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The NGTS Survey Transiting Neptunes & Super-Earths

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FNSNF
Swiss National Science Foundation

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are a research instrument of the Swiss National Science Foundation

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Overview

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- In coordination with François Bouchy & Christophe Lovis at the Observatory of Geneva (WG A1).

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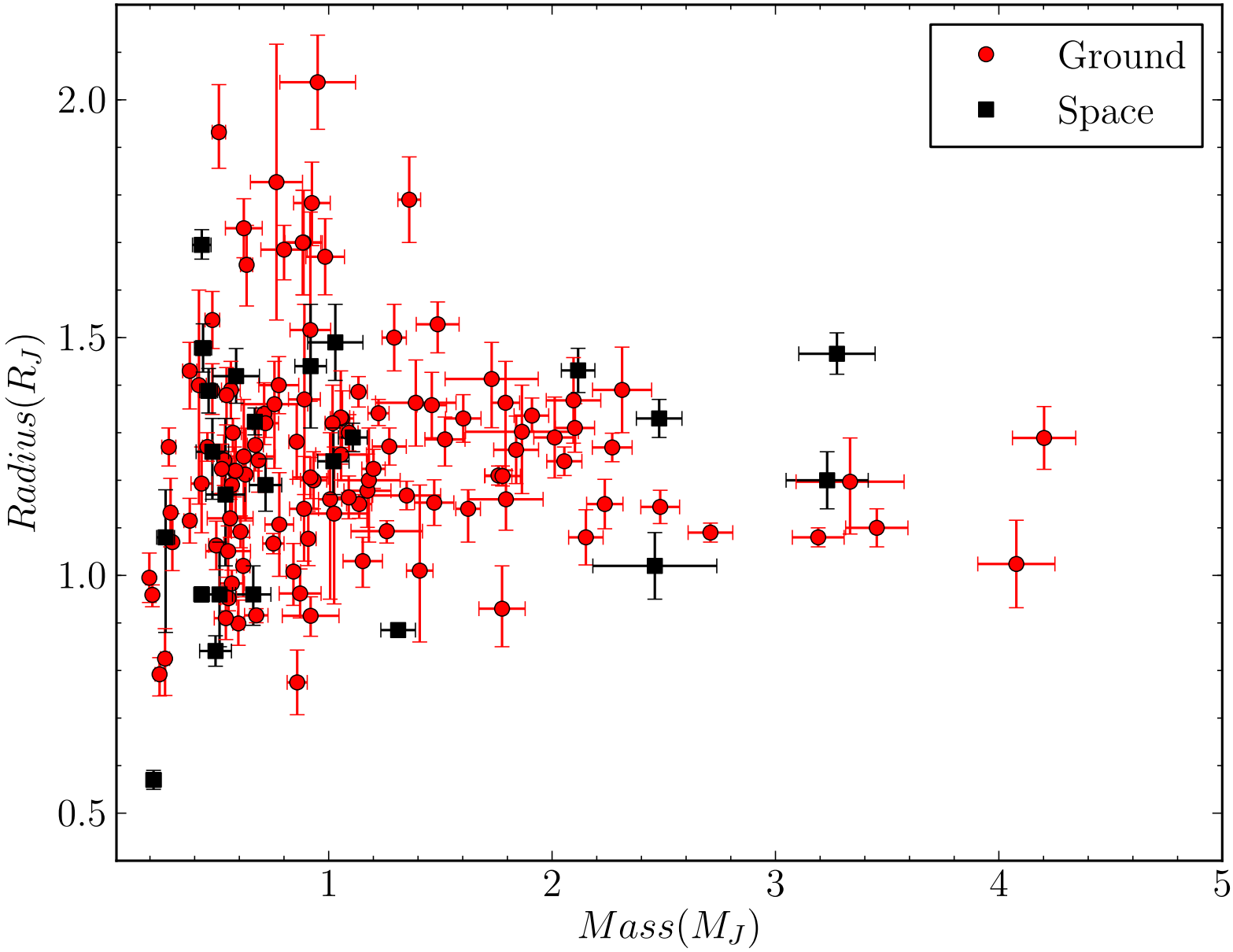
- Focus primarily on transiting gas-planets (Neptune to Jupiter radii).
- Discuss more than only NGTS: current state of field and prospects over the next 2-3 years in lead-up to CHEOPS launch.

