

H. Maness, CfAO Spring Retreat, Mar 2007

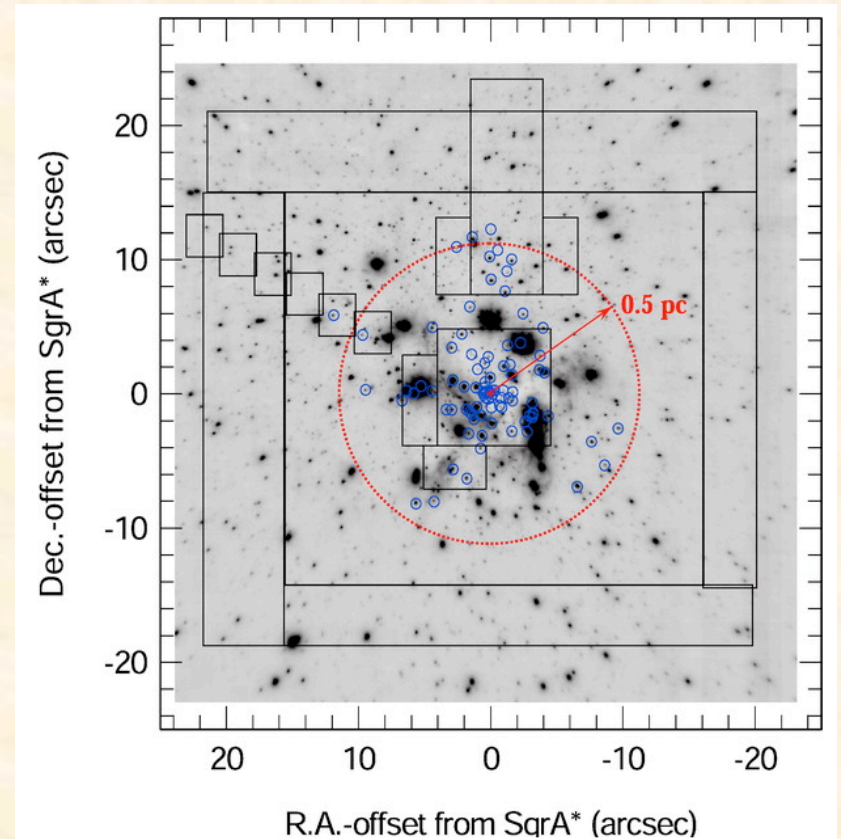
The Star Formation History of the Galactic Center



Holly Maness (Berkeley), F. Martins, S. Trippe, R. Genzel,
J. R. Graham, C. Sheehy, M. Salaris, A. Sternberg, S. Gillessen,
T. Alexander, T. Paumard, T. Ott, R. Abuter, F. Eisenhauer

