Characterising our Universe with REFLEX cluster survey

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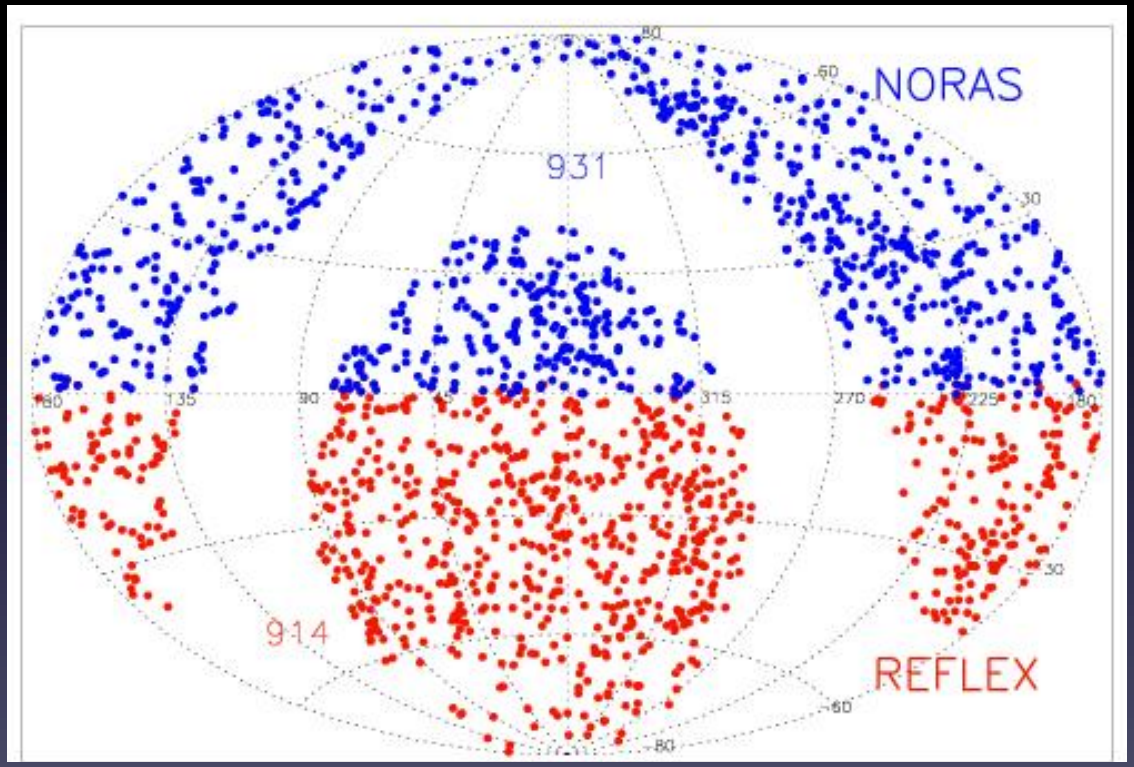
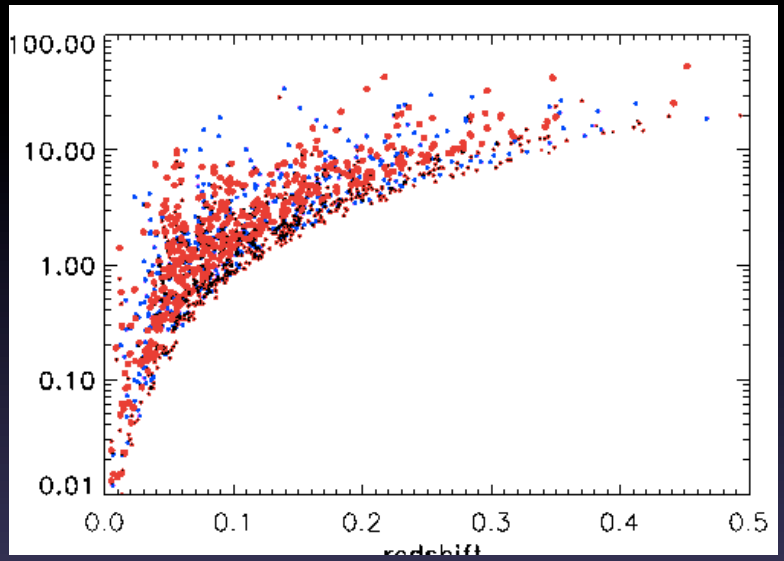
Recent results from REFLEX II

- Cosmological constraints [Böhringer+ 2013,2014]
- LSS probed by superclusters [Chon+ 2013, 2014]
- Local (under-)density [Böhringer+, in prep.]