Current State

Transiting “giant” planets



Transiting exoplanet discoveries

- Currently driven by WASP/SuperWASP (87 TEPs) and HATNet/HATSouth (55 TEPs). Also KELT for bright stars (5 TEPs)

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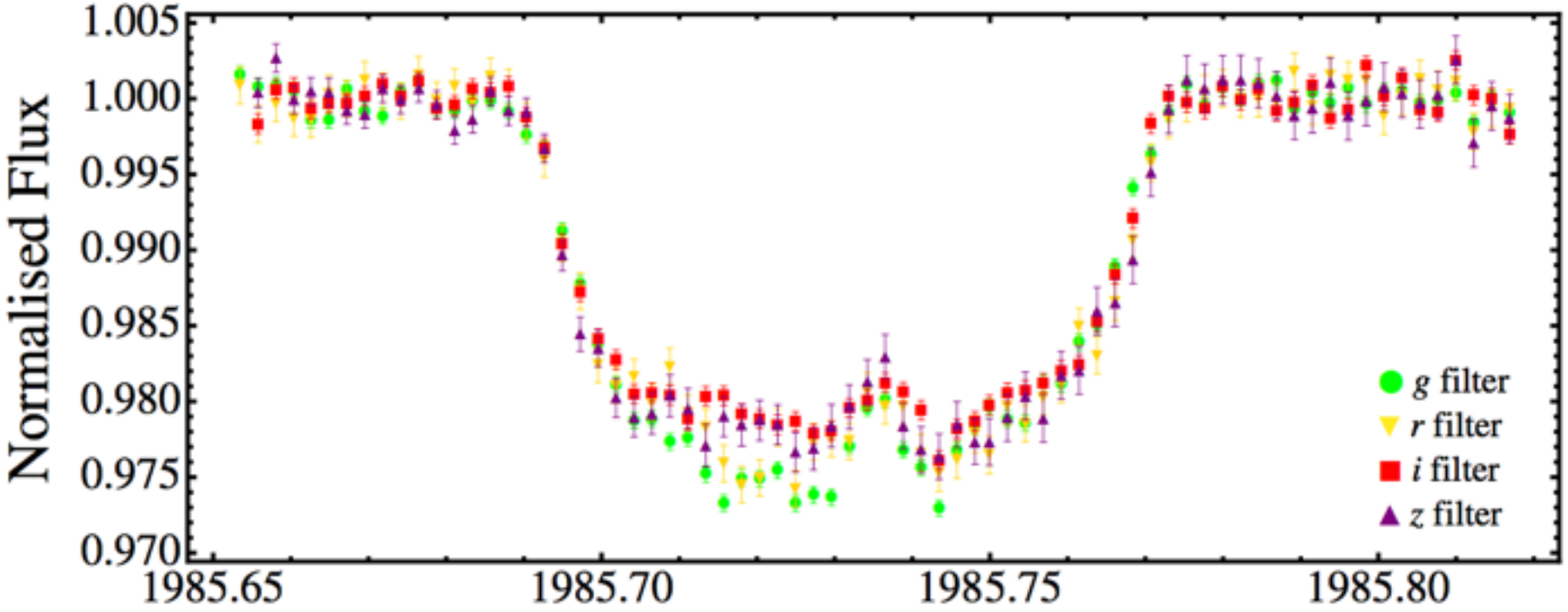
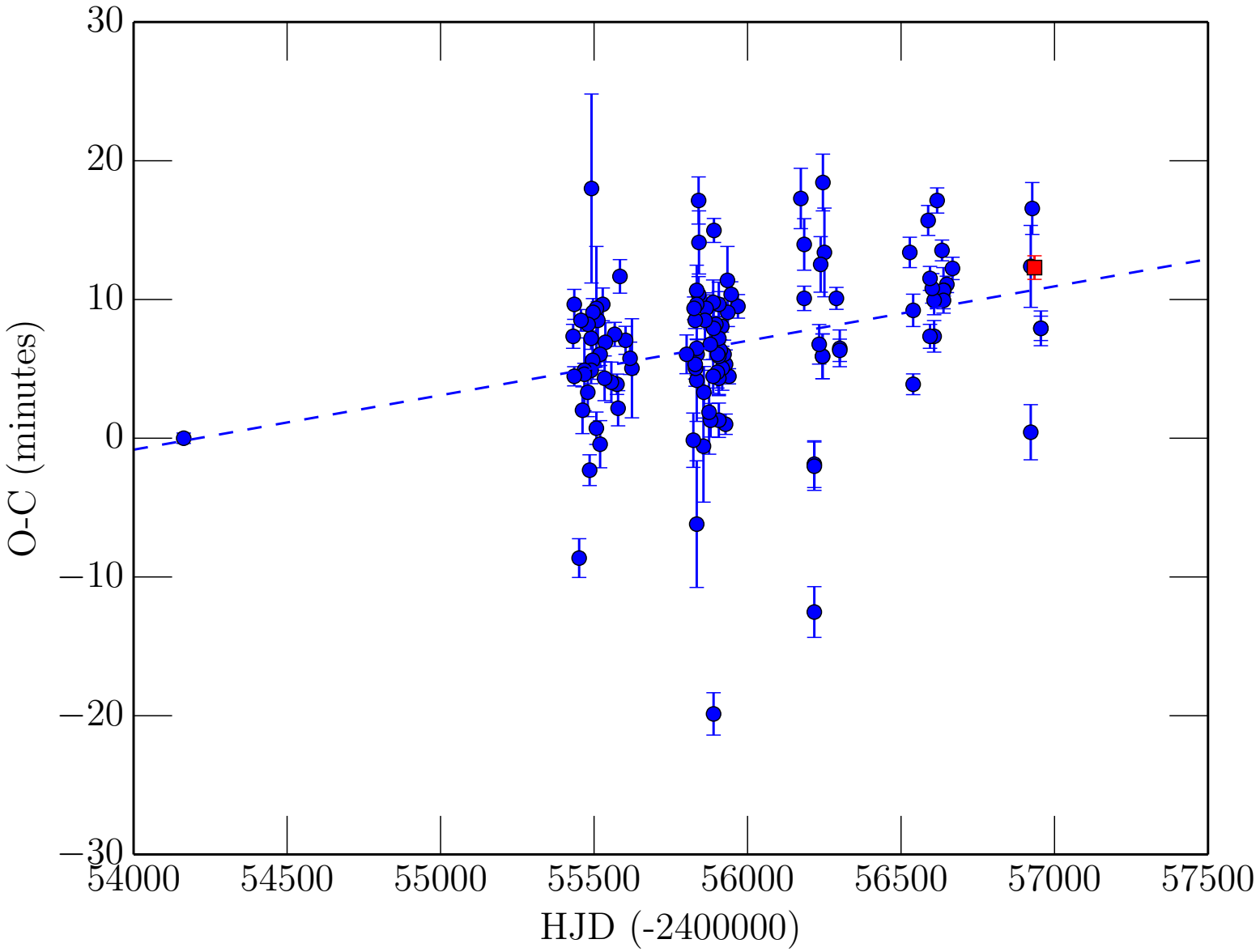
Star-spots (e.g. HATS-2b)



