The COSMOS2015 catalogue


December 19, 2016

1 Abstract

This document describes the COSMOS2015 catalogue which contains precise photometric redshifts and stellar masses for more than half a million objects over the 2 deg^2 COSMOS field. Including $YJHK_s$ images from the UltraVISTA-DR2 survey, $Y$-band from Subaru/HyperSuprime-Cam and infrared data from SPLASH Spitzer legacy program, this near-infrared selected catalogue is highly optimised for the study of galaxy evolution and environments in the early Universe.

1.1 Acknowledging this catalogue

If you use this catalog, please cite the following paper: ”The COSMOS2015 catalog: exploring the 1 < z < 6 universe with half a million galaxies” [Laigle et al. 2016, ApJS, 224, 24]

You must also include the following standard acknowledgement:

“Based on data products from observations made with ESO Telescopes at the La Silla Paranal Observatory under ESO programme ID 179.A-2005 and on data products produced by TERAPIX and the Cambridge Astronomy Survey Unit on behalf of the UltraVISTA consortium.”

You are additionally encouraged to cite the papers representing the data included in the catalogue (such as McCracken et al. 2012 for UltraVISTA); see Laigle et al. (2016).
2 Context and changes with respect to the published catalogue

As stated in [Laigle et al. (2016)](ftp://ftp.iap.fr/pub/from_users/hjmcc/COSMOS2015/), the catalogue was initially made available via anonymous ftp with the aim of adding additional distribution channels, such as ESO’s Phase 3, which is what this document concerns. Since the catalogue includes photometry in $Y JHK_s$ from the UltraVISTA DR2 images, ESO has given this catalogue release a release number of 2.1 (i.e. DR2.1) in the UltraVISTA Phase 3 collection. This DR2.1 catalogue release supplements rather than supersedes the DR2 image release.

With respect to the catalogue made available via anonymous ftp, some noteworthy changes are:

- Some column names were changed: the dot in `FLUX_XMM_0.5_2`, `FLUX_CHANDRA_0.5_2` and `FLUX_CHANDRA_0.5_10` was removed, `OFFSET` was changed to `OFFSET_MAG`, and an underscore was inserted in the 11 absolute magnitude columns, now called $M_{NUV}$, $M_U$, ..., $M_K$.

- The original catalogue used different real numbers to indicate bad or missing data; e.g. $-99.9$ for fluxes, magnitudes and their errors, $99$ additionally for the ISO and AUTO magnitudes and their errors, $-99.9$, $-99$ or $9.99$ for `PHOTOZ`, and $-999$ for e.g. `SFR_BEST` and `MASS_BEST`. To follow the Phase 3 standard all these real-valued “NULL values” were changed to the correct NULL value of NaN (not a number).

- It was discovered that a small fraction of the absolute magnitudes were wrong (in the interval $\sim \left[ -105, -90 \right]$), and these were set to NaN. This concerns about 2% of the $M_{NUV}$ values and 0.1% of the values in the 10 other absolute magnitude columns ($M_U$, ..., $M_K$). The 3 log luminosity columns ($L_{NU}$, $L_R$, $L_K$) do not have this problem.

- Negative (i.e. unphysical) values of the 50% flux radius column (`FLUX_RADIUS`) were set to NaN.

- 17 likely fake objects with `ALPHA_J2000 > 150.887` (all having no data in the 5 bands used to construct the detection image) were “removed” by setting `ALPHA_J2000` and `DELTA_J2000` to NaN (thus keeping the number of rows and their order unchanged).

- UCDs (unified content descriptors) were added to the header for all columns. The UCDs describe the columns using a standardised vocabulary[2]. The UCDs can be seen in the header doing e.g. `dfits -x 1 ADP*.fits` or viewed online in the ESO catalogue facility at [http://www.eso.org/qi/](http://www.eso.org/qi/)

- Units were already present for most columns, but units for a few extra columns were added. The units can be viewed in the same way as the UCDs.

- Descriptions (comments) were added in the header for all columns; these can also be seen in Sect. 3.2.

- The primary header was updated to comply with the Phase 3 standard.

The number of rows (1,182,108) and the number of columns (536) was not changed.

[2] e.g. [http://www.ivoa.net/documents/REC/UCD/UCDlist-20070402.html](http://www.ivoa.net/documents/REC/UCD/UCDlist-20070402.html)
3 Release Content

We present a catalogue containing photometry and physical parameters for more than half a million objects over the 2 deg² COSMOS field. This catalogue is largely identical to the one which has already been presented in Laigle et al. (2016). It has been reformatted by the UltraVISTA consortium to comply with ESO’s Phase 3 requirements (cf. Sect. 2). The catalogue contains in total 536 columns together with 1,182,108 rows. The number “half a million” is mentioned since the number of objects with the “best” data is 536,077; these objects are selected using these flags:

(FLAG_HJMCC==0) & (FLAG_COSMOS==1) & (FLAG_PETER==0)

(see also Sect. 3.1).

