It Came from Outer Space!

Internal Metallicity Variations in the Milky Way Globular Cluster NGC 3201

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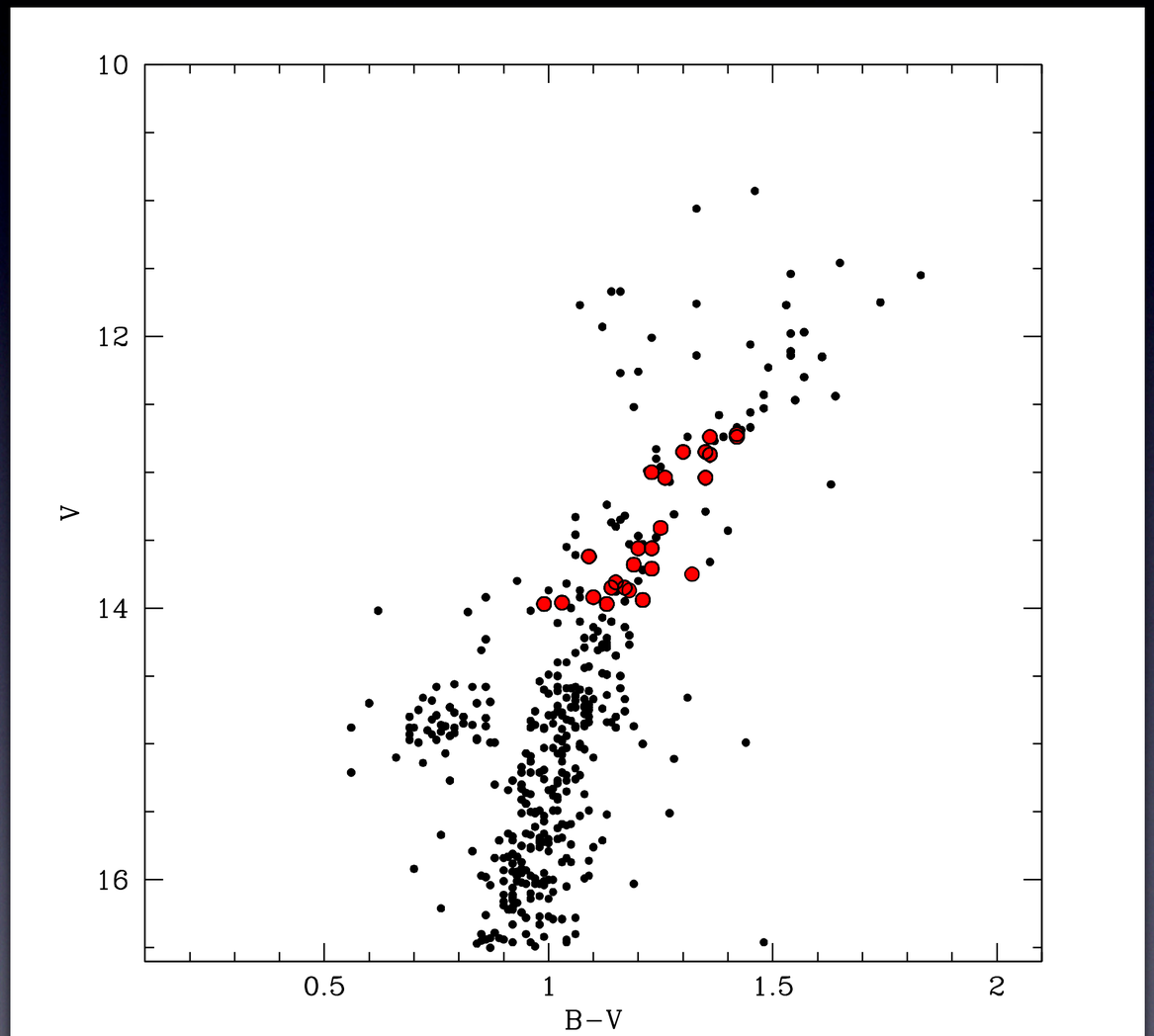
Peculiar


NGC 3201
r_{apo}=22.1 kpc
r_{per}=9.0 kpc
orbital inclination=18°
v_{rad}=494 km/s

Observations



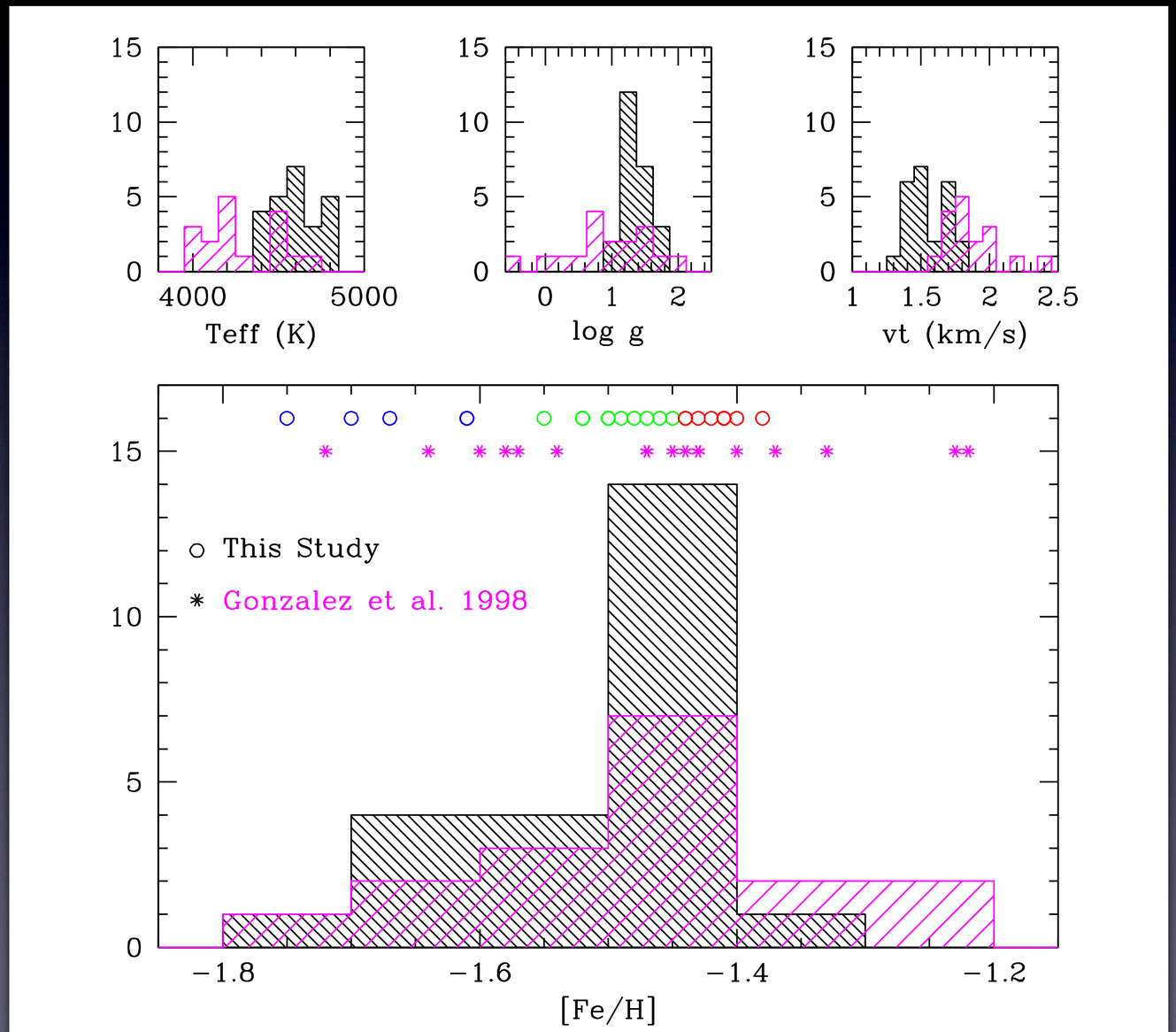
Cote et al. (1994)