ROSAT-ESO flux-limited (REFLEX) X-ray cluster survey [P.I. Hans Böhringer]





REFLEX II 918 clusters

NORAS II 882 clusters

F> 1.8 10^{-12} erg s^{-1} cm^{-2}

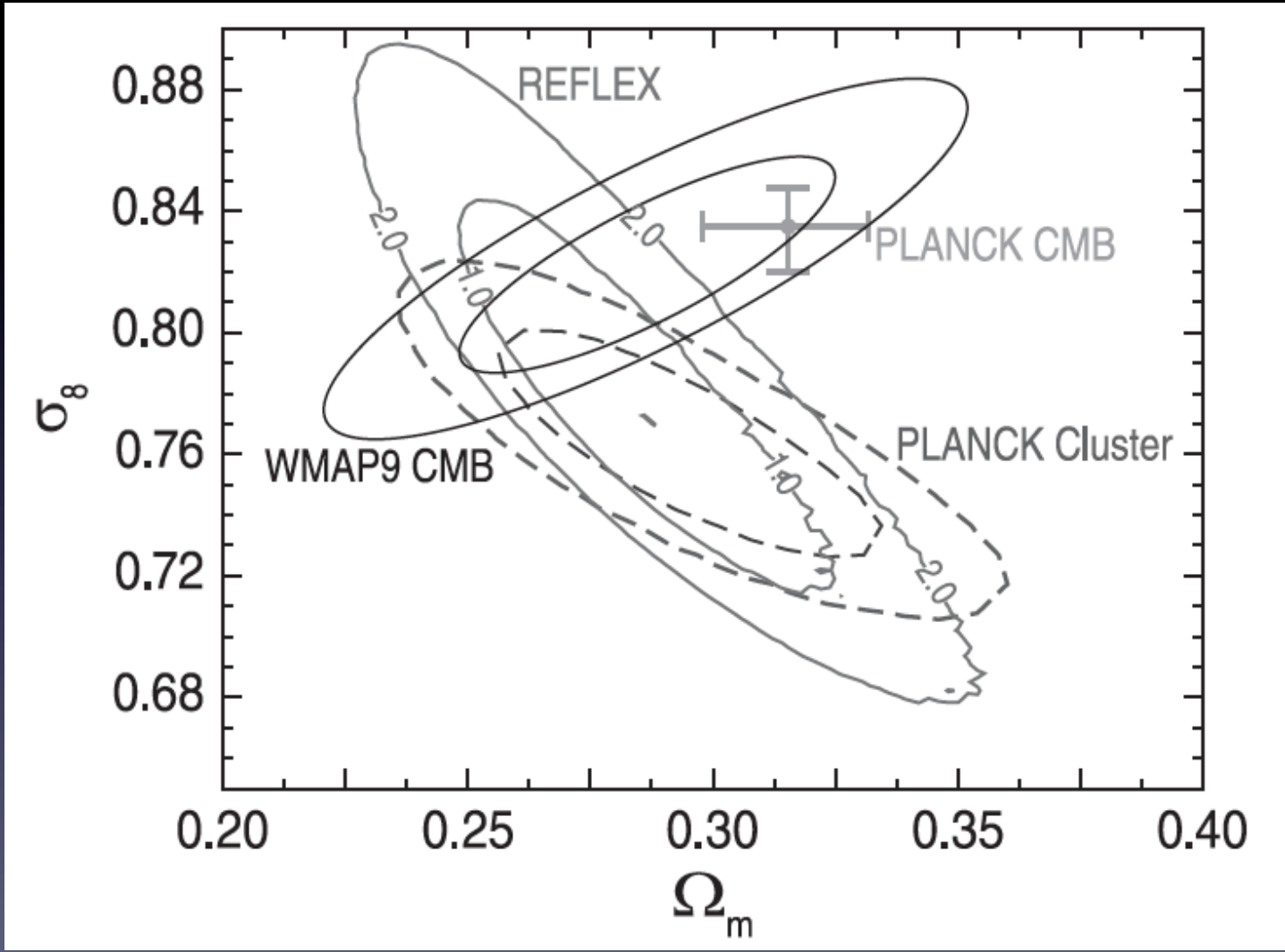
REFLEX I: 18 runs La Silla

REFLEX II: 9 runs ESO 3.6m/NTT

NORAS: 10 runs C.A. 2 runs K.P.

