TOI Catalog from the TESS Prime Mission

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TOI: TESS Object of Interest

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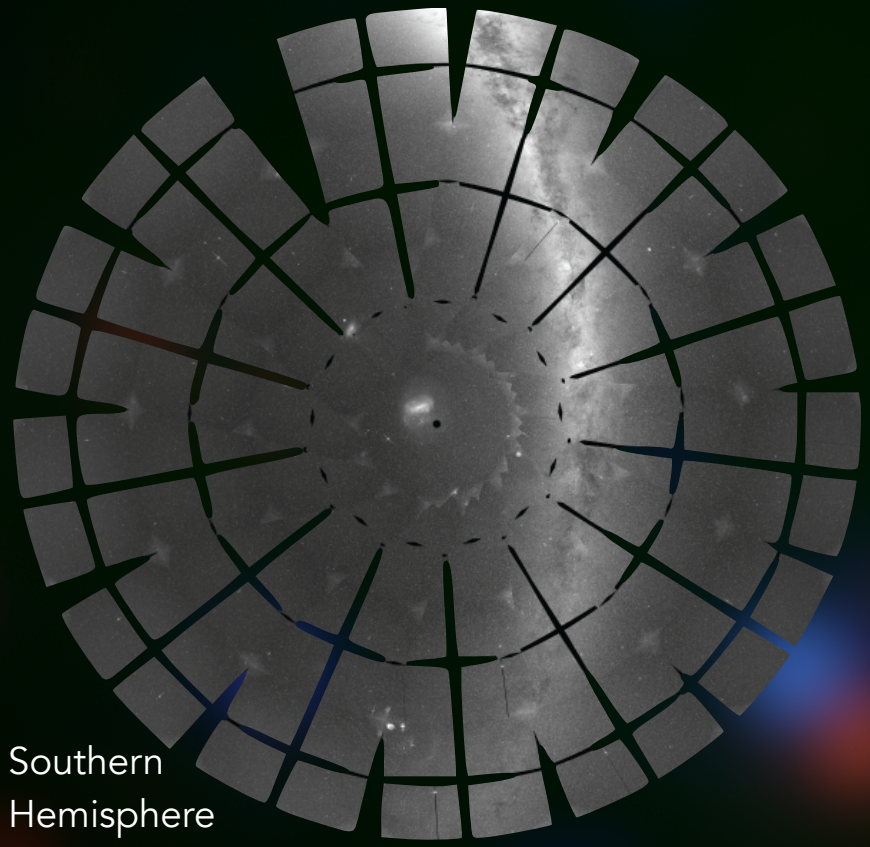
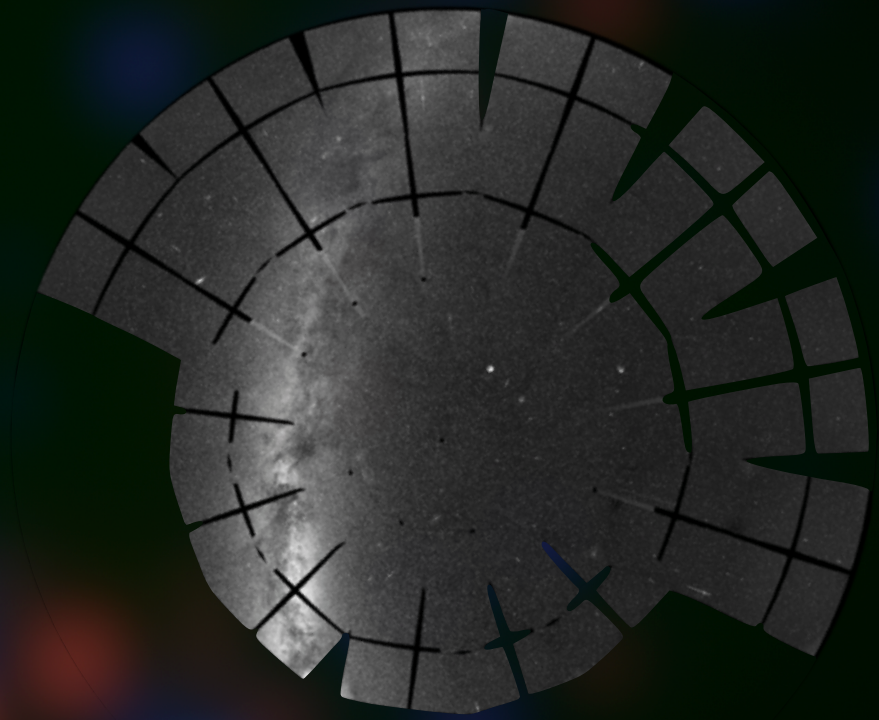
TESS prime mission: 4 cameras x 13.7 days/orbit x 2 orbits/sector x 26 sectors



