Second data set available at CDS

Release of Frontier Fields dataset and catalogues

CNRS for the Astrodeep project

ASTRODEEP

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

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[Exploitation of space science and exploration data]

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ABSTRACT

In this document we present the second generation of processed data and catalogues produced by ASTRODEEP to appear on CDS. We also present a first complete release of the CDS tools, 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, we will maintain a CDS database for the long-term accessibility of all datasets and catalogs produced by the collaboration. In addition to the database, we have developed a dedicated web-portal with ad-hoc tools that will enhance data mining capabilities for external users. In this document we present both the second dataset available at CDS and all new CDS tools necessary to maximize the scientific output of our data products.

Description of Data Set

As presented in Deliverable 4.3, the second generation of ASTRODEEP products includes the analysis of the two first Frontier Fields datasets, Abell 2744, MACS 0416 and parallel pointings. The catalogues include multiband photometry (8 HST bands, deep Ks from HAWK-I FF program and Spitzer-IRAC 3.6 and 4.5um), magnification, photometric redshifts, rest-frame properties and a variety of diagnostic information. The cluster pointings have been analysed following a multi-step procedure to remove foreground emission from intra-cluster light and very bright galaxies. Photometry from low-resolution IR bands has been derived with T-PHOT.

Two papers describing in details the catalogues and the procedures followed to obtain them have been submitted to Astronomy and Astrophysics and are available on arXiv:
Paper I: "*The ASTRODEEP Frontier Fields Catalogues: I - Multiwavelength photometry of Abell-2744 and MACS-J0416*", Merlin et al. 2016, A&A, 590, 30
Paper II: "*The ASTRODEEP Frontier Fields Catalogues: II - Photometric redshifts and rest-frame properties in Abell-2744 and MACS-J0416*", Castellano et al. 2016, A&A, 590, 31

Downloading the Data Set

The CDS Astrodeep-portal can be found in the following link:

http://astrodeep.u-strasbg.fr/ff/

From this portal the external user can download, both the original and processed fits images for each survey, as can be seen in Fig. 1 and Fig. 2.

	B435	V606	I814	Y105	J125	JH140	H160	Ks	CH1	CH2
Abell 2744 Cluster	Download	Download	Download	Download	Download	Download	Download	Download	N/A	N/A
Abell 2744 Parallel	Download	Download	Download	Download	Download	Download	Download	Download	N/A	N/A
MACS J0416.1-2403 Cluster	Download	Download	Download	Download	Download	Download	Download	Download	N/A	N/A
MACS J0416.1-2403 Parallel	Download	Download	Download	Download	Download	Download	Download	Download	N/A	N/A

Fig. 1: List of original Frontier Fields images that can be downloaded from the Astrodeep portal

	B435	V606	I814	Y105	J125	JH140	H160
Abell 2744 Cluster	Download	Download	Download	Download	Download	Download	Download
MACS J0416.1-2403 Cluster	Download	Download	Download	Download	Download	Download	Download

Fig. 2: List of processed Frontier Fields images that can be found on the CDS Astrodeep portal.

All images have been combined to create HiPS that can be viewed in Aladin. Processed images are the result of a procedure subtracting foreground light from ICL and bright cluster galaxies, described in Merlin et al. 2016. They are displayed on a different scale with respect to the original images, to make faint sources more evident. For parallel fields, the processed images are the same as the original images, but with different scale levels to see fainter sources.

The full catalogues of all sources detected on the images described above, can be found on the ASTRODEEP site and on VizieR:
http://www.astrodeep.eu/frontier-fields-download/
http://vizier.u-strasbg.fr/viz-bin/VizieR?-source=J/A+A/590/A31&-to=3

Description of the table columns:

ID: Identication number in the input photometric catalogues. The IDs are organized as follows:
- H-detected objects have IDs starting from 1;
- IR-detected objects have IDs starting from 20000;
- the bright cluster objects, modeled and subtracted from the HST images, have IDs starting with 100000.

RA, DEC: Positions of objects.

