A New Sample of Li Rich Giants Constraints on Stellar Evolution

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SMSLRGSS

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(oh no not another Li talk)

Sarah & Matt's Search for Li Rich Giants from Sloan Segue

Expectations

Li is burned as a star evolves up the giant branch.

A few giants (~1%) have large Li enhancements some even larger than the predicted initial values they would have had on the main sequence.

Li could be produced at the bump in the luminosity function from 3He in the Cameron-Fowler process as the H shell evolves outward.

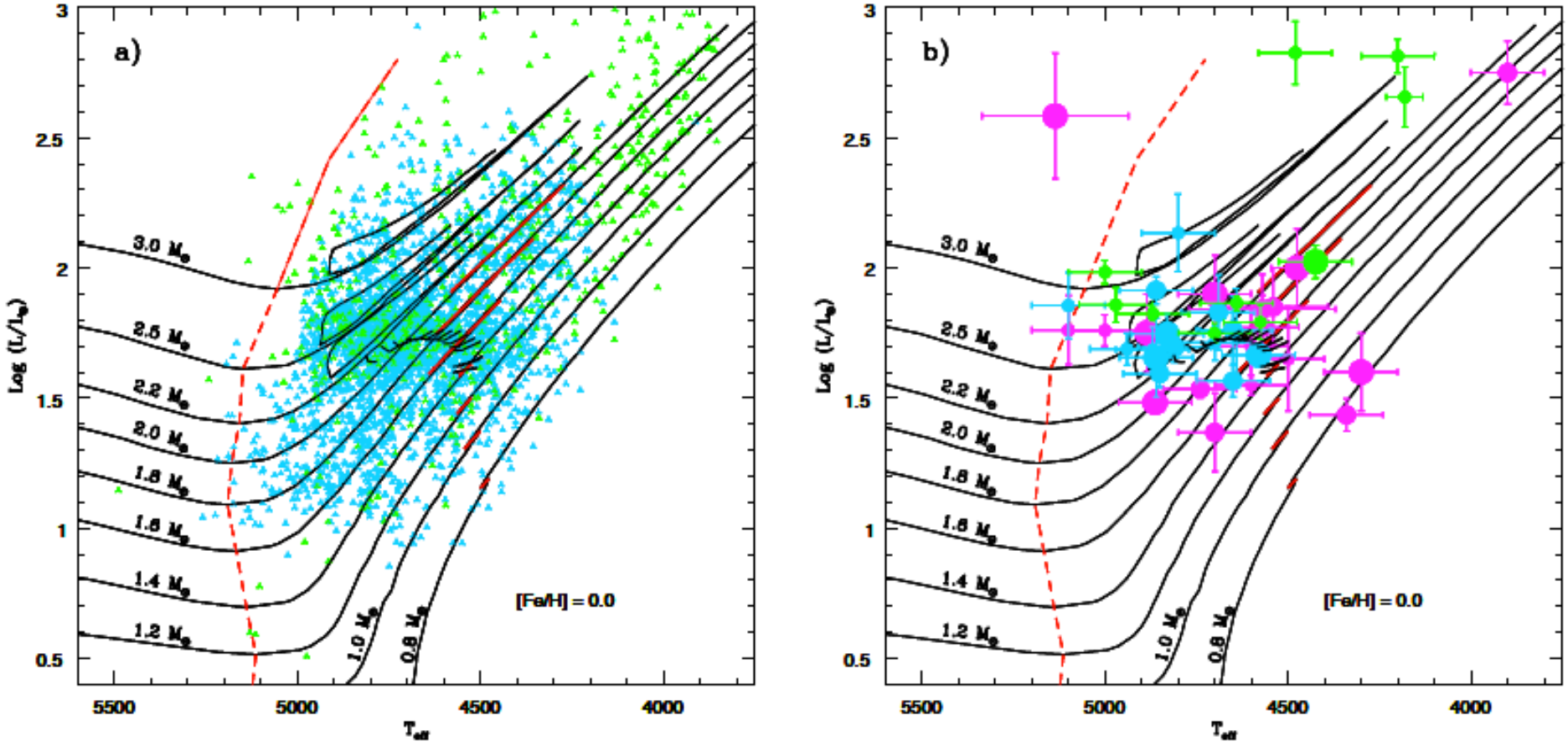
Li could also be produced in more massive stars as the He shell evolves outward.

Li rich giants near the tip of the RGB might be produced by Li production in the He core flash.

