Granada, May 2008
The X-ray Universe

Evolution of the Thermodynamical and Chemical properties of the IntraCluster Medium

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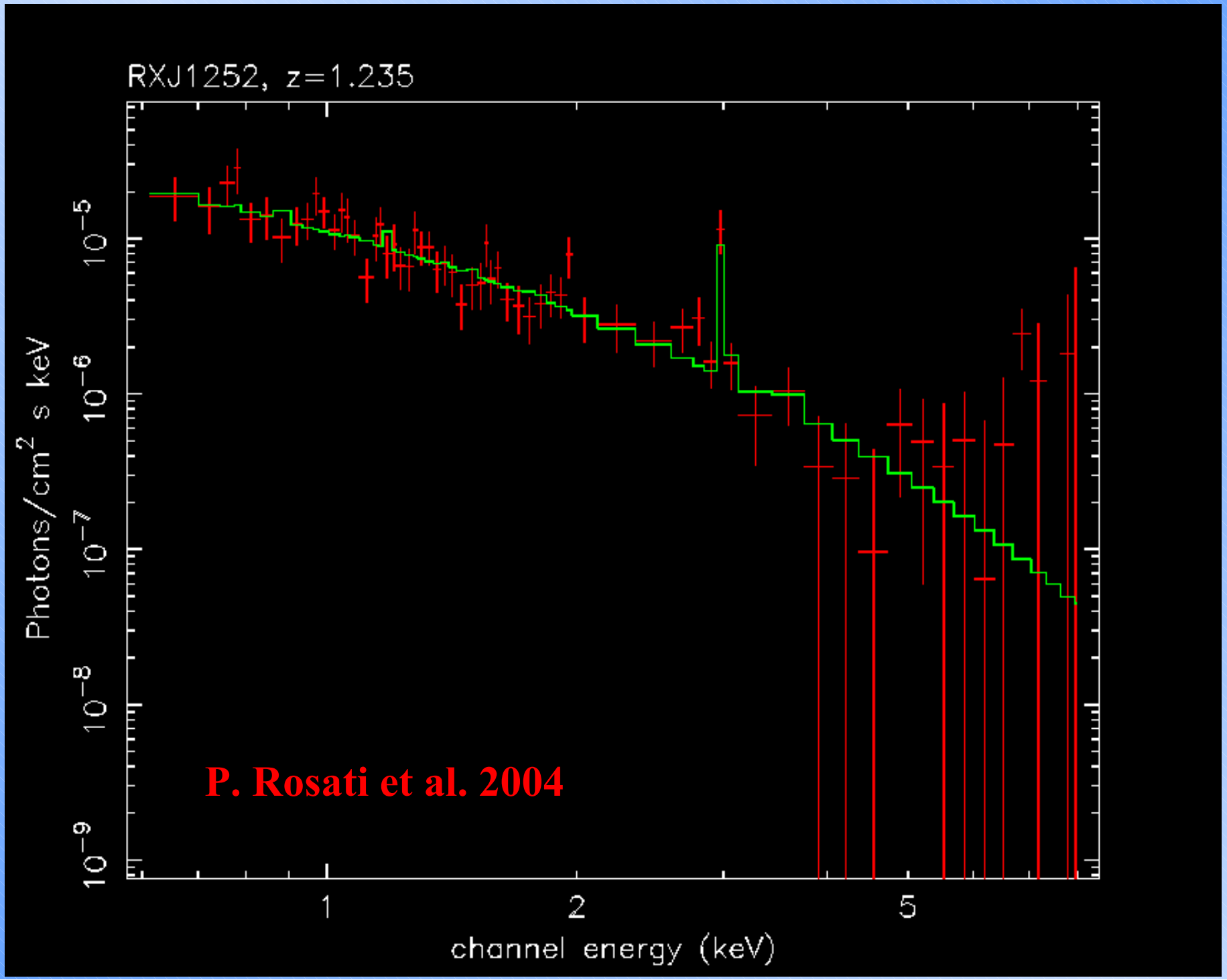
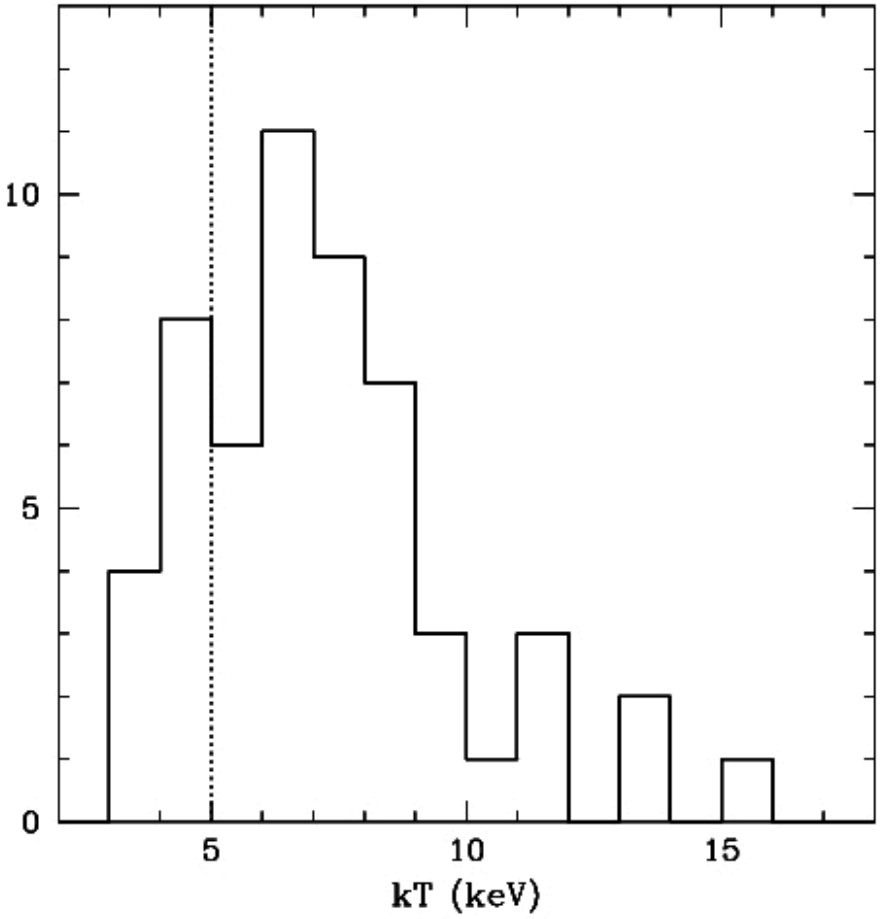
INAF

