

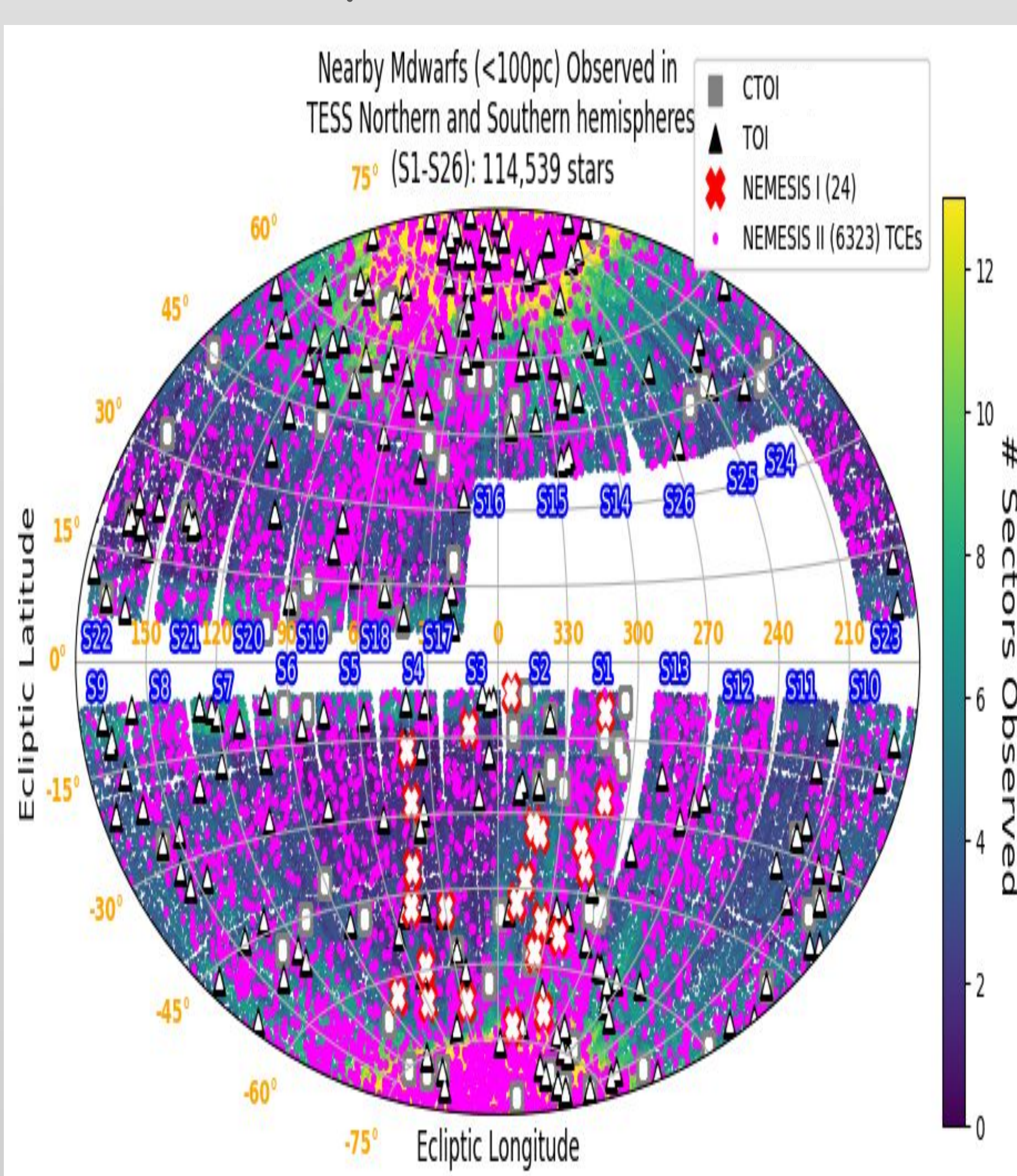


Abstract

- TESS has observed over 20 million stars with TESS magnitude < 13.5 using Full-Frame Images (FFIs).
- However, many M-dwarfs have TESS magnitude > 13.5, and were only observed with 30-minute cadences in prime mission.
- FFI transit surveys provide empirical insights into the types of planet detections that were missed due to TESS' observing mode strategy for faint M-dwarfs.
- Using the NEMESIS pipeline, we analyze ~114,539 FFI light curves from nearby M-dwarfs (<100 pc) in Sectors 1–26.
- Our preliminary analysis integrates both automated vetting tests and manual inspection to identify promising planet candidates.