Böhringer et al. 2000, 2001, 2004, 2012
Chon & Böhringer, 2012

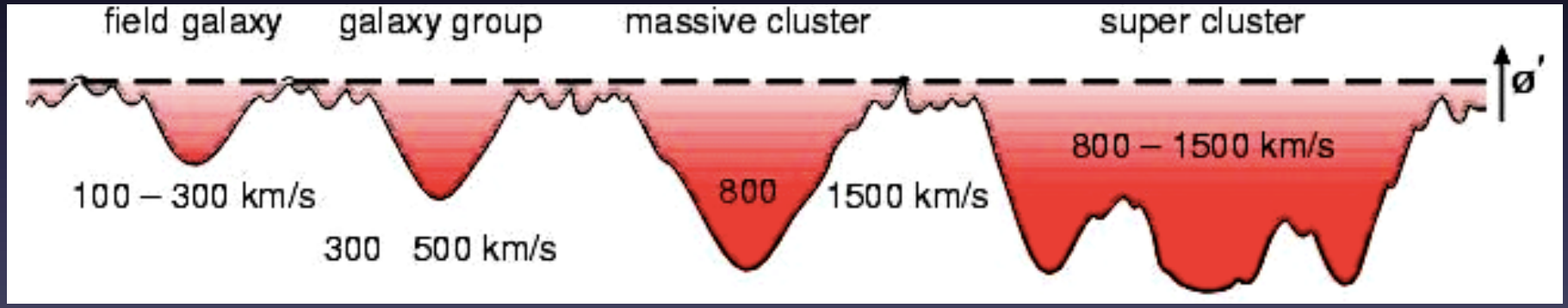
REFLEX II cosmological constraints



$\Omega m = 0.27 \pm 0.03$
$\sigma 8 = 0.80 \pm 0.03$

$\Omega m = 0.29 \pm 0.04$
$\sigma 8 = 0.77 \pm 0.07$

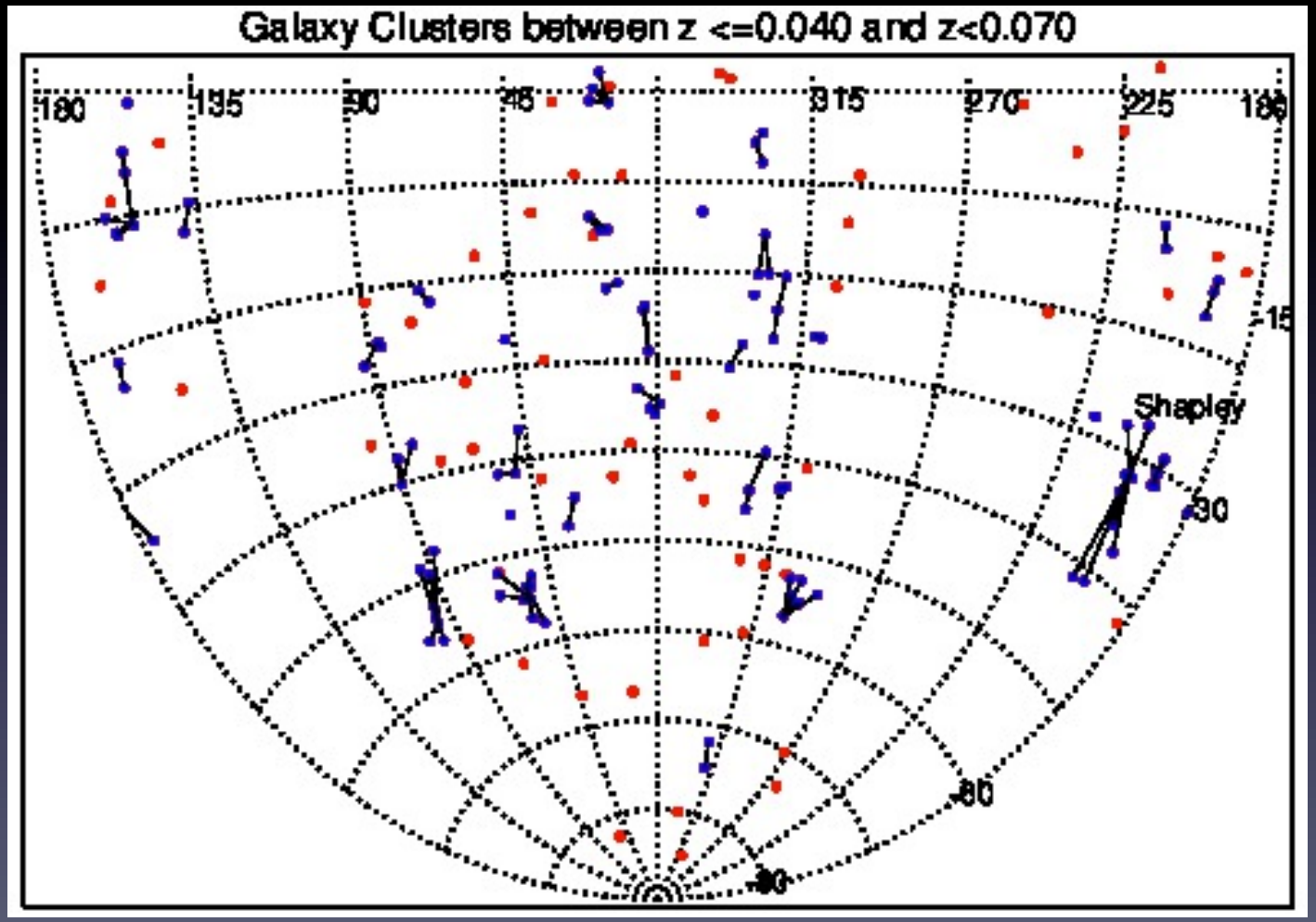
X-ray superclusters
as a probe of the large-scale structure (LSS)



