Nottingham: Omar Almaini, Kyle Lane, Sebastien Foucaud, Frazer Pearce Steve Maddox, Chris Conselice, WH

Edinburgh: Michele Cirasuolo, Ross McLure, Jim Dunlop (also University of British Columbia)

LJM: Chris Simpson

Durham: Ian Smail

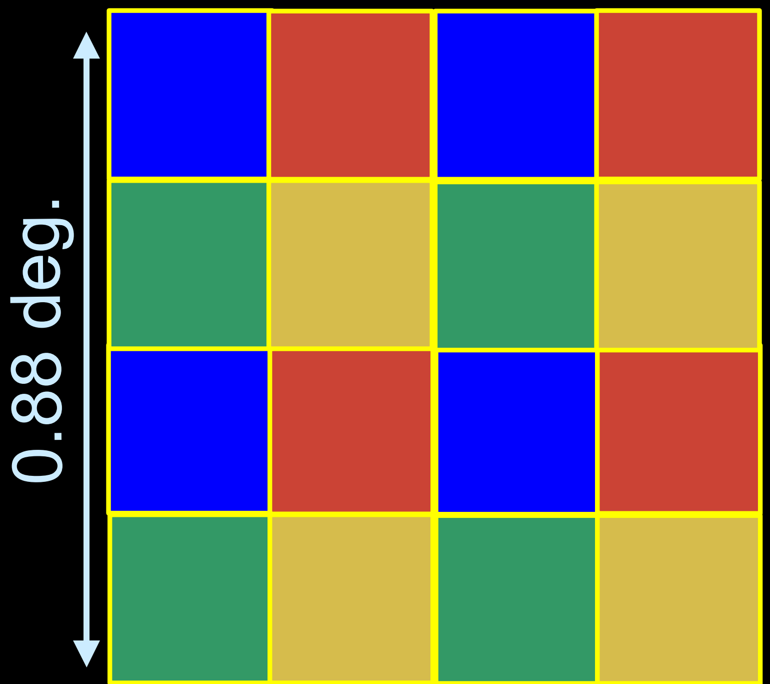
+ the UKIDSS Consortium

Can Semi-analytic models reproduce the UKIDSS UDS field?

Will Hartley, University of Nottingham

11th Birmingham-Nottingham galaxy formation workshop.

The UKIDSS Ultra-Deep Survey



Depths achieved so far:

(5σ, 2" apertures, AB)

DR4: **Coming soon….**

DR3: K_{AB}=23.8, H_{AB}=23.4, J_{AB}=23.5

seeing : J~0.90'' H~0.85'' K~0.75''

Almaini, Foucaud et al. (in prep.)

DR1: K_{AB}=23.6, J_{AB}=23.5

seeing : J~0.90'' K~0.75''

Warren et al. (2007)

EDR: K_{AB}=22.6, J_{AB}=22.6

seeing : J~0.80'' K~0.70''

Dye et al. (2006); Foucaud et al. (2007)

+See Michele Cirasuolo's talk.

Motivation for the UDS

We wish to find the origin of the passive galaxy population.

Ideally we'd like 1000's of spectra at high redshift, selected in an unbiased way.

- UDSz coming soon….

In the meantime:

Photometric selection (BzK, BM/BX, ERO etc.)

Photometric redshifts

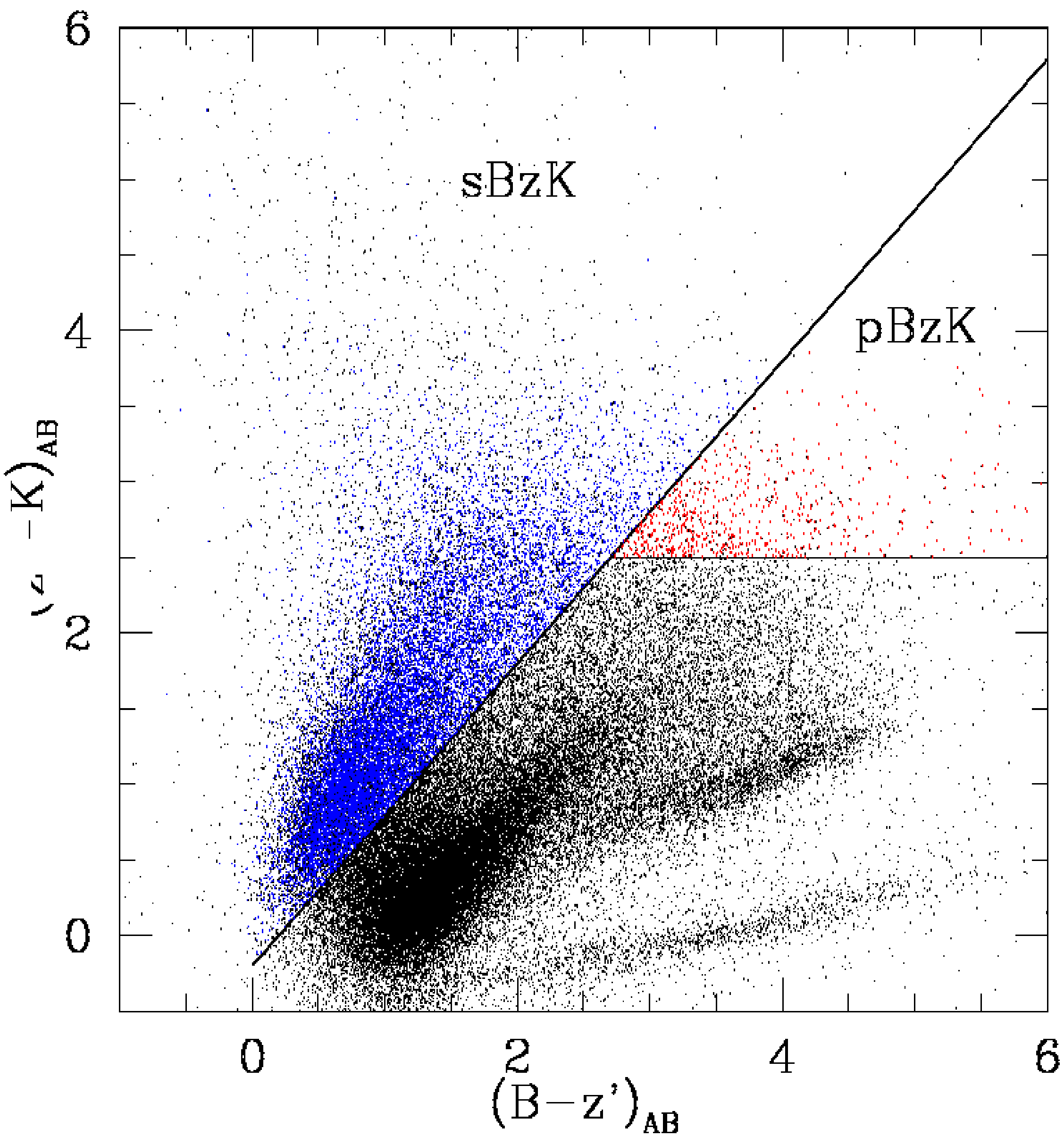
(UDS: deep U,B,V,R,i,z',J,H,K,Spitzer: 3.6,4.5,SCUBA)

