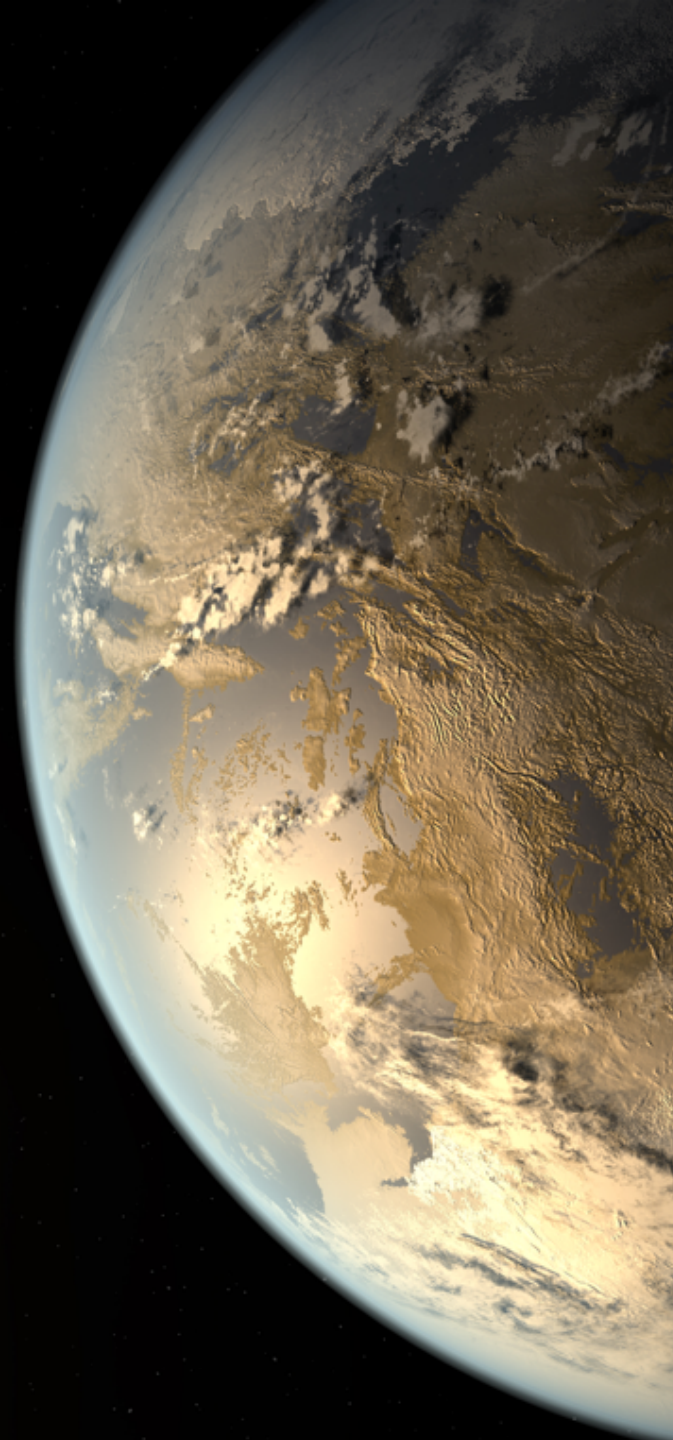


K2, TESS and the future

K2/TESS Special Session
#aas229, January 4 2017
Jessie Christiansen
Caltech/IPAC-NExSci



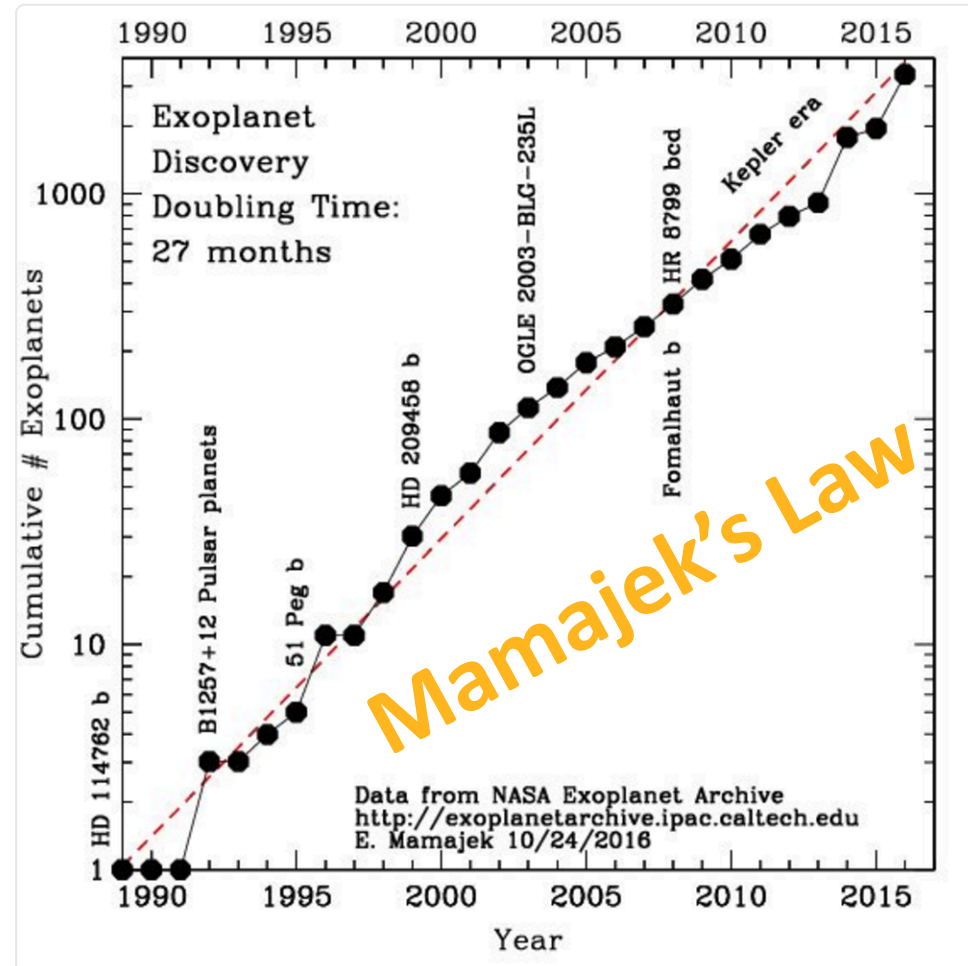
The number of known exoplanets has been increasing exponentially for 25 years...

NASAExoplanetArchive and 3 others liked



Eric Mamajek @EricMamajek · Oct 24

@aussiastronomer @NASAExoArchive Updtd versn of #exoplanet discovery # plot. Doubling time still ~27 months. Hit mil in 2034, bil in 2057?



