



# Determining Ages of APOGEE Giants with Known Distances

Diane Feuillet (NMSU)

Jon Holtzman, Jo Bovy, Leo Girardi,  
The APOGEE Team

New Mexico Symposium

Socorro, NM

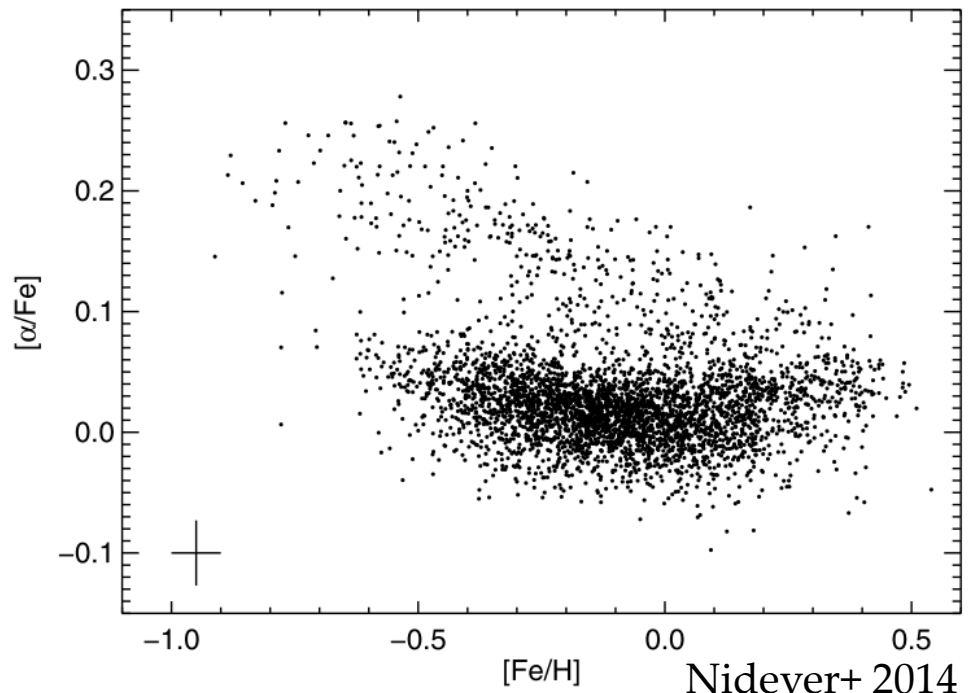
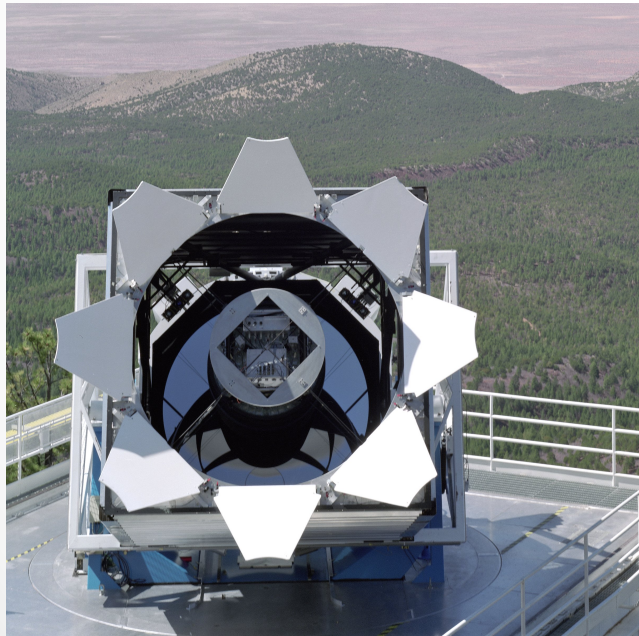
November 6, 2015



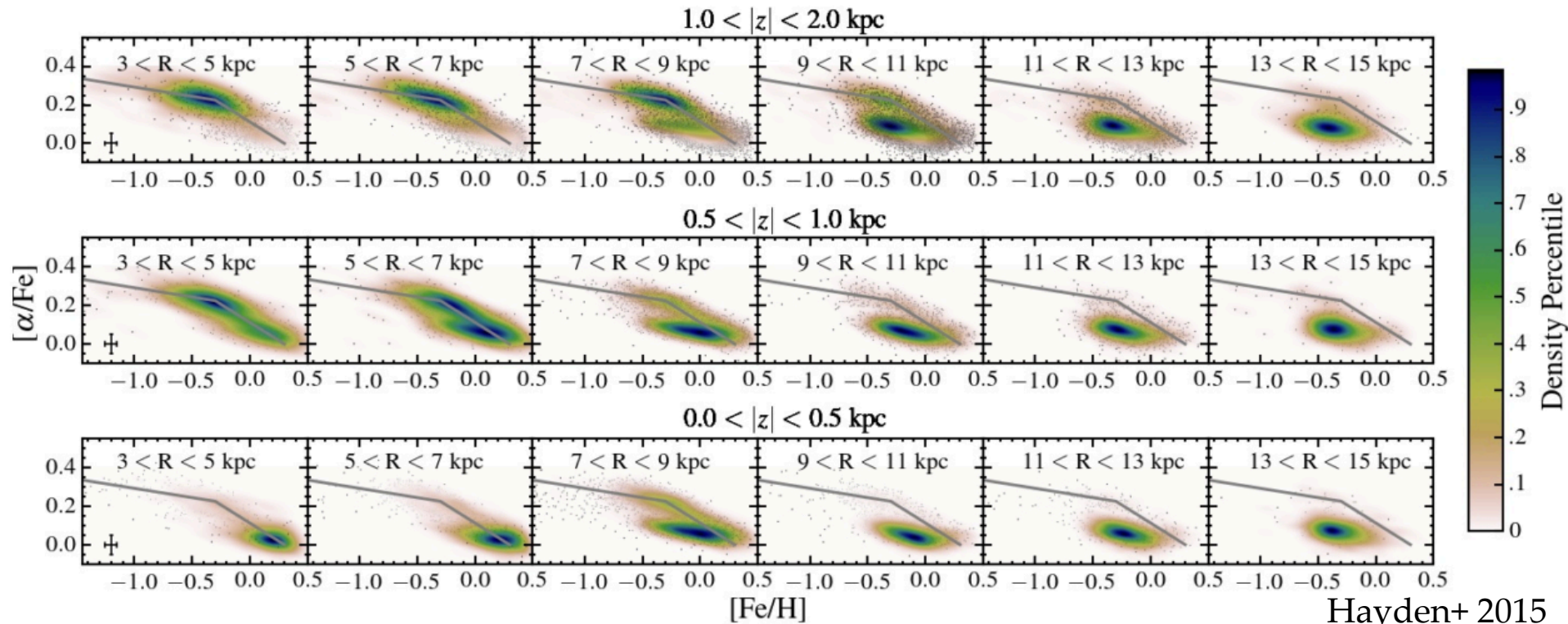
**SDSS**|||

# Apache Point Observatory Galactic Evolution Experiment

- Explore Galactic evolution through detailed chemical abundances
- High resolution near-IR spectrograph
- 130,000 red giants, ~400,000 in APOGEE-2