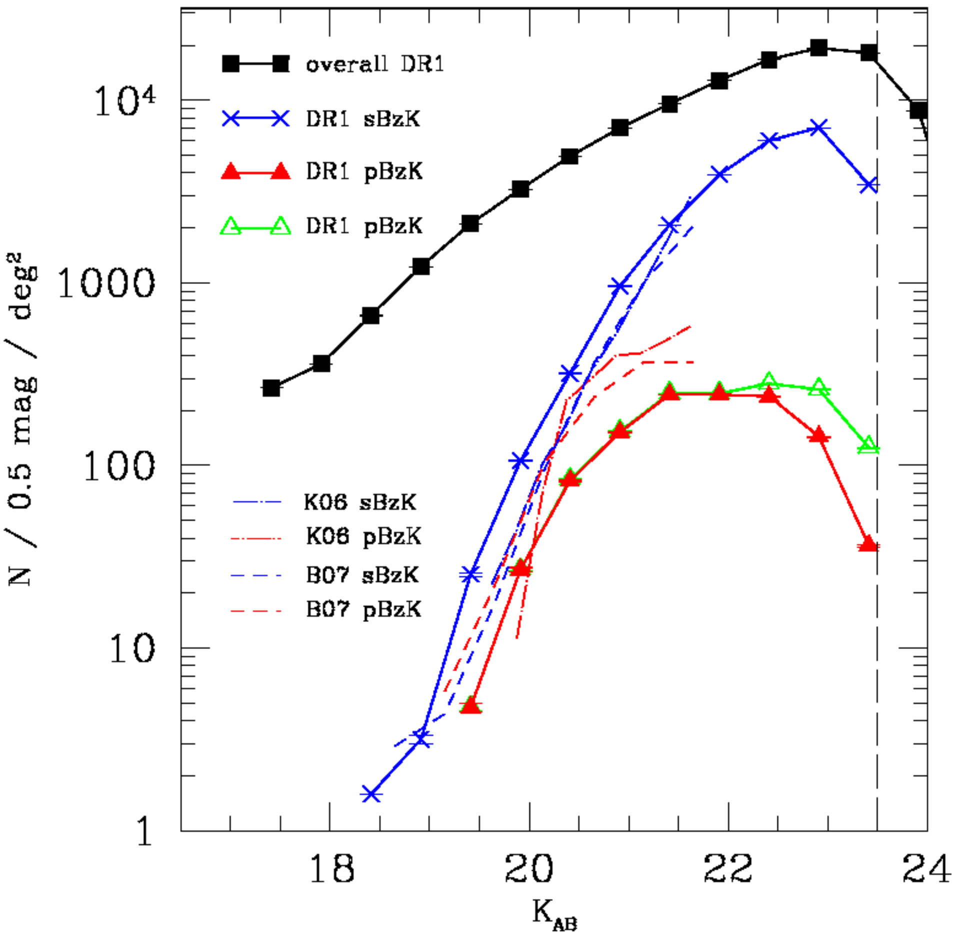
This work uses both the BzK selection and photometric redshift information.

BzK selection

Used the standard selection criteria from Daddi et al. (2004) to isolate star-forming, passive galaxies in the range 1.4 < z < 2.5.

Hartley et al. (2008, submitted)

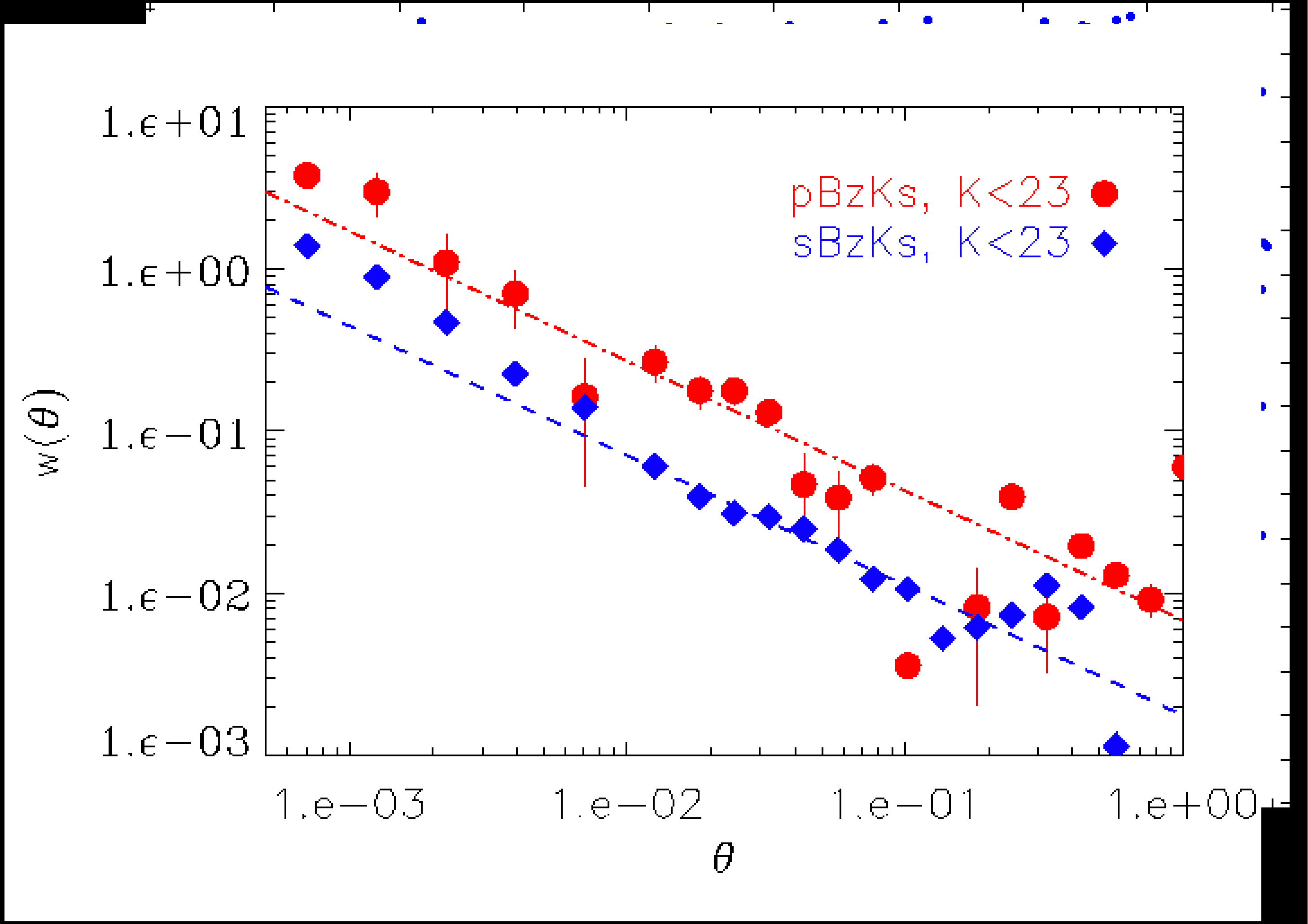




The number counts show a clear turn-over at 22.5.

Clustering measurement

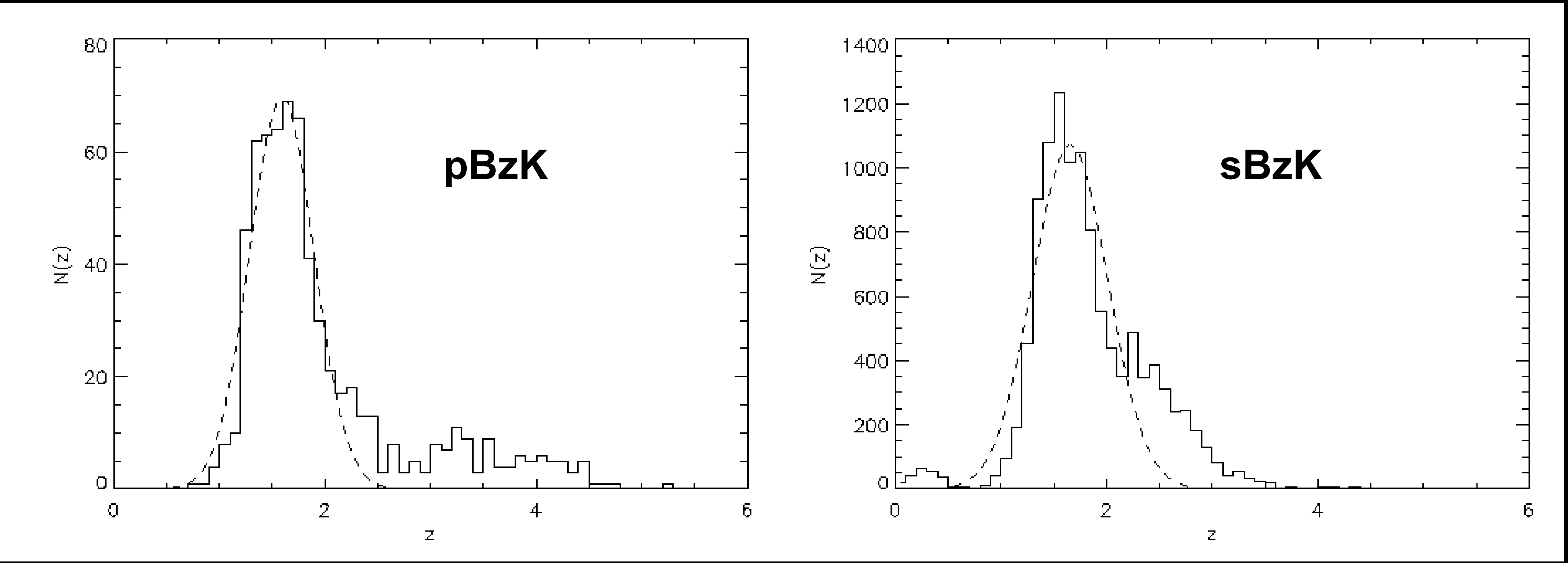
The **angular** clustering is a measure of how many more pairs in a set of objects you find for a given separation than you'd expect if their positions were random.