2

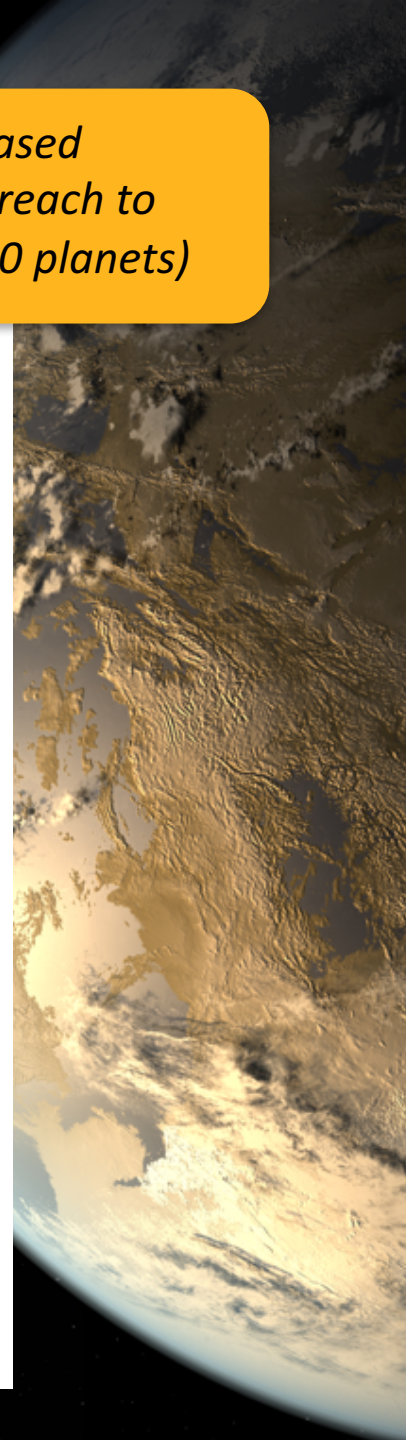
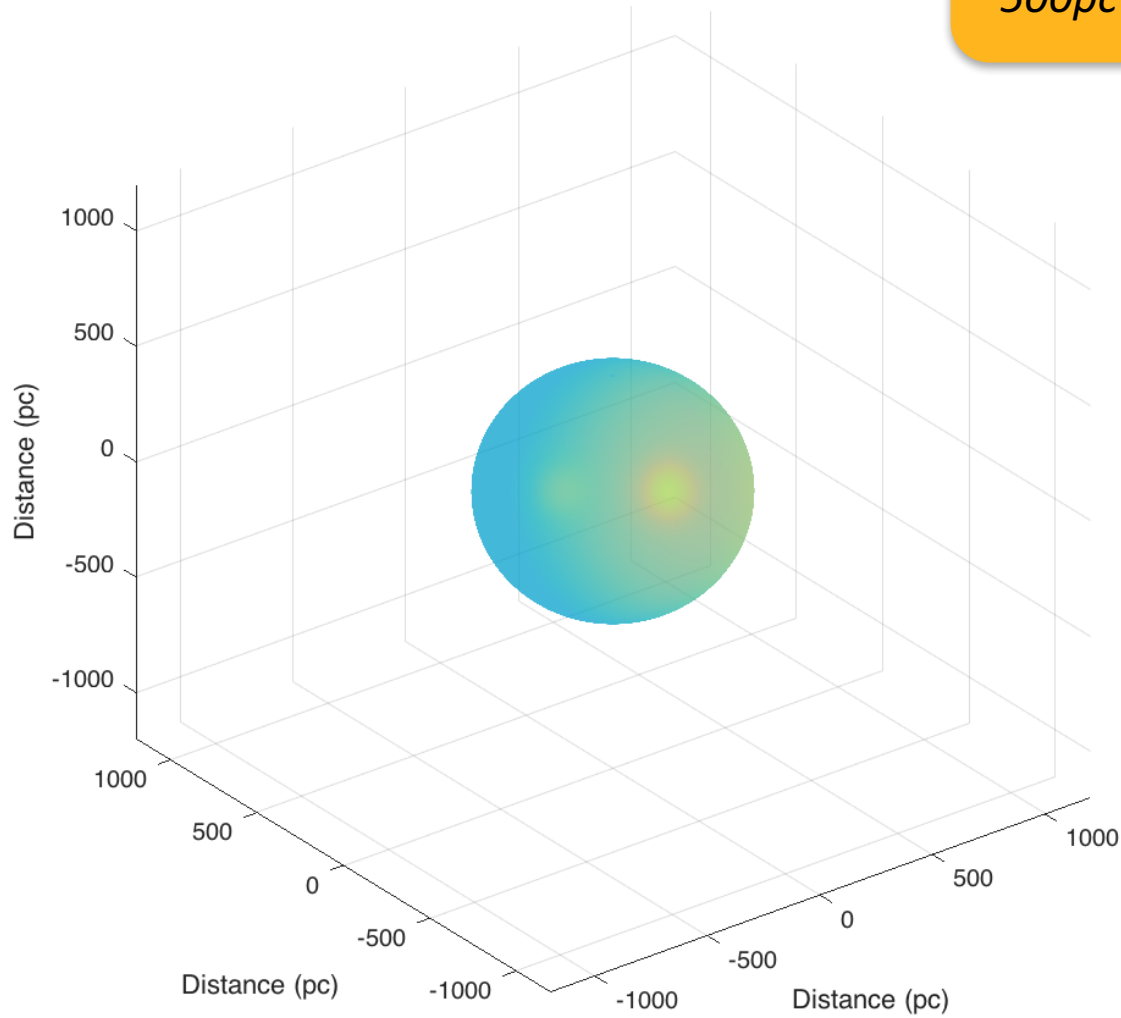
20

18

...

