Stellar masses from the CANDELS survey: the GOODS-S and UDS fields

Paola Santini and the CANDELS collaboration

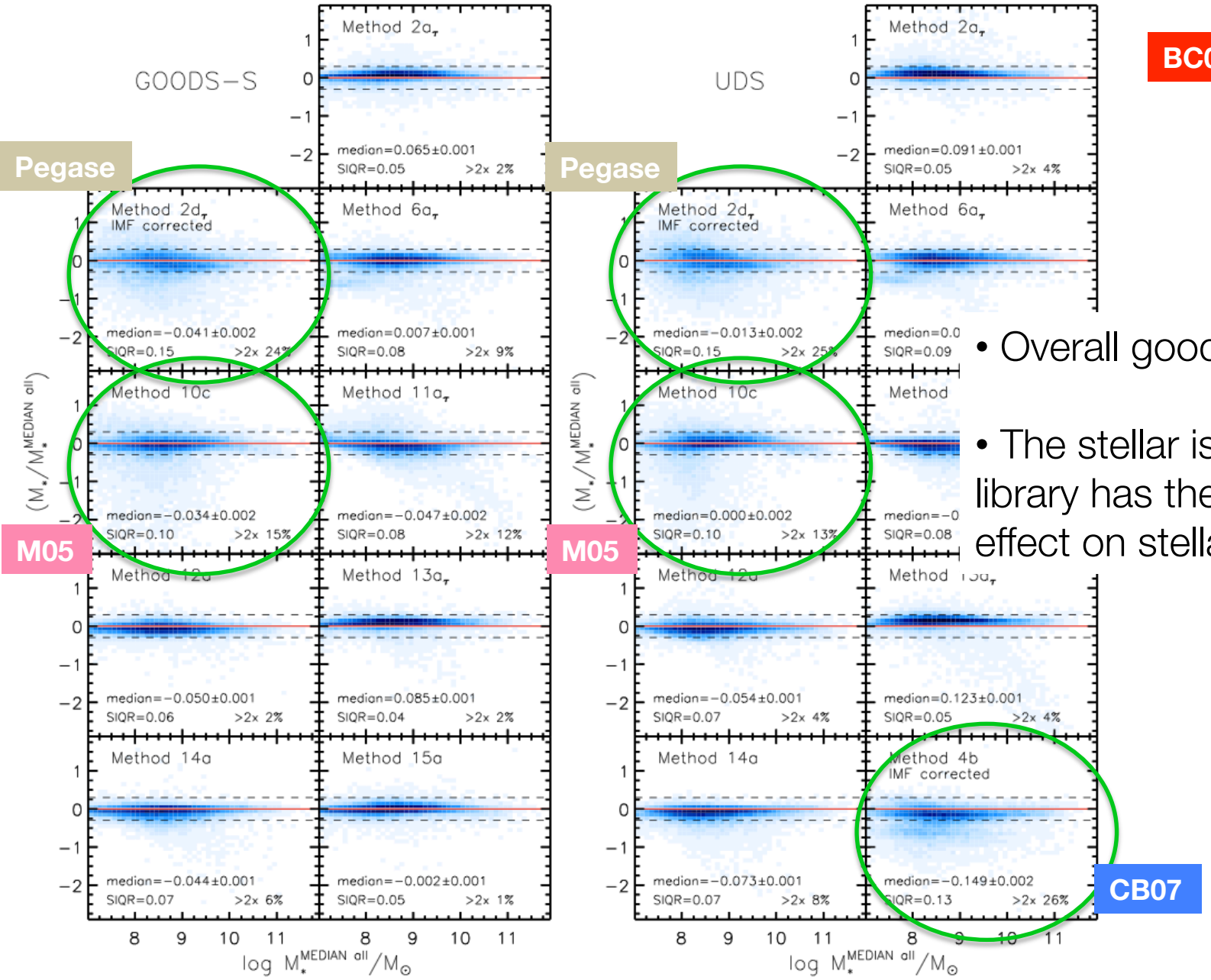
Public release of stellar masses (+ other physical parameters and rest-frame magnitudes)

- 9 teams within CANDELS computed the stellar masses by assuming:

  - the same photometry: the official CANDELS photometric catalogs (Guo et al. 2013 for GOODS-S, Galametz et al. 2013 for UDS)
  - the same redshifts (spec-z when available, official CANDELS photo-z from Dahlen et al. 2013 otherwise)
  - their preferred assumptions in terms of method, stellar isochrone models, IMF, SFH parameterization, parameter grid, priors, etc.