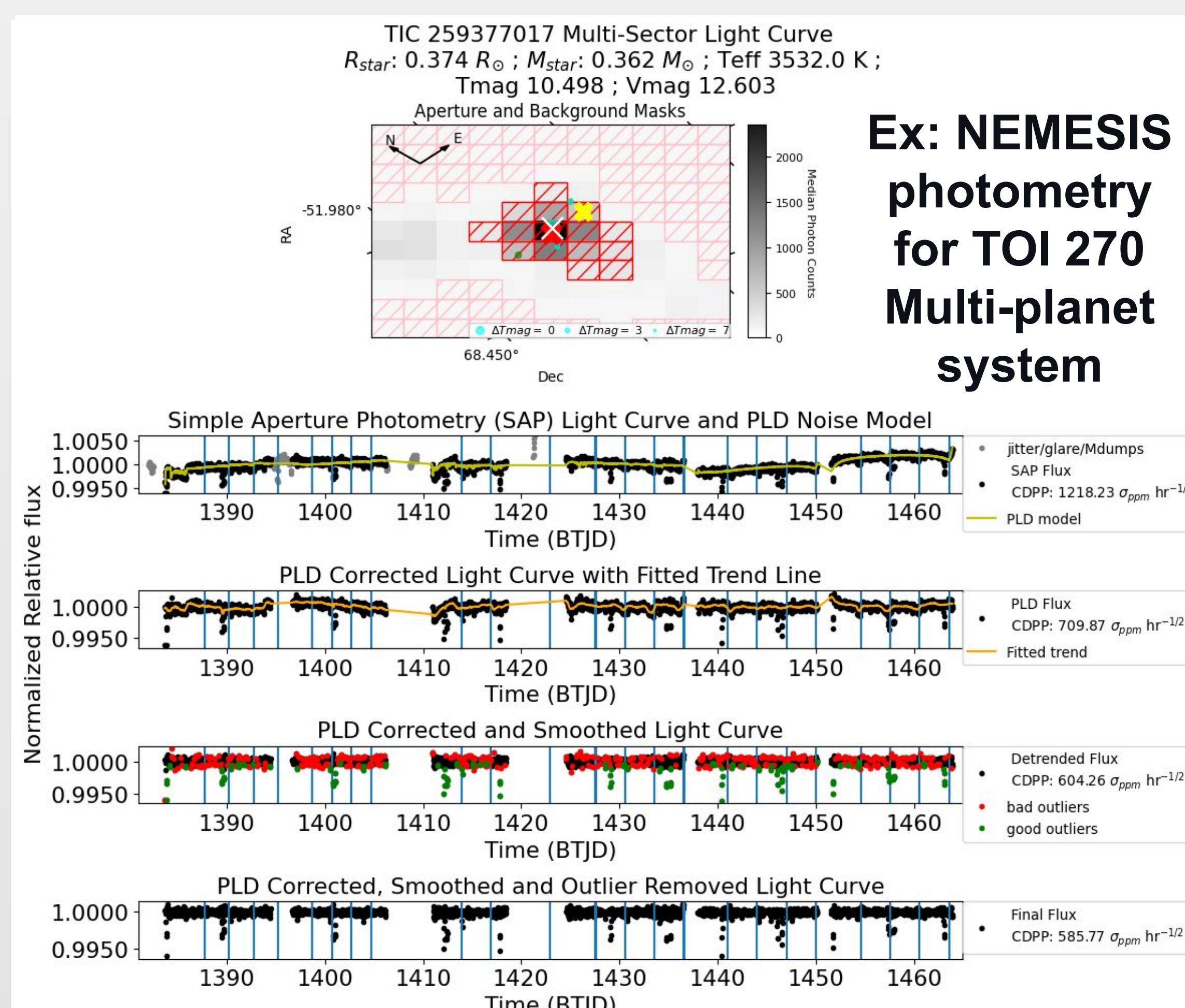
NEMESIS II Target List Selection Criteria:

