The Stellar and Observational Properties of the TESS Prime Mission 2-min Targets

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All data described in this poster will be distributed as machine-readable tables in an upcoming paper.

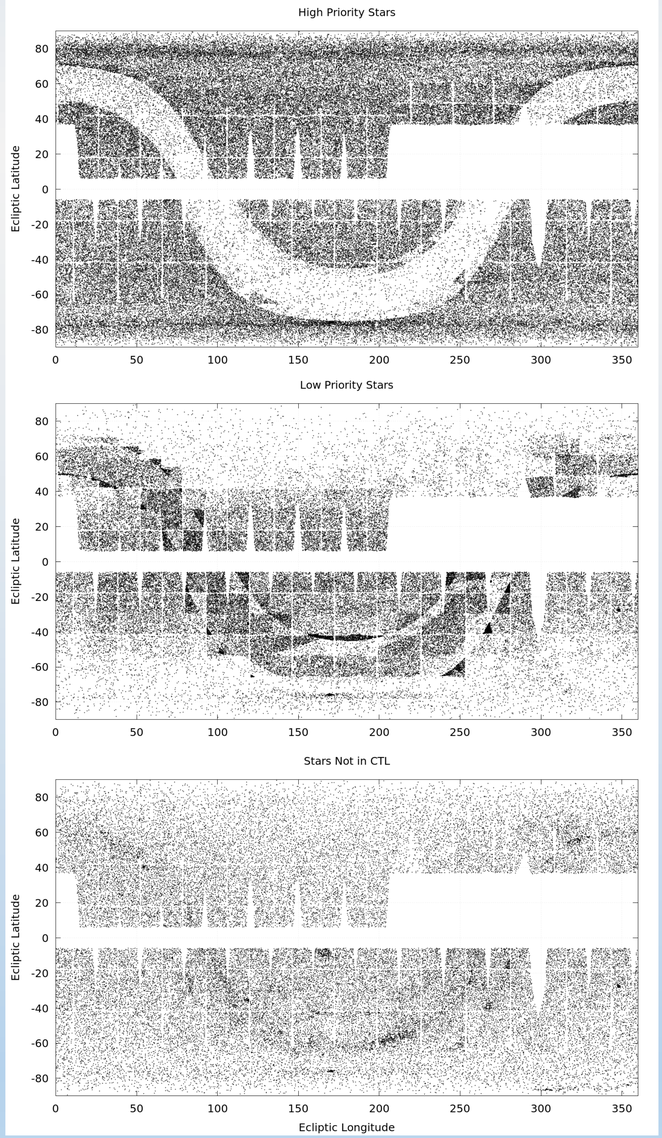


Figure 1: TESS observed 232,705 stars with 2-min cadence in the prime mission. The stars were selected for a number of science purposes, with the largest batch coming from the exoCTL, which prioritized stars based on their suitability for small planet transit detection and the length of time TESS observes them. Stars closer to the continuous viewing zones thus have higher priority. But the mission requires a certain number of target stars in each camera and CCD. Therefore the stars observed at mid-latitudes have different population characteristics than those at high latitudes, as shown in Fig 2 above.

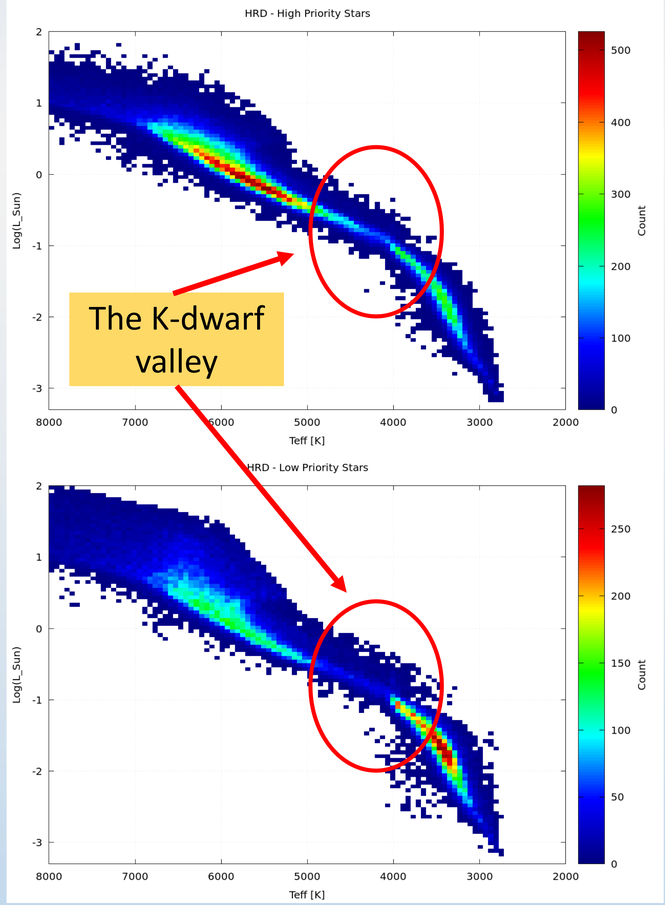


Figure 2: Stars are prioritized for transit observations according to their sensitivity to the smallest detectable transits. That depends on their brightness and size. F and G dwarfs dominate that set due to their brightness, while M dwarfs are also included due to their small size. Once the closest F and G dwarfs are included, M dwarfs (being more common) occupy the next batch of targets.