MAG_...: AB magnitudes.

MAGERR_...: Relatives uncertainties for each magnitude.

ZBEST: Corresponds to the reference (median) photo-z value except when a match with a publicly available high-quality spectroscopic source is found within 1 arcsec. Sources for which the photo-z run did not converge to a solution are set to ZBEST=-1.0.

ZBEST_SIQR: Median photometric redshift uncertainty range (equal to 0 for spectroscopic sources).

MAGNIF: Median magnification (cluster fields), or magnification from the Merten model (parallel fields).

ZSPECFLAG: The value is set =1 for sources with spectroscopic redshift, =0 otherwise.

MSTAR: Stellar mass in units of $10^9 M\odot$ (assuming Salpeter IMF).

SFR: Star-formation rate in units of $M\odot$/yr.

RELFLAG: This flag is meant to provide a combined indication of the robustness of photometric and photo-z estimates.

• Sources with RELFLAG=1 have enough reliable photometric information for estimating photometric-redshifts.
• Instead, the value is =0 for sources either:
  ◦ falling close to the border of the images;
  ◦ close to strong residual features of the Galfit image pre-processing;
  ◦ found to be spurious (mostly stellar spikes) from visual inspection;
  ◦ having SExtractor FLAG>=16;
  ◦ having unphysical flux in the detection band;
  ◦ having less than 5 HST bands with reliable flux measurement available for photo-z procedures.
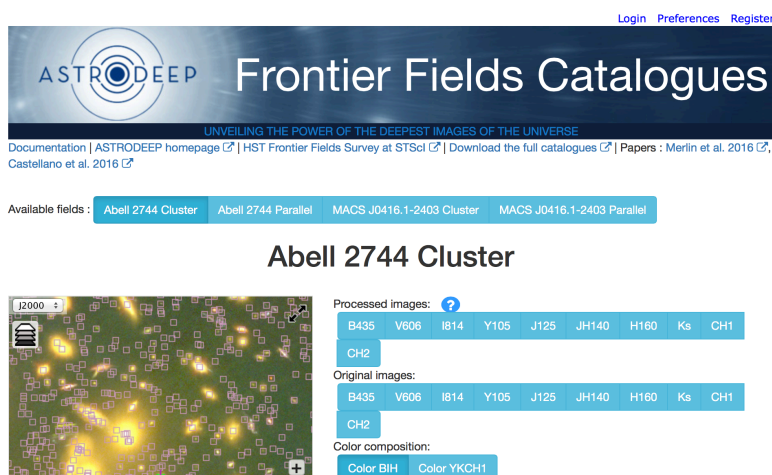
The CDS ASTRODEEP portal