Background

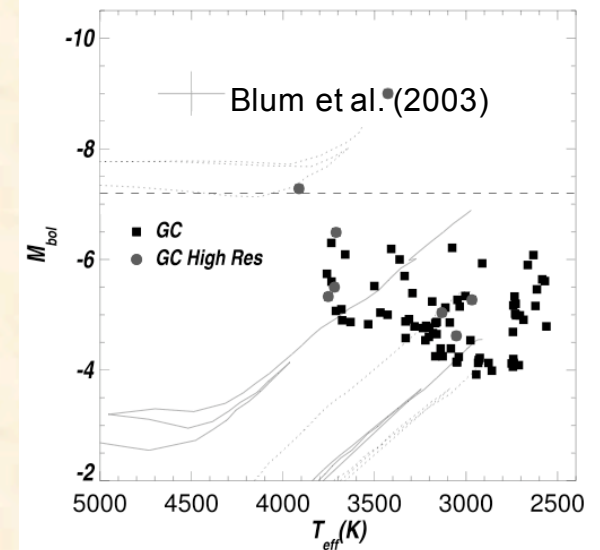
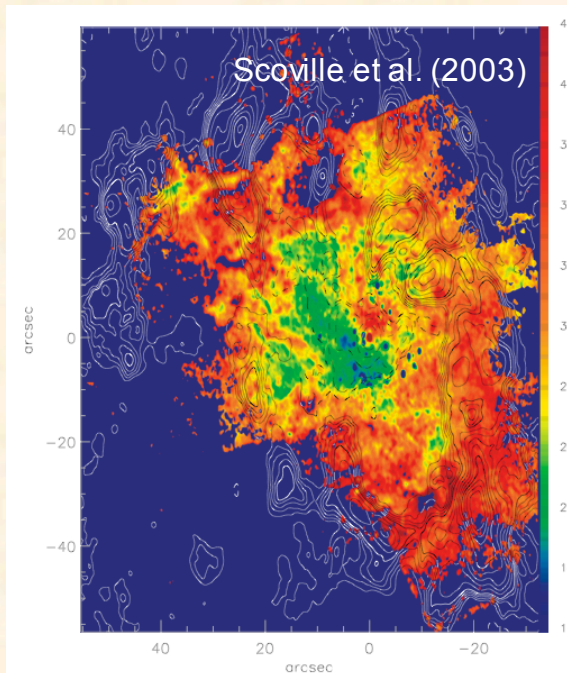
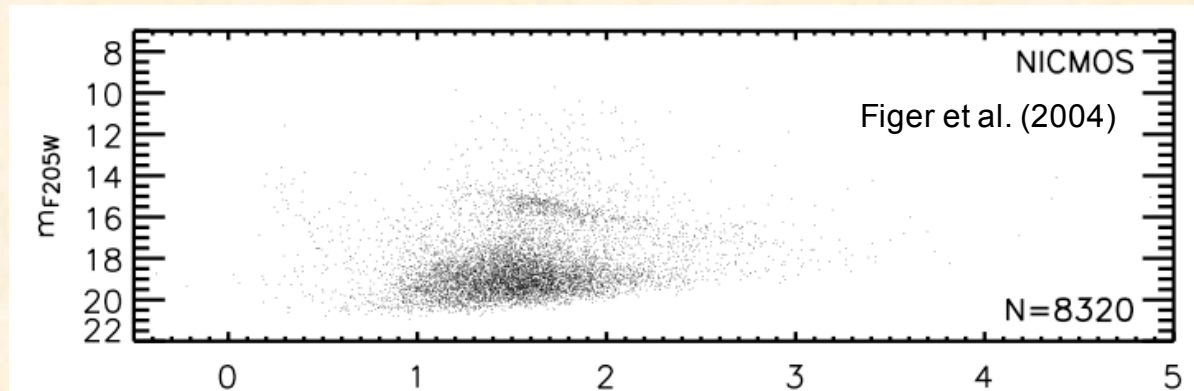
- Massive star formation occurred at or near the Galactic Center within the last few million years.
- This is a surprising result.
- Are we witnessing a special time in the Galactic Center's history?
- When did the bulk of stars in the central parsecs form?



Paumard et al. (2006)

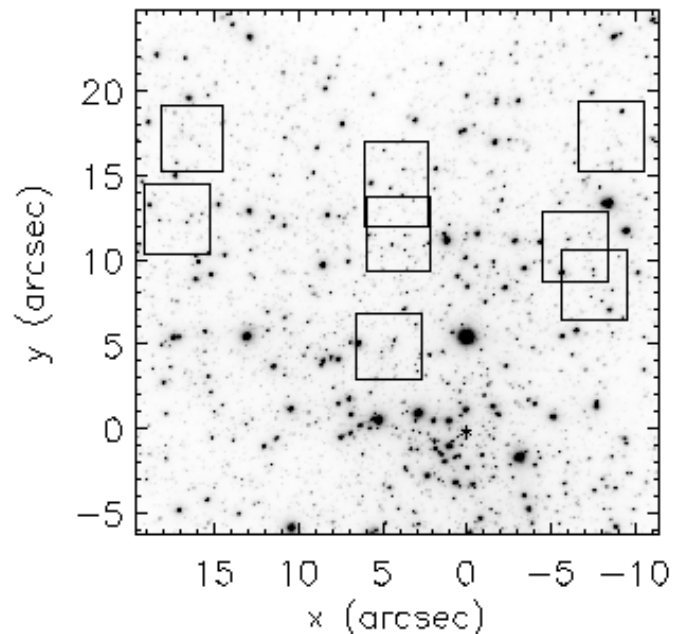
Background

- Detailed star formation history requires spectroscopy, due to large scatter in extinction and intrinsic variation in giant colors
- Blum et al. (2003) spectroscopically classified 79 giants and supergiants (50% complete at $K \sim 10$ mag) in central 5 pc

