Exploring the evolution of the stellar mass function in the redshift range z=1-3

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Exploring the evolution of the stellar mass function (and K-band luminosity function) in the redshift range z=0.5-3.5

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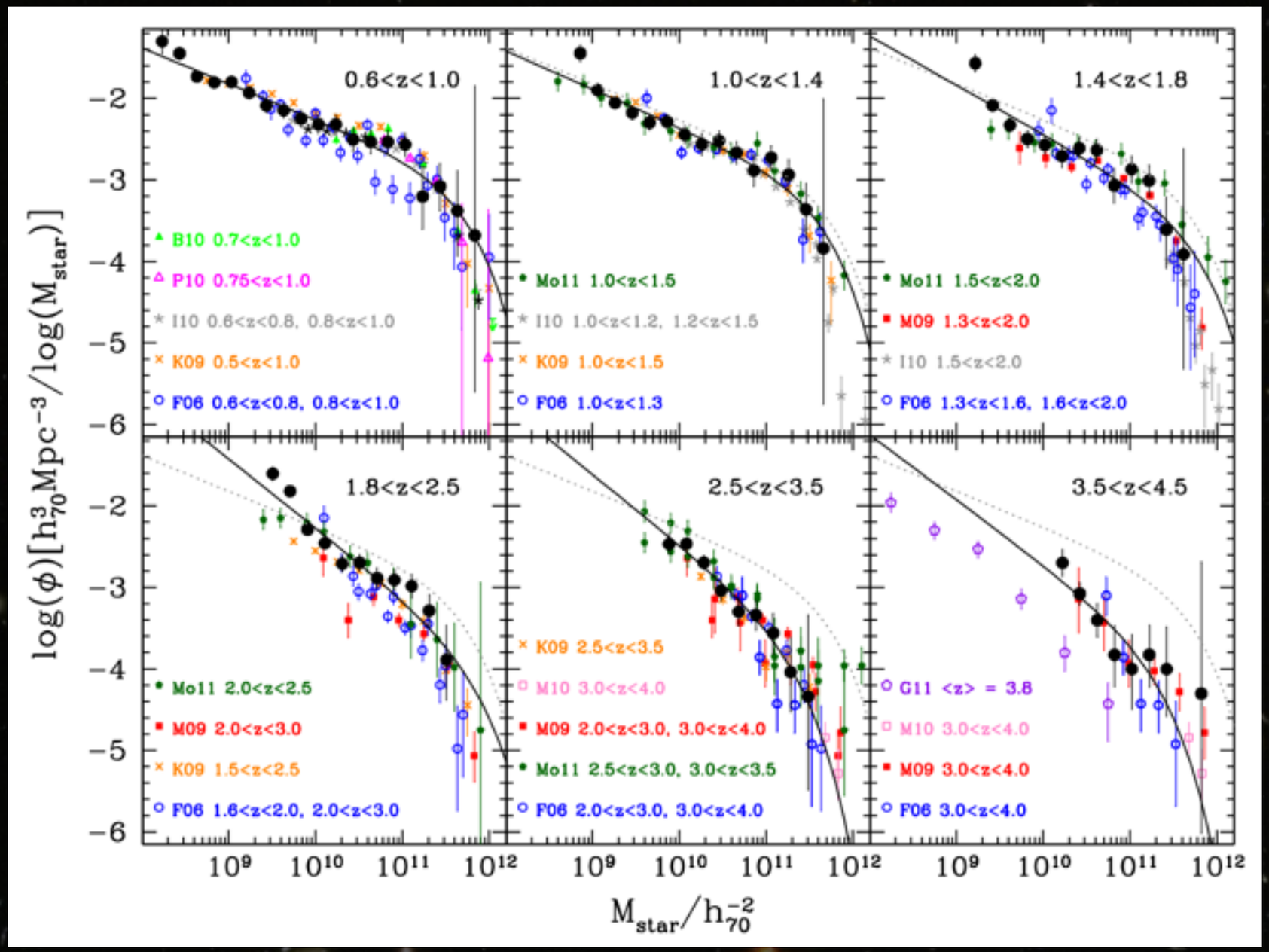
Motivation



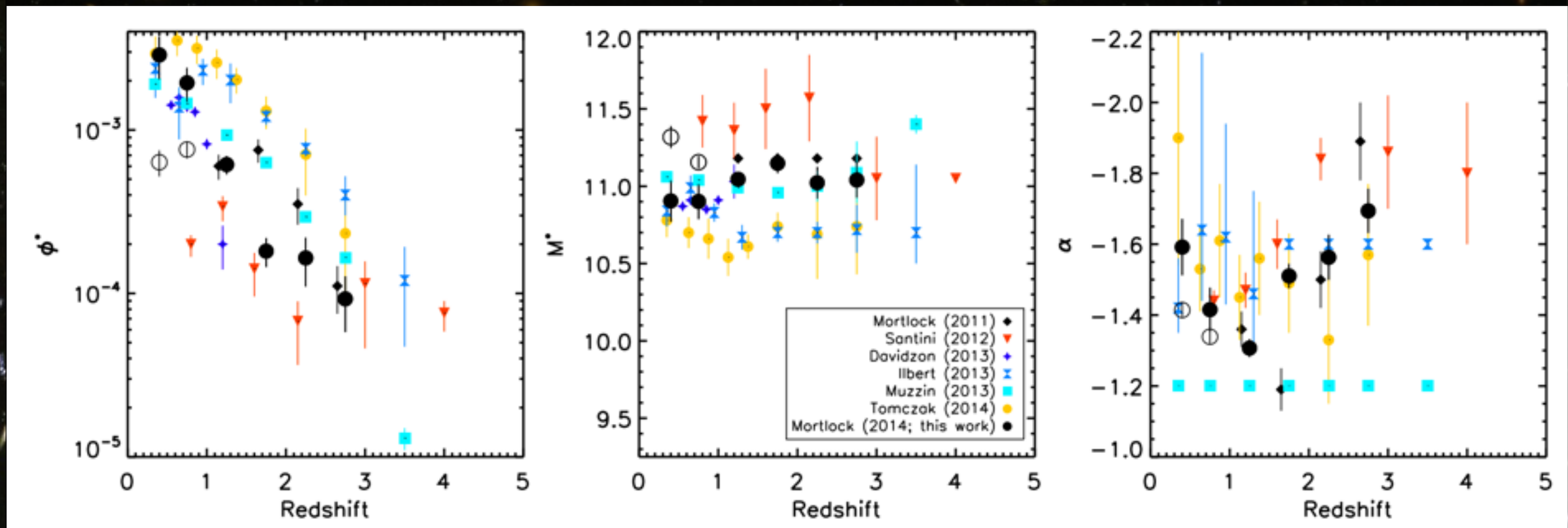
High mass end: Fewer objects means larger errors

Low mass end: Fainter objects are harder to observe

Santini et al. 2012

Motivation

Huge amount of work in the literature, but still disagreement on the form of the MF (and LF)

