EPOCHS V1 Catalogue Information

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1 Introduction

This document provides information on the available columns in the EPOCHS v1 catalogue release. The EPOCHS v1 catalogue consists of 1165 galaxy canidates at $z > 6.5$ taken from 214 arcmin^2 of deep JWST NIRCam observations.

The EPOCHS paper series is as follows:

1. **EPOCHS I: The Discovery and Properties of Distant Galaxies in the Epoch of Reionization at** $6.5 < z < 20$ **with Pearls, JADES GTO, and Public JWST data** *Conselice et al. 2024, ApJ submitted*
2. **EPOCHS II: The Ultraviolet Luminosity Function from** $7.5 < z < 13.5$ **using 180 square arcminutes of deep, blank-fields from the PEARLS Survey and Public JWST data** *Adams et al. 2024, ApJ*
3. **EPOCHS III: Unbiased UV continuum slopes at** $6.5 < z < 13$ **from combined PEARLS GTO and public JWST NIRCam imaging** *Austin et al. 2024, ApJ submitted*
4. **EPOCHS IV: SED Modelling Assumptions and their impact on the Stellar Mass Function at** $6.5 \leq z \leq 13.5$ **using PEARLS and public JWST observations** *Harvey et al. 2024, ApJ submitted*
5. **EPOCHS V: The dependence of galaxy formation on galaxy structure at** $z < 7$ **from JWST observations** *Conselice et al. 2024, MNRAS*
6. **EPOCHS VI: the size and shape evolution of galaxies since** $z \sim 8$ **with JWST Observations** *Ormerod et al. 2024, MNRAS*
7. **EPOCHS VII: Discovery of high-redshift** $(6.5 < z < 12)$ **AGN candidates in JWST ERO and PEARLS data** *Juodžbalis et al. 2023, MNRAS*
8. **EPOCHS VIII: An Insight into MIRI-selected Galaxies in SMACS-0723 and the Benefits of Deep MIRI Photometry in Revealing AGN and the Dusty Universe** *Li et al. 2023, MNRAS*
9. **EPOCHS IX. When cosmic dawn breaks: Evidence for evolved stellar populations in** $7 < z < 12$ **galaxies from PEARLS GTO and public NIRCam imaging** *Trussler et al. 2024, MNRAS*
10. **EPOCHS X: Environmental effects on Galaxy Formation and Protocluster Galaxy candidates at** $4.5 < z < 10$ **from JWST observations** *Li et al. 2024, MNRAS submitted*
11. More to come!

1.1 Notes

BAND refers to any of the ACS_WFC or NIRCam bands listed in Table 1. If a band is listed as available in Table 1, but is not given for a galaxy in that field, then that galaxy fall swithin our image mask in that filter.

Table 1: Table of the available HST/ACS_WFC and JWST/NIRCam data used in each field in the EPOCHS v1 catalogue. A '⋆' means the imaging only partially covers the NIRCam wideband footprint.

	HST/ACS_WFC		JWST/NIRCam								
Field	**F606W**	**F814W**	**F090W**	**F115W**	**F150W**	**F200W**	**F277W**	**F335M**	**F356W**	**F410M**	**F444W**
NEP	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y
El Gordo	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y
MACS-0416	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y
CLIO	N	N	Y	N	Y	Y	Y	N	Y	N	Y
CEERS	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y
SMACS0723	N	N	Y	N	Y	Y	Y	N	Y	N	Y
GLASS	N	N	Y	Y	Y	Y	Y	N	Y	N	Y
NGDEEP	Y⋆	Y⋆	N	Y	Y	Y	Y	N	Y	N	Y
JADES Deep GS	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table 2: Table of EPOCHS v1 catalog column names, units, descriptions and column shape. A "⋆" indicates that the column has been corrected for any flux associated with the galaxy which falls outside the extraction aperture.

Column Name	Unit	Description
IDs, Positions, Fluxes and local depths		
ID		Unique catalogue ID, consisting of number and fieldname
ALPHA_J2000	degree	Right ascension
DELTA_J2000	degree	Declination
FIELDNAME		Field/pointing in Table 1 the galaxy is in
FLUX_APER_**BAND**	nJy	Aperture corrected flux in 0.16 arcsec radius apertures
FLUXERR_APER_**BAND**	nJy	Local-depth derived flux error from NMAD of 200 nearby empty apertures
sigma_**BAND**		SNR of detection in 0.16 arcsec aperture
local_depth_**BAND**	AB Mag	5σ local depth from NMAD of flux in 200 nearby empty apertures
unmasked_**BAND**	Boolean	Whether galaxy is masked in **BAND**
auto_corr_factor_**BAND**		Correction factor in **BAND** for flux outside 0.16 arcsec aperture
Photometric Redshifts and Selection		
zbest		Photometric redshift using `EAZY-py`
zbest_l1		-1σ photometric redshift uncertainty using `EAZY-py`
zbest_u1		$+1\sigma$ photometric redshift uncertainty using `EAZY-py`
chi2_best		χ^2 of `EAZY-py` fit
PDF_integral_eazy		$\int_{0.94\times\mathrm{zbest}}^{1.06\times\mathrm{zbest}} \mathrm{PDF}(z)dz$ - Integral of `EAZY-py` posterior redshift PDF
zbest_lowz		Photometric redshift using `EAZY-py`, with $z_{\mathrm{max}} = 6$
chi2_best_lowz		χ^2 of `EAZY-py` fit, with $z_{\mathrm{max}} = 6$
UV Properties		
M_UV⋆	AB Mag	Absolute UV mag in 100Å tophat at 1500Å rest-frame flux at redshift zbest
M_UV_u1	AB Mag	
M_UV_l1	AB Mag	
BETA_UV		UV slope $f \propto \lambda^{\beta}$
BETA_UV_l1		
BETA_UV_u1		
SFR_UV⋆	$\mathrm{M}_{\odot}\ \mathrm{yr}^{-1}$	
SFR_UV_l1	$\mathrm{M}_{\odot}\ \mathrm{yr}^{-1}$	
SFR_UV_u1	$\mathrm{M}_{\odot}\ \mathrm{yr}^{-1}$	
Sample identifiers		
certain_by_eye	Boolean	Visual inspection of cutout and SED boolean
EPOCHS_II	Boolean	Used in EPOCHS II (UV LF)
EPOCHS_III	Boolean	Used in EPOCHS III (UV and SF properties)
EPOCHS_IV	Boolean	Used in EPOCHS IV (SMF)

