First data set available at CDS

first generation of processed data release

INAF – OAR for the Astrodeep project

ASTRODEEP

"Unveiling the power of the deepest images of the Universe"

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ABSTRACT

In this document we present the first generation of processed data and catalogues produced by ASTRODEEP to appear on CDS. We also present our vision of the CDS tools to be developed for optimizing data mining and exploitation. One of the main goals of the ASTRODEEP collaboration is to make all data products available on the CDS long-term archive.
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Goal

One of the main goals of the ASTRODEEP collaboration is to efficiently distribute the output of our work to the community. For this reason, in addition to the dedicated web-portal for immediate data dissemination, presented in document D7.2, we will ensure the long-term archiving of all processed data and catalogues on the CDS database. Furthermore, we are currently exploring the possibility of implementing advanced methods of data mining and visualization using existing VO tools, in order to optimize the exploitation of our data products by external users. Although such tools were declared to be part of the dedicated web-portal in the original proposal, we believe that by integrating them directly on the CDS database would enhance their utility and extend their duration in time, long after the conclusion of the project. Thus in this document we present both the first data available at CDS and our vision of the CDS tools necessary to maximize the scientific output of such data products.

Description of Data Set

According to the plan of data releases, presented in document D4.1, one of the first datasets to be published by the ASTRODEEP collaboration is the one in the CANDELS field and more specifically in GOODS-South and UDS-CANDELS. This dataset includes final mosaic images and source catalogs, that are the outcome of the ultra-deep IR imaging survey named HUGS: "Hawk-I UDS and GOODS Survey", performed with the Hawk-I imager at the VLT.
For each of the two fields (GOODS-S and UDS) we made publicly available:

Images:
- The coadded image for each pointing (UDS1,2,3, GOODSD1, D2, W1, W2, W3 and W4) – these are all calibrated and rescaled to a standard zeropoint of 27.5 for the K –band images, and 27.0 for the Y -band;
- The relevant absolute r.m.s. images, with the same flux scale;
- A global mosaic of the two fields in each band, with the relevant absolute r.m.s., after homogenizing all images to the same PSF.
- A global mosaic of the two fields in each band, with the relevant absolute r.m.s., without any correction for the different PSFs.

Catalogues:
- ***Single-band***: On the seeing–averaged mosaics of both the GOODS-S and UDS HUGS imaging we derived source catalogues in the K and Y band using SExtractor.

- ***Multi-wavelength***: The photometry extracted in single-band mode for the K and Y bands was subsequently included in the UDS and GOODS multi-wavelength catalogues described in Galametz et al. (2013) and Guo et al. (2013) respectively, resulting in the extension of their wavelength coverage.

All the HUGS images and catalogues described above are publicly available at the CDS via anonymous ftp to:

http://cdsarc.u-strasbg.fr (ftp://130.79.128.5)

or via

http://cdsarc.u-strasbg.fr/viz-bin/qcat?J/A+A/570/A11

The above site, also offers a link to the full data paper publication (Fontana et al. 2014, A&A, 570, A11) that complements the data with technical details about the survey.

Development of CDS Widgets

Use cases:

The data products of the Astrodeep project will include:
- Processed images (FITS): final mosaicks along with weight, r.m.s. and exposure maps.
- Catalogues: single-band and multi-wavelength
- Spectra
- Other data products like Spectral Energy Distributions (SEDs), Photometric redshift (Photo-z) distributions.

Some possible use cases for the data portal include:
- Explore image for one band with the relative catalogue overlaid and SED visualisation for selected sources.
- Simultaneous view of 3, 4 or 5 bands for the same region, and possibly their respective r.m.s map
- Dedicated study of one object: customized choice of widgets to display as much information as possible for one source, useful for analysing outliers.
- Browse lists of 100+ sources: compact list view, accompanied by images (thumbnail-like, dynamic, cut-out service) and SEDs.

Existing Widgets

CDS has already started developing widgets, each performing simple tasks. According to the needs of each project, such widgets can be grouped to create modular data portals. A single web page can include several widgets that can interact with each other and can also be dynamically added as demonstrated on the CDS web page.

http://cdsweb.u-strasbg.fr/~boch/widgets/sDashboard/widgets.html

Existing widgets include:

Sesame

The Sesame name resolver widget can take as input the name of an object (param widget_sesame_input), and will retrieve and display its sky coordinates.

