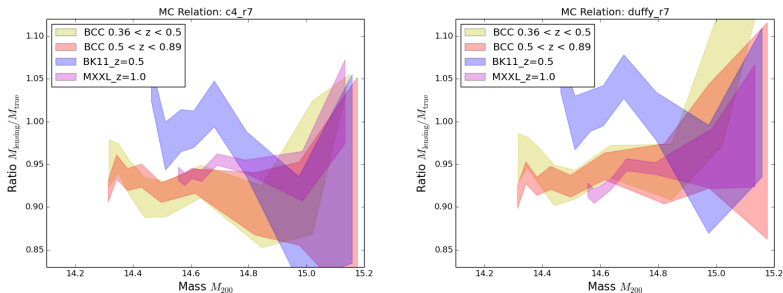
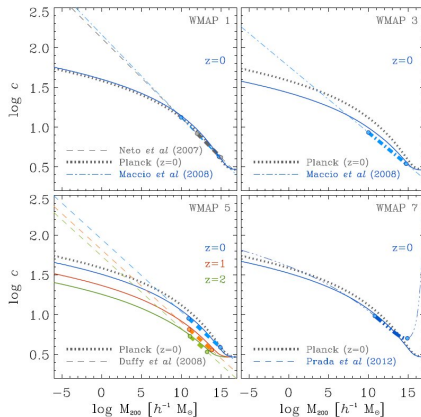


The Situation at last report

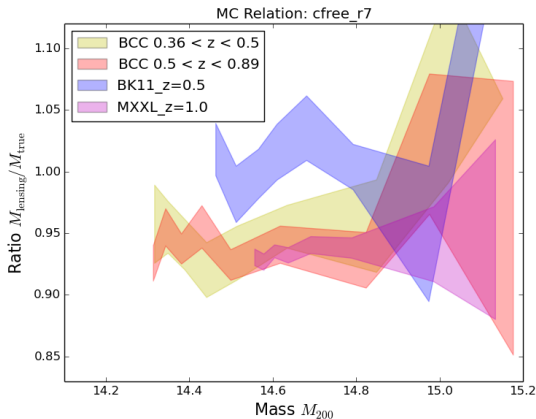


Plot of bias versus mass. Left: Assuming $c=4$, Right: Assuming Duffy08. The fit range is 0.5 - 3.0 Mpc. The width of each colored band represents the 1σ uncertainty in the median bias for each mass bin.

M-C Cosmology Dependence



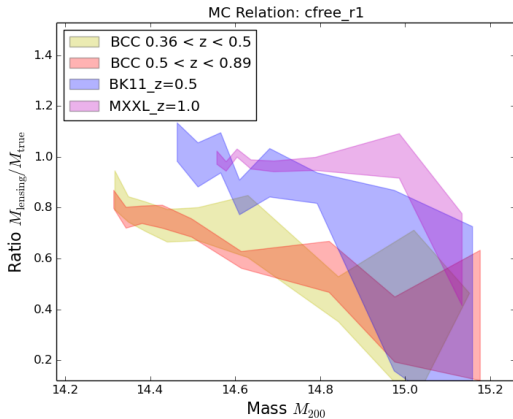
M-C cosmology dependence, from Ludlow et al. 2013.



Working on: Cosmology-dependent M-C relation (Zhao et al. 2008)

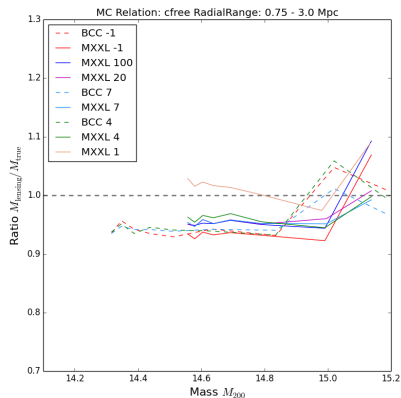
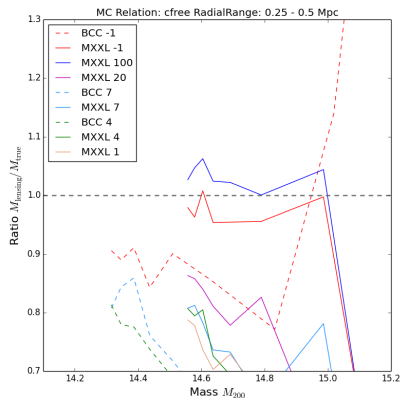
Question: Why is BK11 different?

Question: Are there other hidden cosmology dependencies (eg, substructure)?



C-free. 0.25 - 0.5 Mpc.
Problem at the cluster core? No...

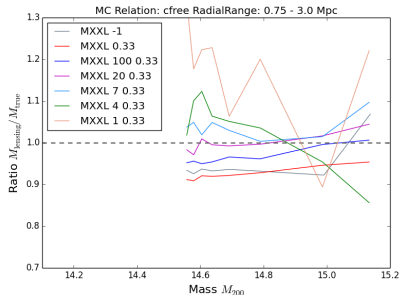
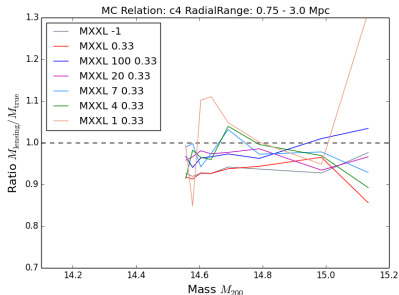
Controlling for Noise Levels



Bias measured from the BCC and MXXL simulations. No shape noise is added, but different sampling densities are used. Left, right are different fit radii.

