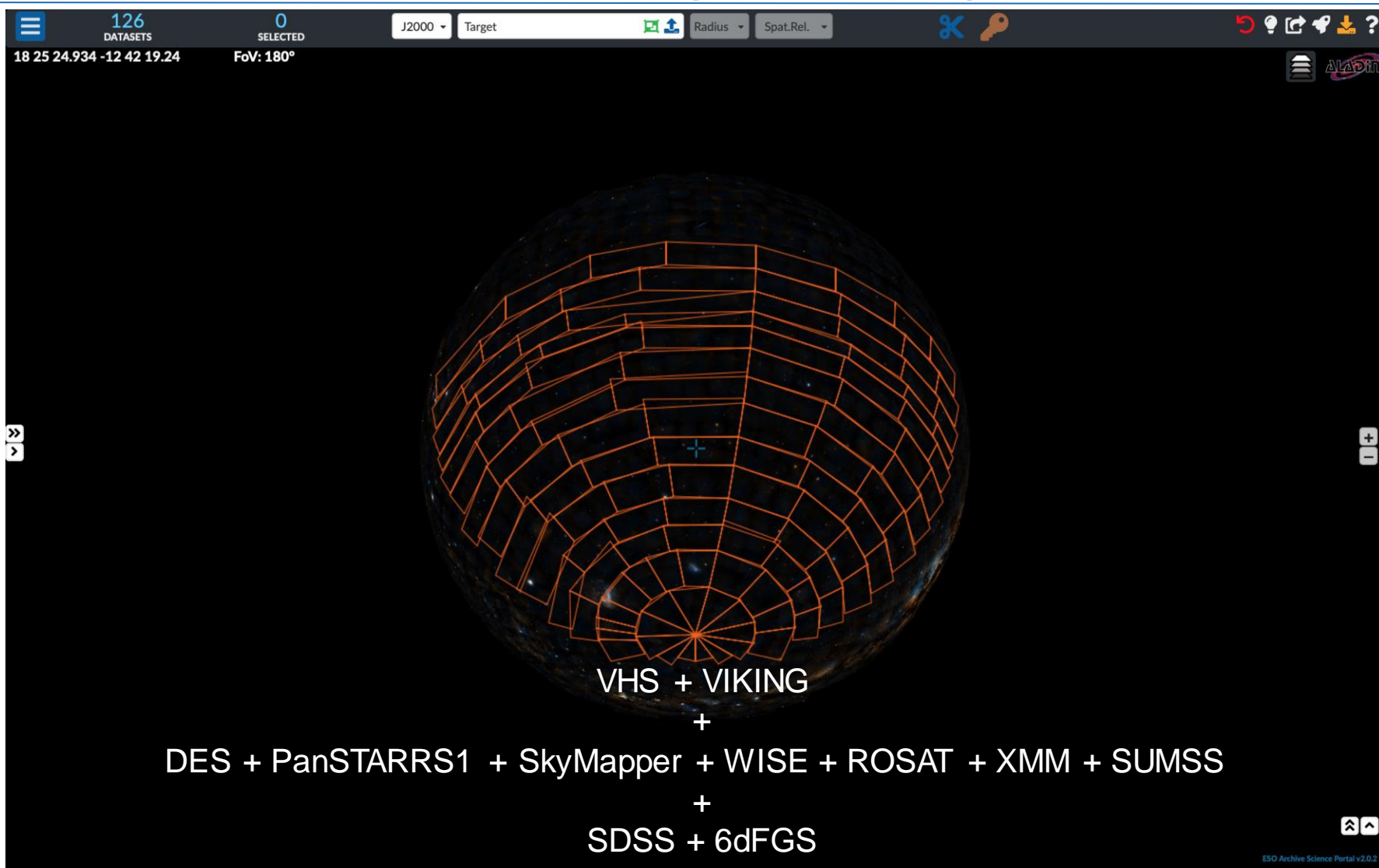
UltraVISTA

The screenshot displays the UltraVISTA software interface. At the top, it shows the selected target 'J2000' with coordinates '10 07 12.620 +02 50 23.51' and a field of view 'FoV: 5.46°'. The left sidebar contains several control panels: 'Observatory' (La Silla Paranal APEX), 'Data Type' (CATALOG, IMAGE), 'Spectral Range' (graph), 'Filter/Band' (H, J, Y, Ks, NB118), 'Spectral Resolution' (graph), 'Signal-to-Noise Ratio' (No data to display), and 'Sensitivity (AB mag)' (graph). The main window shows a star field with a zoomed-in region outlined in orange. The bottom right corner features the ESO Active Science Portal v2.0.2 logo.

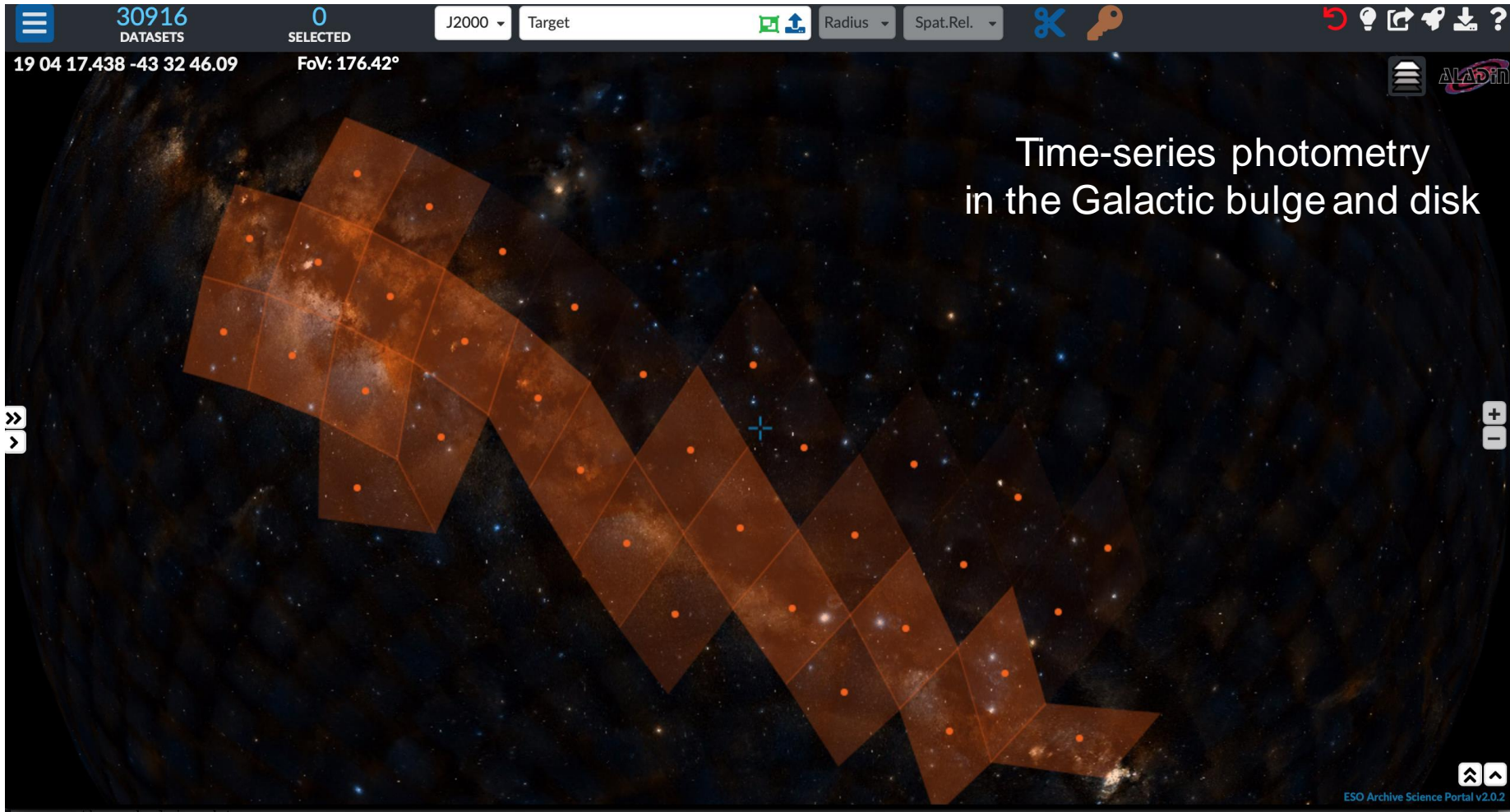
Ultra-deep pencil-beam IR imaging
of the COSMOS field



VEXAS: the VISTA EXtension to Auxiliary Surveys

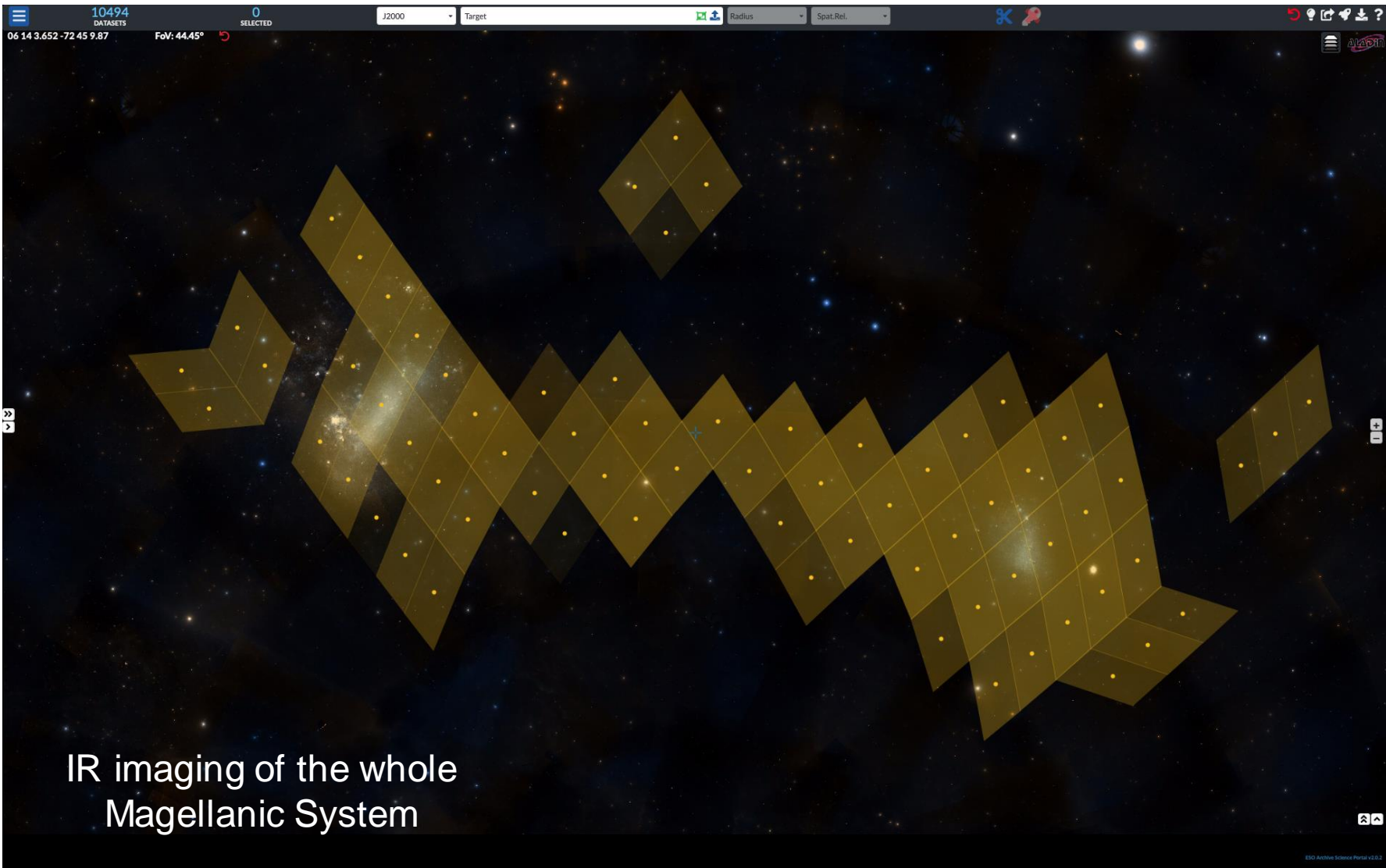


VVV: Variable Stars in the Via Lactea





VMC: VISTA Magellanic Clouds





MXDF: The MUSE eXtreme Deep Field in the Hubble UDF area

Dataset:
ADP.2019-11-20T14:57:13.894

Position

Object	MXDF
RA (J2000)	03:32:39.30
Dec (J2000)	-27:47:55.3
Galactic longitude	223.54381
Galactic latitude	-54.39278
Sky Coverage	2.3 arcmin ²
Field of View	2.15'
Sky Resolution	0.815"
Pixel Scale	0.2"