pBzK's are clearly more strongly clustered, hence they live in more massive halos.

Also, note the large excess on small scales for the sBzK's – suggests a lot of merging by z = 0.

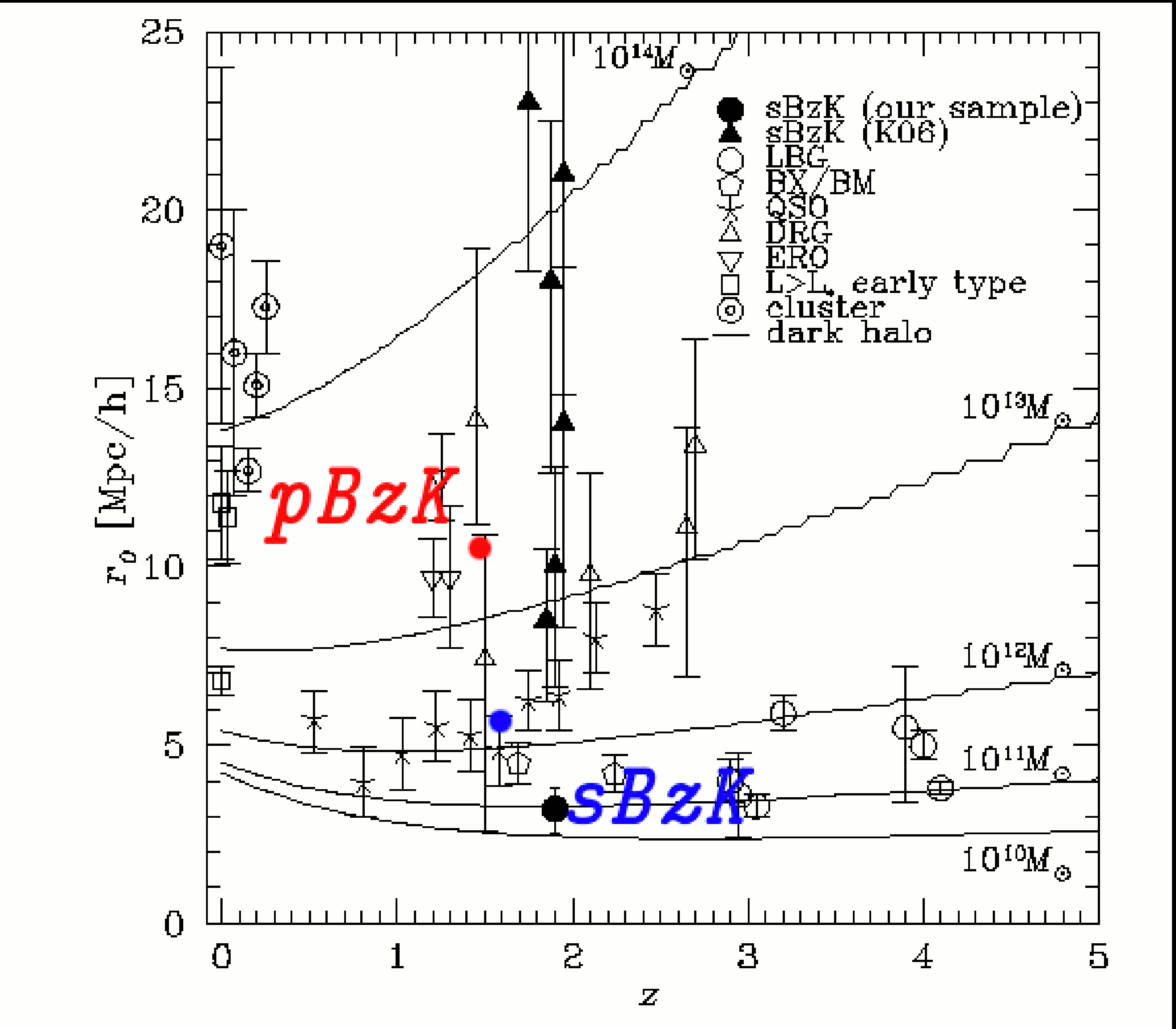
If the redshift distribution is known, we can de-project to find the scale length of clustering in 3-D space…



r_0 values: pBzK – 9.9 h^{-1}Mpc; sBzK – 5.3 h^{-1}Mpc.

…and hence the mass of the halos they occupy.

r_0 value for pBzK's implies a halo mass in excess of 10^{13} M_{sun}.

