The TESS Input Catalog and Exoplanet Target Selection Strategy

Daniel Huber

University of Sydney

Josh Pepper (Lehigh), Keivan Stassun, Nathan De Lee & Ryan Oelkers (Vanderbilt), Martin Paegert, Willie Torres & Dave Latham (CfA), Luke Bouma (MIT), Bill Chaplin, Tiago Campante & Mat Schofield (Birmingham) and the TESS Target Selection Working Group

KASC9/TASC2

July 2016


LOJA
PETER
SQWEAR
SQWEAR

Austria vs Portugal

UEFA EURO Group stage

Sunday, June 19, 5:00 AM

Parc des Princes, Paris

Portugal	0 - 0	Austria
	FT	

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KASC9/TASC2

July 2016

Why yet another input catalog?

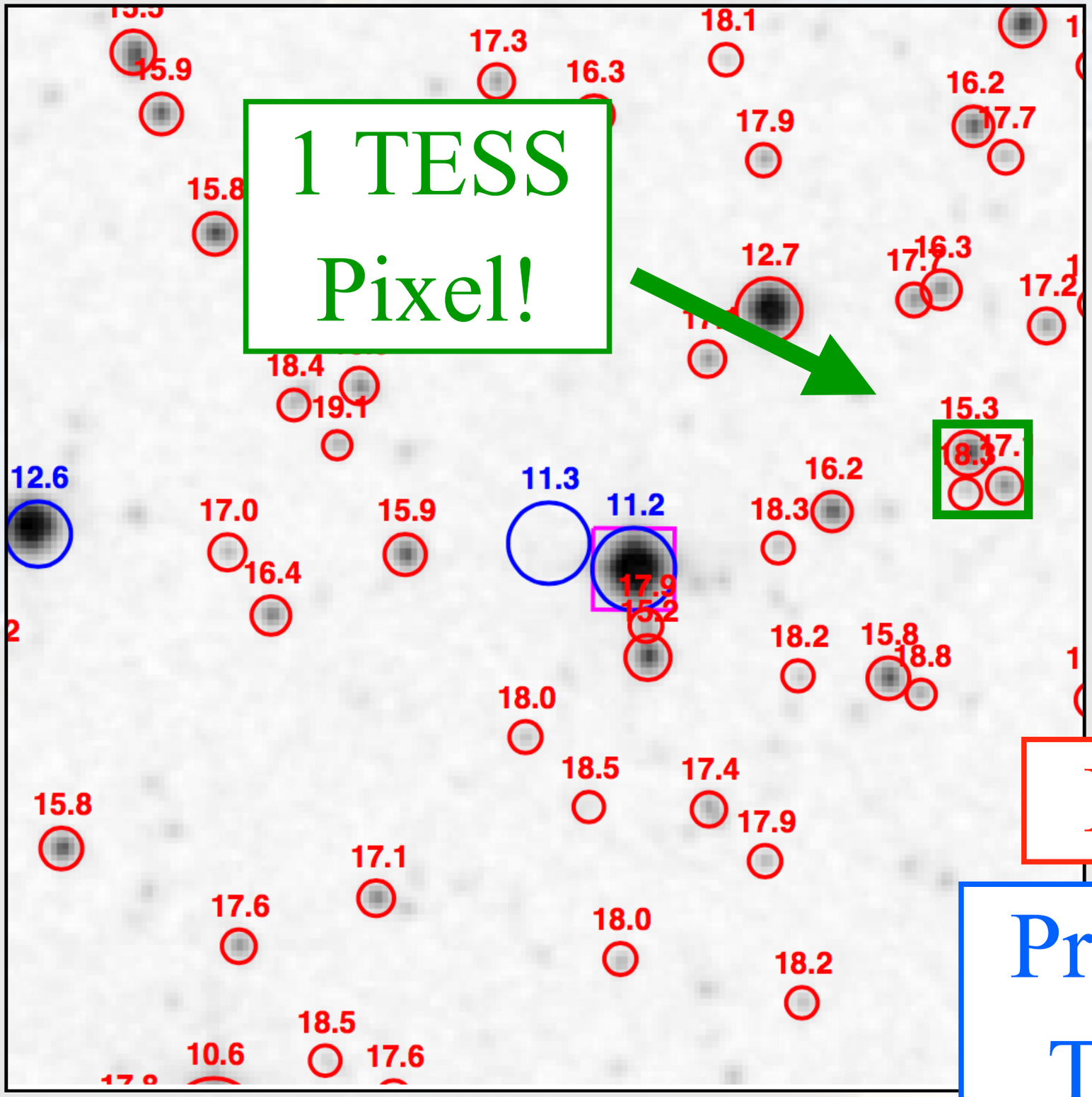
EPIC

PIC(?)