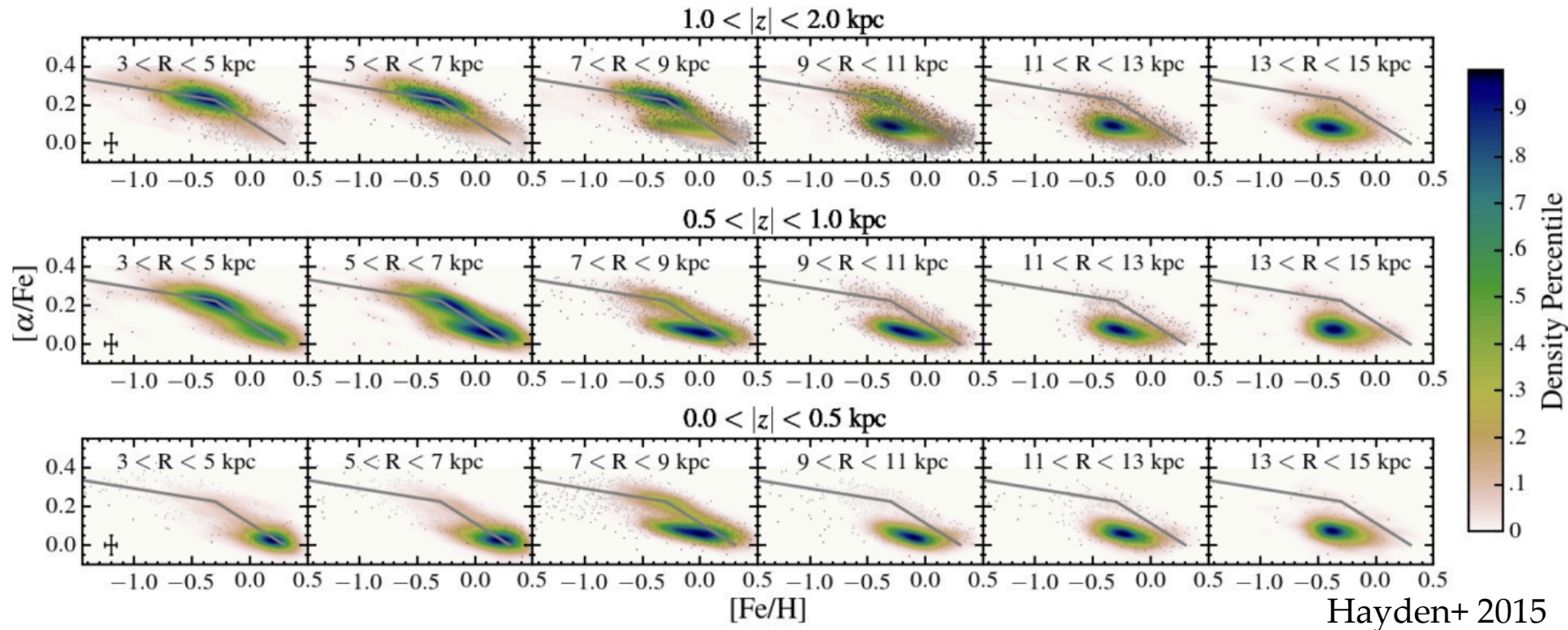


# Abundances Across the Disk



Hayden+ 2015

# Abundances Across the Disk

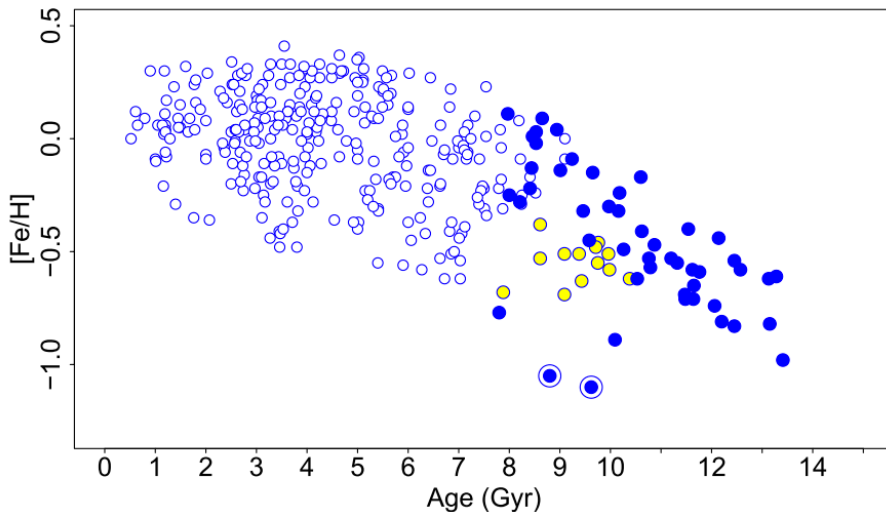
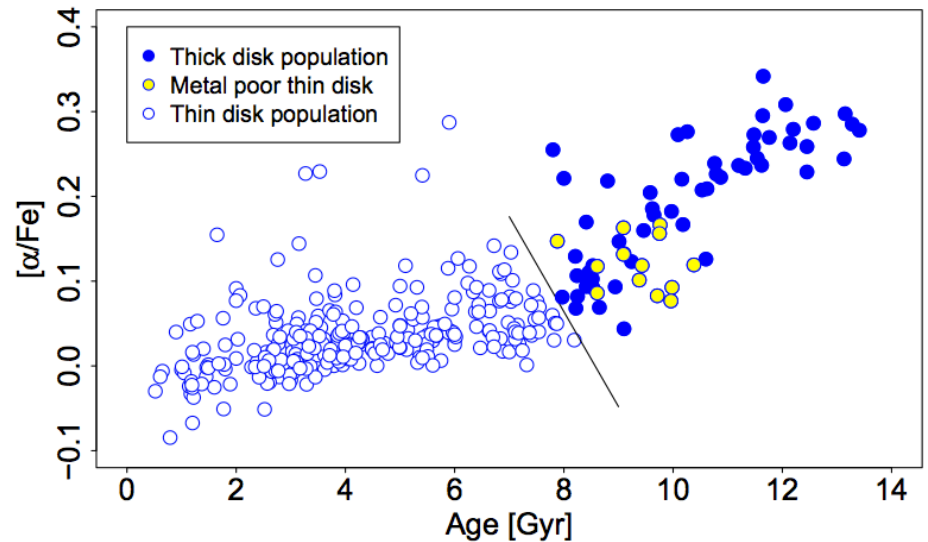
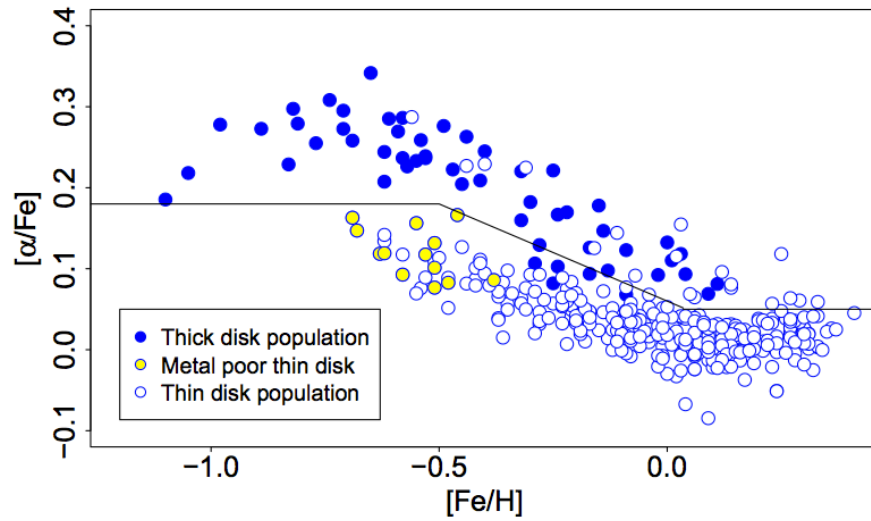