21 UVES stars (from archive)
5 MIKE stars (from Inese)

→ 24 stars in all

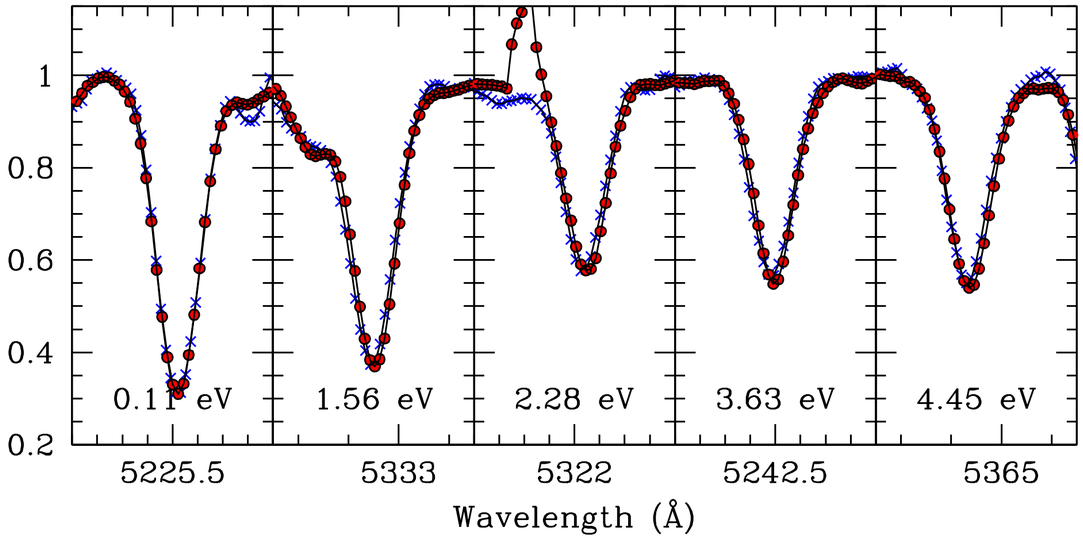
Gonzalez & Wallerstein (1998)

Very good agreement from a different part of the RGB!