Southern
Hemisphere



Northern
Hemisphere

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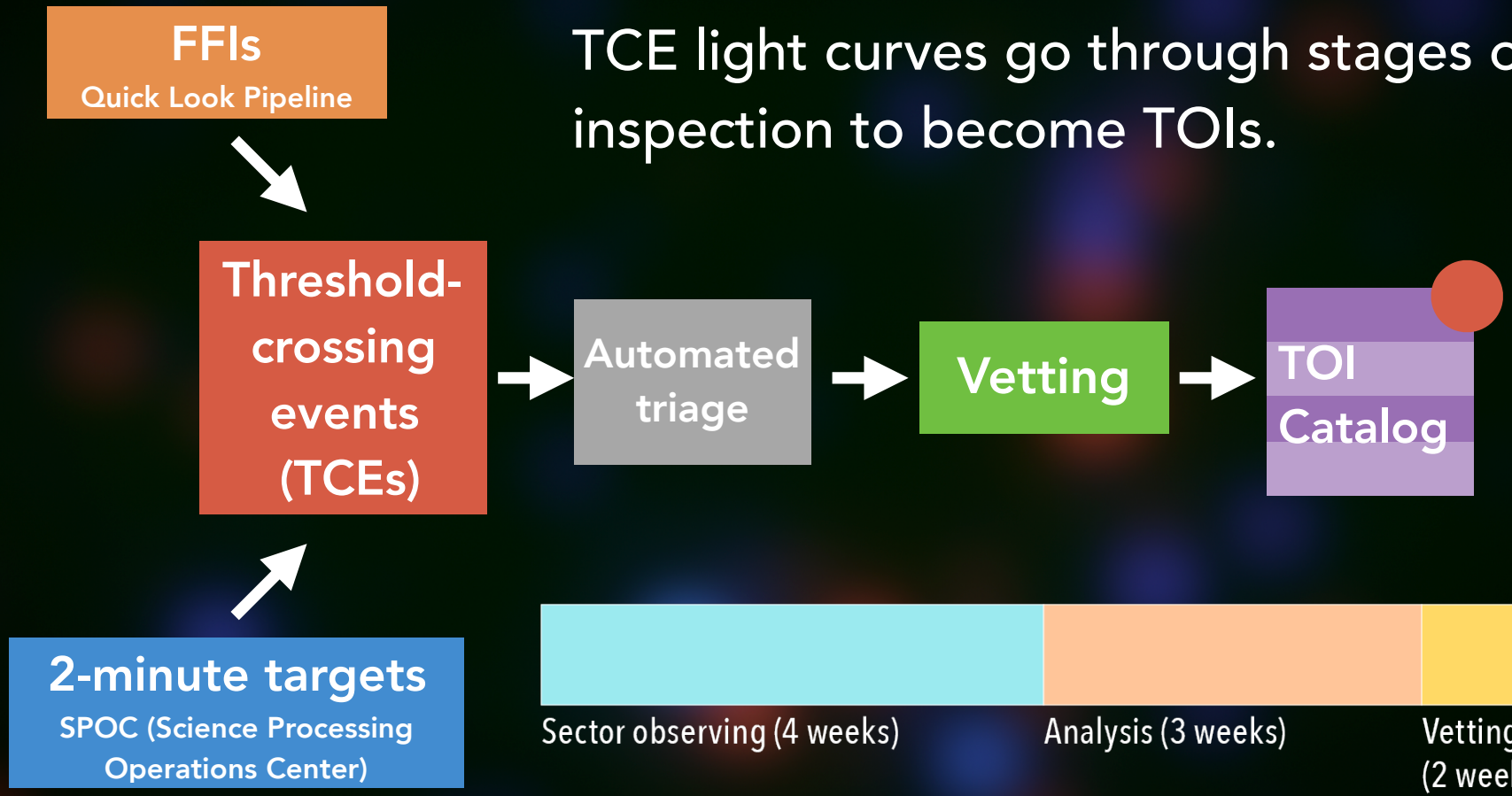
TCE light curves go through stages of inspection to become TOIs.



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Triage

FFIs
Quick Look Pipeline

AstroNet-Triage

Convolutional neural network triages phase-folded light curves into "transiting" and "non-transiting" categories. (Yu et al, arxiv:1904.02726)

Code and training set are publicly available!
https://github.com/yuliang419/AstroNet-Triage
https://github.com/yuliang419/AstroNet-Vetting

2-minute targets
SPOC (Science Processing Operations Center)

TESS ExoClass (TEC)

TESS Exo-Class (TEC) triages 2-minute targets with SPOC DV products using a decision tree and a database of attributes/metrics.

Code is publicly available!
https://github.com/christopherburke/TESS-ExoClass

2,174 planet candidates (so far!)

from twenty-six sectors

533 false positives

599 candidates smaller than Neptune

67 published planets and many more to come…

Exoplanet Archive (8/25/20)