Hayden+ 2015

- Direct comparisons of different radial bins is difficult
- SFR, inflow, mixing, etc



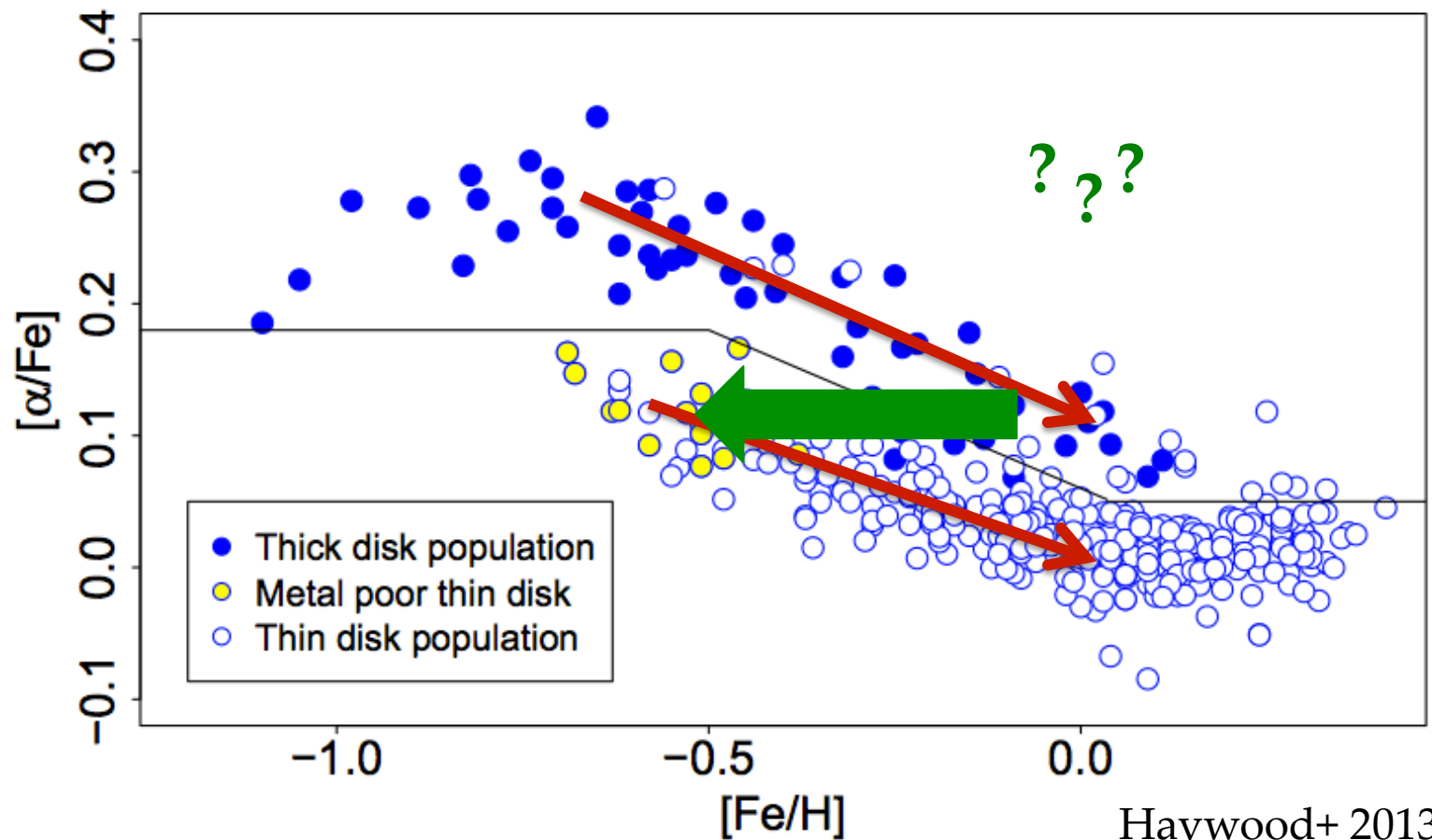
# Ages and Abundances



Haywood+ 2013

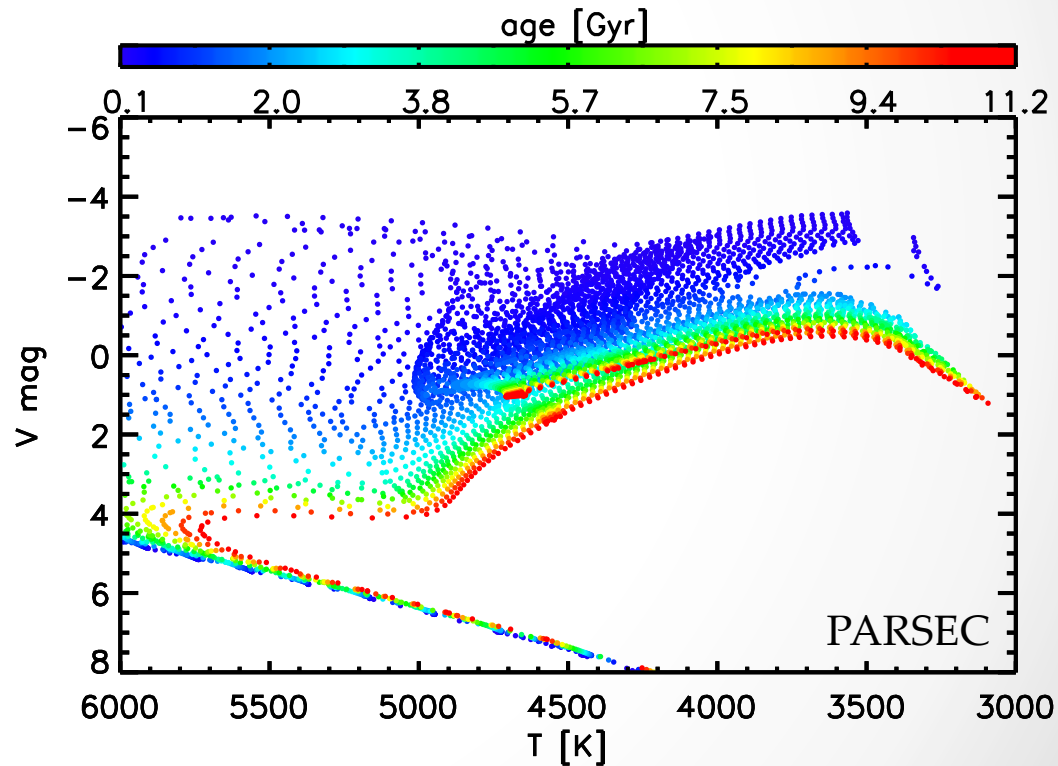
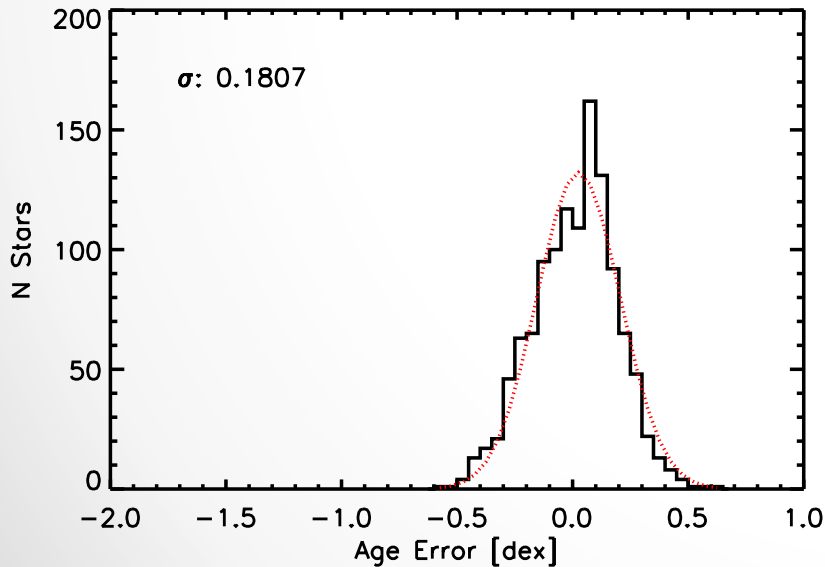
