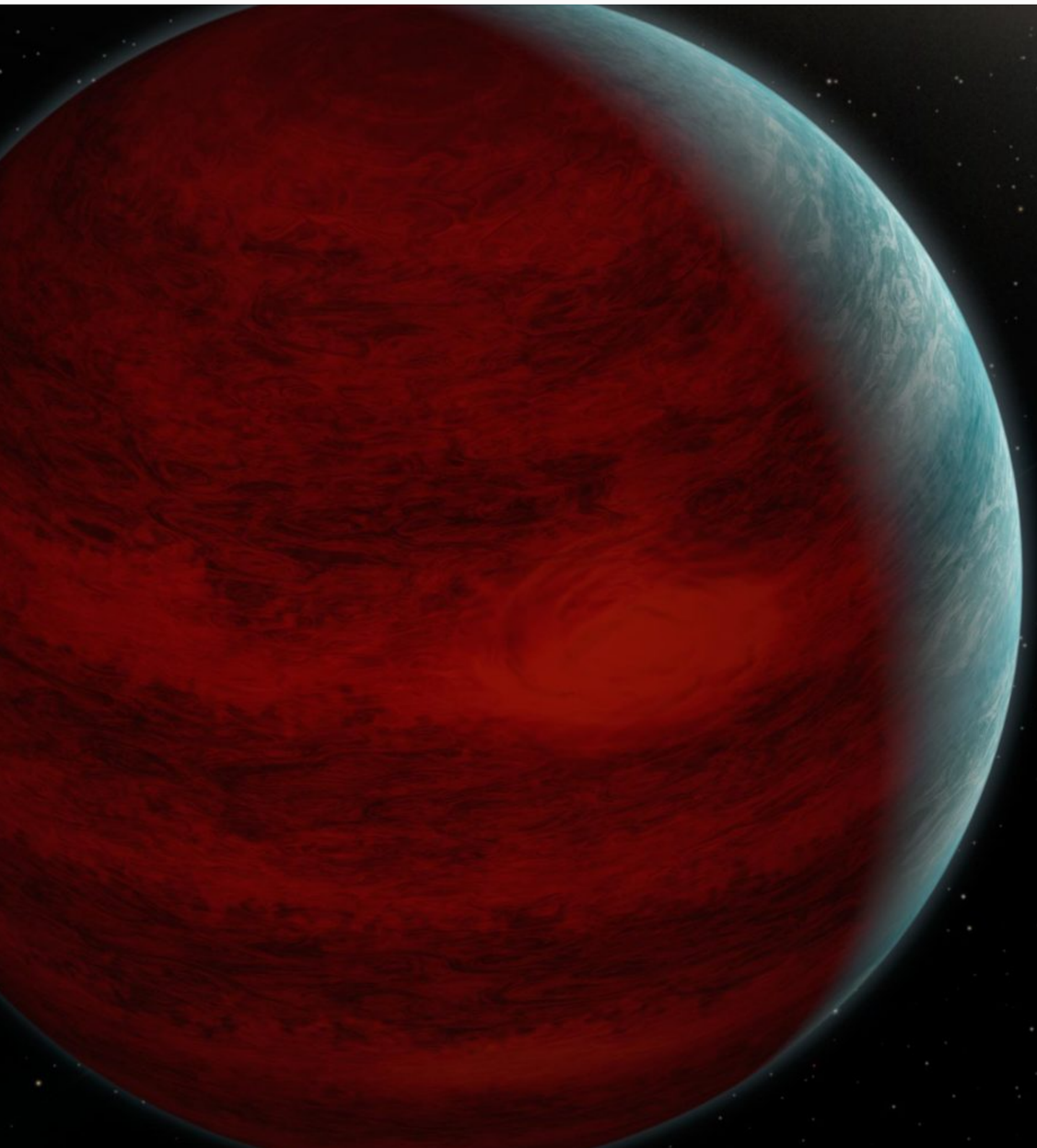
From Transits to Trends: the Next Decade of Long-Period Exoplanets



August 5 - 8, 2025
University of New Mexico, Albuquerque, NM

Meeting Summary and Takeaways

Diana Dragomir - SOC chair

Jan. 3, 2026 - ExoPAG 33

Scientific Rationale

Goals:

1. highlight recent results in the detection, characterization and demographics of transiting exoplanets with orbital periods in the tens-to-hundreds of days

2. foster discussion on how to best maximize the scientific return of studies of this population of exoplanets

3. help inform future observing strategies and mission development

Acknowledgments

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Jessie Christiansen (IPAC/Caltech)
Diana Dragomir (UNM)
Nestor Espinoza (STScI)
Zahra Essack (UNM)
Sam Gill (University of Warwick)
Renyu Hu (JPL)
Monika Lendl (U. Geneva)
Malena Rice (Yale University)

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Mallory Harris (UNM)
Ismael Mireles (UNM)
Dominic Oddo (UNM)
Brett Skinner (UNM)
Sarah Stamer* (UNM)

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This workshop (including travel support) was largely made possible thanks to a NASA TESS Key Project grant 80NSSC23K0769 (“TESS Reaches for Cooler Planets”; PI Dragomir).