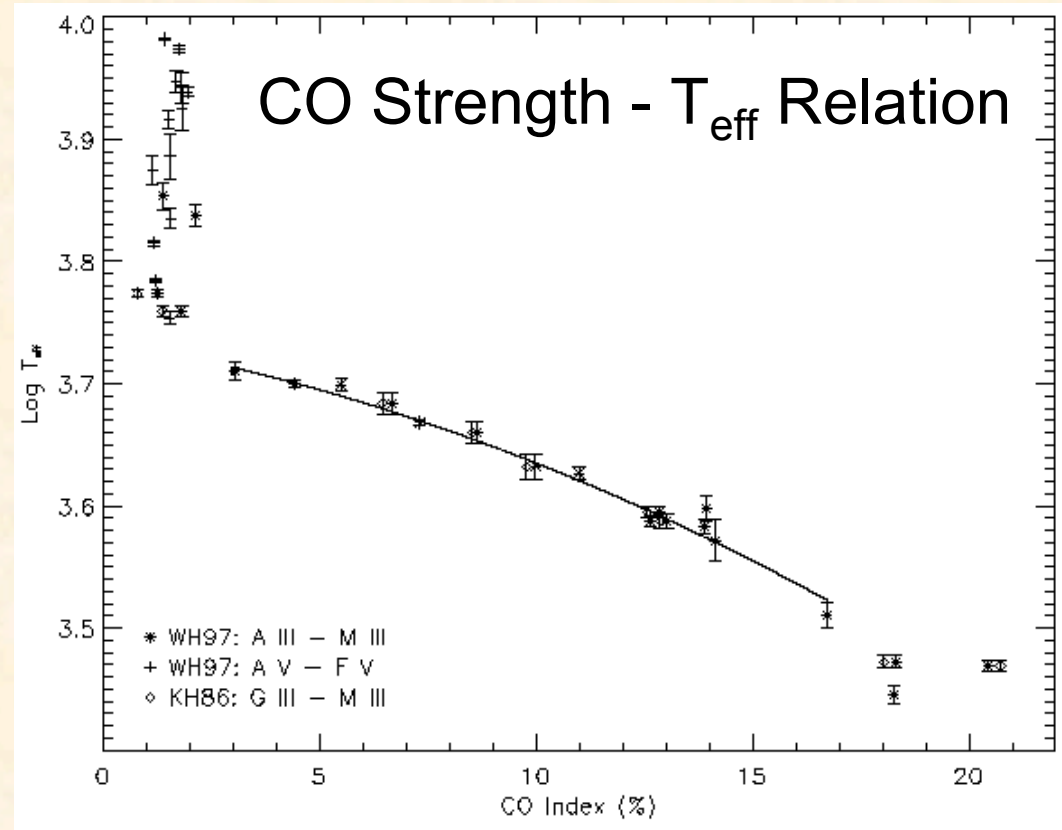
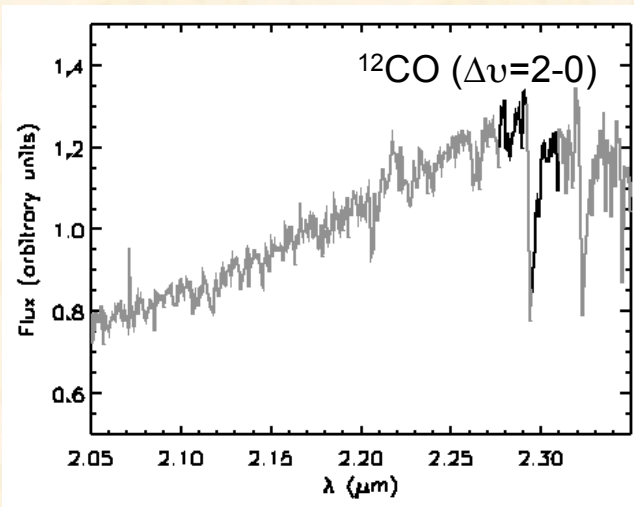
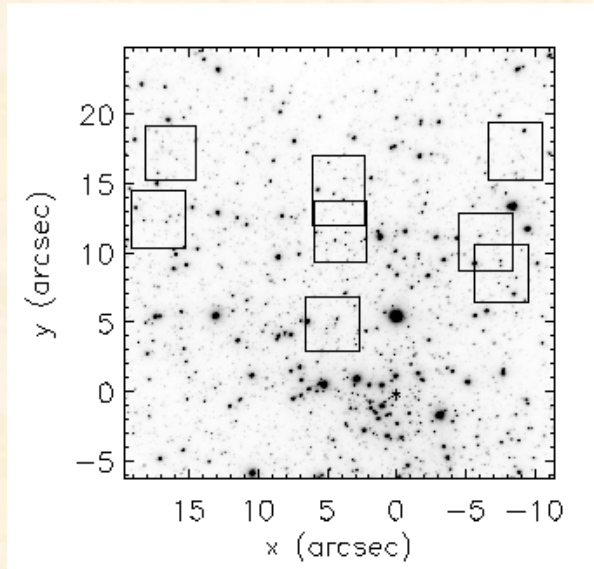