Age adds crucial evolutionary information and population identification

# Ages and Abundances



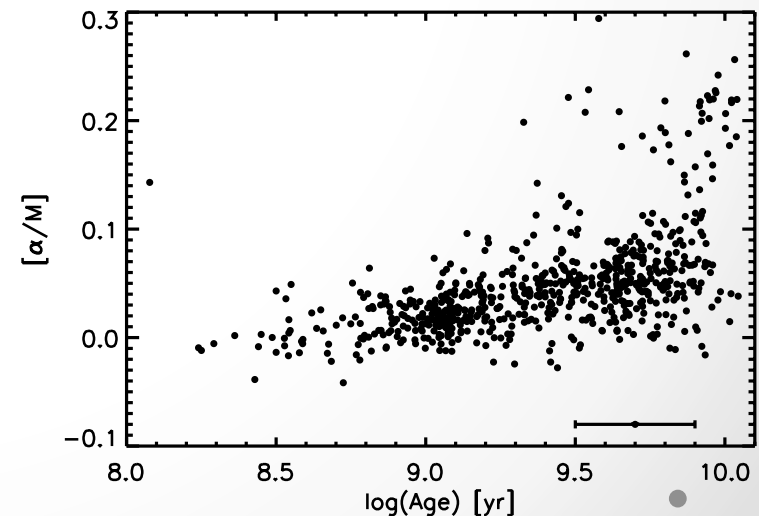
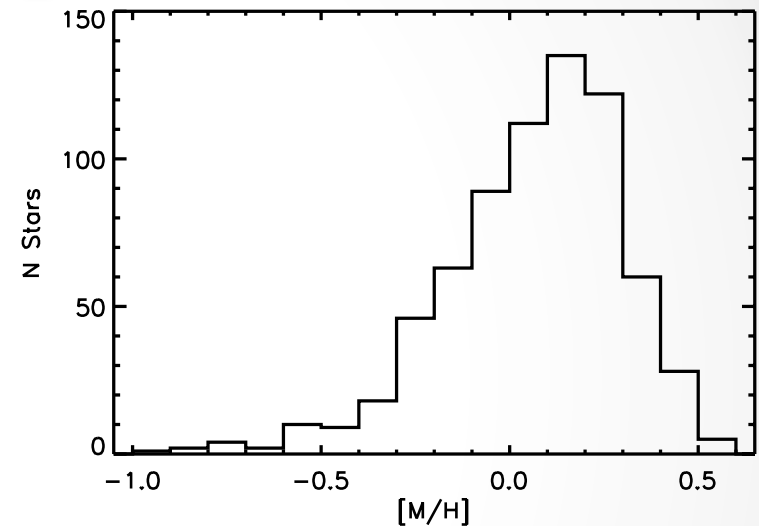
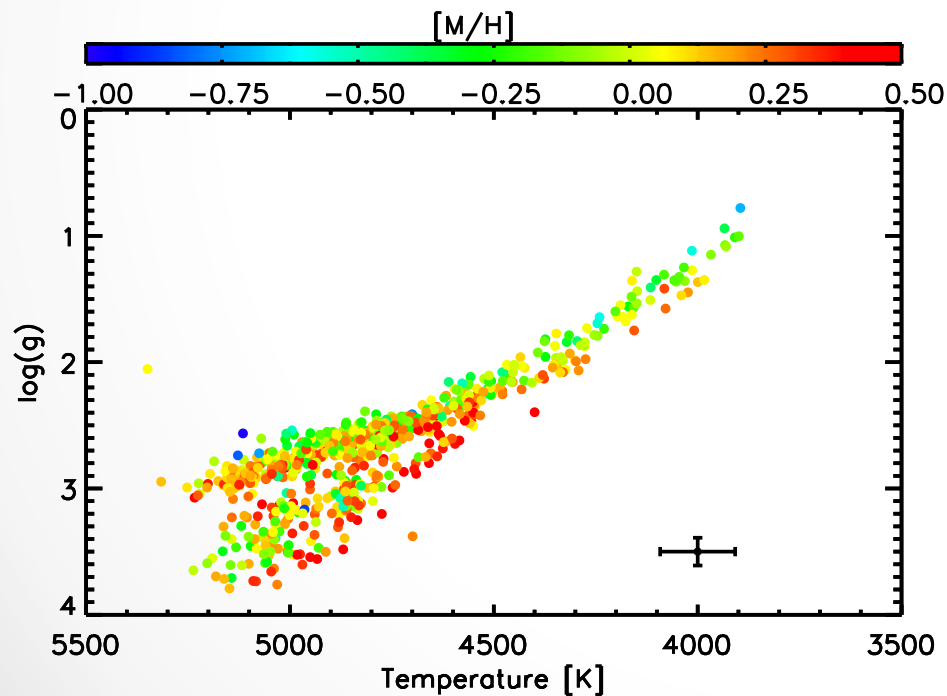
# Ages of Red Giants