- the different mass estimates were combined to reduce the systematics associated with the fitting assumptions

Comparison of different methods



- Overall good agreement
- The stellar isochrone library has the greatest effect on stellar masses

SFH: (on average) poor effect on stellar masses

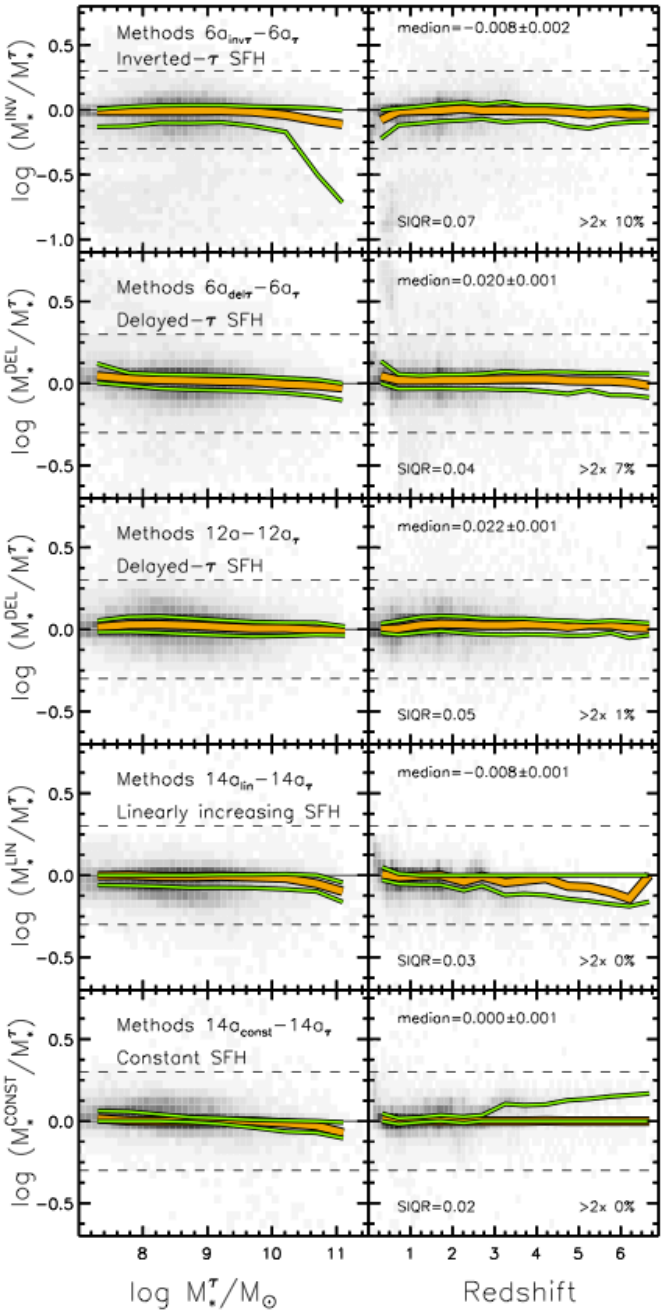
$$\psi(t) \propto \exp(t/\tau)$$