Transits to Trends Program

	8/4 MONDAY	8/5 TUESDAY	8/6 WEDNESDAY	8/7 THURSDAY	8/8 FRIDAY
8:30 AM					
8:45 AM		Welcome + Intro			
9:00 AM		**Ulmer-Moll (Keynote)**	**Dittmann (Keynote)**	**Christiansen (Keynote)**	**Fortney (Keynote)**
9:15 AM					
9:30 AM		Collins	Skinner	Rodel	Hyder
9:45 AM		Wheatley	Feliz	Jordan	Zilinskas (to be given by Hu)
10:00 AM		Sgro	Harris	Welsh	Claringbold
10:15 AM		Osborn	Ment	Tubthong	
10:30 AM		Coffee break	Coffee break	Thomas	Coffee break
10:45 AM				Coffee Break	
11:00 AM		Brahm	Oddo		Sikora
11:15 AM		Gill	Schlaufman		Yang
11:30 AM		Lin			Pass
11:45 AM		***Poster Pops***	***Discussion***	***Discussion***	***Discussion***
12:00 PM					
12:15 PM					
12:30 PM		Lunch			Lunch
12:45 PM			Lunch		
1:00 PM					
1:15 PM					
1:30 PM		Martin	**Izidoro (Keynote)**		Bayliss
1:45 PM		Polanski			**Wilson (Keynote)**
2:00 PM		Garcia-Mejia	Meyer		
2:15 PM		Essack	Chachan		**Mortier (Keynote)**
2:30 PM		DiTomasso	Coffee break		
2:45 PM		Mireles		Free afternoon	Coffee break
3:00 PM		Coffee break			
3:15 PM					
3:30 PM		Rajkumar	***Discussion***		***Discussion***
3:45 PM		Johnson			
4:00 PM		Rhem			
4:15 PM					
4:30 PM		***Discussion***			
4:45 PM					Concluding Remarks