- TESS mag < 18 & distance < 100 pc
- Removed duplicates and artifacts in TIC
- Crossmatch TIC with GAIA DR3
- $0.8 < G - GRP < 2$
- $0.3 < J - H < 0.8$
- $2300 \text{ K} < T_{\text{eff}} < 4000 \text{ K}$
- $7 < \text{Reduced } \mu \text{ in } J < 25$



Light Curve Extraction Pipeline

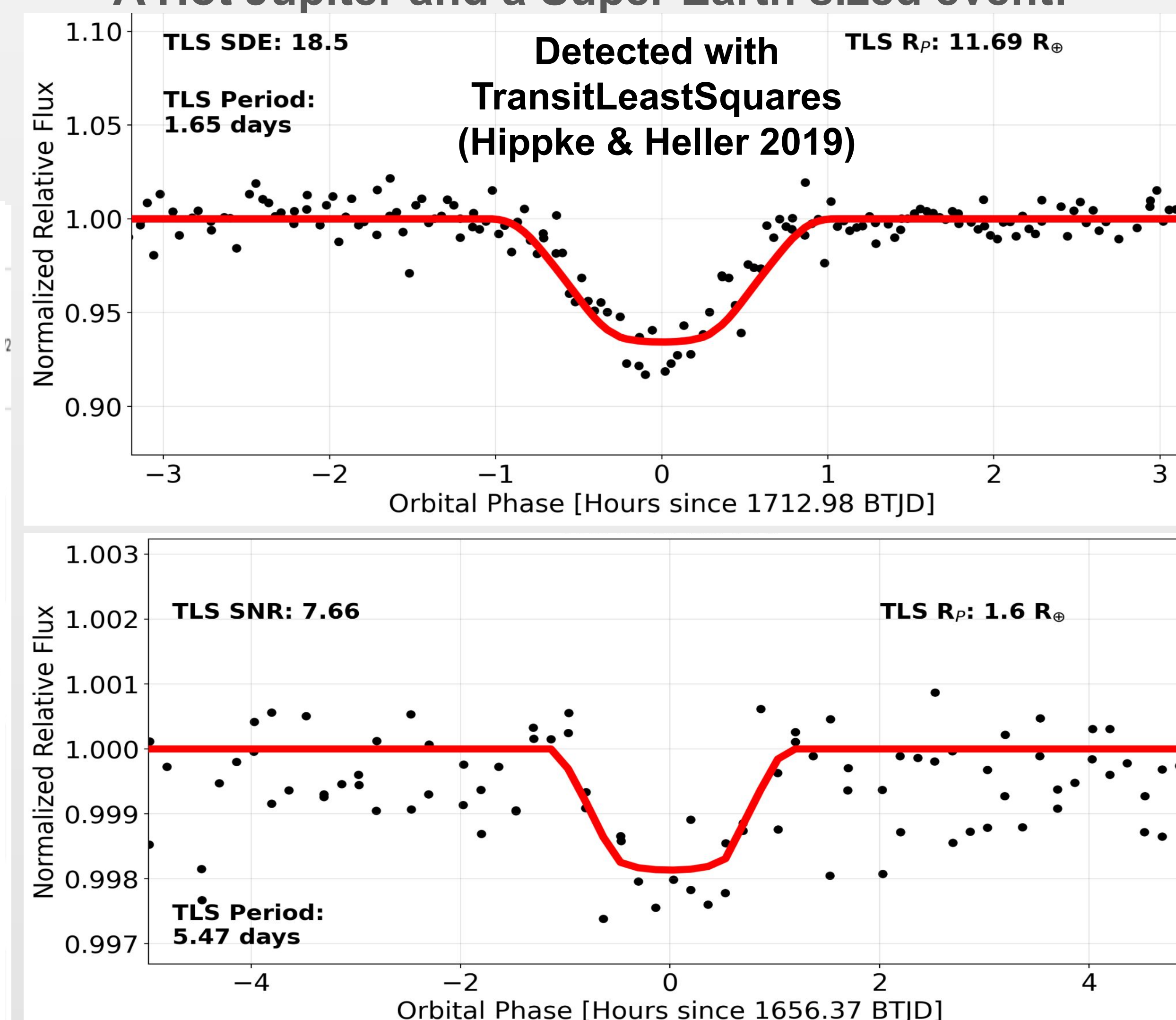
- SAP, background subtraction + flux decontamination
- Pixel Level Decorrelation
- Smoothing with Wotan's biweight (Hippke et al. 2019)
- Removal of non-consecutive outliers



