PLATO

Planet yield expectations

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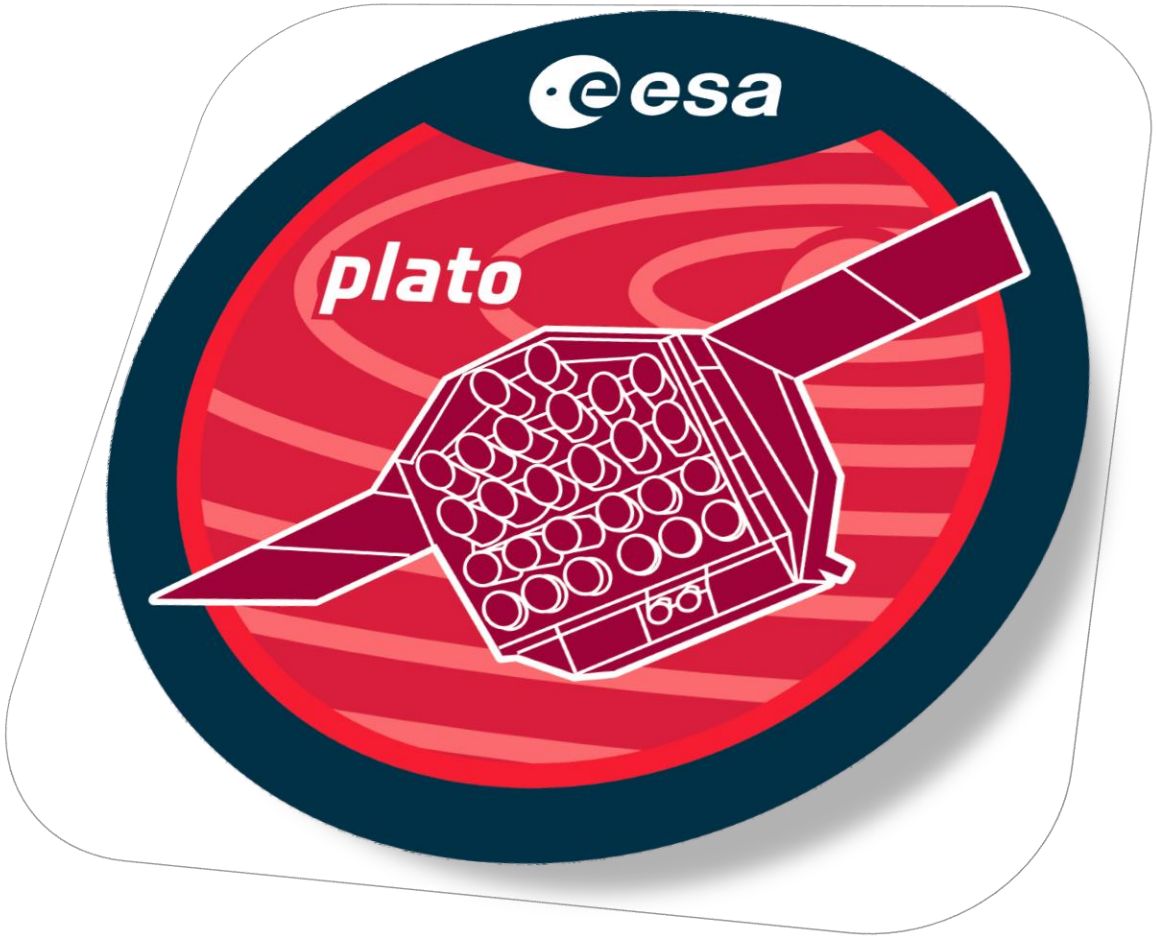
and the PLATO Team