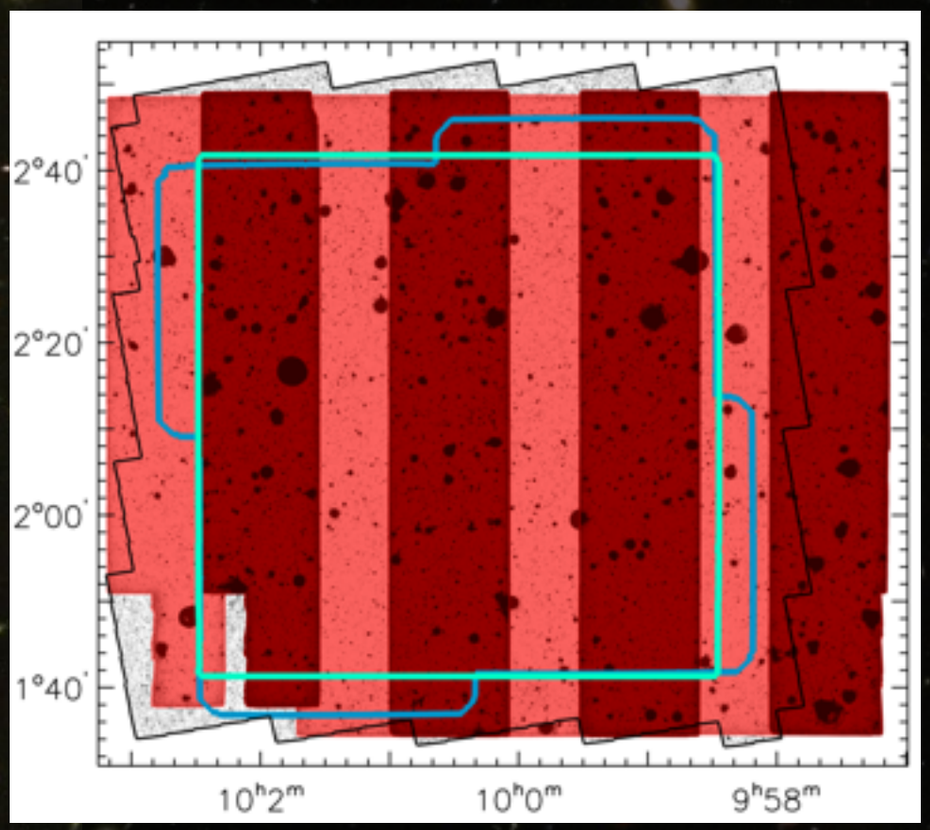


Mortlock et al. 2015

- Often disagreements arise from:
  - survey area
  - depth
  - fitting the form of the LF/MF
  - differences in galaxy selection

Constraining the bright end: we need large area

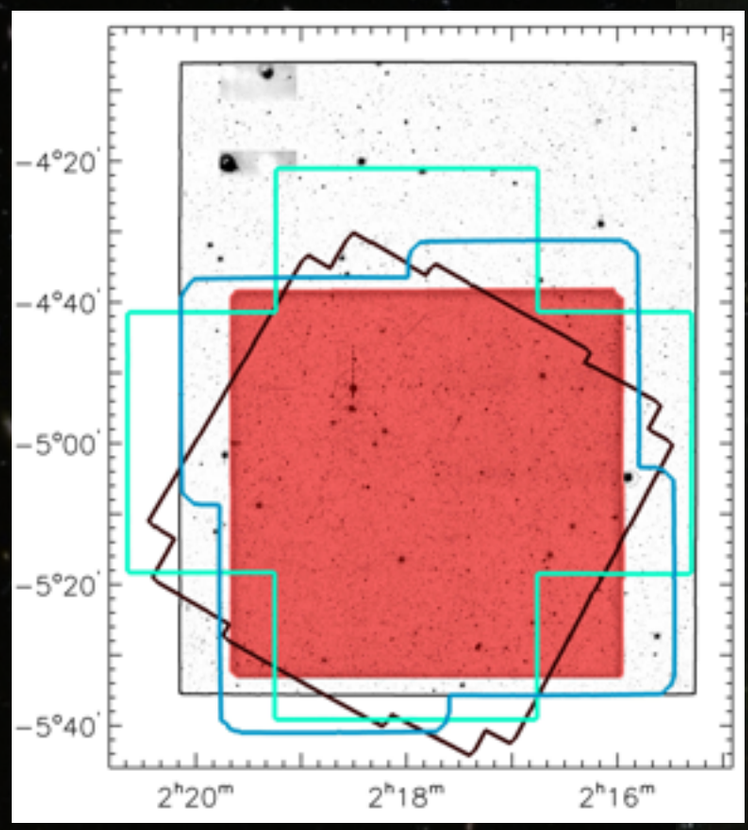
UltraVISTA



CFHT/MegaCam
Subaru/Suprime-Cam
HST/ACS
DR1
DR2

Subaru/Suprime-Cam (z')
Subaru/Suprime-Cam
VISTA
UKIRT/WFCAM

UDS



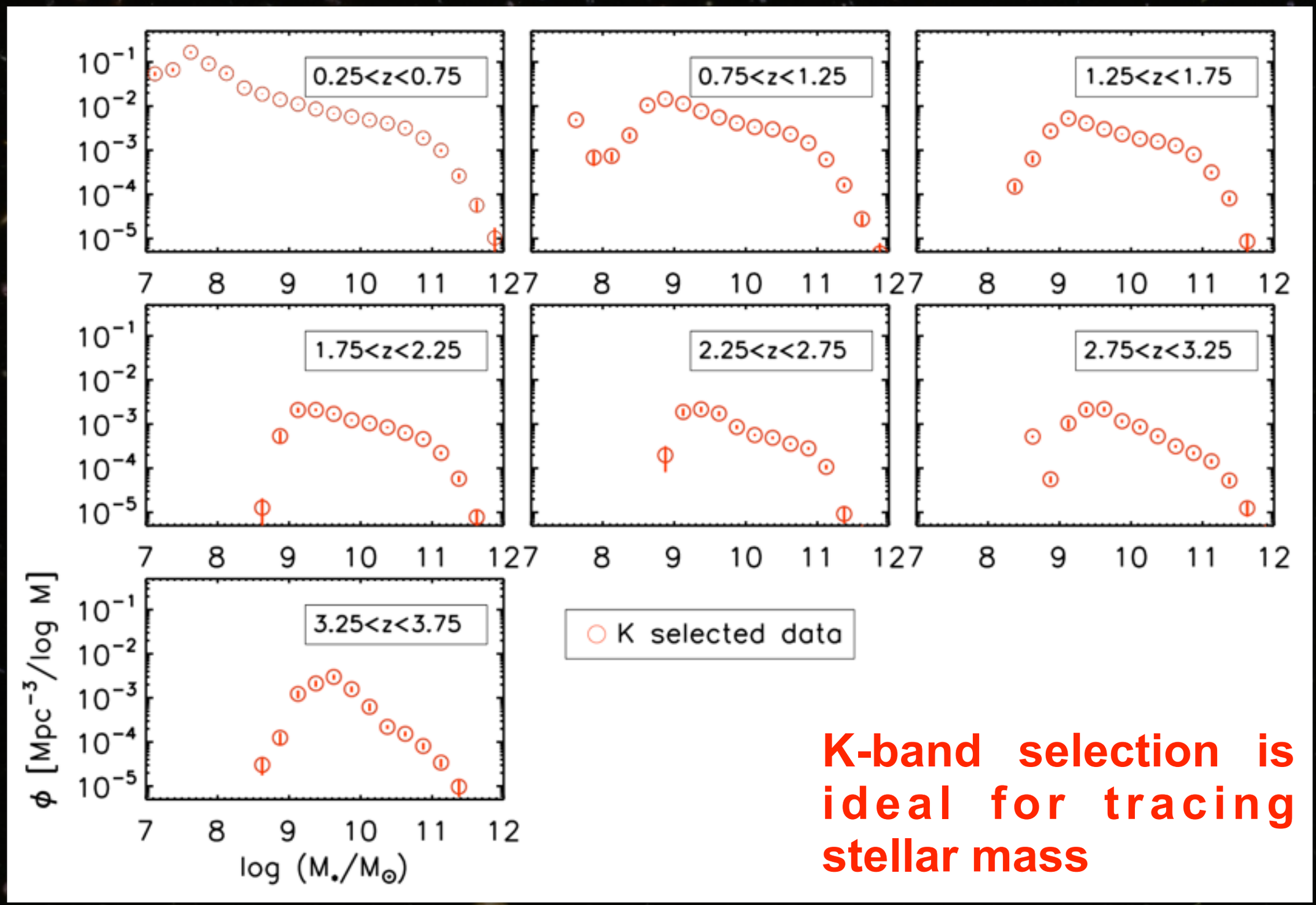
Bowler et al. 2013

- Deep strips
  - Area ~0.4 deg^2
  - K(AB)=24.5 (5σ 2")
- Interstrip gaps
  - Area ~0.4 deg^2
  - K(AB)=23.5 (5σ 2")
- Deep 3.6 and 4.5μm
  - SPLASH
  - SEDs