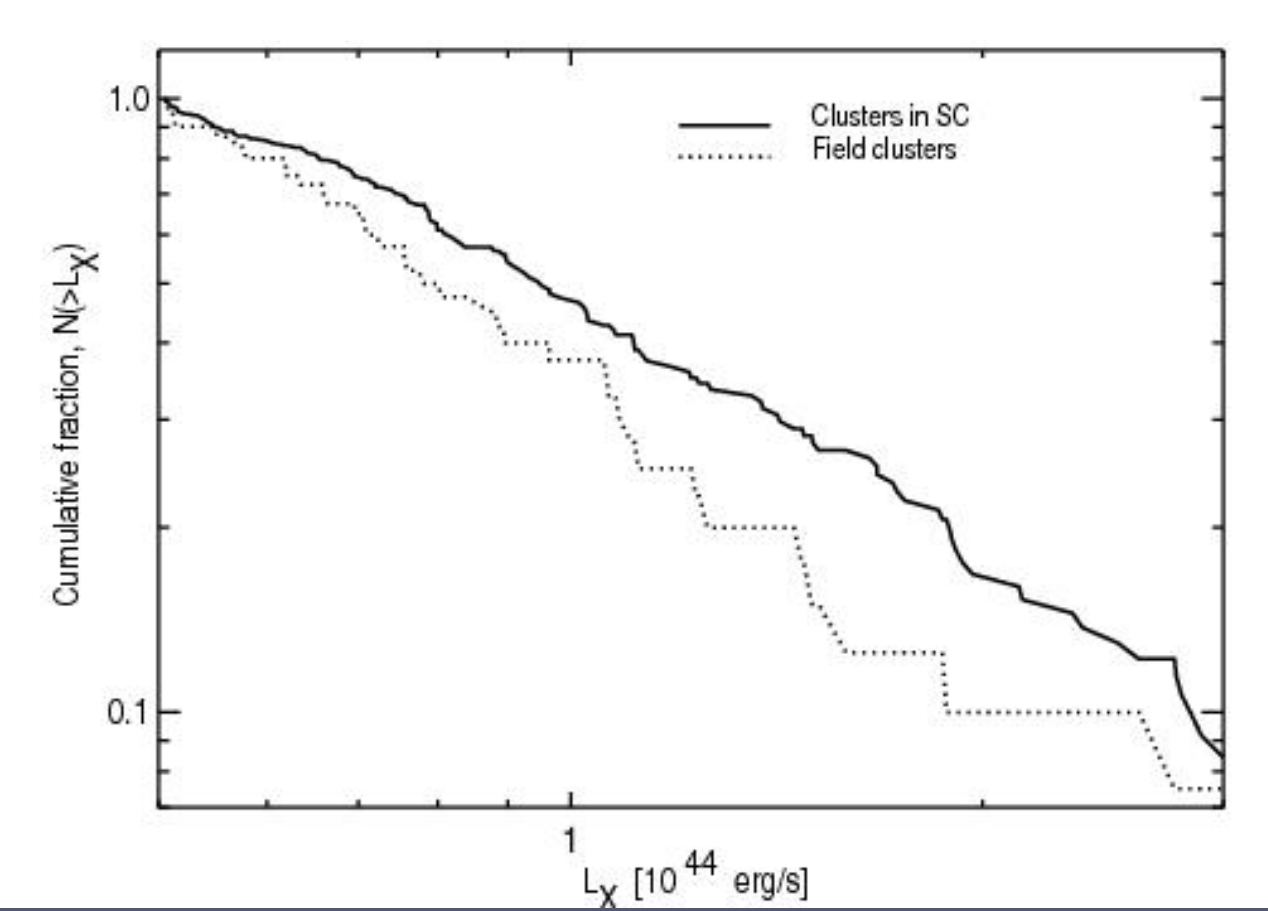
A few remarks

- Well-understood selection of clusters: can address issues quantitatively, e.g. simulations.
- Using a friends-of-friends algorithm – linking length
- Characterise the largest, not collapsed objects and understand physical properties, cluster properties.
- N-body simulation – apply selection criteria to select halos, testing concepts