KIC

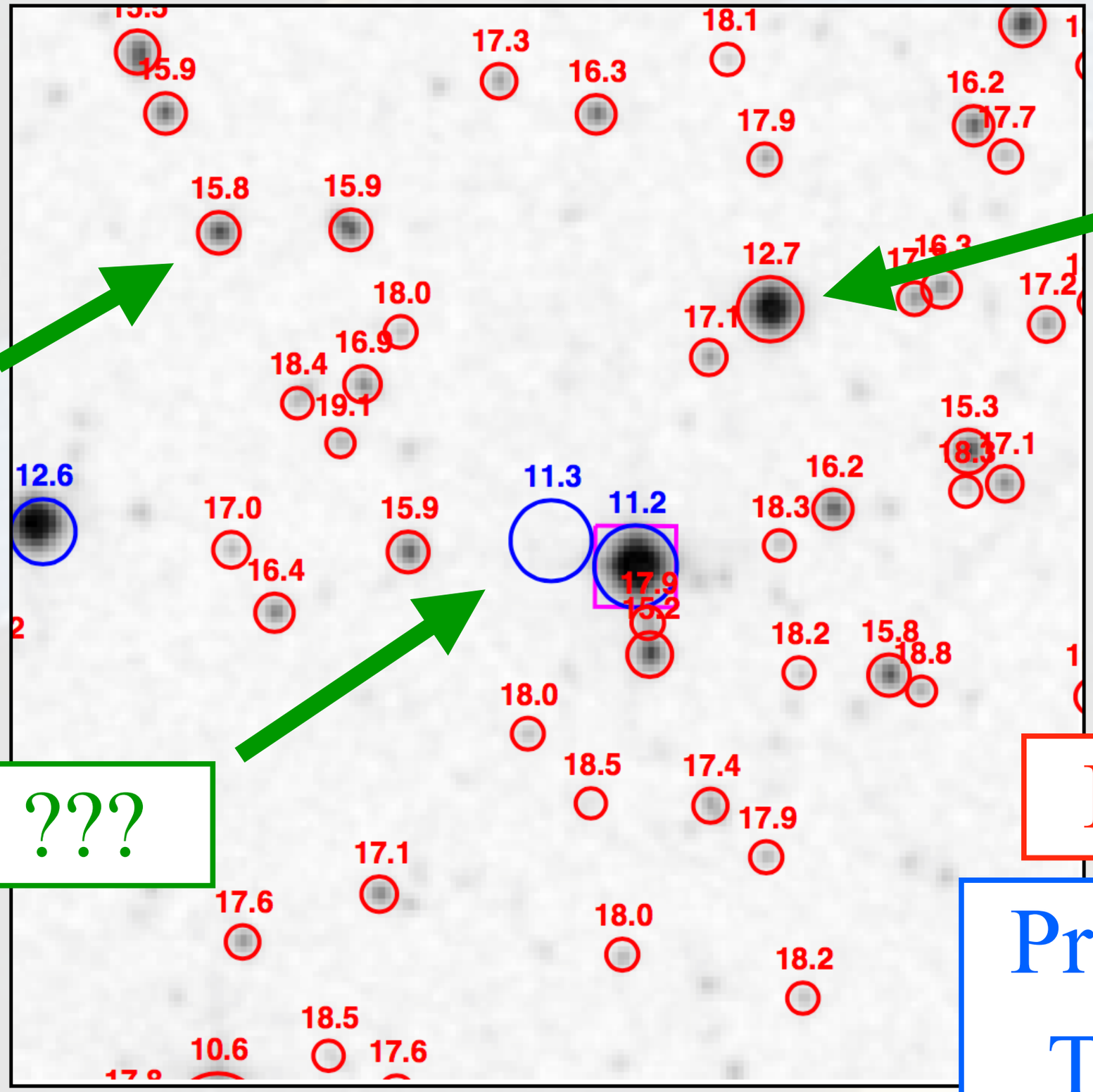
TIC

Reason 1: Flux Contamination



Huber et al. (2016)

Reason 2: Target Selection



M dwarf ?

K-giant?

???

EPIC

Proposed Targets

Huber et al. (2016)

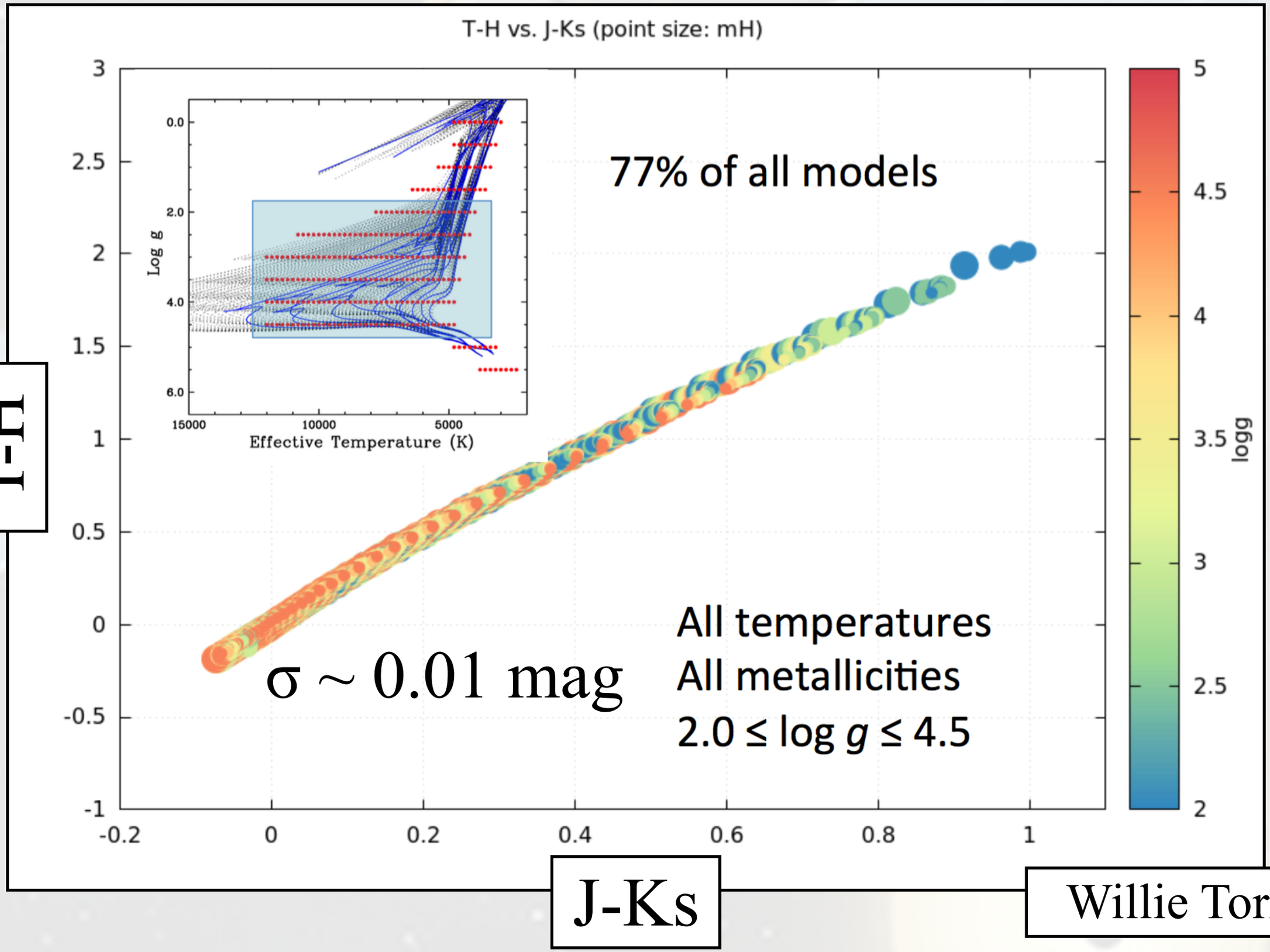
TESS Input Catalog (TIC)

- Same purpose as the KIC for Kepler, the EPIC for K2, the PIC for PLATO … ***but all sky***