M. Mohler-Fischer et al.: HATS-2b

Long-baseline transit timing variations



WASP-33b - Data from Exoplanet Transit Database

Future Prospects (2-3 years)

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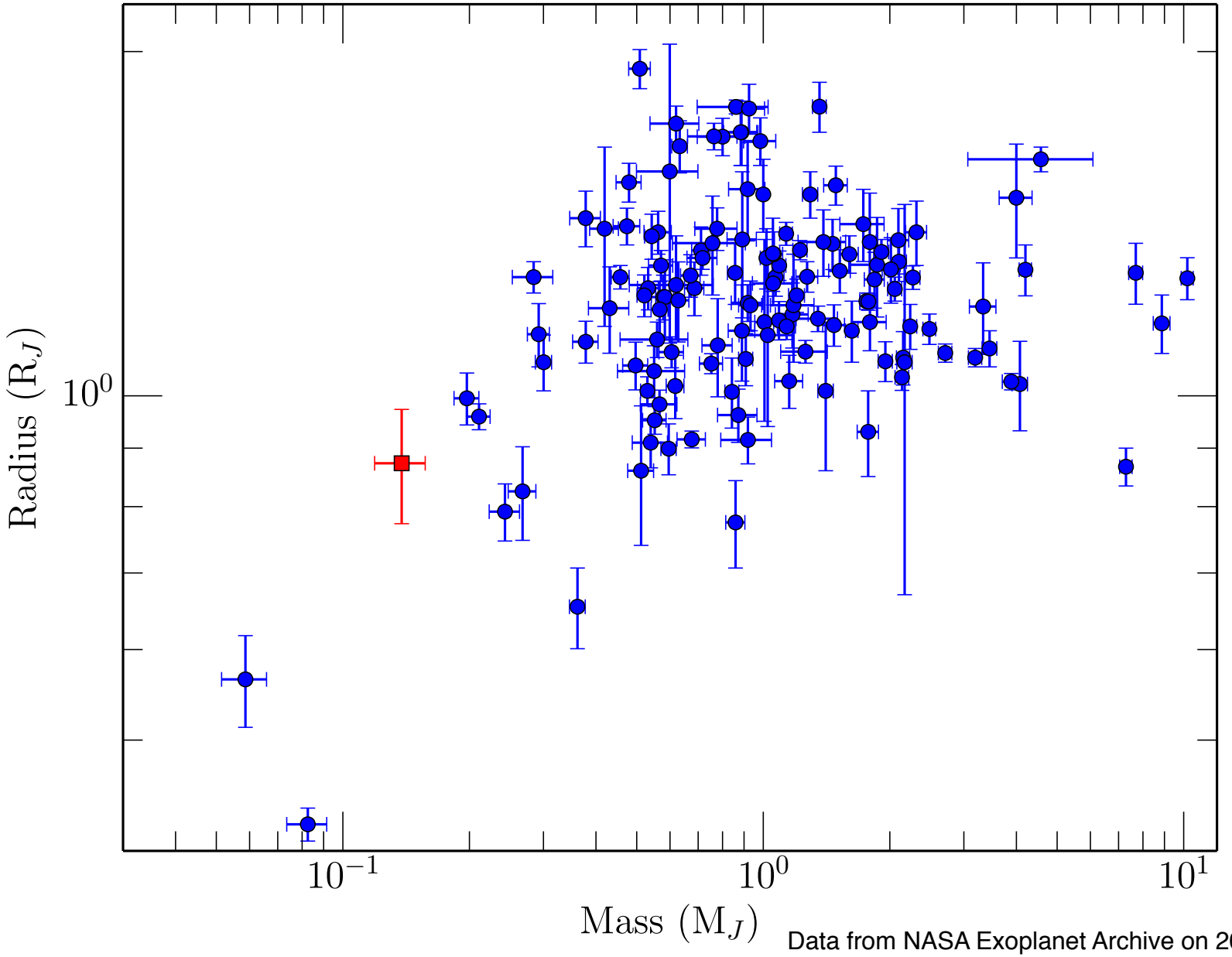
Ground-based Detections



Data from NASA Exoplanet Archive on 2015 March 25

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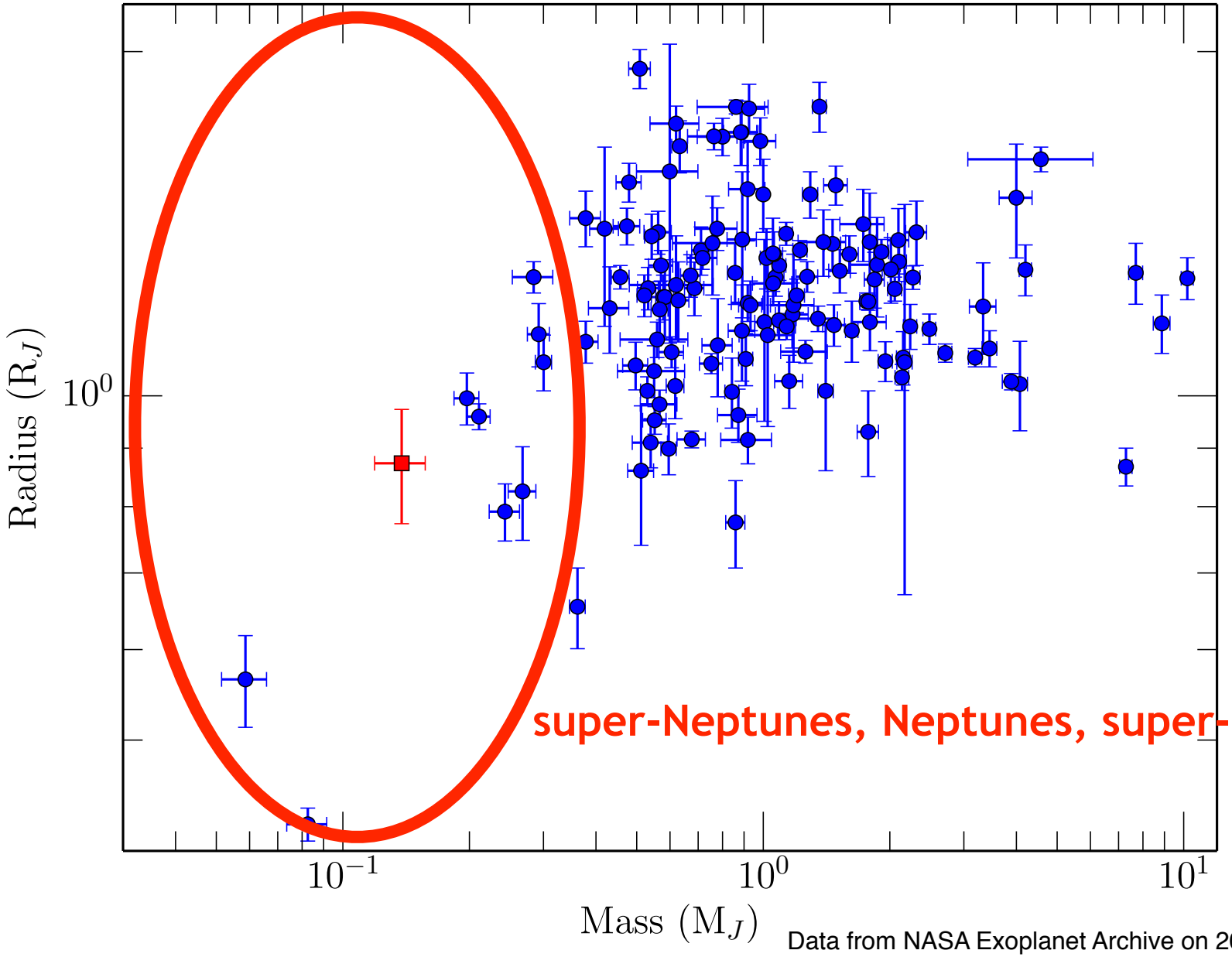