Example TCEs and distribution in Period-Radius space

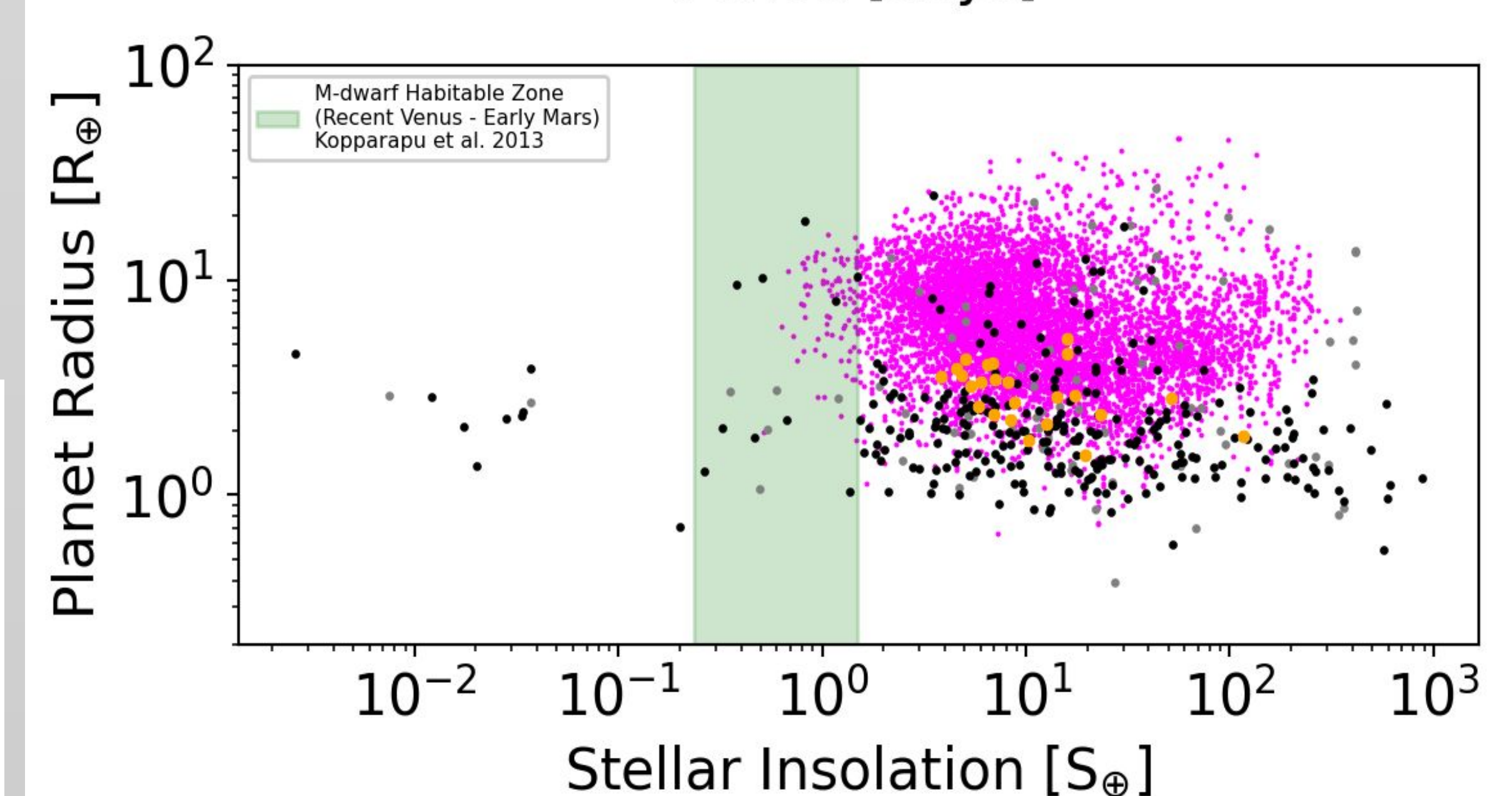