Follow-Up and Characterization

Detection

Formation

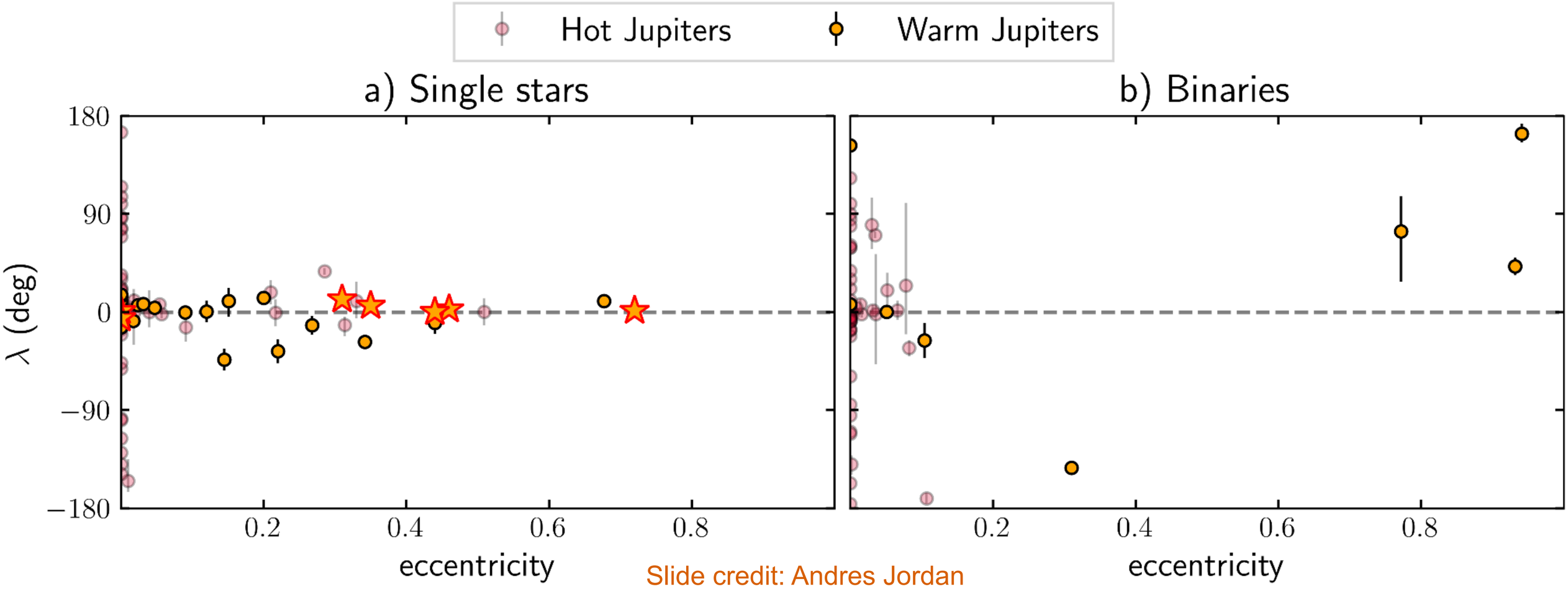
Demographics

Atmospheres

Future