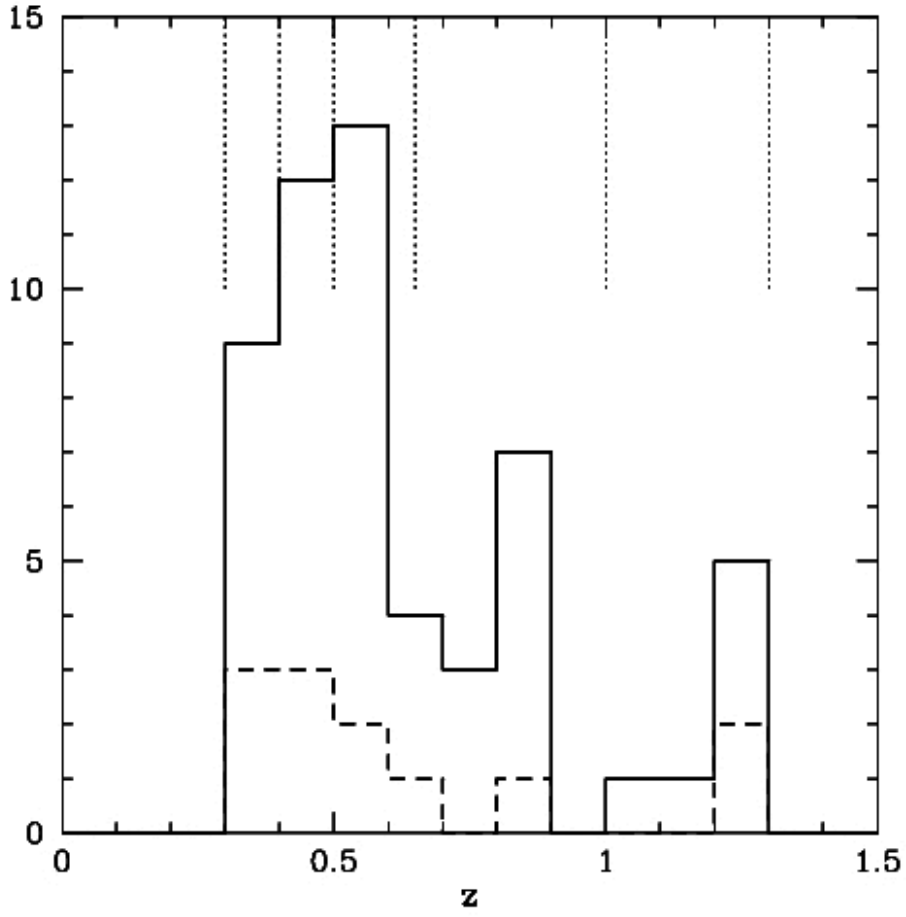
XMM2235: z=1.39 180 ks with Chandra, PI Chris Mullis

Fe line is detected in most of the z>1 X-ray clusters



Distribution of temperature and z of the Chandra high-zsample



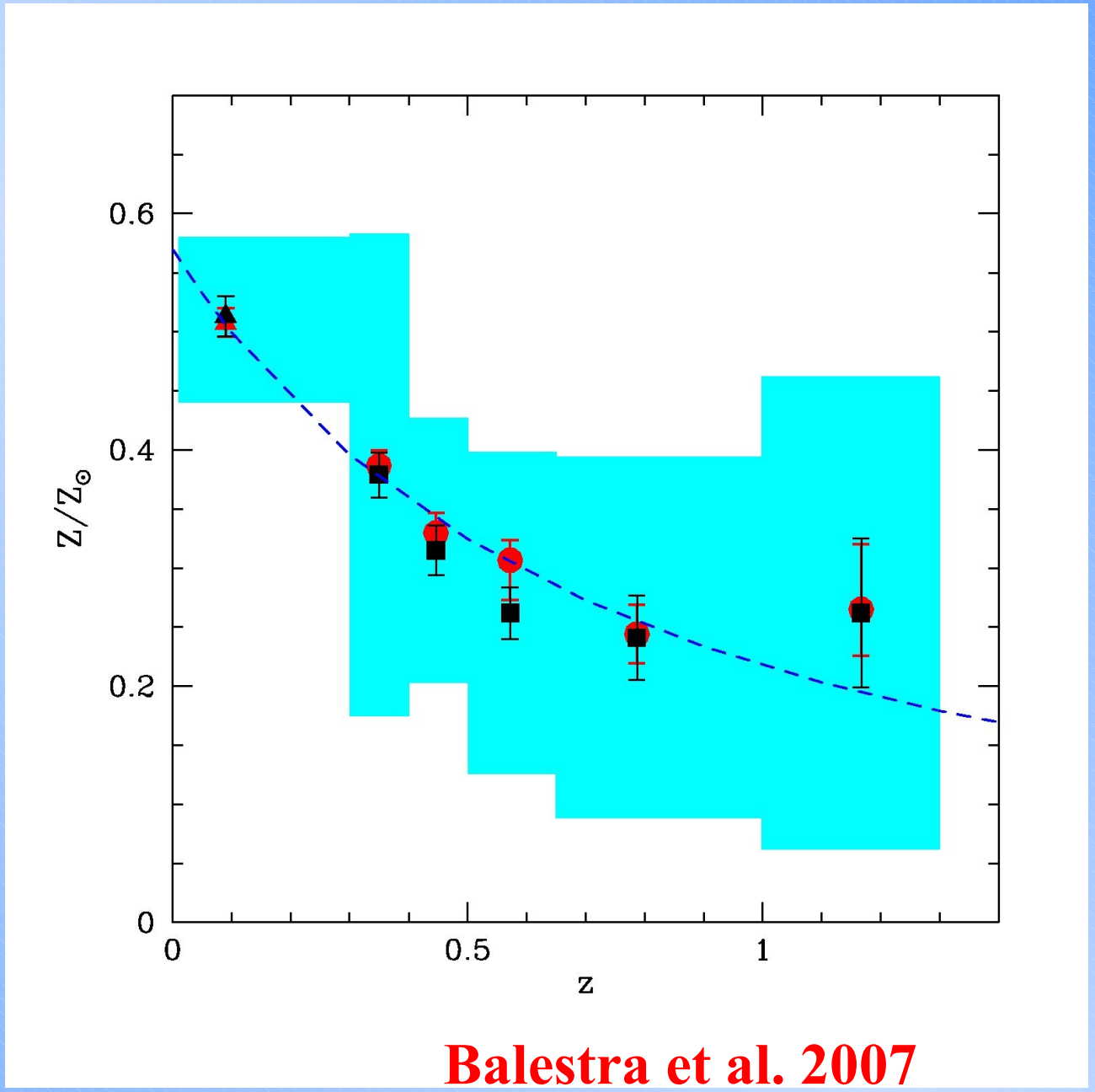


Balestra et al. 2007

We select from the Chandra archive
56 clusters at z>0.3 (among them 7 clusters at z>1)