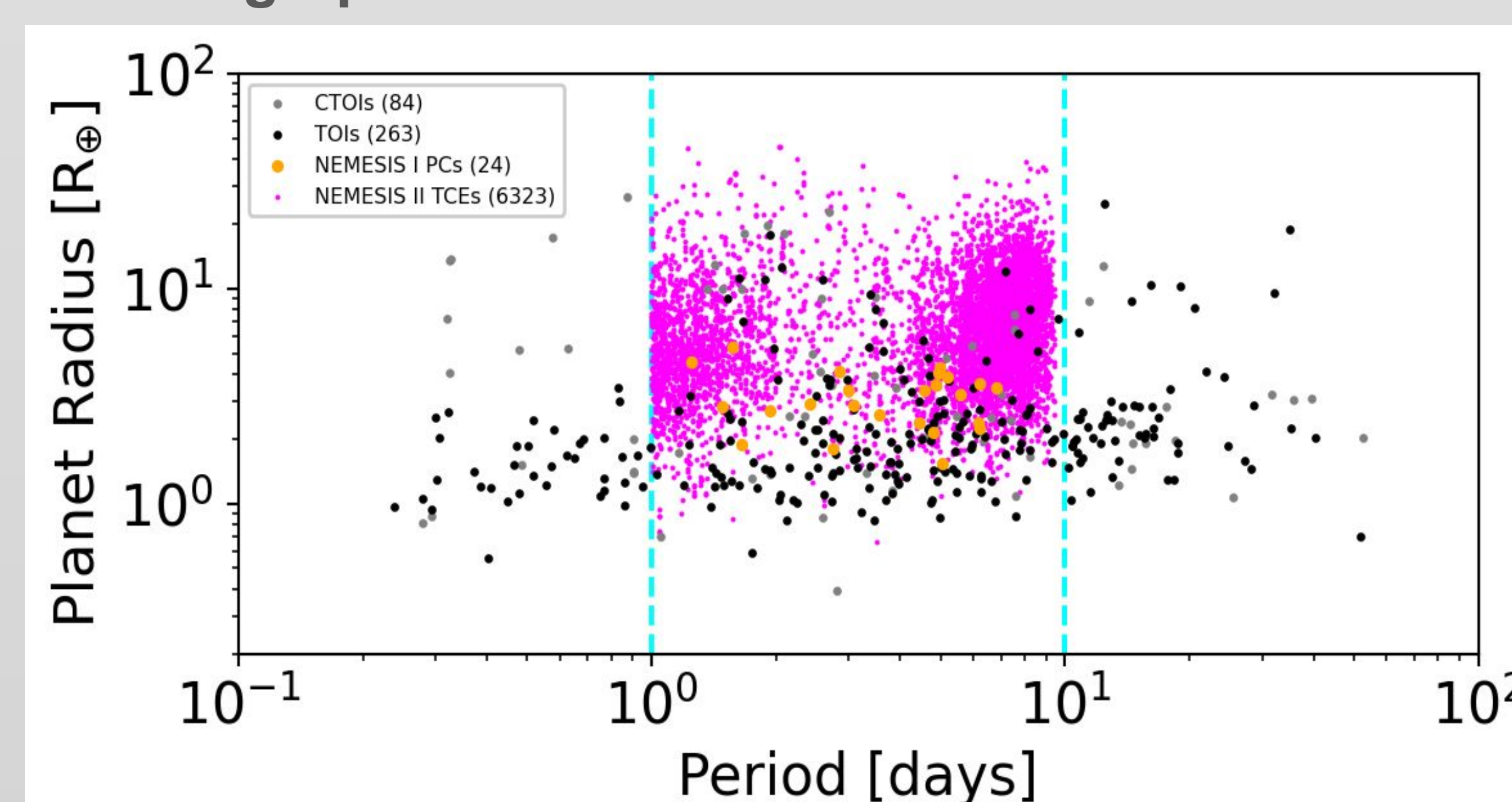
So far NEMESIS has found a couple of interesting Threshold Crossing Events (TCEs, SNR > 10):