DLR Deutsches Zentrum für Luft- und Raumfahrt German Aerospace Center

FREIE UNIVERSITÄT

INAF ISTITUTO NAZIONALE DI ASTROFISICA

INTA

WARWICK THE UNIVERSITY OF WARWICK

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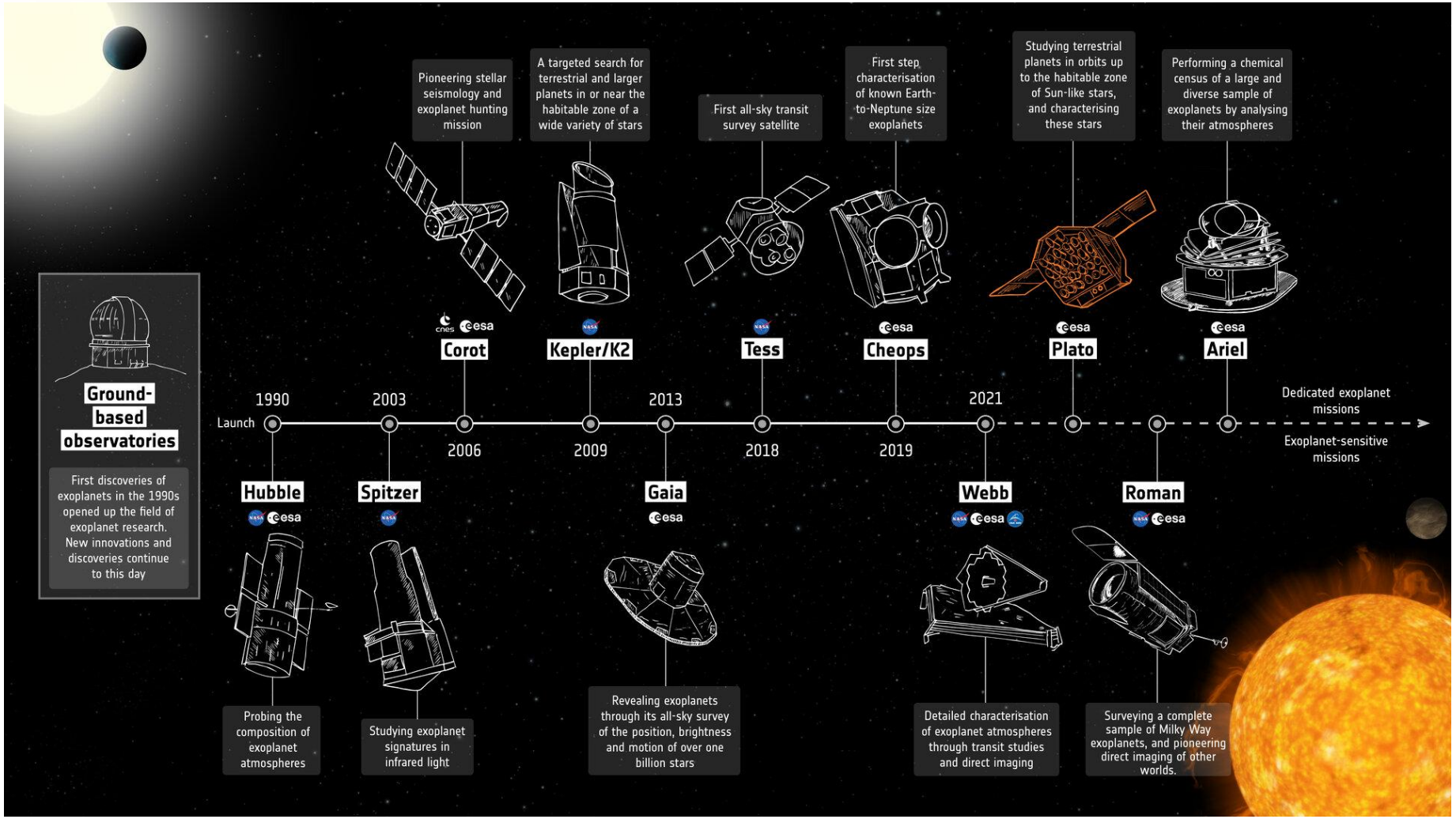
LIRA