Iron abundance vs redshift

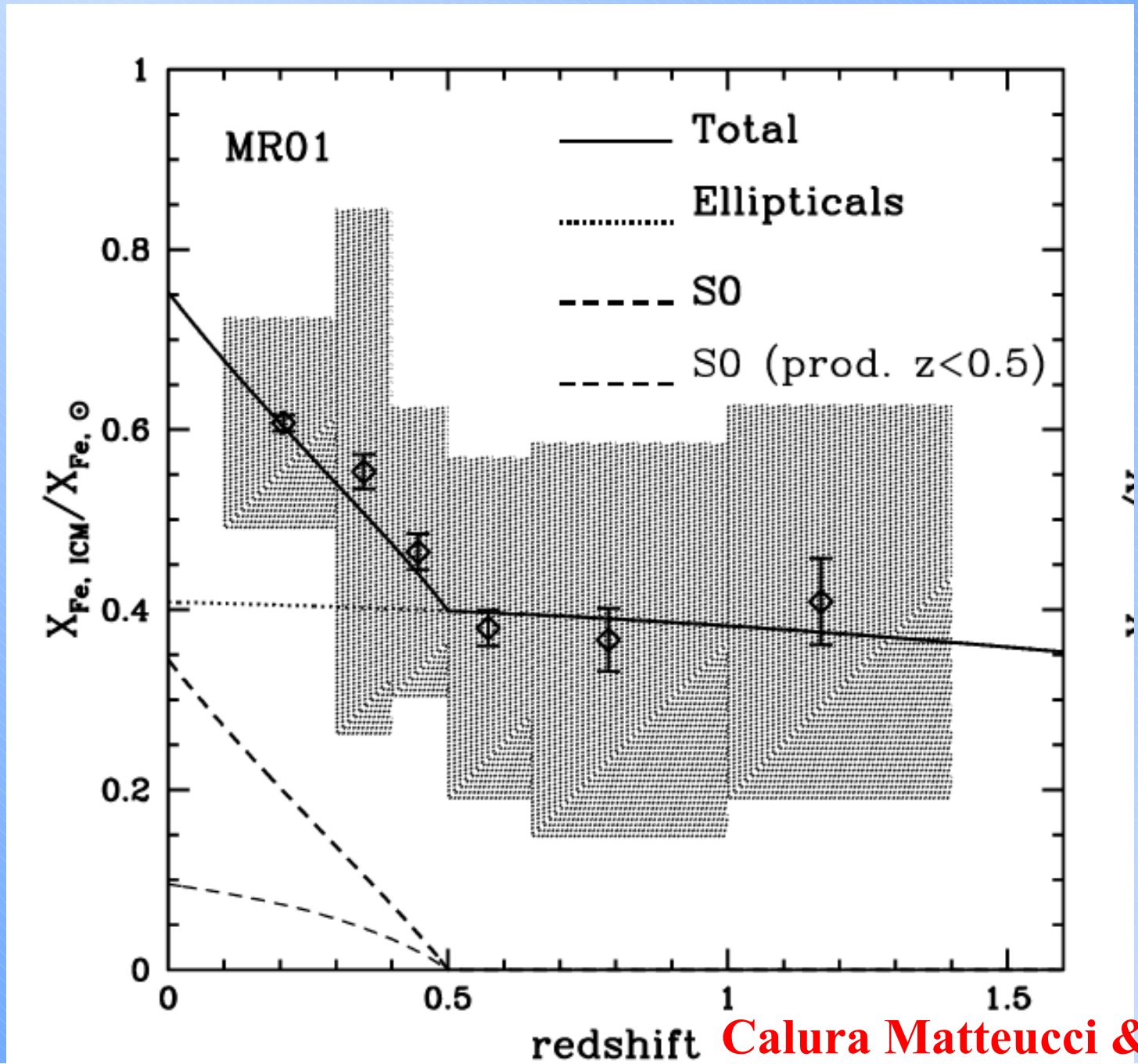
Small effect of cooling cores.
When does most of the evolution occur?
Use of XMM data for 0.2<z<0.8