The photometry has been extracted from PSF-homogenised COSMOS optical near-infrared data and infrared data. Each near-infrared and optical band has been convolved so the final seeing (measured using a fit to a Moffat profile) corresponds to 0.8". Sources are selected from a chi-squared sum of the optical $z++$ (zpp) band (SuprimeCam) and the 4 NIR $YJHK_s$ bands (UltraVISTA-DR2). This ensures that the catalogue contains both redder and bluer objects. It contains the NIR photometric data obtained at the ESO-VISTA telescope by the UltraVista collaboration, as processed at IAP-TERAPIX and made publicly available, the imaging data publicly available from the COSMOS collaboration including Subaru and CFHT, Y band taken with HSC Subaru, and the IR data taken with Spitzer as a part the SPLASH Spitzer legacy program. It contains also a match with the MIPS 24 um catalog. Physical parameters have been computed with Le Phare at Laboratoire d’Astrophysique de Marseille and have been calibrated using spectroscopic data. In order to compute photometric redshifts with this catalogue, some additional corrections have to be applied to the magnitudes provided here. They are fully described in Laigle et al. (2016).

We provide also the matches with ACS, X-Ray, UV, IR, FIR, Radio catalogs and previous versions of the multi-band catalogue on COSMOS field. When the photometry is not described in Laigle et al. (2016), the corresponding references are mentioned below. What follows in Sect. 3.1 is a description of each column taken from the README file distributed with the original catalogue. Additionaly, in Sect. 3.2 we provide a list of all the 536 columns (number, name, description).

3.1 Description of catalogue columns (from the README file)

0) object identification

# name = 'NUMBER'

Right Ascension and Declination

# name = 'ALPHA_J2000' ; unit = 'deg'
Positions in pixels
# name = 'X_IMAGE';
# name = 'Y_IMAGE';
# name = 'ERRX2_IMAGE'; variance on X_IMAGE
# name = 'ERRY2_IMAGE'; variance on Y_IMAGE
# name = 'ERRXY_IMAGE'; covariance of X_IMAGE,Y_IMAGE

2) Regions Flags. see the Readme file COSMOS2015_Flags.pdf for a full description of the regions.

UltraVISTA area
# name = 'FLAG_HJMCC'; 0: UltraVISTA area, >=1 out of UltraVISTA

UltraVISTA Ultra-deep stripes
# name = 'FLAG_DEEP'; 1: Ultra-deep stripes, 0: deep stripes

COSMOS 2deg^2 area
# name = 'FLAG_COSMOS'; 1: 2deg2 COSMOS area

Saturated objects and bad areas
# name = 'FLAG_PETER'; 0: good area, >=1 masked in optical broad-bands (P. Capak)

3) Galactic extinction (Schlegel et al. 1998) at the object position

# name = 'EBV';

4) Photometry.

Non-detection convention (unless otherwise specified) Flux, Fluxerr, mag, magerr = NaN in a particular band: there is no data (or pixels are flagged as saturated) in this band at this position. Flux + Fluxerr >0 and mag, magerr = NaN: flux is negative at this position, but flux error is consistent.

# name = 'FLUX_RADIUS'; radius enclosing 0.5 of the total flux (FLUX_AUTO)
### Optical and NIR photometry
[# is the filter name. Below is the filter list:
CFHT: u
SuprimeCam: B V r ip zpp IB427 IB464 IA484 IB505 IA527 IB574
IA624 IA679 IA738 IA767 IB709 IB827 NB711 NB816
Hyper Suprime-Cam: yHSC (Y band)
UltraVISTA-DR2: Y, J, H, Ks
WIRCam: Hw (H), Ksw (Ks)]

Fluxes and Fluxes errors:
2 diameter apertures fluxes
# name = #_FLUX_APER2'; unit = 'uJy'
# name = #_FLUXERR_APER2'; unit = 'uJy'

3 diameter apertures fluxes
# name = #_FLUX_APER3'; unit = 'uJy'
# name = #_FLUXERR_APER3'; unit = 'uJy'

AB Magnitudes and Magnitudes errors:
2 diameter apertures magnitudes
# name = #_MAG_APER2'; unit = 'mag'
# name = #_MAGERR_APER2'; unit = 'mag'

3 diameter apertures magnitudes
# name = #_MAG_APER3'; unit = 'mag'
# name = #_MAGERR_APER3'; unit = 'mag'

automatic apertures magnitudes
# name = #_MAG_AUTO'; unit = 'mag'
# name = #_MAGERR_AUTO'; unit = 'mag'

Isophotal magnitudes
# name = #_MAG_ISO'; unit = 'mag'
# name = #_MAGERR_ISO'; unit = 'mag'

Flags from SExtractor
# name = #_FLAGS';
  1 The object has neighbours, bright and close enough to
significantly bias the MAG AUTO photometry,
or bad pixels (more than 10% of the integrated area affected),
  2 The object was originally blended with another one,
  4 At least one pixel of the object is saturated (or very close to),
8 The object is truncated (too close to an image boundary),
16 Objects aperture data are incomplete or corrupted,
32 Objects isophotal data are incomplete or corrupted,
64 A memory overflow occurred during deblending,
128 A memory overflow occurred during extraction.
#
# name = #_IMAFLAGS_ISO'; Object flags indicating saturation