Eccentric WJs are particularly well aligned

Espinoza-Retamal, Jordan, et al 2025AJ....170...70E



Slide credit: Andres Jordan

Atmospheres

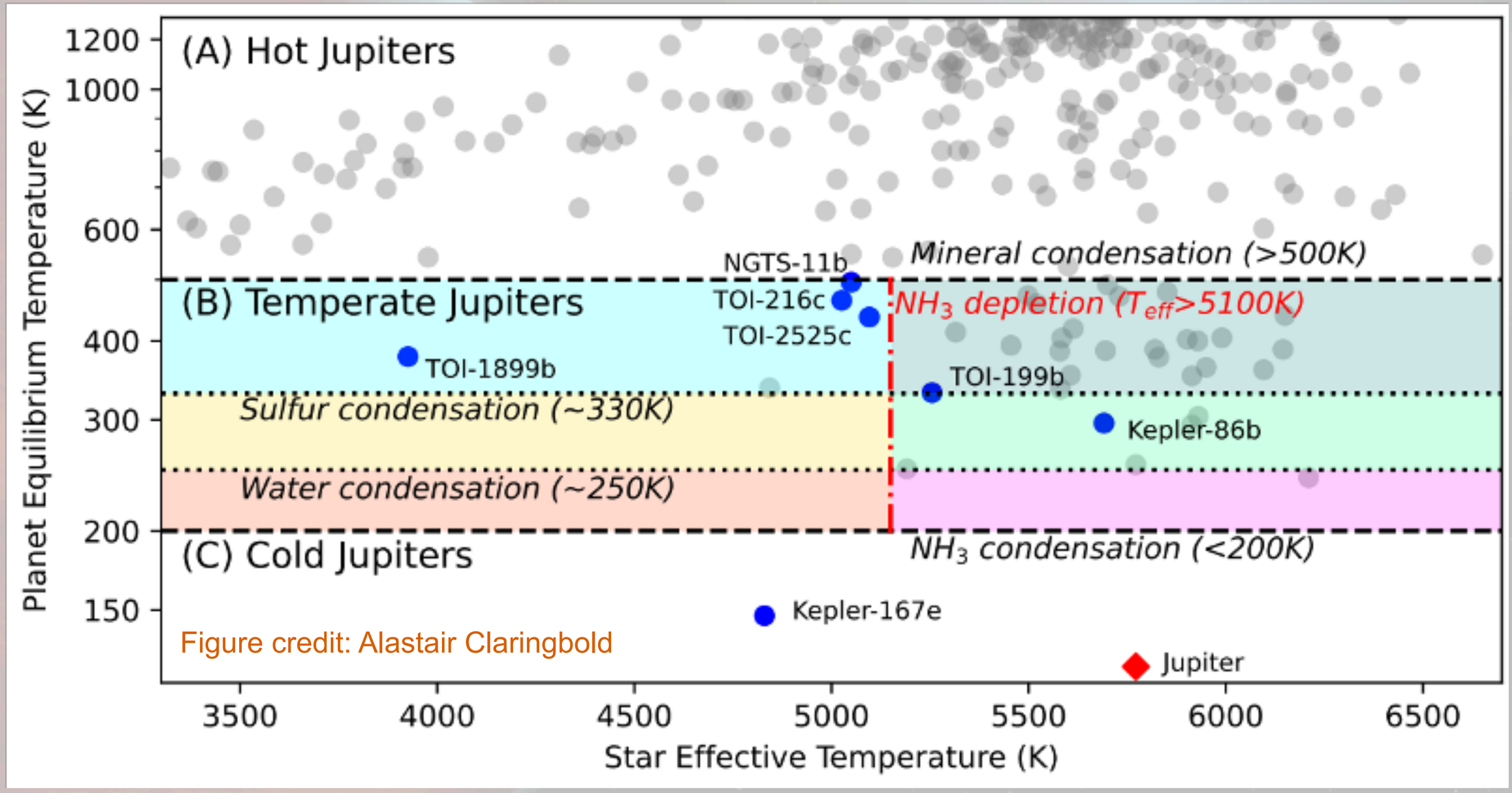
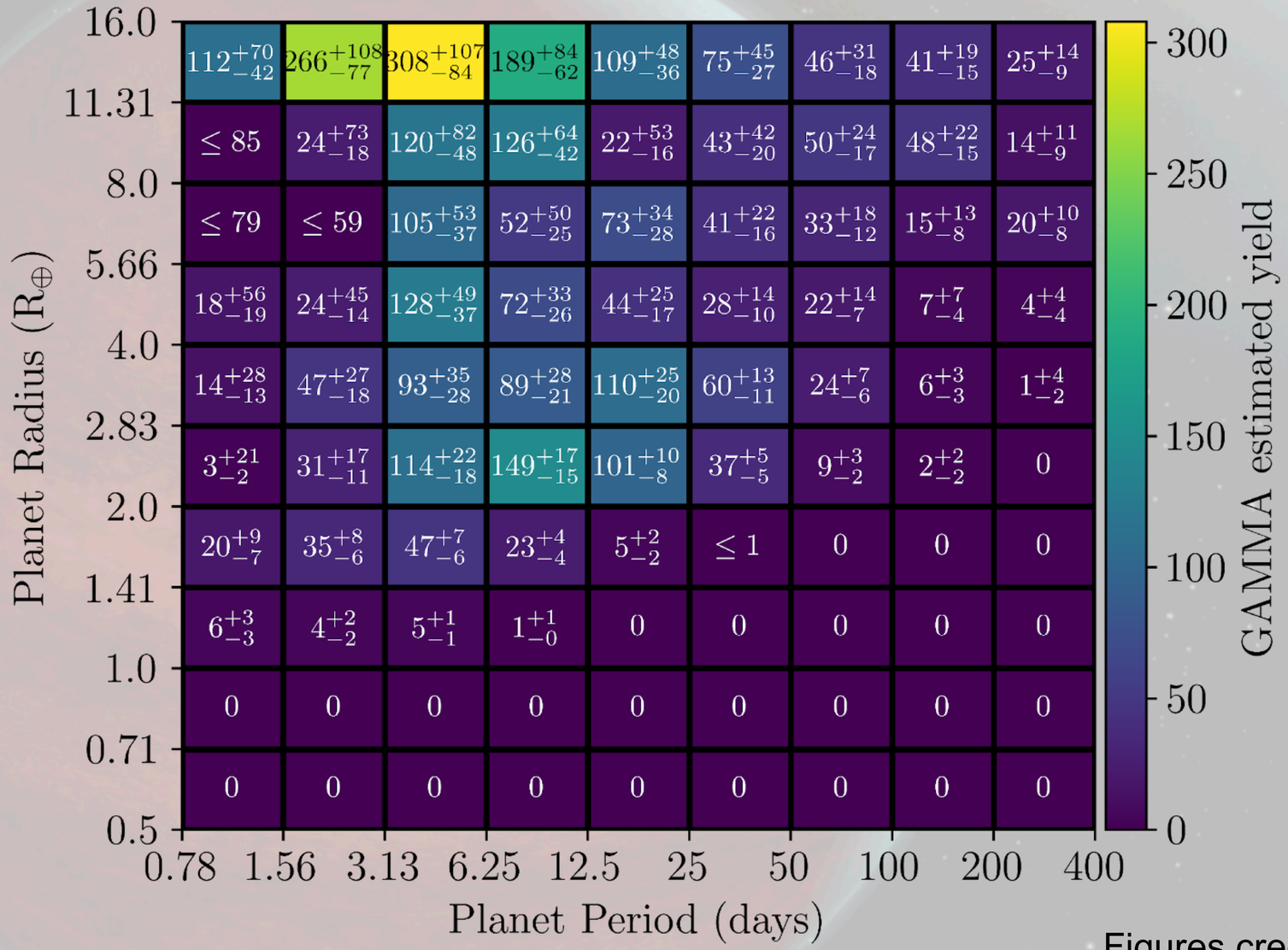
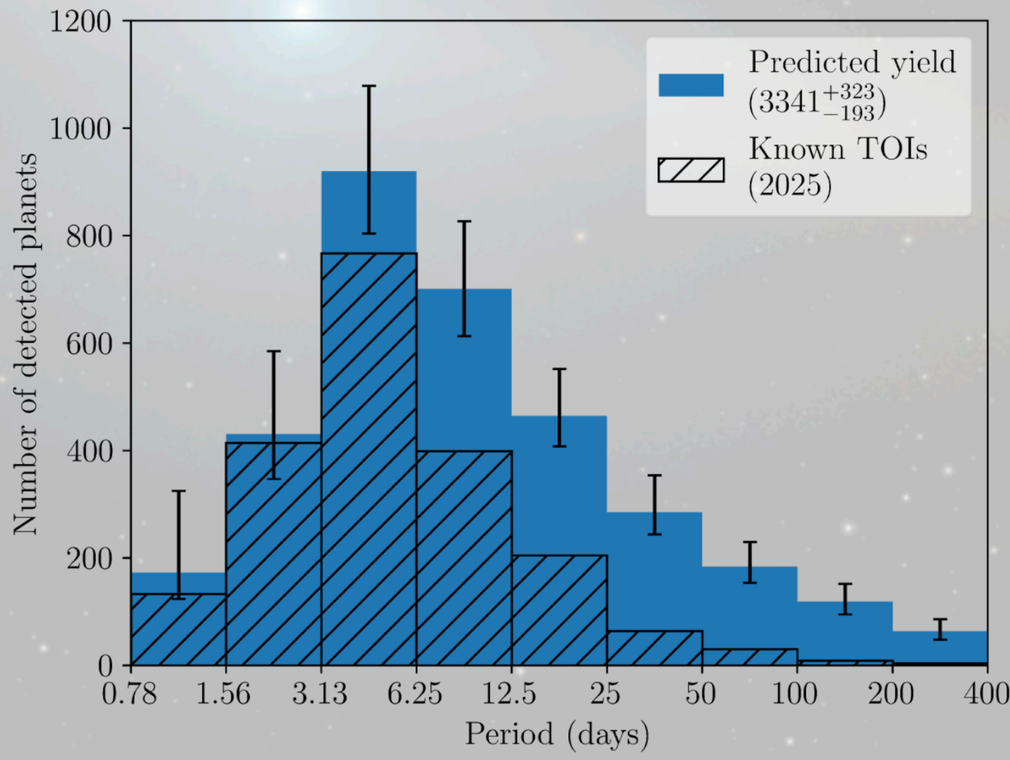