- Need distance
- Bayesian isochrone matching
- Assume flat SFH



# Local Sample

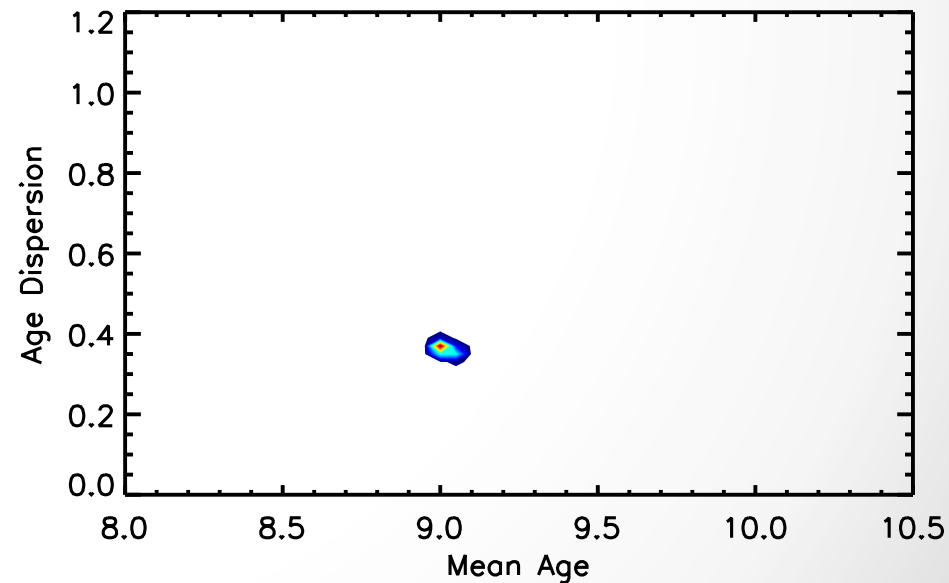
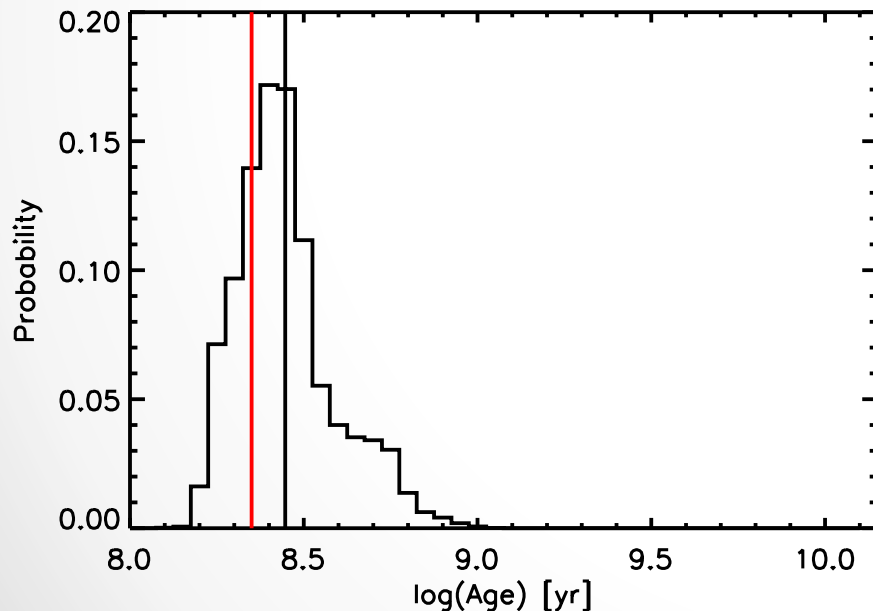
- 700 local giants within 400 pc
- Use Bayesian analysis to find ages