B) IRAC filters (# is the filter name: SPLASH_1 (ch1, 3.6um),
SPLASH_2 (ch2, 4.5um), SPLASH_3 (ch3, 5.8um), SPLASH_4 (ch4, 8.0um)):

fluxes and fluxes errors in a 3 aperture:
  # name = #_FLUX; unit = 'uJy'
  # name = #_FLUX_ERR'; unit = 'uJy'

Magnitudes and Magnitudes errors in a 3 aperture:
  # name = #_MAG'; unit = 'mag'
  # name = #_MAGERR'; unit = 'mag'

C) MIPS 24 micrometer photometry (Match with the 24um catalog by 1")
(based on Le Floc’h 2009)

fluxes and fluxes errors:
  # name = FLUX_24; unit = 'uJy'
  # name = FLUXERR_24'; unit = 'uJy'

Magnitudes and Magnitudes errors:
  # name = MAG_24'; unit = 'mag'
  # name = MAGERR_24'; unit = 'mag'

ID in the 24um catalog:
  # name = ID_A24';

D) PACS/PEP photometry (Lutz et al. 2011)
fluxes and fluxes errors 100um:
  # name = FLUX_100; unit = 'mJy'
  # name = FLUXERR_100'; unit = 'mJy'

fluxes and fluxes errors 160um:
# name = FLUX_160; unit = 'mJy'
# name = FLUXERR_160'; unit = 'mJy'

E) SPIRE/HERMES photometry (Oliver et al. 2012)
fluxes and fluxes errors 250um:
# name = FLUX_250; unit = 'mJy'
# name = FLUXERR_250'; unit = 'mJy' (instrumental noise)
# name = FLUXERRTOT_250'; unit = 'mJy' (total (inst+conf) noise)

fluxes and fluxes errors 350um:
# name = FLUX_350; unit = 'mJy'
# name = FLUXERR_350'; unit = 'mJy' (instrumental noise)
# name = FLUXERRTOT_350'; unit = 'mJy' (total (inst+conf) noise)

fluxes and fluxes errors 500um:
# name = FLUX_500; unit = 'mJy'
# name = FLUXERR_500'; unit = 'mJy' (instrumental noise)
# name = FLUXERRTOT_500'; unit = 'mJy' (total (inst+conf) noise)

F) GALEX photometry (Zamojski et al. 2007, Capak et al. 2007)
fluxes and fluxes errors FUV:
# name = MAG_GALEX_FUV; unit = 'mag'
# name = MAGERR_GALEX_FUV'; unit = 'mag'
# name = FLUX_GALEX_FUV; unit = uJy'
# name = FLUXERR_GALEX_FUV'; unit = uJy'

fluxes and fluxes errors NUV:
# name = MAG_GALEX_NUV; unit = 'mag'
# name = MAGERR_GALEX_NUV'; unit = 'mag'
# name = FLUX_GALEX_FUV; unit = uJy'
# name = FLUXERR_GALEX_FUV'; unit = uJy'

G) X-Ray photometry
nan value if there is no corresponding object in the matched catalog.

match from the new Chandra COSMOS catalog (Civano et al. 2016, Marchesi et al. 2016):
The match is described in Laigle et al. 2016.
# name = 'ID_CHANDRA16'; format = '9A'
fluxes and fluxes errors from the previous Chandra COSMOS catalog (Elvis et al. 2009):
# name = 'ID_CHANDRA09'; format = 'J'; null = -2147483648
# name = 'FLUX_CHANDRA_05_2'; format = 'D'; unit = 'erg/cm2/s' (0.5-2 keV band flux)
# name = 'FLUX_CHANDRA_2_10'; format = 'D'; unit = 'erg/cm2/s' (2-10 keV band flux)
# name = 'FLUX_CHANDRA_05_10'; format = 'D'; unit = 'erg/cm2/s' (0.5-10 keV band flux)

fluxes and fluxes errors from XMM/Newton (Cappelluti et al. 2009):
# name = 'ID_XMM'; format = 'J'; null = -2147483648
# name = 'FLUX_XMM_05_2'; format = 'E' (0.2-2 keV band flux)
# name = 'FLUX_XMM_2_10'; format = 'E' (2-10 keV band flux)
# name = 'FLUX_XMM_5_10'; format = 'E' (5-10 keV band flux)
# name = 'HARDNESS_XMM'; format = 'E' (hardness ratio)

fluxes and fluxes errors from Nustar (Civano et al. 2015):
# name = 'ID_NUSTAR'; format = '20A'
# name = 'FLUX_NUSTAR_3_24'; format = 'E' (3-24 keV band flux)
# name = 'FLUXERR_NUSTAR_3_24'; format = 'E' (3-24 keV band flux error)
# name = 'FLUX_NUSTAR_3_8'; format = 'E' (3-8 keV band flux)
# name = 'FLUXERR_NUSTAR_3_8'; format = 'E' (3-8 keV band flux error)
# name = 'FLUX_NUSTAR_8_24'; format = 'E' (8-24 keV band flux)
# name = 'FLUXERR_NUSTAR_8_24'; format = 'E' (8-24 keV band flux error)
# name = 'HARDNESS_NUSTAR'; format = 'E' (hardness ratio)
# name = 'HARDNESSLOW_NUSTAR'; format = 'E' (hardness ratio lower bound)
# name = 'HARDNESSUP_NUSTAR'; format = 'E' (hardness ratio upper bound)
# name = 'FLAG_XRAYBLEND'; format = 'I'; null = -32768 (flag for blended sources)