Balestra et al. 2007

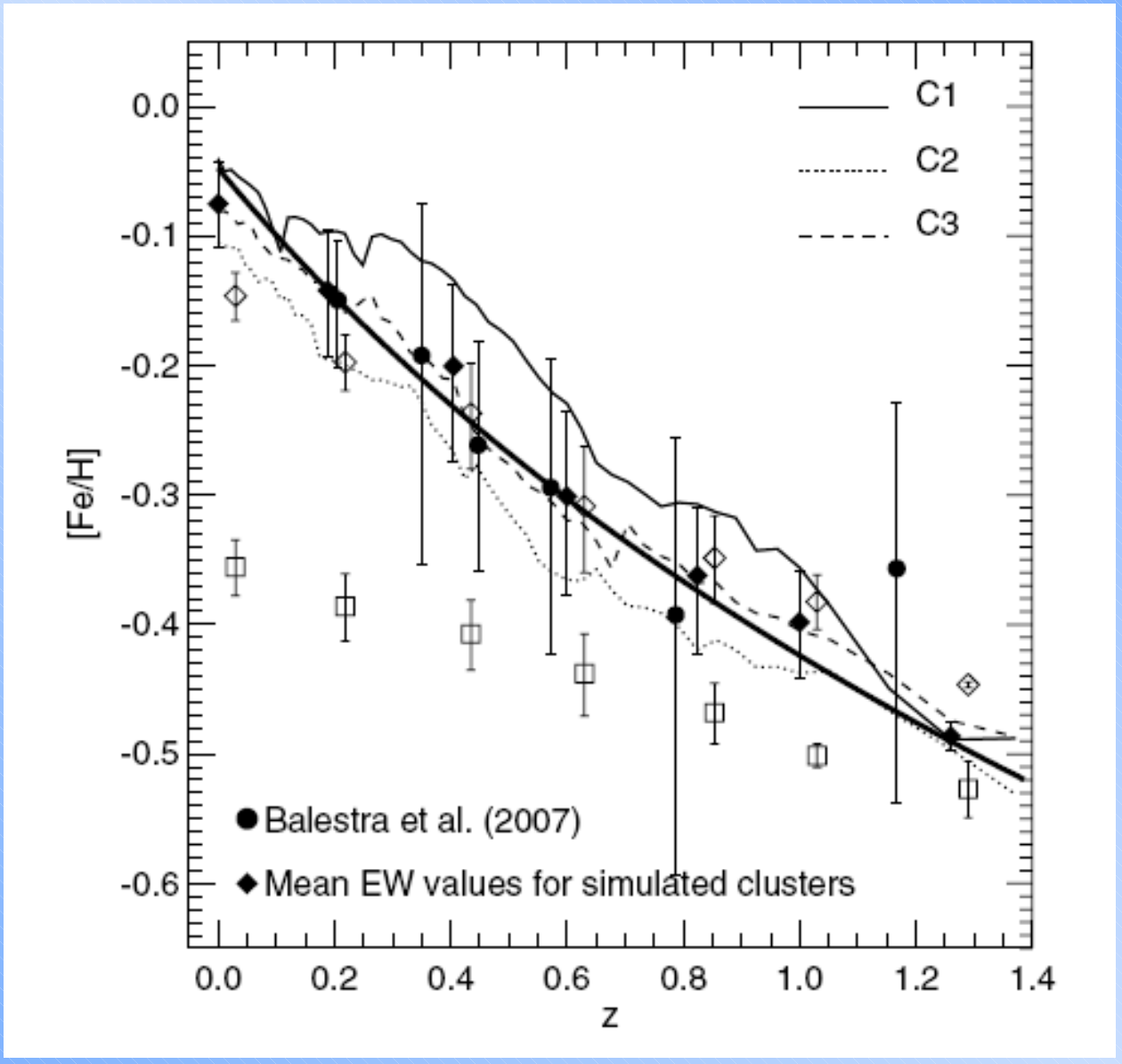
See also Maughan et al. 2008

Fe abundance evolution and S0 fraction evolution



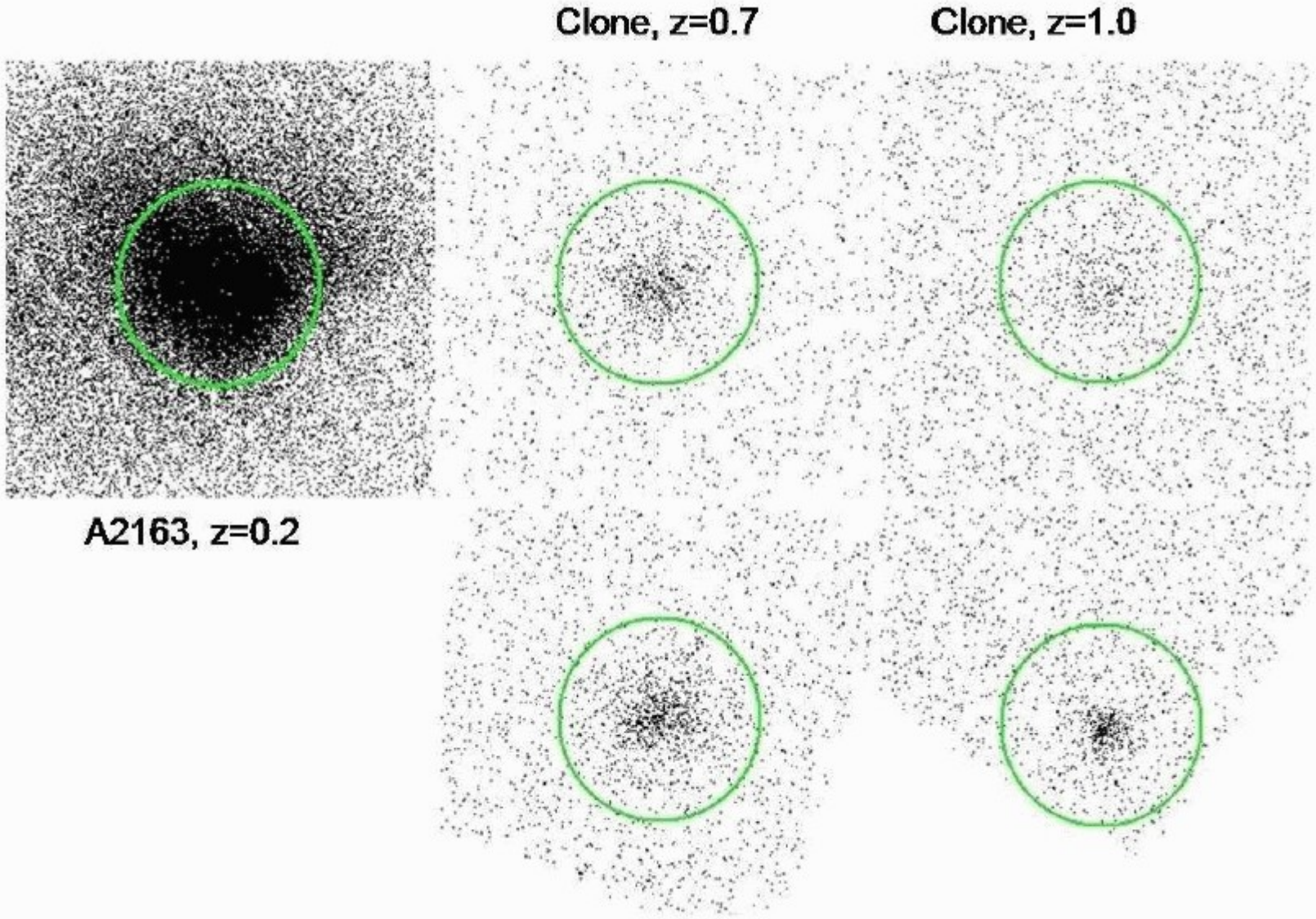
Calura Matteucci & Tozzi 2007

Dynamical origin of the Fe abundance evolution



Cora et al. 2008

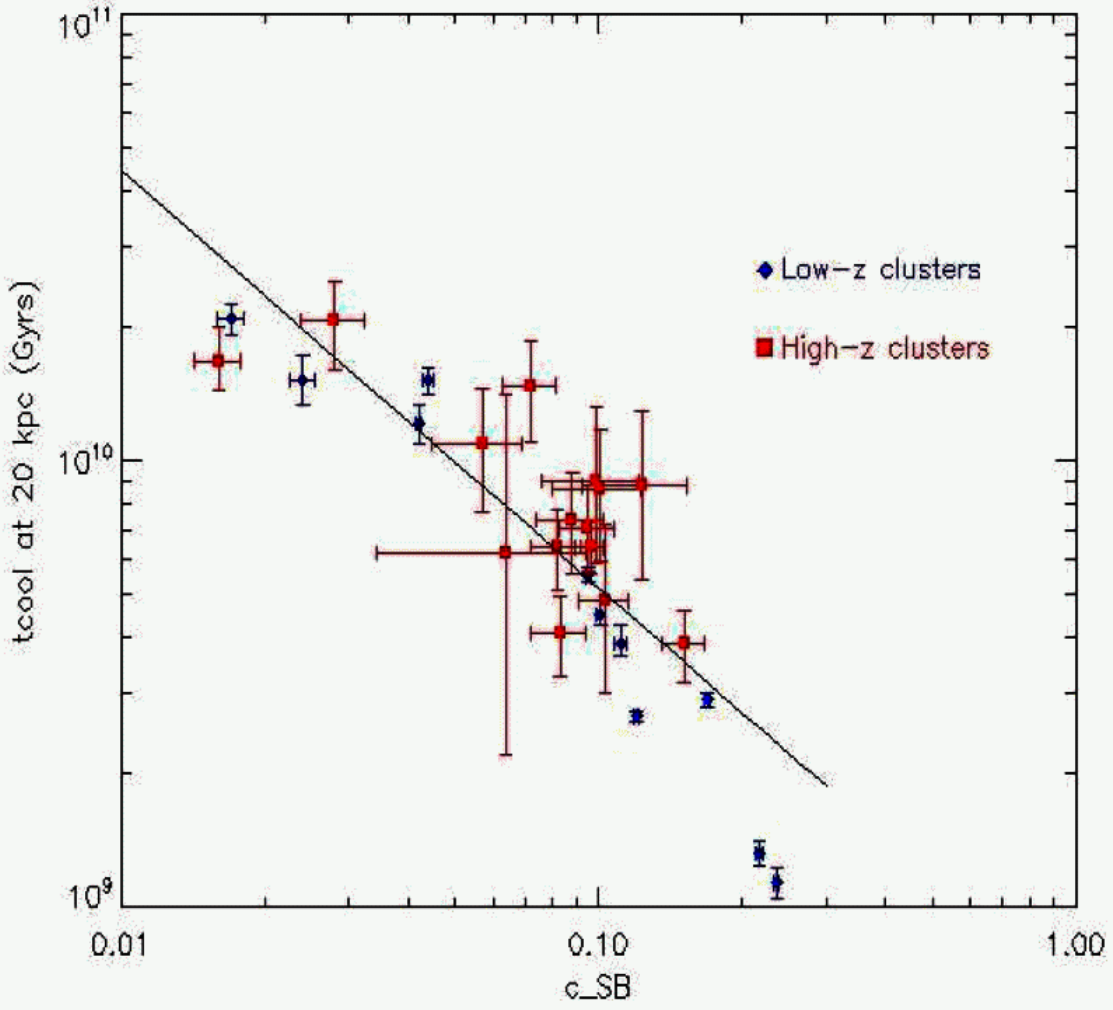
Investigating the Cool Core fraction in the distant Cluster population