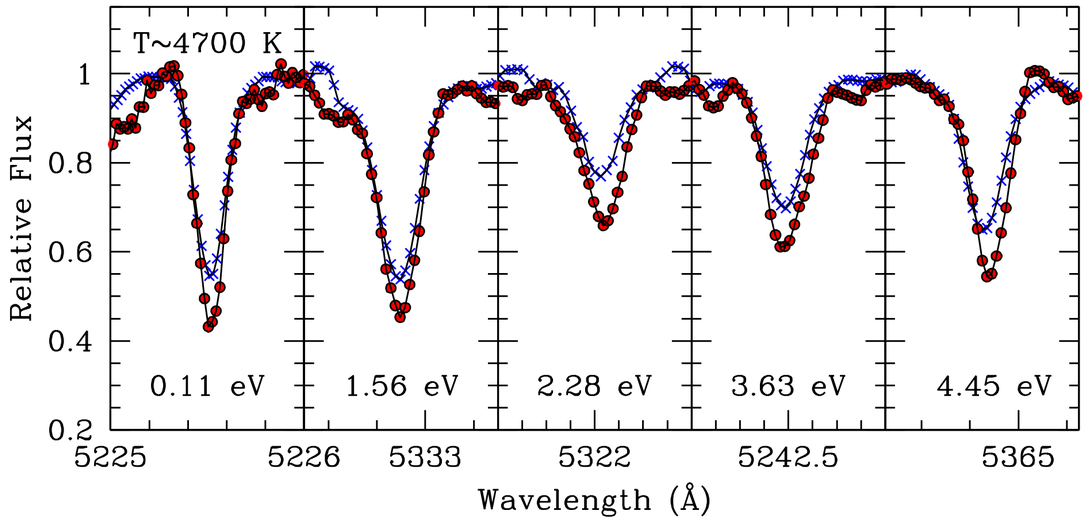


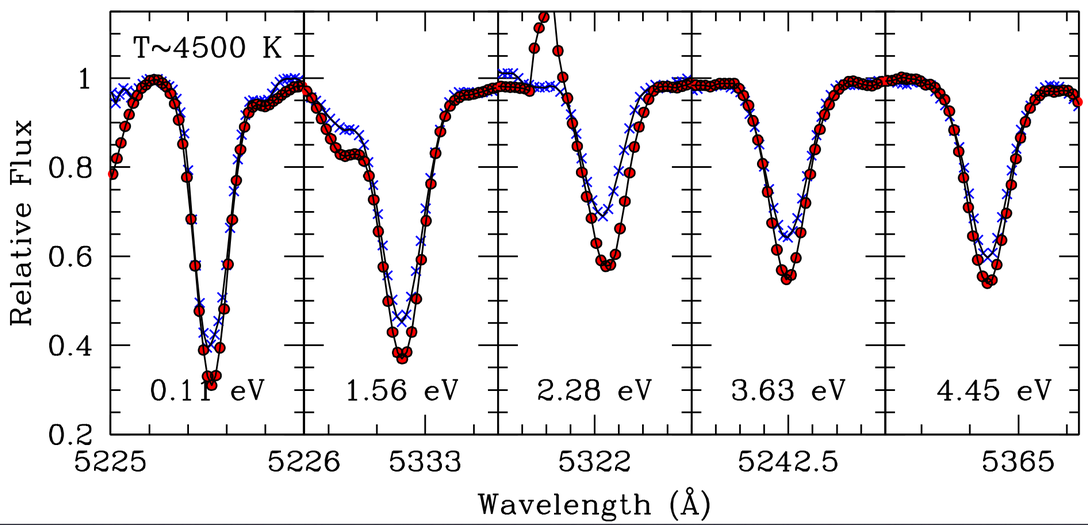
Spectrum Comparison

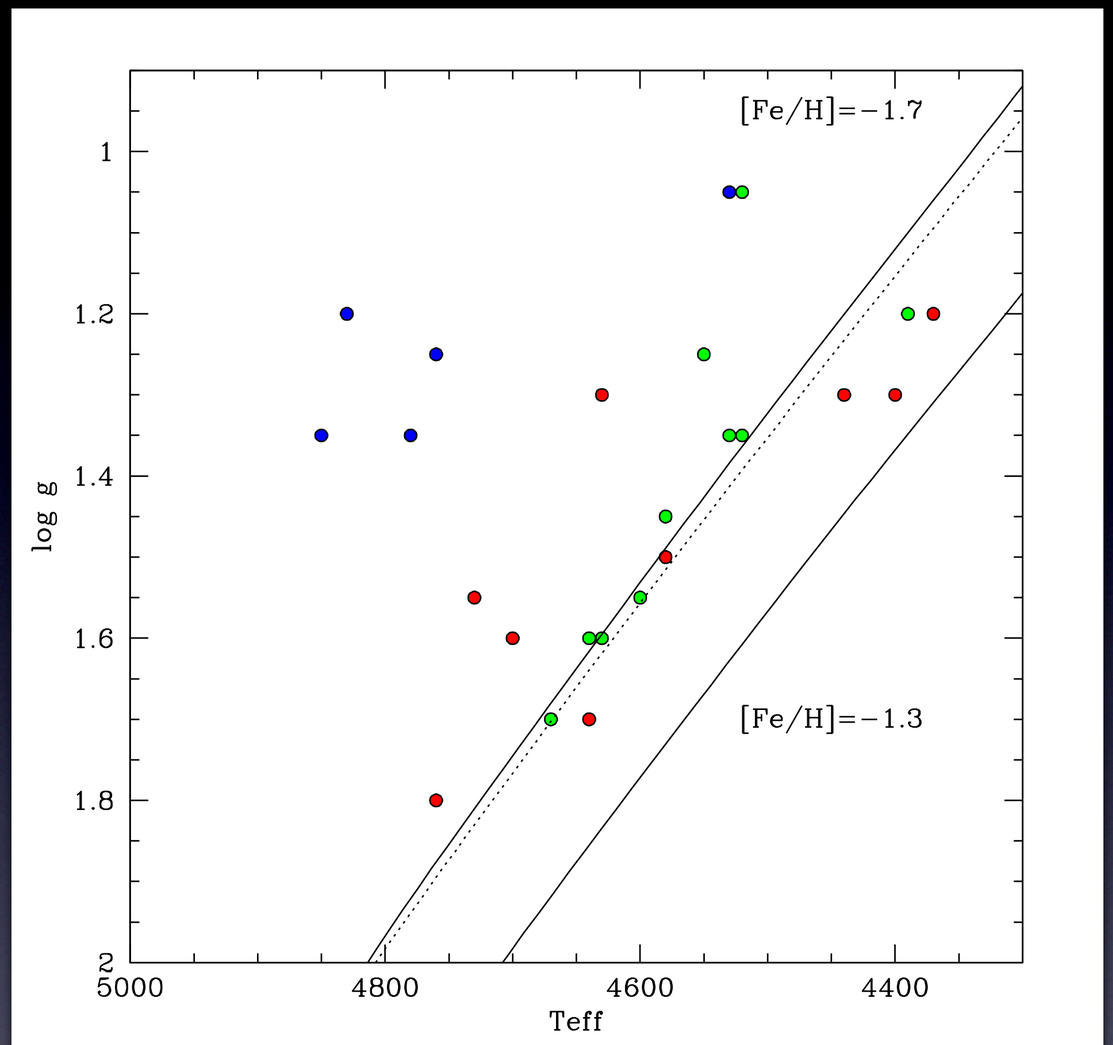
The Same

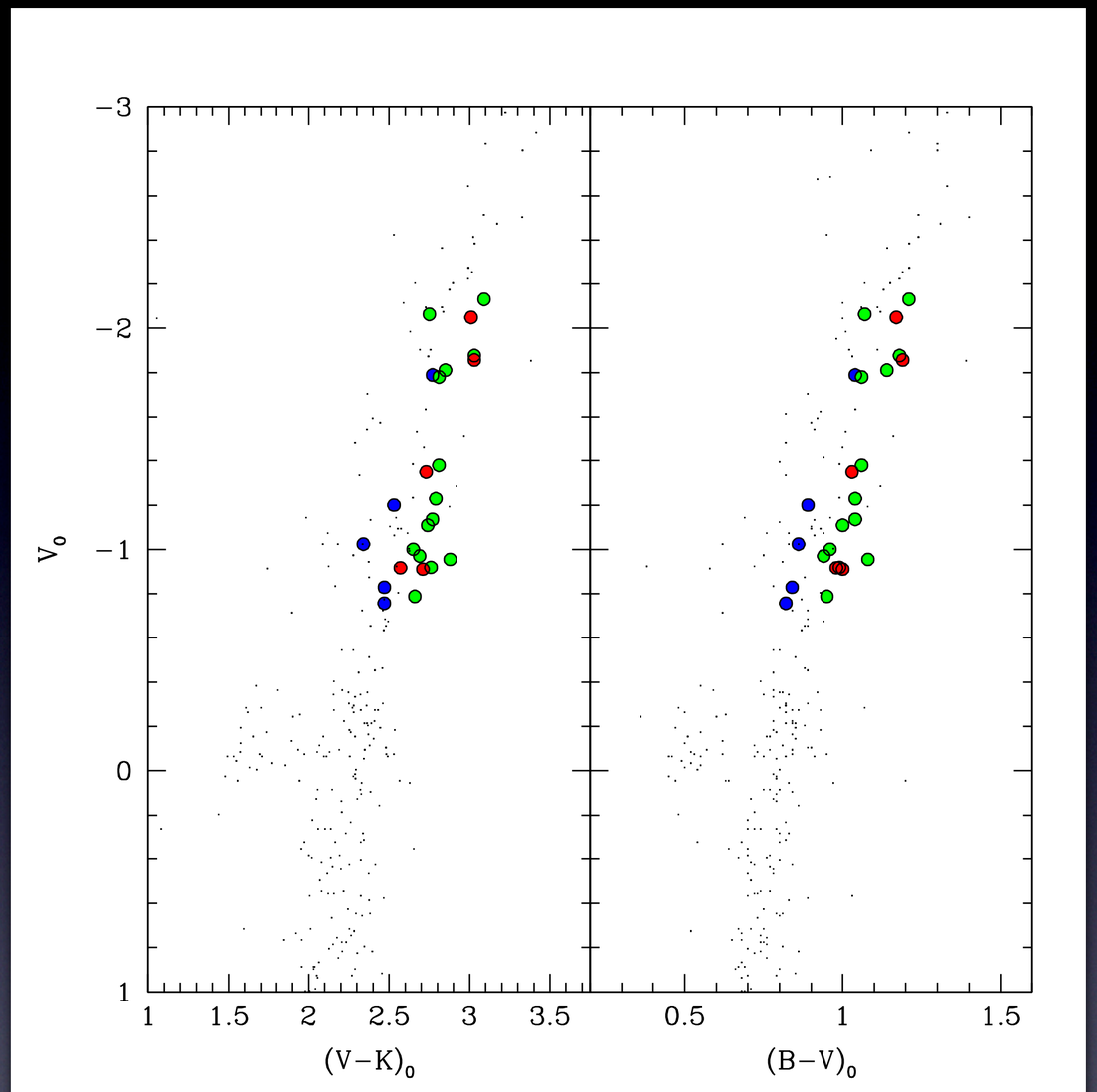


Same Teff, different [Fe/H]