Subtle, but possibly different reactions to changing noise levels.

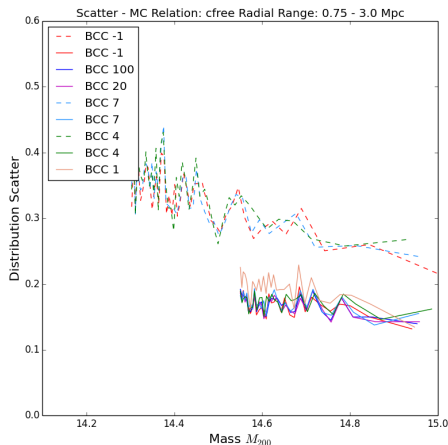
Effect of Noise



Shape noise + changing sample density. Left: M-C fixed, Right: C-free.

Is this just noise bias, and can we properly account for it?

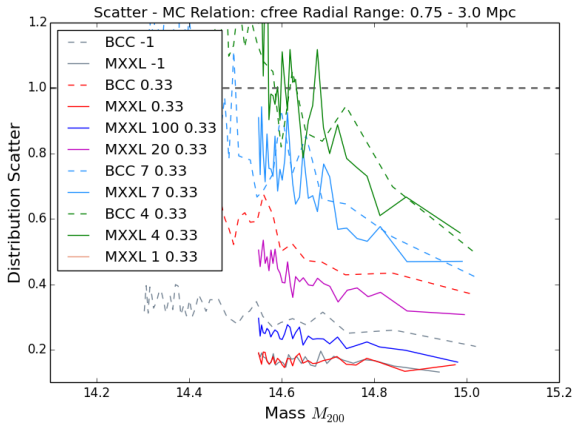
Why are intrinsic noise levels different?



Scatter from BCC and MXXL, under a range of sampling densities. Solid is MXXL, dotted is BCC.

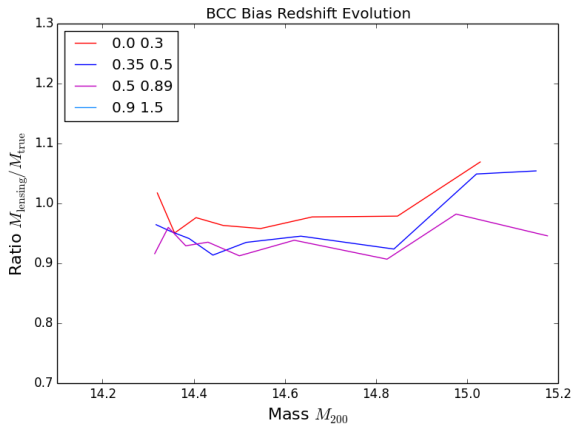
BCC has much higher intrinsic noise. Is this light cone vs 200Mpc box?
(Probably)

Realistic Shape Noise Dominates



Scatter measured in BCC & MXXL w/ shape noise + finite sampling.

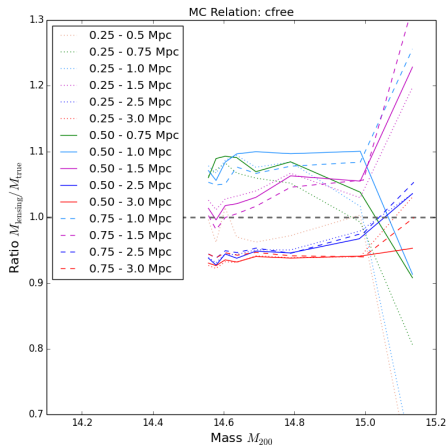
Redshift Bias Evolution



BCC redshift evolution. 0.75 - 3Mpc

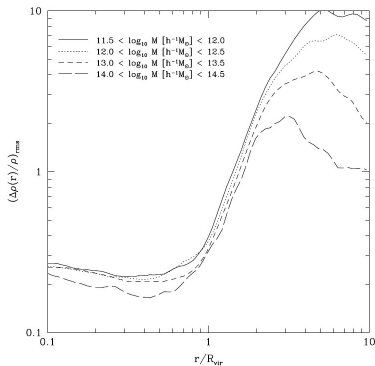
Redshift evolution, smaller than noise bias, comparable to binning method.

Sensitivity to Fit Range



MXXL, c-free. Line styles = inner boundary. Color = outer boundary.

Profile Uncertainty beyond R_{vir}



Halo-to-Halo rms scatter in 3D density profile. From Tavio et al. 2008.

Which mass to calibrate?

- Bias depends on $\Delta = 500, 200$ (BK11)
- Shouldn't we calibrate M_Δ used in mass-function?

Questions & Next Steps

- Why is the C-free bias different for BK11?
- Do cosmology-dependent M-C relations work?
- Are we seeing noise bias?
- Is the intrinsic noise difference a box vs light-cone issue?
- Does MXXL also see redshift evolution?
- Can we eliminate the fit-radius dependence?