H) Match with the ACS catalog (Leauthaud et al. 2007)

fluxes and fluxes errors F814W:
# name = FLUX_814W'; unit = 'mJy'
# name = FLUXERR_814W'; unit = 'mJy'

I) Radio VLA photometry:
To do the match, 90cm catalog is merged with the 20cm catalog using a 6 radius.
The 20cm catalog to the optical catalog with a 2 radius.

fluxes and fluxes errors 20cm:
# name = FLUXPEAK_20CM'; unit = 'mJy' (peak flux of the radio source)
# name = FLUXPEAKERR_20CM'; unit = 'mJy' (rms uncertainty in the peak
flux of the radio source)
# name = FLUXINT_20CM'; unit = 'mJy' (total integrated flux of the radio source)
# name = FLUXINTERR_20CM'; unit = 'mJy' (rms uncertainty total integrated flux of the radio source)
# name = RMSBKG_20CM'; unit = 'mJy' (measured local rms noise at the source position)

fluxes and fluxes errors 90cm:

# name = FLUXPEAK_90CM'; unit = 'mJy' (peak flux of the radio source)
# name = FLUXPEAKERR_90CM'; unit = 'mJy' (rms uncertainty in the peak flux of the radio source)
# name = FLUXINT_90CM'; unit = 'mJy' (total integrated flux of the radio source)
# name = FLUXINTERR_90CM'; unit = 'mJy' (rms uncertainty total integrated flux of the radio source)
# name = RMSBKG_90CM'; unit = 'mJy' (measured local rms noise at the source position)
name of the sources in VLA 90cm catalog
# name = NAME_VLA90CM';
name of the sources in JVL Deep catalog
# name = NAME_JVLDEEP';
name of the sources in JVL Large catalog
# name = NAME_JVLLARGE';

5) Match with previous multi-band catalogs

1st version of the catalog from Capak et al. 2007
 name= 'ID2006'
2nd version of the catalog from Capak et al. 2007
 name= 'ID2008'
catalog from Ilbert et al. 2013
 name= 'ID2013'

6) Main parameters computed with LePhare derived using a method similar to Ilbert et al. (2009, 2013)
# name= 'OFFSET_MAG' (offset applied to the aperture magnitudes to obtain total quantities)
# name= 'PHOTOZ' (z= zPDF if galaxy [median of the likelihood distribution], z= 0 if star, z= NaN if Xray source based on Chandra (Civano program), z= NaN if masked area in flag_Capak)

# name= 'TYPE' (Given even in masked regions; type=0 if galaxy; type=1 if star[mainly based on the chi2, only for objects detected in NIR or 3.6]; type=2 if Xray source; type=-9 if failure in the fit [most of these objects have less than 1 band])

Best fit obtained with the galaxy templates warning: every source has a redshift, regardless of the type or if it is in a masked area or not

# name= 'ZPDF' (photo-z measured using the galaxy templates. Median of the likelihood distribution.)

# name= 'ZPDF_L68' (lower limit, 68% confidence level [a comparison photo-z/spec-z shows that these errors could be underestimated by a factor 0.1*I-0.8 at I>20 and 1.2 at I<20])

# name= 'ZPDF_U68' (upper limit, 68% confidence level [a comparison photo-z/spec-z shows that these errors could be underestimated by a factor 0.1*I-0.8 at I>20 and 1.2 at I<20])
# name= 'ZMIN_CHI2' (photo-z measured using the galaxy templates. Photo-z defines as the minimum of the chi2 distribution.)

# name= 'CHI2_BEST' (reduced chi2 for zMinChi2)

# name= 'ZP_2' (second photo-z solution if a second peak is detected with P>5% in the PDF)

# name= 'CHI2_2' (reduced chi2 for the second photo-z solution)
# name= 'NBFILT' (Number of filters used in the fit)

Best fit obtained with the AGN templates, in LePhare standard modality, but NOT optimised for Xray detected sources (no prior based on morphology, no variability correction, etc.) !!!! Warning: PLEASE use photos from Marchesi et al 2016 for the Xray selected sources. This mentioned paper revises also the counterparts, so it supersedes
Salvato+09, Salvato+11, Civano+11, and Brusa+10.