Depth of surveys

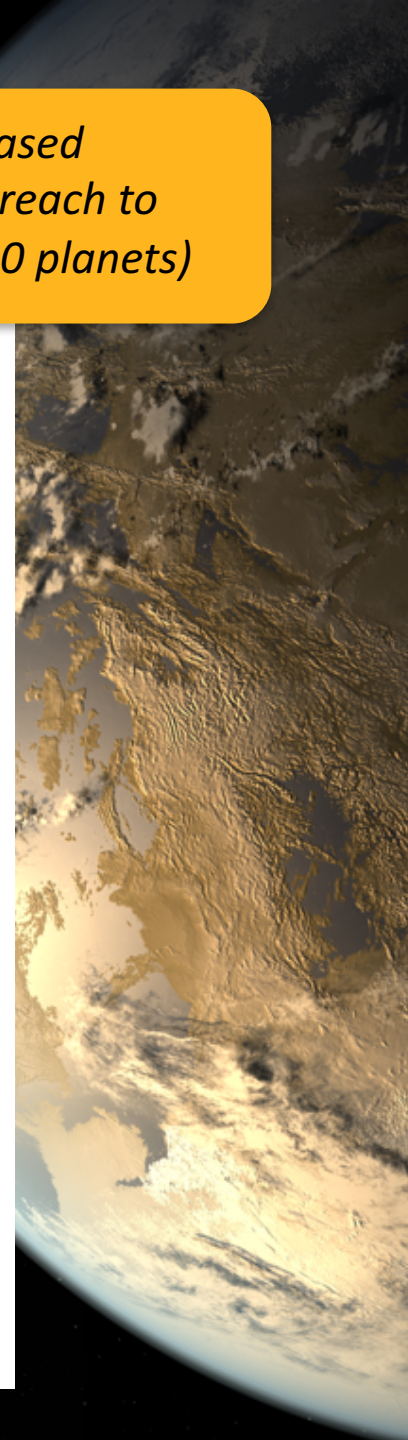
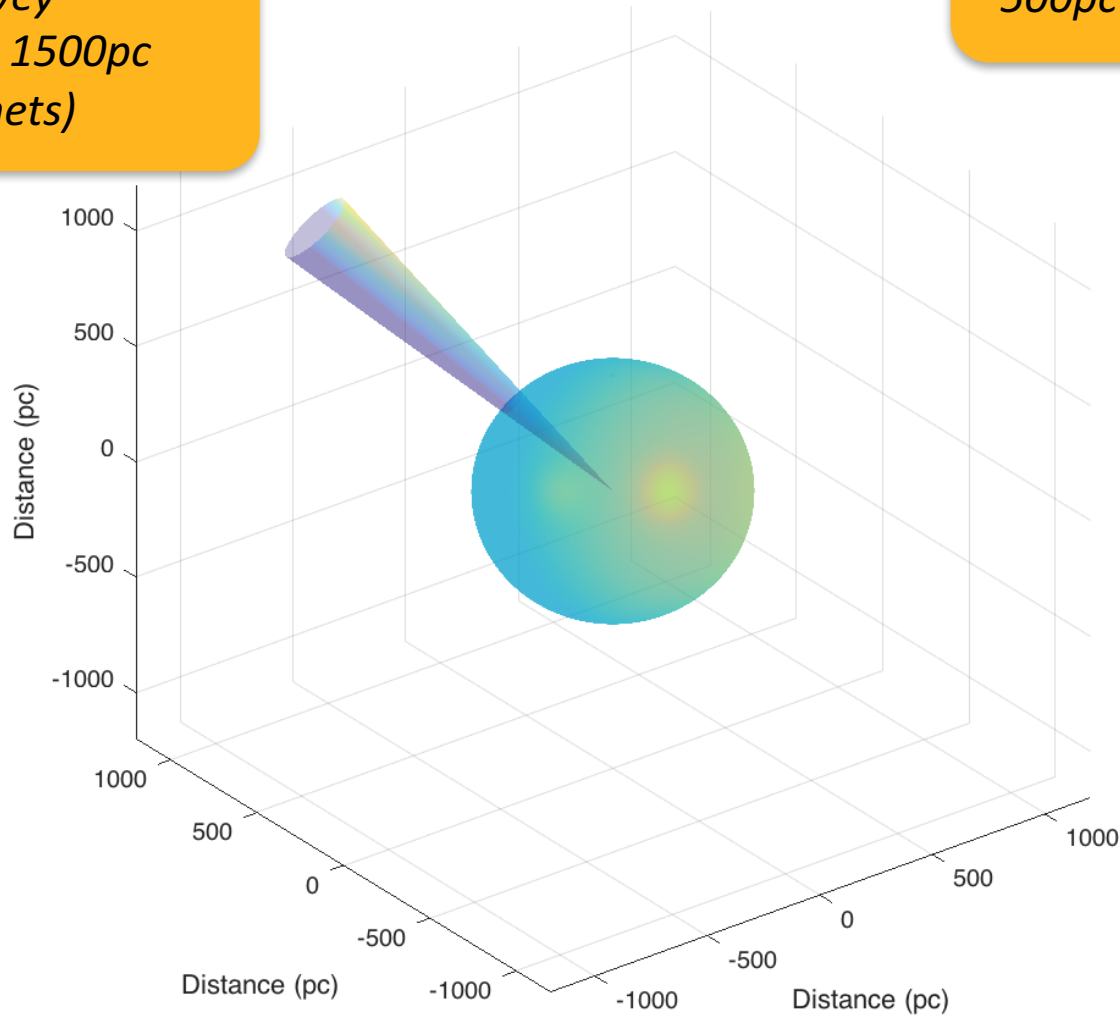
Ground-based surveys – reach to 500pc (940 planets)



Depth of surveys

*Kepler survey –
reaches to 1500pc
(2331 planets)*

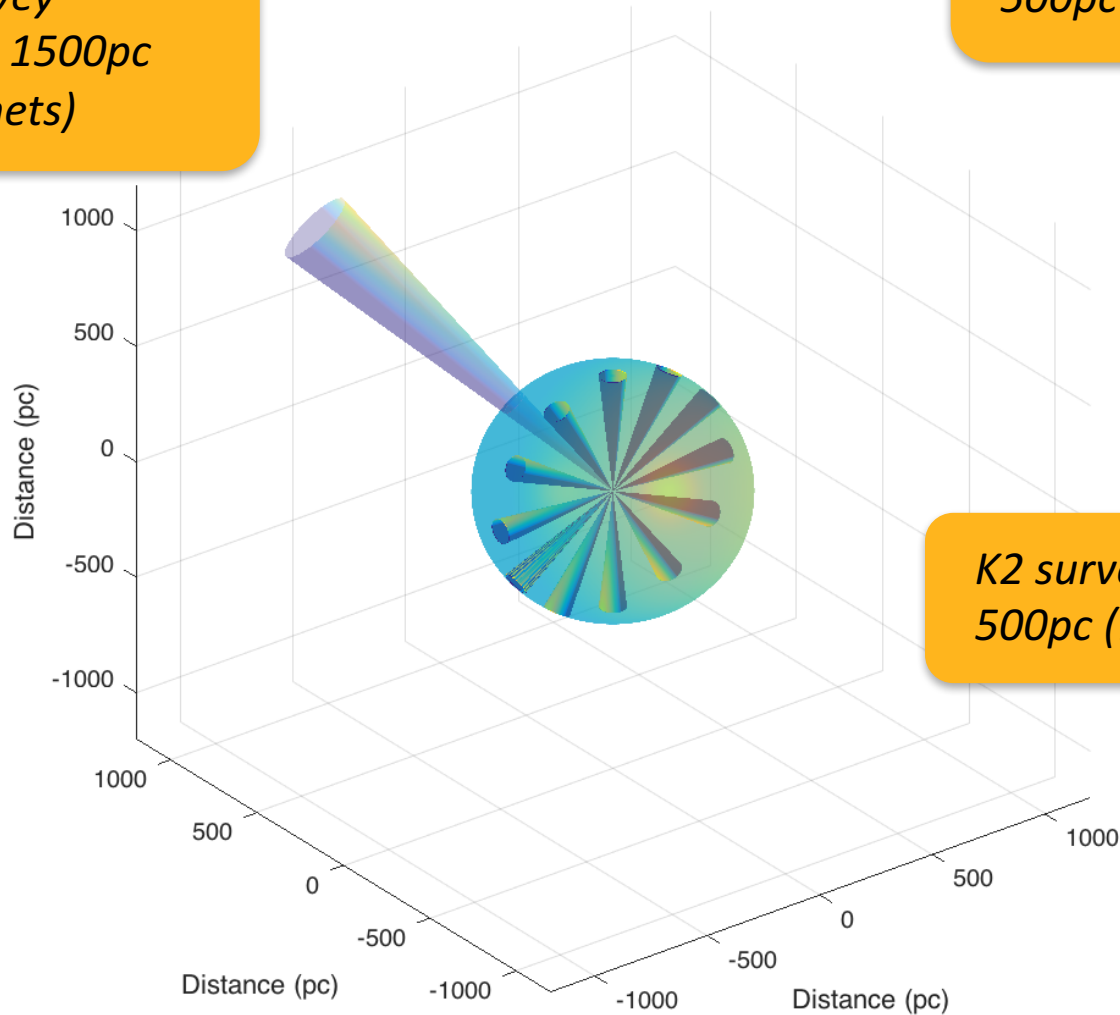
*Ground-based
surveys – reach to
500pc (940 planets)*