$$\psi(t) \propto \frac{t^2}{\tau} \exp(-t/\tau)$$

$$\psi(t) \propto \frac{t}{\tau^2} \exp(-t/\tau)$$

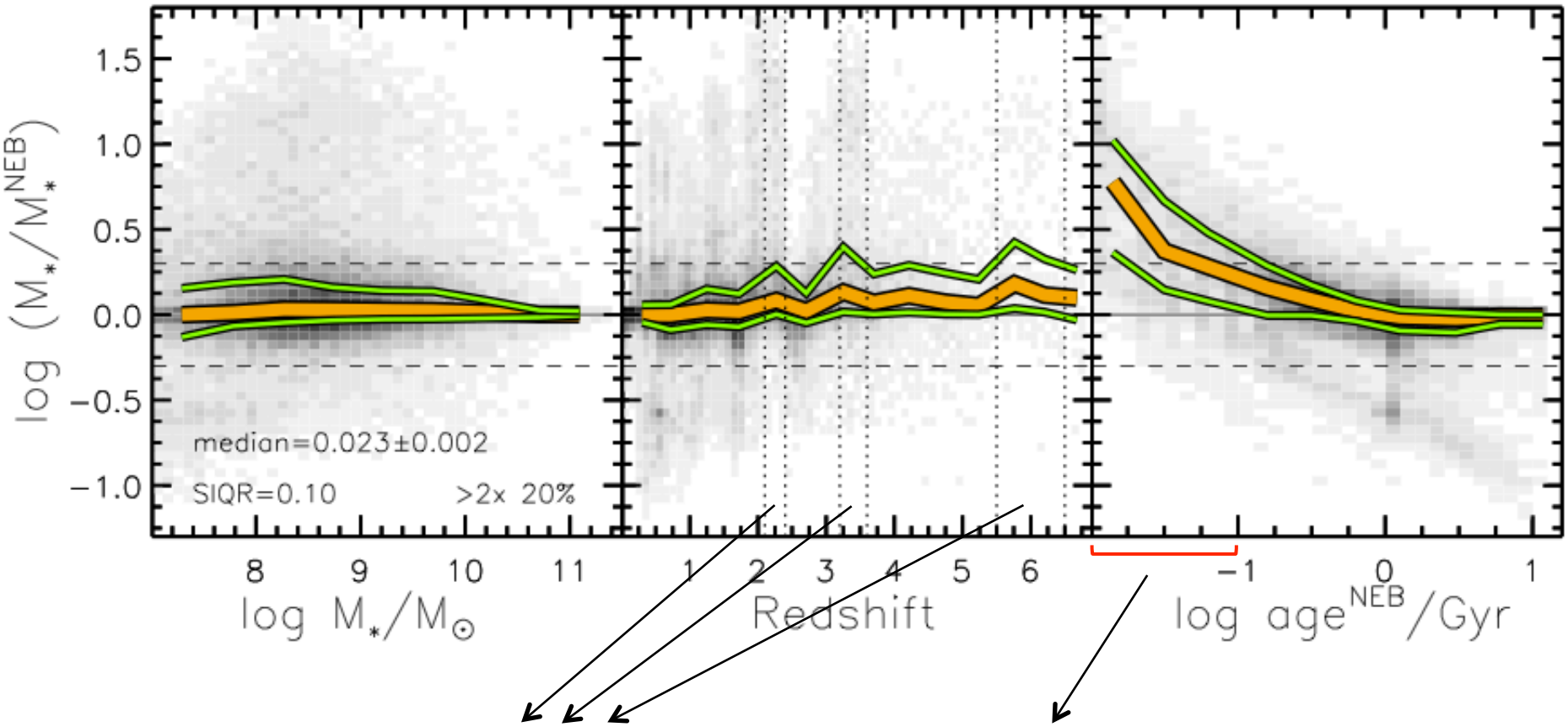
$$\psi(t) \propto t$$

$$\psi(t) = const$$



$$\psi(t) \propto \exp(-t/\tau)$$

Nebular contribution: large effect on a subsample of galaxies



Strong nebular lines enter the NIR filters at these redshifts