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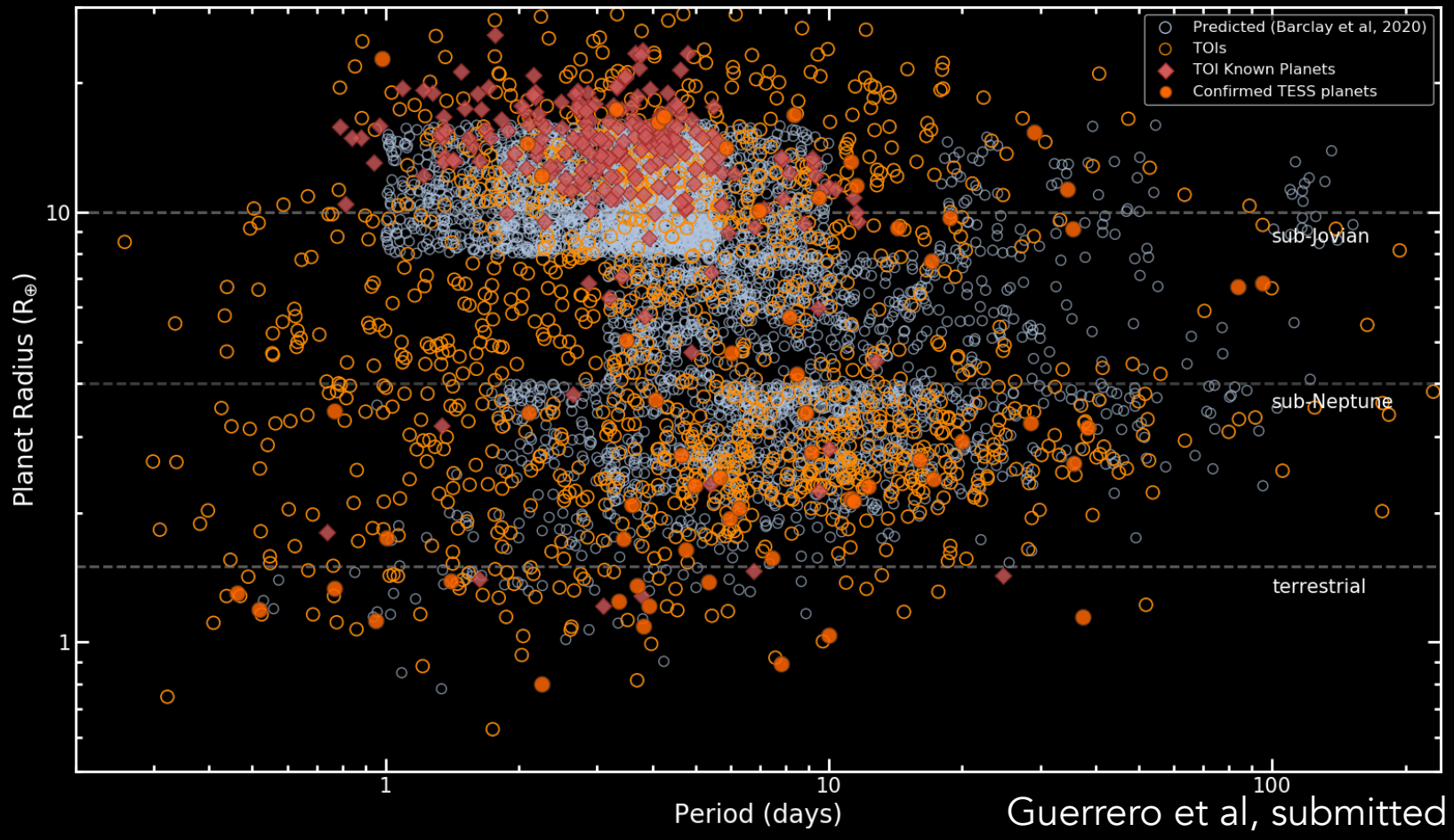
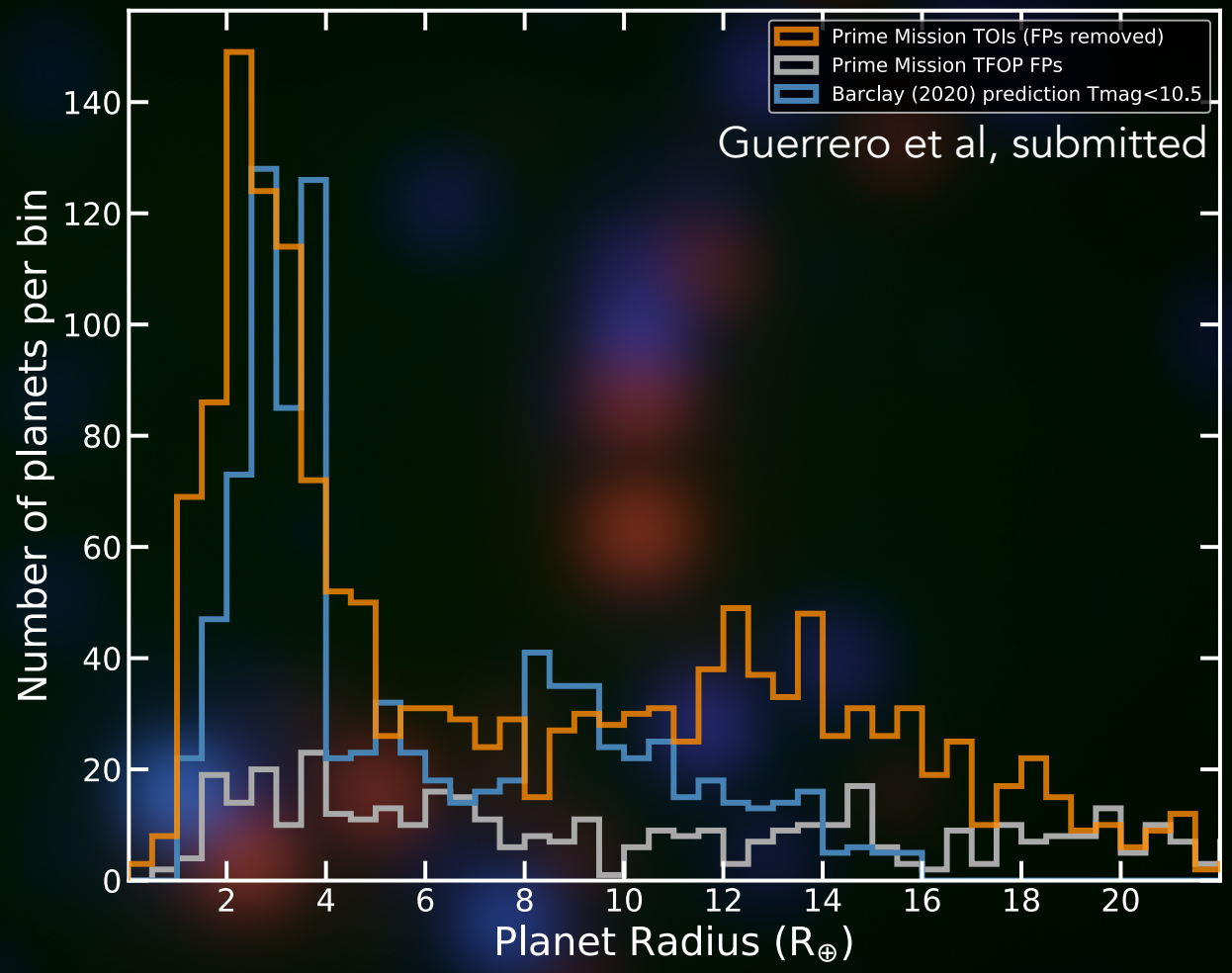
TOIs are diverse in period-radius space.