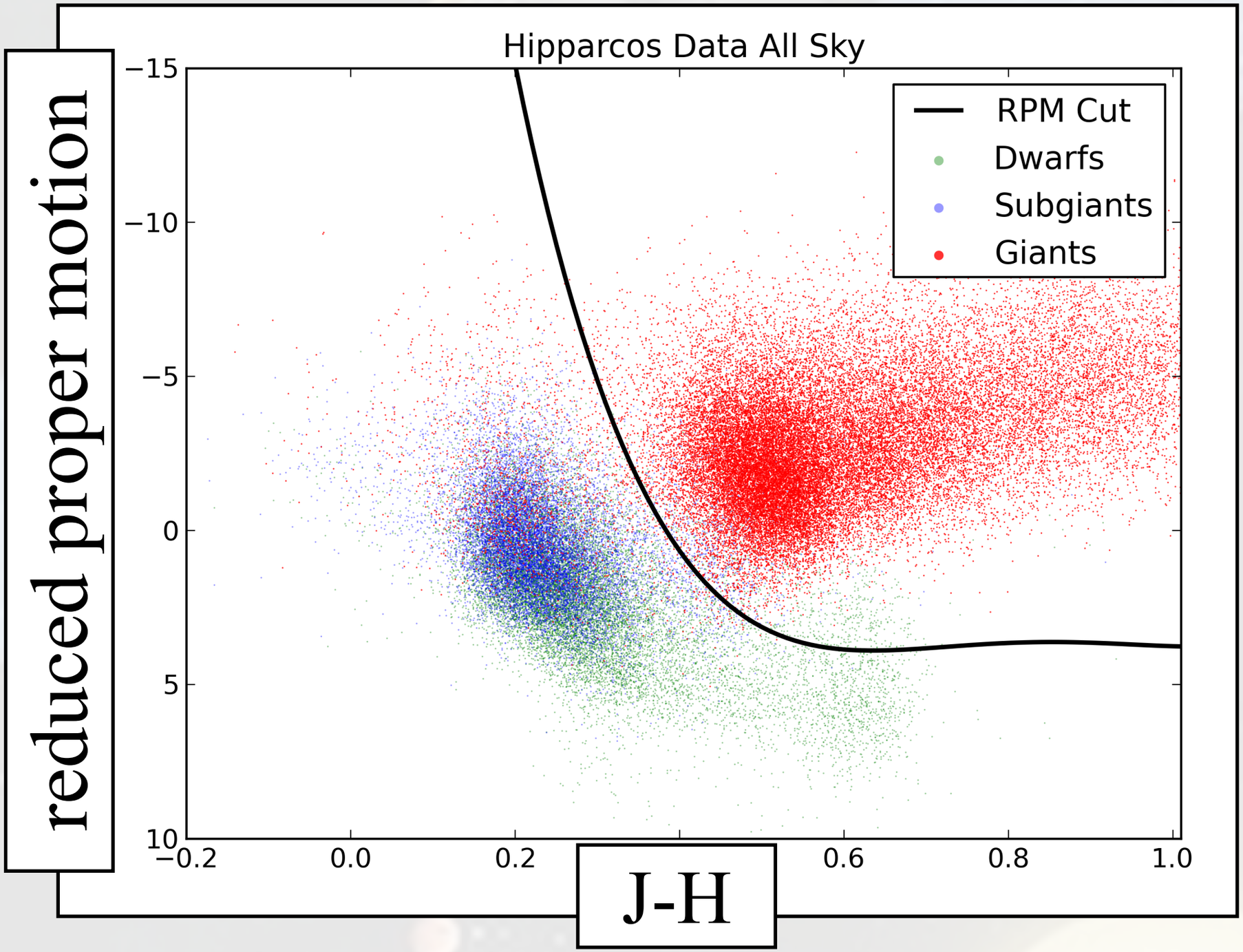
- Based on a federation of all-sky catalogs (2MASS, UCAC-2, APASS, WISE, …)

- Contains coordinates, identifiers, photometry, TESS magnitudes, kinematics and estimates of stellar properties

TESS Magnitudes



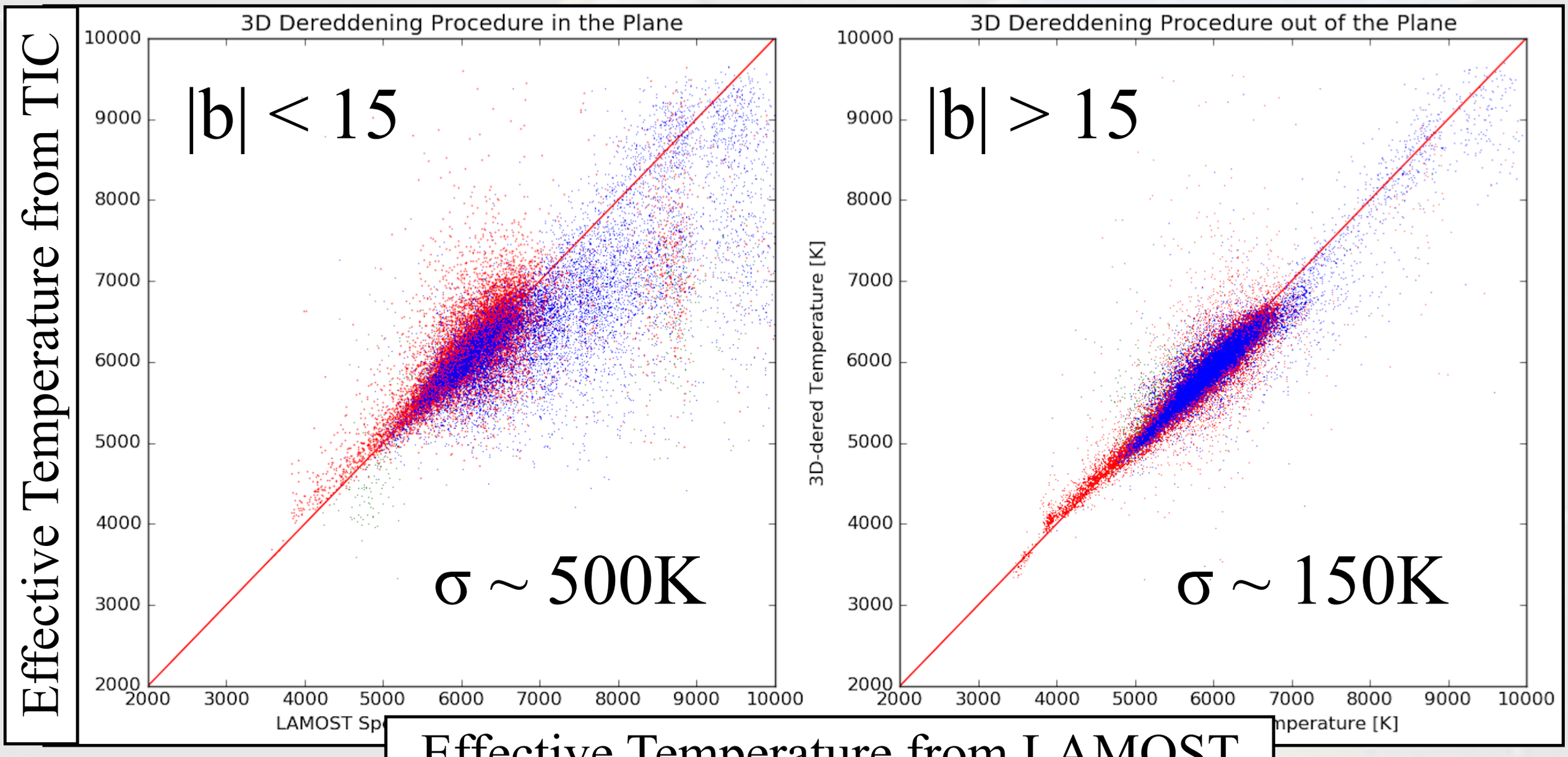
Giant - Dwarf Classification



~95% reliable, but ~50-60% subgiant contamination

(similar to KIC and EPIC)