K dwarfs suffer in this metric due to being too faint for good photometric precision compared to F and G dwarfs, but too big to yield deep transits compared to M dwarfs.

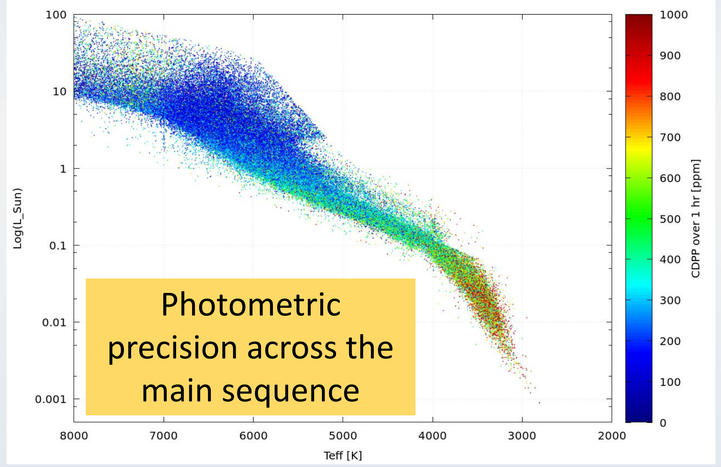
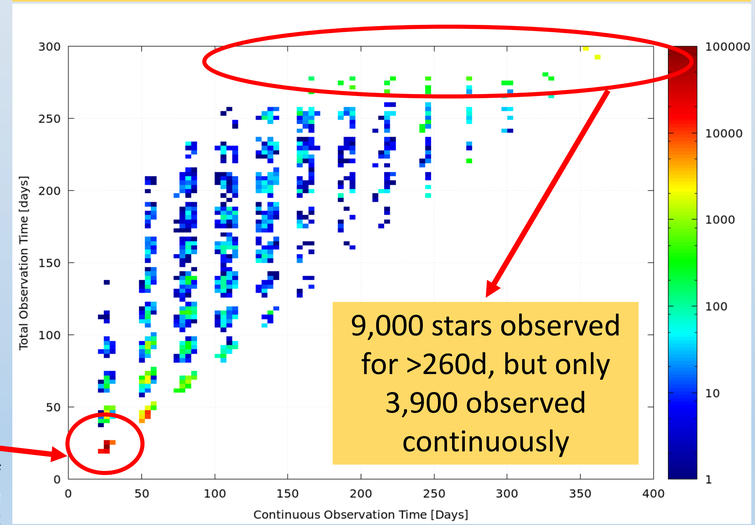


Figure 3: Since photometric precision is generally a monotonic function of apparent brightness, early-type stars being more luminous have more precise light curves. Although the TESS target selection process prioritized smaller stars at a given apparent brightness, late-type dwarfs are substantially fainter, yielding light curves with lower precision.

TESS Observing Duration Properties for all Targets

153,000 stars observed for one sector



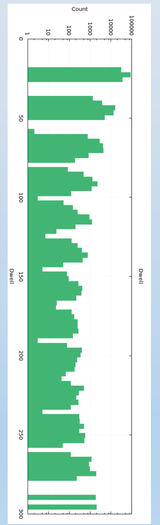
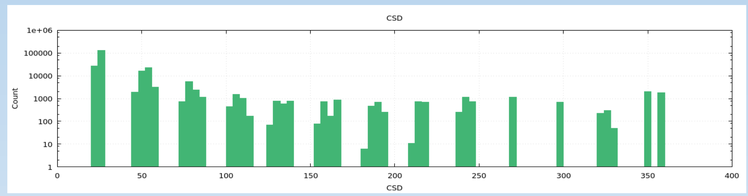


Figure 4: Most stars (abut 153,000 out of 233,000) were observed for just a single sector in the prime mission. But just because a star is in or near the continuous viewing zone, they are not necessarily observed during every sector, due to gaps between cameras or detectors. Only 3,900 stars were observed in 13 consecutive sectors.



See upcoming paper from Fausnaugh, et al.

References:

- Stassun, et al. 2018 “The TESS Input Catalog and Candidate Target List“ AJ, 156, 102
- Stassun, et al. 2019 “The Revised TESS Input Catalog and Candidate Target List“ AJ, 158, 138