- A Hot Jupiter and a Super Earth sized event!



Conclusion and Acknowledgements

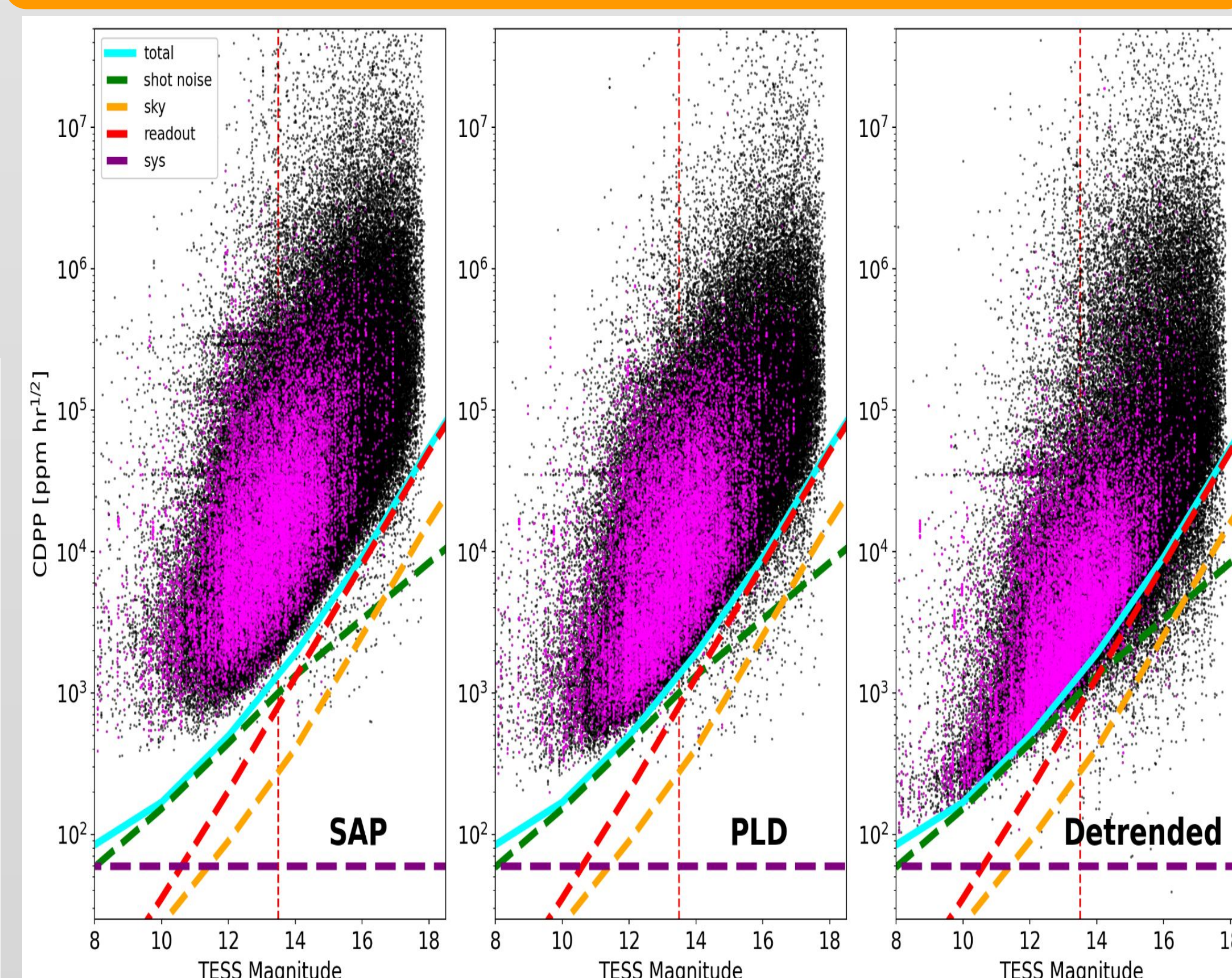
- At the moment, we currently have detected > 6,300 Threshold Crossing Events with SNR > 10.
- 77 happen to be in the Recent Venus - Early Mars Habitable Zone for M-dwarfs (Kopparapu et al. 2013)
- The detections of new planet candidates through this ongoing project will significantly enhance TESS's ability to improve the statistical power of demographic studies



We extend our sincere appreciation to the Sagan Workshop SOC and LOC for bringing us all together!

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NEMESIS Photometric Precision



Near-Future Work!

- Multi-Sector Transit searches!
- To vet TCEs as validated Planet Candidates, I will employ use of automated vetting tools (LEO-vetter & TRICERATOPS)