- Area ~0.7 deg^2
- K(AB)=24.75 (5σ 2")

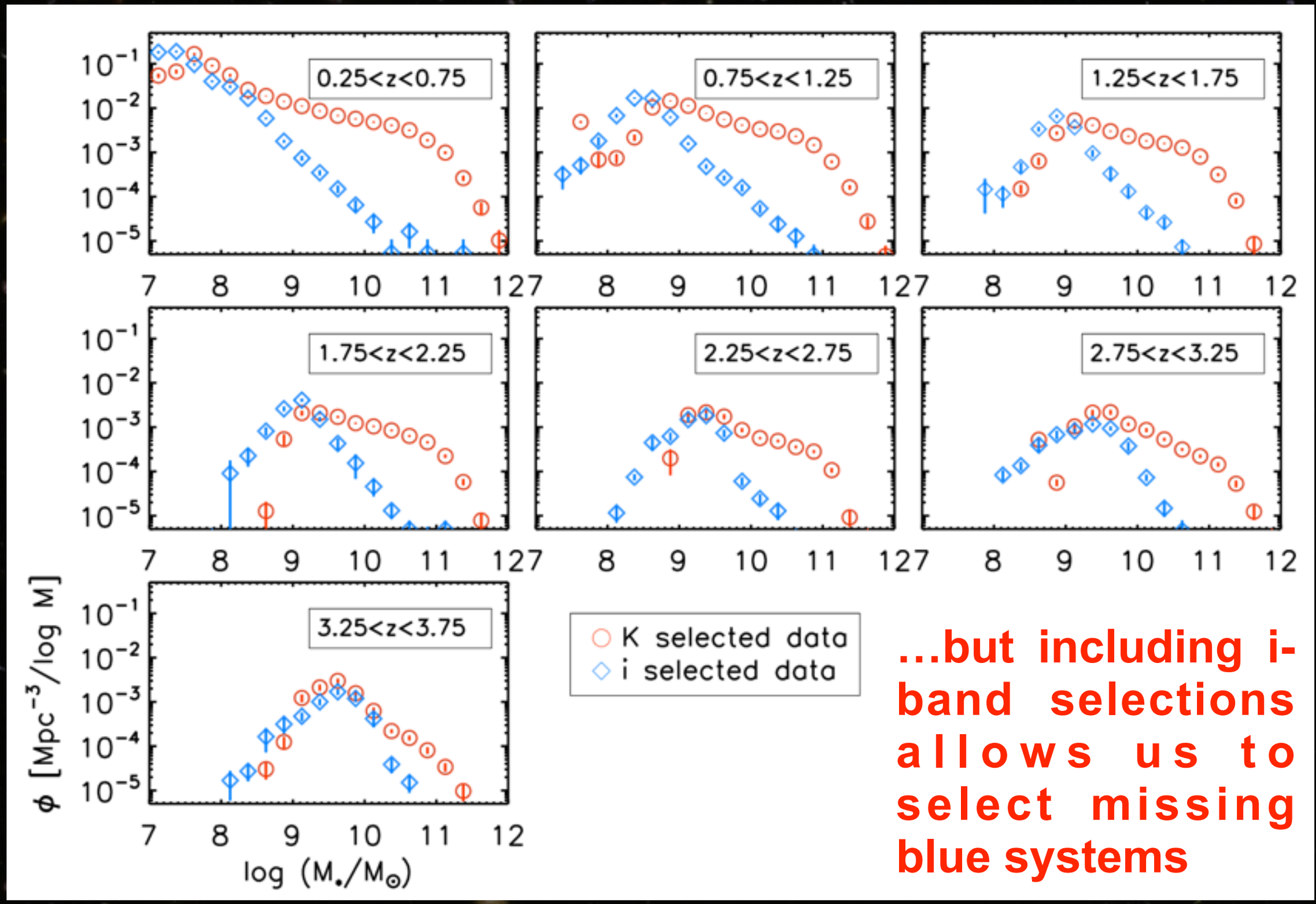
Provide a total of ~1.5 deg^2 of area.

The K-band selected MF in UVISTA



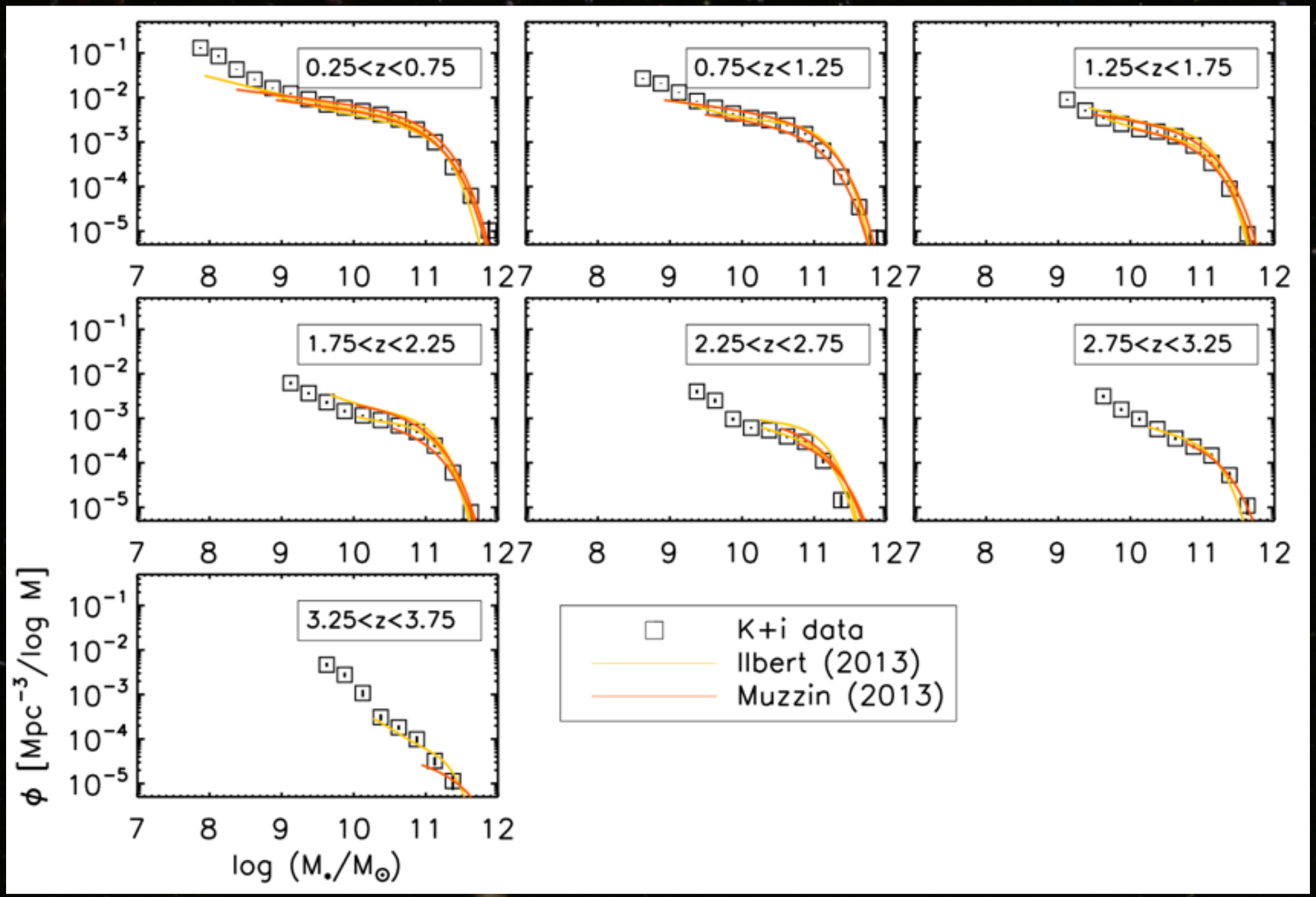
K-band selection is ideal for tracing stellar mass