# name= 'ZQ'    (photoz for the AGN library.)
# name= 'CHIQ'  (reduced chi2 )
# name= 'MODQ'  (best fit template)

Best fit obtained with the STAR templates

# name= 'MODS'  (model for the star library)
# name= 'CHIS'  (reduced chi2)

PHYSICAL PROPERTIES

derived from the BC03 best-fit templates at zPDF (Chabrier IMF;
  cosmo:70,0.3,0.7; BC03 tau+delayed models described in Ilbert et
  al. 2015).

Best fit BC03 model at zPDF
# name = 'MODEL'
# name = 'AGE'
# name = 'EXTINCTION'

Absolute magnitudes
# name = 'M_NUV'  NUV galex
# name = 'M_U'    u* CFHT
# name = 'M_B'    B Subaru
# name = 'M_V'    V Subaru
# name = 'M_R'    r+ Subaru
# name = 'M_I'    i+ Subaru
# name = 'M_Z'    z Subaru (new filter)
# name = 'M_Y'    VISTA
# name = 'M_J'    VISTA
# name = 'M_H'    VISTA
# name = 'M_K'    VISTA

Dust corrected color at zPDF
# name = 'MNUV_MR' corrected from dust-extinction.

Classification quiescent/star-forming
# name = 'CLASS' 0:quiescent/1:star-forming based on the NUV-R/R-J

##########################
Mass
# name = 'MASS_MED' log Stellar mass from BC03 best-fit template. median of the PDF
# name = 'MASS_MED_MIN68' lower limit, 68% confidence level
# name = 'MASS_MED_MAX68' upper limit, 68% confidence level
# name = 'MASS_BEST' log Stellar mass from BC03 best-fit template. Taken at the minimum chi2

##########################
SFR !Warning: computed without IR, large uncertainties with such methods
# name = 'SFR_MED' log SFR from BC03 best-fit template. median of the PDF
# name = 'SFR_MED_MIN68' lower limit, 68% confidence level
# name = 'SFR_MED_MAX68' upper limit, 68% confidence level
# name = 'SFR_BEST' log SFR from BC03 best-fit template. Taken at the minimum chi2
# name = 'SSFR_MED' log sSFR from BC03 best-fit template. median of the PDF
# name = 'SSFR_MED_MIN68' lower limit, 68% confidence level
# name = 'SSFR_MED_MAX68' upper limit, 68% confidence level
# name = 'SSFR_BEST' log sSFR from BC03 best-fit template. Taken at the minimum chi2

##########################
Luminosities
# name = 'L_NU' log(dust corrected luminosity in erg/s/Hz) in NUV filter
# name = 'L_R' log(dust corrected luminosity in erg/s/Hz) in r filter
# name = 'L_K' log(dust corrected luminosity in erg/s/Hz) in K filter

3.2 Complete list of catalogue columns

The following is a list of column number, name and description. This information was derived from the original README file and from [Laigle et al. (2016)](Laigle2016), with the small update that it has been noted that the 3 log luminosity columns (L_NU, L_R, L_K) are dust corrected (i.e. corrected for dust attenuation).