Santos et al. 2008

Characterization of a CC Cluster

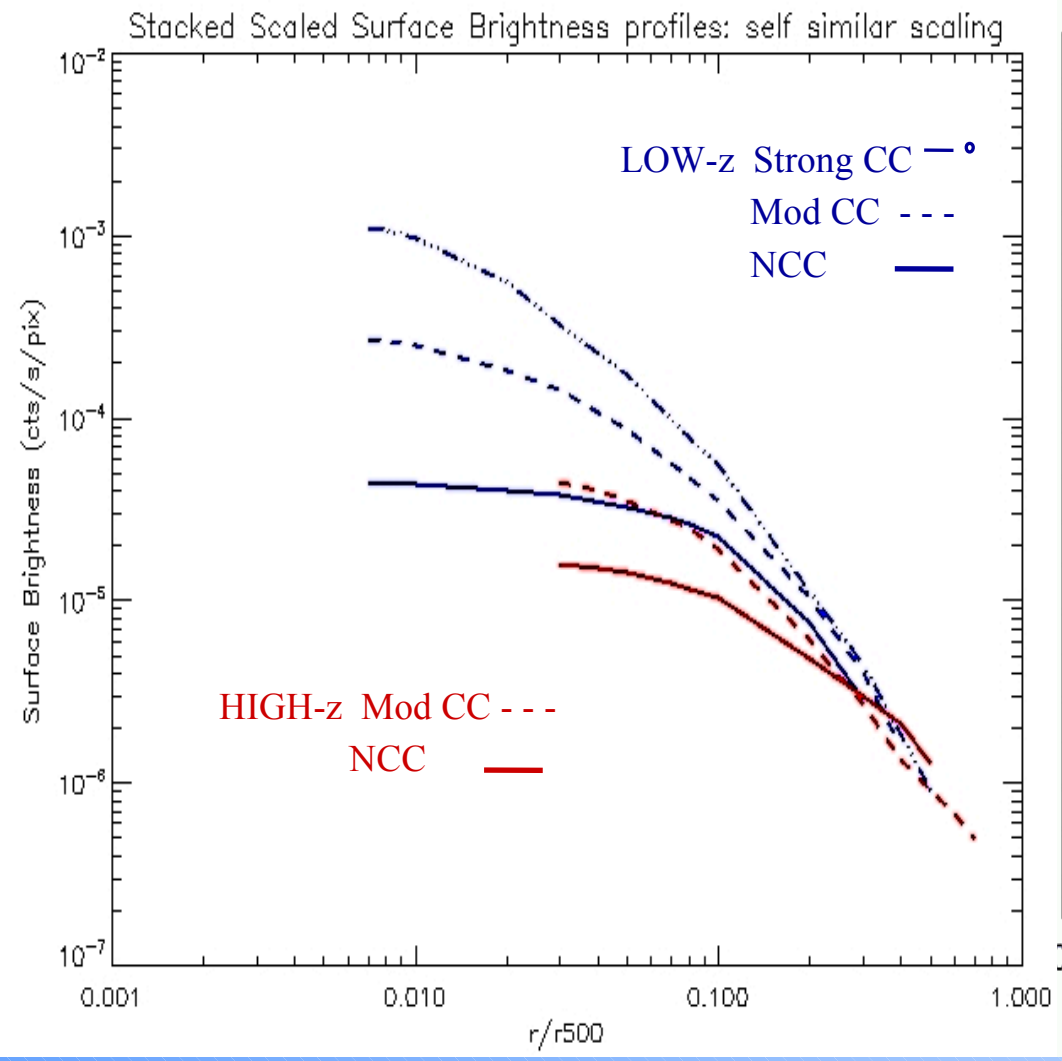
- Central temperature decrease: $T_{central} \sim 1/3\ T_{average}$
- Central Surface Brightness (SB) excess
- Cooling time, t_{cool}: shorter than Hubble Time