The i-band selected MF in UVISTA

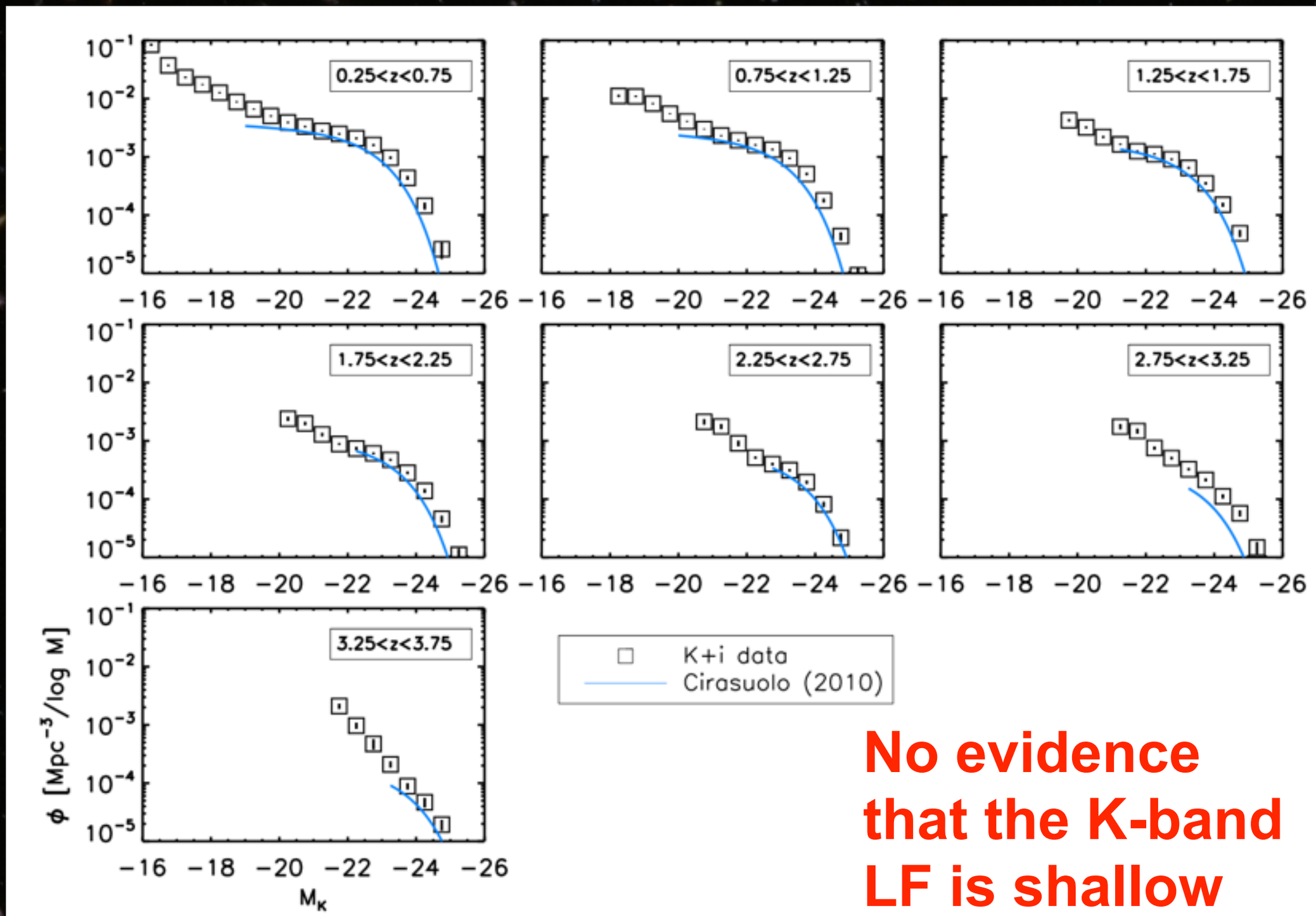


…but including i-band selections allows us to select missing blue systems

The K+i-band selected MF in UVISTA

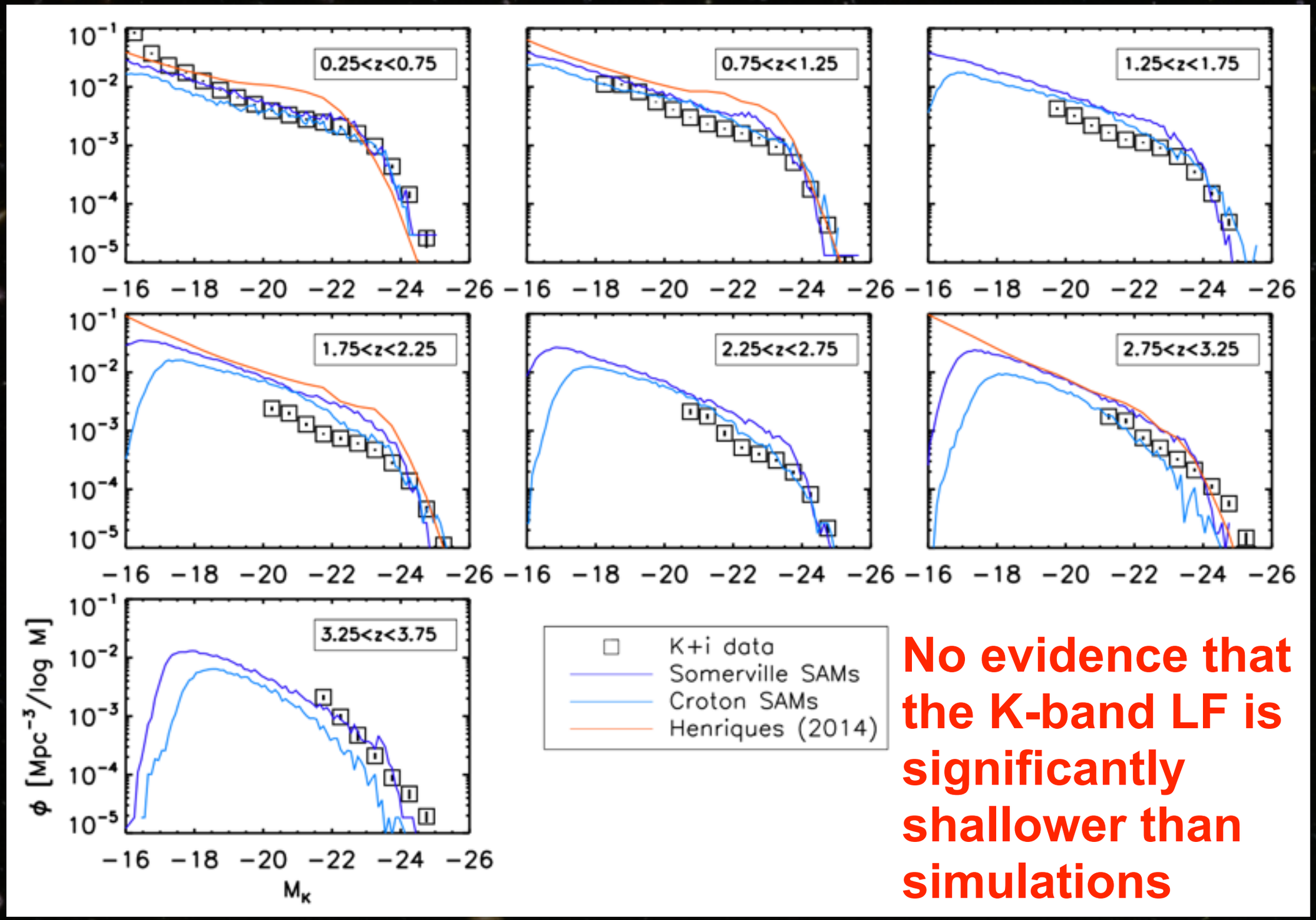


The K+i-band selected LF in UVISTA



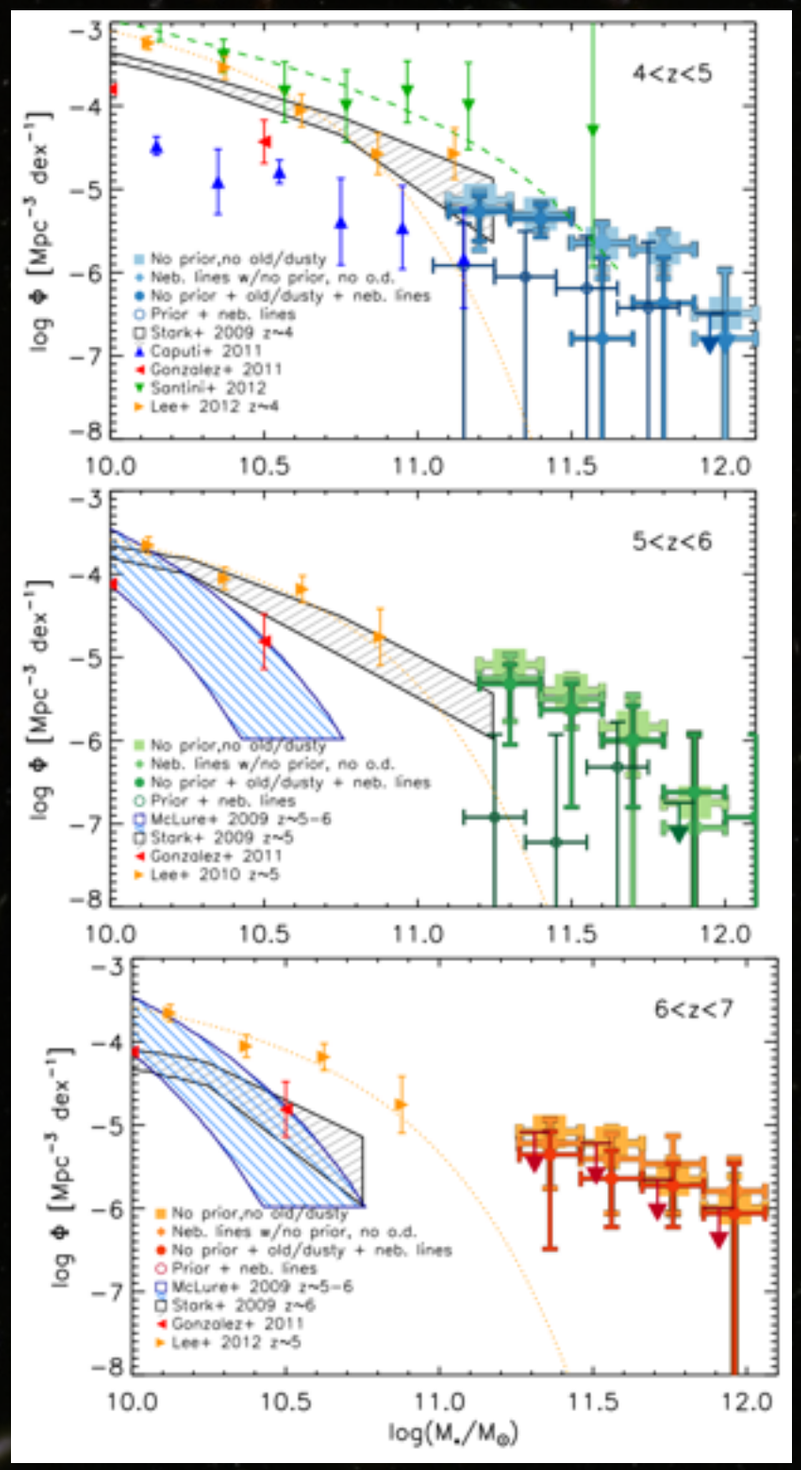
No evidence that the K-band LF is shallow