Figure credit: Alastair Claringbold

TESS is still hiding some long-period planets

Yields and TOI counts based on Years 1, 3 and 5





Figures credit: Toby Rodel

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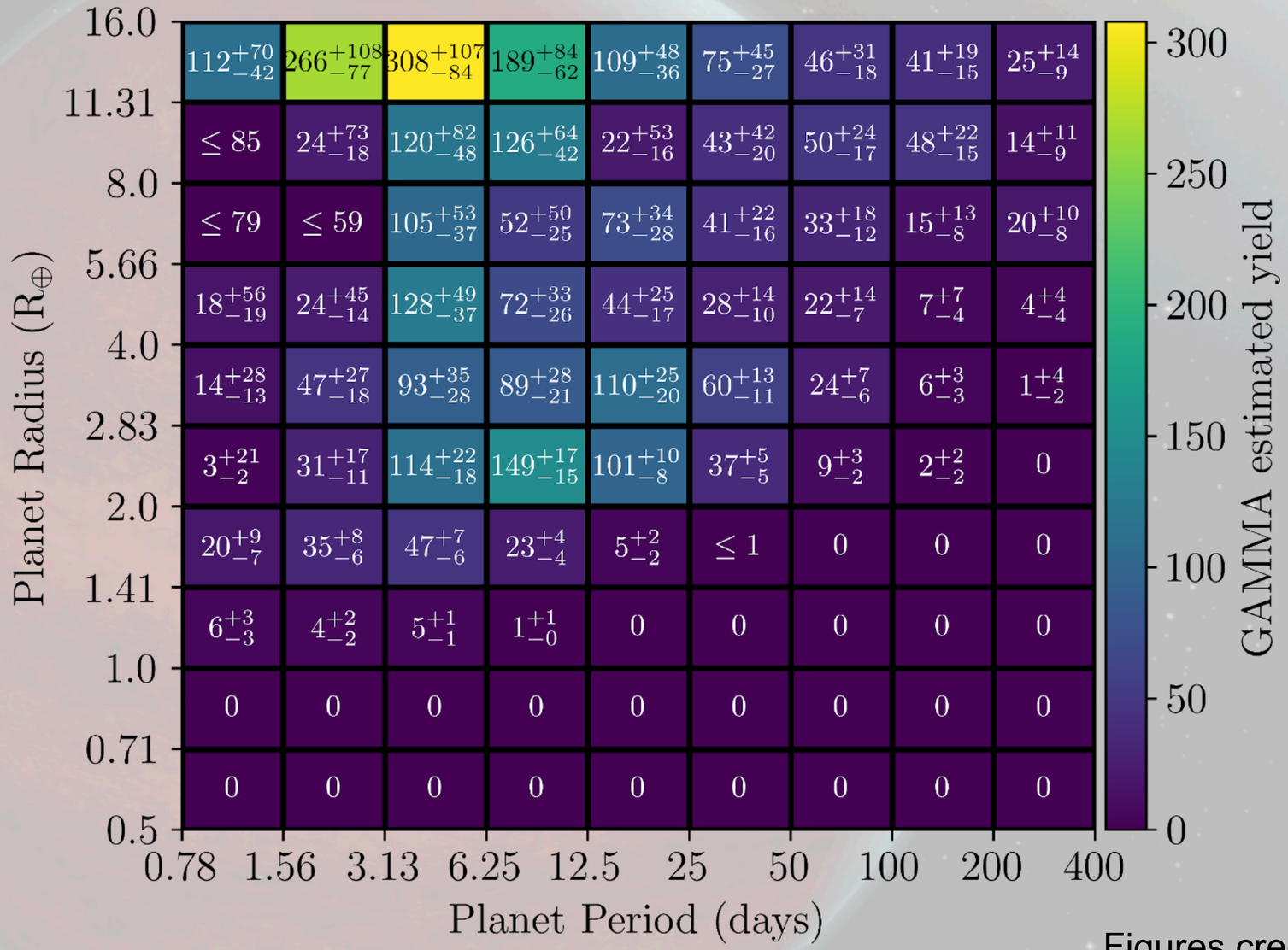