esa

PLATO Mission Consortium PLAnetary Transits and Oscillations of stars

PLATO schedule



2011: failed selection M1/M2

2014: mission selection M3

2017: mission adoption

2018: contract with OHB signed

2019: first CCD delivered

2022: Critical Milestone success

2022: EM tests at SRON and IAS

2024: first FMs integrated in S/C

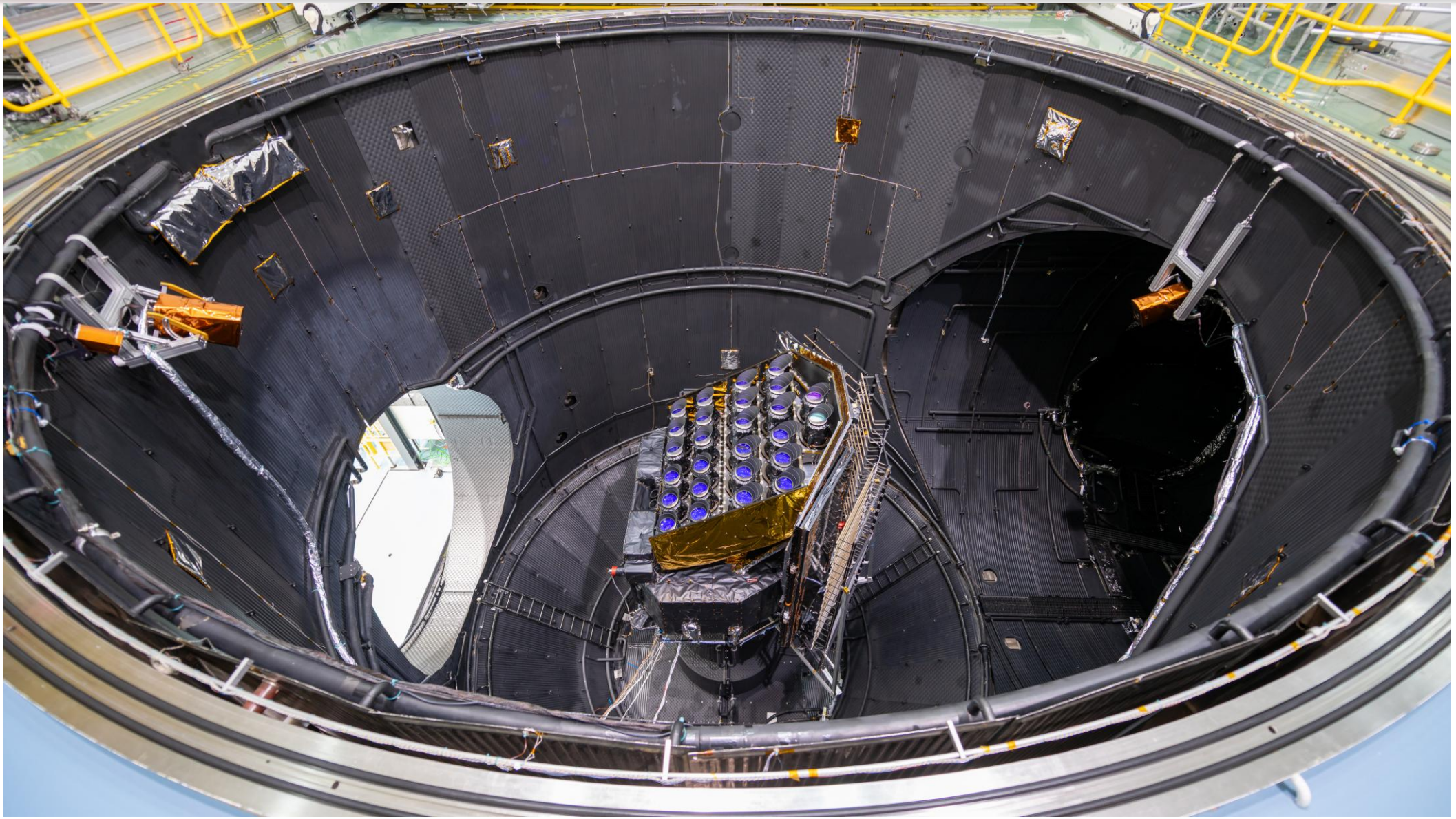
2025: Spacecraft at ESTEC

2027: launch Ariane 6

2027: start nominal operations

2028: first calibrated data

PLATO today



PLATO in the Large Space Simulator (LSS) chamber at ESTEC.

credit: ESA

https://www.esa.int/About_Us/Week_in_images/Week_in_images_09-13_March_2026

PLATO Mission Goals

- **Prime mission goals**:
  - detect and characterize a large number of extrasolar transiting planets including **Earth-sized planets up to the habitable zone of solar-like stars**
  - investigate seismic activity in stars, enabling the precise characterisation of the planet host star, including its **age**