Data

Data Type	CUBE (FIS)
Sensitivity (AB mag at 5σ)	26.492
Data Level	3

Energy

Spectral Range	474-935.1 nm
Spectral Resolution (R)	2043

Time

Start of Observation	2018-08-13 07:14:11
End of Observation	2019-01-09 04:50:55
MJD Range	58343.30152-58492.20203
Effective Exposure Time	321693 s
Total Exposure Time	560454 s
Number of Observations	187

Provenance

Principal Investigator	BACON, ROLAND
Program ID	1101.A-0127
Program Title	MXDF: The MUSE eXtreme Deep Field in the Hubble UDF area
Telescope	

Circular Aperture: ϕ 1"

2" 1" 2" 5" 10"
diameter

FoV: 5.99"

J2000 **03 32 39.301 -27 47 5.31** FoV: 2.15'

156 hours of observation
374 input files from 187 OBs

Sum of 19 spaxels centered at 03:32:39.48 -27:47:07.3



The UVES point-source archive

137704 DATASETS 0 SELECTED J2000 Target Radius Spat.Rel.

21 10 41.673 +64 46 37.41 FoV: 180°

20 years worth of high-resolution spectroscopy
...and counting!

ESO Archive Science Portal v2.0.2

Interactive access from a browser

ARCHIVE SCIENCE PORTAL: USER SERVICES



Data previews - I

Dataset: ADP.2017-03-24T13:59:14.977

[FITs Header](#)
[File Download](#)
[Dataset Download](#)
[Printable Preview](#)
[Data Documentation](#)

Position

Object: UDF-08

RA (J2000): 03:32:35.61

Dec (J2000): -27:47:59.0

Galactic longitude: 223.56568

Galactic latitude: -54.40845

Sky Coverage: 2.2 arcmin²

Field of View: 2.11'

Sky Resolution: 0.666"

Pixel Scale: 0.2"

Data

Data Type: CUBE (IFS)

Sensitivity (AB mag at 5σ): 26.232

Data Level: 3

Circular Aperture: ϕ 3"

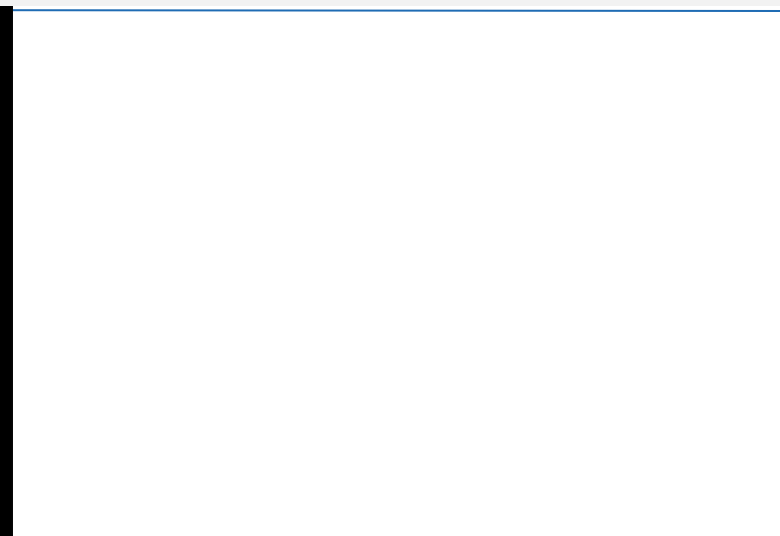
Wavelength: 486.841
Flux: 2.007e+2

Sum of 177 spaxels centered at 03:32:35.75 -27:47:49.3

10⁻¹⁷(-20)^Werg/s/cm²/Angstrom

nm

ESD Archive Science Portal v2.0.2



Header

[File Download](#)
[Dataset Download](#)
[Printable Preview](#)
[Data Documentation](#)

Object: vphas_2240

RA (J2000): 17:57:34.47

Dec (J2000): -37:44:34.4

Galactic longitude: 353.66309

Galactic latitude: -6.61705

Sky Coverage: 0.9 deg²

Field of View: 1.43°

Sky Resolution: 0.505"

Pixel Scale: 0.2133"

Data

Data Type: IMAGE (PAWPRINT)

Sensitivity (AB mag at 5σ): 21.677

Data Level: 2

J2000: 17 57 20.228 -37 38 30.78

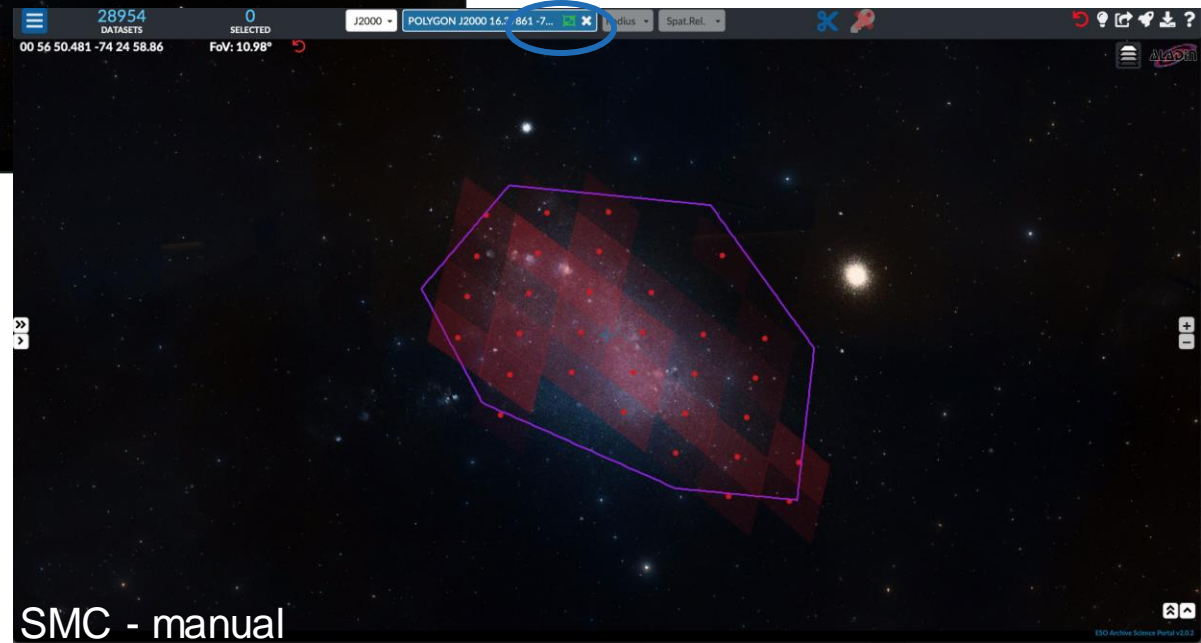
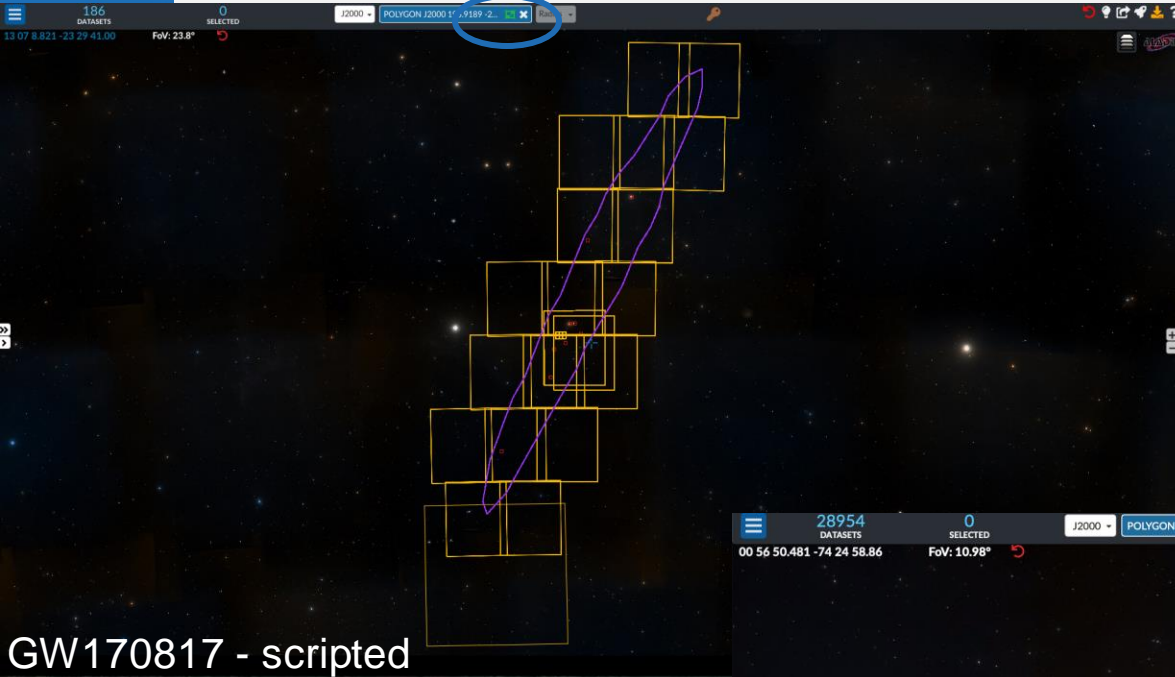
FoV: 2.87°

FoV: 21.18"

ESD Archive Science Portal v2.0.2



Custom contour queries





Target lists



The screenshot shows the ESO Science Portal interface. At the top, the user is logged in as '3072097'. The main view is a sky map with a grid overlay, showing a field of view (FoV) of 175.69 degrees. On the left, there are several filter panels: 'Observatory' (La Silla Paranal APEX: 2778251, ALMA: 293846), 'Data Type' (SPECTRUM: 1742430, IMAGE: 699169, CATALOG: 992276, CUBE: 274906, VISIBILITY: 3022), 'Spectral Range' (UV, opt, NIR, MIR, mm), and 'Filter/Band' (Ks: 435147, J: 223915, Band 6: 142301, Y: 74402, Band 3: 68880).

The screenshot shows a table of target lists. The table has columns for Line, Target, RA, Dec, Datasets, and Size. The table is filtered to show targets in the RA range 74.462500 to 76.316875 and Dec range -69.22446 to -68.43245. The table contains 26 rows of data.