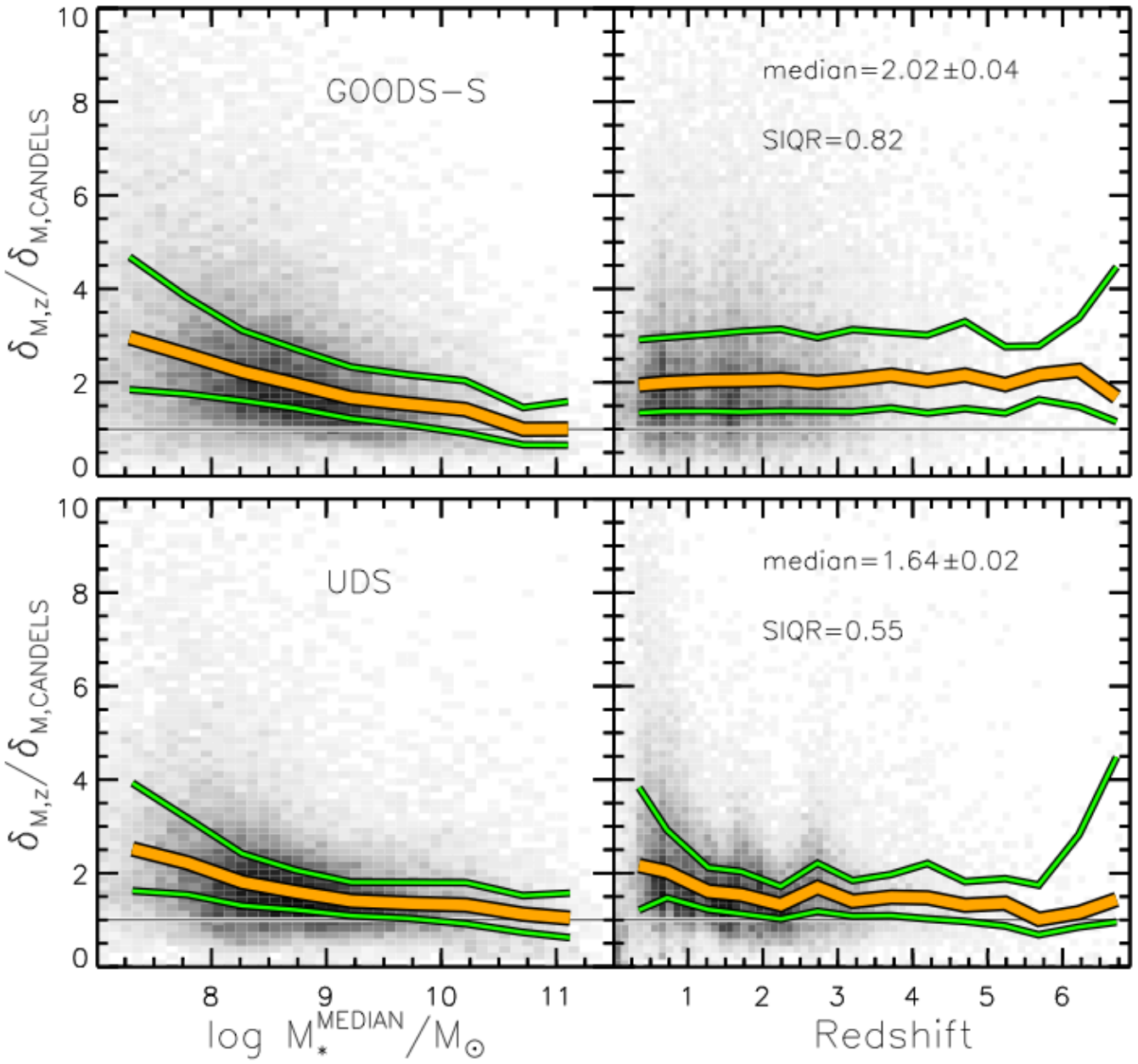
Many intense nebular lines in the spectra of young SF galaxies may mimick the Balmer and 4000Å breaks

CANDELS reference stellar masses

The median of all estimates based on BC03 templates (7 values in GOODS-S, 6 values in UDS) and the same IMF reduces the systematics associated with each method.