Guerrero et al, submitted

In prime mission,
abundant small TOIs,
excess large TOIs,
FPs across the board



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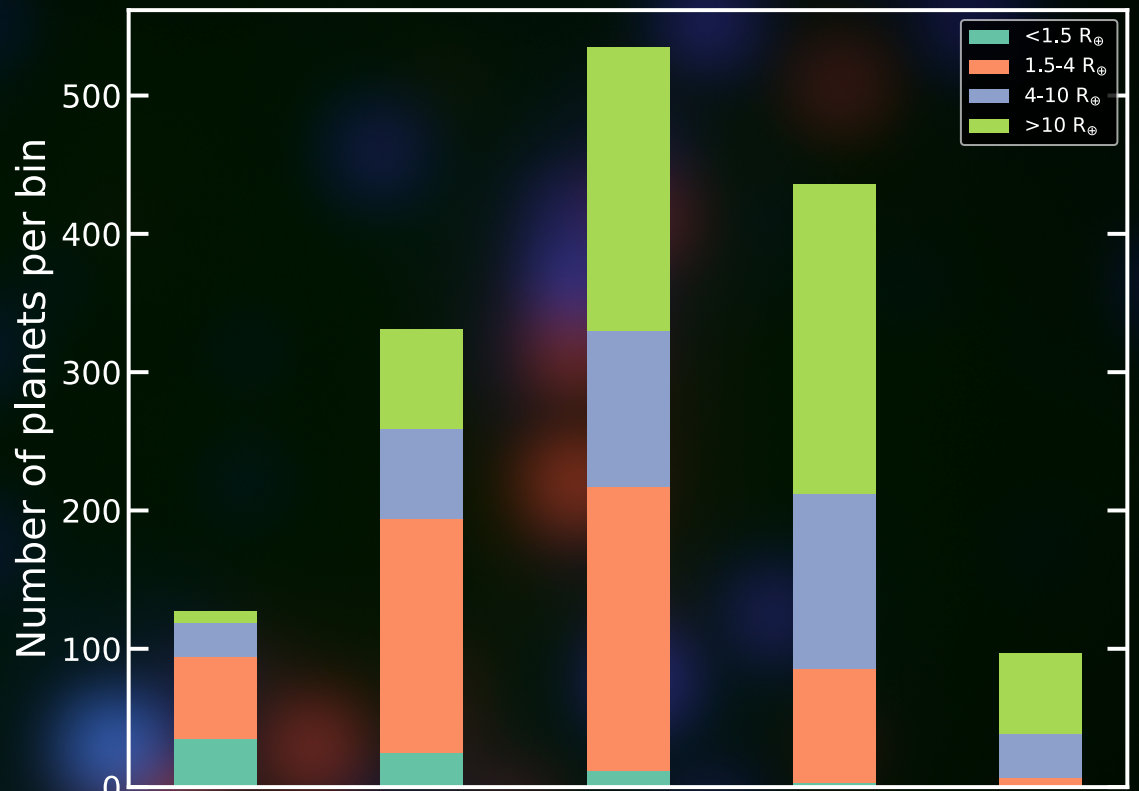
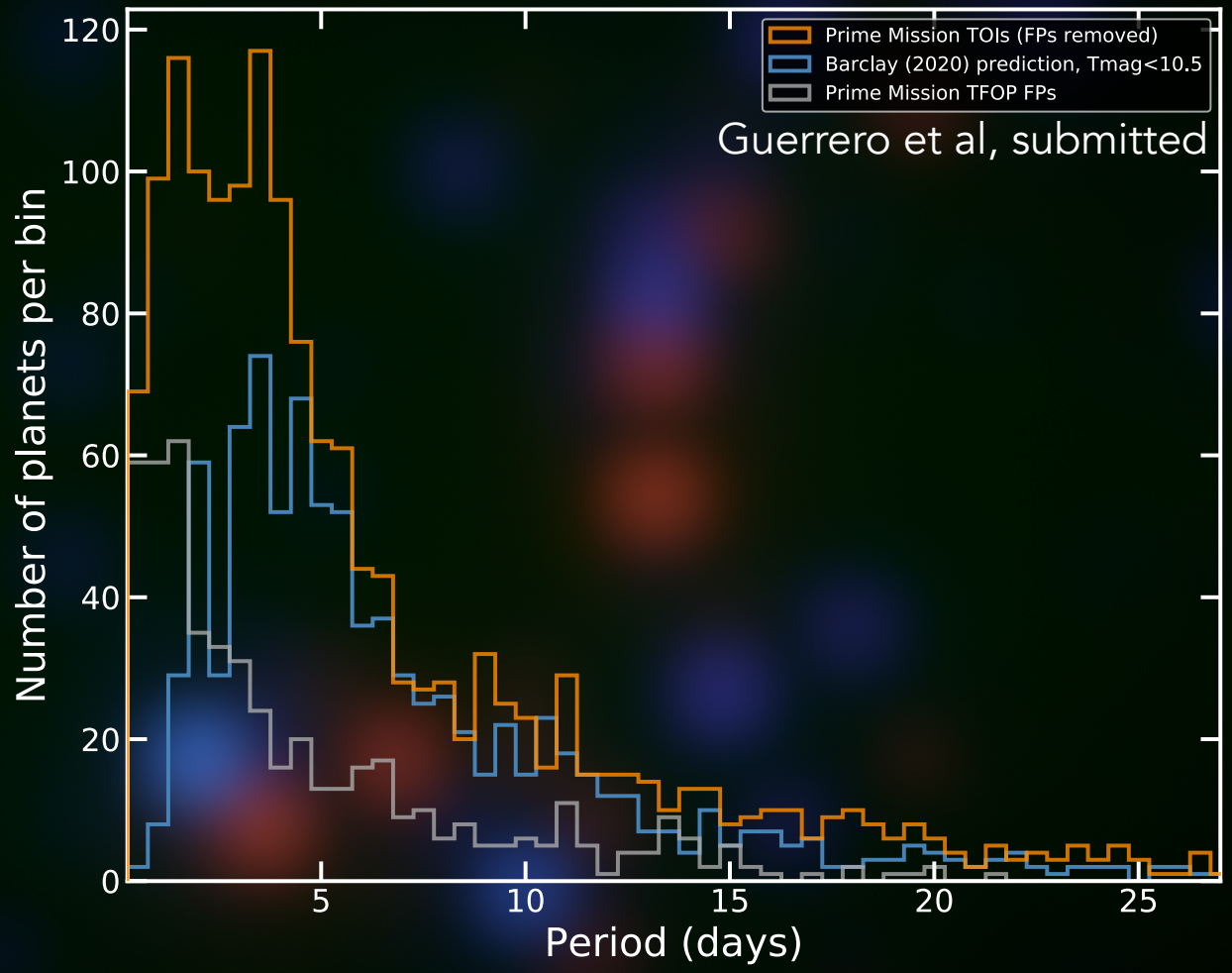
The TOI catalog provides sub-Neptune candidates around cooler stars.