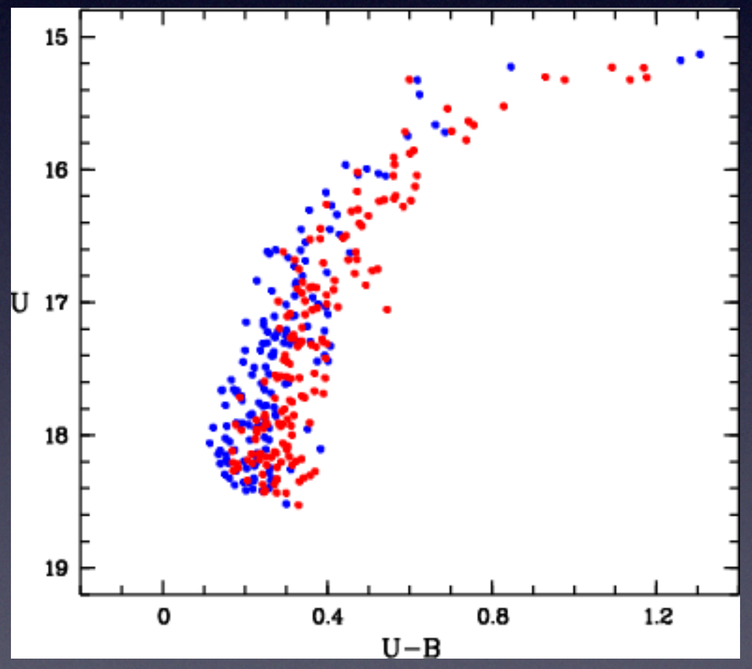


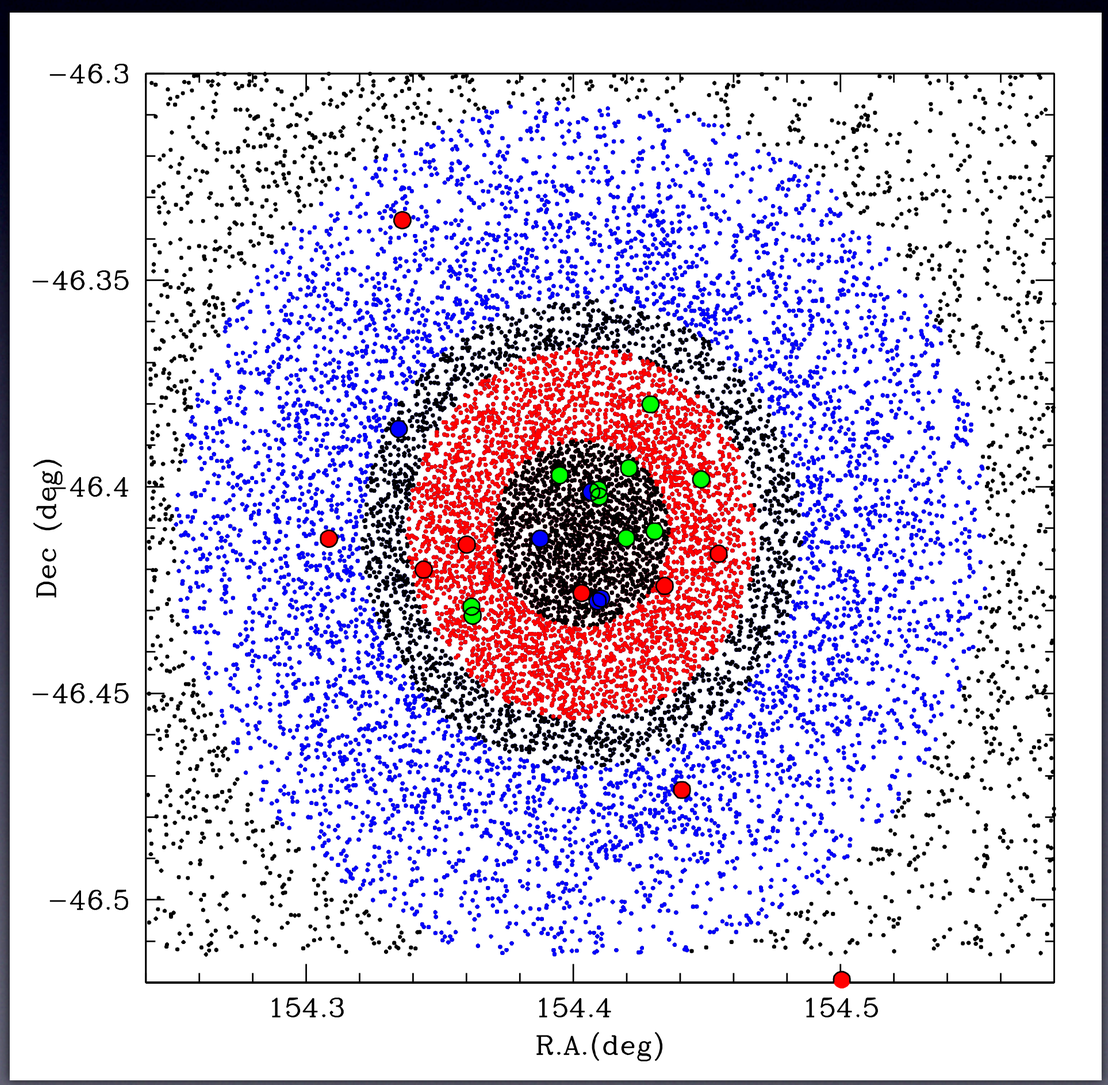




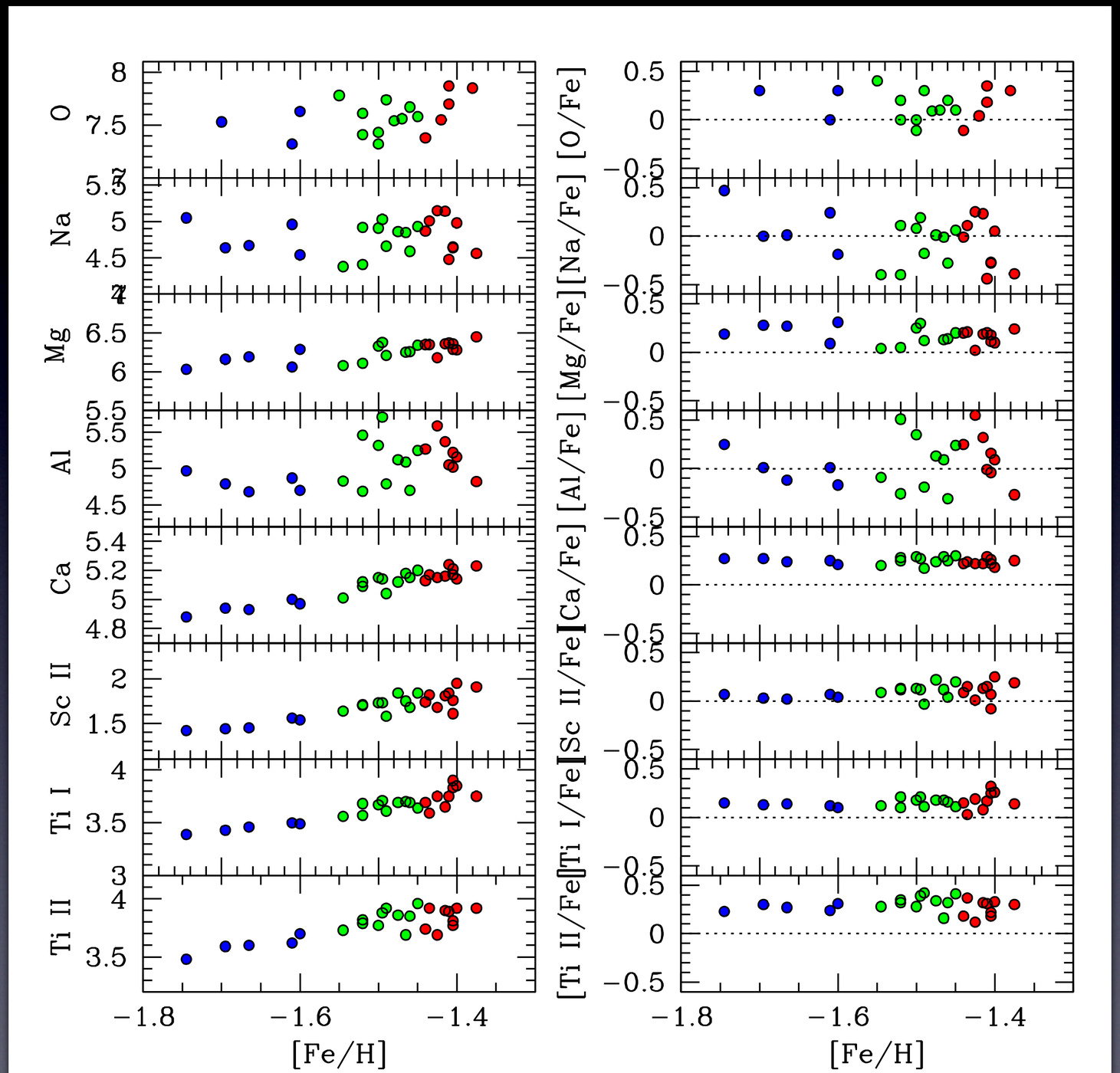
CMDs reassure us; everything lands where it should.
Altering model scales will not make the [Fe/H] variation go away!