Line	Target	RA	Dec	Datasets	Size	
<input checked="" type="checkbox"/>	1	74.114583 -69.379611	04:56:27.50	-69:22:44.6	0	0.00 B
<input type="checkbox"/>	2	74.462625 -69.958250	04:57:51.03	-69:57:29.7	27	138.72 MB
<input type="checkbox"/>	3	74.523208 -69.454333	04:58:05.57	-69:27:15.6	2	7.2 MB
<input checked="" type="checkbox"/>	4	74.545000 -69.949694	04:58:10.80	-69:56:58.9	0	0.0 B
<input type="checkbox"/>	5	74.636583 -70.346028	04:58:32.78	-70:20:45.7	28	143.86 MB
<input checked="" type="checkbox"/>	6	74.696292 -70.061583	04:58:47.11	-70:03:41.7	0	0.0 B
<input checked="" type="checkbox"/>	7	74.921417 -69.456111	04:59:41.14	-69:27:22.0	0	0.0 B
<input checked="" type="checkbox"/>	8	74.937833 -69.493194	04:59:45.08	-69:29:35.5	0	0.0 B
<input checked="" type="checkbox"/>	9	75.201500 -69.531861	05:00:48.36	-69:31:54.7	0	0.0 B
<input type="checkbox"/>	10	75.333917 -70.071750	05:01:24.94	-70:04:18.3	17	87 MB
<input checked="" type="checkbox"/>	11	75.477375 -68.904028	05:01:54.57	-68:54:14.5	0	0.0 B
<input type="checkbox"/>	12	75.503958 -68.922833	05:02:00.95	-68:53:22.2	0	0.0 B
<input checked="" type="checkbox"/>	13	75.542667 -69.539917	05:02:10.24	-69:32:23.7	0	0.0 B
<input checked="" type="checkbox"/>	14	75.629333 -69.397056	05:02:31.04	-69:23:49.4	0	0.0 B
<input checked="" type="checkbox"/>	15	75.714750 -68.784806	05:02:51.54	-68:47:05.3	0	0.0 B
<input checked="" type="checkbox"/>	16	75.787750 -69.223333	05:03:09.06	-69:13:24.0	0	0.0 B
<input type="checkbox"/>	17	75.848542 -69.000889	05:03:23.65	-69:00:03.2	6	0.8 MB
<input type="checkbox"/>	18	75.854417 -68.772500	05:03:25.06	-68:46:21.0	23	5.1 MB
<input type="checkbox"/>	19	75.908167 -69.063083	05:03:37.96	-69:03:47.1	6	0.8 MB
<input type="checkbox"/>	20	75.942333 -68.876778	05:03:46.16	-68:52:36.4	16	2.1 MB
<input type="checkbox"/>	21	75.956250 -68.934083	05:03:49.50	-68:56:02.7	5	0.7 MB
<input type="checkbox"/>	22	75.988583 -68.840056	05:03:57.26	-68:50:24.2	15	3.1 MB
<input type="checkbox"/>	23	76.064458 -69.026778	05:04:15.47	-69:01:34.4	9	1.3 MB
<input type="checkbox"/>	24	76.081833 -68.930306	05:04:19.64	-68:55:49.1	7	1.0 MB
<input checked="" type="checkbox"/>	25	76.087833 -68.728556	05:04:21.08	-68:43:42.8	0	0.0 B
<input type="checkbox"/>	26	76.316875 -68.723472	05:05:16.05	-68:43:24.5	12	2.7 MB



Cutouts: images, spectra, cubes



3071357 DATASETS **0 SELECTED** J2000 Target Radius Spat.Rel.

10 20 15.347 -13 39 36.48 **FoV: 177.44°**

Observatory

- La Silla Paranal APEX 2778228
- ALMA 293129

Data Type

Switch to Data Subtype

- SPECTRUM 1742414
- IMAGE 659007
- CATALOG 392976
- CUBE 273938
- VISIBILITY 3022

Spectral Range

UV
opt
NIR
MIR
mm

1 100 10k 1M 100M

Undefined for 26 datasets

Filter/Band

- Ks 435147

ESO Data Product Cutout Service

To minimize the download data volume the cutout service allows clipping the original full-size datasets with respect to position or spectral range while maintaining the intrinsic data quality (i.e. no resampling or rescaling).

Cutouts are supported for all science and most ancillary datatypes having suitable positional or spectral dimensions. Note that the cutout service is currently not available for ALMA data.

As entered in the graphical user interface, the search parameters, target position, search radius and, optionally, spectral range, are taken into account to generate the corresponding cutouts immediately before downloading from the ESO archive. Instead of entering these parameters one by one you may Upload a target list with different format options (see dedicated help topic).

You can upload your list of targets here to ensure that the cutout option will be already pre-selected in the Download Portal when downloading the data.

If you upload your target list from the main window, the functionality is the same except for the need to select the cutout option in the Download Portal explicitly. Data volumes displayed in the download portal currently reflect the full size of the original data but not the data reduction thanks to cutouts. The latter feature will be added soon.

Example 1: Image cutouts defined by position and radius for a list of targets. TARGET is [...](#)

Upload target list & Activate cutouts in the Download Portal

ESO Archive Science Portal v2.0.2



Data download

Download Portal Sign in ↗

La Silla Paranal (incl. APEX) 249 Files (7.38 GB)

Please acknowledge the use of archive data in any publication. Ancillary

SCIENCE.CUBE.IFS

- SCIENCE.CUBE.IFS 1
- ANCILLARY.README 1
- ANCILLARY.CUBE.IFS.NO_TELLCORR 1
- ANCILLARY.IMAGE.WHITELIGHT 1
- ANCILLARY.IMAGE 1
- ANCILLARY.PREVIEW 1
- ANCILLARY.PIXELCOUNTMAP 1
- ANCILLARY.KMOS.SPECTRUM.TELLURIC 1

SCIENCE.SPECTRUM

- SCIENCE.SPECTRUM 1
- ANCILLARY.HARPSTAR 1

SCIENCE.IMAGE

- SCIENCE.IMAGE 1
- ANCILLARY.WEIGHTMAP 1

SCIENCE.SRCTBL

- SCIENCE.SRCTBL 1

ALMA

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Full-size data Cutout

Download 1 ObsUnitSet

Send us your comments ESO Download Portal v1.0.0



Virtual Observatory

The screenshot displays the Virtual Observatory interface with several key components:

- TOPCAT Panel:** Shows 'Table List' with '1: ESO Archive Science Portal' selected. 'Current Table Properties' include: Label: ESO Archive Science Portal, Location: samp:ESO Archive Science Portal, Name: ESO Archive Science Portal, Rows: 10,000, Columns: 48, Sort Order: (arrow up), Row Subset: All, and Activation Action: (no action).
- Match Tables Panel:** Shows 'Match Criteria' with Algorithm: Sky and Max Error: 1.0 arcsec. It lists 'Table 1' (ESO Archive Science Portal) with RA and Dec columns in degrees, and 'Table 2' with RA and Dec columns in degrees. 'Output Rows' are set to 'Best match, symmetric' and 'Join Type' is '1 and 2'.
- By Service Properties Panel:** Shows 'Keywords' and 'Match Fields' (Table Name, Table Description, Service). A list of 114 TAP services is shown, including TAPVizieR, VSA TAP, WSA TAP, HEASARC, IRSA TAP, WFAU OSA TAP, SSA, GAVO DC TAP, ESASKY, SDSS DR6, GAIA, ESO TAP_CAT, PS1DR2 TAP, ATLAS DR1, APPLAUSE, and ARI-Gaia.
- Selected TAP Service Panel:** Shows 'Selected TAP Service' and a 'TAP URL' field with a 'Use Service' button.
- Background:** A star field visualization with a grid overlay.
- Bottom Panels:** 'Spectral Range' and 'Spectral Resolution' plots, and a 'Filter/Band' list (Ks, J, Y, H, r_sDDS).



Digression: ESO data in ESASky

The screenshot displays the ESASky interface. At the top, it shows the J2000 coordinates (13 10 15.547 -23 26 24.78) and the field of view (FoV: 56' X 35'). The main view is a star field with numerous orange rectangular footprints overlaid, indicating observation areas. A central region is highlighted with a green scribble. On the left, a sidebar titled 'External TAP Services > ESO > Images' lists 'ESO-VISTA', 'ESO-VLT-U', and 'ESO-VST'. At the bottom, a table lists observation data for 'ESO-Images-ESO-VLT-U'.

Obs	O Calib Status	O Ucd	Obs Collection	Obs Creator Did	Obs Creator Name	Obs Id	Obs Publisher Did	Obs Release Date	Obs Title	Obstech	P3orig	Poi States	Poi Xel	Proposal Id	Publication Date	S Dec	S Fov	S Pixel Scale	S Ra
absolute			VIMOS	ivo://eso.org/orig	LEVAN, A.	1690097	ivo://eso.org/ID?	2018-09-06T00:		IMAGE	IDP			099.D-0668(C)	2019-01-10T15:-23.3153	0.1265	0.2061	197.5214	
absolute			VIMOS	ivo://eso.org/orig	LEVAN, A.	1690087	ivo://eso.org/ID?	2018-08-21T23:		IMAGE	IDP			099.D-0668(D)	2019-01-10T15:-23.3001	0.1293	0.2061	197.5393	
absolute			VIMOS	ivo://eso.org/orig	LEVAN, A.	1690079	ivo://eso.org/ID?	2018-08-21T23:		IMAGE	IDP			099.D-0668(D)	2019-01-10T15:-23.3	0.1294	0.206	197.5391	
absolute			VIMOS	ivo://eso.org/orig	LEVAN, A.	1690081	ivo://eso.org/ID?	2018-08-22T00:		IMAGE	IDP			099.D-0668(D)	2019-01-10T15:-23.2985	0.1279	0.2061	197.54	
absolute			VIMOS	ivo://eso.org/orig	LEVAN, A.	1690097	ivo://eso.org/ID?	2018-09-05T23:		IMAGE	IDP			099.D-0668(C)	2019-01-10T15:-23.3819	0.1279	0.2061	197.45	



Interactive access from a browser

3. PROCESSED DATA: SOURCE CATALOGUES



archive.eso.org

Science Archive Facility

- Data Portal
- ESO Data
- Hubble Space Telescope Data
- Virtual Observatory Tools
- Catalogues, Plates and DSS
- Tools and Documentation
- Related External Services
- ESO & HST Image Galleries
- News and Updates
- FAQ
- ESO Data Access Policy

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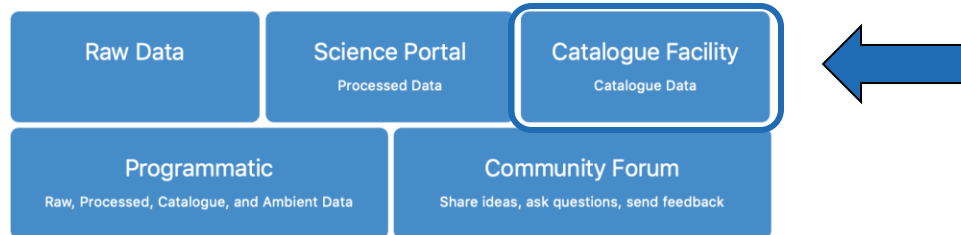
Welcome to the ESO Science Archive Facility

The ESO Science Archive Facility contains data from ESO telescopes at La Silla Paranal Observatory, including the APEX submillimeter telescope on Llano de Chajnantor. In addition, the raw UKIDSS/WFCAM data obtained at the UK Infrared Telescope facility in Hawaii are available.

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Browsing the archive does not require authentication. Please [acknowledge the use of archive data](#) in any publication.

There are three main ways to access the archive, varying for content and presentation/interface: the usual Raw Data query form, the innovative Science Portal to browse and access the processed data, and the novel Programmatic and Tools access which permits direct database access to both raw and processed data, and to the ambient condition measurements, also in a scriptable and VO manner. Other query forms are available in the table at the bottom of this page.