	M	K	G	F	A
<1.5 $R_\oplus$	35	25	12	3	0
1.5-4 $R_\oplus$	59	169	205	83	7
4-10 $R_\oplus$	25	65	113	126	32
>10 $R_\oplus$	8	72	205	224	58

In prime mission,
many short-period TOIs,
an expected abundance
of short-period FPs.



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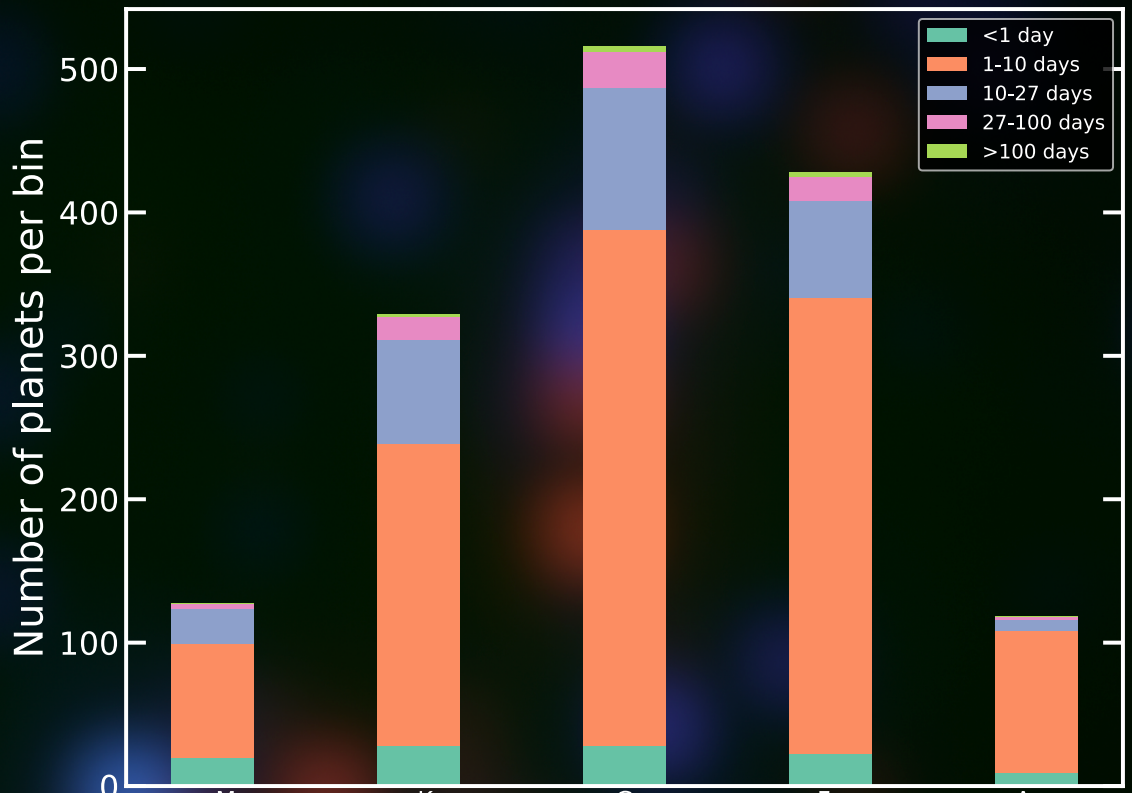
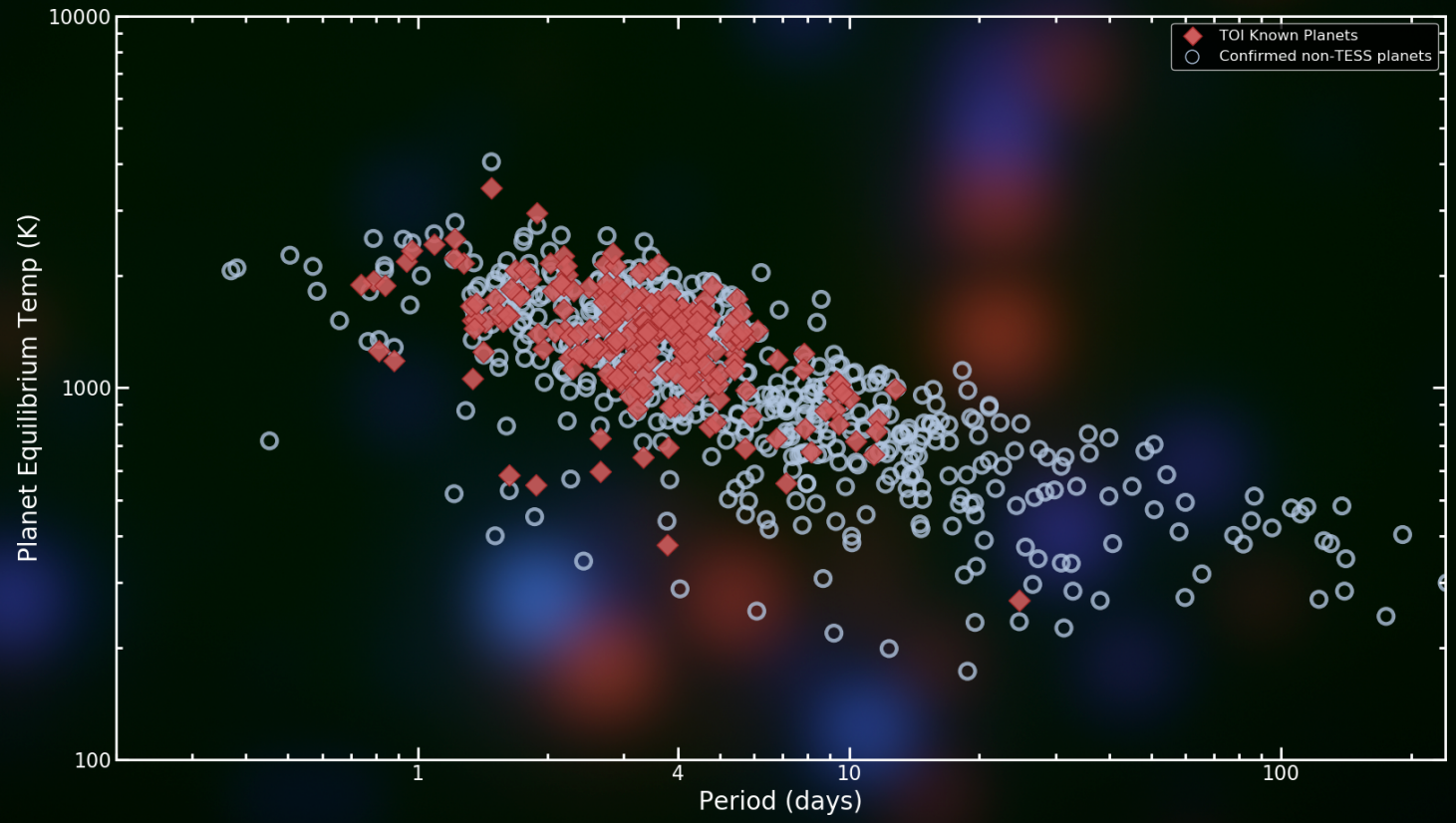
Short-period TOIs dominate each spectral type.



	M	K	G	F	A
<1 day	20	28	28	23	9
1-10 days	79	211	360	318	99
10-27 days	25	72	99	67	8
27-100 days	3	16	25	17	2
>100 days	0	2	4	3	0

Guerrero et al, submitted

Pre-TESS, there were many measured short-period, warm planets.