Effective Temperatures

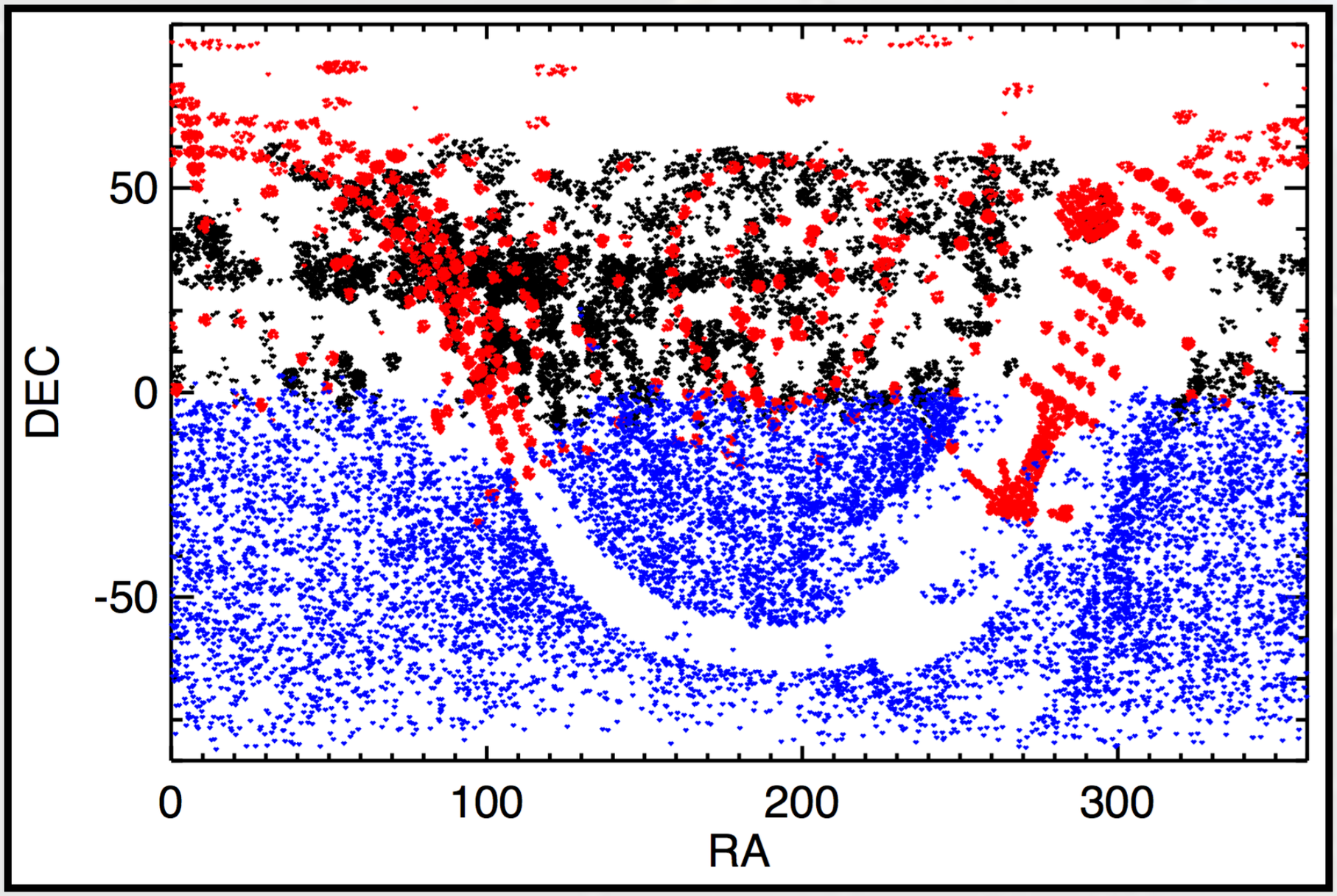


Effective Temperature from LAMOST

De-reddening using empirical ZAMS or 3D Maps - problematic near the galactic plane!

Ryan Oelkers

log(g), Radii and Masses



APOGEE

LAMOST

RAVE

GALAH
+Funnelweb

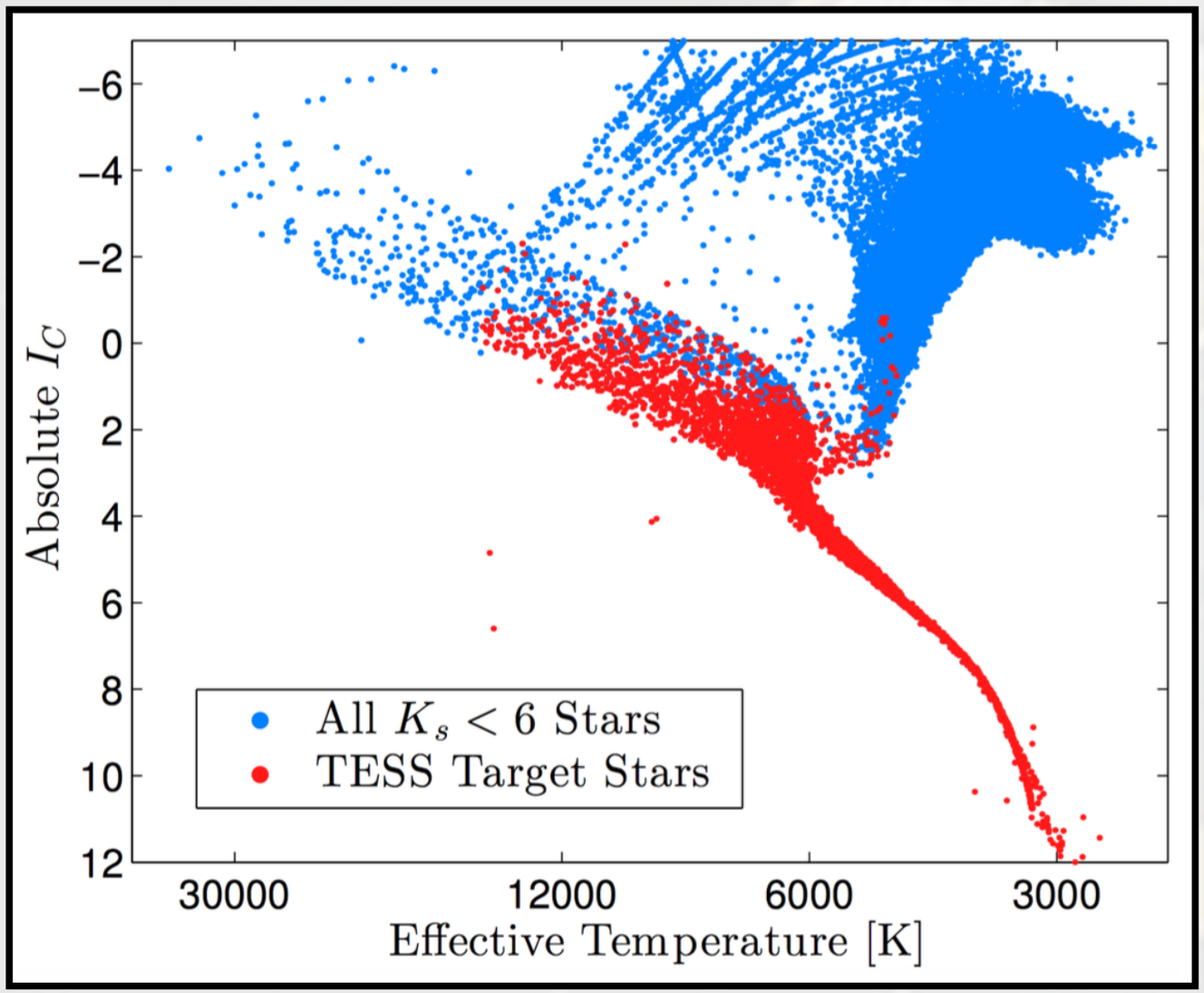
- From spectroscopic surveys whenever possible
- Otherwise T_{eff}-ZAMS relations (i.e. not available for giants!)