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HATSouth - Improvements:

- larger telescopes (20cm)
- more telescopes (24 units)
- global network (3 sites)

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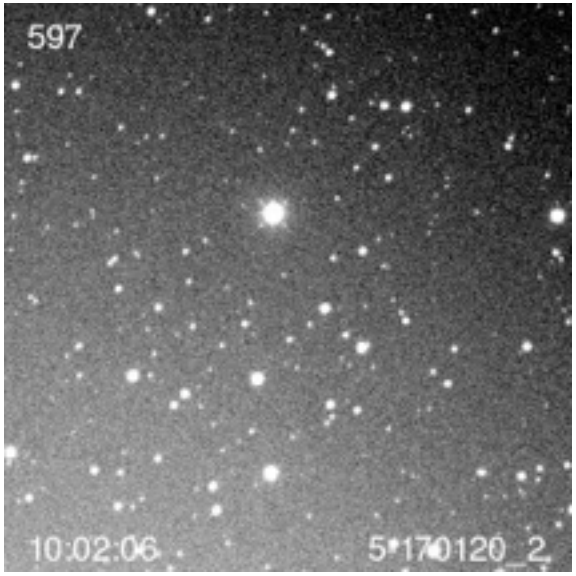
HATSouth


HATSouth @ SSO 2010-09-24 15:16:44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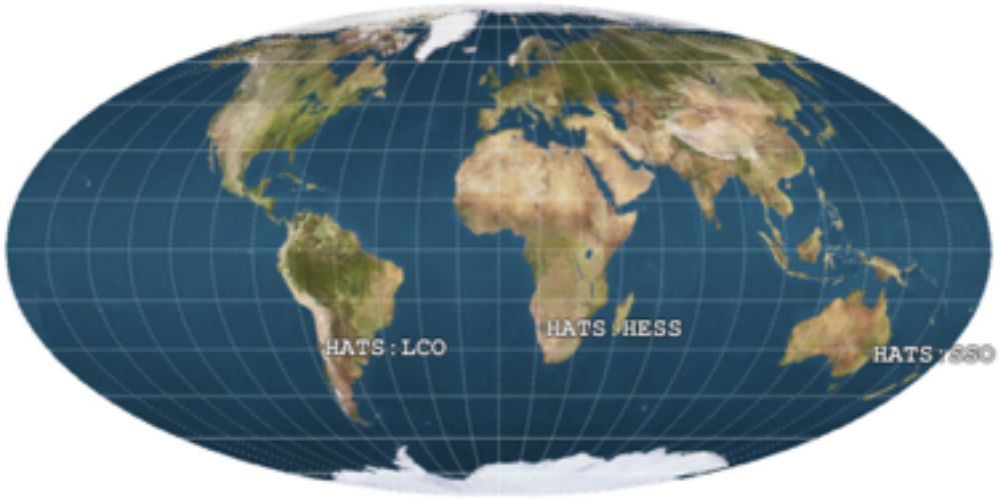
HATS:LCO
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HATS:SSO