Depth of surveys

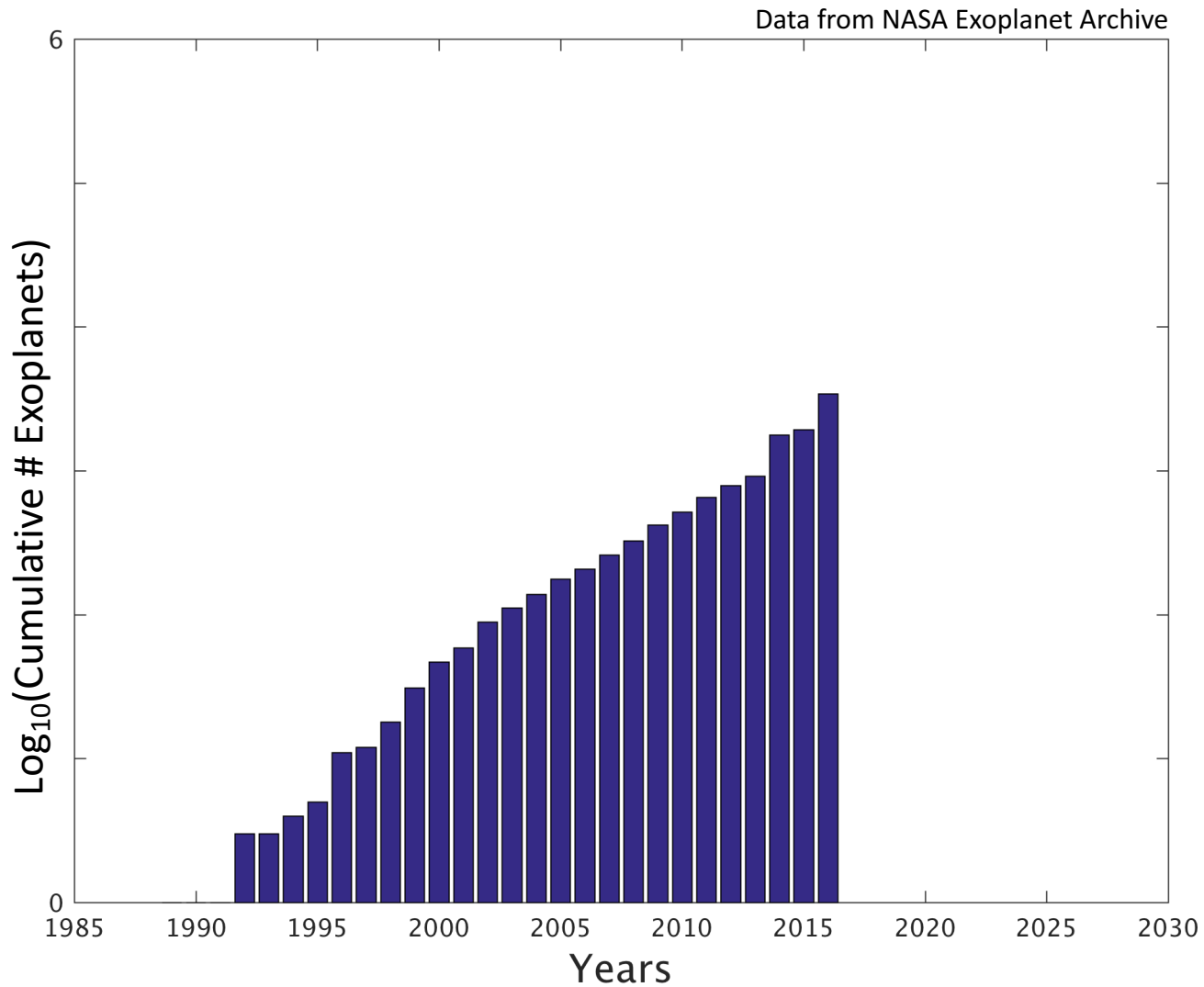
*Kepler survey –
reaches to 1500pc
(2331 planets)*