Some work in this field by attendees

- Wallerstein & Sneden 1982 1st Li-rich giant?
- Brown, Sneden, Lambert & Dutchover 1989 – the first systematic search for Li-rich giants
- Kraft, Peterson, Guhathakurta, Sneden, Fulbright & Langer 1999 – Li rich giant in M3
- Smith, Shetrone & Keane 1999 – Li rich giant in NGC 362
- Pilachowski, Sneden, Kraft, Harmer, Willmarth 2000 - GC survey for Li-rich giants

From a recent Li – rich giant Survey



From Kumar, Reddy & Lambert 2011

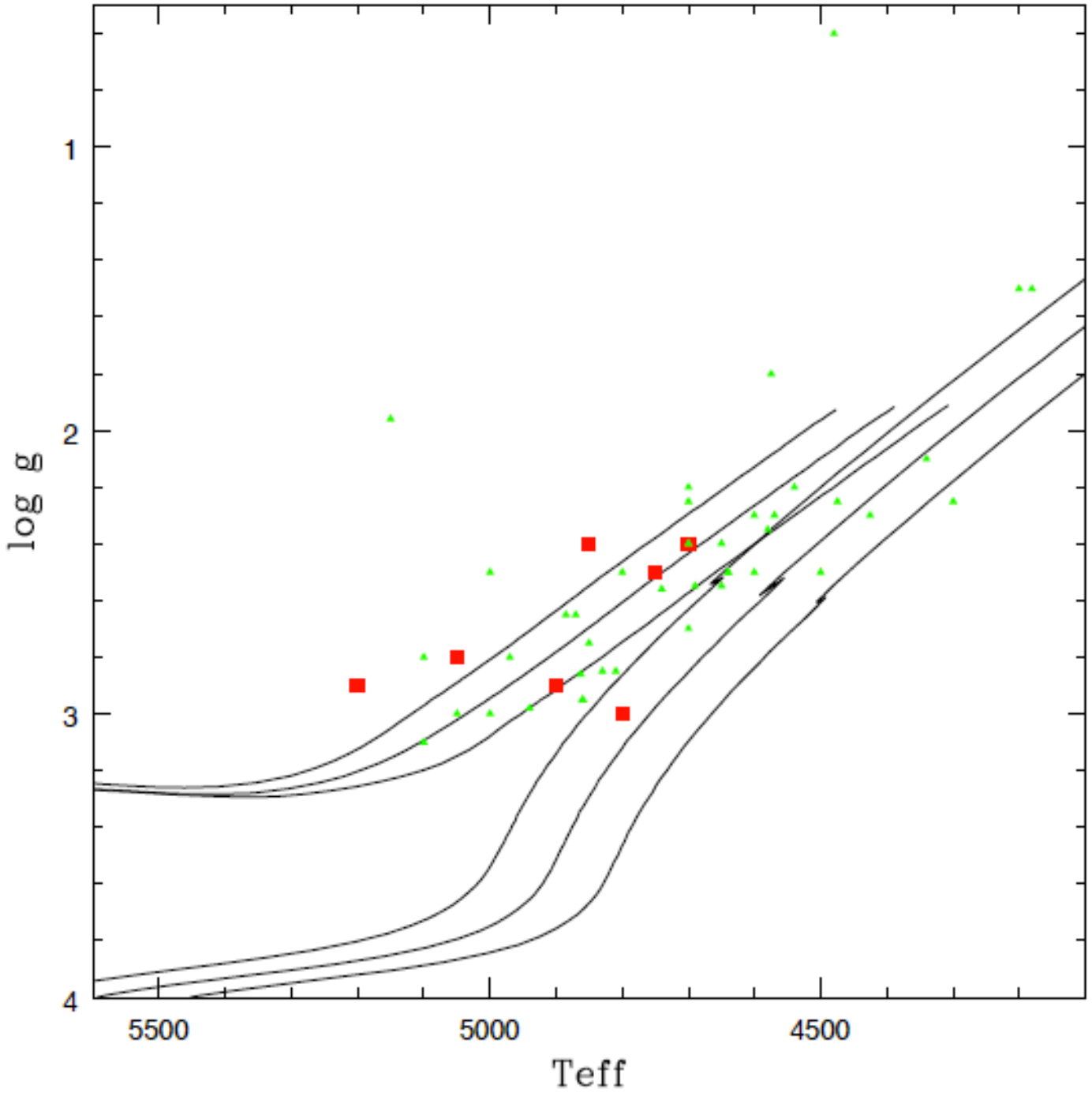
Dartmouth isochrones for

- 1 & 10 Gyr
- -0.2, 0.0 & +0.2 [Fe/H]