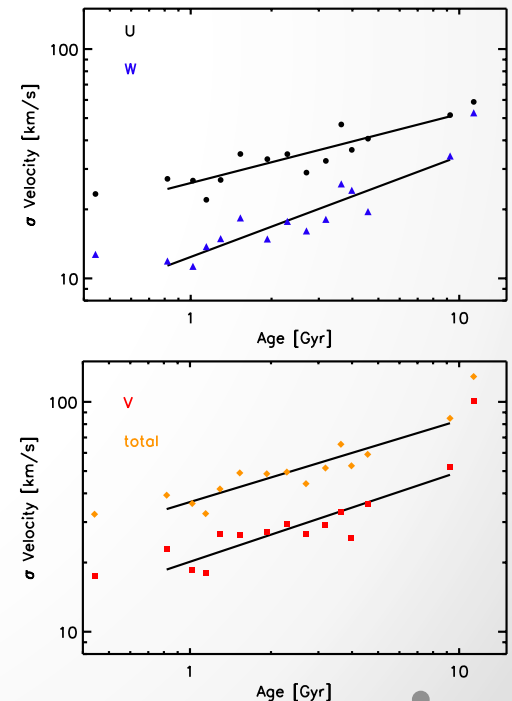
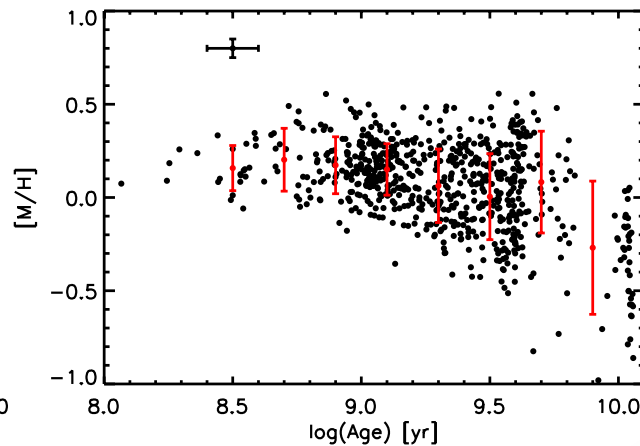
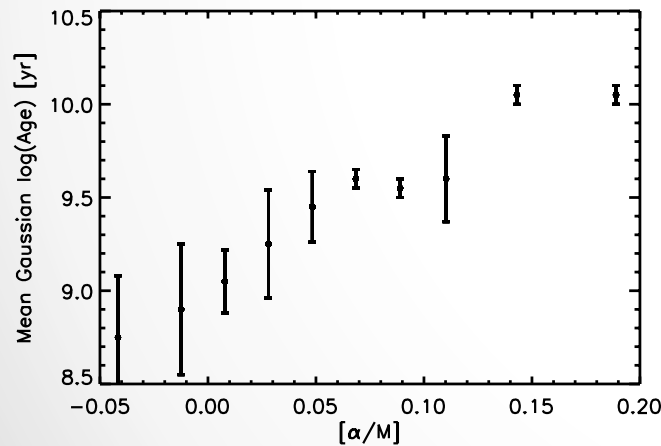
# Hierarchical Modeling

- Better prior on the SFH
- Use the full age PDF to constrain a model SFH
- $\alpha$ -dependent Gaussian SFH

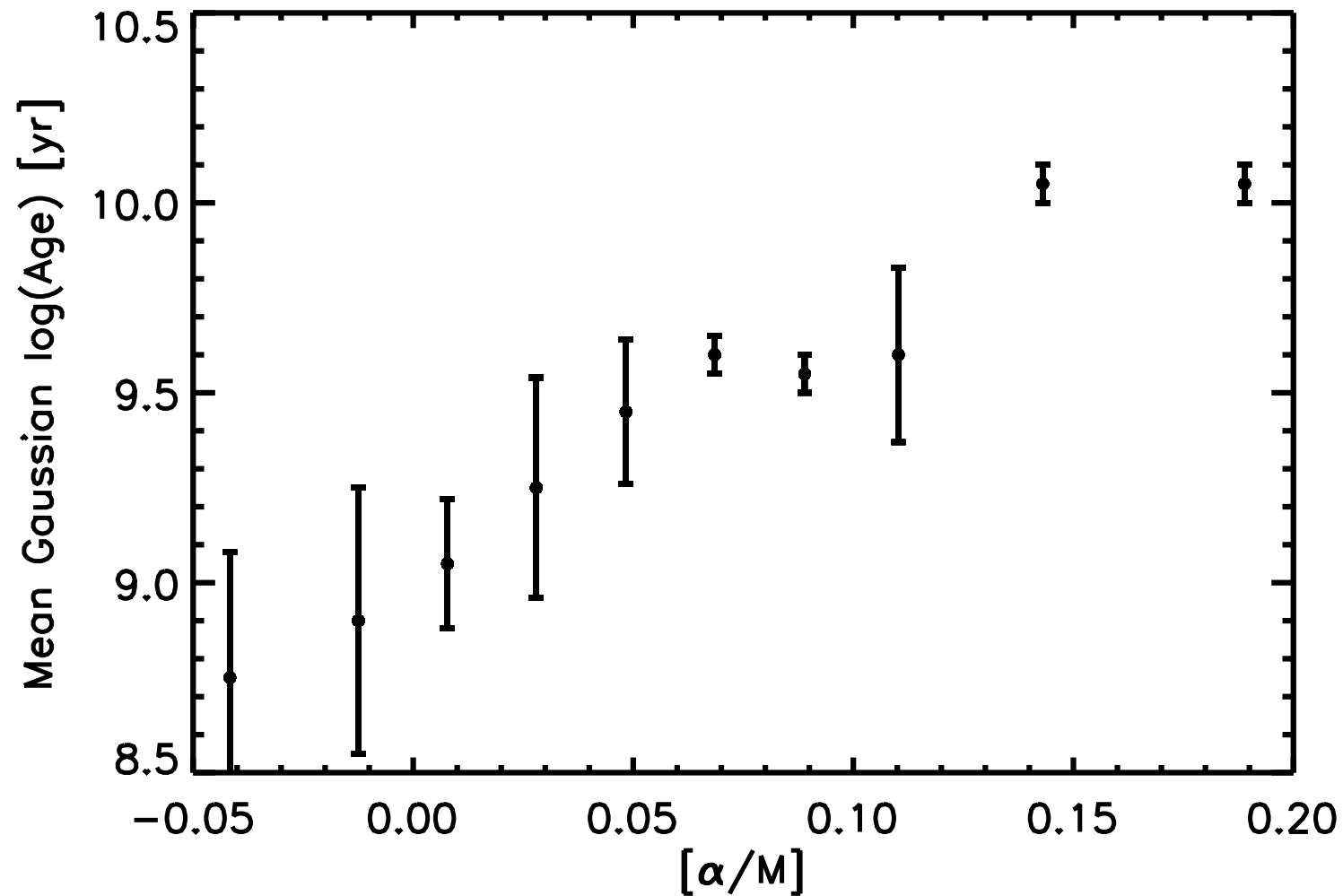


# Age Trends

- Strong relation between  $\alpha$  abundance and mean age of Gaussian model
- Age-metallicity relation consistent with other work
- Velocity dispersion consistent with GCS