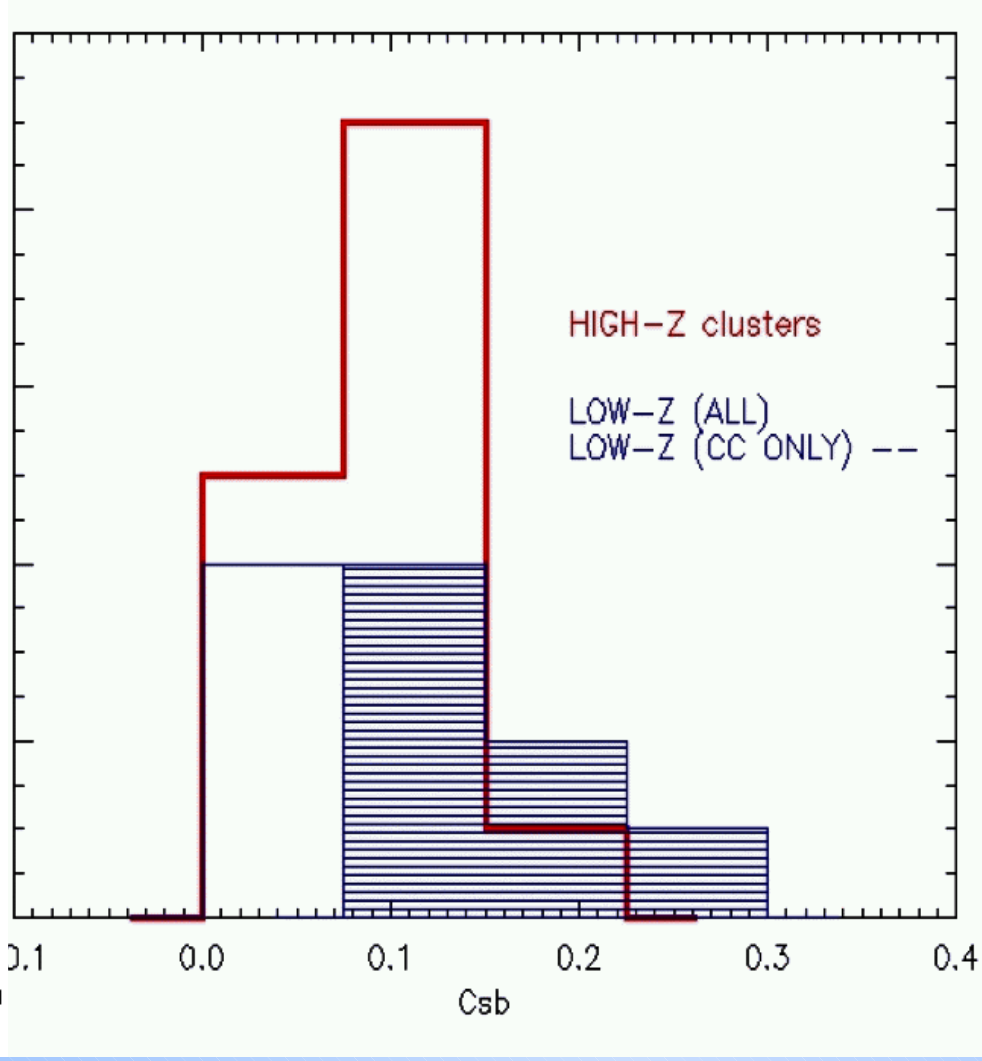


$$t_{cool} \propto C_{SB}^{-0.93}$$

Santos et al. 2008

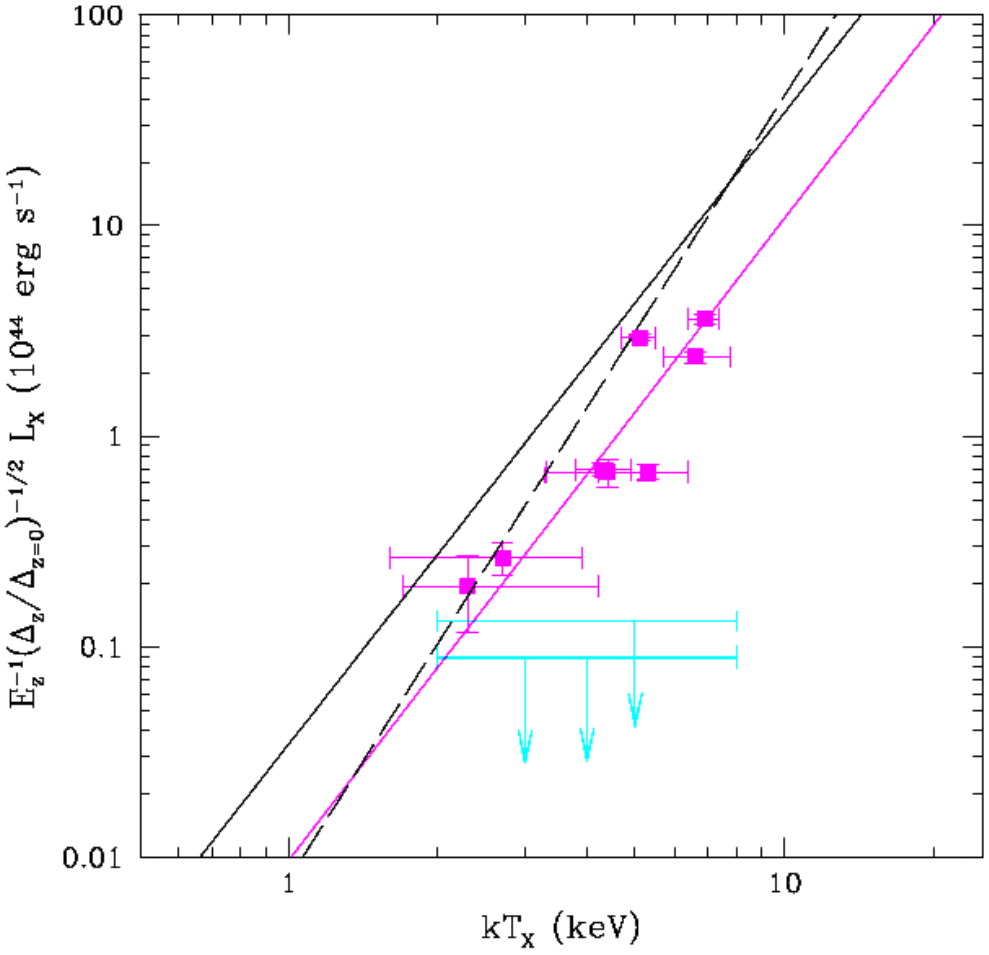
Searching for cool cores in high-z clusters