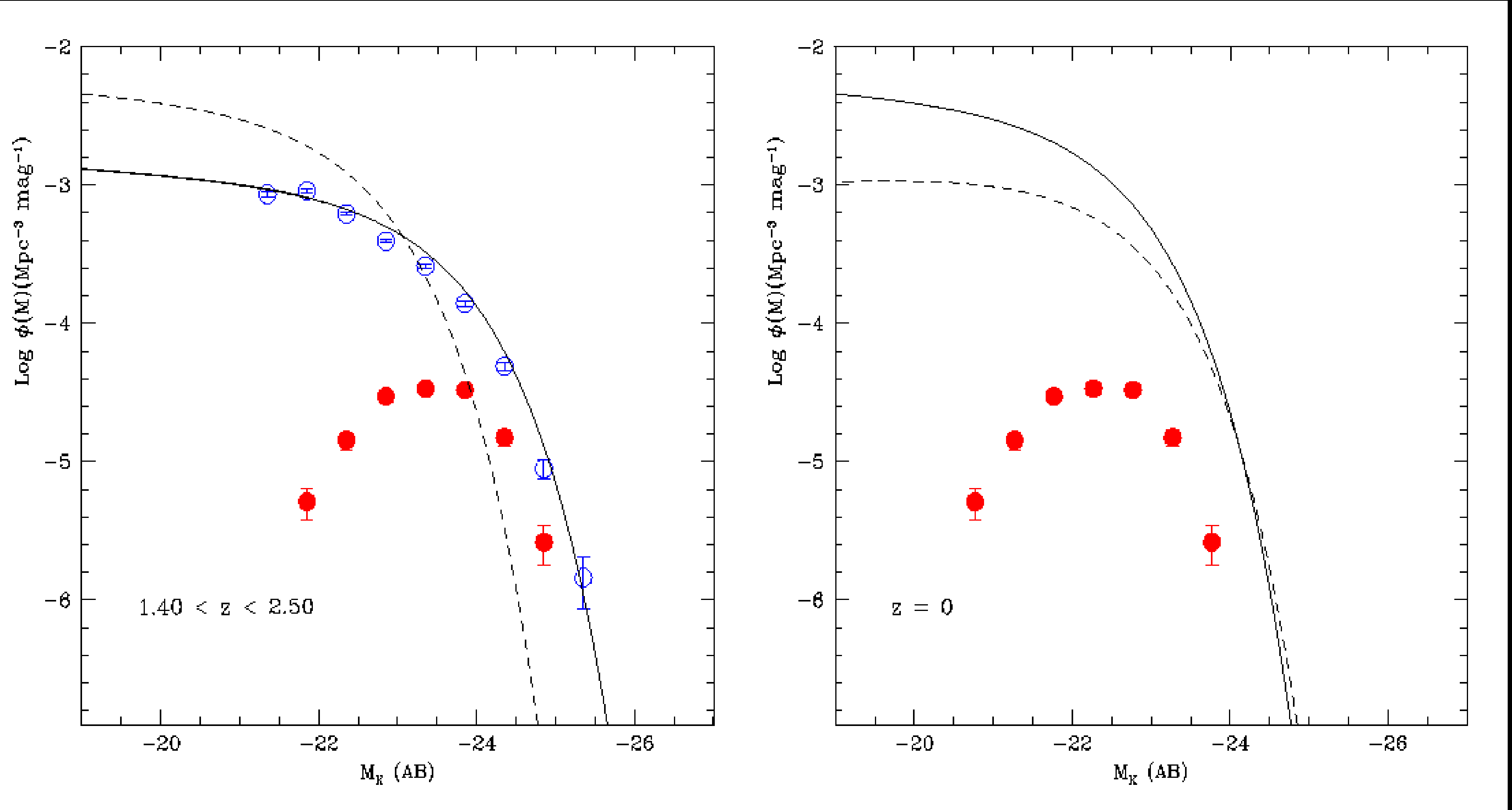


Hayashi et al. (2007)

BzK luminosity function (Cirasuolo)

pBzK's are a bright population (but not all of the brightest objects in their redshift range are pBzK's). Consistent with the down-sizing scenario, and further evidence that we are witnessing the build-up of the red sequence.

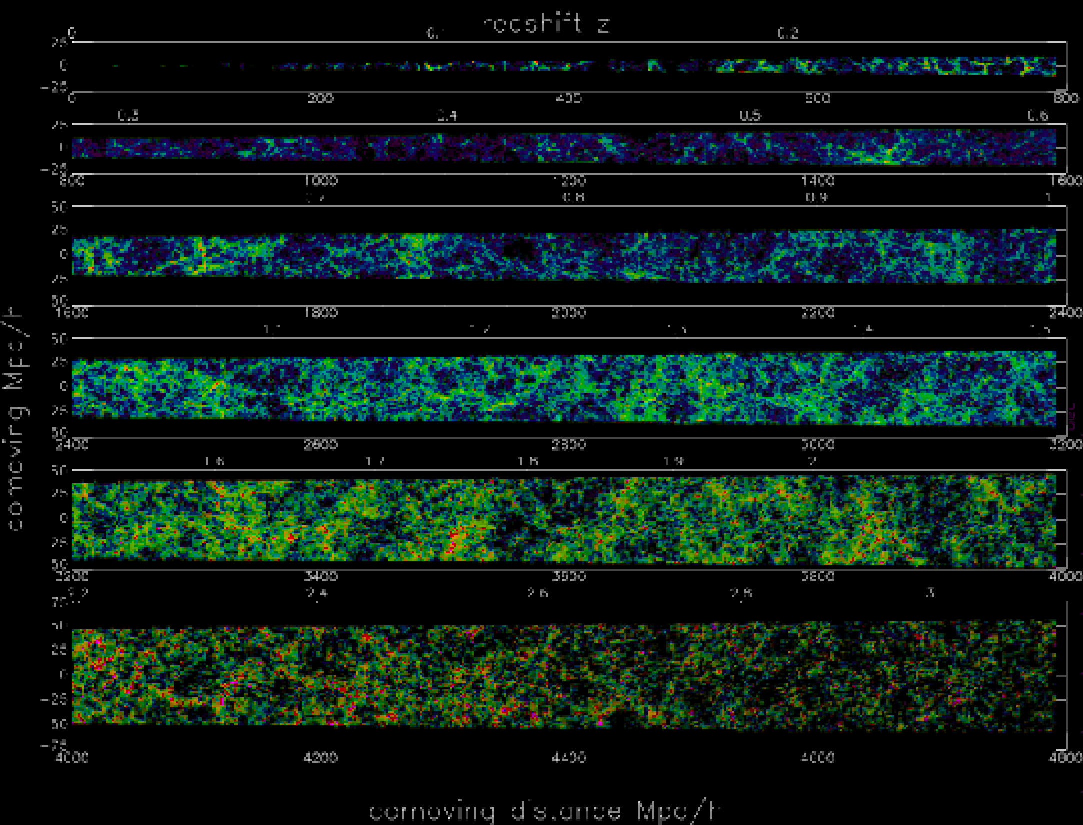
A simple evolution model predicts they will dim by ~1 magnitude by z=0. pBzK descendants would then make up a ~5% of the massive ellipticals at z = 0.

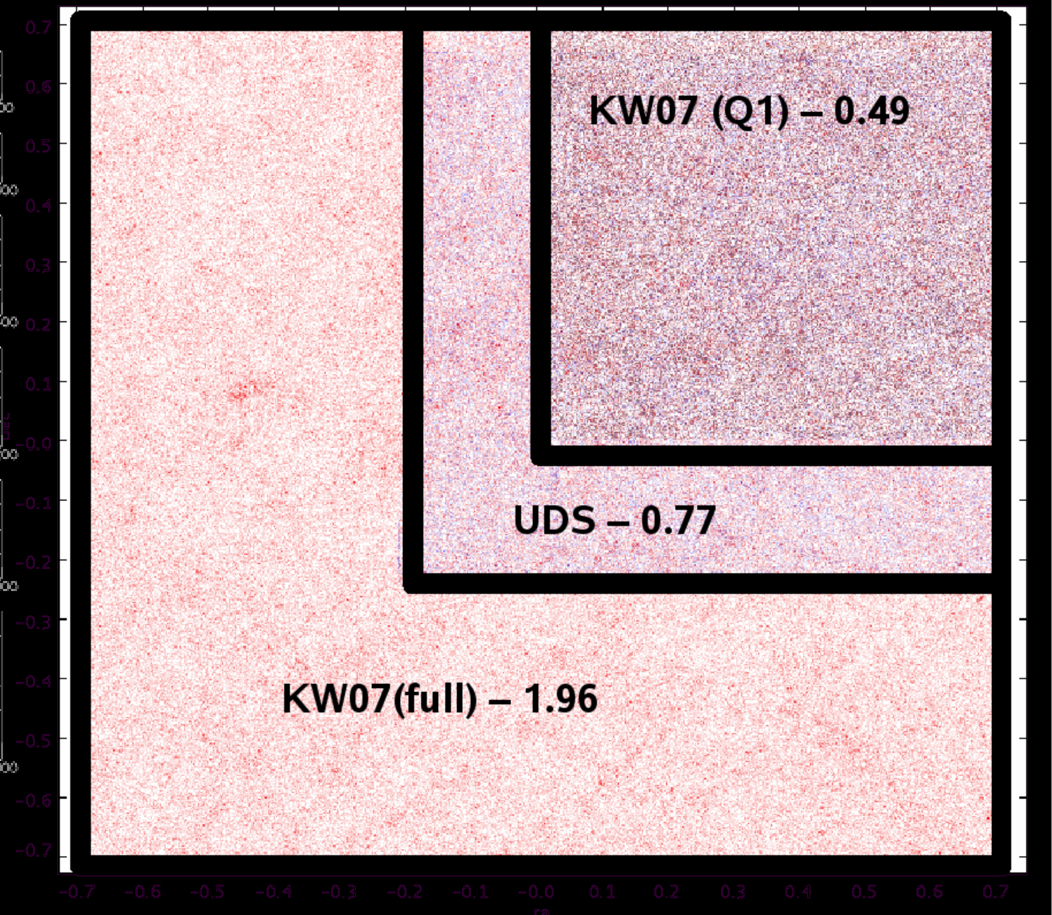


Using merger trees from the Millennium simulation:

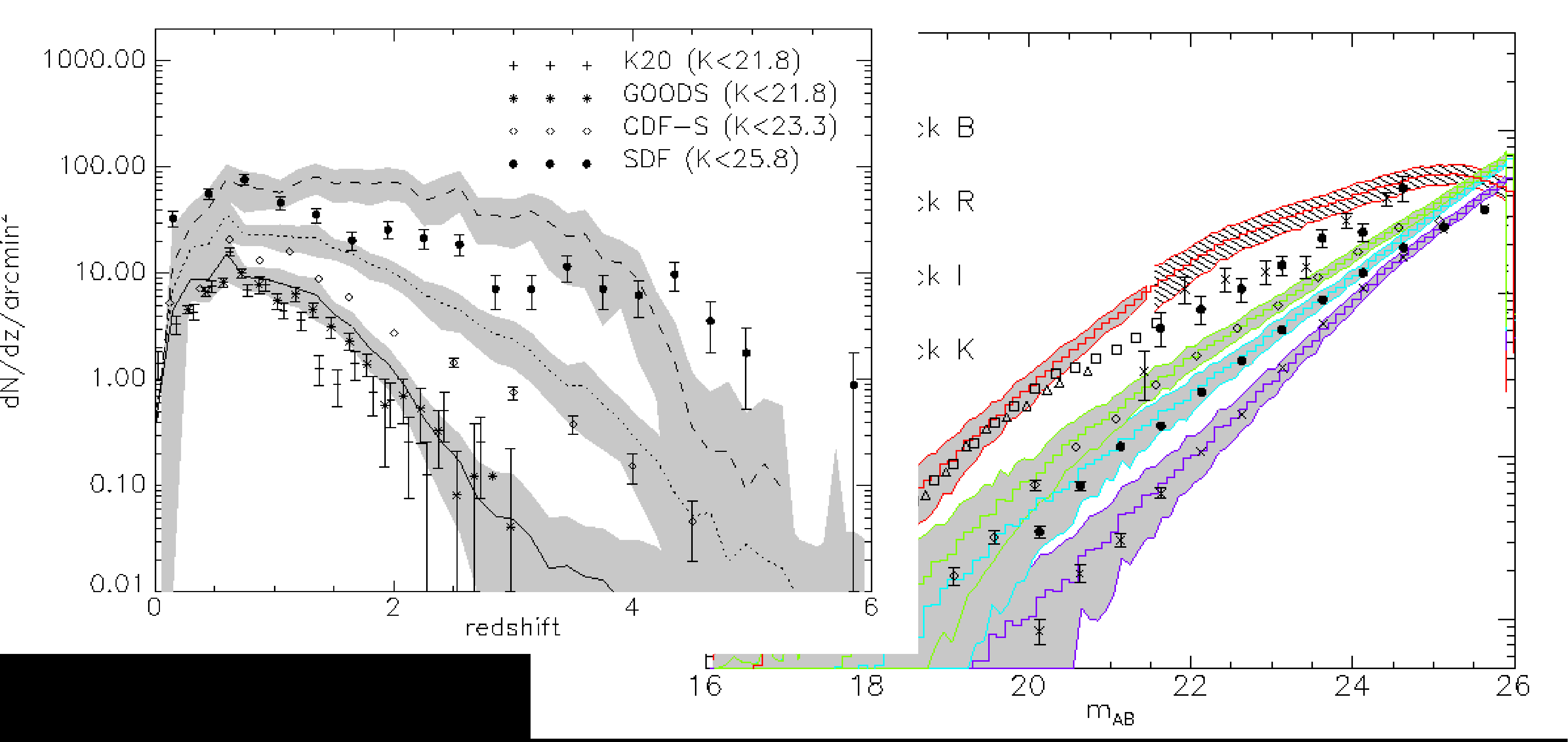
=> De Lucia et al. (2007) – AGN, radio mode.

=> Kitzbichler & White (2007) – Light Cone.





Kitzbichler & White (2007)

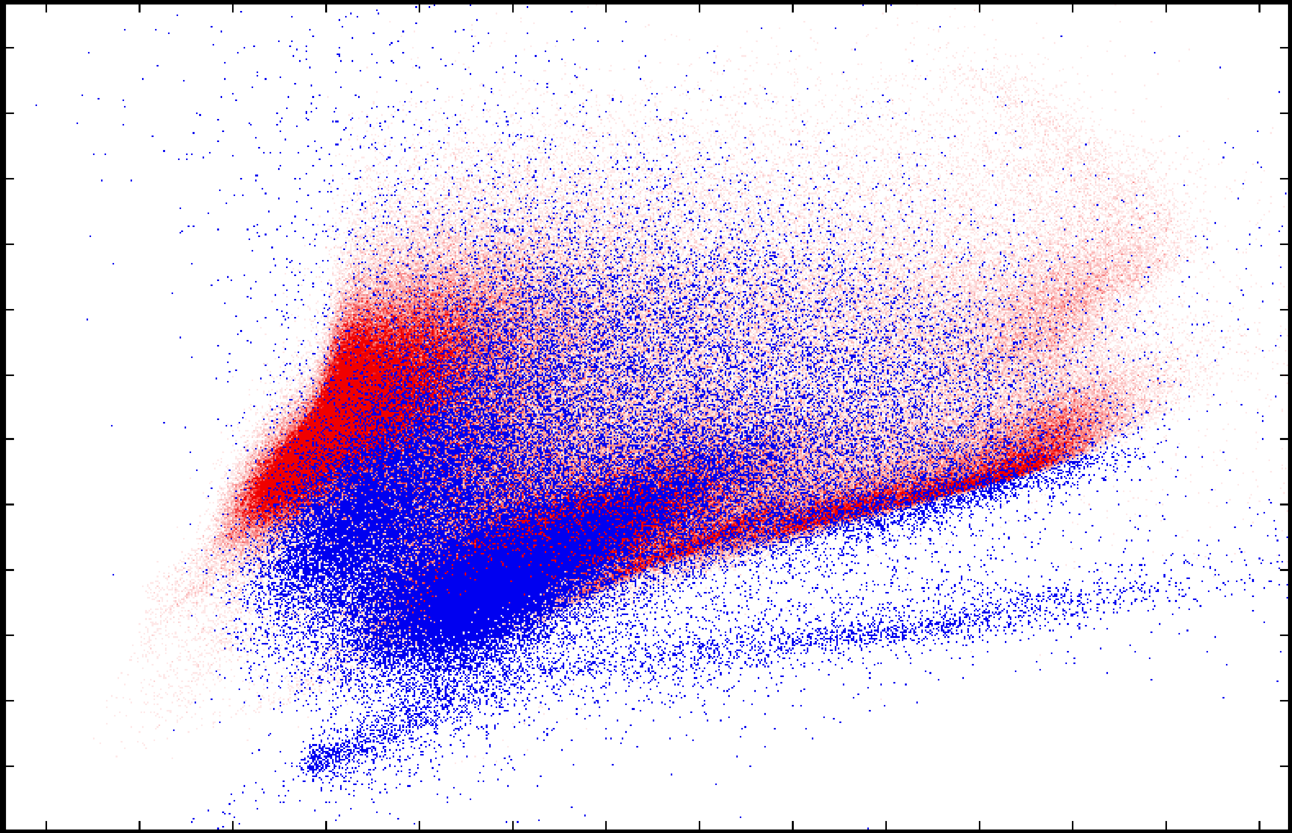


The model seems quite poor between 1.5 < z < 3 in the K-band.

The problems with the K-band suggest that the model might be producing too much stellar mass at these epochs. (c.f. Galform)

But despite this, perhaps the stages of evolution are ok?