Current Work

- Improve on work of Blum et al.
- Observe 328 late-type giants (50% complete at $K \sim 15.5$ mag) in the central 1-2 pc with SINFONI and NaCo on the ESO VLT



SINFONI Spectra $\rightarrow T_{\text{eff}}$



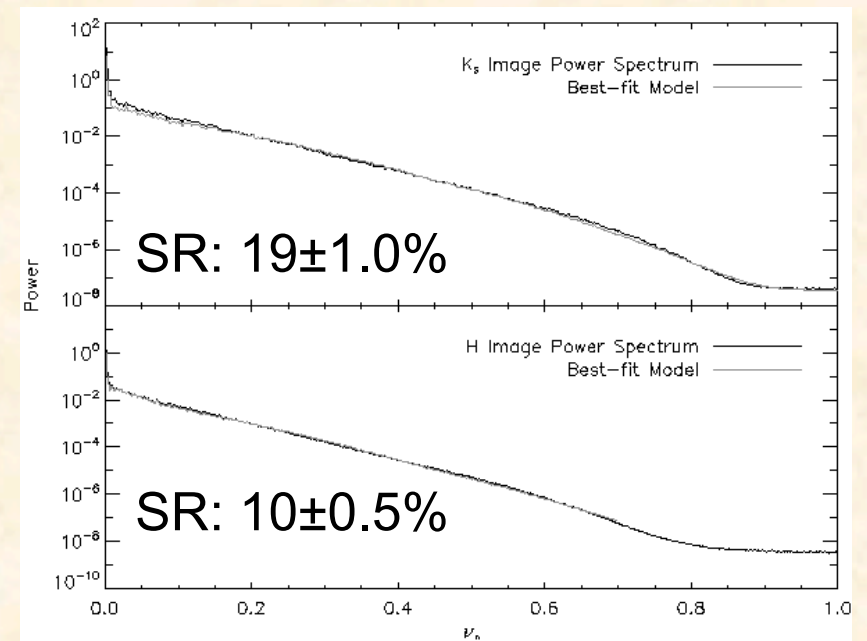
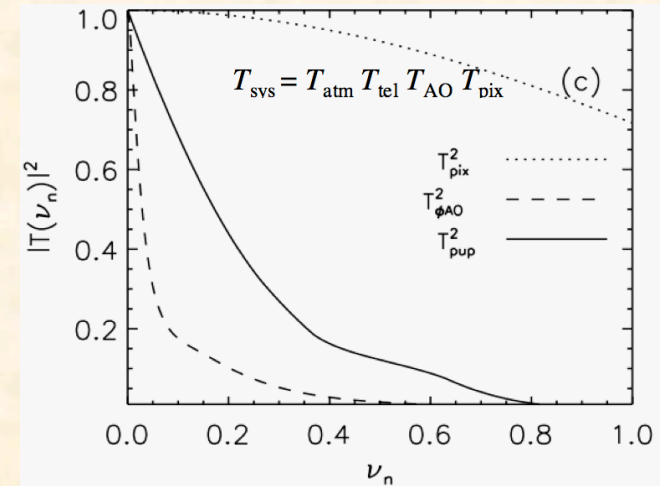
AO Photometry: Getting the PSF