Latest News and Updates

- [ESPRESSO commissioning data release \(03 Sep 2020\)](#)
- [Second data release of the Next Generation Transit Survey \(20 July 2020\)](#)
- [Release of pipeline processed and telluric corrected KMOS 3D data cubes \(16 Jul 2020\)](#)
- [ESO Science Data Products standard version 6 published \(23 Jun 2020\)](#)

[More news ...](#)

To browse the archive

Currently, **raw data** and various types of **data products** can be reached via different interfaces:

Category	Access Point	Data collection	Data Type	Instruments
LPO Raw Data	Raw data query form (all instruments) Instrument specific query forms Direct retrieval of raw data by file name	All ESO raw data	Various	Many La Silla Paranal instruments
LPO Processed Data	Science Portal (Processed Data) Type specific query forms (generic, spectral, imaging, VISTA) Direct retrieval of reduced data by file name	Processed Data (ESO public surveys; ESO pipeline-reduced products; Large programs: GOODS, zCOSMOS; etc.)	Imaging, Spectroscopy, Catalogs, etc.	Various



Source catalogues

ESO public survey

PROGRAM ME	TITLE (click on title for querying)	INSTRUMENT	FILTER SET	VERSION	PUBLICATION DATE	INFO	REQUEST
UltraVISTA	COSMOS2015 catalogue: photometric redshifts and stellar masses (Lajole et al. 2016)	VIRCAM	Y,J,H,Ks	1	2016-12-20	(f)	(r)
UltraVISTA	Deep/Ultra-Deep Near-IR Survey of the COSMOS Field (Ultra-VISTA)	VIRCAM	Y,J,H,Ks,NB118	3	2019-03-11	(f)	(r)
GCAV	GCAV catalogue for RXCJ1514.9-1523 cluster	VIRCAM	Y,J,Ks	1	2018-12-20	(f)	(r)
GCAV	GCAV catalogue for RXCJ2129.6+0005 cluster	VIRCAM	Y,J,Ks	1	2018-12-20	(f)	(r)
GAIASO	Gaia-ESO spectroscopic survey	GIRAFFE,UVES		2	2016-12-05	(f)	(r)
LEGA-C	Large Early Galaxy Census Spectroscopic Survey	VIMOS		2	2018-06-21	(f)	(r)
PESSTO	PESSTO Multi-epoch Photometry	MULTI		2	2017-08-25	(f)	(r)
PESSTO	PESSTO Public ESO Spectroscopic Survey of Transient Objects	EFOSC		2	2017-08-25	(f)	(r)
KIDS	The Kilo-Degree Survey 9-band ugrIZYJHKs source catalogue	OMEGACAM, VIRCAM	u_SDSS,g_SDSS,r_SDSS,i_SDSS,z_Y_J,H,Ks	4	2020-05-20	(f)	(r)
KIDS	The Kilo-Degree Survey: Weak lensing shear measurements	OMEGACAM	u_SDSS,g_SDSS,r_SDSS,i_SDSS	1	2017-01-03	(f)	(r)
VANDELS	VANDELS High-Redshift Galaxy Evolution: Spectroscopic and Photometric Redshifts in the CANDELS UDS and CDFS Fields	VIMOS		3	2019-11-11	(f)	(r)
VIDEO	VISTA Deep Extragalactic Observations Survey (VIDEO) - CDFS field	VIRCAM	Z,Y,J,H,Ks	2	2016-09-09	(f)	(r)
VIDEO	VISTA Deep Extragalactic Observations Survey (VIDEO) - ES1 field	VIRCAM	Z,Y,J,H,Ks	2	2016-09-09	(f)	(r)
VIDEO	VISTA Deep Extragalactic Observations Survey (VIDEO) - XMM field	VIRCAM	Z,Y,J,H,Ks	3	2016-09-09	(f)	(r)
VHS	VISTA Hemisphere Survey band-merged multi-waveband catalogues (VHS)	VIRCAM	Y,J,H,Ks	3	2020-03-17	(f)	(r)
VIKING	VISTA Kilo-degree Infrared Galaxy Survey (VIKING)	VIRCAM	Z,Y,J,H,Ks	4	2020-03-17	(f)	(r)



Large programme

PROGRAM ME	TITLE (click on title for querying)	INSTRUMENT	FILTER SET	VERSION	PUBLICATION DATE	INFO	REQUEST
ATLASGAL	ATLASGAL - APEX Large Area Survey of the Galaxy	APEXBOL	870u	1	2016-01-20	(f)	(r)
196.D-0214	EREBOS source catalogue	FORS2		1	2018-03-19	(f)	(r)
196.D-0214	EREBOS spectroscopic catalogue	FORS2		1	2018-03-19	(f)	(r)
GOODS_FORS2	GOODS/FORS2 Spectroscopic Survey	FORS2		1	2014-07-11	(f)	(r)
GOODS_ISAAC	GOODS/ISAAC imaging	ISAAC		1	2014-12-12	(f)	(r)
GOODS_VIMOS_SPE	GOODS/VIMOS Spectroscopic Survey	VIMOS		1	2014-12-12	(f)	(r)
HUGS	K band image of the GOODS-South field	HAWKI	Ks	1	2014-09-29	(f)	(r)
HUGS	K band image of the UDS field	HAWKI	Ks	1	2014-09-29	(f)	(r)
XQ-100	Quasars and their absorption lines: a legacy survey of the high-redshift universe (XQ-100)	XSHOOTER		1	2016-07-18	(f)	(r)
VIPERS	VIPERS - VIMOS Public Extragalactic Redshift Survey	VIMOS		1	2016-12-15	(f)	(r)
HUGS	Y band image of the UDS field	HAWKI	Y	1	2014-09-29	(f)	(r)
ZCOSMOS	ZCOSMOS Spectroscopic Redshift Survey	VIMOS		2	2015-11-04	(f)	(r)

Other

PROGRAM ME	TITLE (click on title for querying)	INSTRUMENT	FILTER SET	VERSION	PUBLICATION DATE	INFO	REQUEST
AMBRE	Atmospheric Parameters and Chemical Abundances from Stellar Spectra	FEROS		1	2013-07-15	(f)	(r)
MW-BULGE-PSFPHOT	Milky Way Bulge PSF Photometry	VIRCAM	J,Ks	1	2019-08-21	(f)	(r)
NGTS	Next Generation Transit Survey - light curve catalogue	NGTS	VIS/NIR_NGTS	2	2020-07-20	(f)	(r)

Sort	Column	Constraint	Unit	Description	UCD
▲ ▼	IAUNAME	<input type="text"/>		IAU Name (not unique)	meta.id
▲ ▼	SOURCEID	<input type="text"/>		UID of this merged detection as assigned by merge algorithm	meta.id;meta.main
▲ ▼	RA2000	<input type="text"/>	Degrees	Celestial Right Ascension	pos.eq.ra;meta.main
▲ ▼	DEC2000	<input type="text"/>	Degrees	Celestial Declination	pos.eq.dec;meta.main
▲ ▼	MERGEDCLASS	<input type="text"/>		Class flag, 1101-11-21-31-9=gallnoise1starprobStarprobGallsaturated	meta.code
▲ ▼	EBV	<input type="text"/>		The galactic dust extinction value measured from the Schlegel maps	phys.absorption.gal
▲ ▼	ZMYPNT	<input type="text"/>	mag	Point source colour Z-Y (using aperMag3)	phot.color.em.opt.I;em.IR.NIR
▲ ▼	ZMYPNTERR	<input type="text"/>	mag	Error on point source colour Z-Y	stat.error;em.opt.I;em.IR.NIR
▲ ▼	ZMYEXT	<input type="text"/>	mag	Extended source colour Z-Y (using aperMagNoAperCorr3)	phot.color.em.opt.I;em.IR.NIR
▲ ▼	ZMYEXTERR	<input type="text"/>	mag	Error on extended source colour Z-Y	stat.error;em.opt.I;em.IR.NIR
▲ ▼	YMJPNT	<input type="text"/>	mag	Point source colour Y-J (using aperMag3)	phot.color.em.IR.NIR;em.IR.J
▲ ▼	YMJPNTERR	<input type="text"/>	mag	Error on point source colour Y-J	stat.error;em.IR.NIR;em.IR.J
▲ ▼	YMJEXT	<input type="text"/>	mag	Extended source colour Y-J (using aperMagNoAperCorr3)	phot.color.em.IR.NIR;em.IR.J
▲ ▼	YMJEXTERR	<input type="text"/>	mag	Error on extended source colour Y-J	stat.error;em.IR.NIR;em.IR.J
▲ ▼	JMHPNT	<input type="text"/>	mag	Point source colour J-H (using aperMag3)	phot.color.em.IR.J;em.IR.H
▲ ▼	JMHPNTERR	<input type="text"/>	mag	Error on point source colour J-H	stat.error;em.IR.J;em.IR.H
▲ ▼	JMHEXT	<input type="text"/>	mag	Extended source colour J-H (using aperMagNoAperCorr3)	phot.color.em.IR.J;em.IR.H
▲ ▼	JMHEXTERR	<input type="text"/>	mag	Error on extended source colour J-H	stat.error;em.IR.J;em.IR.H
▲ ▼	HMKSPNT	<input type="text"/>	mag	Point source colour H-Ks (using aperMag3)	phot.color.em.IR.H;em.IR.K
▲ ▼	HMKSPNTERR	<input type="text"/>	mag	Error on point source colour H-Ks	stat.error;em.IR.H;em.IR.K
▲ ▼	HMKSEXT	<input type="text"/>	mag	Extended source colour H-Ks (using aperMagNoAperCorr3)	phot.color.em.IR.H;em.IR.K



Interactive access from a browser

4. COMMUNITY FORUM



archive.eso.org

Science Archive Facility

- Data Portal
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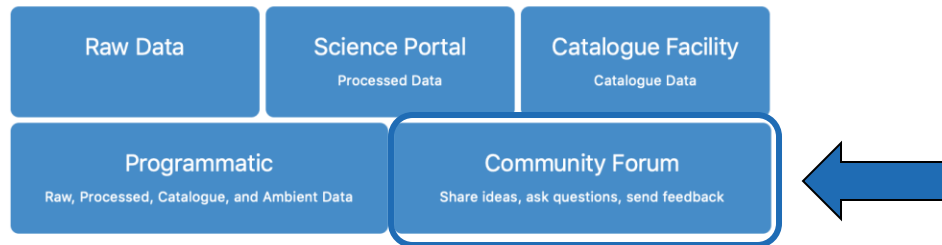
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Archive Community Forum



- User feedback/questions
- Knowledge database

3071357 DATASETS 0 SELECTED J2000 - Target Radius - Spat. Rel. -

15 58 22.035 -14 09'58.71 FoV: 175.69°

Observatory: La Silla Paranal APEX (2778228), ALMA (293129)

Data Type: SPECTRUM (1742414), IMAGE (639007), CATALOG (392974), CUBE (273936), VISIBILITY (3022)

Spectral Range: UV, opt, NIR, MIR, mm

Actions	Data Type	Spec. Range	Spec. Res.	SNR	Sens. (AB mag)	Obs. Date	FoV
<input type="checkbox"/>	CUBE	475-935.2 nm	3027	23.426	23.426	2020-03-22 08:00:58	1.52°
<input type="checkbox"/>	CUBE	475-935 nm	3027	23.842	23.842	2020-03-21 06:02:52	1.51°
<input type="checkbox"/>	CUBE	475-935 nm	3027	24.399	24.399	2020-03-	
<input type="checkbox"/>	CUBE	475-935.2 nm	2595	58.414	58.414	2020-03-	
<input type="checkbox"/>	CUBE	475-935.2 nm	2595	57.865	57.865	2020-03-	
<input type="checkbox"/>	CUBE	475-935 nm	3027	23.834	23.834	2020-03-	

ESO Archive Community Forums Knowledge bases Sign in / Sign up

WELCOME TO THE ESO ARCHIVE COMMUNITY FORUM

The *ESO Archive Community Forum* is a platform for sharing ideas and methods, asking questions and sending feedback and suggestions on how to improve and use the new *ESO Archive Science Portal* and on how to gain Programmatic and tool access to the archive science portal.