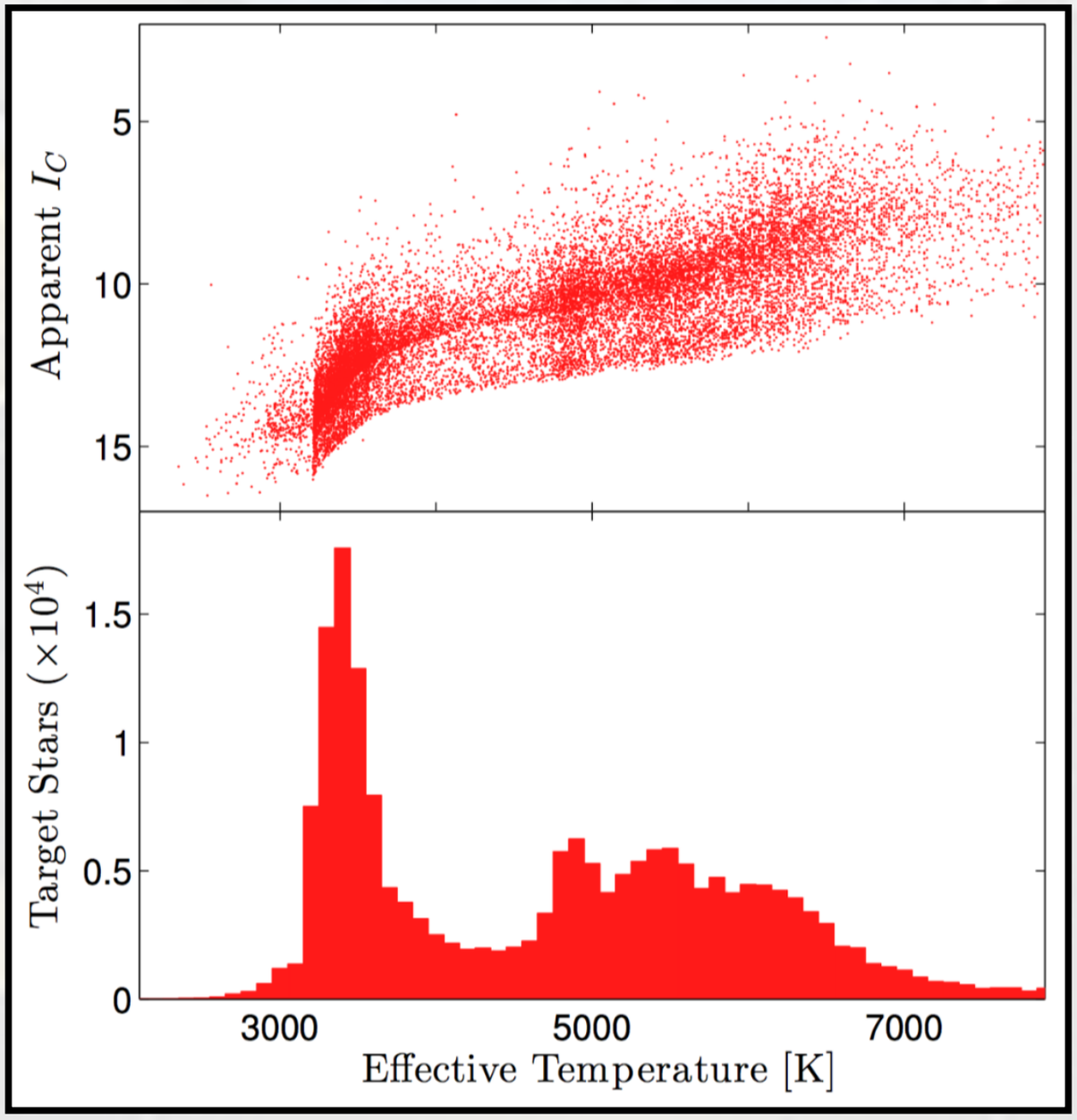
TIC Exoplanet Target Selection

transiting Candidate Target List (tCTL)

- 2.4M targets, subset of the TIC
- Source of ~200,000 2-min cadence targets for transit detection
- Optimized for the detection of small planets; might not include ancillary exoplanet targets (e.g. seismic subgiants, white dwarfs, etc)
- Priority ranking for all stars $\propto R_{star}\,\sigma^{0.5}$