- AO photometry difficulty: PSF difficult to characterize
- Crucial to construct the PSF from data acquired at the observation time
- Extended method of Sheehy, McCrady, & Graham (2006) to model NaCo and derive the PSF directly from the data, using:

$$i(\mathbf{x}) = s(\mathbf{x}) * p(\mathbf{x}) + n(\mathbf{x})$$

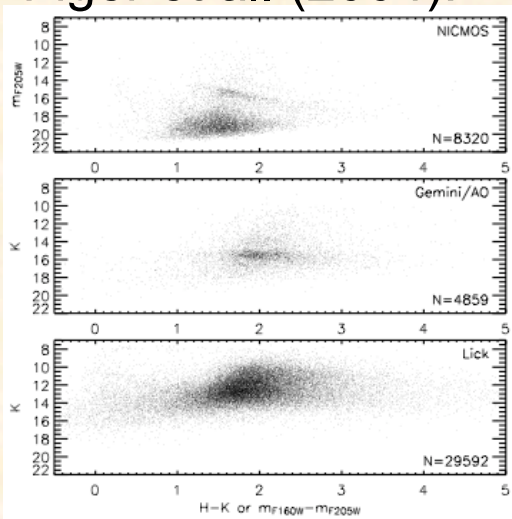
$$p_{\text{sys}}(\mathbf{x}) = p_{\text{atm}}(\mathbf{x}) * p_{\text{tel}}(\mathbf{x}) * p_{\text{AO}}(\mathbf{x}) * p_{\text{pix}}(\mathbf{x})$$