HATSouth


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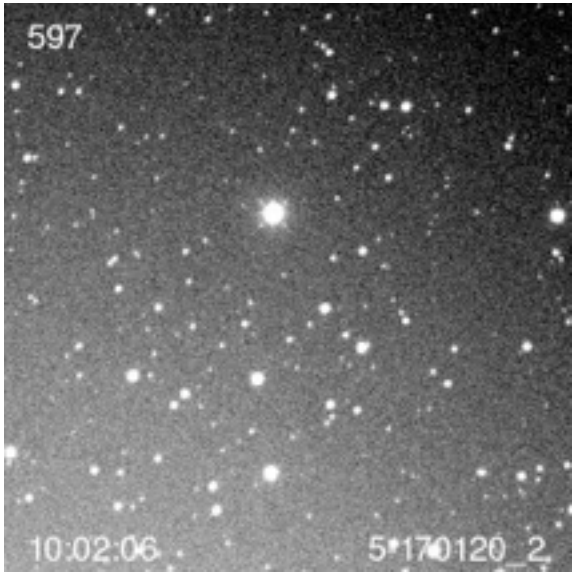
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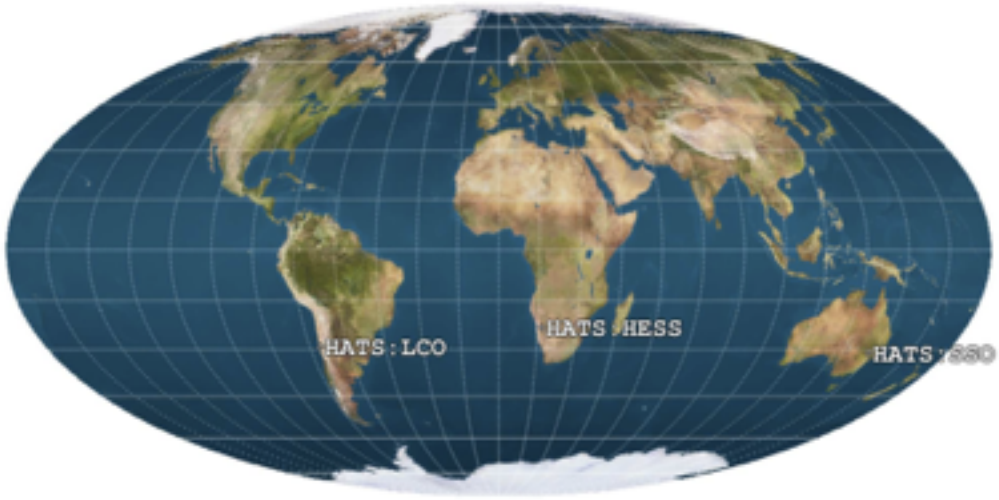
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HATS:SSO

Results to Date

Planet name	Period [days]	Semimajor axis [AU]	Eccentricity	Mass [$M_{Jupiter}$]	Radius [$R_{Jupiter}$]	Discovery paper
HATS-14b	2.76676	0.03815	< 0.142	1.071	1.039	Mancini+ 2015
HATS-13b	3.04405	0.04057	< 0.181	0.543	1.212	Mancini+ 2015
HATS-10b	3.31285	0.04491	< 0.501	0.526	0.969	Brahm+ 2015
HATS-9b	1.91531	0.03048	< 0.129	0.837	1.065	Brahm+ 2015
HATS-8b	3.58389	0.04667	< 0.376	0.138	0.873	Bayliss+ 2015
HATS-6b	3.32527	0.03621	0 (fixed)	0.333	1.000	Hartman+ 2014
HATS-5b	4.76339	0.0542	0.019	0.237	0.912	Zhou+ 2014
HATS-4b	2.51673	0.0362	0.013	1.323	1.020	Jordan+ 2014
HATS-3b	3.57485	0.0485	0 (fixed)	1.071	1.381	Bayliss+ 2013
HATS-2b	1.13541	0.0230	0 (fixed)	1.345	1.168	Mohler-Fischer+ 2013
HATS-1b	3.44646	0.0444	0.120	1.855	1.302	Penev+ 2013