tCTL: Simulations

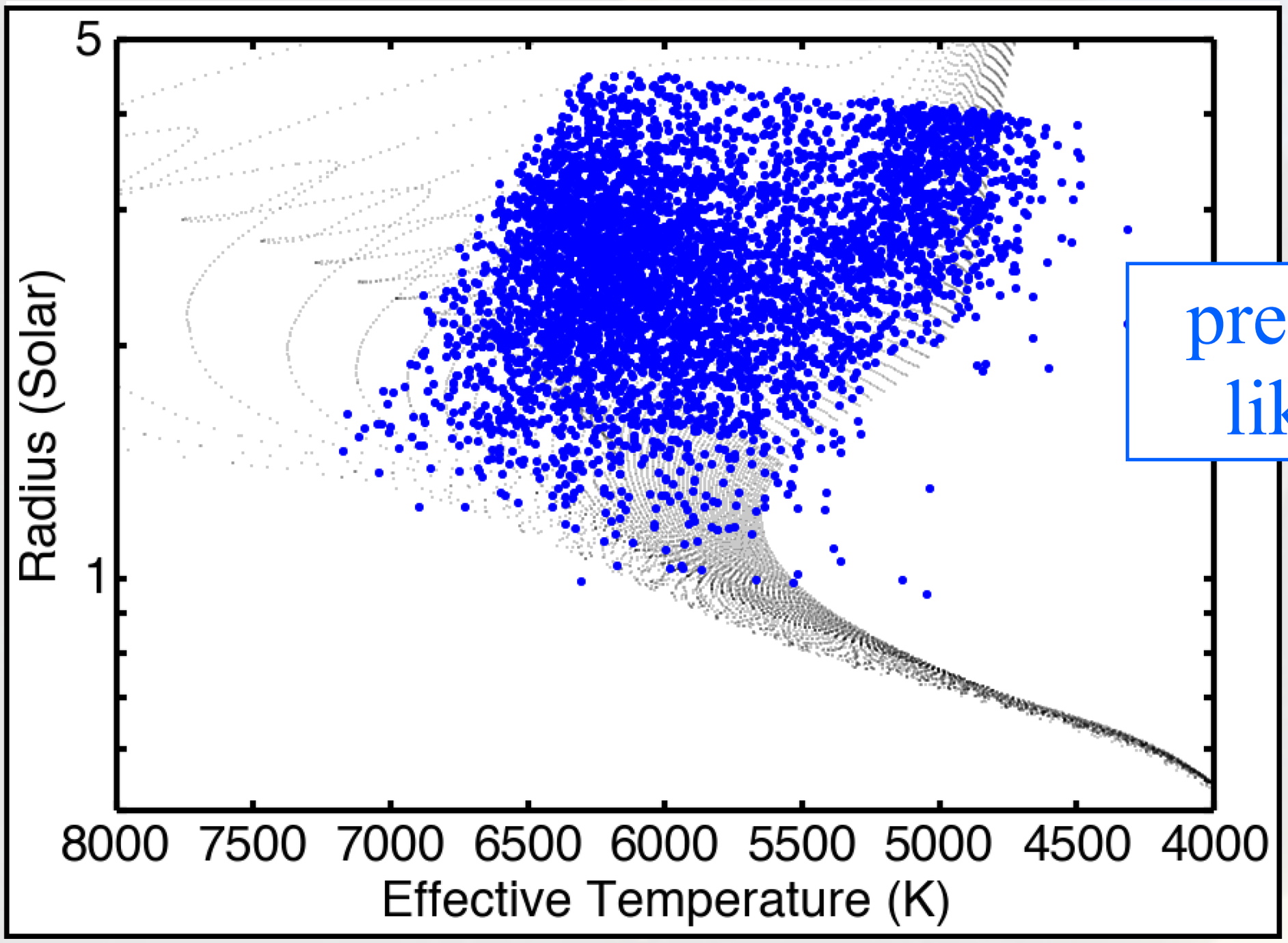




TESS: ~ 80% K-M dwarfs

Sullivan et al. 2015

Exoplanets versus Asteroseismology

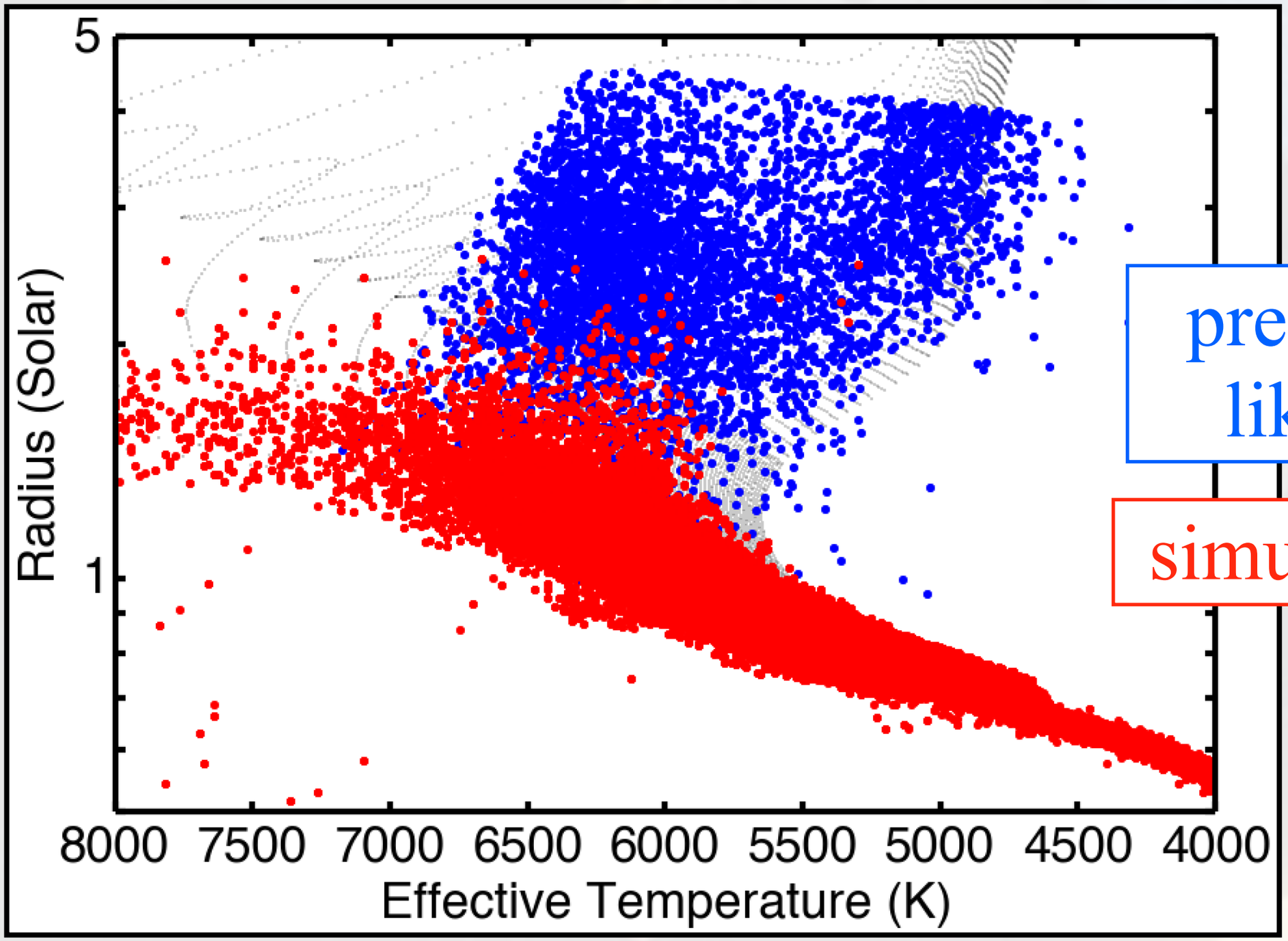


prelim. solar-like targets

Luke Bouma
Mat Schofield

→ *see WG1+2 splinter (Thu) + Tiago's talk (today)*

Exoplanets versus Asteroseismology



prelim. solar-like targets

simulated tCTL

Luke Bouma
Mat Schofield

→ *see WG1+2 splinter (Thu) + Tiago's talk (today)*

tCTL: Current Status

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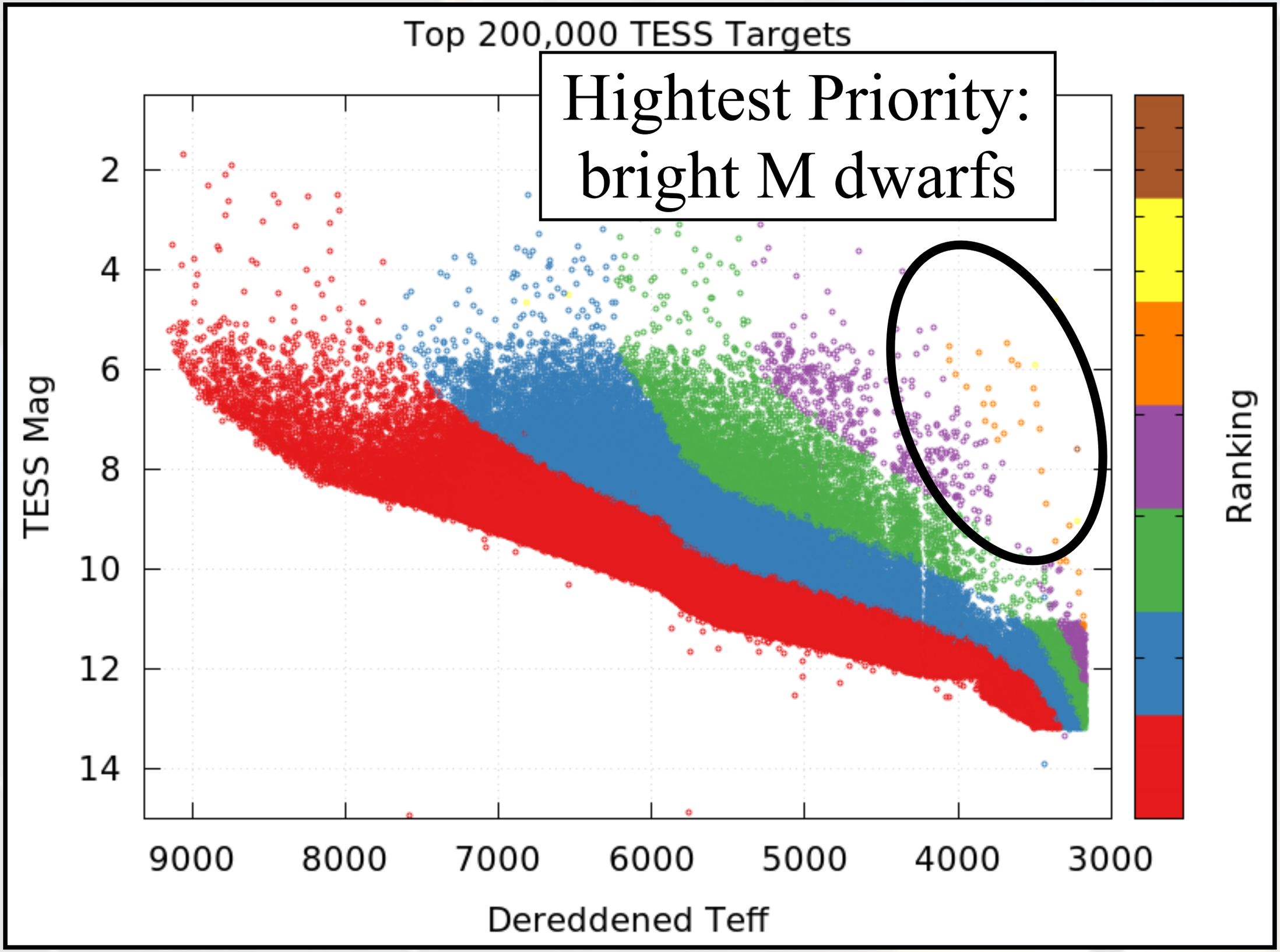