Registry
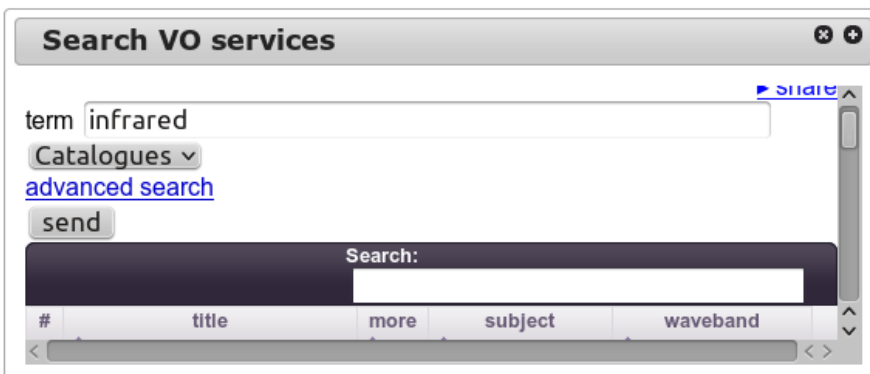
The Registry widget can be used to search the VO Registry for relevant resources. The parameter used for a keyword search is gadget_registry_term. These resources are identified by a unique identifier in the form:

ivo://provider/resource-id

Cone Search

The Cone Search widget builds queries to a Cone Search service. The base URL (cat_query_url) can be sent from the Registry Widget. Other parameters are the sky position (cat_query_position) and search radius (cat_query_radius).

Simple Image Access (SIA) Query

This widget performs a Simple Image Access query to a VO SIA service. This service access URL can be retrieved from the Registry Widget.

2D-plot Display
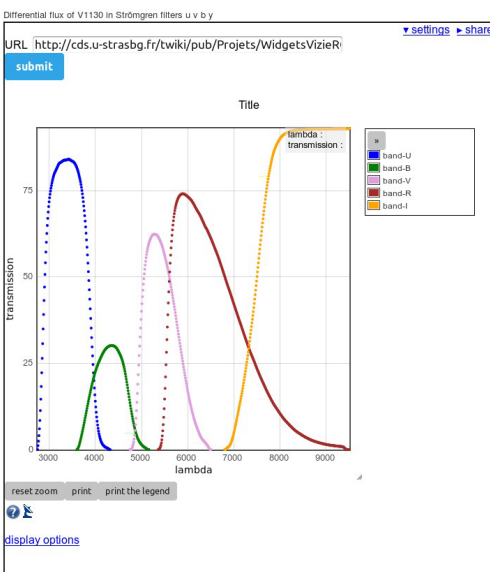
This widget can be used to display 2D scatterplots. The dataset (param dataset_url) has to be in VOTable format. The title and columns to be used on each axis can be configured.

AladinLite
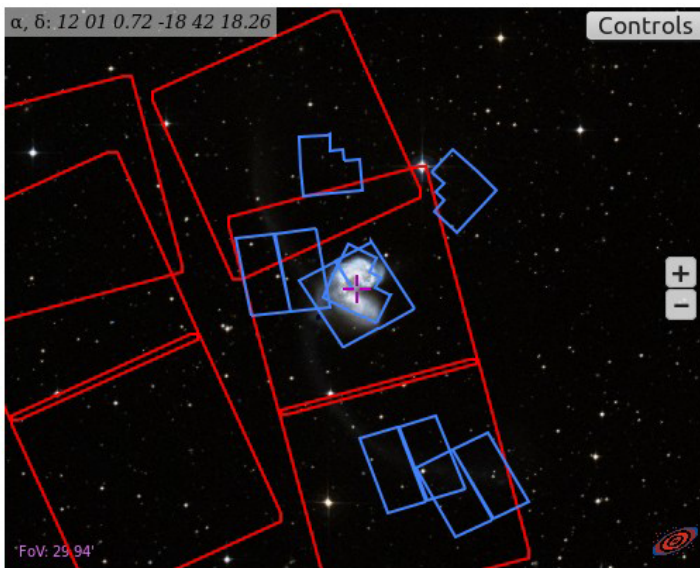
AladinLite (http://aladin.u-strasbg.fr/AladinLite/) is a light version of the Aladin atlas based on HTML5 and JS, and can run in the browser without requiring a Java plugin. It can be used to display HiPS (Hierarchical Progressive Surveys), provided that the tiles have been converted to JPG (this can be easily computed from the FITS tiles). Catalogues can be overlaid, as well as instrument footprints.