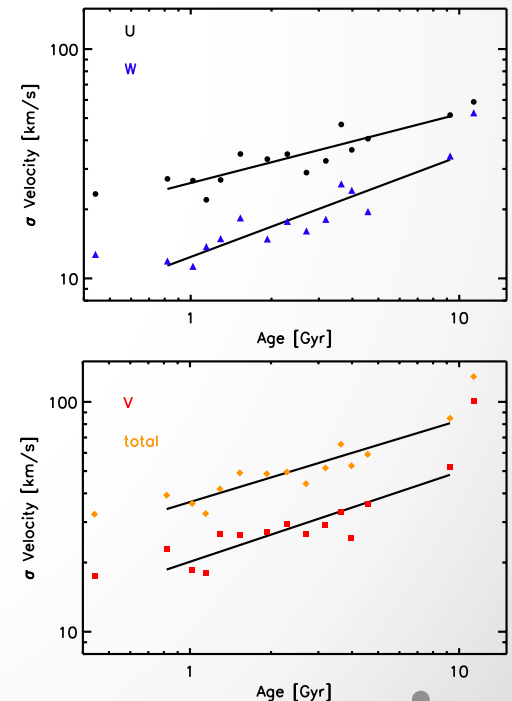
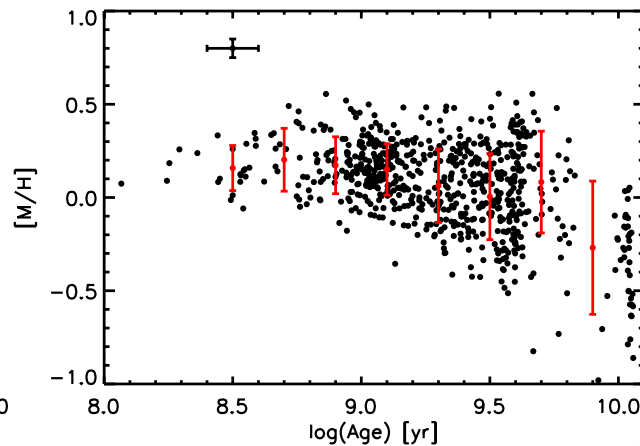
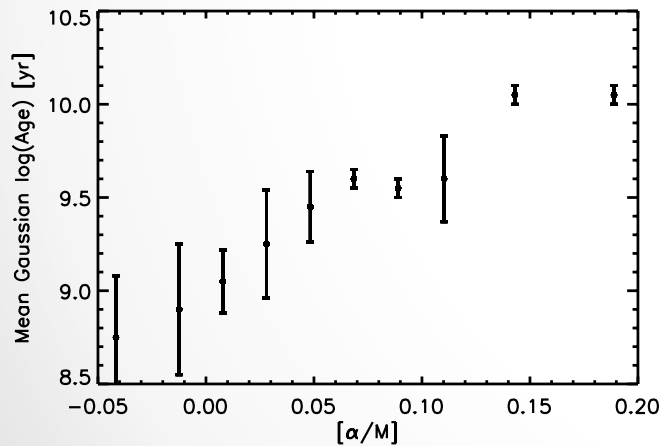


# Age Trends



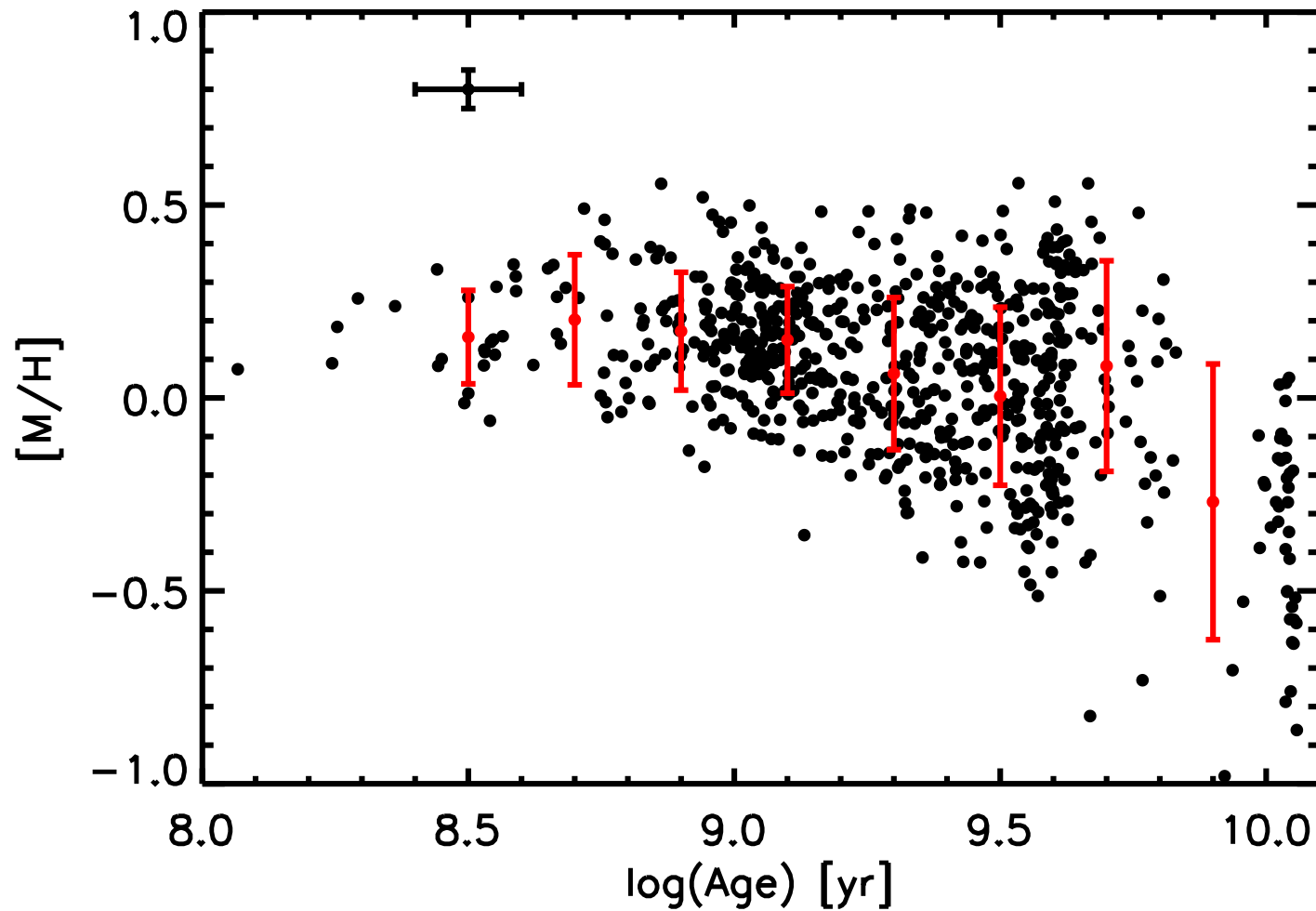
# Age Trends

- Strong relation between  $\alpha$  abundance and mean age of Gaussian model
- Age-metallicity relation consistent with other work
- Velocity dispersion consistent with GCS