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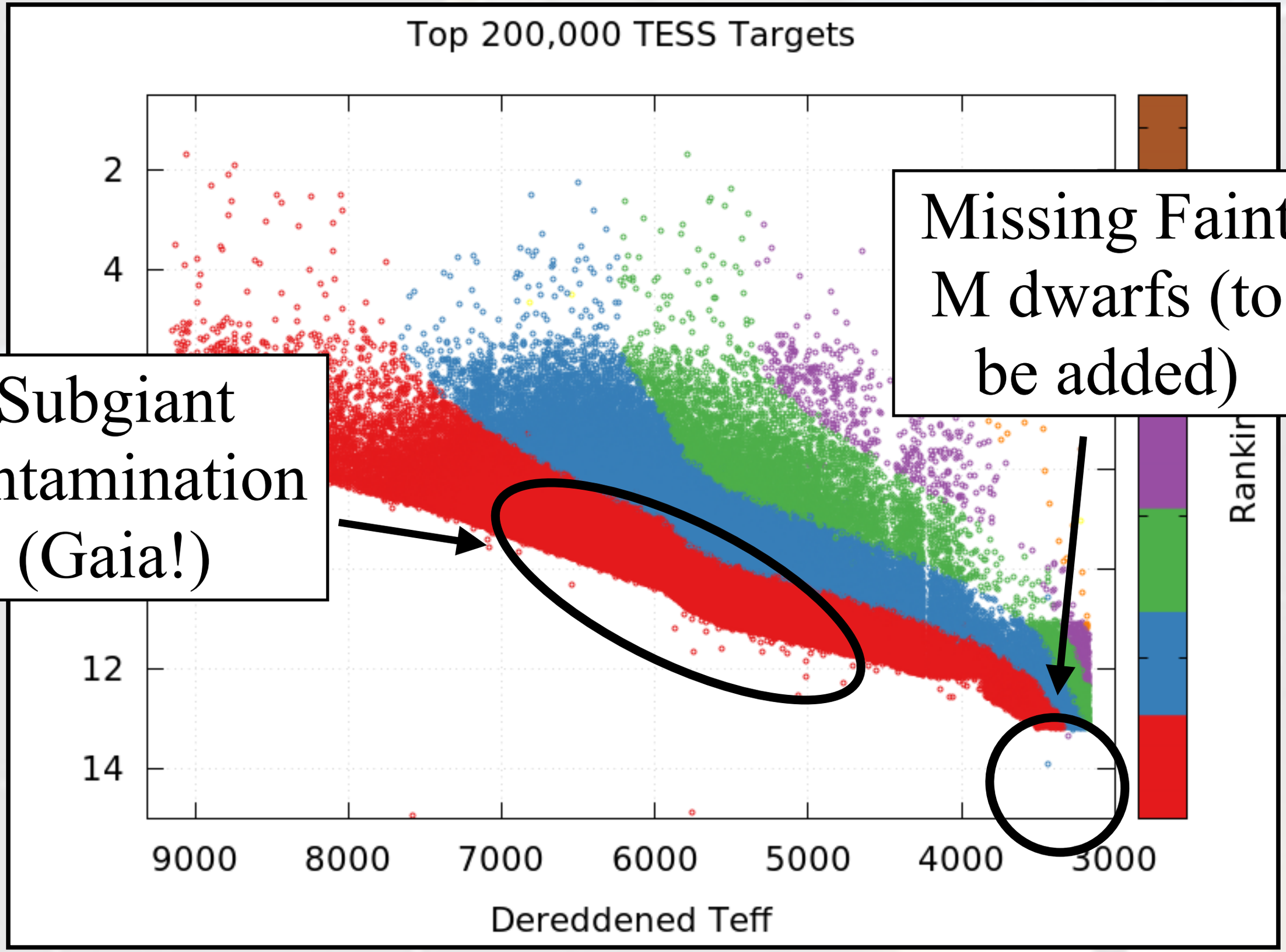


Subgiant contamination (Gaia!)

