ASTRODEEP Frontier Fields Catalogues

Castellano, M., Merlin, E., Amorin, R.

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For a full description of the methods and catalogues please refer to Merlin+2015 and Castellano+2015.

In all the 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.

1 Officially released catalogues

The format of the release catalogues is as follows.

1.1 Photometric Catalogue A - magnitudes

In the first catalogue we list IDs, position, AB magnitudes and relative uncertainties, in the ten considered bands. The format is therefore
`ID RA DEC X Y MAG_B435 MAG_V606 MAG_I814 MAG_Y105 MAG_J125 MAG_JH140 MAG_H160 MAG_Ks MAG_IRAC1 MAG_IRAC2 MAGERR_B435 MAGERR_V606 MAGERR_I814 MAGERR_Y105 MAGERR_J125 MAGERR_JH140 MAGERR_H160 MAGERR_Ks MAGERR_IRAC1 MAGERR_IRAC2`.

1.2 Photometric Catalogue B - fluxes

A second catalogue contains IDs, fluxes and uncertainties of the fluxes (μJy). The format is
`ID FLUX_B435 FLUX_V606 FLUX_I814 FLUX_Y105 FLUX_J125 FLUX_JH140 FLUX_H160 FLUX_Ks FLUX_IRAC1 FLUX_IRAC2 FLUXERR_B435 FLUXERR_V606 FLUXERR_I814 FLUXERR_Y105 FLUXERR_J125 FLUXERR_JH140 FLUXERR_H160 FLUXERR_Ks FLUXERR_IRAC1 FLUXERR_IRAC2`.

1.3 Photometric Catalogue C - diagnostics

A third catalogue contains useful diagnostic data. It lists IDs, position in $H160$ image pixel reference, segmentation limits, SExtractor `CLASS_STAR` parameter, the flag applied to residual features after processing the detection image, a "visual inspection flag" to select spurious detections, the flag given by t-phot to identify saturated and blended priors, and the information on the covariance of the sources (ratio of maximum covariance to the variance) for the Ks and IRAC bands. The format is
`ID X Y XMIN YMIN XMAX YMAX CLASS_STAR SEXFLAG RESFLAG VISFLAG TPHOTFLAG_Ks COVMAX_Ks TPHOTFLAG_IRAC1 COVMAX_IRAC1 TPHOTFLAG_IRAC2 COVMAX_IRAC2].`

1.4 Photo-z Catalogue - redshifts

Photometric redshift catalogues contain the following information (note that the physical parameters are not corrected for magnification):

- `ID`: identification number in the input photometric catalogues.
- `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.
- `ZSPECID`: identification number of spectroscopic counterpart from public catalogues.

  For Abell2744 the following convention is used: sources from Owers et al. 2011 have `ZSPECID` equal to the row index in the original file; sources from Johnson et al. 2014 have `ZSPECID` equal to 3000 + row index from Table 2 in the paper, objects from the GLASS survey have `ZSPECID`=10000 + original ID.

  For MACS0416 the following convention is used: sources from Ebeling, Ma Barrett, 2014 have `ZSPECID` equal to the original ID; the strongly lensed galaxies available at the STSci website for FF lensing modeling (from Grillo et al. in prep. and **?**) have `ZSPECID`=3000 + row index from the original file, objects from the GLASS survey have `ZSPECID`=10000 + original ID.

  The value is -1 for sources with no spectroscopic counterpart.

- `Chi2`: χ^2 of the SED fitting with stellar only templates at redshift fixed to ZBEST.
- `MSTAR`, `MSTAR_MIN`, `MSTAR_MAX`: stellar mass in units of $10^9 M_\odot$ (assuming Salpeter IMF) and relevant uncertainty range. Uncertainties on physical parameters are defined from the range where P(χ^2)>32% estimated in a Δz=0.2 redshift bin around the reference photometric redshift.
- `SFR`, `SFR_MIN`, `SFR_MAX`: star-formation rate ($M_\odot/yr$) and relevant uncertainty range.
- `Chi2_NEB`: χ^2 of the SED fitting with stellar plus nebular models at redshift fixed to ZBEST.
- `MSTAR_NEB`, `MSTAR_MIN_NEB`, `MSTAR_MAX_NEB`: stellar mass ($10^9 M_\odot$) estimated from stellar plus nebular fits.
- `SFR_NEB`, `SFR_MIN_NEB`, `SFR_MAX_NEB`: star-formation rate ($M_\odot/yr$) estimated from the stellar plus nebular fits.
- `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.