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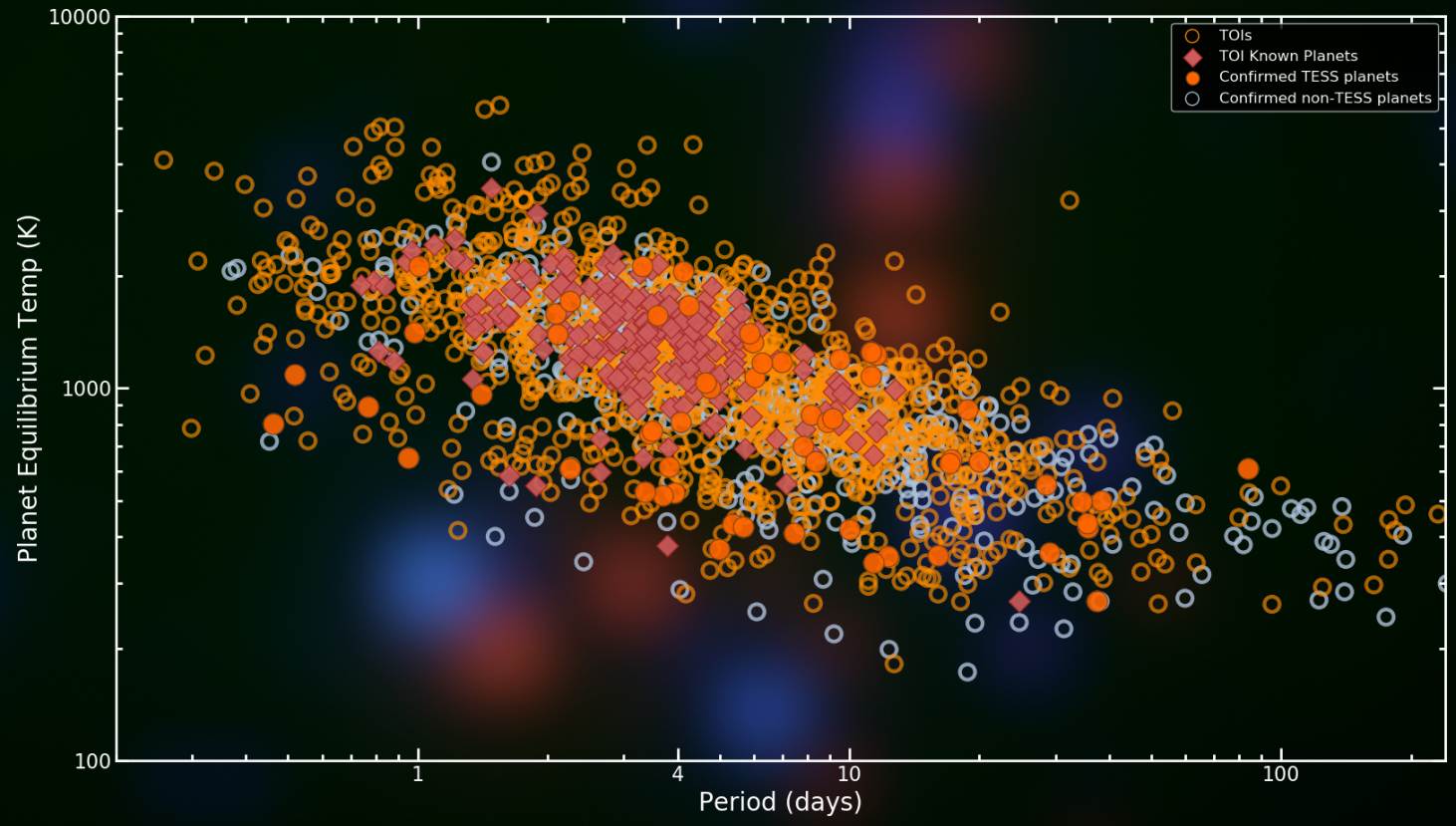
The TOI Catalog fills in and expands the edges of period-Teq space.