Radial Variations? NO

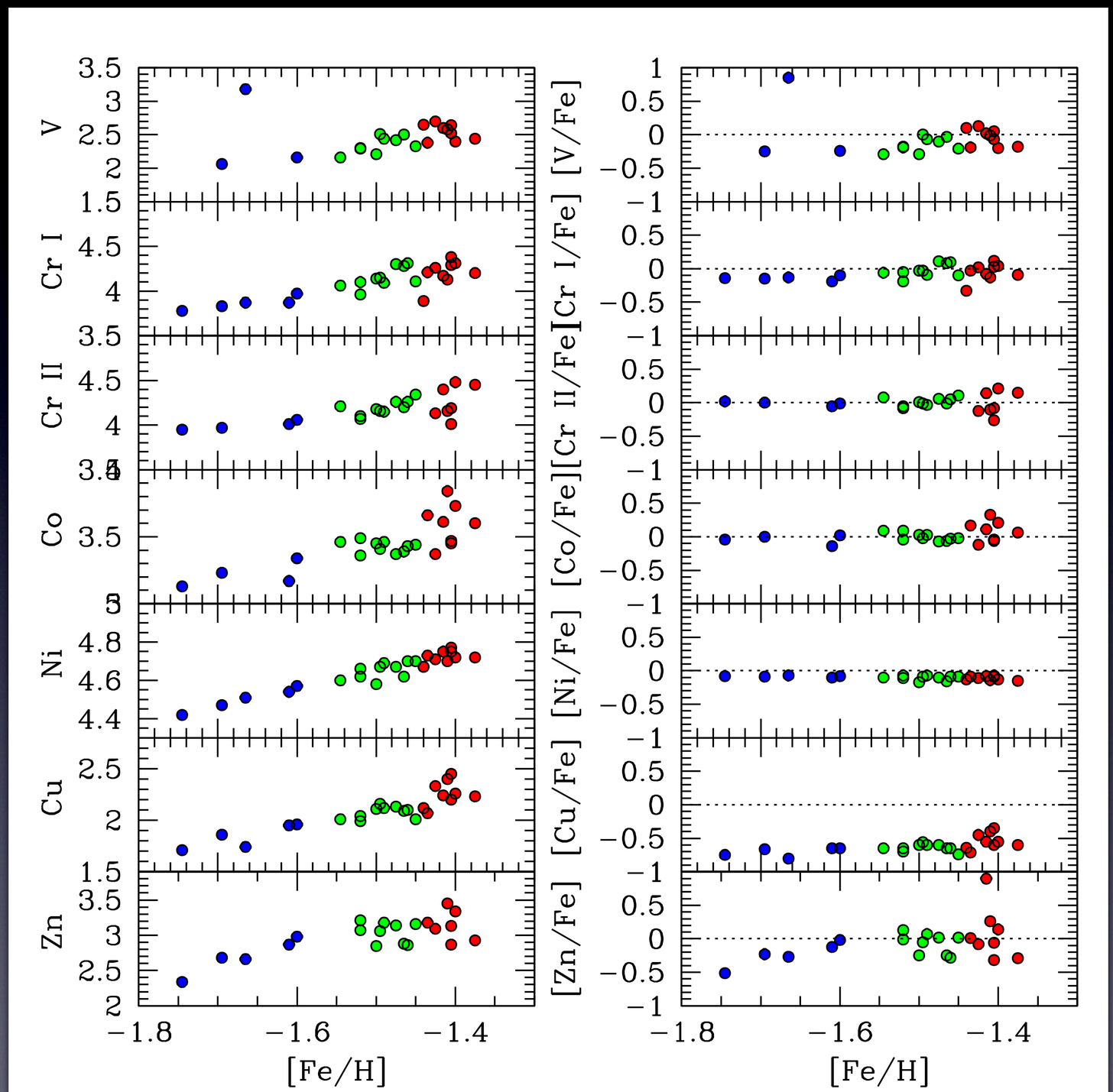




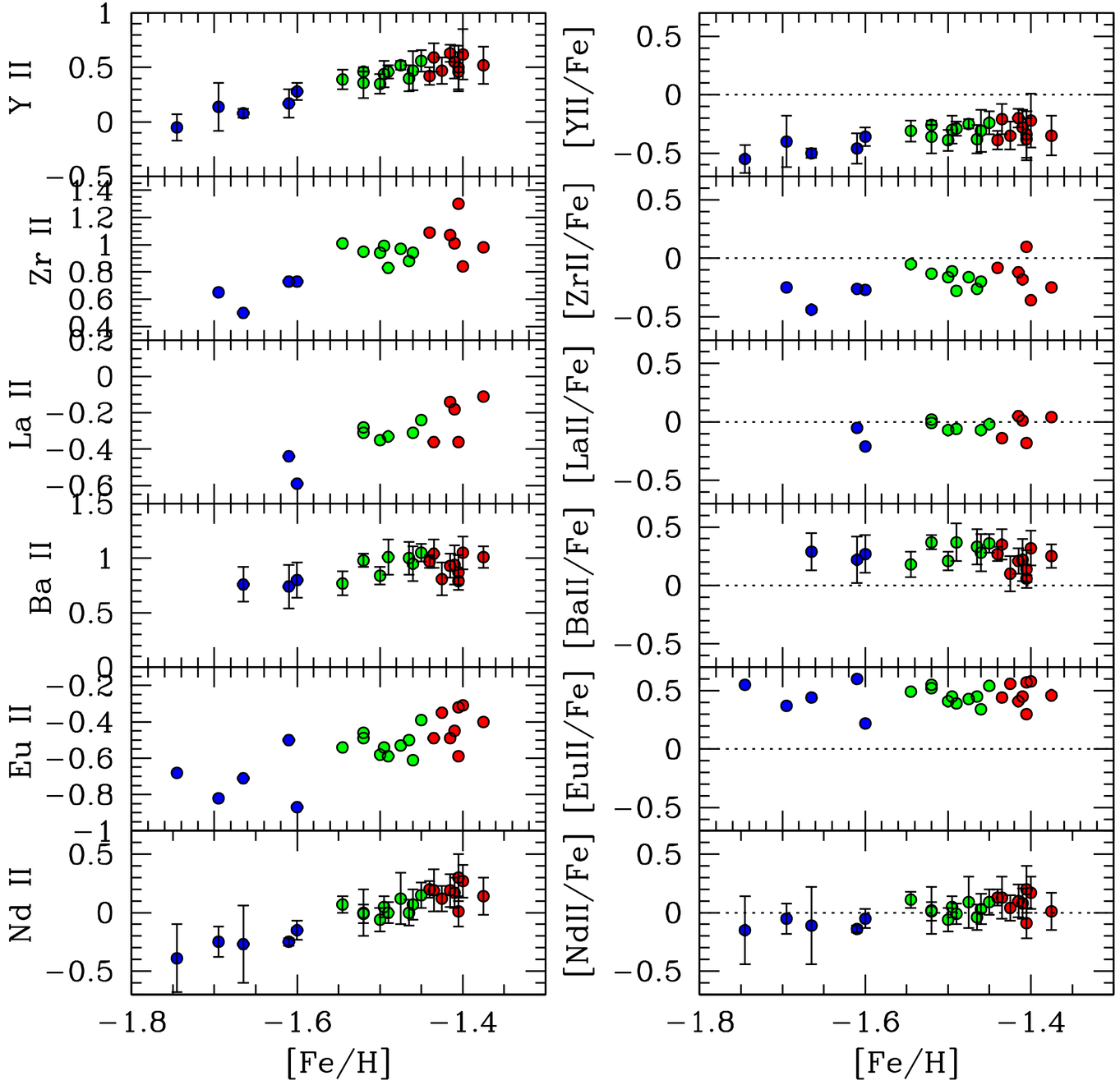
Kravtsov et al. 2010



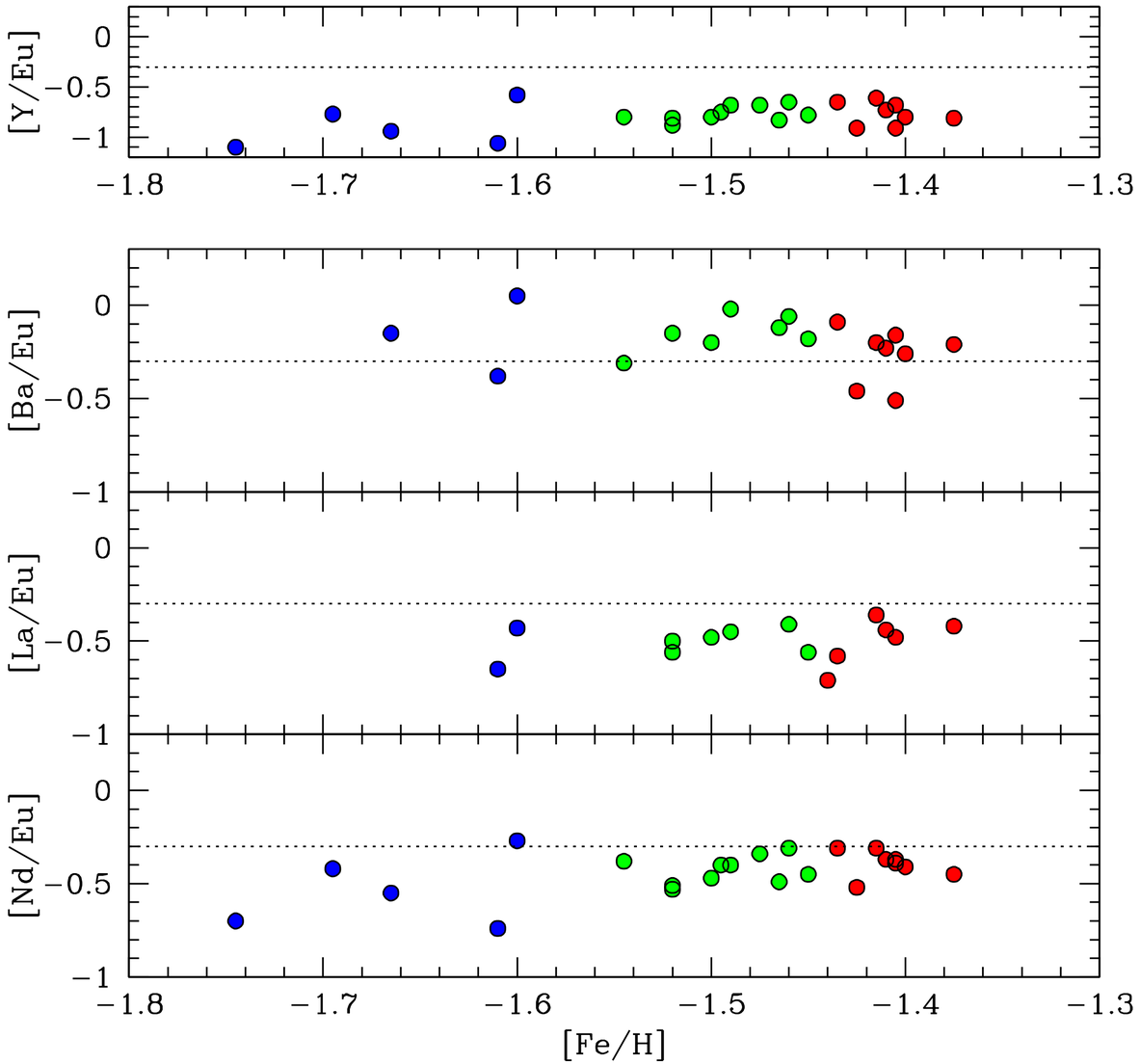
alpha-elements:
no evidence for
Fe-correlated
inhomogeneity