Contributions are welcome from the users, also without any need for registration, they are pre-approved, monitored and moderated by the *ESO Archive Science Group (ASG)*.

If you wish to contribute to the knowledge exchange, please choose a Forum from the right panel or from the drop-down menu on the top of this page and write a message. An agent will receive it and make it public as soon as possible. Please be aware that the official help concerning data access, data reduction and pipelines is provided by the *ESO User Support Department*.

Please observe the usual basic netiquette rule of remain professional, respectful, and courteous at all times.

Enter your idea or search term here ...

Or leave us a private message

UNMARKED TOPICS	ACTIVE TOPICS	CLOSED TOPICS
18	0	14

Forum: News & Ads

Votes left: 1/1

Links: Activity feed, The ESO Messenger, Phase 3

Programmatic, tool and Virtual Observatory

DIRECT AND SCRIPTED DATABASE ACCESS

Motivations

■ *Programmatic access*

- Query and download data from scripts programmed and run by the user, allowing for long/repetitive sequences of queries
- Complex queries, going beyond what a user interface, with its fixed query model, allows

■ *Tool access*

- Discover and access data through standalone community-built^(*) tools with powerful generic capabilities, or with specific capabilities that cannot be implemented in a general interface.

in the community (Aladin, Topcat, ...)

(*) Benefitting of the expertise and resources available

■ *VO standards and protocols*

- Use established standards and protocols from the Virtual Observatory, to make the ESO science archive data discoverable through VO services and tools. Benefit: we used existing VO s/w libs

What's demoed here today

■ *Programmatic access to **tabular data and metadata***

- Queries written in a standard language: *Astronomical Data Query Language (ADQL, VO standard)*, and executed via a standard protocol: *Table Access Protocol (TAP, VO standard)*
 - To search for **raw, processed, and ambient data (tap_obs)**, and to query the community-provided Phase 3 **catalogues (tap_cat)**

■ *Programmatic access to **data files** (or part of them)*

- **File download** anonymous and authenticated (JWT tokens, OAuth2.0)
- **Datalink**
 - VO standard protocol to access data and related files (ancillary files, previews, etc.) and to navigate the provenance information (originating files the data were derived from, derived products)
- **Cutout** to download user-defined slices of images, cubes, spectra, catalog tiles, and source tables (SODA, VO standard)

■ *Putting in it all together*

- Using **tools, scripts, and jupyter notebooks (python)**



http://archive.eso.org/programmatic








Science Archive Programmatic and Tools Access Demo page

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 ADQL 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: [\[open\] click here to read the page description...](#)

 Query a TAP Service	 async Query Manager	 Script your access	 Configure tools	 Learn dataset actions	VO standards &  software	 Change Log
---	---	--	---	---	---	--

Click on a tab to see its contents here.

Would you like to provide your [feedback?](#)

Last modification: 3 September 2020 ([see change log](#))



ADQL Queries via TAP (1)

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

[Query a TAP Service](#)
[async Query Manager](#)
[Script your access](#)
[Configure tools](#)
[Learn dataset actions](#)
[VO standards & software](#)
[Change Log](#)

TAP Service: tap_obs (http://archive.eso.org/tap_obs): raw, reduced and ambient data its list of jobs: /async ESO TAP Query Manager
[/capabilities](#) [/availability](#) [/tables](#) [/examples](#)

[TAP_SCHEMA database diagram](#)

Service type: /sync
REQUEST: doQuery
FORMAT: votable/td votable/base64 votable/fits fits json text
LANG: ADQL
MAXREC: 200
QUERY : Choose a query from this pull-down menu, or type your own query here below

```
SELECT TOP 10 * FROM ivoa.ObsCore
```

[Submit the Query](#) [Decode the ADQL string](#) [Show the Link](#) [Parse/Validate the ADQL](#) [Create link to this page](#)

Helper: Characteristics of standard filters

Phot. Sys.	Filter Name	central wavelength (m)	A/Δλ	fwhm (m)	ZP	ZF Er
stroemgren	u	350E-9	10.3	34E-9		
johnson-morgan	U	365E-9	5.4	68E-9		
Zombeck-Allen	U	365E-9	5.4	68E-9	1897	

Helper: Characteristics of ESO filters

Filter Name	Instrument Name	central wavelength (m)	A/Δλ	em_min (m)	em_max (m)
u_SDSS	OMEGACAM	3.5400e-07	6.32	3.260e-07	3.820e-07
U	VIMOS	3.7000e-07	7.40	3.450e-07	3.950e-07
g_SDSS	OMEGACAM	4.7450e-07	3.57	4.080e-07	5.410e-07
r_SDSS	OMEGACAM	6.2500e-07	4.63	5.575e-07	6.925e-07
R	VIMOS	6.4850e-07	4.99	5.835e-07	7.135e-07

Last modification date of Query a TAP Service: 2018-07-02

Would you like to provide your [feedback?](#)

Last modification: 3 September 2020 ([see change log](#))

Credits: the author of the [ADQL parser/validator library](#), Grégory Mantelet, and the supporting institutes, the Astronomisches Rechen-Institut, Heidelberg (ARI), and the Centre de Données astronomiques de Strasbourg (CDS), are kindly acknowledged.

Pull-down menu with a list of TAP services to choose from.

First two are:

TAP_OBS

- To query for ESO observational data (ambient, raw, processed data, provenance information)

TAP_CAT

- To query the ESO community-generated catalogs (phase 3)

ADQL Queries via TAP (2)

- *“Cool, but... Which tables are available? What are their names?”*
- In TAP, also the descriptors of the tables and their columns are stored in the database, and are therefore queryable:

QUERY:

```
SELECT table_name, description
FROM TAP_SCHEMA.tables
ORDER BY table_name
```



ADQL Queries via TAP (3)

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

[Query a TAP Service](#)
[async Query Manager](#)
[Script your access](#)
[Configure tools](#)
[Learn dataset actions](#)
[VO standards & software](#)
[Change Log](#)

TAP Service: [tap_obs \(http://archive.eso.org/tap_obs\)](http://archive.eso.org/tap_obs): raw, reduced and ambient data

[/capabilities](#)
[/availability](#)
[/tables](#)
[TAP_SCHEMA database diagram](#)

Service type: [/sync](#)

REQUEST:

FORMAT: votable votable/td votable/b votable/b2 votable/fits fits text json

LANG: [ADQL](#)

MAXREC:

QUERY:

```

-- Use case name: 'obs tap_schema 1'
SELECT table_name, description
FROM TAP_SCHEMA.tables
ORDER BY table_name

-- Full explanation:
-- All TAP services must support a set of (meta) tables, in a schema named TAP_SCHEMA.
-- These meta-tables describe all tables and columns published through the TAP service.
-- The meta-tables can be queried themselves via TAP.
-- Users can discover ESO-published tables or columns by querying the tables in this schema.
  
```

[Submit the Query](#)
[Decode the ADQL string](#)
[Show the URL](#)
[Parse/Validate the ADQL](#)
[Create link to this page](#)

http://archive.eso.org/tap_obs/sync?REQUEST=doQuery&LANG=ADQL&MAXREC=200&FORMAT=&QUERY=SELECT%20table_name,%20description%0aFROM%20TAP_SCHEMA.tables%0aORDER%20BY%20table_name

Helper: Characteristics of standard filters

Phot. Sys.	Filter Name	central wavelength (m)	Δλ	fwhm (m)	ZP	ZF Er
stroemgren	u	350E-9	10.3	34E-9		
johnson-morgan	U	365E-9	5.4	68E-9		
Zombeck-Allen	U	365E-9	5.4	68E-9	1897	

 Helper: Characteristics of ESO filters

Filter Name	Instrument Name	central wavelength (m)	Δλ	em_min (m)	em_max (m)
u_SDSS	OMEGACAM	3.5400e-07	6.32	3.260e-07	3.820e-07
U	VIMOS	3.7000e-07	7.40	3.450e-07	3.950e-07
g_SDSS	OMEGACAM	4.7450e-07	3.57	4.080e-07	5.410e-07
r_SDSS	OMEGACAM	6.2500e-07	4.63	5.575e-07	6.925e-07
R	VIMOS	6.4850e-07	4.99	5.835e-07	7.135e-07

Last modification date of Query a TAP Service: 2018-07-02

The first example from this pulldown menu provides you that query

Comments start with -- (a double minus)

“Show the URL” button click on it to see which URL will be invoked

Would you like to provide your [feedback?](#)

Last modification: 23 April 2020 (see [change log](#))

Credits: the author of the [ADQL parser/validator library](#), Grégory Mantelet, and the supporting institutes, the Astronomisches Rechen-Institut, Heidelberg (ARI), and the Centre de Données astronomiques de Strasbourg (CDS), are kindly acknowledged.





ADQL Queries via TAP (4)

```
-<VOTABLE version="1.3" xsi:schemaLocation="http://www.ivoa.net/xml/VOTable/v1.3 http://www.ivoa.net/xml/VOTable/v1.3">
-<RESOURCE type="results">
  <INFO name="QUERY_STATUS" value="OK"/>
  <INFO name="PROVIDER" value="ESO">TAP service for the science archive</INFO>
  <INFO name="QUERY" value=" SELECT table_name, description FROM TAP_SCHEMA.tables ORDER BY table_name "/>
-<TABLE name="result_S1599209365261">
  -<FIELD arraysize="*" datatype="char" name="table_name">
    <DESCRIPTION>the fully qualified table name</DESCRIPTION>
  </FIELD>
  -<FIELD arraysize="*" datatype="char" name="description">
    <DESCRIPTION>describes tables in the tableset</DESCRIPTION>
  </FIELD>
  -<DATA>
    -<TABLEDATA>
      -<TR>
        <TD>asm.dimn_paranal</TD>
        -<TD>
          Table containing the ambient measurements of the Differential Image Motion Monitor (DIMM) channel of the MASS-DIMM instrument. DIMM operates in an extended range of atmospheric conditions which overlap science operation. It provides, along with other measurements, the Paranal reference seeing. Time coverage: 2016-APR-04 12:00:00 UTC onwards. More info at: http://archive.eso.org/wdb/help/eso/ambient\_paranal.html#dimn\_2016
        </TD>
      </TR>
      -<TR>
        <TD>asm.lhatpro_paranal</TD>
        -<TD>
          Table containing the ambient measurements of the Low Humidity And Temperature PROfiling microwave radiometer (LHATPRO) resolves the low levels of precipitable water vapour (PWV) that are prevalent on Paranal (median ~2.4 mm). The instrument consists of a humidity profiler (183-191 GHz), a temperature profiler (51-58 GHz), and an infrared camera (~10 micrometers) for cloud detection. Time coverage: 2016-APR-04 12:00:00 UTC onwards. More info at: http://archive.eso.org/wdb/help/eso/ambient\_paranal.html#lhatpro
        </TD>
      </TR>
      -<TR>
        <TD>asm.mass_paranal</TD>
        -<TD>
          Table containing the ambient measurements of the Multi-Aperture Scintillation Sensor located in Paranal. Included measurements like; vertical profile of the turbulence Cn2(h) (6 layers), Isoplanatic angle, Coherence time, etc. More info at: http://archive.eso.org/wdb/help/eso/ambient\_paranal.html#mass
        </TD>
      </TR>
      -<TR>
        <TD>asm.meteo_lasilla</TD>
        -<TD>
          Table of the ambient measurements of the Vaisala meteorological station installed at La Silla. The following measurements are provided: temperature, relative humidity, wind speed and direction, at various heights. The sampling intervals are 2 seconds for digital sensors (wind speed and direction) and one minute for analog sensors (T, Rh, P). One minute
        </TD>
      </TR>
    </TABLEDATA>
  </DATA>
</TABLE>
</RESOURCE>
</VOTABLE>
```



Currently available TAP_OBS tables

- asm.dimmm_paranal
- asm.lhatpro_paranal
- asm.mass_paranal
- asm.meteo_lasilla
- asm.meteo_paranal
- asm.slodar_paranal
- TAP_SCHEMA.columns
- **dbo.raw** (raw data)
- dbo.ssa
- **ivoa.ObsCore** (processed data)
- TAP_SCHEMA.key_columns
- TAP_SCHEMA.keys
- phase3v2.files
- provenance
- TAP_SCHEMA.schemas
- TAP_SCHEMA.tables

More to come...