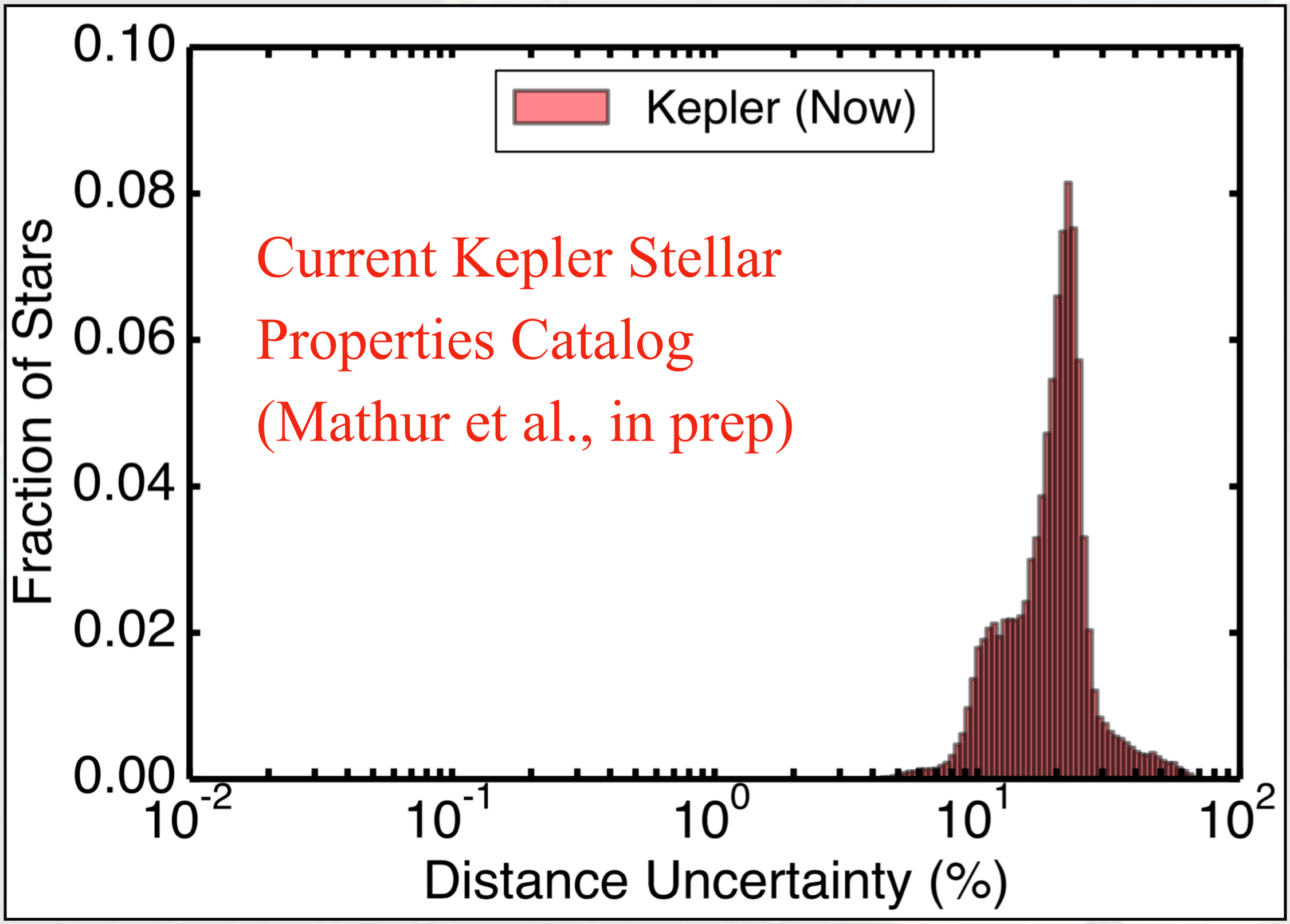
Missing Faint M dwarfs (to be added)

Timeline and Future Work

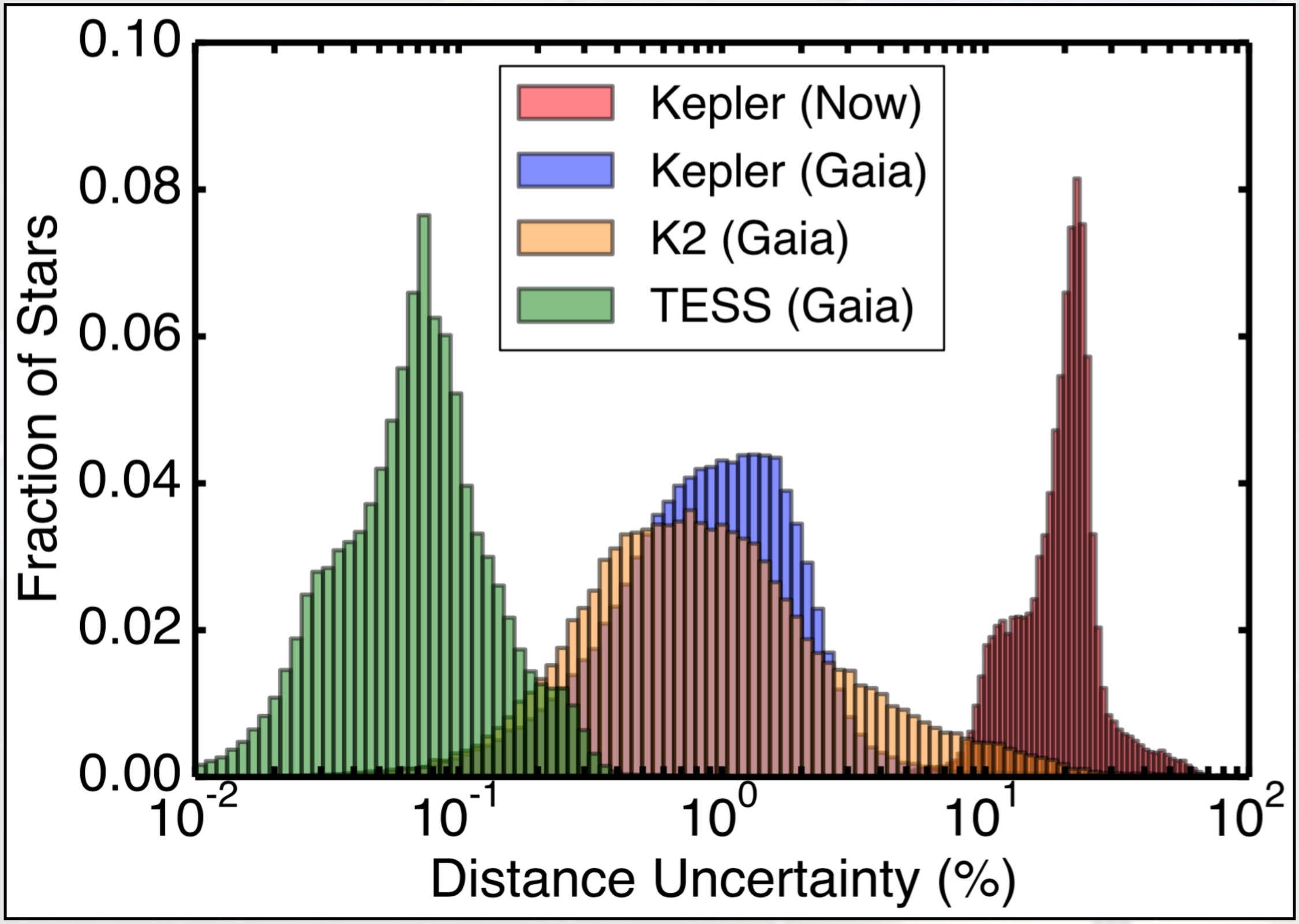
TIC Timeline

- **10/2016:** 1st public TIC release (on MAST), *possibly including Gaia DR1*
- **12/2016:** GO Cycle 1 Announcement
- **6/2017:** GO Targets selected
- **6/2017:** 2nd public TIC release
- **7-8/2017:** Assembly of final exoplanet target list
- **8/2017:** Gaia DR2 (?)
- **12/2017:** TESS launch

The Gaia Impact



The Gaia Impact



Summary

- **TESS Input Catalog (TIC):** equivalent of KIC/ EPIC for Kepler/K2; first release in Oct 2016

- **Stellar Classifications:** giant/dwarf classifications good to ~95%, T_{eff} problematic for low b; use with caution (similar to KIC/EPIC!)

- **Exoplanet Target Selection:** aim for ~80% K-M dwarfs, i.e. little overlap with asteroseismology

tCTL: Current Status