*Ground-based
surveys – reach to
500pc (940 planets)*

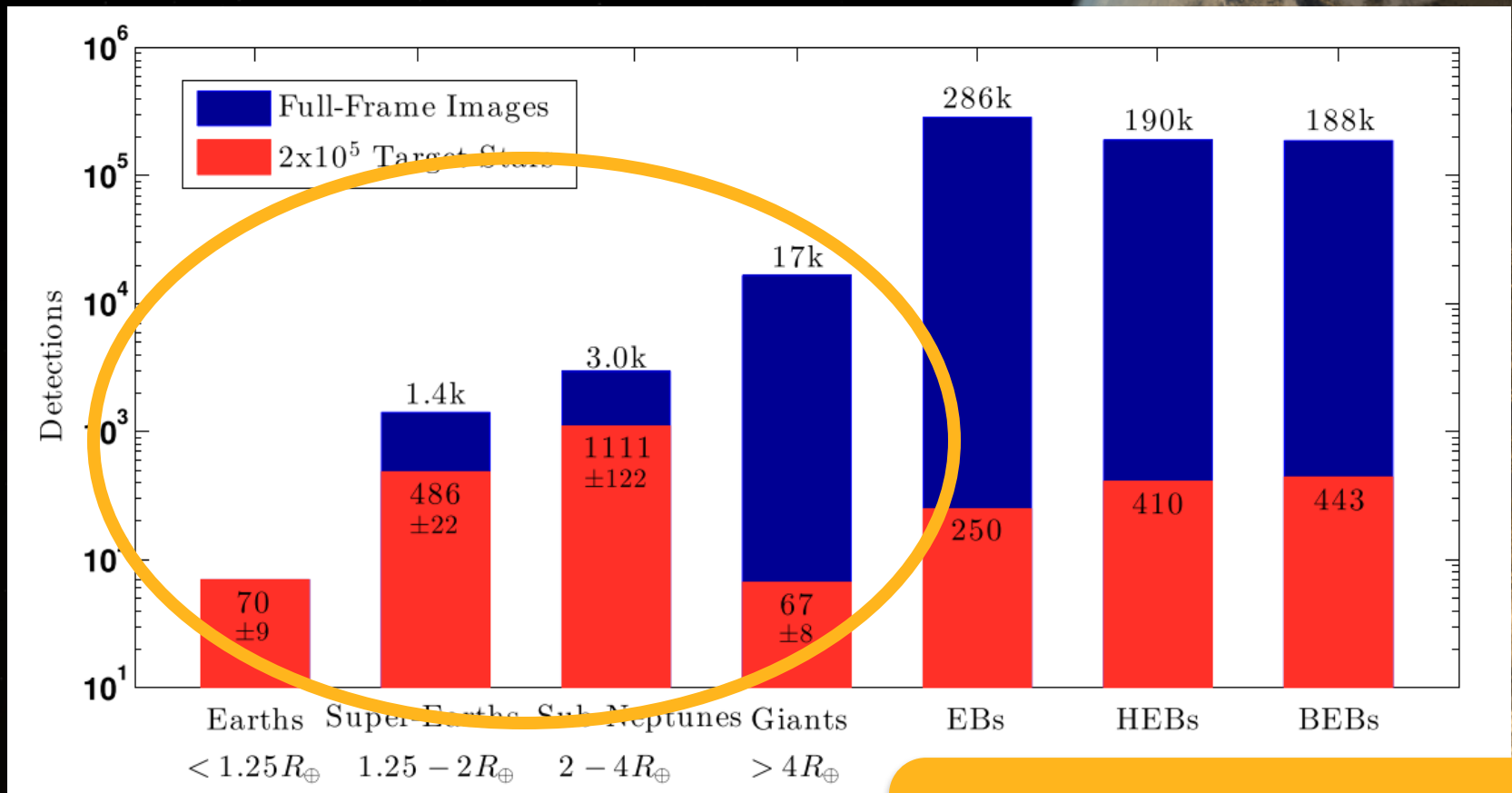


*K2 survey – reaches to
500pc (178 planets)*

How much longer can Mamajek's Law last?



The NASA *TESS* Mission



Sullivan+2015

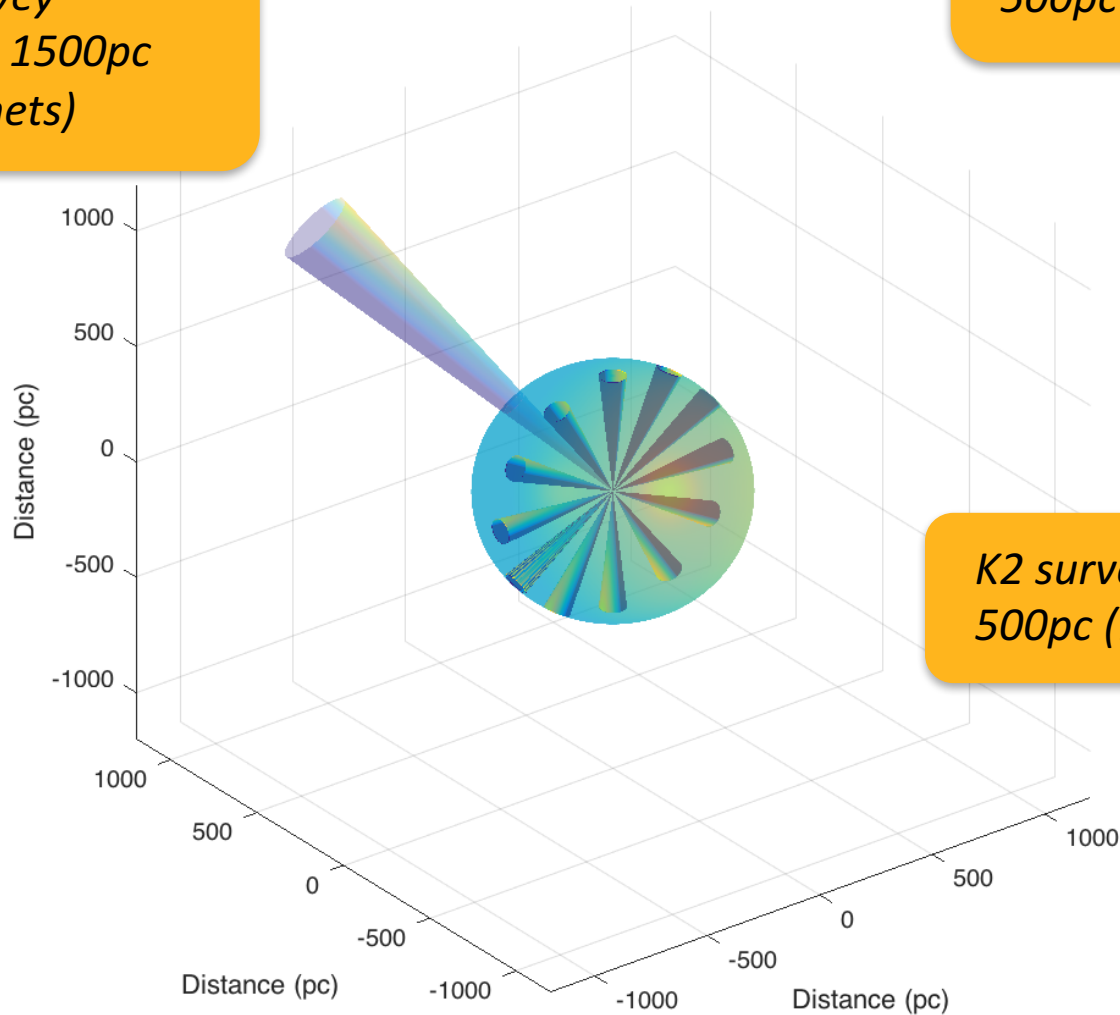
23,000 planets

(not planet candidates.... *planets*)