The K+i-band selected LF in UVISTA
Comparison to simulations



No evidence that the K-band LF is significantly shallower than simulations

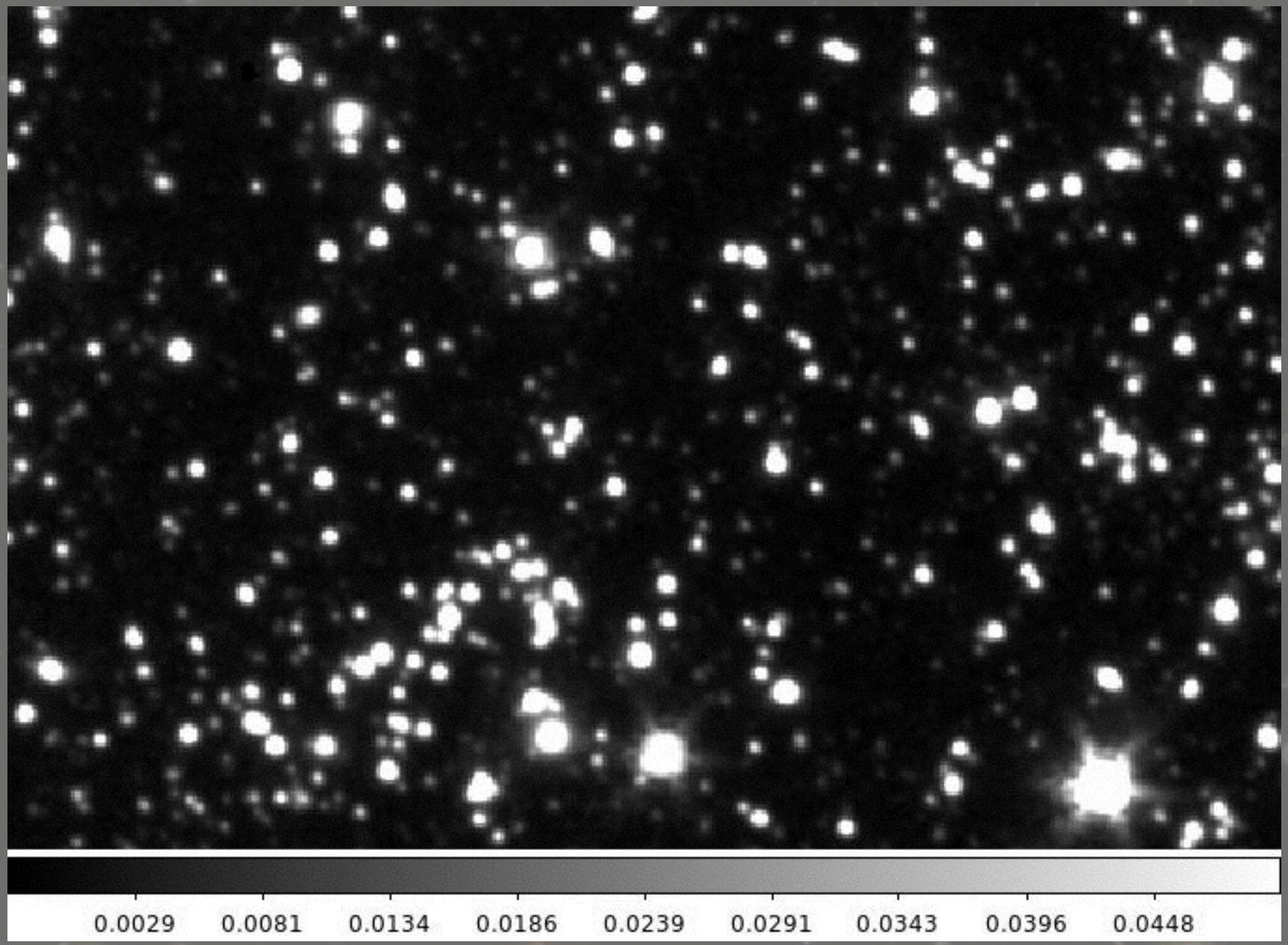
The IRAC selected MF in UVISTA
Motivation



Stefanon (2014) report a sample of 7 massive galaxies at z>4 selected in S-COSMOS over 1.5 deg^2.