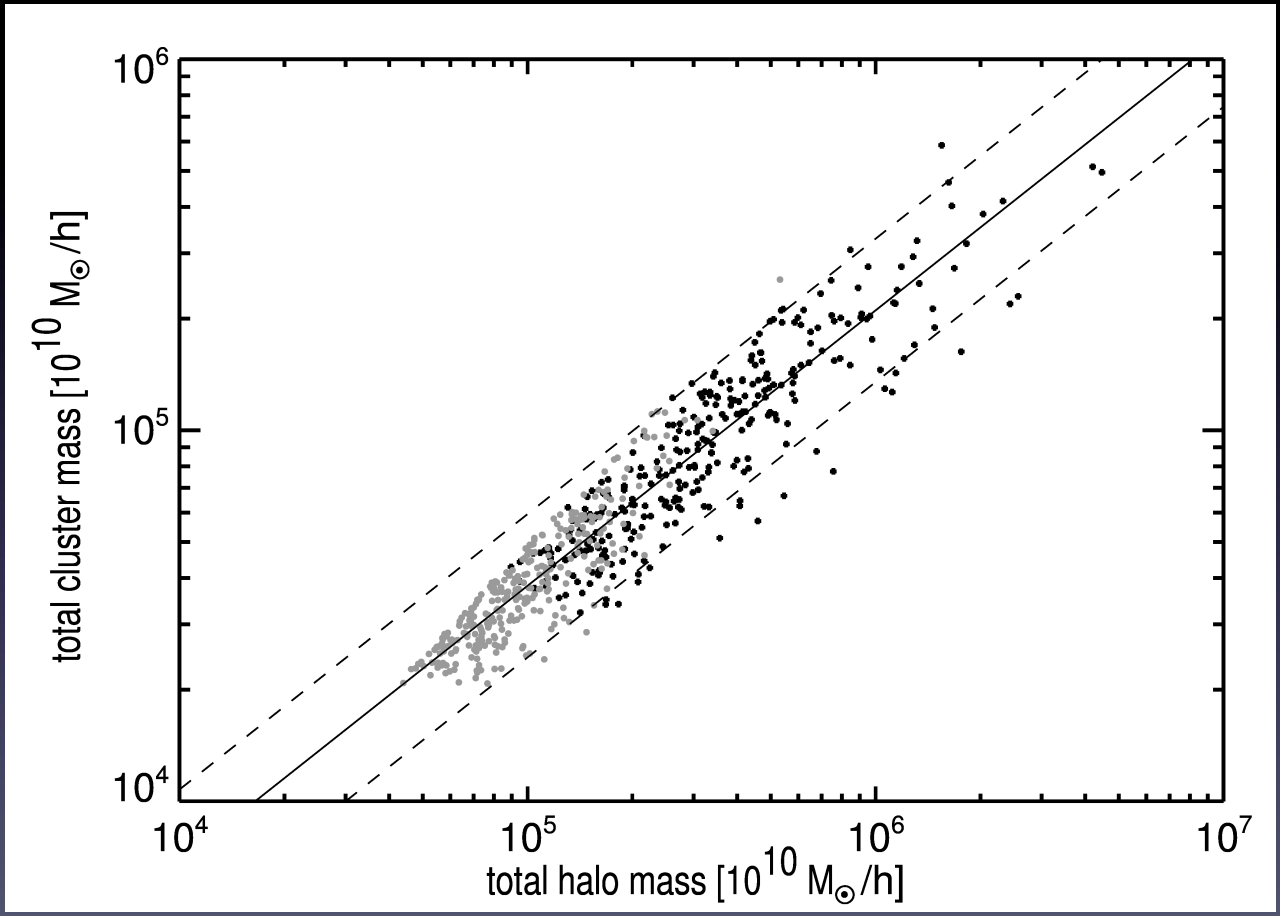
Distribution of REFLEX II superclusters