Fig. 3: A partial view of the CDS Astrodeep portal home page

As can be seen in Fig. 3, the external user can choose which band of which field she would like to visualize and they are displayed in the left panel. The positions of all detected sources are over-plotted on the displayed image. By selecting a single object, the most important information, like magnitude in the H-band (MAG_H160) and best photometric redshift fit (ZBEST), are displayed next to the image along with the Spectral Energy Distribution (SED) plot. Simultaneously the source is highlighted in the catalogue below, where more information is available. An example of this procedure is shown in Figs. 4 and 5.
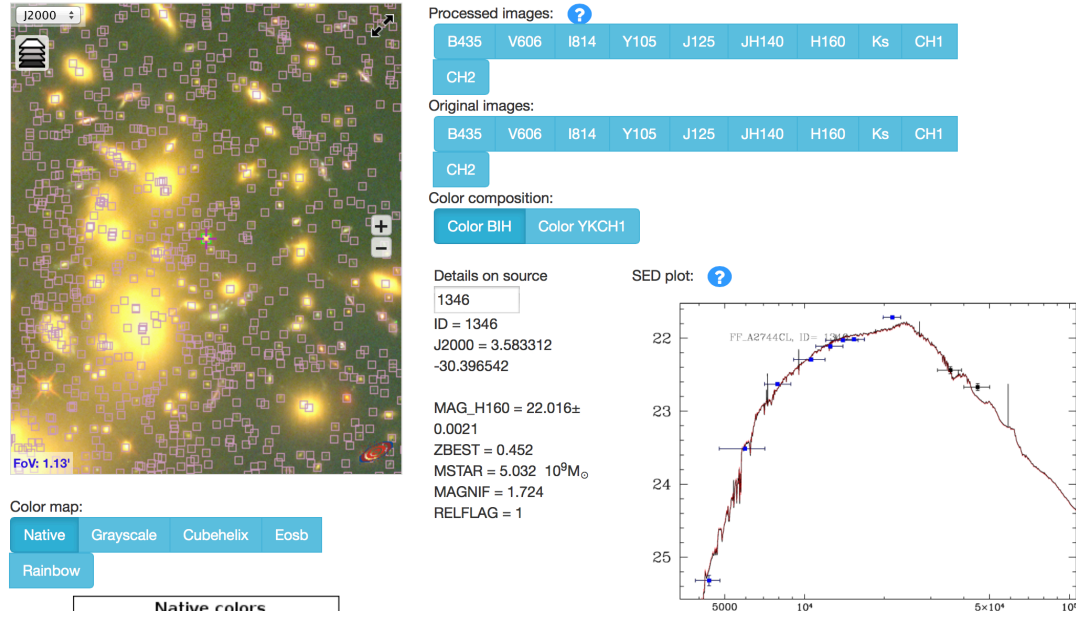

Fig. 4: When the user selects a source, in this case 1346, key information is displayed next to the image along with the SED plot.

ID	RA	DEC	MAG_B435	MAG_V606	MAG_I814	MAG_Y105	MAG_J125	MAG_JH140	MAG_
1345	3.588135	-30.396181	99.0	99.0	99.0	99.0	99.0	99.0	99.0
1346	3.583312	-30.396542	25.3197	23.5141	22.6295	22.2928	22.111	22.0277	22.0157
1347	3.604188	-30.39719	25.4742	25.1148	24.933	24.5141	23.9682	23.7417	23.6969
1348	3.585216	-30.396502	-30.2137	29.5906	29.5475	28.9932	28.8876	28.6895	28.5254
1349	3.573801	-30.396477	-30.1137	28.6862	28.7755	28.5781	28.6591	28.1982	28.3528
1350	3.57682	-30.396534	28.7981	28.1468	28.2917	27.2953	27.1002	26.8696	26.9282
1351	3.607189	-30.39723	26.1346	24.5744	23.951	23.731	23.613	23.5614	23.5878
1352	3.592872	-30.396357	25.1403	23.2448	22.3654	21.9634	21.737	21.6345	21.5912
1353	3.572193	-30.396547	-29.616	28.1888	27.1722	27.1676	26.7692	26.5596	26.3893
1354	3.587674	-30.396469	99.0	99.0	99.0	99.0	99.0	99.0	99.0

Showing 1,344 to 1,355 of 3,587 entries
Download this XML table (VOTable format)

Share http://astrodeep.u-strasbg.fr/ff/   Copy URL to clipboard

Fig. 5: The same source is highlighted in the catalogue below the image, where more information is available.

It is possible, for the external user, to add her own catalogue, in VOTable format, on the image in Aladin Lite using the link "Upload your catalogues". Such catalogues must first be uploaded to the user's personal storage space at the CDS. For correct visualization, RA and DEC columns have to be selected before sending the file to Aladin Lite. With the "View your catalogues" button, the user can get a list of all saved files and using the checkbox the file is then displayed in Aladin Lite. The colour that appears near the checkbox is the colour in which the sources are displayed in Aladin Lite. For more options in the analysis, data can be sent via Samp to external tools, like Aladin or TOPCAT.

The CDS portal will continue to evolve including all new releases of ASTRODEEP data sets and catalogues. According to users' feedback we will also continue to improve all mining tools, in order to optimize accessibility and maximize scientific output.