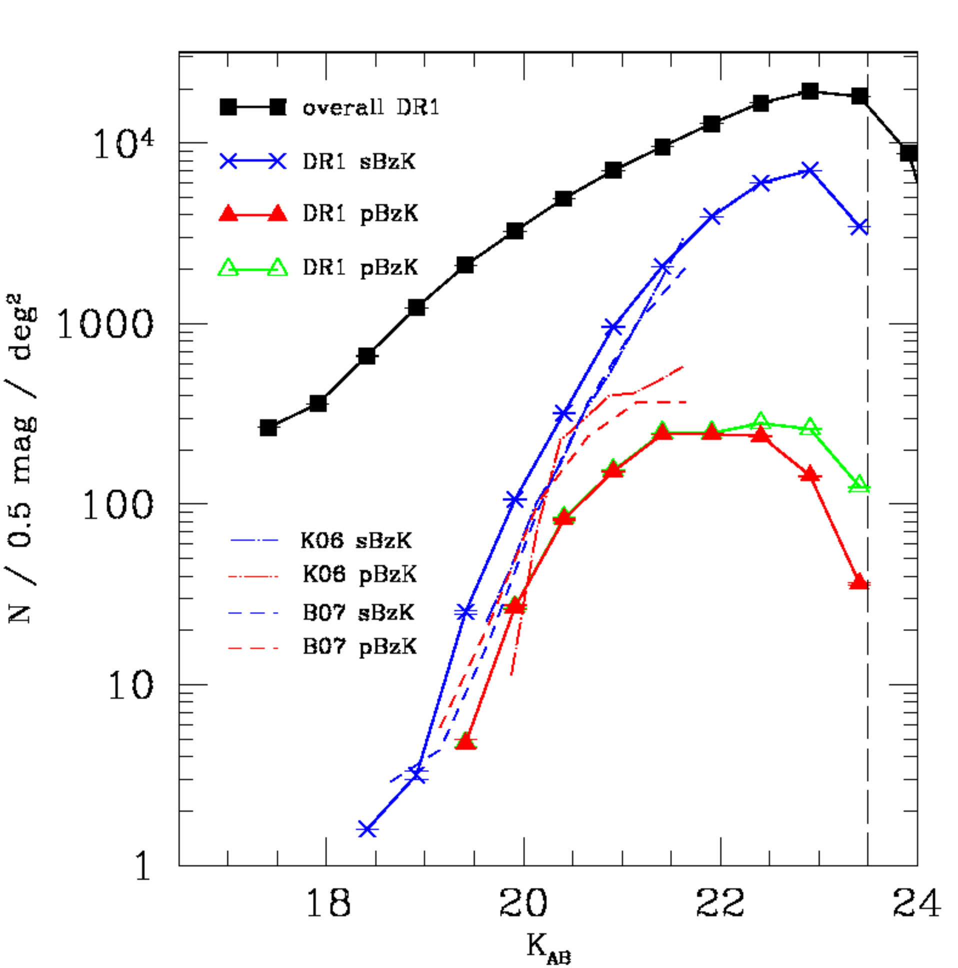
=> BzK

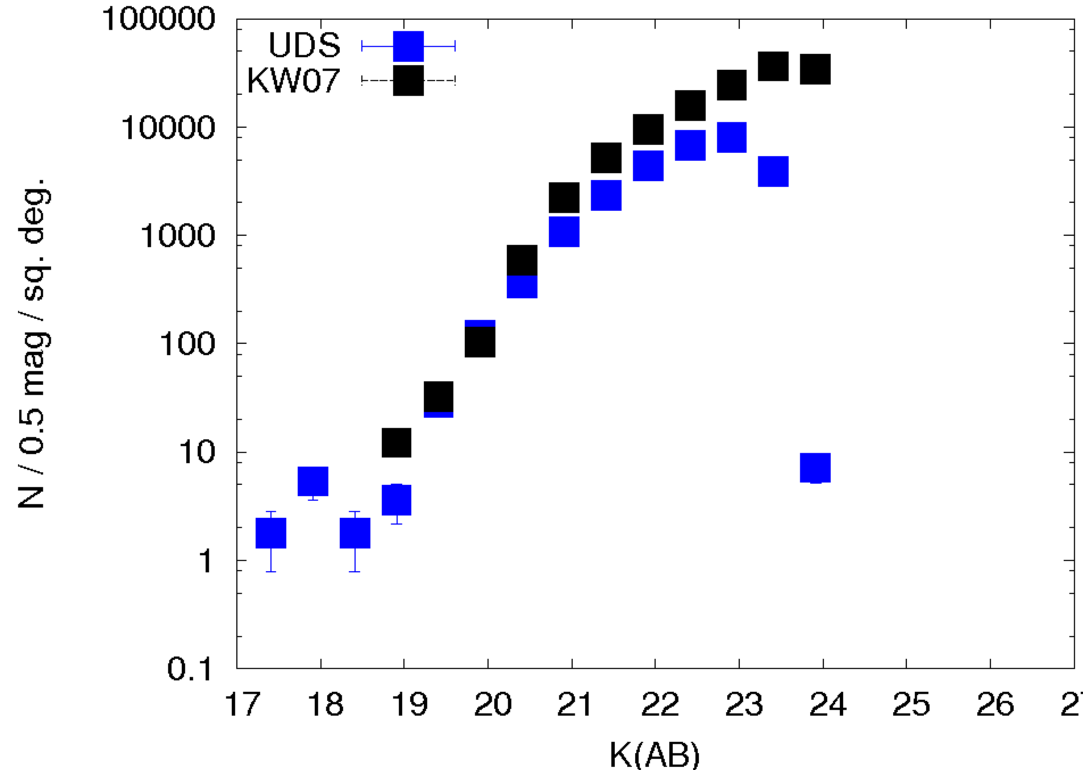


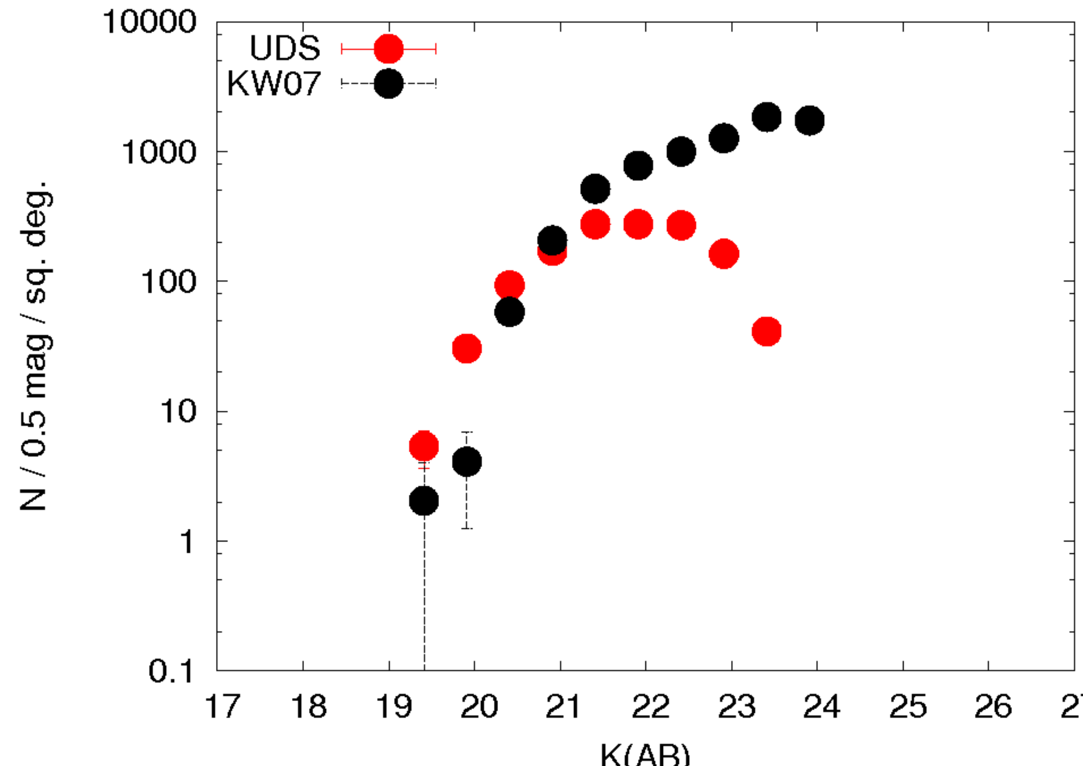
Colour correction required.