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Low-density Saturn

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HATS-6b	3	Saturn orbiting m-dwarf host			1.000	Hartman+ 2014
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HATS-9b	1.91531	0.03048	< 0.129	0.837	1.065	Brahm+ 2015
HATS-8b	3	Low-density super-Neptune		8	0.873	Bayliss+ 2015
HATS-6b	3	Saturn orbiting m-dwarf host			1.000	Hartman+ 2014
HATS-5b	4	Low-density Saturn		19	0.237	0.912 Zhou+ 2014
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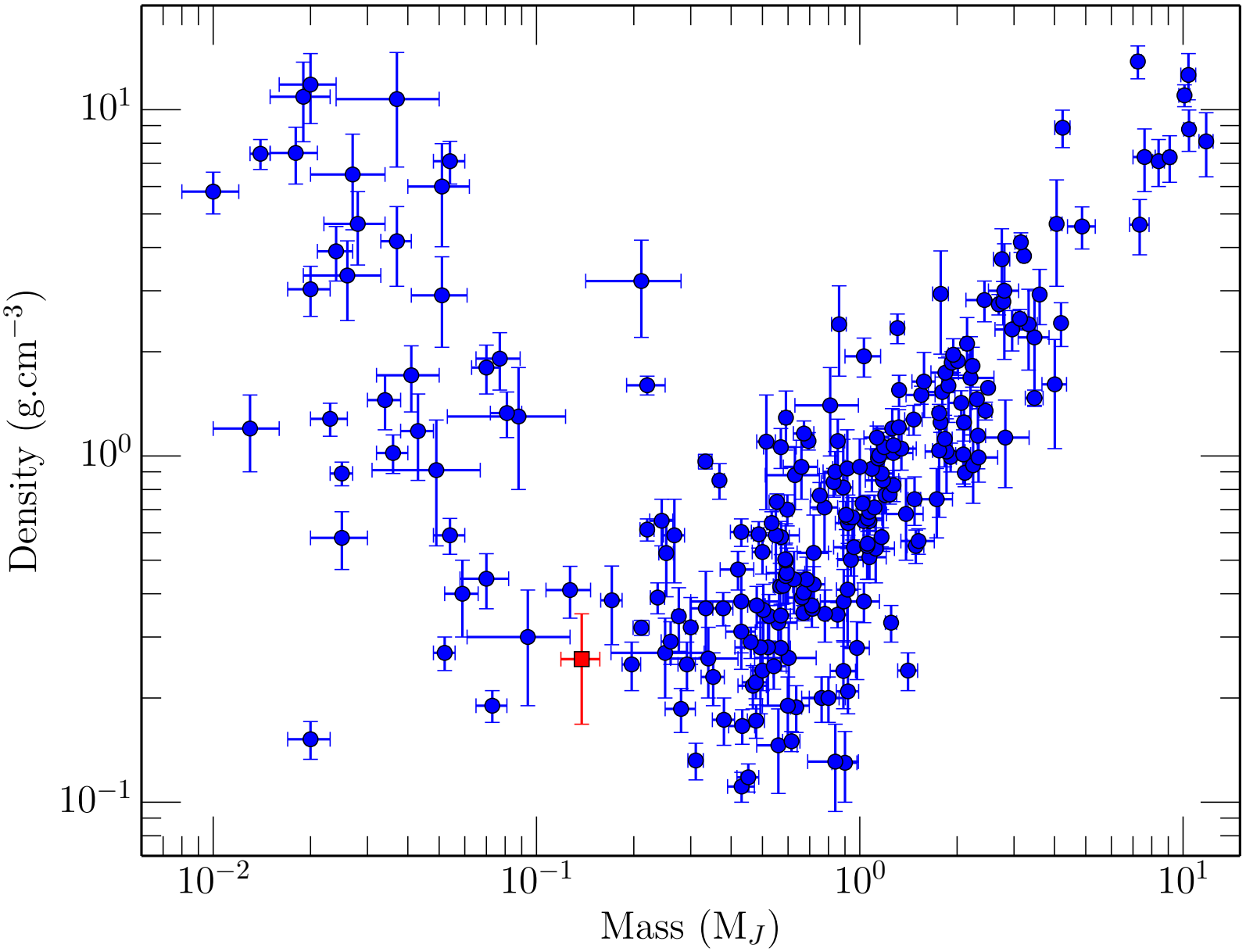
Exoplanet Densities



Data from NASA Exoplanet Archive on 2015 March 25

NGTS - Improvements

- Larger telescopes (20cm).
- High quality CCDs (red sensitive).
- Individual mounts and high precision tracking/ guiding (stars stay on same pixel).
- More telescopes (12 units).
- Excellent site (Paranal).