- Easiest to work in Fourier space



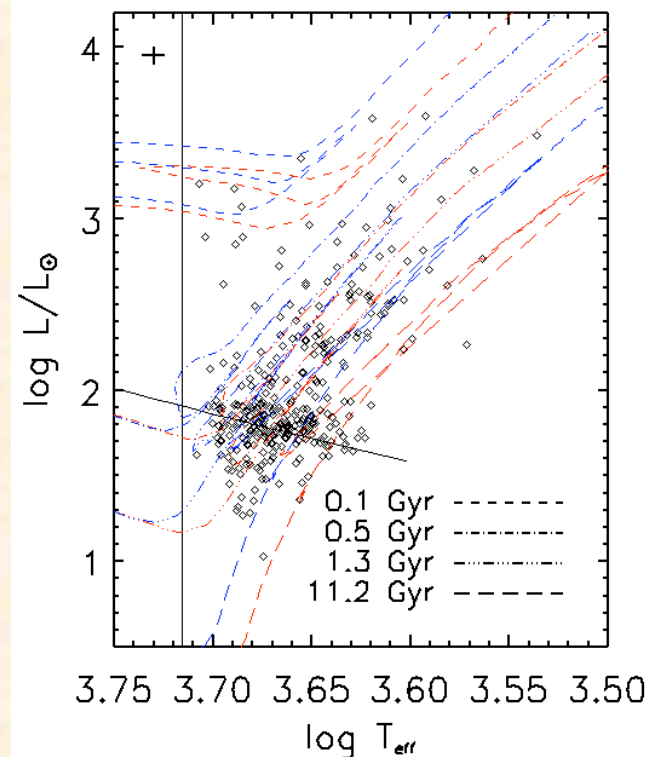
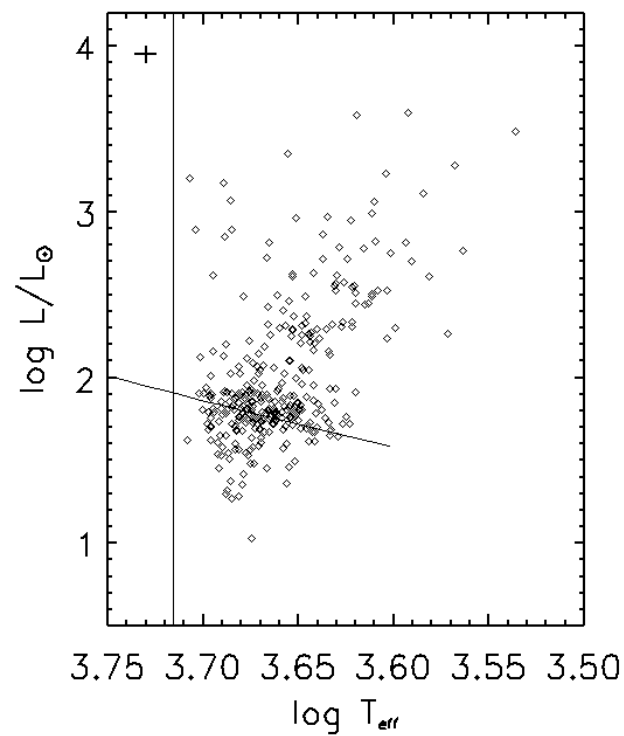
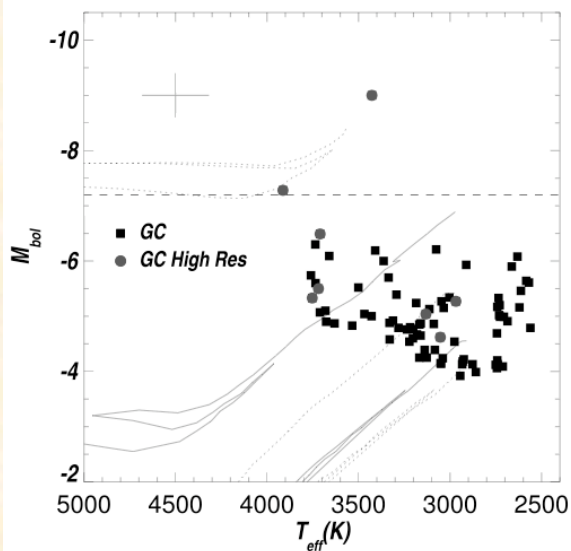
H-R Diagram

Figer et al. (2004):