Performed by assuming a $f_v \sim 1 / v$ spectrum, and integrating over the filters.

<u>Results</u>…



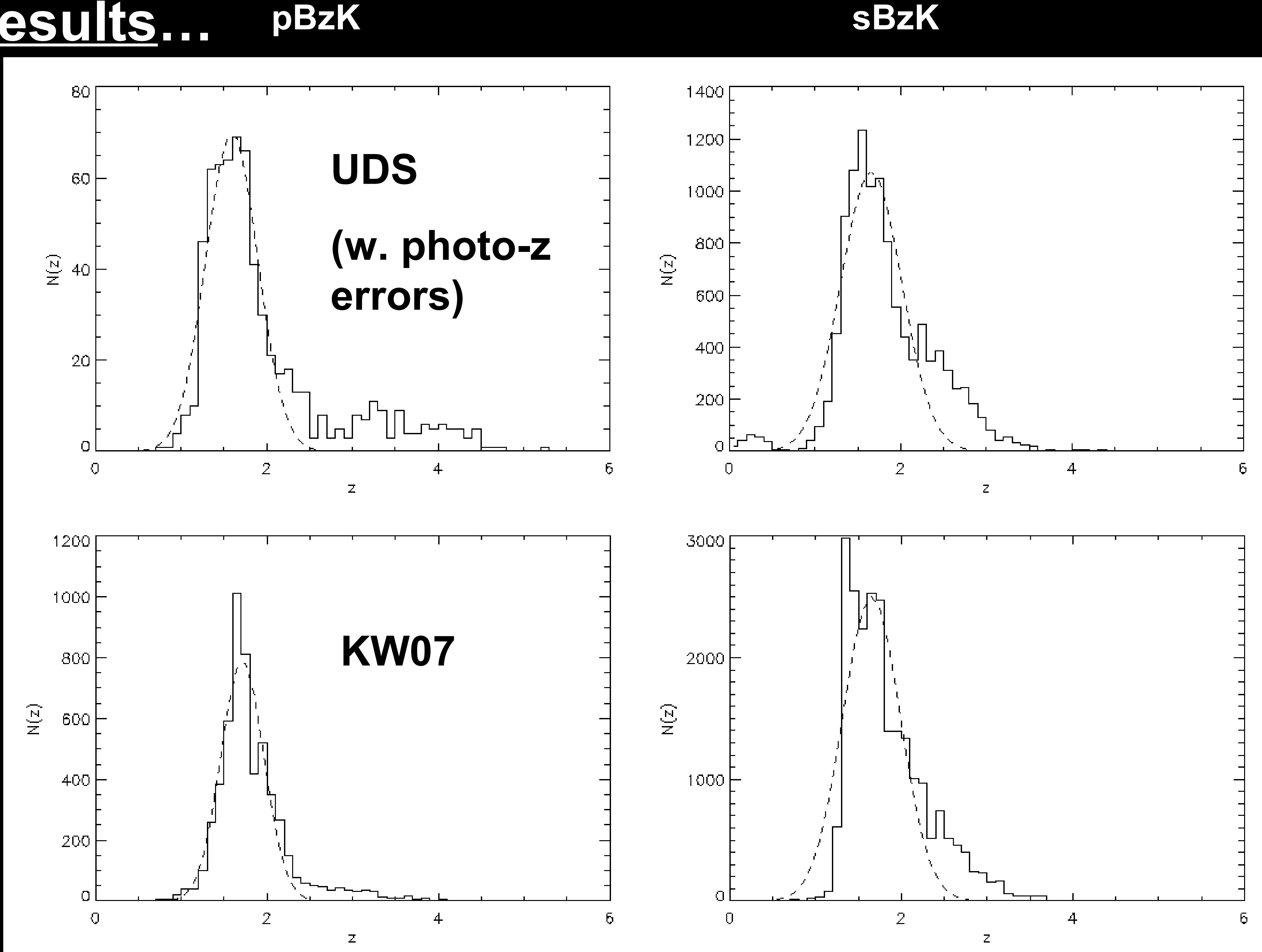




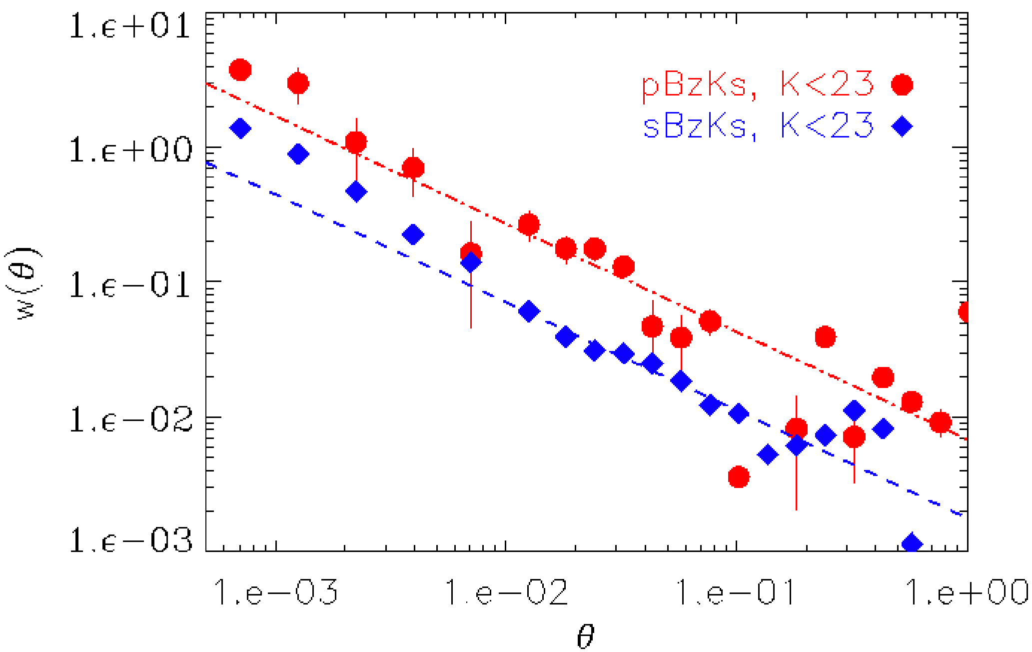
sBzK – top

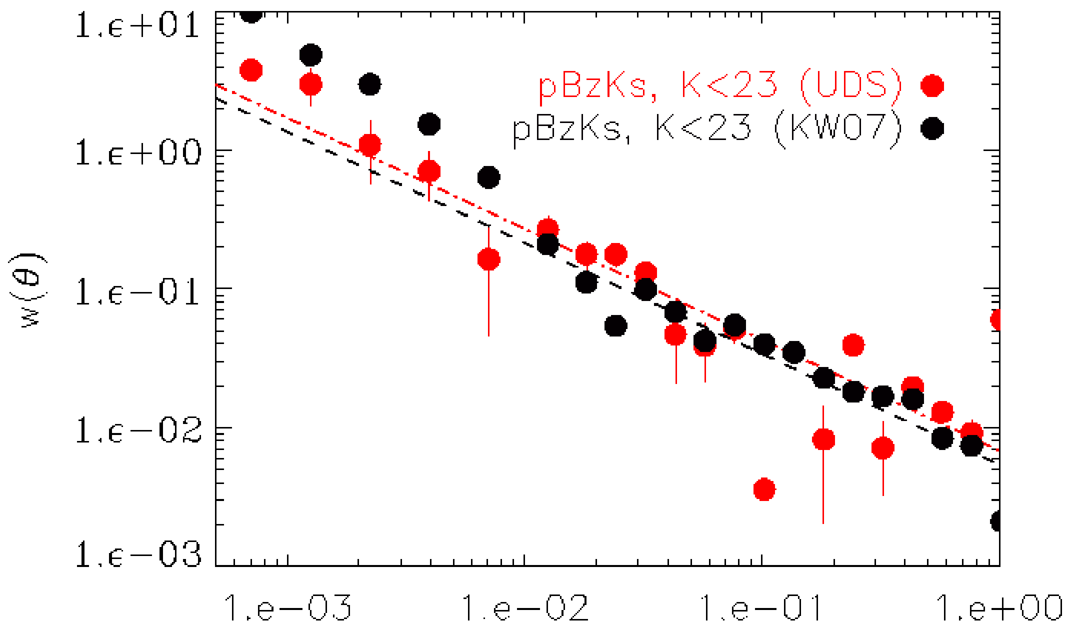
pBzK – bottom

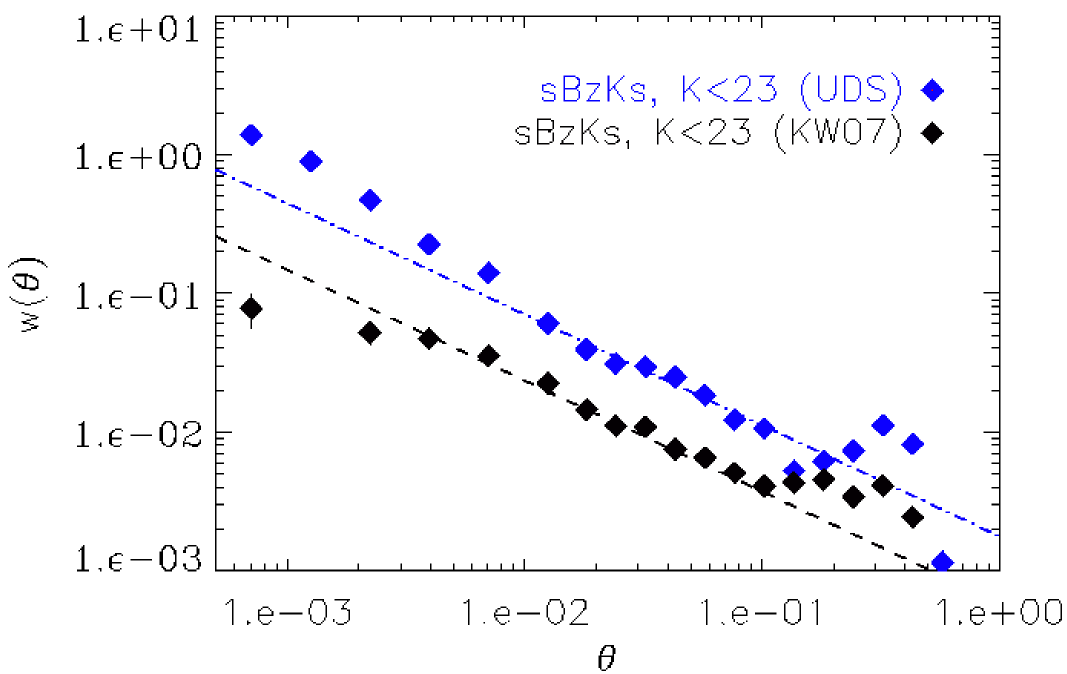
Results…



Results…







Left: UDS; Top: pBzK;

Bottom: sBzK

Answer: over-stripping of infall?

A problem with M / L ratio?

Conclusions

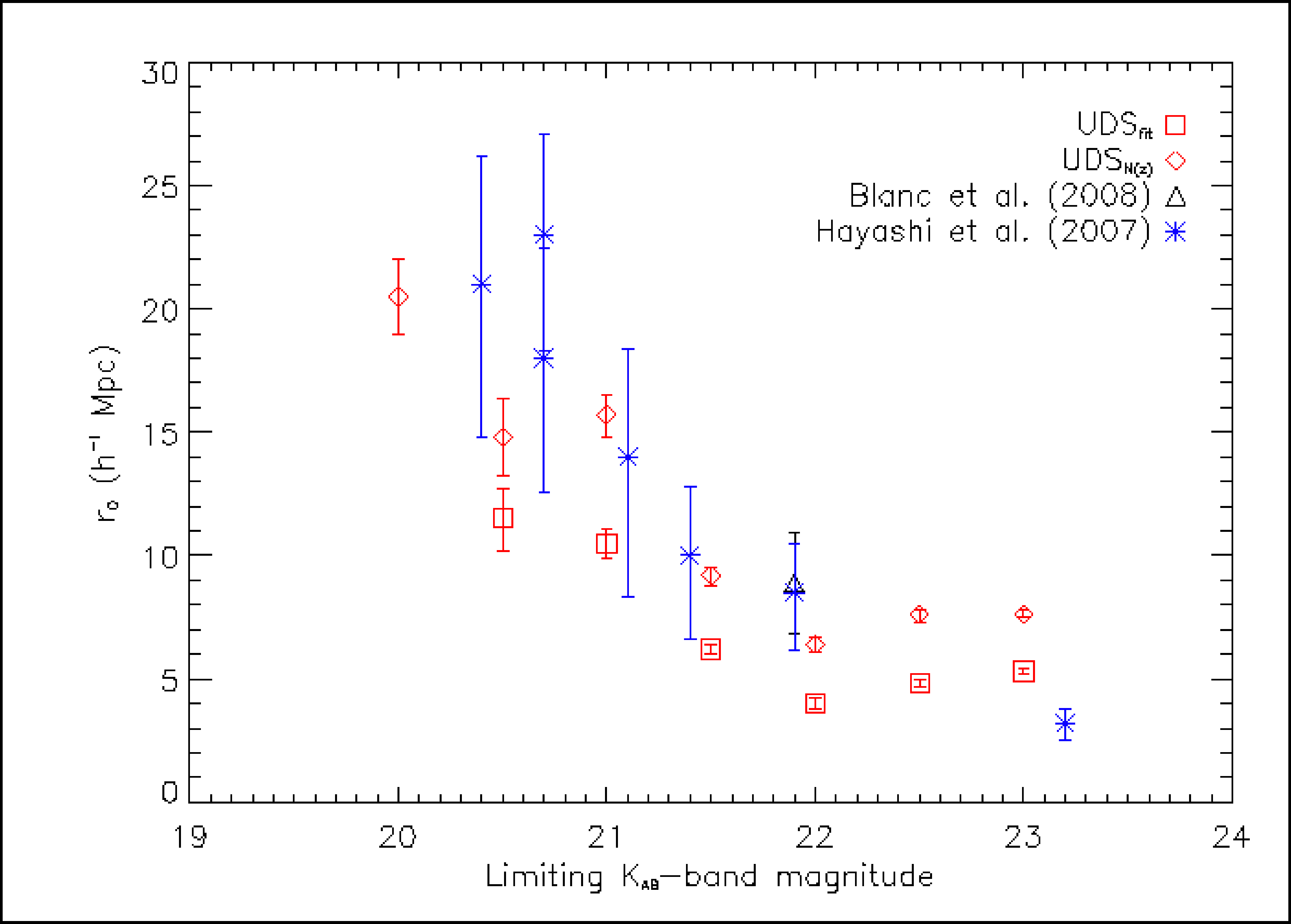
- pBzK selected galaxies are (some of) the progenitors of the BCG's found in the local universe.

  The clustering strength implies a halo mass that would be expected to evolve into a group / cluster-sized halo.

  The luminosity function shows that, under passive evolution, they will make up a significant fraction of the bright end of the low z luminosity function.

- One of the latest semi-analytic models can reproduce some properties that it wasn’t tuned for, but struggles with some other basic statistical properties of BzK selected galaxies.
  - Faint end of pBzK number counts.
  - Clustering of sBzKs.

  One possible explanation is over-stipping of infall galaxies (to be tested).



30
25
20
15
10
5
0
19
20
21
22
23
24
r_o (h^{-1} Mpc)
Limiting K_{AB}–band magnitude
UDS_{fit}
$UDS_{N(z)}$
Blanc et al. (2008)
Hayashi et al. (2007)