Green points are from

Kumar, Reddy & Lambert 2011 and references therein

Red points are this survey



Dartmouth isochrones for

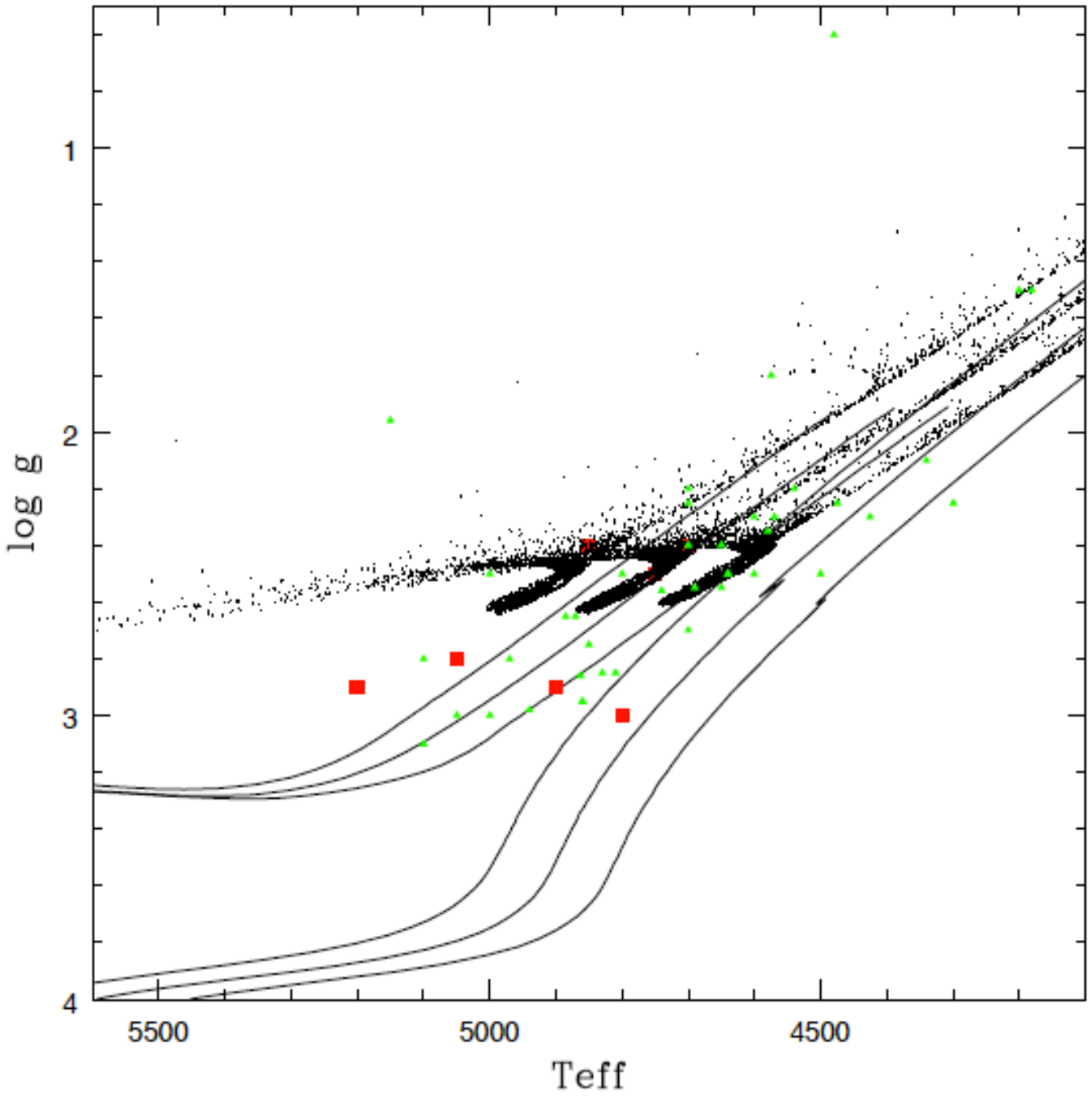
- 1 & 10 Gyr
- -0.2, 0.0 & +0.2 [Fe/H]