Ivoa.ObsCore: VO standard table

- ObsCore is a standard VO service:
 - column names, formats, units are fixed by the standard
 - all sites running an ObsCore service can be queried with one and the same query
 - E.g., this "cone-search" query around Eta Car for spectra can be sent unchanged to all existing ObsCore services:

```
SELECT target_name, s_dec, s_ra, t_exptime, em_res_power, em_min,  
dataprod_type, instrument_name  
FROM ivoa.ObSCORE  
WHERE CONTAINS(s_region, CIRCLE('ICRS', 161.265, -59.684,  
100./3600.)) = 1  
AND em_res_power > 27000
```



Ivoa.ObsCore: VO standard table

■ ObsCore is a standard VO service:

- column names, formats, units are standard
- all sites running an ObsCore can be queried with one and the same query
- E.g., this "cone-search" around Eta Car for spectra can be sent to all existing ObsCore services:

Remember: use the ESO ObsCore only for processed products!

```
SELECT s_ra, s_dec, s_ra, t_exptime, em_res_power, em_min,
       instrument_name
```

`ivoa.Obscore`

```
WHERE CONTAINS(s_region, CIRCLE('ICRS', 161.265, -59.684,
100./3600.)) = 1
```

```
AND em_res_power > 27000
```


- *“I’m interested in processed data; what are the columns of the `ivoa.ObsCore` table?”*



Query a TAP Service

async Query Manager

Script your access

Configure tools

Learn dataset actions

VO standards & software

Change Log

TAP Service: tap_obs (http://archive.eso.org/tap_obs): raw, reduced and ambient data its list of jobs: /async ESO TAP Query Manager

/capabilities /availability /tables /examples

TAP_SCHEMA database diagram

Service type: /sync

REQUEST: doQuery

FORMAT: [votable/td] [votable/base64] [votable/fits] [fits] [json] [text]

LANG: ADQL

MAXREC: 200

QUERY : ots3: I am interested in reduced data. What are the column names of the ivoa.obscore table?

```
-- Use case name: 'obs tap_schema 3'

SELECT column_name, datatype, unit, ucd, utype -- add description to know more
from TAP_SCHEMA.columns
where table_name='ivoa.ObsCore'

-- WHAT ARE THE COLUMNS OF THE DATA PRODUCT TABLE called ivoa.ObsCore?
-- The TAP_SCHEMA.columns table contains all column names, units,
-- UCDs, description, etc., of all the published ESO tables.
```

Submit the Query Decode the ADQL string Show the URL Parse/Validate the ADQL Create link to this page



Columns of the ivoa.ObsCore table

column_name	datatype	unit	ucd	utype
"abmaglim"	"DOUBLE"	"mag"	"phot.mag;stat.max" →	"mag"
"access_estsize"	"BIGINT"	"kbyte"	"phys.size;meta.file"	"obscore:Access.size"
"access_format"	"VARCHAR"		"meta.code.mime"	"obscore:Access.format"
"access_url"	"CLOB"		"meta.ref.url"	"obscore:Access.reference"
"bib_reference"	"VARCHAR"		"meta.bib.bibcode"	"obscore:Curatation.reference"
"calib_level"	"INTEGER"		"meta.code;obs.calib"	"obscore:ObsDataset.calibLevel"
"dataprodct_subtype"	"VARCHAR"		"meta.code.class"	"obscore:ObsDataset.dataProductSubtype"
"dataprodct_type"	"VARCHAR"		"meta.code.class"	"obscore:ObsDataset.dataProductType" →
"dp_id"	"VARCHAR"		"meta.id"	
"em_max"	"DOUBLE"	"m"	"em.wl;stat.max"	"obscore:Char.SpectralAxis.Coverage.Bounds.Limits.HiLimit"
"em_min"	"DOUBLE"	"m"	"em.wl;stat.min"	"obscore:Char.SpectralAxis.Coverage.Bounds.Limits.LoLimit"
"em_res_power"	"DOUBLE"		"spect.resolution"	"obscore:Char.SpectralAxis.Resolution.ResolPower.refVal"
"em_xel"	"BIGINT"		"meta.number"	"obscore:Char.SpectralAxis.numBins"
"facility_name"	"VARCHAR"		"meta.id;instr.tel"	"obscore:Provenance.ObsConfig.Facility.name"
"filter"	"VARCHAR"		"meta.id;instr.filter"	
"gal_lat"	"DOUBLE"	"deg"	"pos.galactic.latitude" →	"galactic:Char.SpatialAxis.Coverage.Location.Coord.Position2D.Value2.C2"
"gal_lon"	"DOUBLE"	"deg"	"pos.galactic.longitude"	"galactic:Char.SpatialAxis.Coverage.Location.Coord.Position2D.Value2.C1"
"instrument_name"	"VARCHAR"		"meta.id;instr"	"obscore:Provenance.ObsConfig.Instrument.name"
"multi_ob"	"CHAR"		"meta.code.multip;obs"	
"n_obs"	"INTEGER"		"meta.number;obs" →	
"o_calib_status"	"VARCHAR"		"meta.code.qual"	"obscore:Char.ObservableAxis.calibrationStatus"
"o_ucd"	"VARCHAR"		"meta.ucd"	"obscore:Char.ObservableAxis.ucd"
"obs_collection"	"VARCHAR"		"meta.id"	"obscore:DataID.collection"
"obs_creator_did"	"VARCHAR"		"meta.id"	"obscore:DataID.creatorDID"
"obs_creator_name"	"VARCHAR"		"meta.id"	"obscore:D:"
"obs_id"	"VARCHAR"		"meta.id"	"obscore:D:"
"obs_publisher_did"	"VARCHAR"		"meta.ref.ivoid"	"obscore:C:"
"obs_release_date"	"TIMESTAMP"		"time.release"	"obscore:C:"
"obs_title"	"VARCHAR"		"meta.title;obs"	"obscore:D:"
"obstech"	"VARCHAR"		"instr.setup"	
"p3orig"	"VARCHAR"		"meta.ref" →	
"pol_states"	"VARCHAR"		"meta.code;phys.polarization"	"obscore:C:"
"pol_xel"	"BIGINT"		"meta.number"	"obscore:C:"
"proposal_id"	"VARCHAR"		"meta.id;obs.proposal"	"obscore:P:"
"publication_date"	"TIMESTAMP"		"time.publiYear" →	
"s_dec"	"DOUBLE"	"deg"	"pos.eq.dec"	"obscore:C:"
"s_fov"	"DOUBLE"	"deg"	"phys.angSize;instr.fov"	"obscore:C:"
"s_pixel_scale"	"DOUBLE"	"arcsec"	"phys.angSize;instr.pixel"	"obscore:C:"
"s_ra"	"DOUBLE"	"deg"	"pos.eq.ra"	"obscore:C:"
"s_region"	"REGION"		"pos.outline;obs.field"	"obscore:Char.SpatialAxis.Coverage.Support.Area"
"s_resolution"	"DOUBLE"	"arcsec"	"pos.angResolution"	"obscore:Char.SpatialAxis.Resolution.Refval.value"
"s_xel1"	"BIGINT"		"meta.number"	"obscore:Char.SpatialAxis.numBins1"
"s_xel2"	"BIGINT"		"meta.number"	"obscore:Char.SpatialAxis.numBins2"
"snr"	"DOUBLE"		"stat.snr" →	
"t_exptime"	"DOUBLE"	"s"	"time.duration;obs.exposure"	"obscore:Char.TimeAxis.Coverage.Support.Extent"
"t_max"	"DOUBLE"	"d"	"time.end;obs.exposure"	"obscore:Char.TimeAxis.Coverage.Bounds.Limits.StopTime"
"t_min"	"DOUBLE"	"d"	"time.start;obs.exposure"	"obscore:Char.TimeAxis.Coverage.Bounds.Limits.StartTime"
"t_resolution"	"DOUBLE"	"s"	"time.resolution"	"obscore:Char.TimeAxis.Resolution.Refval.value"
"t_xel"	"BIGINT"		"meta.number"	"obscore:Char.TimeAxis.numBins"
"target_name"	"VARCHAR"		"meta.id;src"	"obscore:Target.name"

Standard ObsCore columns have a utype prefixed with the namespace "obscore:"

→ ESO-specific columns don't!



Example of a Complex Query: overlapping H & J HAWKI tiles

```
SELECT count(distinct H.dp_id) num_H, min(H.s_resolution) H_minfwhm, max(H.s_resolution) H_maxfwhm,  
       count(distinct J.dp_id) num_J, min(J.s_resolution) J_minfwhm, max(J.s_resolution) J_maxfwhm  
FROM  
(select * FROM ivoa.ObSCORE WHERE dataproduct_subtype='tile' AND obs_collection = 'HAWKI'  
   AND (gal_lat < -10 OR gal_lat > 10)  
   AND obs_release_date < getdate()  
   AND em_min < 1.265E-6 AND em_max > 1.265E-6) J,  
(select * FROM ivoa.ObSCORE WHERE dataproduct_subtype='tile' AND obs_collection = 'HAWKI'  
   AND (gal_lat < -10 OR gal_lat > 10)  
   AND obs_release_date < getdate()  
   AND em_min < 1.66E-6 AND em_max > 1.66E-6) H  
WHERE INTERSECTS( J.s_region , H.s_region)=1  
AND ESO_INTERSECTION( J.s_region , H.s_region) > 0.8*AREA( J.s_region )
```



Example of a Complex Query: overlapping H & J HAWKI tiles

```
SELECT count(distinct H.dp_id) num_H, min(H.s_resolution) H_minfwhm, max(H.s_resolution) H_maxfwhm,  
        count(distinct J.dp_id) num_J, min(J.s_resolution) J_minfwhm, max(J.s_resolution) J_maxfwhm  
FROM
```

```
(select * FROM ivoa.ObSCORE WHERE dataproduct_subtype='tile' AND obs_collection = 'HAWKI'  
    AND (gal_lat < -10 OR gal_lat > 10)  
    AND obs_release_date < getdate()  
    AND em_min < 1.265E-6 AND em_max > 1.265E-6) J,
```

```
(select * FROM ivoa.ObSCORE WHERE dataproduct_subtype='tile' AND obs_collection = 'HAWKI'  
    AND (gal_lat < -10 OR gal_lat > 10)  
    AND obs_release_date < getdate()  
    AND em_min < 1.66E-6 AND em_max > 1.66E-6) H
```

```
WHERE INTERSECTS(J.s_region, H.s_region)=1  
AND ESO_INTERSECTION(J.s_region, H.s_region) > 0.8*AREA(J.s_region)
```