Fe-peak elements: no evidence for inhomogeneity

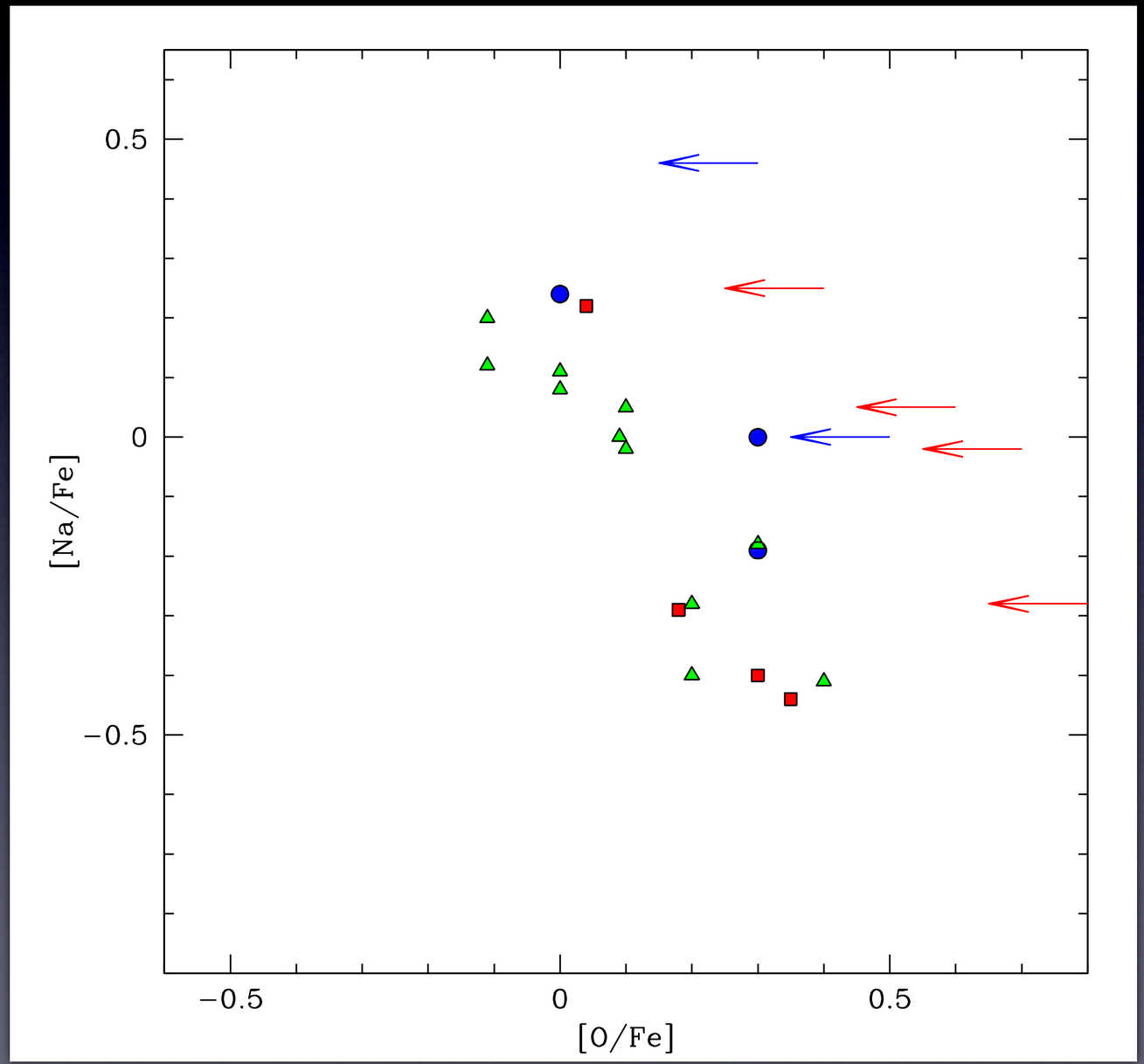


n-capture elements: no evidence for inhomogeneity

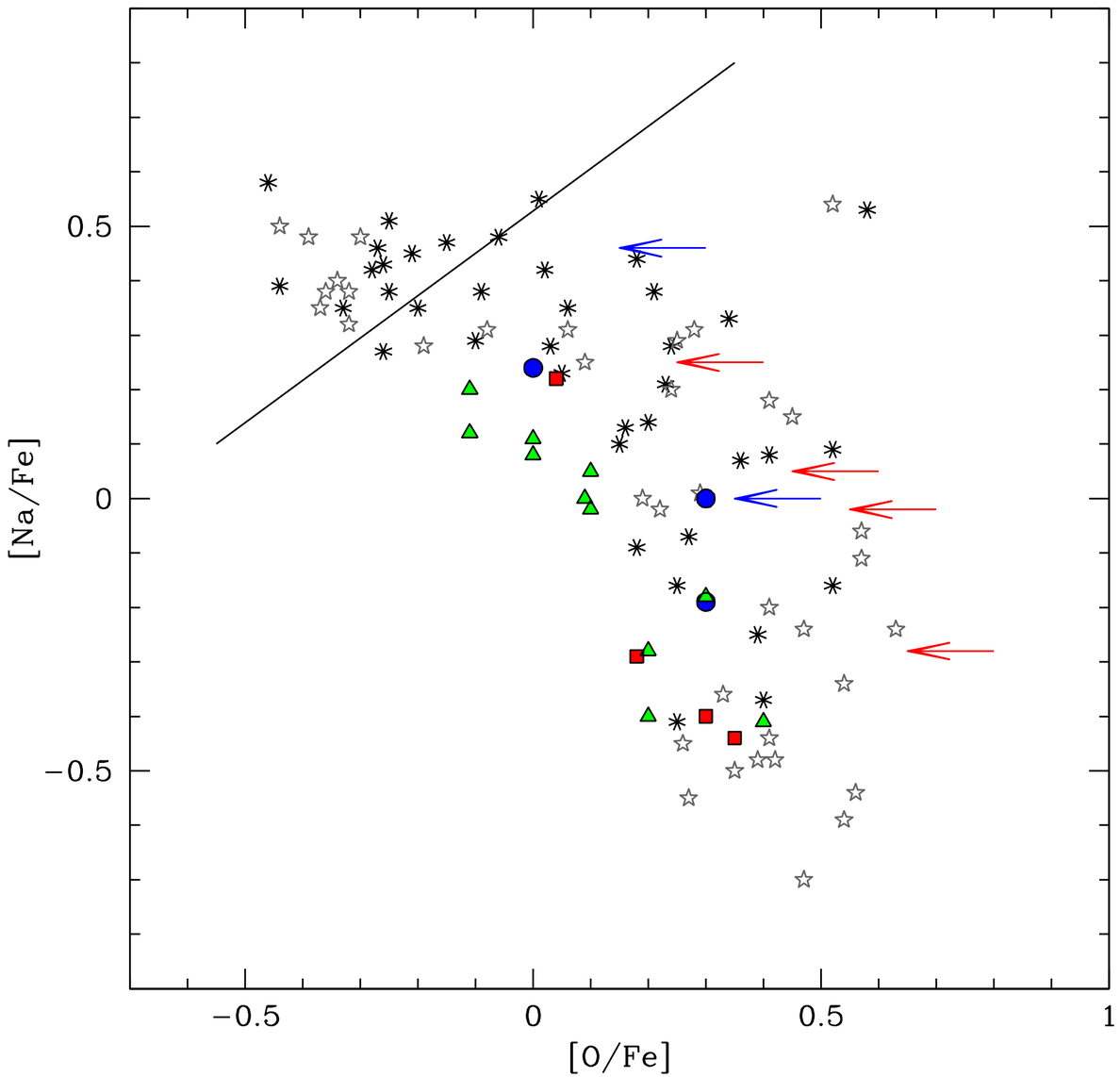


"s-rich" discriminant line implies that NGC 3201 has no s-enhanced population

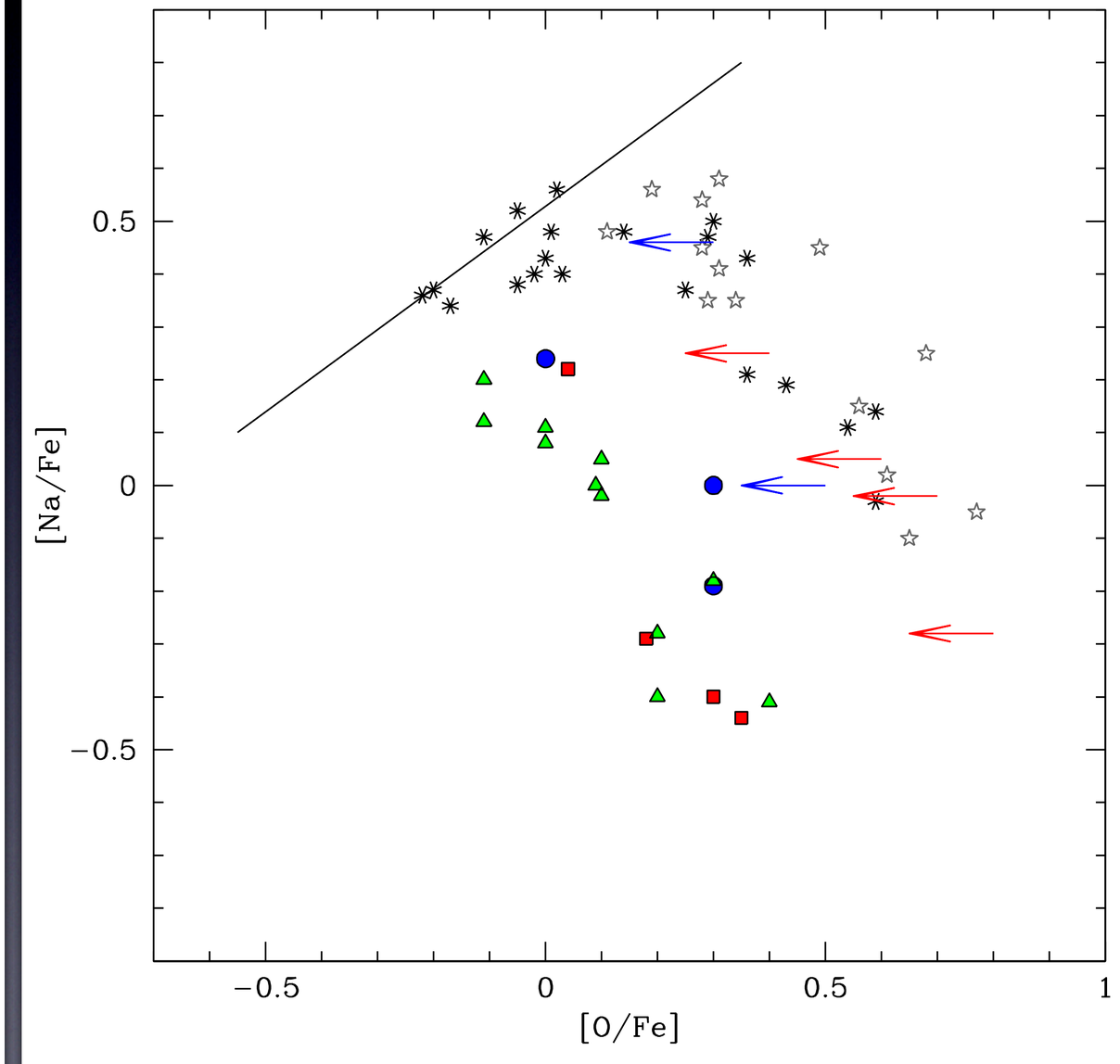
Na-O Anticorrelation