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ALPHA_J2000</td>
<td>Right ascension of barycenter in decimal degrees (J2000)</td>
</tr>
<tr>
<td>2</td>
<td>DELTA_J2000</td>
<td>Declination of barycenter in decimal degrees (J2000)</td>
</tr>
<tr>
<td>3</td>
<td>NUMBER</td>
<td>Running object number</td>
</tr>
<tr>
<td>4</td>
<td>X_IMAGE</td>
<td>Object position along x</td>
</tr>
<tr>
<td>5</td>
<td>Y_IMAGE</td>
<td>Object position along y</td>
</tr>
<tr>
<td>6</td>
<td>ERRX2_IMAGE</td>
<td>Variance of position along X</td>
</tr>
<tr>
<td>7</td>
<td>ERRY2_IMAGE</td>
<td>Variance of position along Y</td>
</tr>
<tr>
<td>8</td>
<td>ERXXY_IMAGE</td>
<td>Covariance of position X / Y</td>
</tr>
<tr>
<td>9</td>
<td>FLAG_HJMCC</td>
<td>Bad region flag</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>FLUX_RADIUS Radius of aperture containing half the flux of MAG_AUTO</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>KRON_RADIUS Kron apertures in units of A or B</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>EBV Galactic reddening E(B-V) based on Schlegel et al (1998) dust maps</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>FLAG_PETER Flag Saturated objects and bad areas</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>FLAG_COSMOS 1: 2deg2 COSMOS area</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>FLAG_DEEP 1: Ultra-deep stripes, 0: deep stripes</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>FLAG_SHALLOW Shallow Flag</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Ks_FLUX_APER2 Ks fixed aperture flux (2&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Ks_FLUXERR_APER2 Ks fixed aperture flux error (2&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Ks_FLUX_APER3 Ks fixed aperture flux (3&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Ks_FLUXERR_APER3 Ks fixed aperture flux error (3&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Ks_MAG_APER2 Ks fixed aperture magnitude (2&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Ks_MAGERR_APER2 Ks fixed aperture mag error (2&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Ks_MAG_APER3 Ks fixed aperture magnitude (3&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Ks_MAGERR_APER3 Ks fixed aperture mag error (3&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Ks_MAG_AUTO Ks auto magnitude (AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Ks_MAGERR_AUTO Ks auto mag error (AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Ks_MAG_ISO Isophotal magnitude</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Ks_MAGERR_ISO rms uncertainty on magK</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Ks_FLAGS Internal Flag</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Ks_IMAFLAGS_ISO External Flag</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Y_FLUX_APER2 Y fixed aperture flux (2&quot;,AB) [detection image]</td>
<td></td>
</tr>
<tr>
<td>32</td>
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59 J_FLUX_APER2   J fixed aperture flux (2",AB) [detection image]
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63 J_MAG_APER2    J fixed aperture magnitude (2",AB)
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65 J_MAG_APER3    J fixed aperture magnitude (3",AB)
66 J_MAGERR_APER3 J fixed aperture mag error (3",AB)
67 J_MAG_AUTO     J auto magnitude (AB)
68 J_MAGERR_AUTO  J auto mag error (AB)
69 J_MAG_ISO      Isophotal magnitude
70 J_MAGERR_ISO   rms uncertainty on magJ
71 J_FLAGS       Internal Flag
72 J_IMAFLAGS_ISO External Flag
73 B_FLUX_APER2   B fixed aperture flux (2",AB) [detection image]
74 B_FLUXERR_APER2 B fixed aperture flux error (2",AB) [detection image]
75 B_FLUX_APER3   B fixed aperture flux (3",AB) [detection image]
76 B_FLUXERR_APER3 B fixed aperture flux error (3",AB) [detection image]
77 B_MAG_APER2    B fixed aperture magnitude (2",AB)
78 B_MAGERR_APER2 B fixed aperture mag error (2",AB)
79 B_MAG_APER3    B fixed aperture magnitude (3",AB)
80 B_MAGERR_APER3 B fixed aperture mag error (3",AB)
81 B_MAG_AUTO     B auto magnitude (AB)
82 B_MAGERR_AUTO  B auto mag error (AB)
83 B_MAG_ISO      Isophotal magnitude
84 B_MAGERR_ISO   rms uncertainty on magB
85 B_FLAGS       Internal Flag
86 B_IMAFLAGS_ISO External Flag
87 V_FLUX_APER2   V fixed aperture flux (2",AB) [detection image]
88 V_FLUXERR_APER2 V fixed aperture flux error (2",AB) [detection image]
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91 V_MAG_APER2    V fixed aperture magnitude (2",AB)
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93 V_MAG_APER3    V fixed aperture magnitude (3",AB)
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95 V_MAG_AUTO     V auto magnitude (AB)
96 V_MAGERR_AUTO  V auto mag error (AB)
97 V_MAG_ISO      Isophotal magnitude
98 V_MAGERR_ISO   rms uncertainty on magV
99 V_FLAGS       Internal Flag
100 V_IMAFLAGS_ISO External Flag
101 ip_FLUX_APER2 ip fixed aperture flux (2",AB) [detection image]
102 ip_FLUXERR_APER2 ip fixed aperture flux error (2",AB) [detection image]
103 ip_FLUX_APER3 ip fixed aperture flux (3",AB) [detection image]
104 ip_FLUXERR_APER3 ip fixed aperture flux error (3",AB) [detection image]
105 ip_MAG_APER2 ip fixed aperture magnitude (2",AB)
106 ip_MAGERR_APER2 ip fixed aperture mag error (2",AB)
107 ip_MAG_APER3 ip fixed aperture magnitude (3",AB)
108 ip_MAGERR_APER3 ip fixed aperture mag error (3",AB)
109 ip_MAG_AUTO ip auto magnitude (AB)
110 ip_MAGERR_AUTO ip auto mag error (AB)
111 ip_MAG_ISO Isophotal magnitude
112 ip_MAGERR_ISO rms uncertainty on magIP
113 ip_FLAGS Internal Flag
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115 r_FLUX_APER2 r fixed aperture flux (2",AB) [detection image]