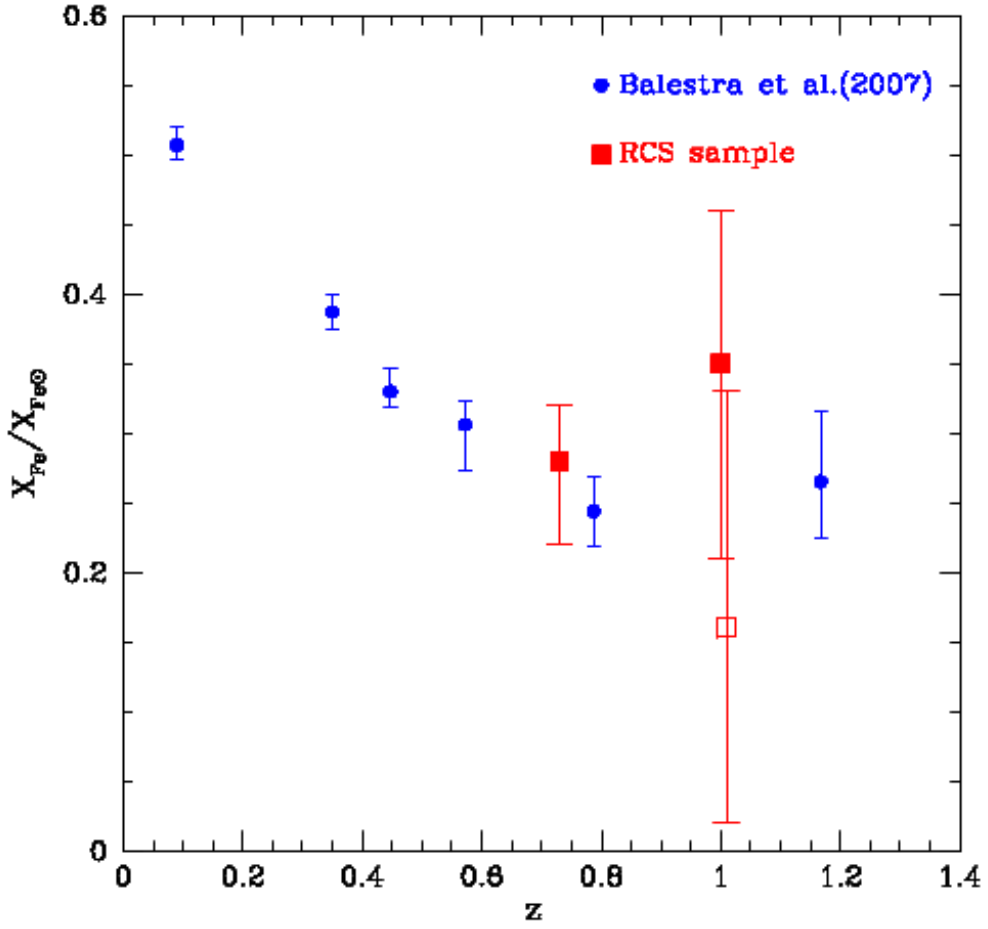




Santos et al. 2008

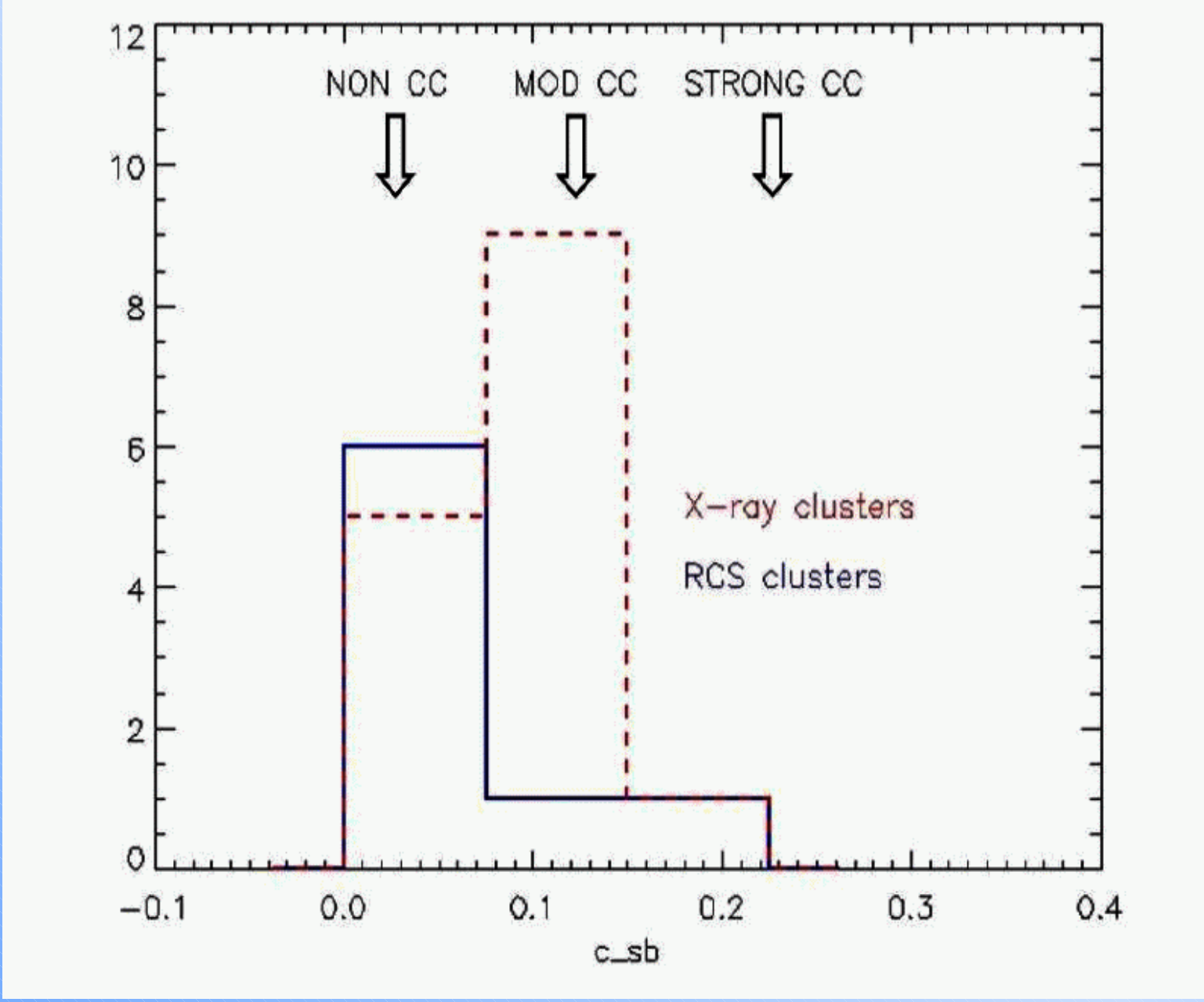
X-ray properties of distant optically selected clusters (RCS)