Black points are Dartmouth synthetic HB

Green points are from

- Lambert 2011
- Brown 1998

Red points are this survey

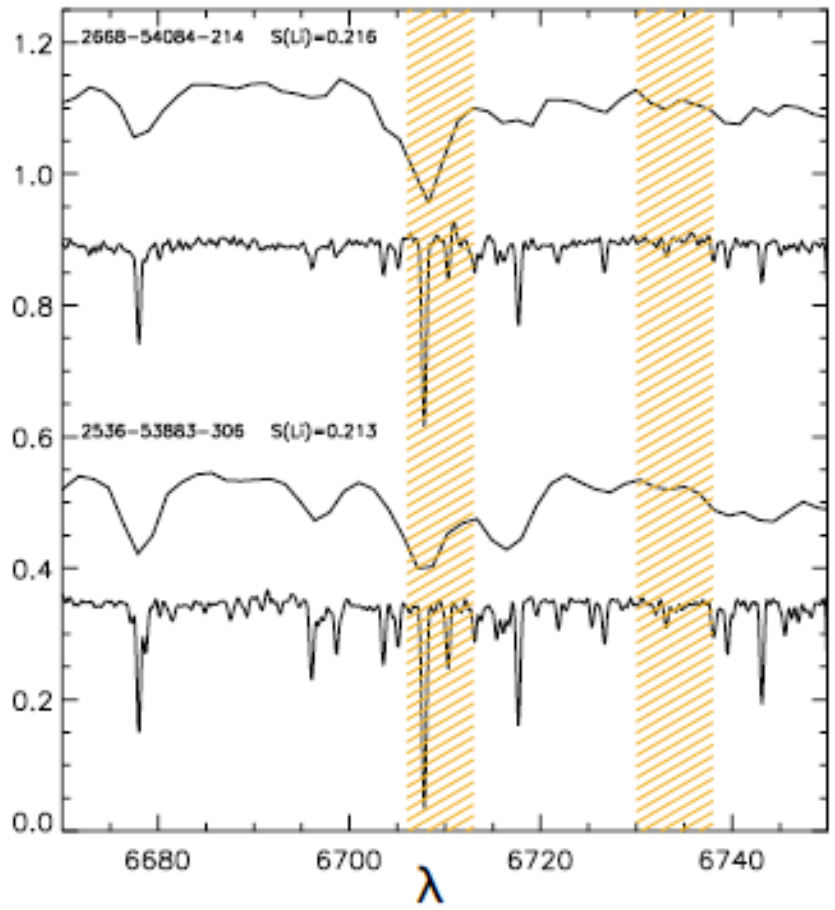


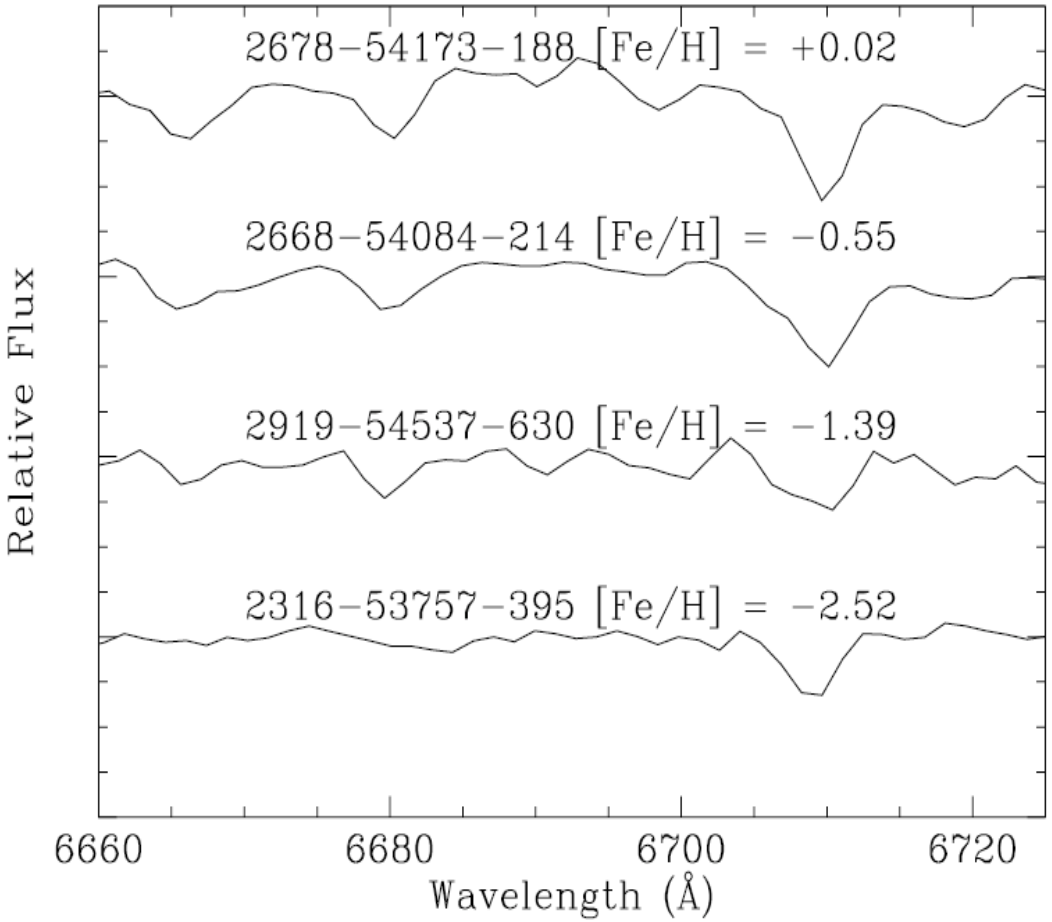
SDSS Spectra

R=1800 spectra with stellar parameters from pipeline

S/N > 40 spectra with log g < bump + 0.4 dex