NGTS
NEXT-GENERATION TRANSIT SURVEY

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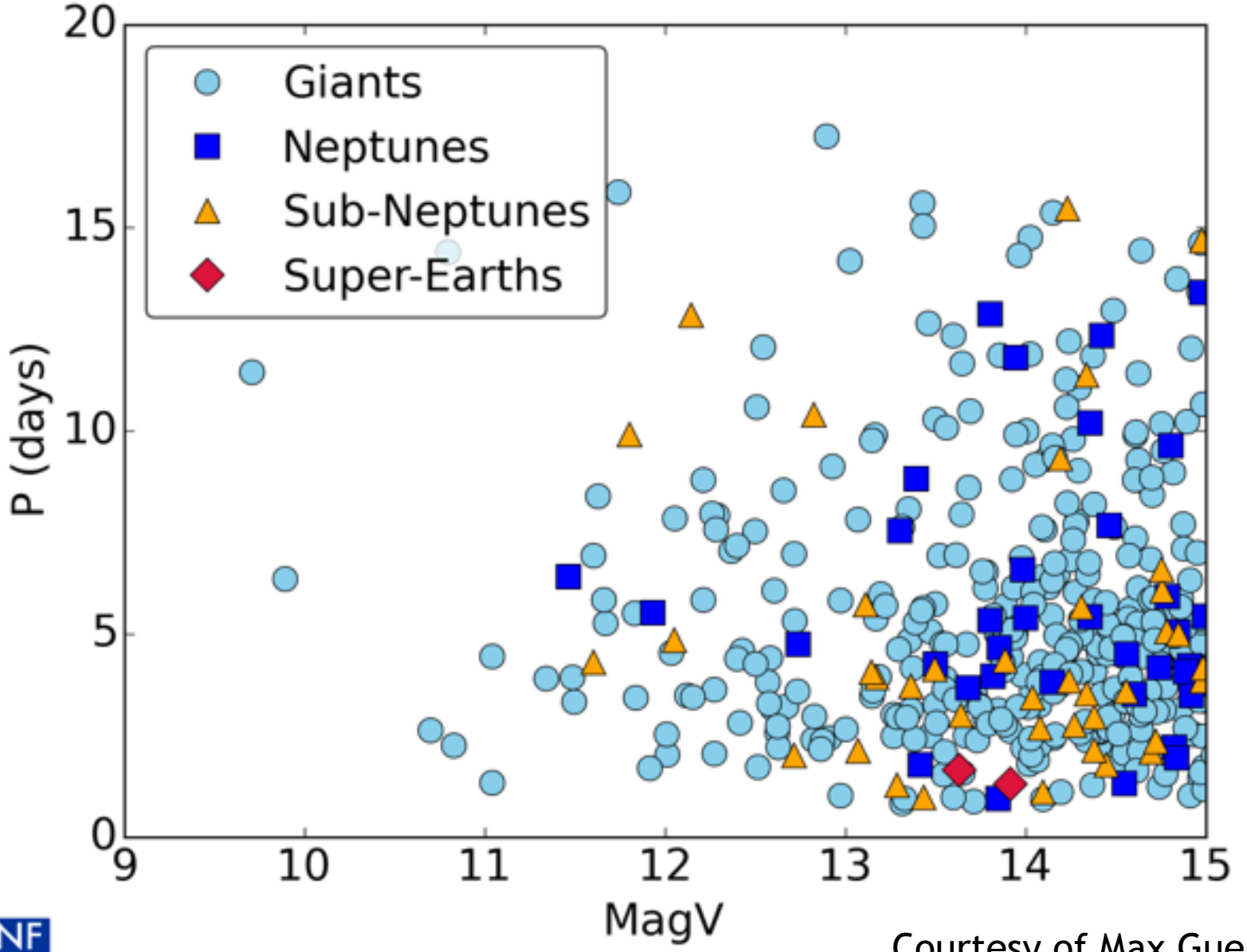
NGTS Yields



Courtesy of Max Guenther

Summary

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Summary

- We need to think about what CHEOPS can do for existing TEPs around bright stars: TTV, star-spots, moons/rings, unseen companions, visible light variations, oblateness, etc

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Summary

- We need to think about what CHEOPS can do for existing TEPs around bright stars: TTV, star-spots, moons/rings, unseen companions, visible light variations, oblateness, etc
- Many interesting systems may be discovered below V=12. What can CHEOPS do for these?

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