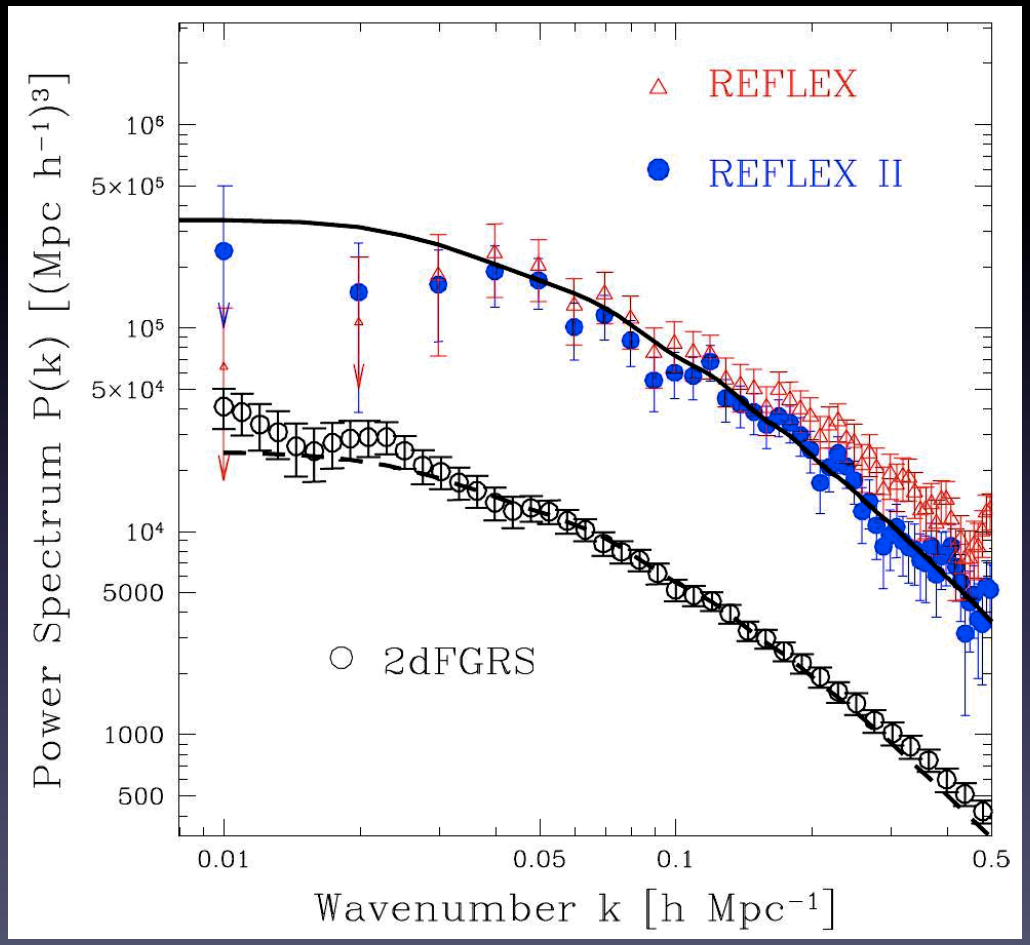
X-ray luminosity function of superclusters