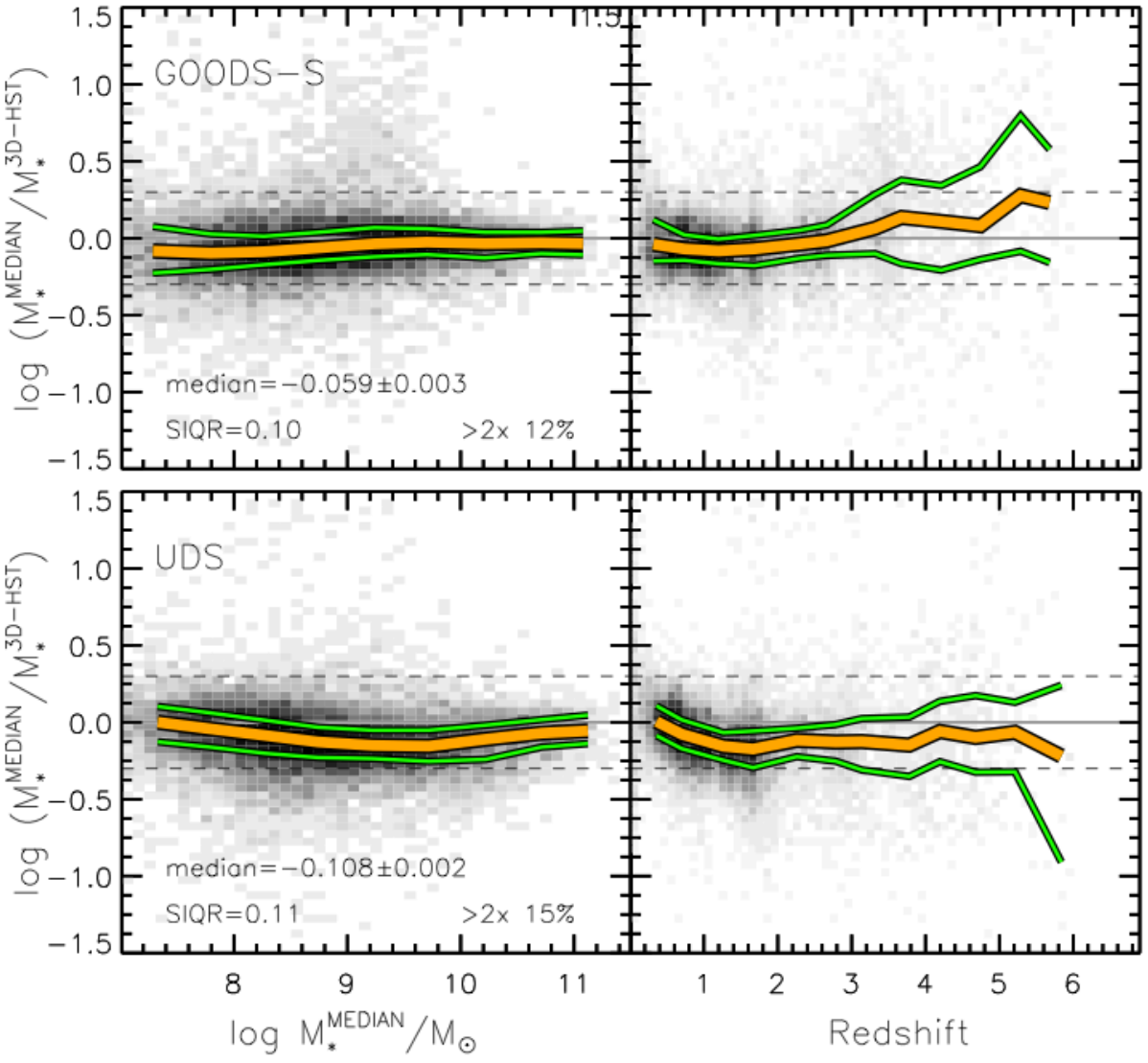
The standard deviation is a measure of the scatter due to: different technicalities, parameter grids, assumptions and priors, assumed SFH, inclusion/non inclusion of nebular emission.

Scatter: different methods vs model degeneracy + photo-z scatter



Model degeneracy and photo-z scatter remain the largest source of uncertainty (larger than scatter due to technicalities by a factor of ~2)

Comparison to 3D-HST masses



Overall good agreement, but:

- Larger distributions: different techniques + different photometry and redshifts.
- Average offset ~-0.1 dex: disappears or is reduced when 3D-HST results are compared with the method adopting the closest assumptions to the 3D-HST team → likely due to systematics affecting 3D-HST results (based on a single method).
- Curved trend in UDS: likely due to systematics in the photometry, mostly affecting the poorer quality UDS dataset.

Public release

Catalogs for GOODS-S and UDS including:

- median stellar masses
- stellar masses from all methods
- rest-frame magnitudes
- other physical parameters (e.g. age, SFR, extinction, metallicity, etc…)

currently available within the collaboration, will soon be publicly released