8535 sample -> 162 with strong Li index -> 37 after synthesis

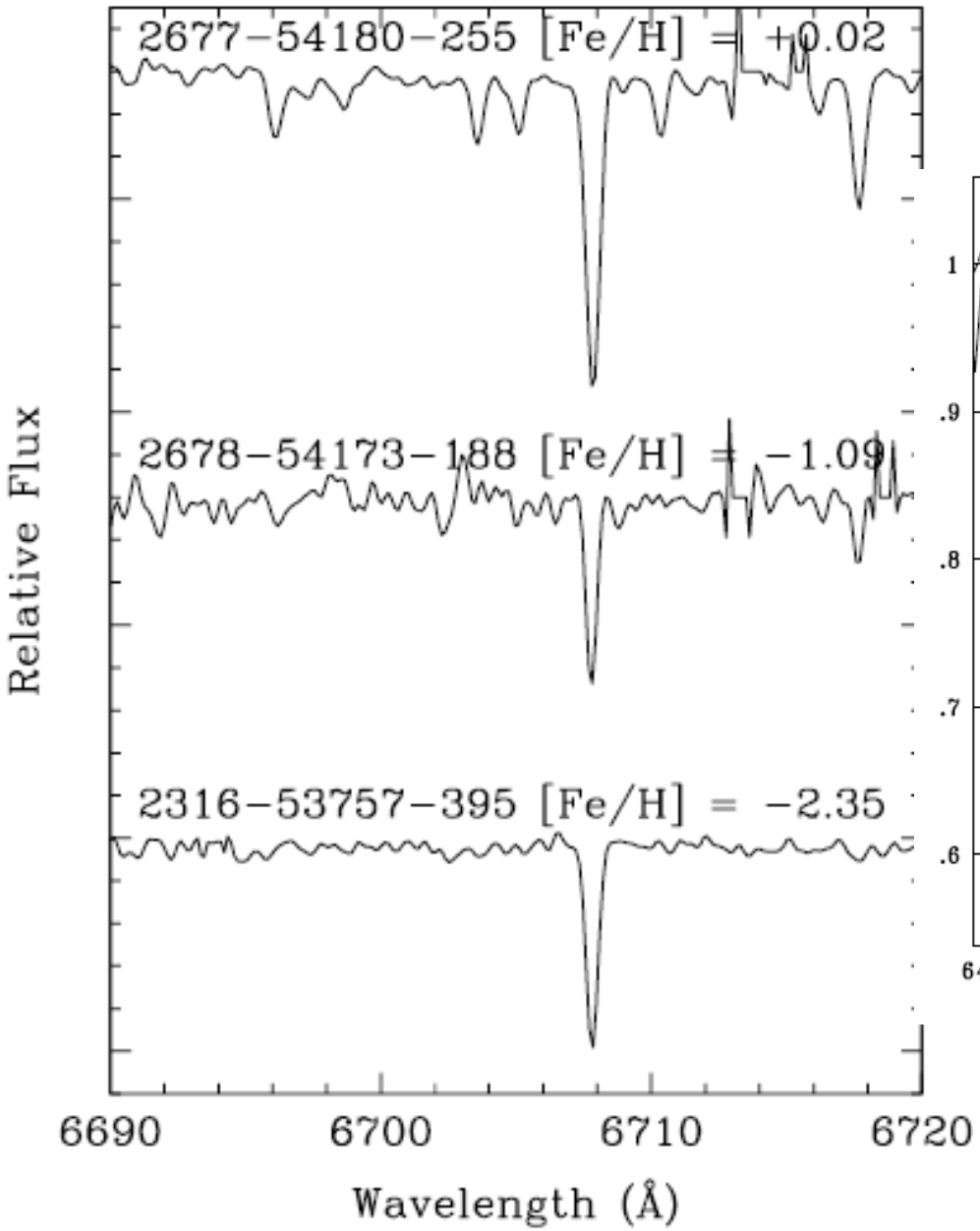




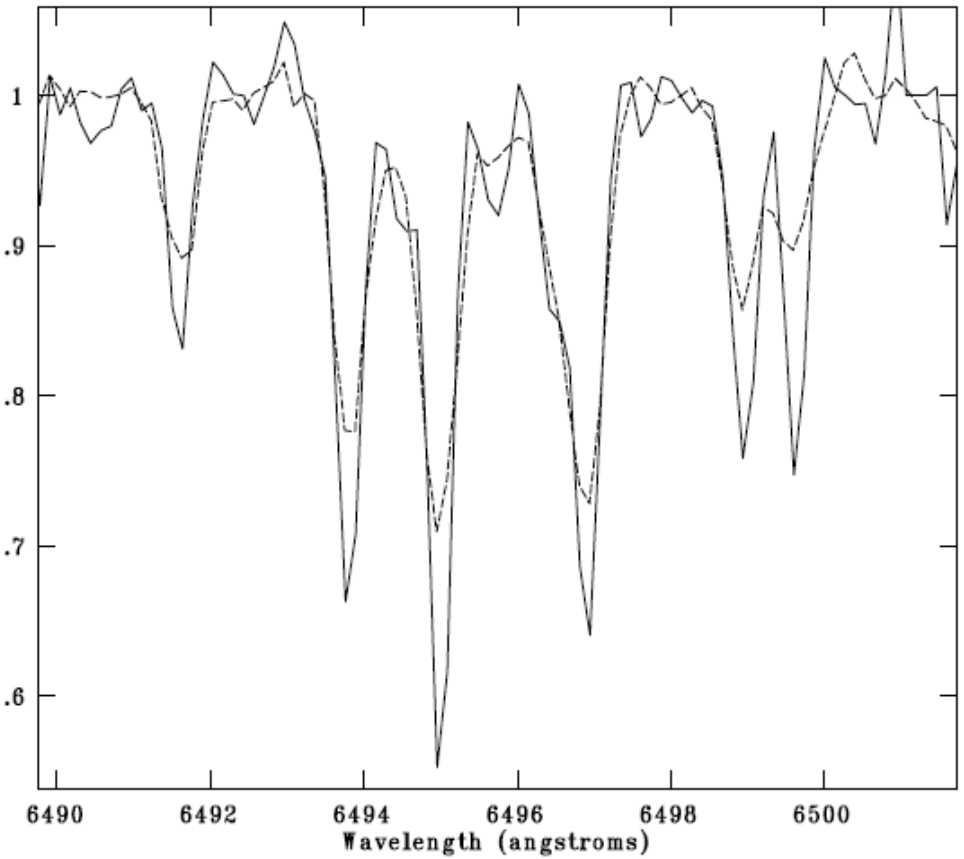
Follow-up HET spectra

- 33 candidates in lowest priority “filler” time.
- HRS at R=15,000
- V ~ 12 – 18
- Exposure times 300 – 3600 seconds