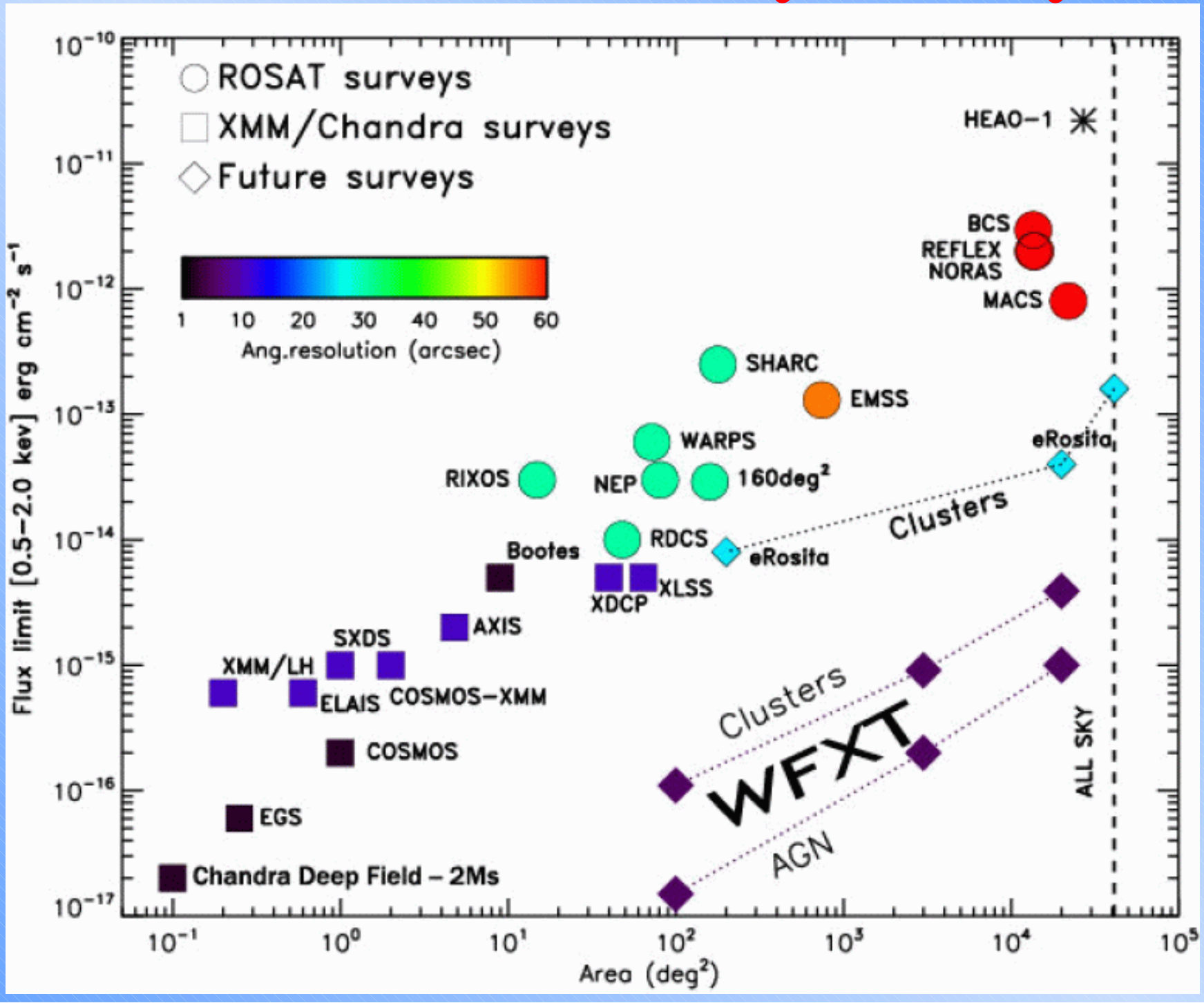
Bignamini et al. 2008

No cool cores in RCS (optically selected) Clusters



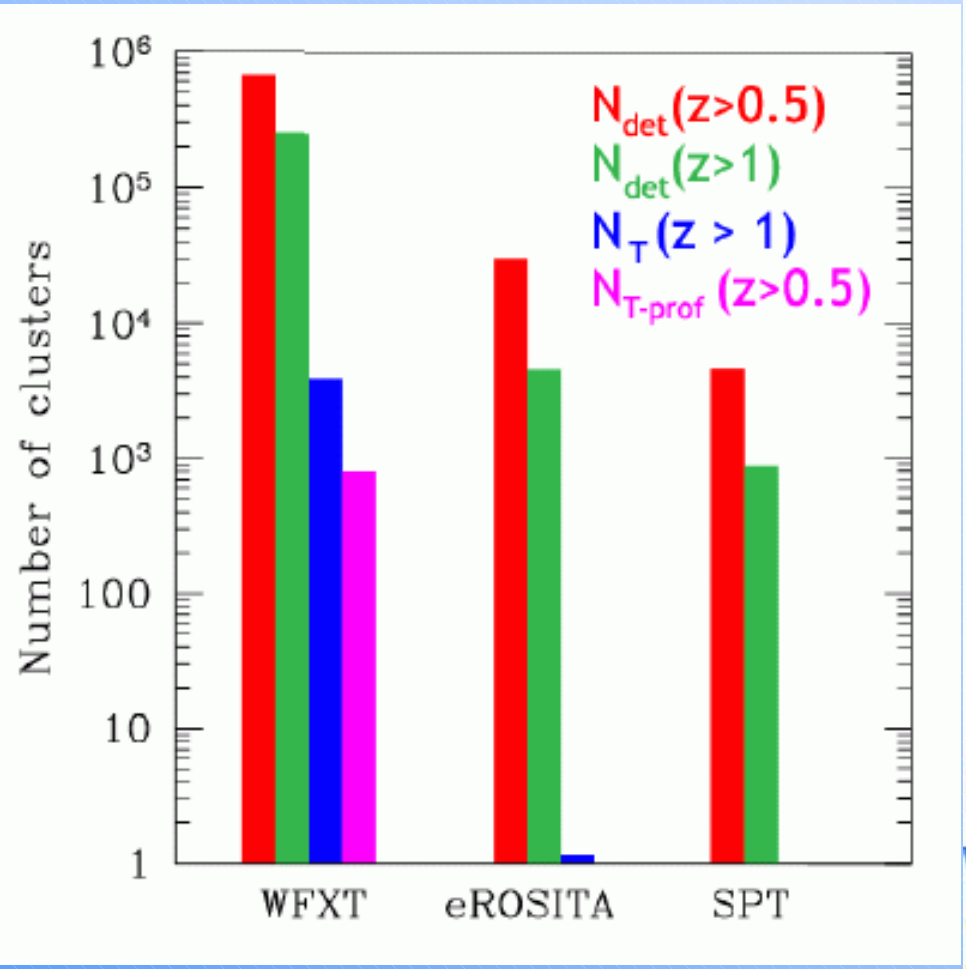
Santos et al. 2008

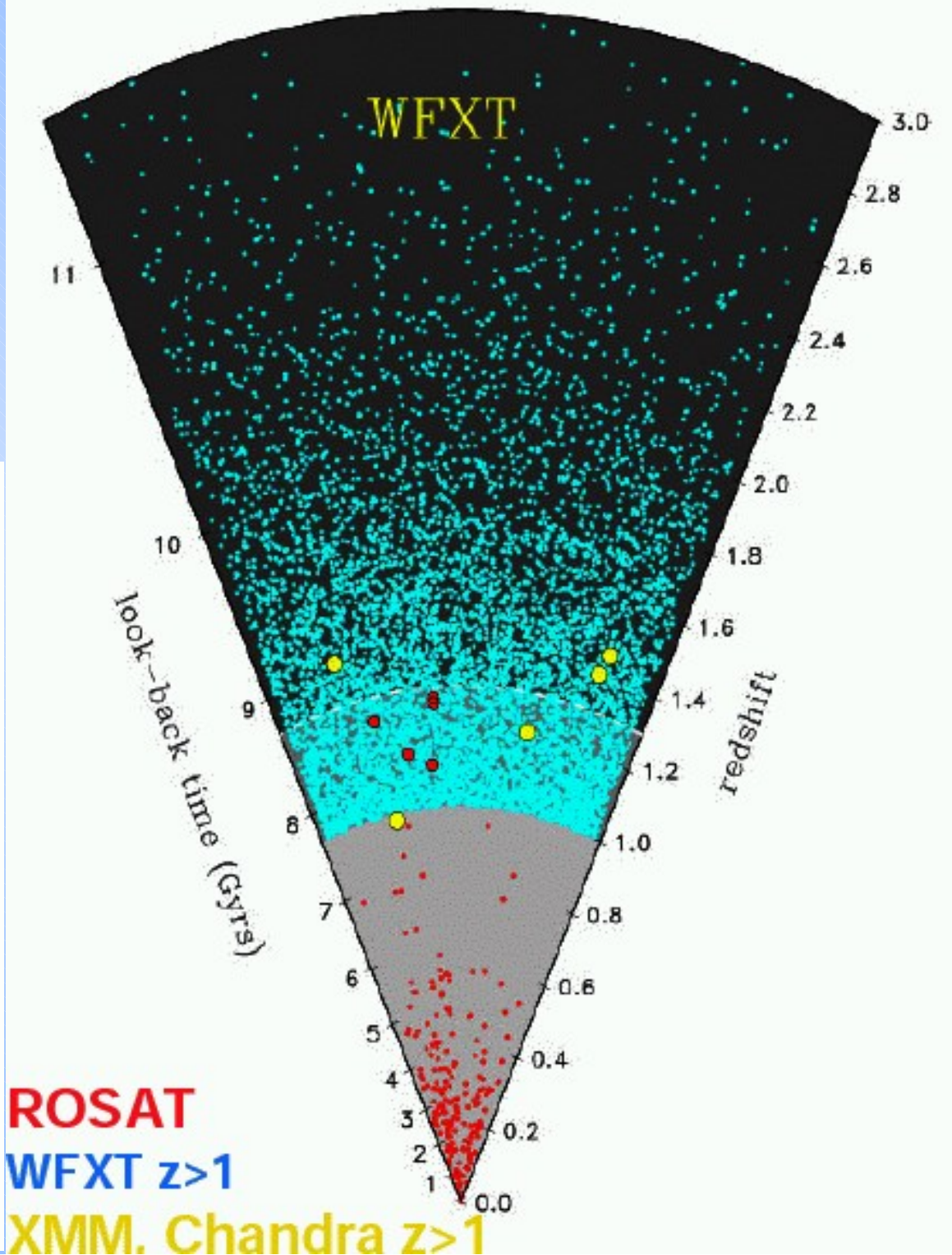
The future of X-ray surveys



WFXT
psf 5''
FOV 1 sq deg

C. Norman, R. Giacconi, A. Ptak, P. Rosati, R. Gilli, S. Borgani, M. Paolillo, P.T., S. Allen +...





Summary

Evidence of evolution in the average Fe abundance, a factor of 2 from z~0.5 to z=0. ICM was already substantially enriched at z>1. This evolution can be explained by the sink of low entropy, high-metallicity gas associated with small halos and/or galaxies.

Surface Brightness analysis: C_{SB}+t_{cool} stacked SB profiles indicate

a significant fraction of moderate CC @ z=[0.7-1.4]

Absence of pronounced CC at high-z

Absence of pronounced CC in optical selected high-z cluster.

To capitalize what we have learned so far with Chandra and XMM we must have soon a mission devoted to a wide area deep survey with a good spatial resolution ~ 5'' like WFXT. The technological challenge for the mirrors is crucial.