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119 r_MAG_APER2 r fixed aperture magnitude (2",AB)
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123 r_MAG_AUTO r auto magnitude (AB)
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125 r_MAG_ISO Isophotal magnitude
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129 u_FLUX_APER2 u fixed aperture flux (2",AB) [detection image]
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147 zp_MAG_APER2 zp fixed aperture magnitude (2",AB)
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zp_MAG_ISO     Isophotal magnitude
zp_MAGERR_ISO  rms uncertainty on magZP
zp_FLAGS       Internal Flag
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zpp_MAGERR_APER3 zpp fixed aperture mag error (3",AB)
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IA484_MAG_AUTO   IA484 auto magnitude (AB)
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244 IA767_FLUXERR_APER3 IA767 fixed aperture flux error (3",AB) [detection image]
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246 IA767_MAGERR_APER2 IA767 fixed aperture mag error (2",AB)
247 IA767_MAG_APER3  IA767 fixed aperture magnitude (3",AB)
248 IA767_MAGERR_APER3 IA767 fixed aperture mag error (3",AB)
249 IA767_MAG_AUTO  IA767 auto magnitude (AB)
250 IA767_MAGERR_AUTO IA767 auto mag error (AB)
251 IA767_MAG_ISO Isophotal magnitude
252 IA767_MAGERR_ISO rms uncertainty on magIA767
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257 IB427_FLUX_APER3  IB427 fixed aperture flux (3",AB) [detection image]
258 IB427_FLUXERR_APER3 IB427 fixed aperture flux error (3",AB) [detection image]
259 IB427_MAG_APER2  IB427 fixed aperture magnitude (2",AB)
260 IB427_MAGERR_APER2 IB427 fixed aperture mag error (2",AB)
261 IB427_MAG_APER3  IB427 fixed aperture magnitude (3",AB)
262 IB427_MAGERR_APER3 IB427 fixed aperture mag error (3",AB)
263 IB427_MAG_AUTO  IB427 auto magnitude (AB)
264 IB427_MAGERR_AUTO IB427 auto mag error (AB)
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271 IB464_FLUX_APER3  IB464 fixed aperture flux (3",AB) [detection image]
272 IB464_FLUXERR_APER3 IB464 fixed aperture flux error (3",AB) [detection image]
273 IB464_MAG_APER2  IB464 fixed aperture magnitude (2",AB)
274 IB464_MAGERR_APER2 IB464 fixed aperture mag error (2",AB)
275 IB464_MAG_APER3  IB464 fixed aperture magnitude (3",AB)
276 IB464_MAGERR_APER3 IB464 fixed aperture mag error (3",AB)
277 IB464_MAG_AUTO  IB464 auto magnitude (AB)
278 IB464_MAGERR_AUTO IB464 auto mag error (AB)
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280 IB464_MAGERR_ISO rms uncertainty on magIB464
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283 IB505_FLUX_APER2  IB505 fixed aperture flux (2",AB) [detection image]
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333 IB827_MAG_AUTO IB827 auto magnitude (AB)
334 IB827_MAGERR_AUTO IB827 auto mag error (AB)
335 IB827_MAG_ISO Isophotal magnitude
336 IB827_MAGERR_ISO rms uncertainty on magIB827
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339 NB711_FLUX_APER2 NB711 fixed aperture flux (2",AB) [detection image]
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341 NB711_FLUX_APER3 NB711 fixed aperture flux (3",AB) [detection image]
342 NB711_FLUXERR_APER3 NB711 fixed aperture flux error (3",AB) [detection image]
343 NB711_MAG_APER2 NB711 fixed aperture magnitude (2",AB)
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347 NB711_MAG_AUTO NB711 auto magnitude (AB)
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357 NB816_MAG_APER2 NB816 fixed aperture magnitude (2",AB)
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361 NB816_MAG_AUTO NB816 auto magnitude (AB)
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363 NB816_MAG_ISO Isophotal magnitude
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368 SPLASH_1_FLUX_ERR SPLASH_1 flux error in a 3" aperture
369 SPLASH_1_MAG SPLASH_1 magnitude in a 3" aperture
370 SPLASH_1_MAGERR SPLASH_1 magnitude error in a 3" aperture
371 SPLASH_2_FLUX SPLASH_2 flux in a 3" aperture
372 SPLASH_2_FLUX_ERR SPLASH_2 flux error in a 3" aperture
373 SPLASH_2_MAG SPLASH_2 magnitude in a 3" aperture
374 SPLASH_2_MAGERR SPLASH_2 magnitude error in a 3" aperture
375 SPLASH_3_FLUX SPLASH_3 flux in a 3" aperture
376 SPLASH_3_FLUX_ERR SPLASH_3 flux error in a 3" aperture
377 SPLASH_3_MAG SPLASH_3 magnitude in a 3" aperture
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516 M_Y Absolute magnitude of VISTA Y-band
517 M_J Absolute magnitude of VISTA J-band
518 M_H Absolute magnitude of VISTA H-band
519 M_K Absolute magnitude of VISTA Ks-band
520 MNUV_MR Dust corrected M(NUV)-M(R) color at zPDF
521 CLASS 0:quiescent/1:star-forming based on the NUV-R/R-J
522 MASS_MED log Stellar mass from BC03 best-fit template. median of the PDF
523 MASS_MED_MIN68 lower limit, 68% confidence level
524 MASS_MED_MAX68 upper limit, 68% confidence level
525 MASS_BEST log Stellar mass from BC03 best-fit template
526 SFR_MED log SFR from BC03 best-fit template. median of the PDF
527 SFR_MED_MIN68 lower limit, 68% confidence level
528 SFR_MED_MAX68 upper limit, 68% confidence level
529 SFR_BEST log SFR from BC03 best-fit template. Taken at the minimum chi2
530 SSFR_MED log sSFR from BC03 best-fit template. median of the PDF
531 SSFR_MED_MIN68 lower limit, 68% confidence level
532 SSFR_MED_MAX68 upper limit, 68% confidence level
533 SSFR_BEST log sSFR from BC03 best-fit template. Taken at the minimum chi2
534 L_NU log(dust corr lum in erg/s/Hz) in NUV filter
535 L_R log(dust corr lum in erg/s/Hz) in r filter
536 L_K log(dust corr lum in erg/s/Hz) in K filter