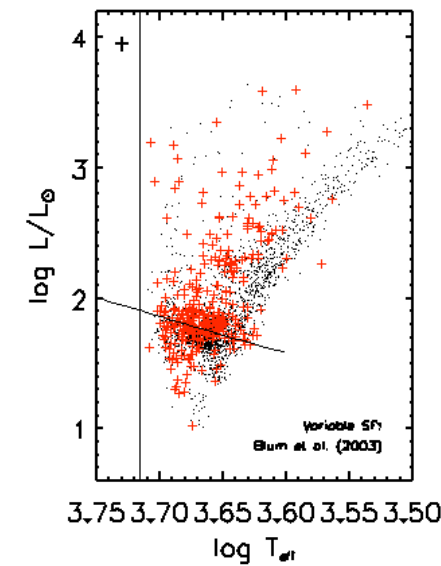
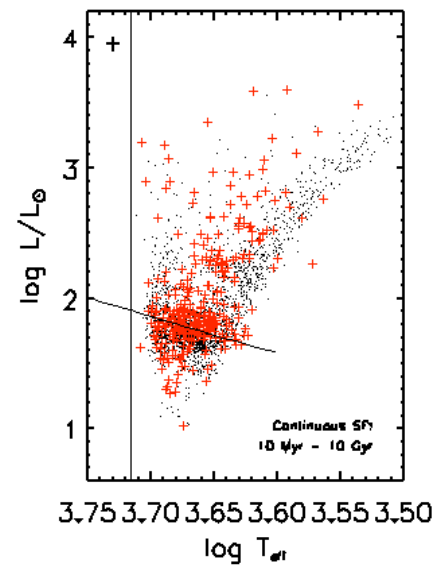
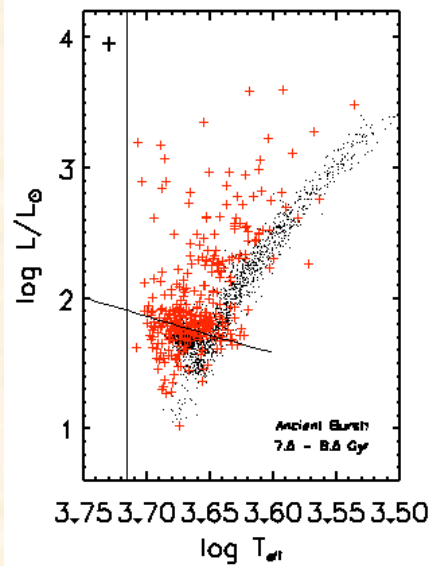
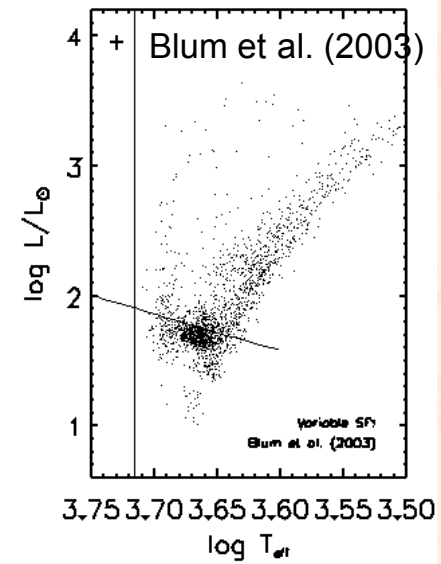
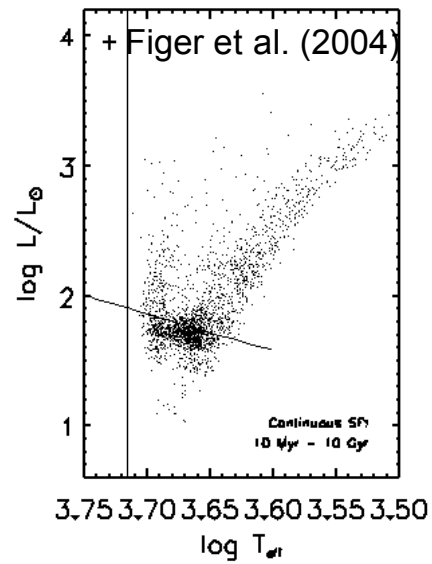
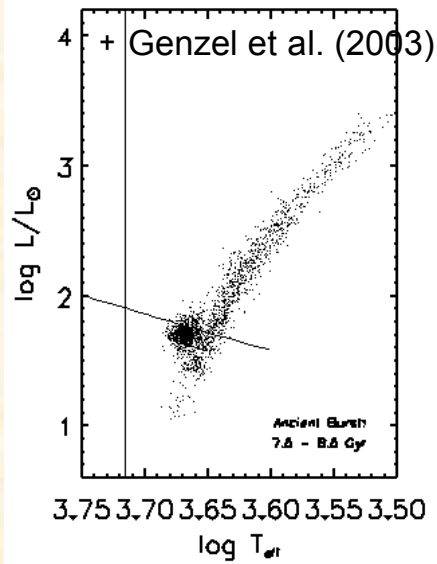


This Work:

Blum et al. (2003):



Star Formation History



Results

- Use numerical methods of Dolphin (1997) to quantify star formation history goodness-of-fit and errors
- Reasonable Models
 - Very metal-poor stars at early times
 - Few stars with ages > 5 Gyr
 - Exotic IMF (flat slope, or high lower-mass cutoff)
- Best-Fit:
 - Continuous star formation with a top-heavy IMF

Model Data Difference