Mass represented by clusters

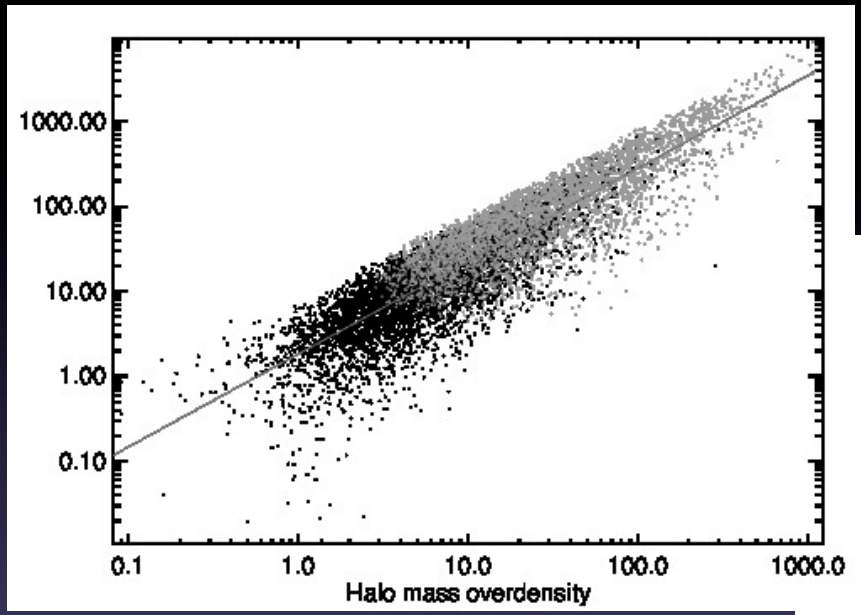


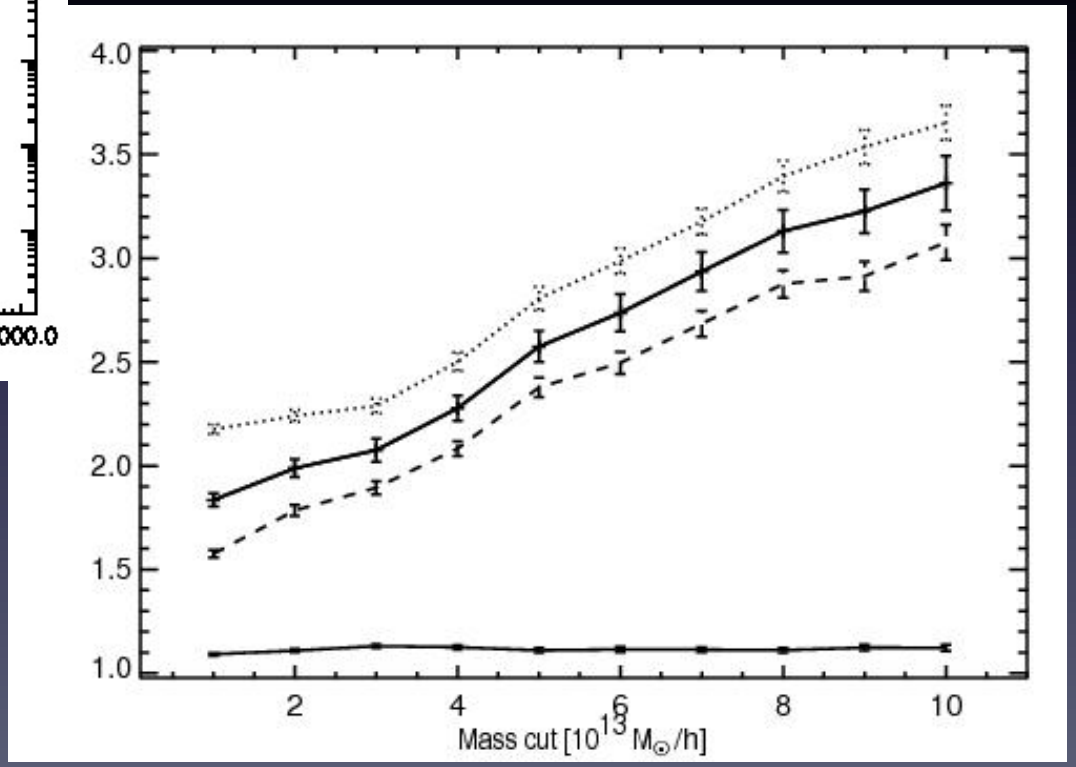
REFLEX II power spectrum and bias



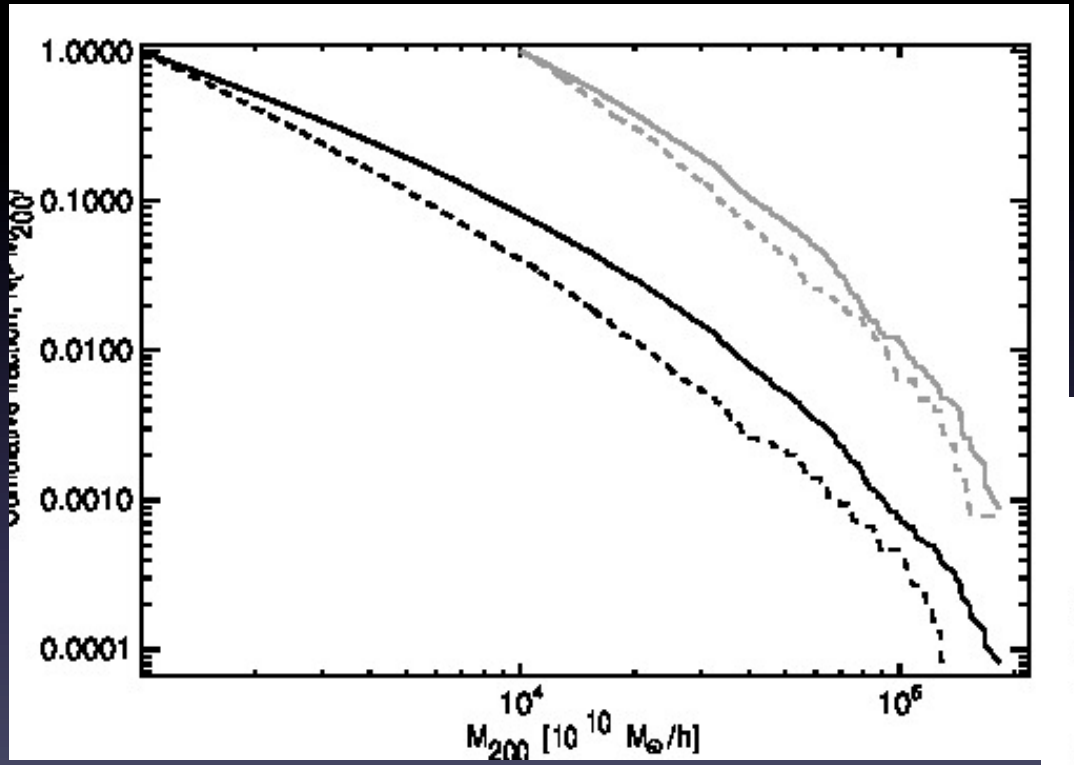
Balaguera-Antolinez et al. 2010

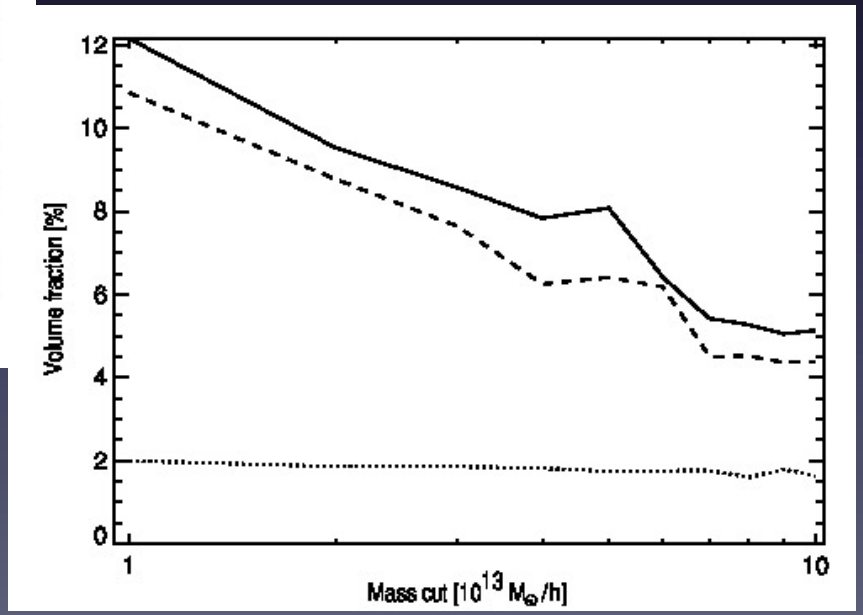
Cluster bias: local measurement





Supercluster environment probed by mass function and volume fraction





Summary

- Characterising our Universe with REFLEX cluster survey
  - Cosmological constraints
  - Statistical description of large scale structure
  - First X-ray supercluster catalogue
  - Superclusters provide special environment : luminosity function and volume fraction