Depth of surveys

*Kepler survey –
reaches to 1500pc
(2331 planets)*

*Ground-based
surveys – reach to
500pc (940 planets)*

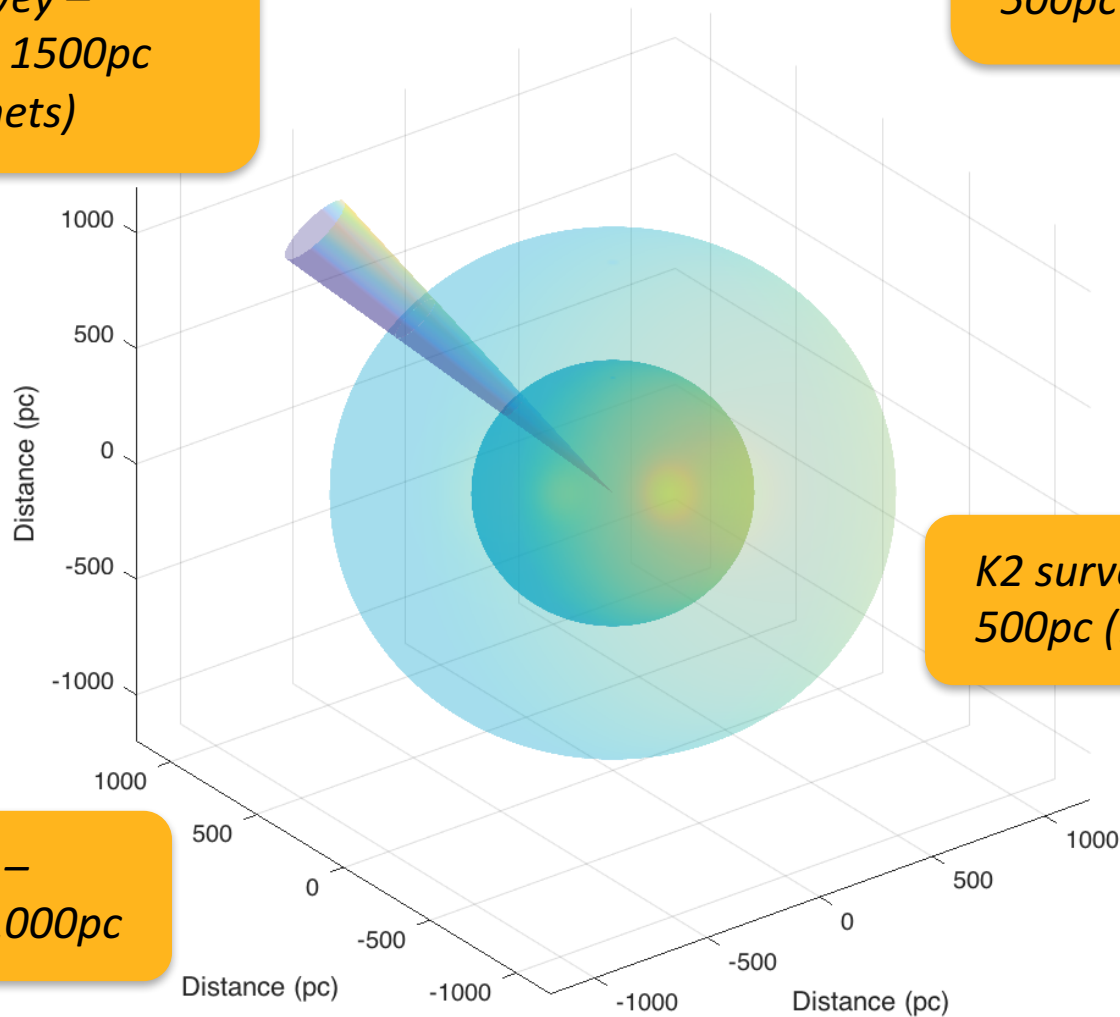


*K2 survey – reaches to
500pc (178 planets)*

Depth of surveys

*Kepler survey –
reaches to 1500pc
(2331 planets)*

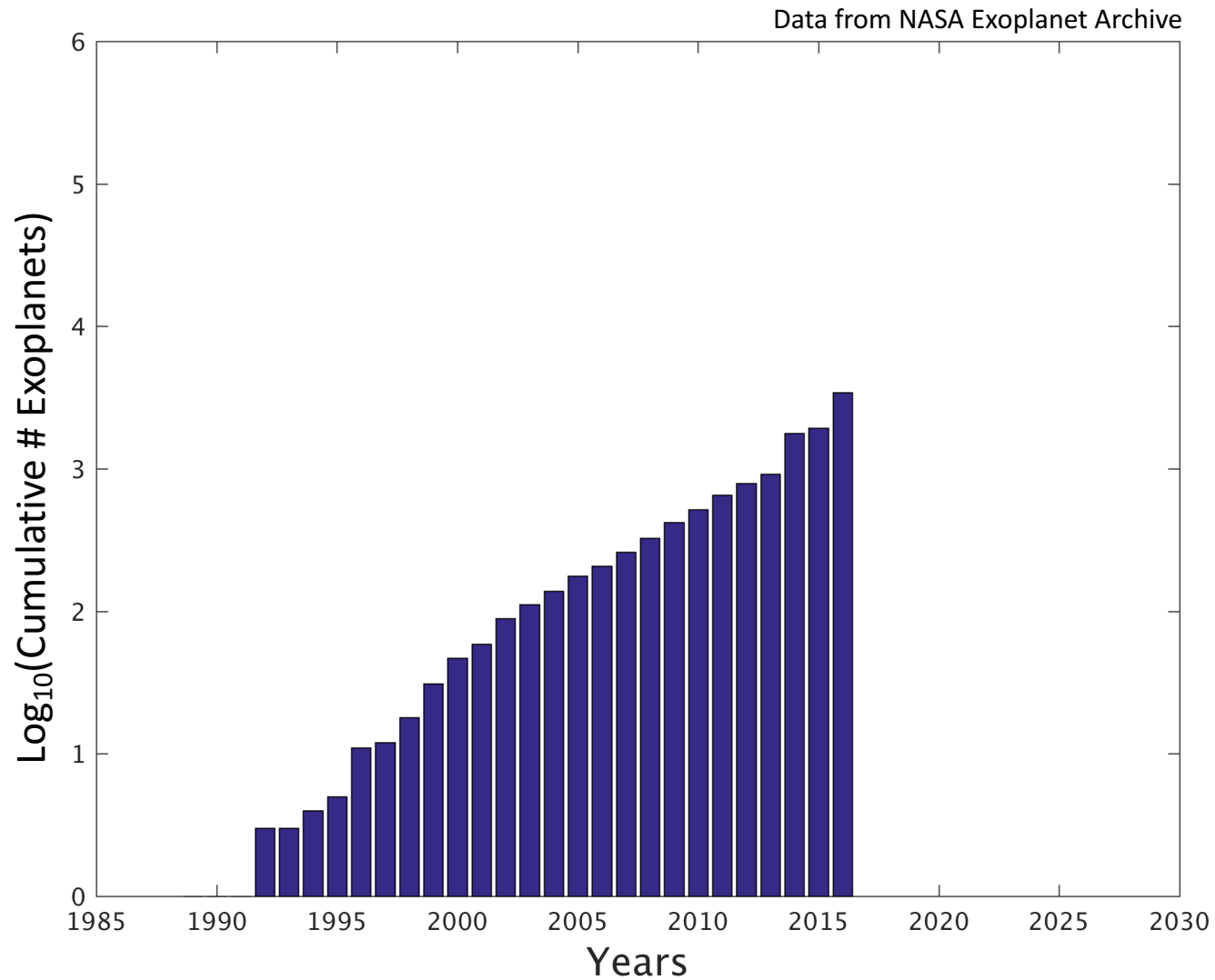
*Ground-based
surveys – reach to
500pc (940 planets)*