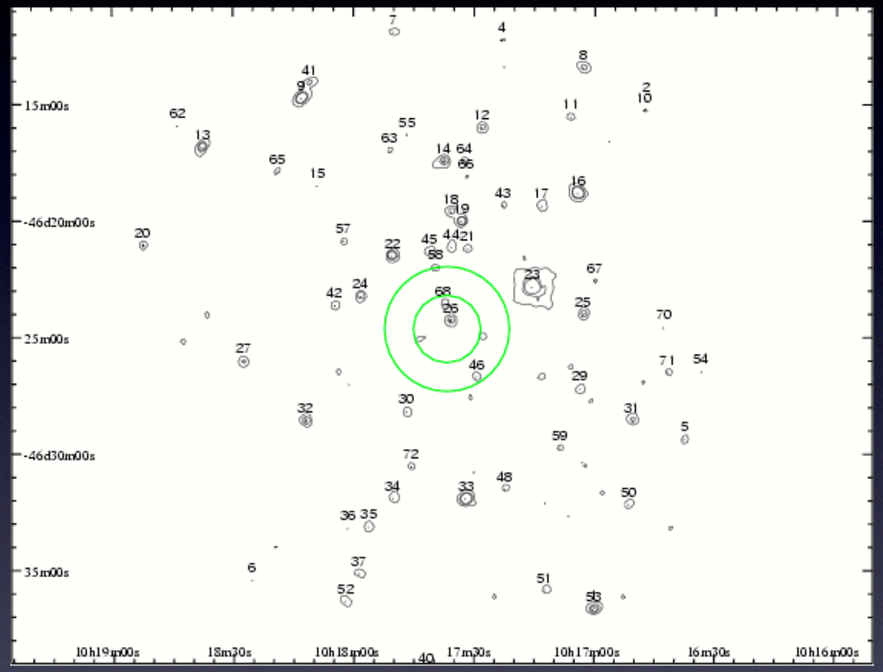
M 54
Carretta et al. 2010



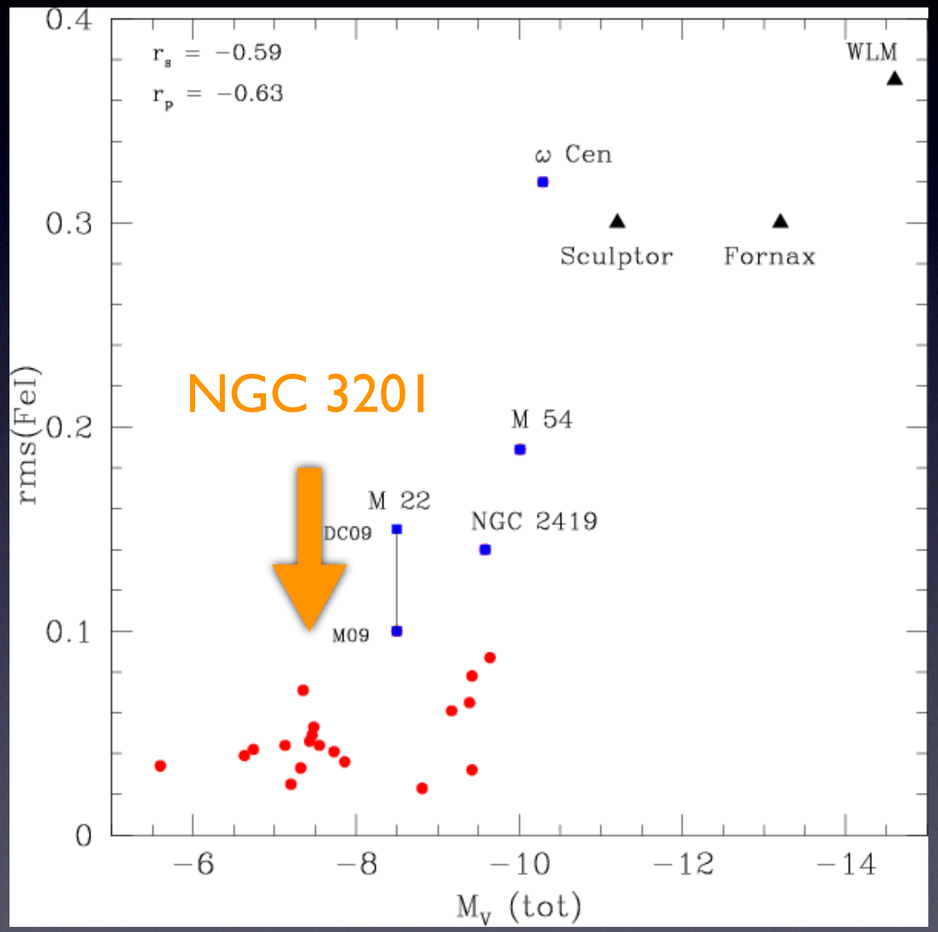
M 22
Marino et al. 2011



Picking on the Little Guy

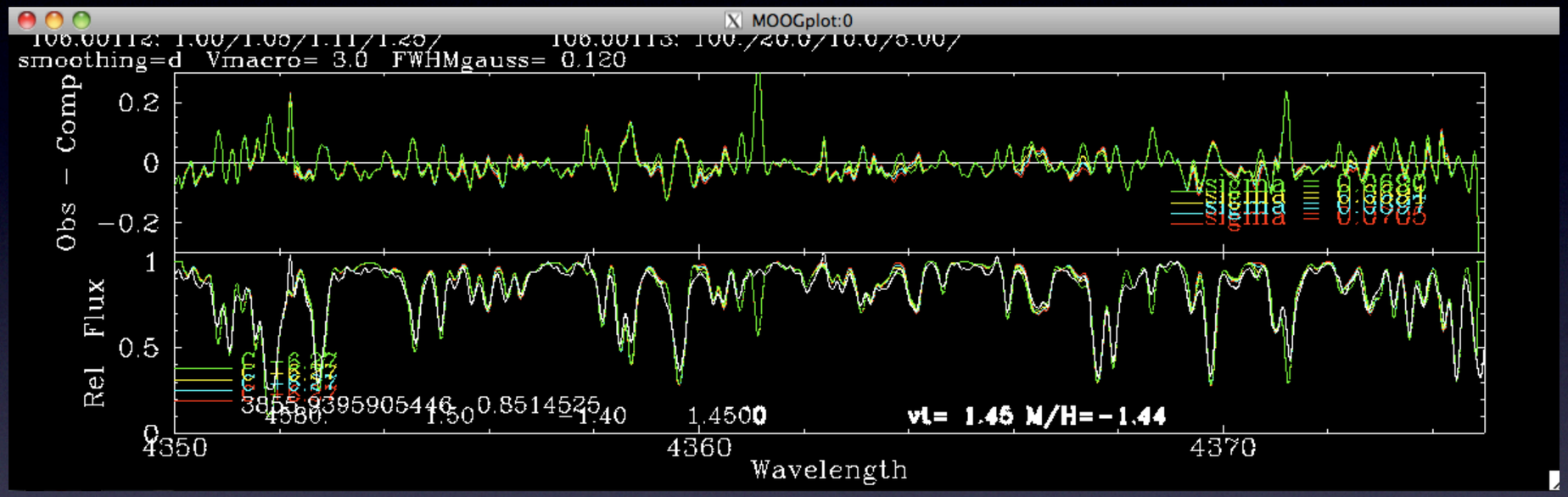


Webb et al. (1996)
of ~15 X-ray sources, few in the core?



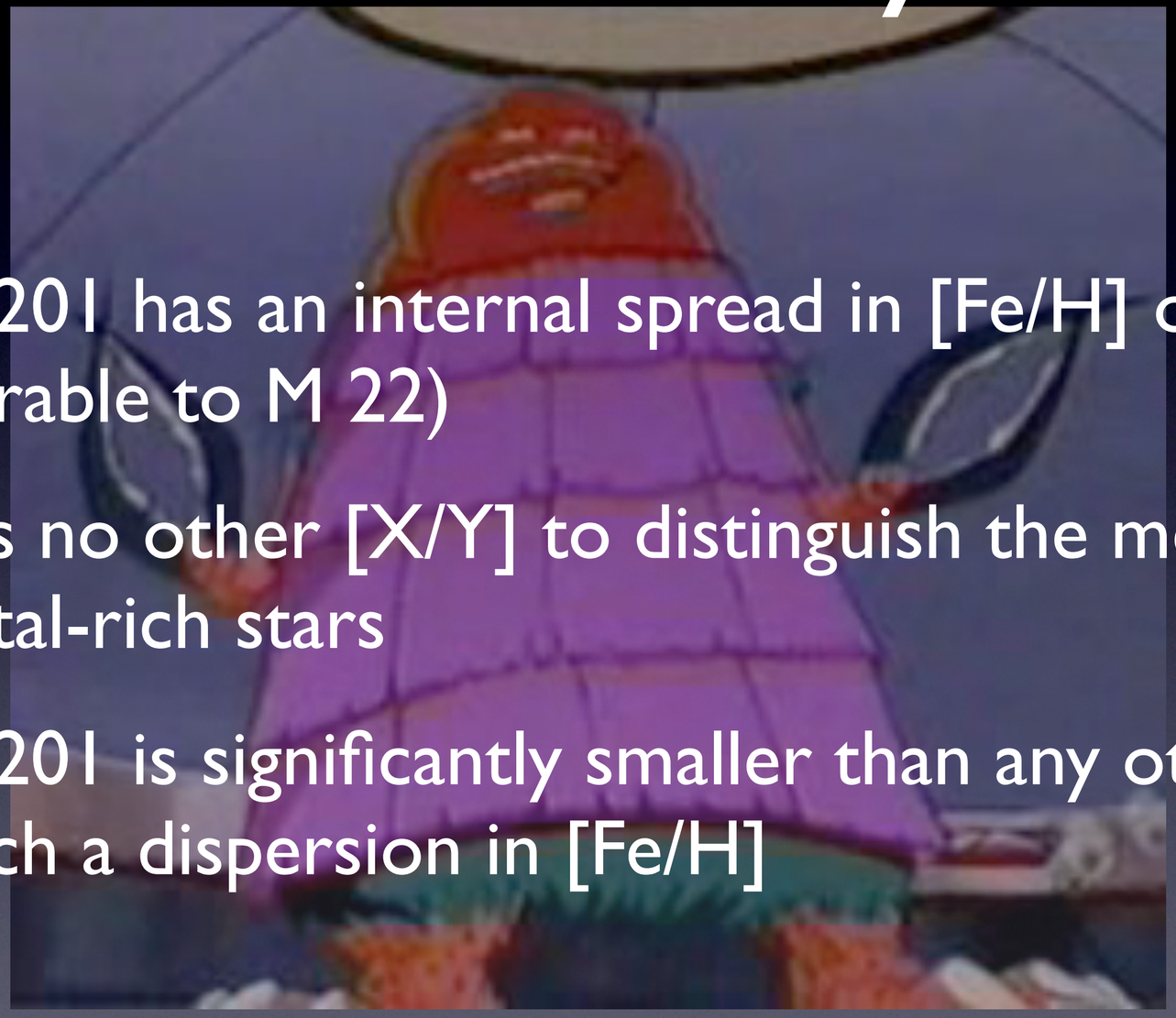
Carretta et al. (2010)

To Do:



We have 11 MIKE spectra from which we can get:
C, N, Pb, Th ...and friends

Summary



- NGC 3201 has an internal spread in [Fe/H] of ~0.4 dex (comparable to M 22)
- There is no other [X/Y] to distinguish the metal-poor and metal-rich stars
- NGC 3201 is significantly smaller than any other cluster with such a dispersion in [Fe/H]