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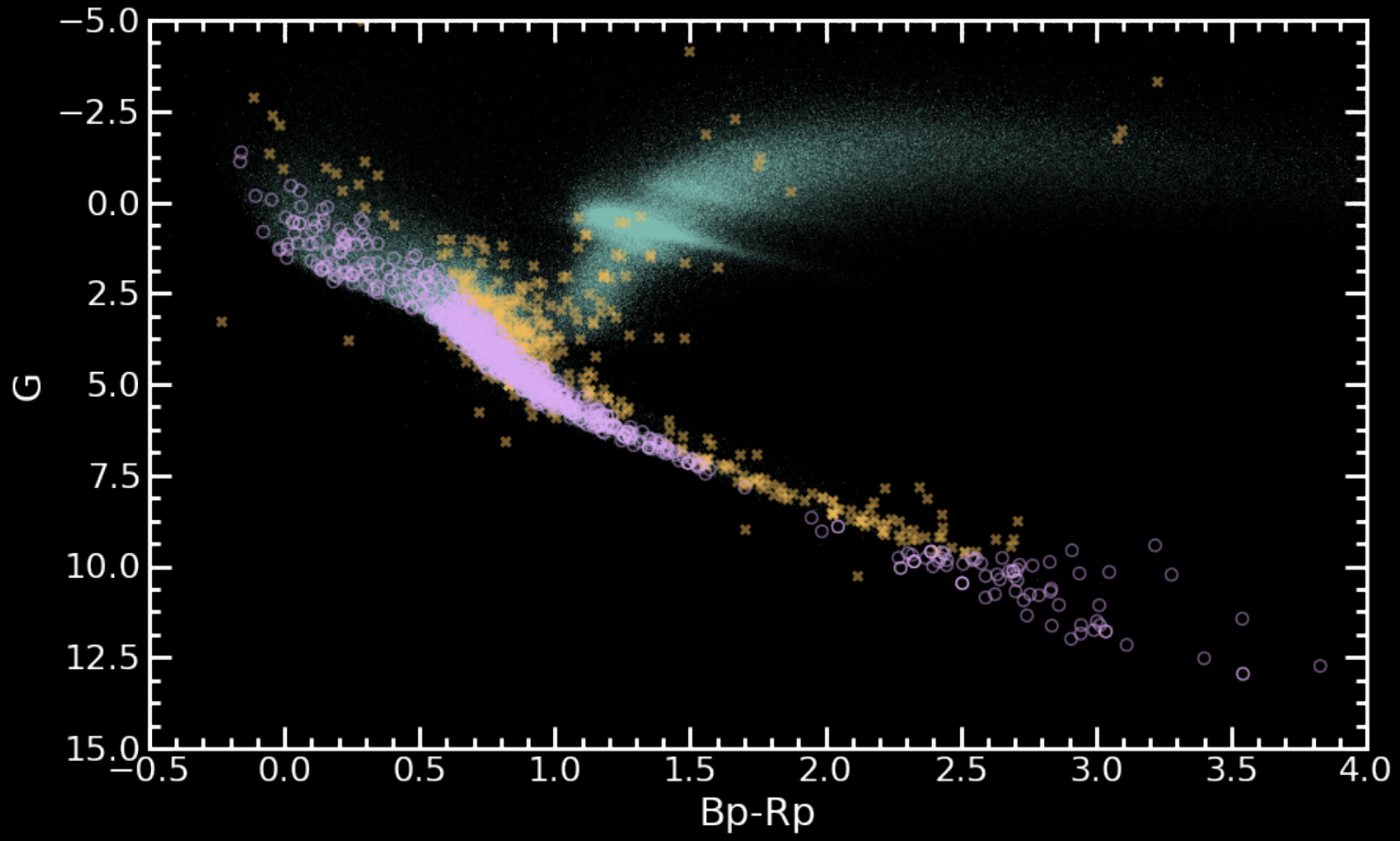
TOIs generally occur along the main sequence