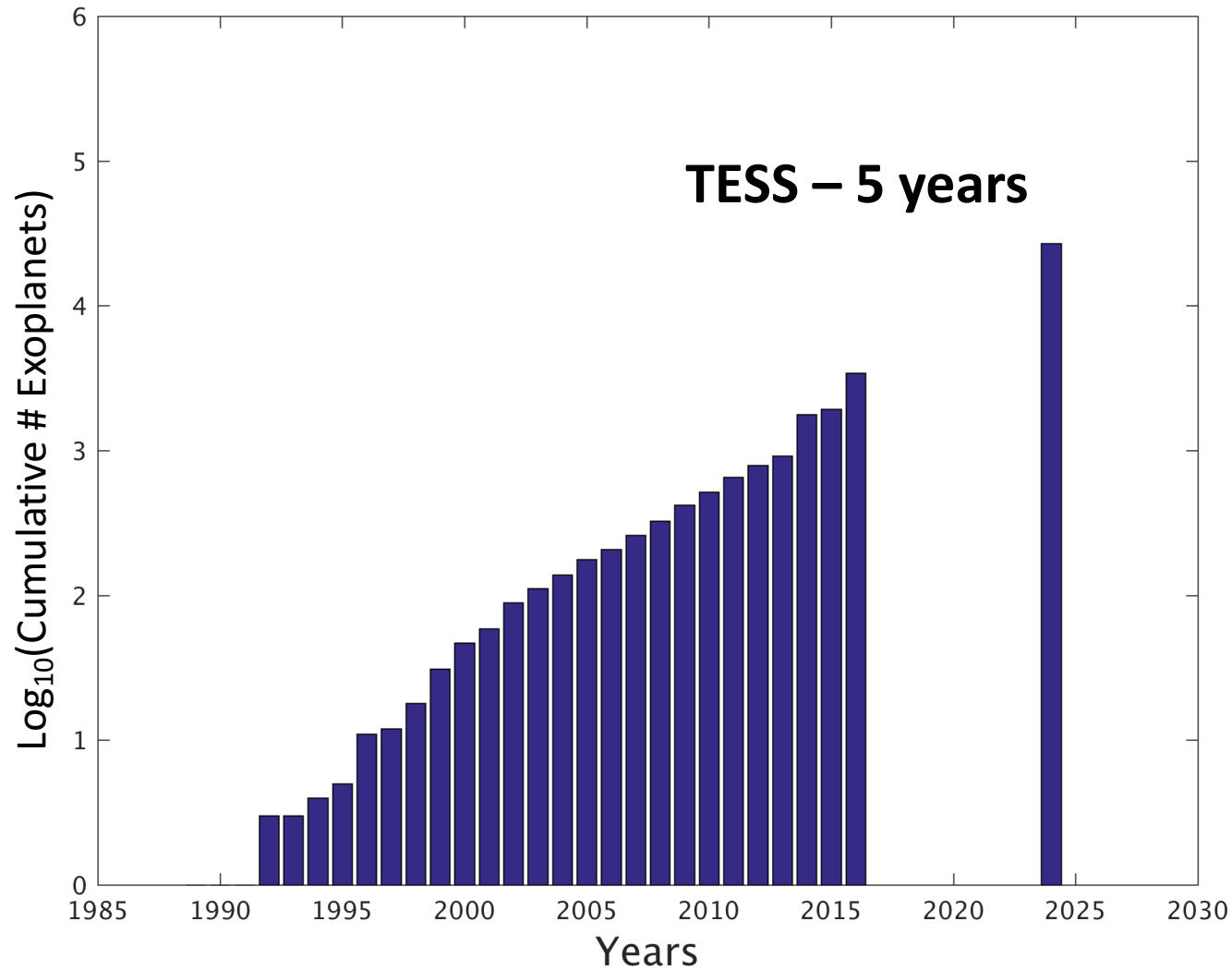
*TESS survey –
reaches to 1000pc*

*K2 survey – reaches to
500pc (178 planets)*

How much longer can Mamajek's Law last?



How much longer can Mamajek's Law last?



The NASA *WFIRST* Mission

M/M _{Earth}	WFIRST-IDRM (432 days)	WFIRST-DRM1 (432 days)	WFIRST-DRM2 (266 days)	WFIRST-AFTA (357 days)	WFIRST-AFTA (417 days)
0.1	22	30	18	50	58
1	208	233	173	367	429
10	575	793	551	1030	1203
100	470	629	439	726	849
1000	298	367	261	426	497
Total	1701	2052	1442	2599	3036

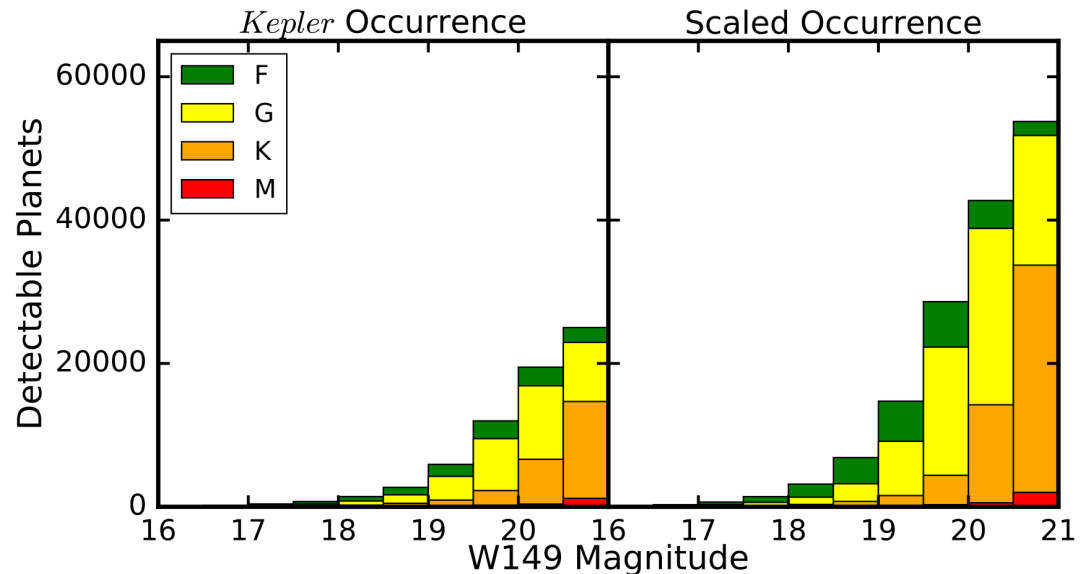
Table 2-4: Predicted yields for bound planets for various mission designs. The yields adopted the planet distribution function for cold exoplanets as measured from ground-based microlensing surveys by Casan et al., and normalized to the most recent microlensing event rates (Sumi et al. 2013) measured in fields that overlap a subset of the WFIRST-AFTA target fields.