SED widget

This widget displays an interactive spectral energy distribution built by querying photometric measurements from all VizieR catalogues with available photometry metadata around a given target.
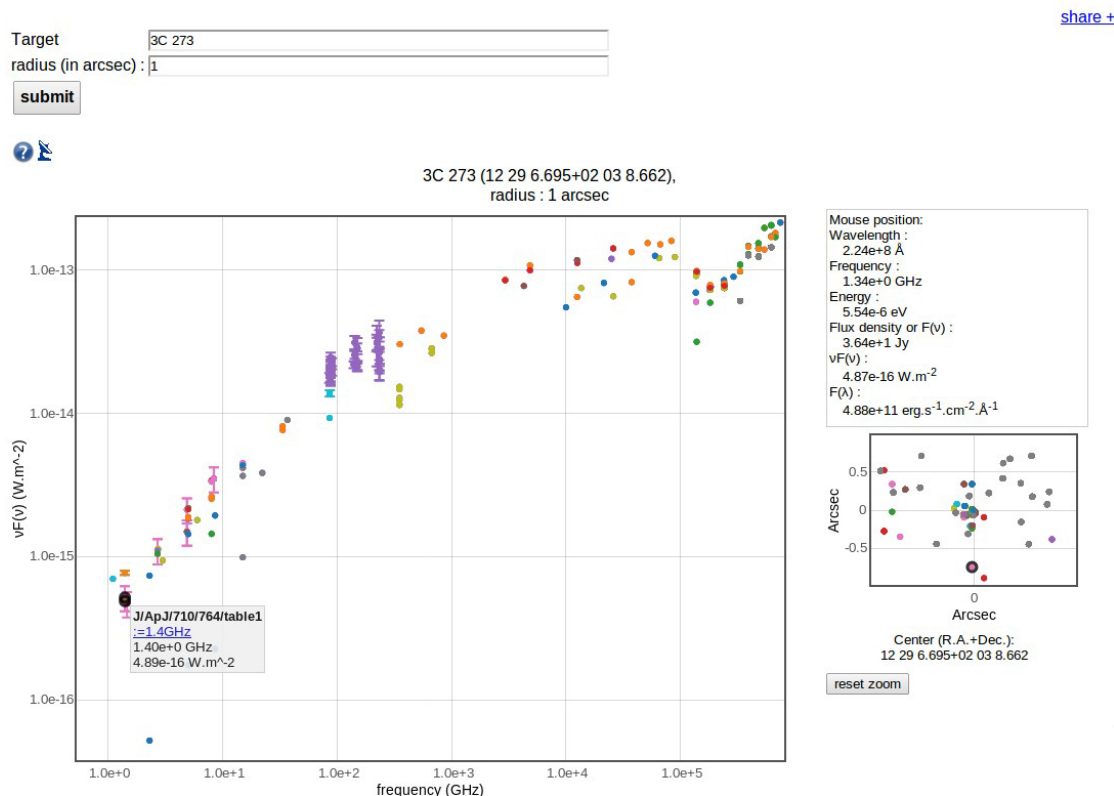
Examples using CDS widgets

CANDELS-based portal

The figure below shows how the combination of various widgets would appear on a dedicated portal. AladinLite is used to access FITS files of the field that have been processed for the production of two HiPS layers: the default layer is a colour composition and the other layer is the HST f606w. The HTML catalogue, appearing under the plots, has also been overlaid in the AladinLite box. The 2D plot appearing on the right panel is a subset of the Galametz et al. 2013 data from VizieR, extracted as VOTable. Additional customs interactions have been added through javascript, like highlighting the source in the image when hovering a row in the table.

Analysis of CANDELS data

This page demonstrates how various kind of data can be integrated in the same web page for data analysis, quality checking, exploration, ... UDS Field

Various image surveys can be displayed as HiPS surveys. Higher resolution details get downloaded as we zoom in on the view.

Full	_r arcmin	_RAJ2000 deg	_DEJ2000 deg	recno	Seq	RAJ2000 deg	DEJ2000 deg	Hlim mag	Q	CStar	SED	uFlux uJy	e_ uJy	BFlux uJy	e_ uJy	VFlu uJy
1	0.0180	034.445931	-05.237783	6762	6762	034.4459305	-05.2377832	28.2217	0	0.070	SED	0.1082	0.0076	0.1232	0.0040	0.1388
2	0.0802	034.445896	-05.238835	6652	6652	034.4458960	-05.2388351	28.3169	0	0.000	SED	0.3953	0.0077	0.5218	0.0040	0.5682
3	0.0878	034.444457	-05.238012	6684	6684	034.4444573	-05.2380124	28.3090	0	0.370	SED	0.0025	0.0066	0.0486	0.0033	0.0721
4	0.1022	034.446013	-05.235807	7112	7112	034.4460129	-05.2358069	28.0995	0	0.880	SED	0.0118	0.0066	0.0208	0.0035	0.0328
5	0.1184	034.444349	-05.236194	29497	29497	034.4443489	-05.2361940	28.0896	0	0.110	SED	0.0173	0.0068	0.0364	0.0034	0.0435
6	0.1259	034.447940	-05.237492	29411	29411	034.4479398	-05.2374915	28.1403	0	0.570	SED	0.0131	0.0068	0.0254	0.0035	0.0266
7	0.1327	034.447116	-05.235694	29520	29520	034.4471156	-05.2356944	28.1068	0	0.200	SED	0.0504	0.0066	0.0473	0.0034	0.0553
8	0.1353	034.447360	-05.239166	6745	6745	034.4473598	-05.2391663	28.1528	0	0.030	SED	1.1860	0.0083	1.7875	0.0045	3.1424
9	0.1595	034.448387	-05.238274	6641	6641	034.4483869	-05.2382744	28.2387	0	0.070	SED	0.0323	0.0068	0.0605	0.0037	0.0575

This is only a very simple example of what could be accomplished with existing widgets. In addition, in the case that specific functionalities are requested, which are not yet available, dedicated widgets could be developed in the framework of the ASTRODEEP collaboration.