4 Appendix: flags and regions

This Appendix explains graphically each of the different regions present in catalogue file and how they may be selected. The region files (represented as DS9 polygon files) are available here: ftp://ftp.iap.fr/pub/from_users/hjmcc/COSMOS2015/region-files.tar.gz
COSMOS

Area: 2deg2
Description: tangent pt= [150.1163213,2.20973097]
Nbr of objects: 773118
File_Name: cosmos_cen.reg
Keyword: FLAG_COSMOS==1

UVISTA

Area: 1.70deg2
Description: The area covered by UVISTA
Nbr of objects: 646939
File_Name: polygon_UVISTA-dr2_Ks_08_15.reg
Keyword: FLAG_HJMCC==0+FLAG_HJMCC==2

UDEEP

Area: 0.62 deg2
Description: The area covered by UDeep stripes
Nbr of objects: 247203
File_Name: Deep-stripes.reg
Keyword: FLAG_DEEP==1

OCT & COSMOS

Area: 1.77 deg2
Description: Safe objects inside the 2deg2 COSMOS square
Nbr of objects: 694478
File_Name: cosmos_cen.reg & COSMOS.Peter2.reg
Keyword: FLAG_PETER==0+FLAG_COSMOS==1
Area: 1.59 deg²
Description: Good area in the chi² images
Nbr of objects: 606887
File Name: Polygon_UVISTA-dr2_Ks_08_15.reg
Keyword: FLAG_HJMCC==0

Area: 1.58 deg²
Description: Intersection Uvista and 2deg² COSMOS
Nbr of objects: 604265
File Name: cosmos_cen.reg & Polygon_UVISTA-dr2_Ks_08_15.reg
Keyword: (FLAG_HJMCC==0 + FLAG_HJMCC==2) & FLAG_COSMOS==1

Area: 1.51 deg²
Description: Intersection Good area in the chi² image and 2deg² COSMOS
Nbr of objects: 576762
File Name: cosmos_cen.reg & Polygon_UVISTA-dr2_Ks_08_15.reg
Keyword: FLAG_HJMCC==0 & FLAG_COSMOS==1

Area: 1.38 deg²
Description: Intersection Good area in the chi² image and 2deg² COSMOS and not masked in optical
Nbr of objects: 536077
File Name: cosmos_cen.reg & Polygon_UVISTA-dr2_Ks_08_15.reg & Cosmos.Peter2.reg
Keyword: FLAG_HJMCC==0 & FLAG_COSMOS==1 & FLAG_PETER==0

Area: 1.38 deg²
Description: Intersection Good area in the chi² image and 2deg² COSMOS and not masked in optical
Nbr of objects: 536077
File Name: cosmos_cen.reg & Polygon_UVISTA-dr2_Ks_08_15.reg & Cosmos.Peter2.reg
Keyword: FLAG_HJMCC==0 & FLAG_COSMOS==1 & FLAG_PETER==0

Area: 1.59 deg²
Description: Good area in the chi² images
Nbr of objects: 606887
File Name: Polygon_UVISTA-dr2_Ks_08_15.reg
Keyword: FLAG_HJMCC==0
Area 0.56 deg²
Description Intersection Good area in the chi2 image and 2deg² COSMOS
Nbr of objects 227278
File_Name Deep-stripes.reg & Polygon_UVISTA-dr2_Ks_08_15.reg
Keyword FLAG_HJMCC==0 & FLAG_Deep==1

=============UDEEP & COSMOS==============

Area 0.53 deg²
Description Intersection Deep stripes and 2deg² COSMOS
Nbr of objects 213716
File_Name Deep-stripes.reg & cosmos_cen.reg
Keyword FLAG_Cosmos==1 & FLAG_Deep==1

=============UDEEP & COSMOS &zpp =============

Area 0.51 deg²
Description Intersection Deep stripes and 2deg² COSMOS and good area in chi2
Nbr of objects 204275
File_Name Deep-stripes.reg & cosmos_cen.reg & polygon_UVISTA-dr2_Ks_08_15.reg
Keyword FLAG_Cosmos==1 & FLAG_Deep==1 & FLAG_HJMCC==0

=============UDEEP & COSMOS &zpp & !Opt=============

Area 0.46 deg²
Description Intersection Deep stripes and 2deg² COSMOS and good area in chi2 and non masked in optics
Nbr of objects 190650
File_Name Deep-stripes.reg & cosmos_cen.reg & polygon_UVISTA-dr2_Ks_08_15.reg & Cosmos.Peter2.reg
Keyword FLAG_Cosmos==1 & FLAG_Deep==1 & FLAG_HJMCC==0 & FLAG_PETER==0
5 Acknowledgements

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A full list of references for the data sources used in this catalogue can be found in Laigle et al. (2016).

References