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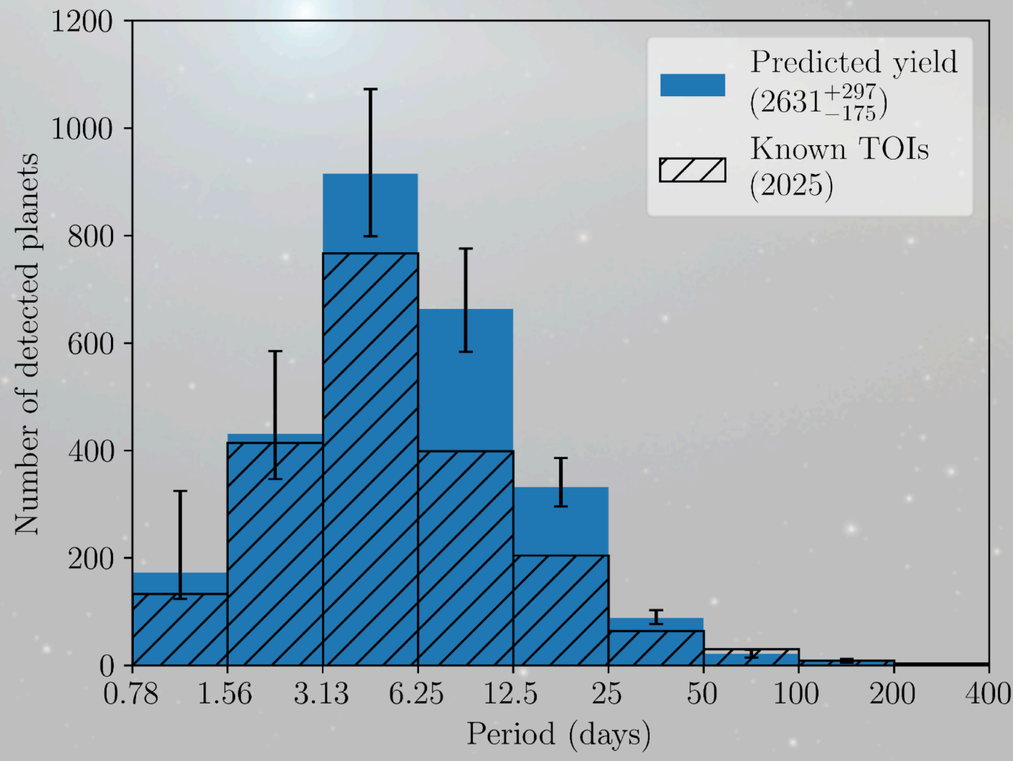

After 3 TESS years, most previously ambiguous periods (monos, duos and some multis) should be solved.

Figures credit: Toby Rodel

Coordination of follow-up of TESS duo-transit PCs

Target	TIC	TOI	RA	Dec	TTF	LCO Auto Schedule	KA	Pipe-line	Sec-tor	Active_Aliases	Cur Eph Unc (min)	Dur Unc (min)	Delta Tc (min)	N Obs	Owner/Interest/ Publication Status	Comments
																A 9, 163.9366777 A 11, 134.130009 A 13, 113.494623 A 15, 98.3620066 A 17, 86.79000582 A 19, 77.65421574 A 21, 70.25857614 A 23, 64.14913474 A 25, 59.01720396 A 27, 54.64555922 A 29, 50.87689997 A 31, 47.59451932 A 33, 44.710003 A 35, 42.15514569 A 37, 39.87648916 The next observation should be a focused high precision (<1.0 ppt/10 min) full transit in a red (r', R, i', I, z) filter to determine the alias, source and timing of the event. When submitting observation report, included the period and alias from the TTF "Period" column, and any duplicate aliases listed at the end of the TTF comments field. Also, place the period and alias information in the notes field on ExoFOP. These values must be extracted from the TTF output row corresponding to the date of observation.
22317640.11	22317640	60.11	12:15:38.237	-47:11:53.27	TTF	0m4p	3	TSTP	S10	1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37	3	3	0	0	Brett Skinner TSTPC duo	
																other stars in apeture; possible blend Greg Srdoc analyzed s10,s37,s63,s90 and found only active alias is s26. Super-period = 704.8855280 d A 26, 27.11098185 The next observation should be a focused high precision (<1.0 ppt/10 min) full transit in a red (r', R, i', I, z) filter to determine the alias, source and timing of the event. When submitting observation report, included the period and alias from the TTF "Period" column, and any duplicate aliases listed at the end of the TTF comments field. Also, place the period and alias information in the notes field on ExoFOP. These values must be extracted from the TTF output row corresponding to the date of observation.
22442522.12	22442522	60.12	12:25:09.412	-22:45:26.16	TTF	0m4p		TSTP	S37	26	7	4	0	0	Brett Skinner TSTPC duo Greg Srdoc Possible TTVs	
																v-shaped, CORALIE 8, vetted, RV variation of 60 m/s over 1 month, (NGTS is also following up this duo) Greg Srdoc anlayzed s10,s36,s37,s63,s90 and limited active aliases to 20. Super-period = 707.663465. A 20, 35.38317325 The next observation should be a focused high precision (<1.0 ppt/10 min) full transit in a red (r', R, i', I, z) filter to determine the alias, source and timing of the event. When submitting observation report, included the period and alias from the TTF "Period" column, and any duplicate aliases listed at the end of the TTF comments field. Also, place the period and alias information in the notes field on ExoFOP. These values must be extracted from the TTF output row corresponding to the date of observation.
162305348.13	162305348	60.13	11:16:37.826	-44:11:39.69	TTF	0m4p		TSTP	S37	20	34	23	0	0	Brett Skinner TSTPC duo	
															Brett Skinner	