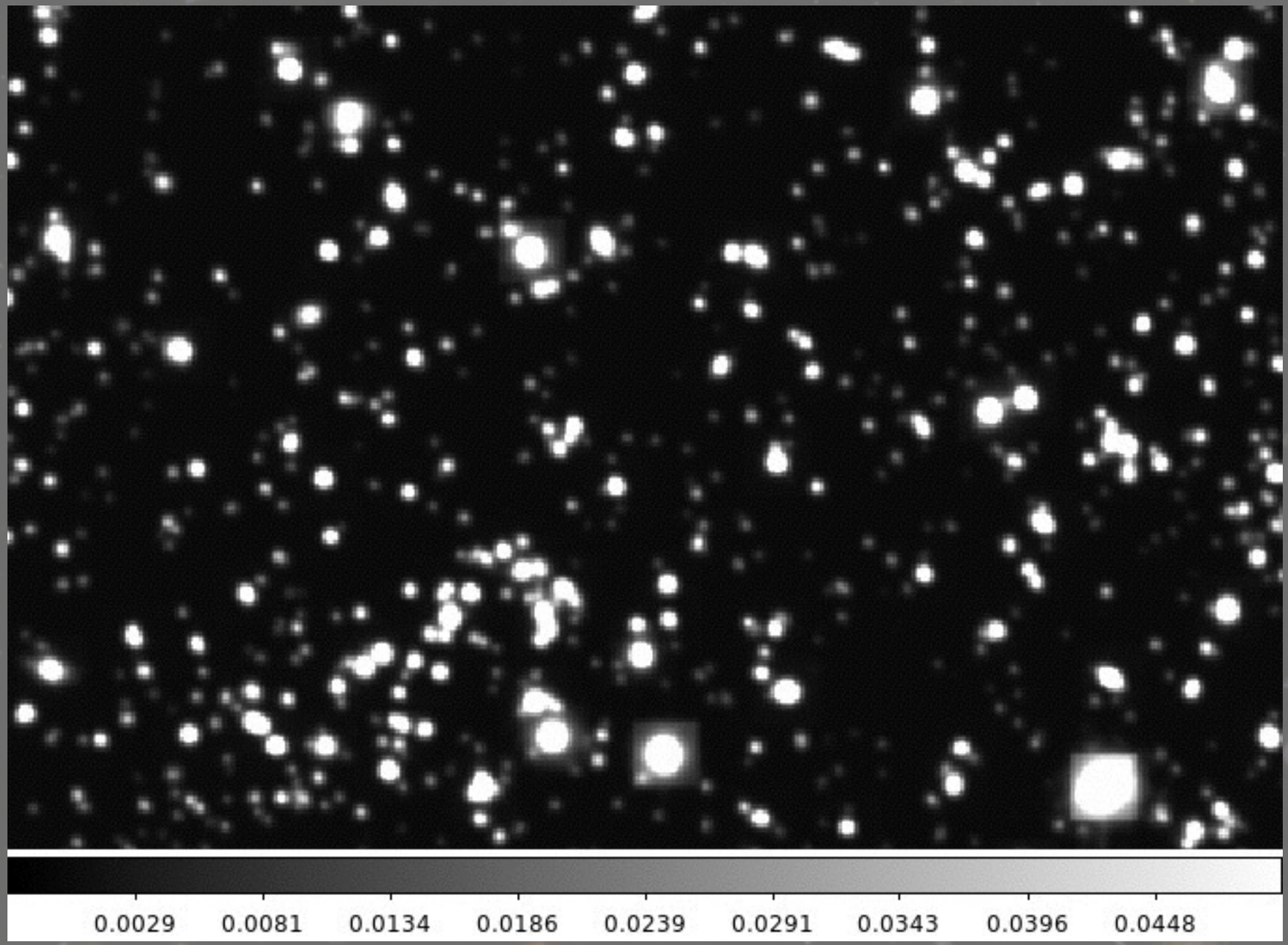
(see also eg. Caputi 2011, 2012)

The IRAC selected MF in UVISTA



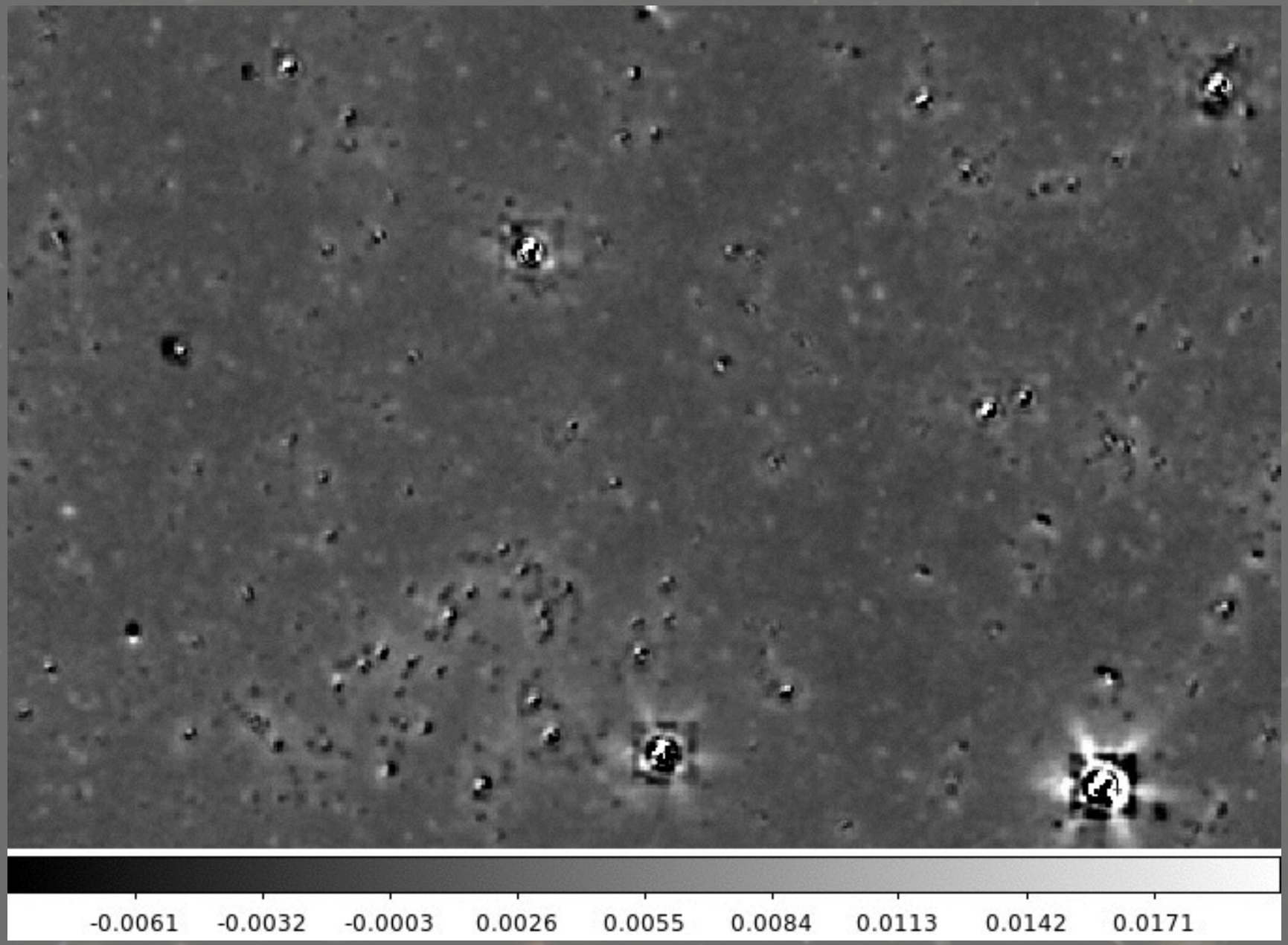
IRAC 3.6μm (SEDS; Ashby 2013)