- **Payload design drivers:**
  - **Planet detection**

    → large number of target stars
  - **Planet and star characterization**

    → bright target stars → wide field-of-view

  → **multi-camera approach:**
    - 24 normal cameras (photometry)
    - 2 fast cameras (fine-guidance, photometry in red and blue)

Image credit: OHB

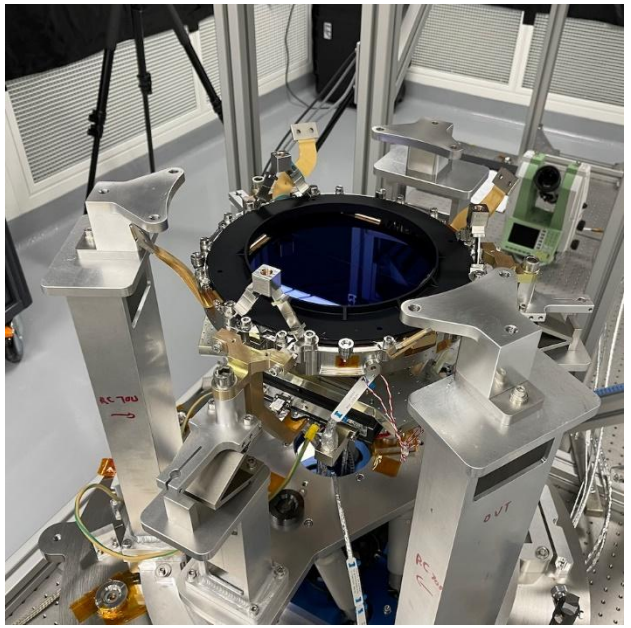
PLATO Camera

24 Normal cameras:

- 12cm aperture dioptric telescopes (6 lenses each)
- range: ~8 ≤ m_V ≤ 11 (13; 16 for M-dwarfs)
- FOV payload ~49°x 49°
- Each camera has 4 x CCD, each 4510×4510px
- Pixels size: 18 μm square
- read-out cadence: 25 sec
- operate in the VIS: 500 – 1050 nm

2 Fast cameras:

- Bright stars (<~8 mag)
- read-out cadence: 2.5 sec
- Used for Fine-Guidance Pointing
- Blue F-CAM: 500 – 700 nm
- Red F-CAM: 665 – 1050 nm