Chelsea Huang for Guerrero et al, submitted


Extended Mission TOIs
Better ephemeris for Y1 TOIs. 166 in preliminary QLP search.
New TOIs! 107 in preliminary QLP search, vetting in progress.
~35 Planet Candidates , 3 Known Planets
Many more to come!
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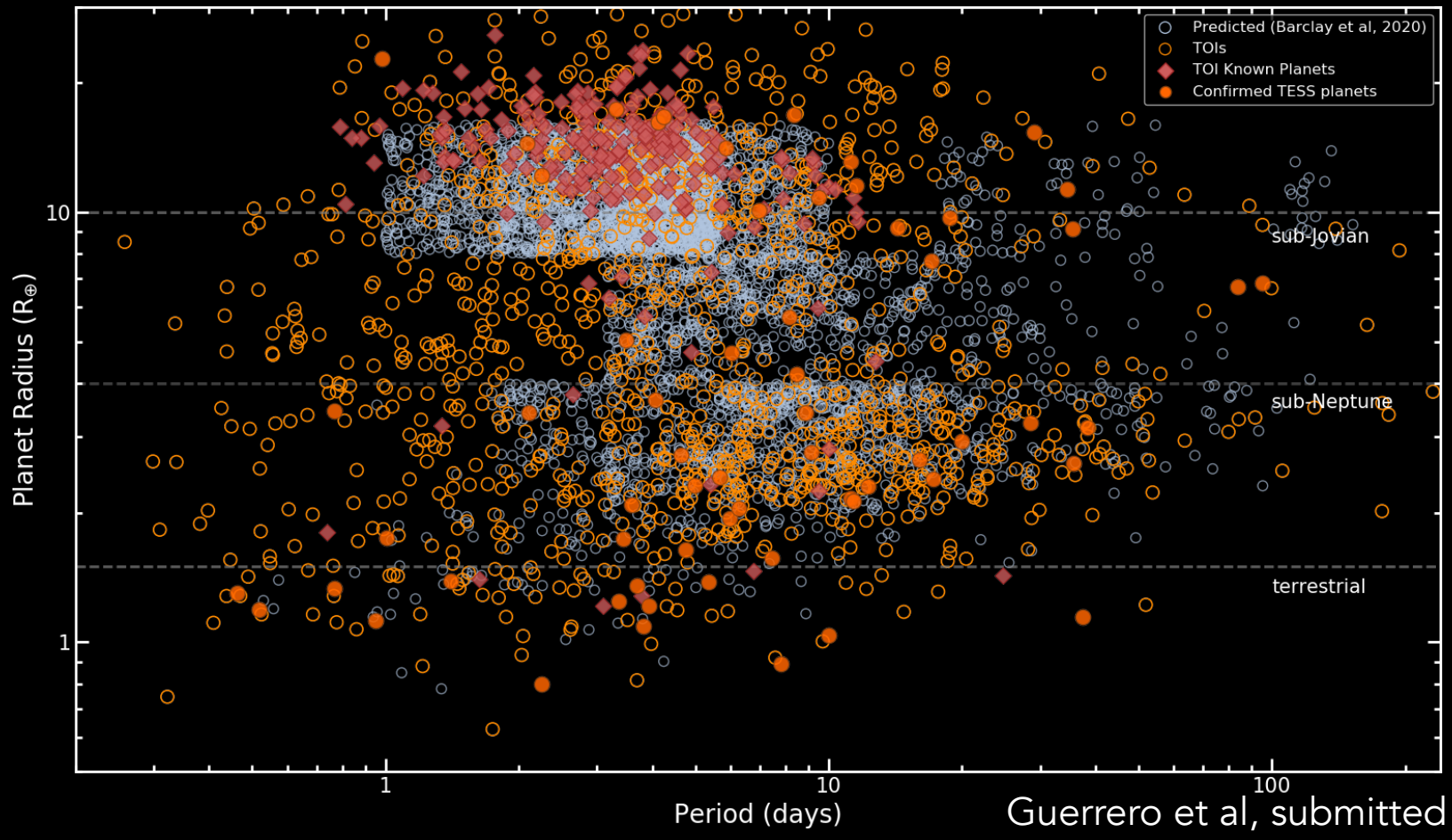
2,174 TOIs from the TESS Prime Mission + more to come!



Guerrero et al, submitted

Additional resources

TESS Observing Plan: tess.mit.edu/observations

TCEs on MAST: exo.mast.stsci.edu

TOIs on ExoFOP: exofop.ipac.caltech.edu/tess

Community light curve vetting: planethunters.org