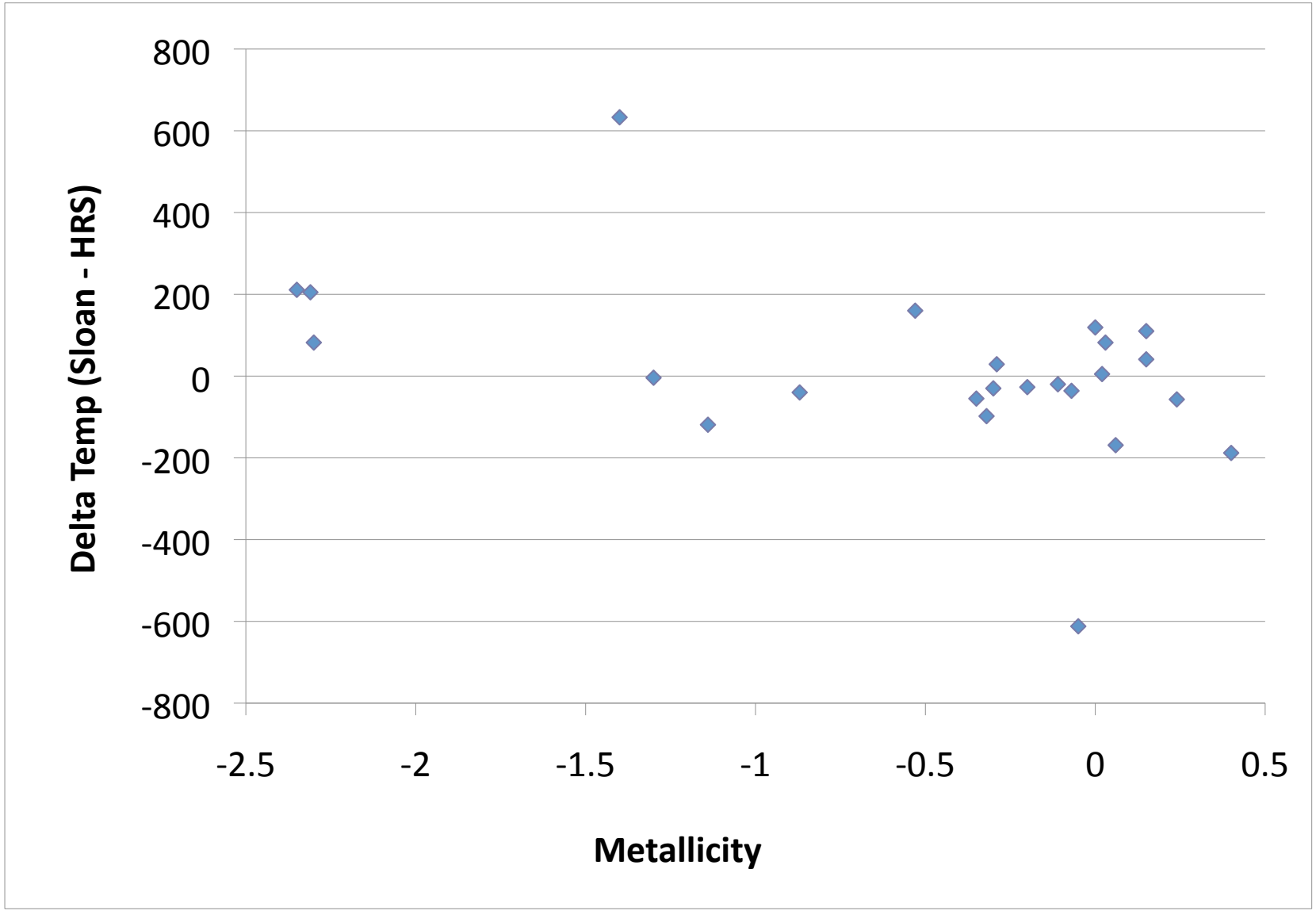
HET spectra

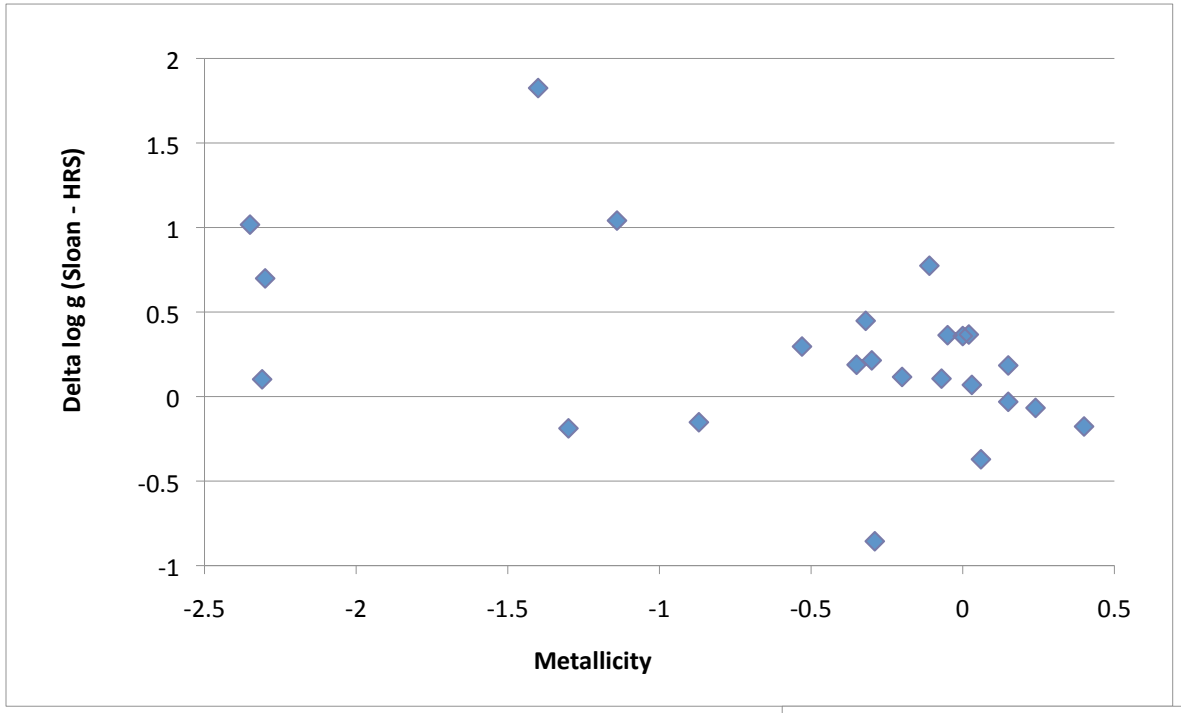


HET



Comparison between Sloan & HET



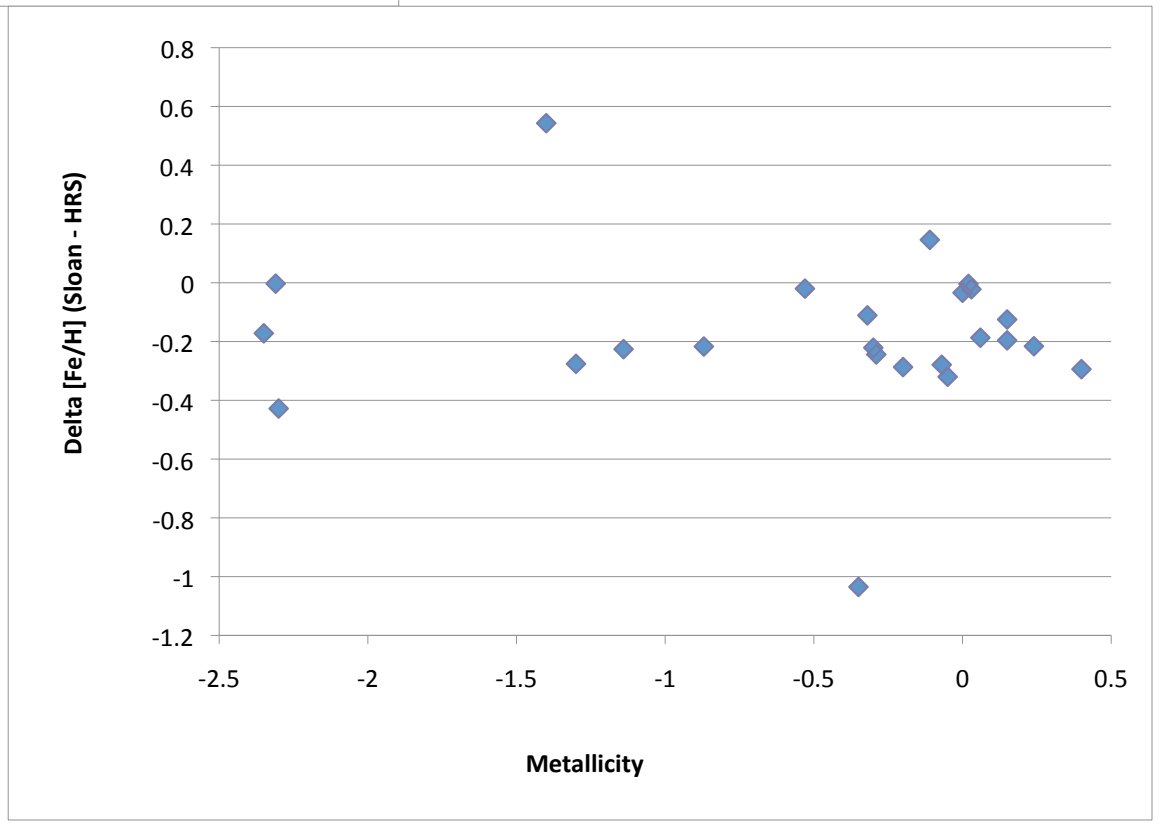


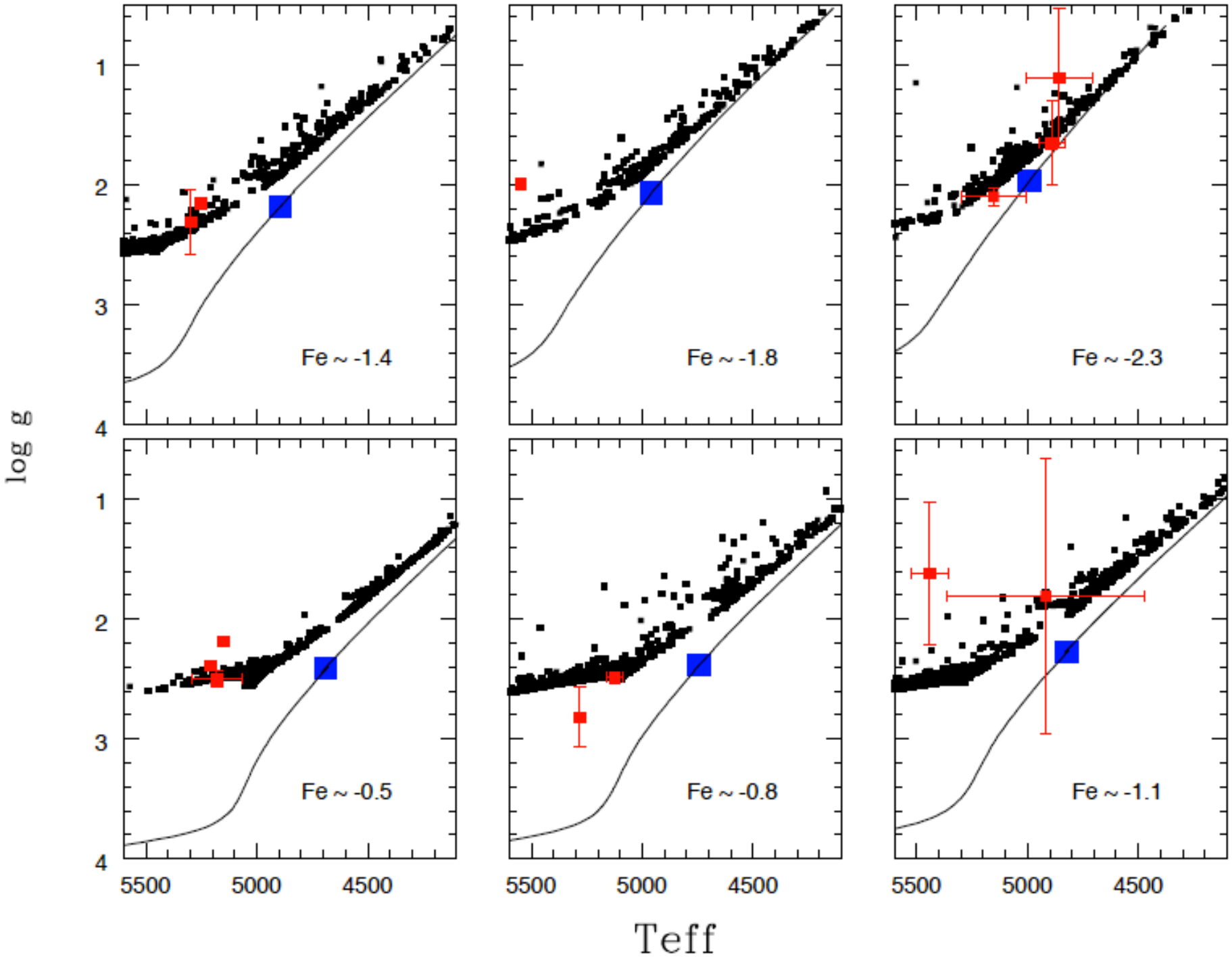
A preliminary zero points:

Delta Teff = 3 K

Delta log g = 0.2 dex

Delta [Fe/H] = -0.2 dex




log g
Teff
Fe ~ -1.4
Fe ~ -1.8
Fe ~ -2.3
Fe ~ -0.5
Fe ~ -0.8
Fe ~ -1.1
1
2
3
4
5500
5000
4500

Summary

- A sample of SDSS Li-rich metal-poor giants have been found.
- These giants have log g and Teff consistent with HB stars not clump stars.
- This may be a reason why previous surveys failed to find Li rich stars?

- Look for this work in late fall or early winter.