The IRAC selected MF in UVISTA



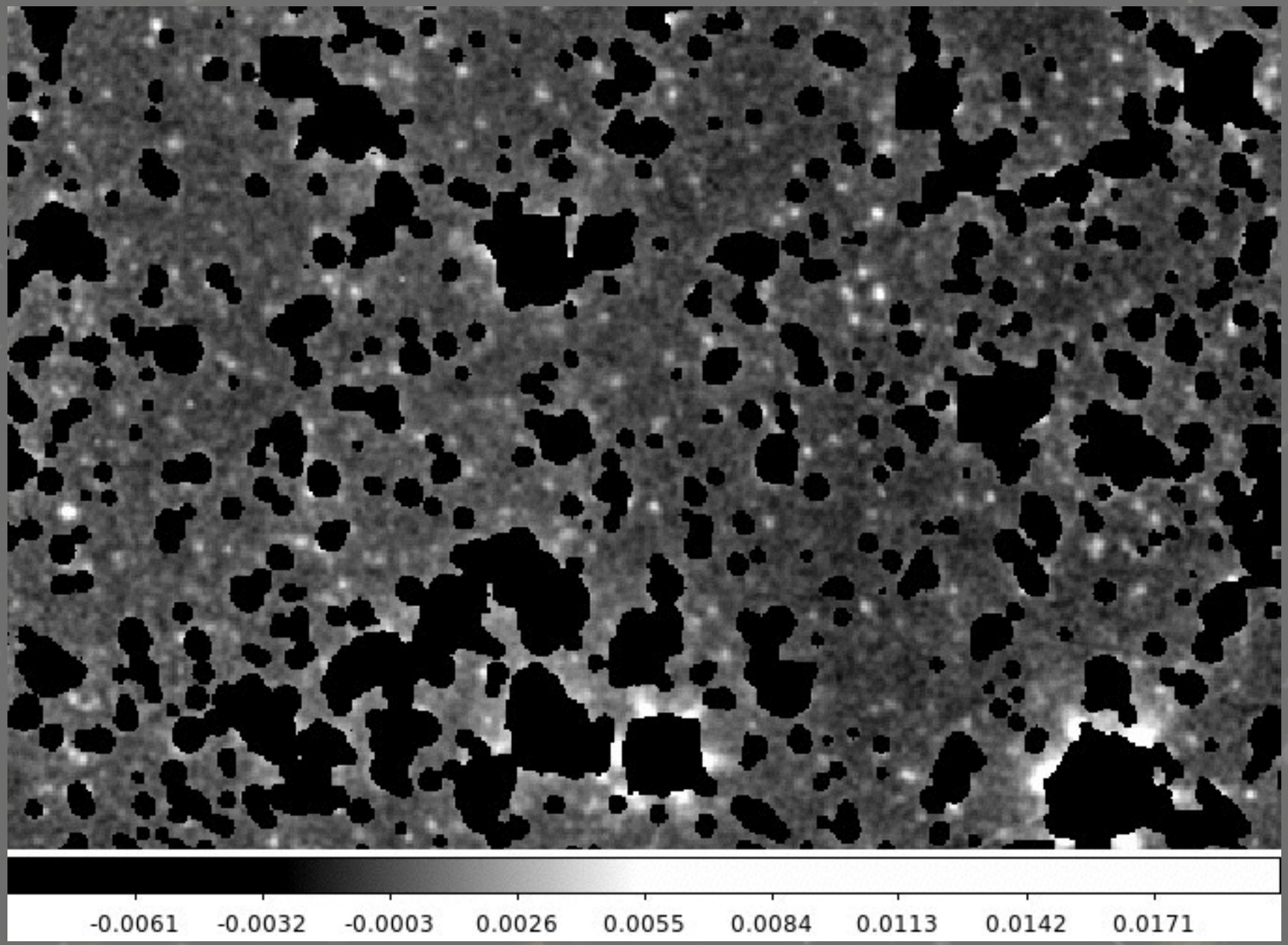
Model of IRAC 3.6μm (TPHOT; Emiliano Merlin)

The IRAC selected MF in UVISTA

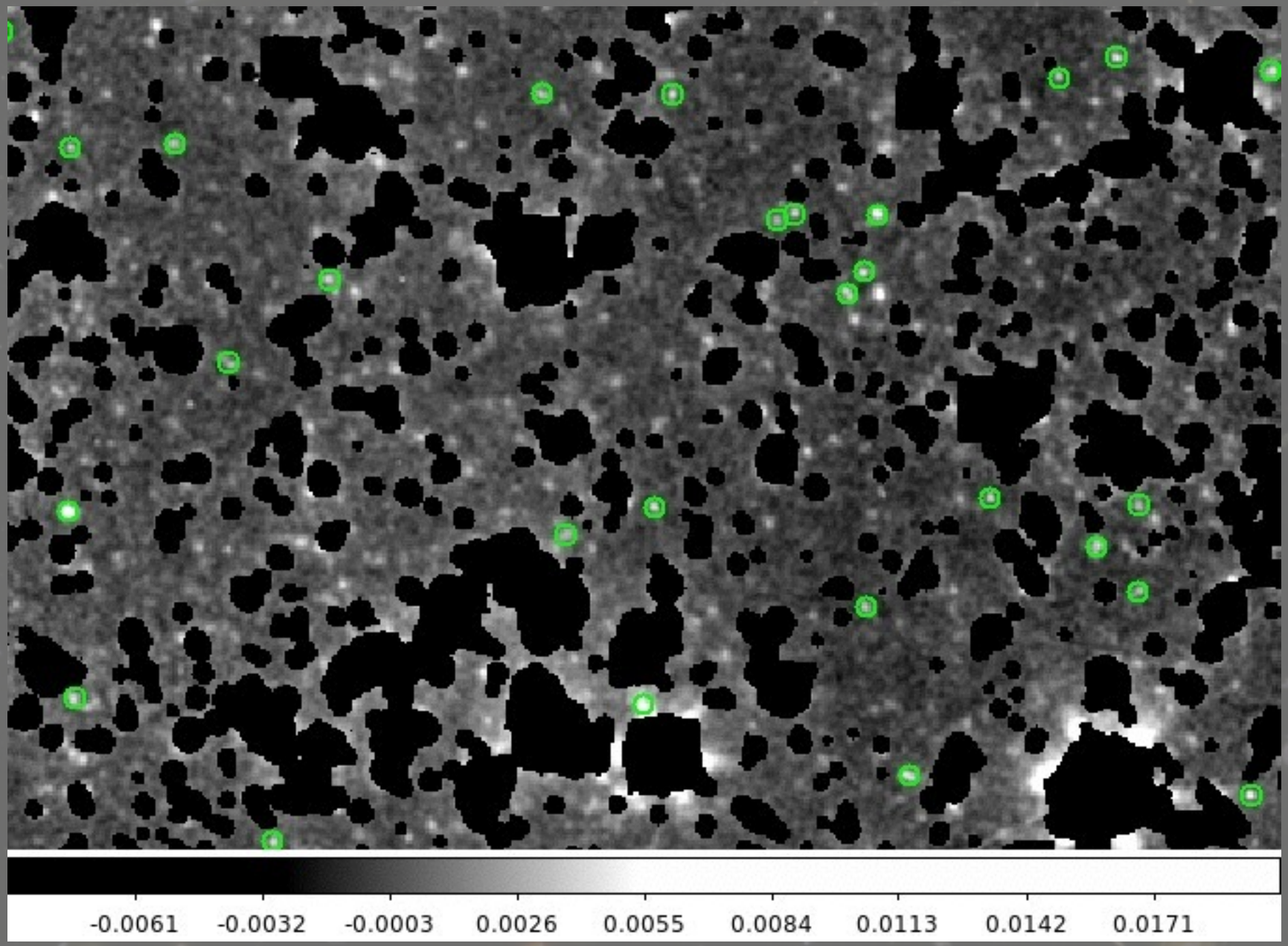


Residual of IRAC 3.6μm (TPHOT; Emiliano Merlin)