Example of a Complex Query: overlapping H & J HAWKI tiles

```
SELECT count(distinct H.dp_id) num_H, min(H.s_resolution) H_minfwhm, max(H.s_resolution) H_maxfwhm,  
       count(distinct J.dp_id) num_J, min(J.s_resolution) J_minfwhm, max(J.s_resolution) J_maxfwhm  
FROM  
(select * FROM ivoa.ObSCORE WHERE dataproduct_subtype='tile' AND obs_collection = 'HAWKI'  
   AND (gal_lat < -10 OR gal_lat > 10)  
   AND obs_release_date < getdate()  
   AND em_min < 1.265E-6 AND em_max > 1.265E-6) J,
```

```
(select * FROM ivoa.ObSCORE WHERE dataproduct_subtype='tile' AND obs_collection = 'HAWKI'  
   AND (gal_lat < -10 OR gal_lat > 10)  
   AND obs_release_date < getdate()  
   AND em_min < 1.66E-6 AND em_max > 1.66E-6) H
```

```
WHERE INTERSECTS( J.s_region , H.s_region)=1  
AND ESO_INTERSECTION( J.s_region , H.s_region) > 0.8*AREA( J.s_region )
```



Example of a Complex Query: overlapping H & J HAWKI tiles

```
SELECT count(distinct H.dp_id) num_H, min(H.s_resolution) H_minfwhm, max(H.s_resolution) H_maxfwhm,  
       count(distinct J.dp_id) num_J, min(J.s_resolution) J_minfwhm, max(J.s_resolution) J_maxfwhm  
FROM  
(select * FROM ivoa.ObSCORE WHERE dataproduct_subtype='tile' AND obs_collection = 'HAWKI'  
   AND (gal_lat < -10 OR gal_lat > 10)  
   AND obs_release_date < getdate()  
   AND em_min < 1.265E-6 AND em_max > 1.265E-6) J,  
(select * FROM ivoa.ObSCORE WHERE dataproduct_subtype='tile' AND obs_collection = 'HAWKI'  
   AND (gal_lat < -10 OR gal_lat > 10)  
   AND obs_release_date < getdate()  
   AND em_min < 1.66E-6 AND em_max > 1.66E-6) H  
WHERE INTERSECTS( J.s_region , H.s_region)=1  
AND ESO_INTERSECTION( J.s_region , H.s_region) > 0.8*AREA( J.s_region )
```




How many high latitude HAWKI H & J tiles, and which spatial resolution?

num_h	h_minfwhm	h_maxfwhm	num_j	j_minfwhm	j_maxfwhm
337	0.321	4.298	331	0.331	2.137

➤ *Nice, but how do I get to know that I need to set the query constraint:*

dataprodct_subtype = 'tile' ?

You can always check the various types and subtypes using a query like:

```
SELECT count(*), dataprodct_type, dataprodct_subtype
FROM ivoa.obscore
where obs_collection='HAWKI'
group by dataprodct_type, dataprodct_subtype
order by 2,3
```

COUNT_ALL	dataprodct_type	dataprodct_subtype
5861	"image"	"pawprint"
5830	"image"	"tile"
11691	"measurements"	"srctbl"



Overlapping H & J HAWK-I: distinct J

```
SELECT * FROM ivoa.ObsCore WHERE dp_id in
```

```
(select distinct J.dp_id FROM
```

```
(select * FROM ivoa.Obscore WHERE dataproduct_subtype='tile' AND obs_collection='HAWKI'
```

```
AND (gal_lat < -10 OR gal_lat > 10)
```

```
AND obs_release_date < getdate()
```

```
AND em_min < 1.265E-6 AND em_max > 1.265E-6) J,
```

```
(select * FROM ivoa.Obscore WHERE dataproduct_subtype='tile' AND obs_collection='HAWKI'
```

```
AND (gal_lat < -10 OR gal_lat > 10)
```

```
AND obs_release_date < getdate()
```

```
AND em_min < 1.66E-6 AND em_max > 1.66E-6) H
```

```
WHERE INTERSECTS( J.s_region , H.s_region)=1
```

```
AND ESO_INTERSECTION( J.s_region , H.s_region) > 0.8*AREA( J.s_region)
```

```
)
```



Using a tool to send the query and visualise results: Aladin (CDS)

The screenshot shows the Aladin v11.0 web interface. At the top, it displays 'Available data → 1 / 25296', 'Command', 'Frame ICRS', and 'Projection Aitoff'. A row of data sources is visible: DSS, SDSS, 2MASS, WISE, GALEX, PLANCK, AKARI, XMM, Fermi, Gaia, Simbad, NED, and a plus sign. The main panel shows a '2MASS color' image of the Milky Way with a red crosshair. Below the image, coordinates are shown: '15°' and '214.5° x 172.8°'. A toolbar below the image includes icons for 'grid', 'study', 'wink', 'north', 'hdr', 'multiview', and 'match'. On the left, a 'Collections' tree shows 'Others → 1 / 1131', 'TAP (table) → 1 / 202', and 'eso.org → 1 / 2', with 'ESO TAP_OBS: a TAP service t' selected. Below this is a query editor with 'select tap_obs' and 'from -- all collections --'. On the right, a 'Data discovery tips' panel explains the interface. At the bottom right, a 'zoom' slider and other controls are visible. The footer contains '(c) 2020 Université de Strasbourg/CNRS - developed by CDS, ALL RIGHT RESERVED' and '0 sel / 0 src 353Mb'.

Using a tool to send the query and visualise results: Aladin (CDS)

Aladin v11.0

Available data → 1 / 25296

Command [] Frame ICRS Projection Aitoff

DSS SDSS 2MASS WISE GALEX PLANCK AKARI XMM Fermi Gaia Simbad NED +

2MASS color

Collections → 1 / 25296

- Others → 1 / 1131
 - TAP (table) → 1 / 202
 - eso.org → 1 / 2
 - ESO TAP_OBS: a TAP service t

1. Filter the “data discovery tree” by entering “tap_obs” in the select input box
2. Click (once) on the ESO TAP_OBS entry
3. and then click OK in the popup window

Data discovery

This panel is dedicated to browse, to filter, and to select the data collections that you want to load, to display and to process in Aladin. These collections represents all public astronomical data available on the net: several thousands of astromical image collections, catalogs, tables, spectra provided by the Centre de Données astronomiques de Strasbourg and other data providers over the world compatible with the Virtual Observatory protocols and standards. For each collection, you can select ...

select

from -- all collections --

Running the query in Aladin (CDS)

TAP access with eso.org/tap_obs

Construct your query, verify and execute

Table: Set ra, dec Join

Select: All Constraints: Max rows:

Target

Radius

Refresh query Check.. SYNC Async jobs>>

```

SELECT * FROM ivoa.ObsCore WHERE dp_id in
(select distinct J.dp_id FROM
(select * FROM ivoa.ObsCore WHERE dataproduct_subtype = 'tile' AND
obs_collection = 'HAWKI'
AND (ga_lat < -10 OR ga_lat > 10)
AND obs_release_date < getdate()
AND em_min < 1.265E-6 AND em_max > 1.265E-6 ))
(select * FROM ivoa.ObsCore WHERE dataproduct_subtype = 'tile' AND
obs_collection = 'HAWKI'
AND (ga_lat < -10 OR ga_lat > 10)
AND obs_release_date < getdate()
AND em_min < 1.66E-6 AND em_max > 1.66E-6 ) H
WHERE INTERSECTS(J.s_region, H.s_region)=1
AND ESO_INTERSECTION(J.s_region, H.s_region) > 0.8*AREA(J.s_region)
    
```

Reset Clear Submit Close

4. Type or paste your query in the query panel

5. Click the Submit button

6. See results

Aladin v11.0

Frame ICRS Projection Aitoff

select pan list phot draw tag moc spect filter cross zoom rgb altarc crop cont pixel prop del

336.4° x 180°

Search

HD 98900

11111510 -1211212

100° 336.4° x 180°

2008-04-29 2020-02-17

0 sel / 589 src. 375Mb

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Query results visualised in Aladin

Aladin v11.0

Command Frame **ICRS** Projection **Aitoff**

DSS SDSS 2MASS WISE GALEX PLANCK AKARI XMM Fermi Gaia Simbad NED +

2MASS color

15° 162.1° x 72.35°

select crop pan cont dist pixel phot prop draw del tag moc spect filter cross x-y rgb assoc

HAWK-I J (#29)
HAWK-I H (#29)
CDS / P / 2MASS

epoch size dens. opac. zoom

Search

access_url	abmaglim	access_e...	access_f...	bib_refe...	calib_le...	dataprod...	dataprod...
http://a..	26.825	81080	applicat...		2	tile	image
http://a..	26.895	80956	applicat...		2	tile	image
http://a..	26.24	80899	applicat...		2	tile	image
http://a..	26.021	81322	applicat...		2	tile	image

11 09 39.65702
+90
-90
2008-04-29 2020-02-17

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Datalink visualised by Aladin

The screenshot shows the Aladin v11.0 interface. The main window displays a 2MASS color image of a star field. A datalink menu is open, listing various files associated with the selected source. The menu items include:

- Requested file (size 81080640 byte)
- Cutout of #this (SODA-sync)
- PDF preview of the requested file (size 1000000 byte)
- HTML representation of the dataset (size 1000000 byte)
- Ancillary file associated to the requested file (size 81077760 byte)
- Ancillary file associated to the requested file (size 81077760 byte)
- Ancillary file associated to the requested file (size 779606 byte)
- File used to generate the requested file (processing provenance) (size 54252895 byte)
- File used to generate the requested file (processing provenance) (size 54005345 byte)
- File used to generate the requested file (processing provenance) (size 53552111 byte)
- File used to generate the requested file (processing provenance) (size 53887765 byte)
- File used to generate the requested file (processing provenance) (size 53670283 byte)
- File used to generate the requested file (processing provenance) (size 53632305 byte)
- File used to generate the requested file (processing provenance) (size 53475718 byte)
- File used to generate the requested file (processing provenance) (size 53889869 byte)
- File used to generate the requested file (processing provenance) (size 53692177 byte)
- File used to generate the requested file (processing provenance) (size 53748789 byte)
- Science product derived from the requested file (size 360000 byte)
- Release description of the collection the requested file belongs to (size 1000000 byte)

The interface also shows a table of data with columns: access_url, abmaglim, access_e..., access_f..., bib_refe..., calib_le..., dataproduct..., dataproduct..., dp_id, em_max, em_min, em_res. The table contains several rows of data.



Cutouts in Aladin (CDS, Strasbourg)

The screenshot displays the Aladin v11.0 interface. On the left, a table selection panel is visible for the 'ivoa.ObsCore' table. The main window shows a star field image with a central cutout. A 'Cutout prototype for SODA server' form is overlaid on the left, with the following fields:

- Target (ICRS, name): 11 09 39.65702 -12 35 11.5476
- Radius: 20"
- Time: [empty]
- Band: 1.181E-6 1.335E-6
- Pol: [empty]
- ID: ivo://eso.org/ID?ADP.2019-01-30T13:13:58.294

Below the form, a list of files is shown, including:

- Requested file (size 81080640 byte)
- Cutout of #this (SODA-sync)
- PDF preview of the requested file (size 1000000 byte)
- HTML representation of the dataset (size 1000000 byte)
- Ancillary file associated to the requested file (size 81077760 byte)
- Ancillary file associated to the requested file (size 81077760 byte)
- Ancillary file associated to the requested file (size 779606 byte)
- File used to generate the requested file (processing provenance) (size 54252895 byte)
- File used to generate the requested file (processing provenance) (size 54005345 byte)
- File used to generate the requested file (processing provenance) (size 53552111 byte)
- File used to generate the requested file (processing provenance) (size 53887765 byte)
- File used to generate the requested file (processing provenance) (size 53670283 byte)
- File used to generate the requested file (processing provenance) (size 53632305 byte)
- File used to generate the requested file (processing provenance) (size 53475718 byte)
- File used to generate the requested file (processing provenance) (size 53889869 byte)
- File used to generate the requested file (processing provenance) (size 53692177 byte)
- File used to generate the requested file (processing provenance) (size 53748789 byte)
- Science product derived from the requested file (size 360000 byte)
- Release description of the collection the requested file belongs to (size 1000000 byte)

The bottom right of the interface shows a table with columns: id, em_max, em_min, em_res_pov, em_xel, facility..., filter, gal_lat, gal_l.