Table 3: Table of EPOCHS v1 catalog column names, units, descriptions and column shape, specifically for the stellar population parameters calculated using `Bagpipes`. **EXT** indicates that the column name appears multiple time with different extensions, and in this case "**EXT**" can take the value of **zfix** or **zgauss**, depending on whether the redshift is fixed to the `EAZY-py` maximum likelihood result given by "zbest", or allowed to vary within a Gaussian centered on "zbest". A "⋆" indicates that the column has been corrected for any flux associated with the galaxy which falls outside the extraction aperture - for masses this is done by correcting the mass by the ratio of MAG_AUTO to MAG_APER in the longest wavelength F444W band, where this exceeds unity. For star formation rates the band covering the rest-frame 1500Å wavelength is used instead.

Column Name	Unit	Description
Fiducial `Bagpipes` Results (z_{fix} or z_{gauss})		
redshift_pipes_zgauss		Fitted redshift (zgauss only)
redshift_pipes_l1_zgauss		Lower uncertainty (50th - 16th percentile)
redshift_pipes_u1_zgauss		Upper uncertainty (84th - 50th percentile)
stellar_mass_pipes_**EXT**⋆	$\log_{10}(M_\odot)$	Total surviving stellar mass
stellar_mass_pipes_l1_**EXT**	$\log_{10}(M_\odot)$	Lower uncertainty (50th - 16th percentile)
stellar_mass_pipes_u1_**EXT**	$\log_{10}(M_\odot)$	Upper uncertainty (84th - 50th percentile)
SFR_10Myr_pipes_**EXT**⋆	$M_\odot$ yr^{-1}	Average total star formation rate over a 10 Myr timescale
SFR_10Myr_pipes_l1_**EXT**	$M_\odot$ yr^{-1}	Lower uncertainty (50th - 16th percentile)
SFR_10Myr_pipes_u1_**EXT**	$M_\odot$ yr^{-1}	Upper uncertainty (84th - 50th percentile)
SFR_100Myr_pipes_**EXT**⋆	$M_\odot$ yr^{-1}	Average total star formation rate over a 100 Myr timescale
SFR_100Myr_pipes_l1_**EXT**	$M_\odot$ yr^{-1}	Lower uncertainty (50th - 16th percentile)
SFR_100Myr_pipes_u1_**EXT**	$M_\odot$ yr^{-1}	Upper uncertainty (84th - 50th percentile)
mass_weighted_age_pipes_**EXT**	Myr	Mass-weighted age of galaxy
mass_weighted_age_pipes_l1_**EXT**	Myr	Lower uncertainty (50th - 16th percentile)
mass_weighted_age_pipes_u1_**EXT**	Myr	Upper uncertainty (84th - 50th percentile)
beta_pipes_**EXT**		UV β slope of best-fitting `Bagpipes` spectra in Calzetti filters
beta_pipes_l1_**EXT**		Lower uncertainty (50th - 16th percentile)
beta_pipes_u1_**EXT**		Upper uncertainty (84th - 50th percentile)
Z_star_pipes_**EXT**	$Z_\odot$	Stellar metallicity
Z_star_pipes_l1_**EXT**	$Z_\odot$	Lower uncertainty (50th - 16th percentile)
Z_star_pipes_u1_**EXT**	$Z_\odot$	Upper uncertainty (84th - 50th percentile)
A_V_pipes_**EXT**	AB mag	Dust extinction in V band
A_V_pipes_l1_**EXT**	AB mag	Lower uncertainty (50th - 16th percentile)
A_V_pipes_u1_**EXT**	AB mag	Upper uncertainty (84th - 50th percentile)
U-V_pipes_**EXT**	AB mag	U-V colour
U-V_pipes_l1_**EXT**	AB mag	Lower uncertainty (50th - 16th percentile)
U-V_pipes_u1_**EXT**	AB mag	Upper uncertainty (84th - 50th percentile)
M_UV_pipes_**EXT**	AB mag	Absolute UV Magnitude
M_UV_pipes_l1_**EXT**	AB mag	Lower uncertainty (50th - 16th percentile)
M_UV_pipes_u1_**EXT**	AB mag	Upper uncertainty (84th - 50th percentile)
chisq_phot_pipes_**EXT**		χ^2 of fit