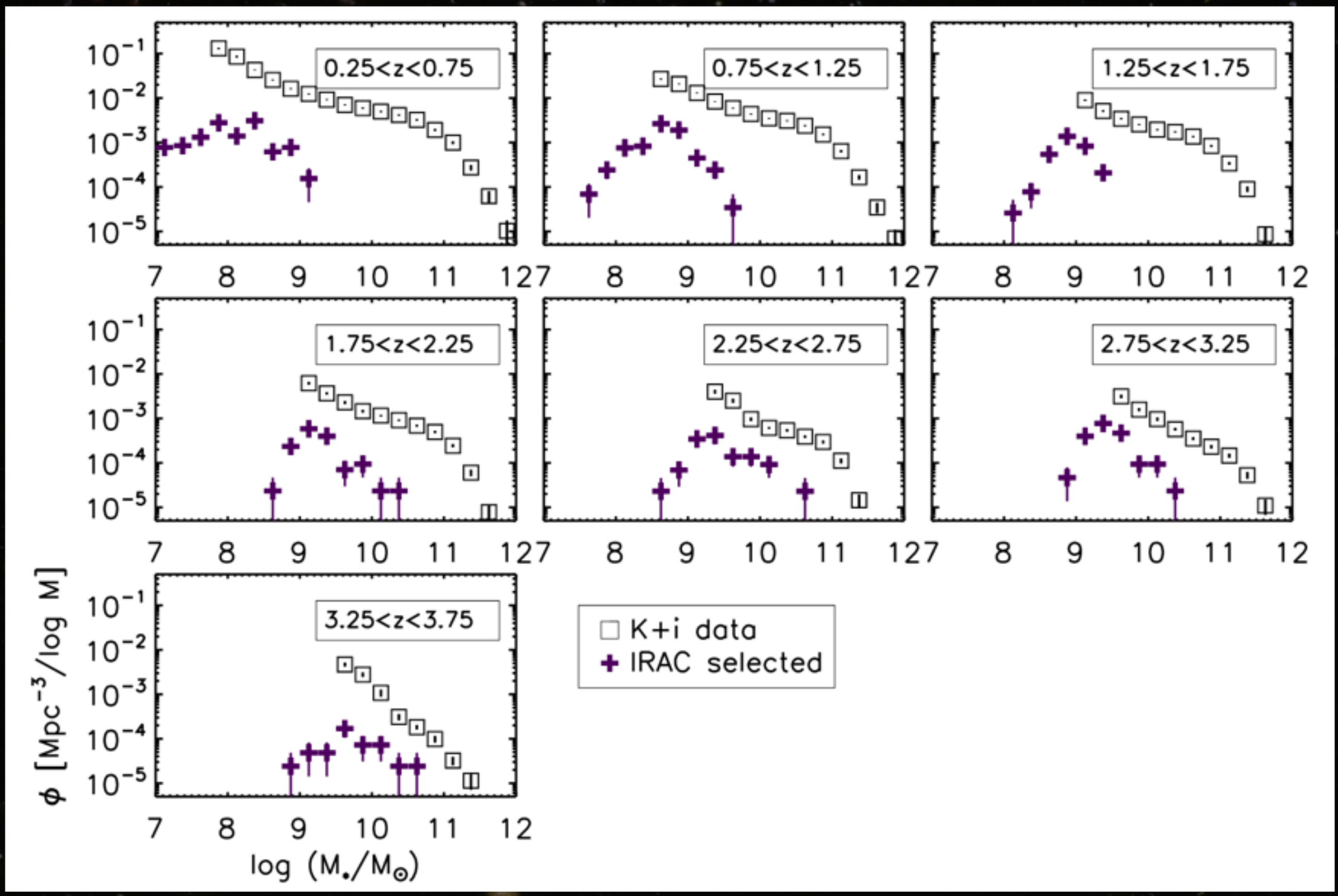
The IRAC selected MF in UVISTA



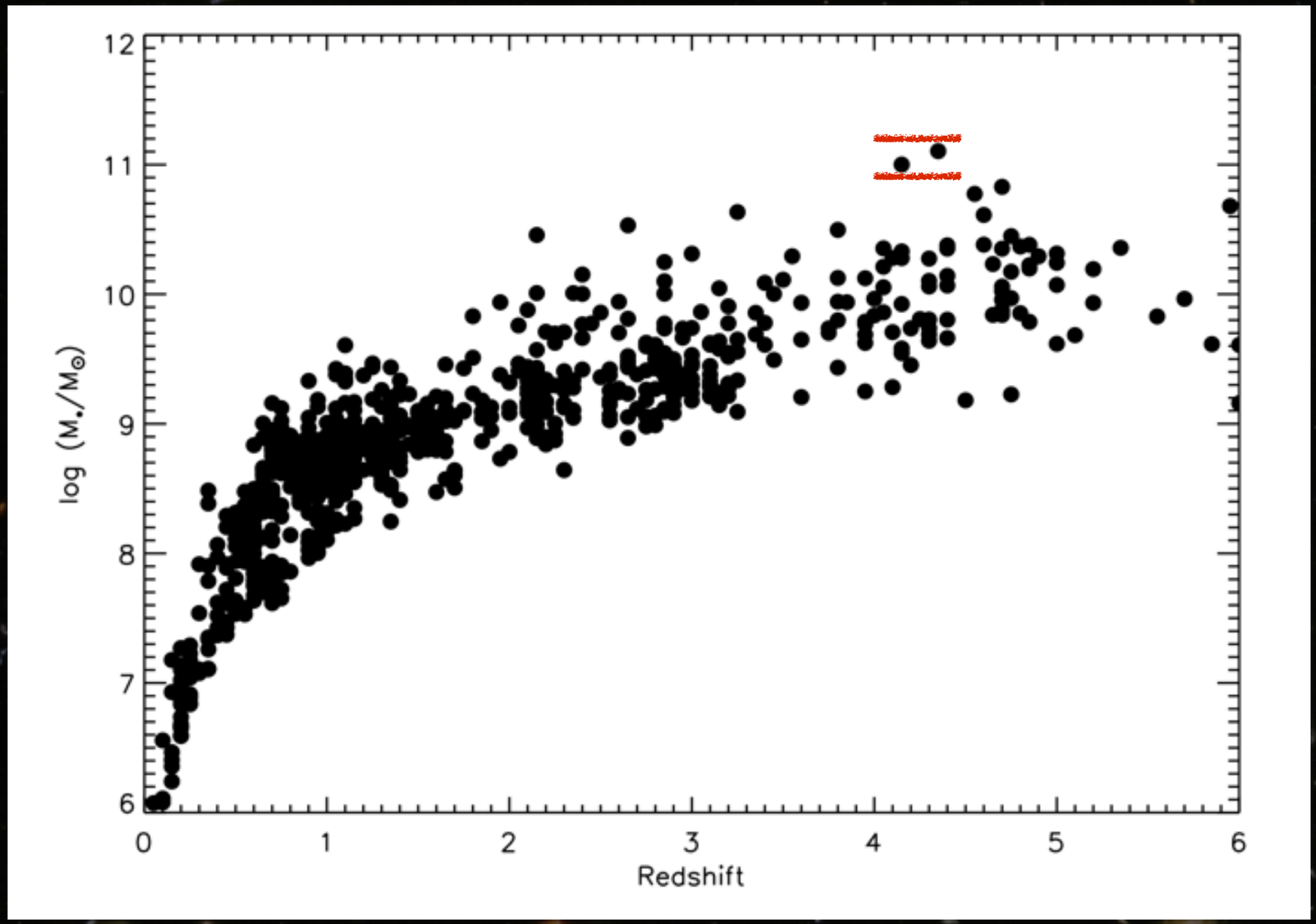
The IRAC selected MF in UVISTA



The IRAC selected MF in UVISTA



…maybe some massive objects at higher redshift?



Summary

- A combination of K+i band selected samples allows us to push further down the MF and LF using the DR2 UltraVISTA data set.
- The K-band LF looks steeper than previously thought.
- No evidence for the K-band LF being shallower than simulations predict.
- Our IRAC selected sample does not contribute strongly to the MF/LF at $z<3$.