Microlensing

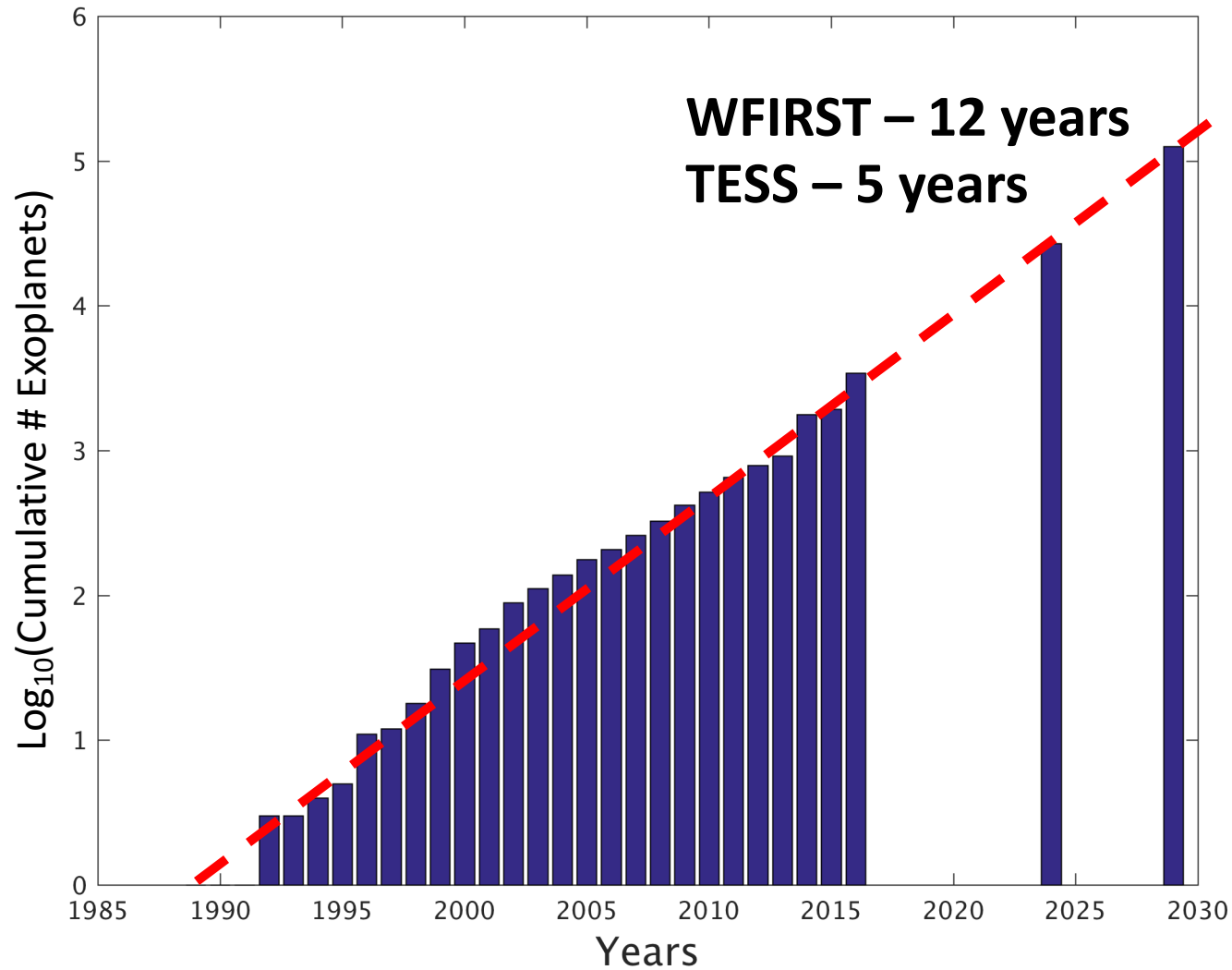
WFIRST-AFTA 2015 Report
(Spergel et al. 2015)

Transiting

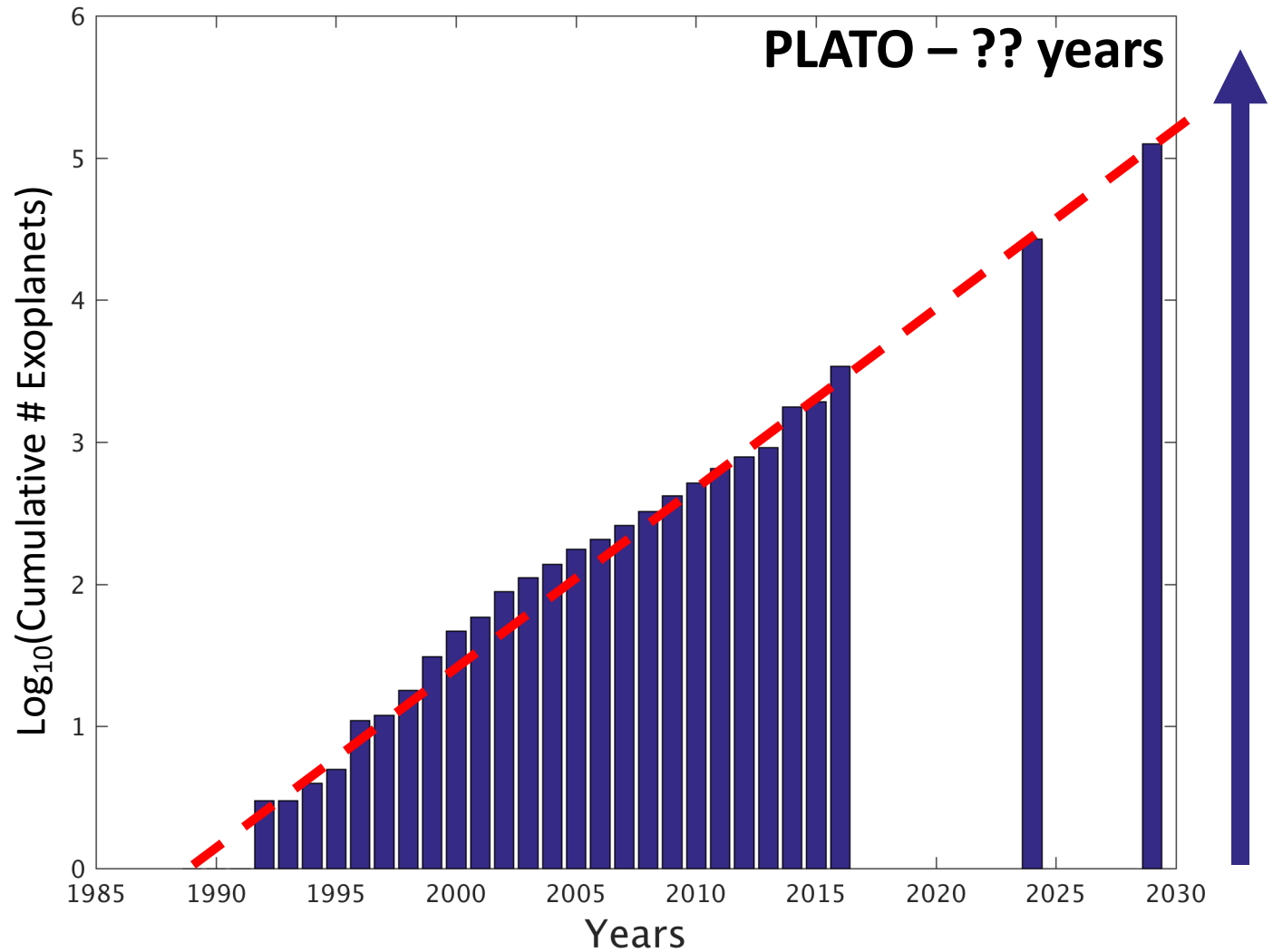
Montet, Yee & Penny 2016
arXiv:1610.03067



How much longer can Mamajek's Law last?



How much longer can Mamajek's Law last?



The legacy of K2 and TESS...

Exoplanets!

- Kepler has been successful at exploring the myriad planets and planetary systems
- But... *“TESS is going to discover the planet we study for the next 100 years.”* – Joe Harrington, 2012
- JWST, LUVOIR/HabEx will have a momentous task!

Astrophysics!

- K2 and TESS will leave behind one of the largest archives of extremely high precision time series photometry, allowing unprecedented studies of:
 - The life and death of stars
 - Clusters and cluster environments
 - Solar system science
 - The origin and nature of AGN activity

The future is...

blazing

brilliant

dazzling

flashing

glistening

glittering

golden

intense

luminous

radiant

shimmering

shiny

silvery