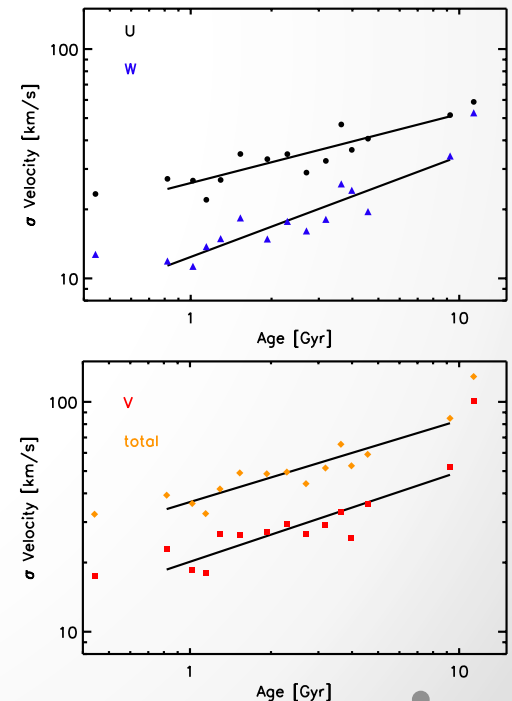
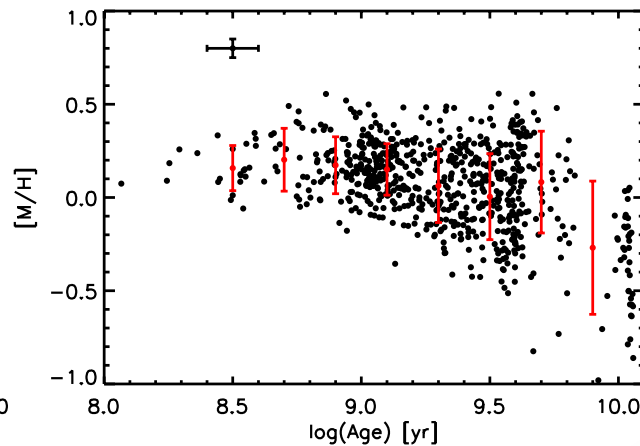
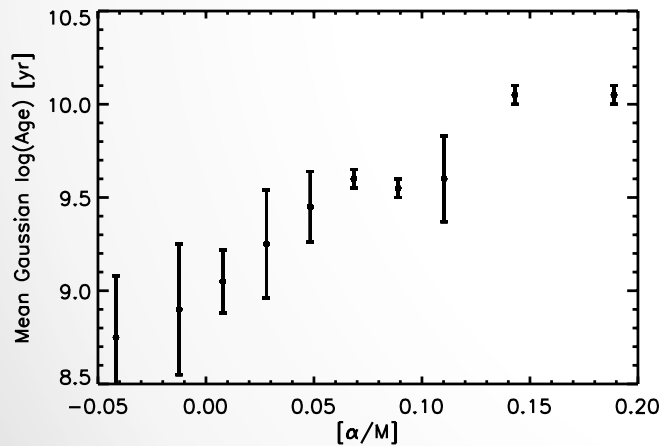


# Age Trends

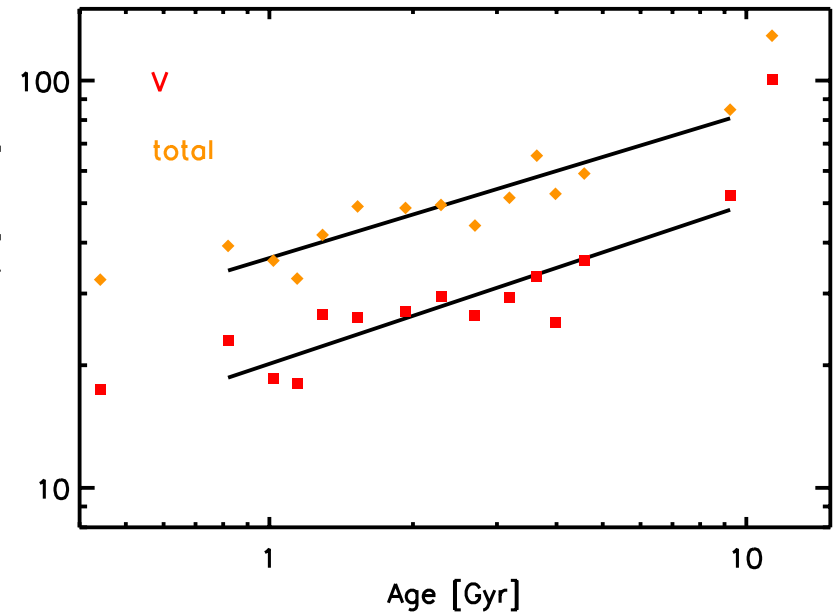
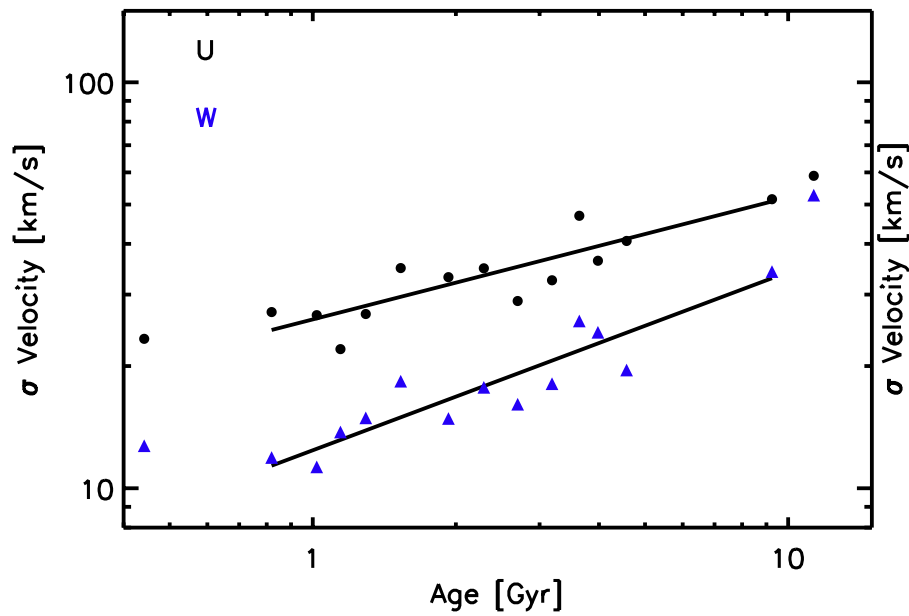


# Age Trends

- Strong relation between  $\alpha$  abundance and mean age of Gaussian model
- Age-metallicity relation consistent with other work
- Velocity dispersion consistent with GCS



# Age Trends



# Future Work

- Use monoabundance subsamples
- Apply to RC sample
- Apply to full APOGEE sample with Gaia distances



## Future Work

- Use monoabundance subsamples
- Apply to RC sample
- Apply to full APOGEE sample with Gaia distances

# QUESTIONS?