Script your access

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

Query a TAP Service

async Query Manager

Script your access

Configure tools

Learn dataset actions

VO standards & software

Change Log

Scripted access to the archive

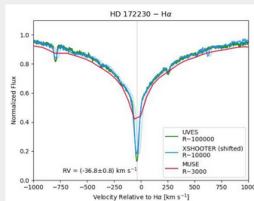
2018-07-02: The [eso_ssa.py](#) script illustrates how a python 3 script using the pyvo module can perform queries to the ESO Simple Spectral Access Protocol (SSAP), and retrieve the spectra with a SNR grater than a certain threshold.

2018-09-17: The [eso_raw.py](#) script illustrates how to query and download raw science frames for a given object.
2019-02-13: New version to reflect a change to the dbo.raw table.

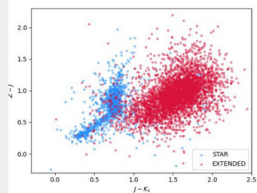
2019-11-25: The [eso_download_raw_and_calibs.py](#) script illustrates how to query and download public (i.e. non-proprietary) raw science frames along with the files necessary to calibrate them (via the [DataLink](#) and [calSelector](#) services).

2020-04-23: More python examples are available as Jupyter Notebooks at: [ESO Science Archive Programmatic: HOWTOs](#)

2020-09-03: More python jupyter notebook examples are available in the [ESO Archive Community Forum](#). Currently available:



Access to Spectroscopic Data: [Example #1](#)



Access to Catalogues: [Example #1](#)



Jupyter Notebooks available (small but growing collection)



How to download data

This section of the ["ESO Science Archive Programmatic: HOWTOs"](#) shows how to programmatically download ESO data, either anonymously (for public data) or with authentication (for proprietary data), using Python.

_Usage: You can access this file either as a static HTML page ([download it here](#)), or as an interactive jupyter notebook ([download it here](#)) which you can download and run on your machine ([instructions](#)). To interact with the jupyter notebook: move up and down the various cells using the arrow keys, execute the code by pressing CTRL+ENTER; you can also modify the code and execute it at will.

Let's start by setting up the python modules:

```
In [ ]: import os
import sys

import requests
import cgi
import json

import getpass
```

Let's define a couple of utility functions, useful to write the files on disk using the ESO file name (provided in the response http header, via the Content-Disposition field.

```
In [ ]: def getDispositionFilename( response ):
    """Get the filename from the Content-Disposition in the response's http header"""
    contentdisposition = response.headers.get('Content-Disposition')
    if contentdisposition == None:
        return None
    value, params = cgi.parse_header(contentdisposition)
    filename = params["filename"]
    return filename

def writeFile( response ):
    """Write on disk the retrieved file"""
    if response.status_code == 200:
        # The ESO filename can be found in the response header
        filename = getDispositionFilename( response )
        # Let's write on disk the downloaded FITS spectrum using the ESO filename:
        with open(filename, 'wb') as f:
            f.write(response.content)
        return filename
```

How to retrieve a file anonymously

Without the need to authenticate, any user can anonymously download public files, that is, files that are out of the proprietary period (of usually one year from the moment the observation takes place).

```
In [ ]: file_url = 'https://dataportal.eso.org/dataportal_new/file/ADP.2016-11-17T12:51:01.877'

response = requests.get(file_url)
filename = writeFile( response )
if filename:
    print("Saved file: %s" % (filename))
else:
    print("Could not get file (status: %d)" % (response.status_code))
```

How to retrieve a file with authentication

Notebooks on How to Access the ESO Scientific Catalogues

HOW TO obtain data given parameters extracted from an ESO catalogue

The ESO Archive provides access to reduced or fully calibrated data sets, and derived catalogs, that were contributed by PIs of ESO programmes or produced by ESO (using ESO calibration pipelines with the best available calibration data), and then integrated into the ESO Science Archive Facility (see for instance the [ESO catalogue facility](#) and the [Archive Science](#)

A powerful way to access this are python wrappers part of the

```
In [1]: from ESOAsg.ancillary
        from ESOAsg import arc
        from ESOAsg import arc

        from astropy.coordinates
        from astropy.io import
        import astropy.units as
        import matplotlib.pyplot
        import numpy as np
```

```
In [2]: %matplotlib notebook
```

Get all archival sp

In this example we will show h

Query the GAIA-ESO c

To begin, you need to know t
astropy table of all catalogues

```
archive_catalogues.
```

```
In [3]: all_catalogues = archi
```

Find metal poor stars:

Now the GAIAESO catalogue is ready to be explored. As an example, we queried a larger fraction of the catalogue to find the most metal poor stars (with $[Fe/H] < -2.5$ dex) and to see their location in the T_{eff} vs. $\log g$ plane:

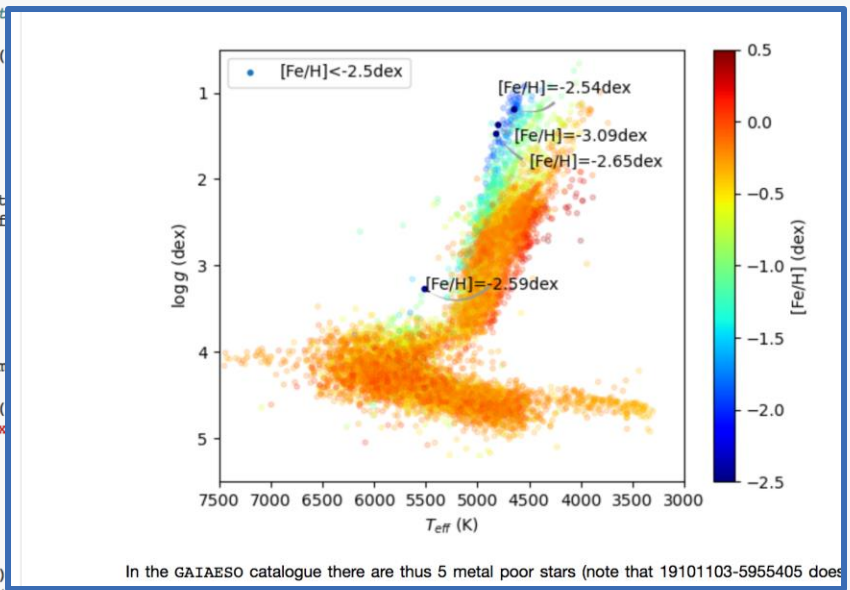
```
In [9]: METAL_LIMIT = -2.5 # limit in Fe/H to select

        GAIAESO = archive_catalogues.get_catalogues(

        # extract the info
        TEFF = GAIAESO['TEFF'].data
        LOGG = GAIAESO['LOGG'].data
        META = GAIAESO['FEH'].data
        # remove nans
        filter_nans = np.isfinite(TEFF) & np.isfinite
        TEFF, LOGG, META = TEFF[filter_nans], LOGG[f

        # plot the result
        plt.figure()
        plt.xlim(7500.,3000.)
        plt.ylim(5.5,0.5)
        plt.scatter(TEFF, LOGG, c=META, alpha=0.2, m
                    cmap='jet')
        plt.scatter(TEFF[(META<METAL_LIMIT)], LOGG[(
                    cmap='jet', label=r'[Fe/H]<{ }dex

        plt.clim(-2.5,0.5)
        cbar = plt.colorbar()
        cbar.set_label(r'[Fe/H] (dex)')
        plt.xlabel(r'$T_{eff}$ (K)')
        plt.ylabel(r'$\log g$ (dex)')
        plt.legend()
        for idx in range(len(TEFF[(META<METAL_LIMIT)
            plt.annotate(r'[Fe/H]={:.2f}dex'.format(META[(META<METAL_LIMIT)][idx]),
                xy=(TEFF[(META<METAL_LIMIT)][idx], LOGG[(META<METAL_LIMIT)][idx]),
                xytext=(-(idx-2)*10, (idx-2)*10), textcoords='offset points',
                arrowprops=dict(arrowstyle="wedge,tail_width=0.2",
                    fc="0.6", ec="none",
                    connectionstyle="arc3,rad=-0.4"))
        plt.show()
        plt.savefig('gaiaeso.jpg', format='jpg', quality=99, bbox_inches='tight')
```



In the GAIAESO catalogue there are thus 5 metal poor stars (note that 19101103-5955405 does

Now all_catalogues contains all the latest version of the catalogues currently present at ESO and you can now look for that table_name associated with the



Change Log for any news/improvements/new tables...

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

Query a TAP Service
async Query Manager
Script your access
Configure tools
Learn dataset actions
VO standards & software
Change Log

Change Log of the programmatic and tool interfaces

The table below, in reverse chronological order, lists all the changes to the programmatic and tool interfaces that could affect your scripts or anyway your way of accessing the ESO science archive via TAP, SSAP, or via one of the URLs specified in the Learn dataset actions. Keep an eye on it, to make sure to be up-to-date with this newly born and still evolving functionality of the ESO Science Archive.

Date	Context	Description of change
2020-09-04	scripted access	added demo script to illustrate how to download science raw frames with authentication, allowing to download proprietary files if authorised. <code style="background-color: #f0f0f0; padding: 5px; display: inline-block;">eso_authenticated_download_raw_and_calibs.py</code>
2020-09-03	Jupyter Notebooks	More python jupyter notebook examples are available in the ESO Archive Community Forum . Currently available: <ul style="list-style-type: none"> • Access to Spectroscopic Data: Example #1 • Access to Catalogues: Example #1 and #2
2020-04-23	Jupyter Notebooks	The new page: ESO Science Archive Programmatic: HOWTOs offers a series of Jupyter Notebooks to learn how to script your access in python. Currently available: <ul style="list-style-type: none"> • How to download data (both anonymously and via authentication) • How to query for reduced data (including queries to find areas of the sky covered in different bands for multiband photometry) • More to come soon... When new notebooks will be available, they will be announced in this page.
2020-04-23	Authentication	Programmatic authenticated access to proprietary data is now fully supported via both basic authentication and JWT tokens (OAuth2.0). (Read more...)
2020-04-23	Cutout service	Positional and spectral cutouts of science data products is now available. The service is fully compliant to the IVOA Server-side Operations for Data Access (SODA) protocol. (Read more...)
2020-04-23	DataLink	The ESO DataLink service now supports: <ul style="list-style-type: none"> • proprietary data • the SODA protocol, to allow an easy programmatic access to the VO-compliant ESO cutout services (Read more...)
2020-04-23	tap_obs ObsCore table	The ivoa.ObsCore table now supports the ALMA data , along with the already served reduced data from La Silla Paranal Observatory (including APEX) [LPO]. Pros: <ul style="list-style-type: none"> • Integrated data discovery experience for both ALMA and LPO processed data • Full support for powerful spatial queries • Ability to cross-match LPO and ALMA data Limitations: <ul style="list-style-type: none"> • Currently, new ALMA data are published here manually about twice a month. We are



Archive Community Forum

- For any questions or suggestions while developing your scripts, building or optimising ADQL queries, etc, please contact us using:

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

(which supports also anonymous questions)

We will be eager to learn about your needs and provide suggestions, if not, possibly, solutions!



archive.eso.org