Maximizing scientific return of long-period planet studies

A few questions that could be addressed with transiting planets:

1. Does sub-Neptune composition differ between aligned and misaligned systems? What about giant planet composition?

2. Does the migration rate of sub-Neptunes and super-Earths depend on planet mass? (Might need PLATO + Gaia + lots of RVs for this one)

3. Is the current preference towards alignment for warm-Jupiters compatible with the dynamic environment of stellar clusters?

4. Does planet formation differ for planets around M dwarfs vs. FGK stars? (Need composition and orbital properties for a range of orbital periods)

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Jason Dittmann's Controversial Statement: The last planet with an orbital period of ~100s of days that will get JWST atmospheric characterization will be identified as a planet candidate in the next year.

Maximizing scientific return of long-period planet studies

Some ways forward:

1. Don’t discount TTVs for mass measurements

2. Focus on young systems as a way to more robustly connect observations and theory

3. To go deeper, turn to long-period non-transiting planets (from RVs but especially Gaia)

Future Roman

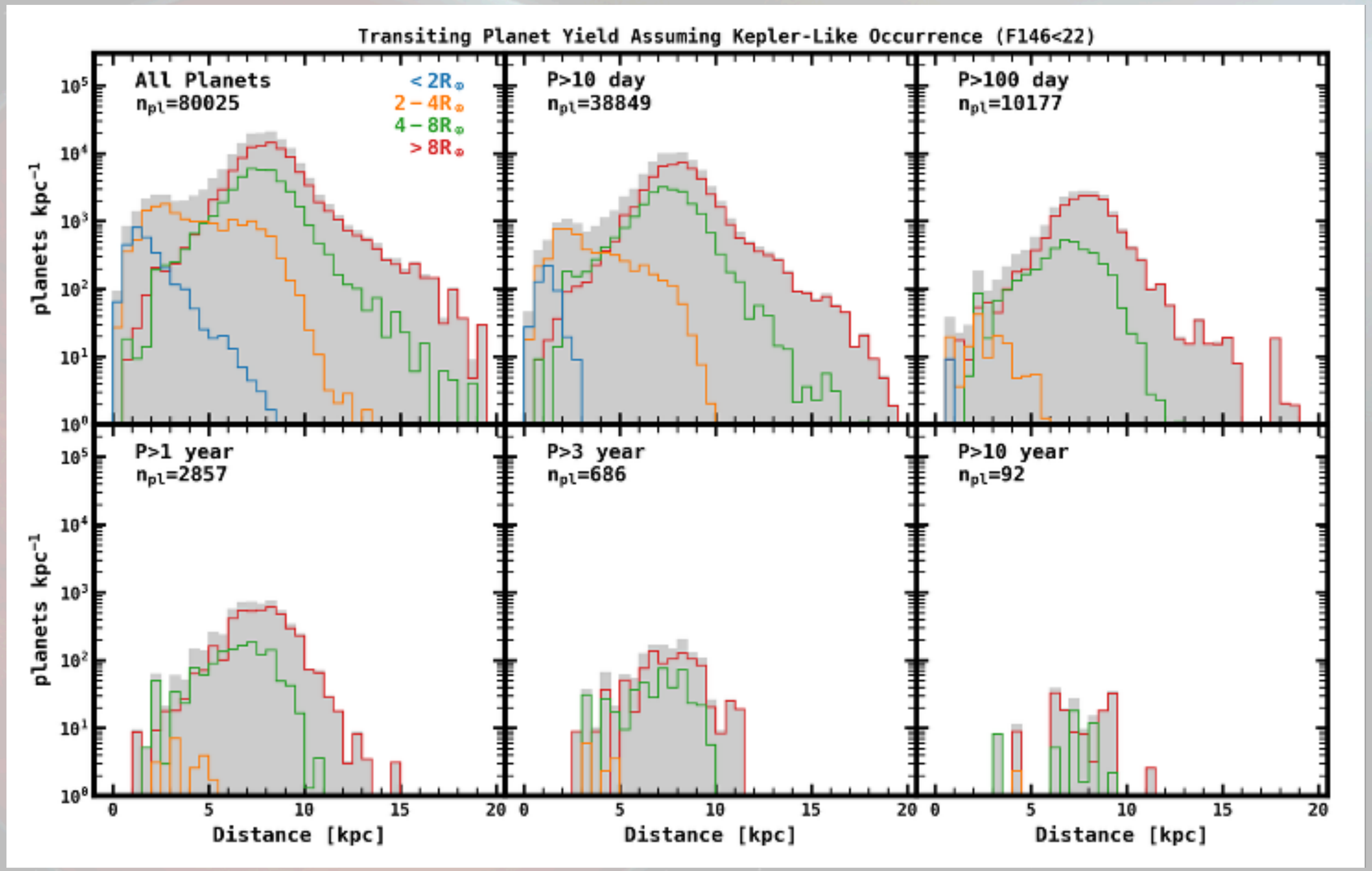


Figure credit: Robbie Wilson

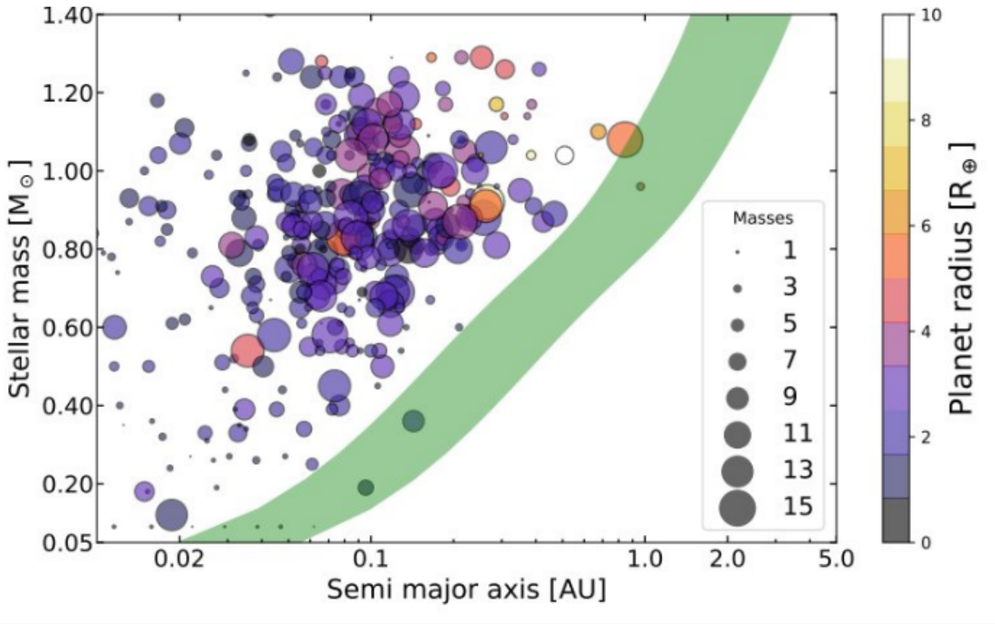
Future PLATO

Figure credit: Annelies Mortier (from Matuszewski et al. 2023)

Planet types	0.5	1	2	5	10	20	50	100	250	500	10000
Jupiters	30±6	59±6	161±8	87±4	77±4	122±7	92±6	136±9	68±6	0.0±0.0	
Neptunes	130±9	74±6	549±19	924±27	1190±27	1381±29	636±19	508±16	245±13	0.0±0.0	
Super-Earths	257±13	229±16	946±26	775±22	562±18	307±14	133±8	114±7	172±10	0.0±0.0	
Earths	253±13	123±8	408±15	403±14	265±11	176±9	84±6	61±4	24±2	0.0±0.0	
Sub-Earths	94±9	46±4	247±10	153±8	56±4	37±3	18±2	11±1	2.0±0.5	0.0±0.0	

Orbital Period [days]

Elephant in the room:
RV masses for HZ Earth-size planets are unlikely with present limitations (dominated by stellar variability)



Conclusions

Goals:

1. highlight recent results in the detection, characterization and demographics of transiting exoplanets with orbital periods in the tens-to-hundreds of days ✅

2. foster discussion on how to best maximize the scientific return of studies of this population of exoplanets ✅

3. help inform future observing strategies and mission development TBD!

Transits to Trends in Numbers

- **62 attendees:**
  - 1 undergraduate student
  - 23 graduate students
  - 18 postdocs
  - 16 faculty
  - 4 other/research scientist

- **7 keynote talks**
- **36 contributed talks** (13 grad students, 15 postdocs, 6 faculty, 2 research scientists)
- **13 posters** (1 undergraduate student, 8 grad students, 1 postdoc, 2 faculty)
- **6 discussion sessions**
- **4 evening social events**