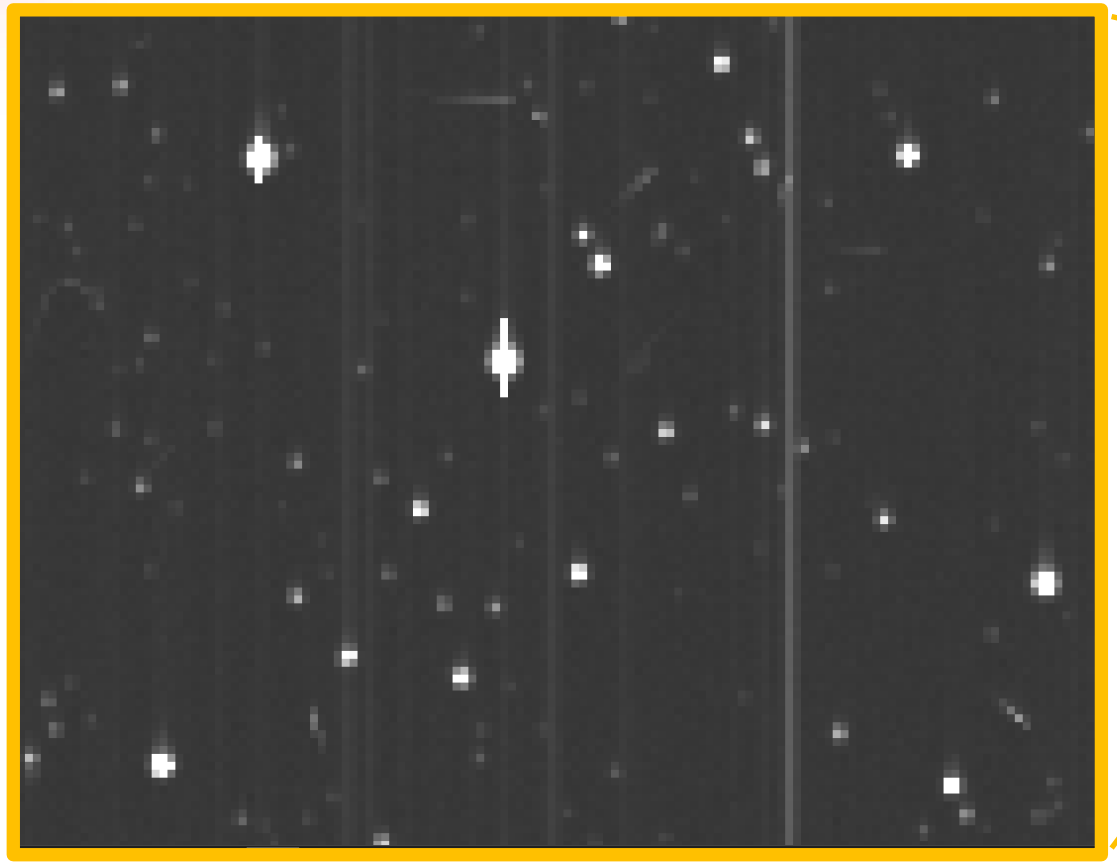


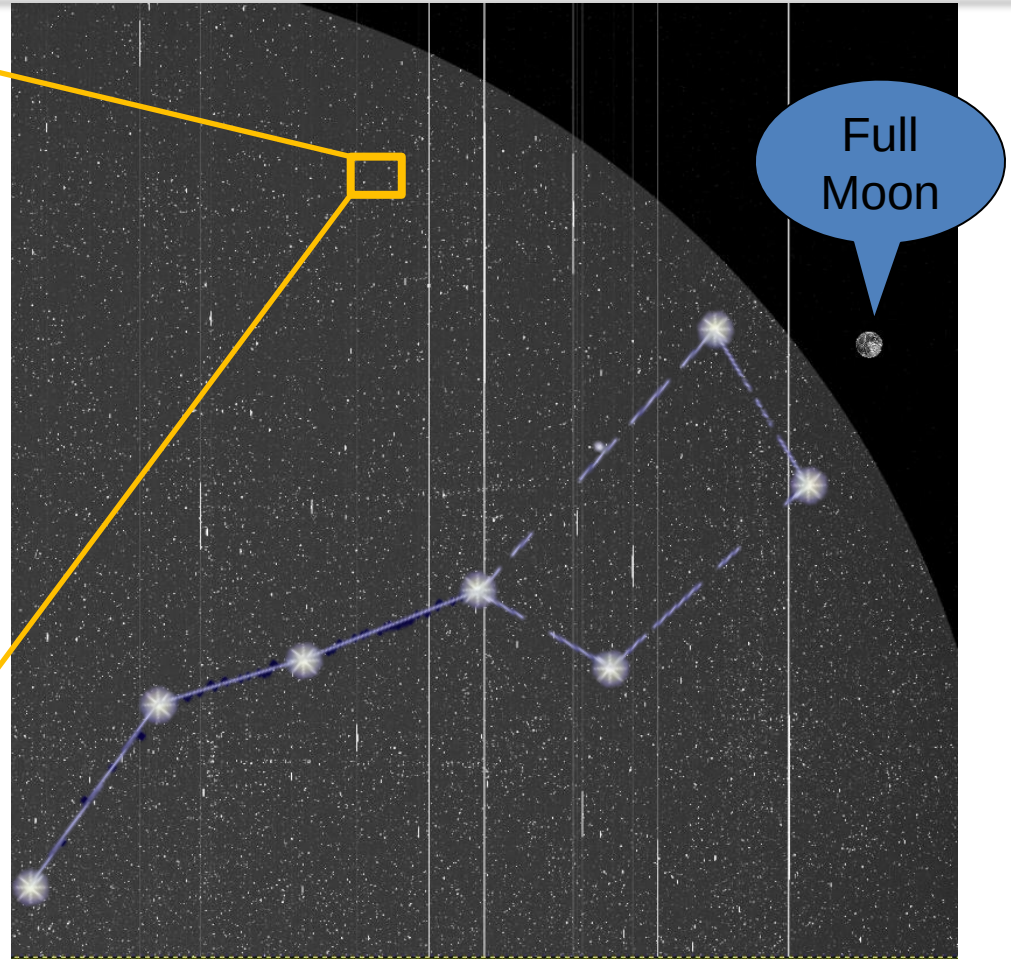
FPA PFM

TOU PFM

credit: M. Pertenais

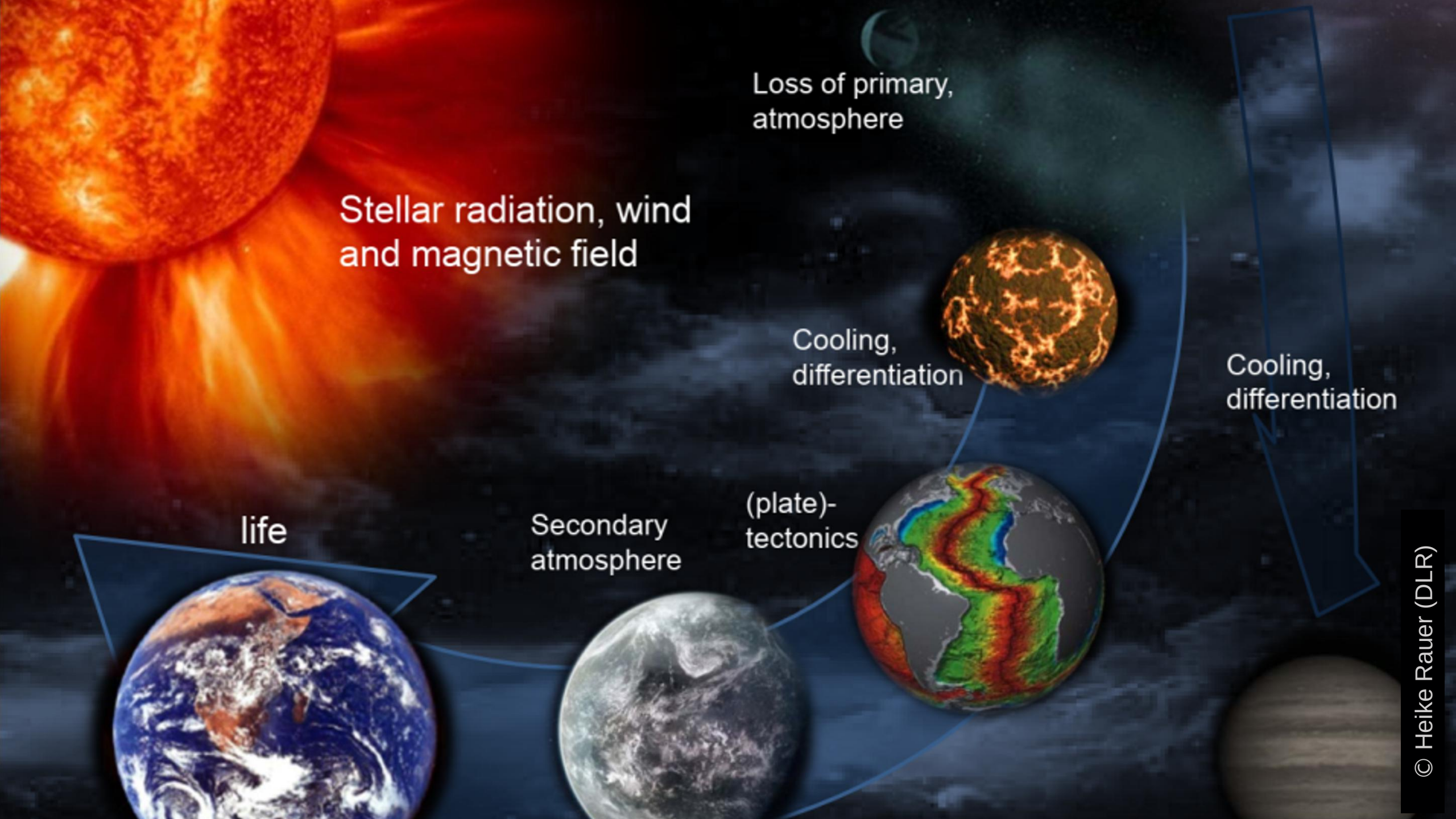
PLATO Field of view

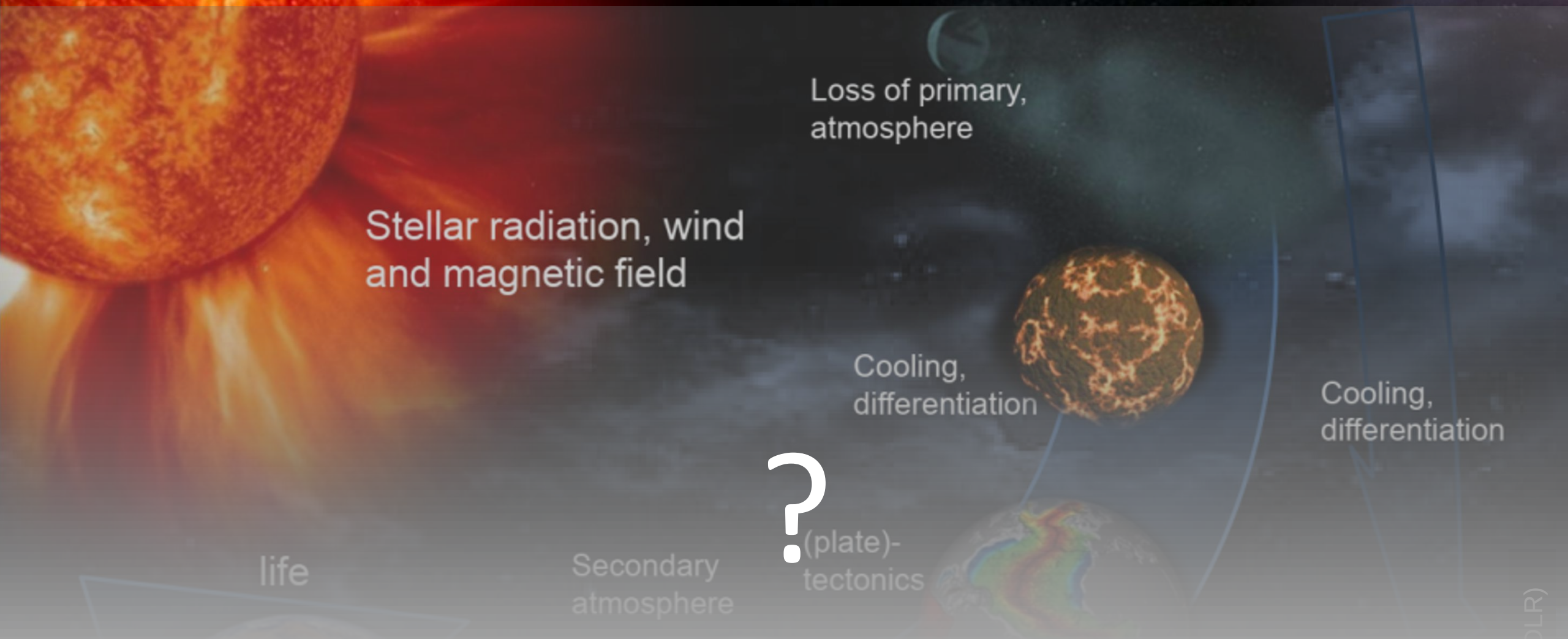




Simulated with PLATOSim (KU Leuven)

credit: M. Pertenais


Loss of primary,
atmosphere
Stellar radiation, wind
and magnetic field
Cooling,
differentiation
Cooling,
differentiation
life
Secondary
atmosphere
(plate)-
tectonics
© Heike Rauer (DLR)



How do planets and planetary systems form and evolve?
Is our Solar System unique or are there other systems like ours?
Are there potentially habitable planets?

MAIN PLATO DATA PRODUCTS

Level-0

All targets

- Imagettes of selected targets
- Validated light curves and centroids (generated on-board)

Level-1

All targets

- Processed imagettes of selected targets
- Light curves and centroids corrected for instrumental effects

Level-2

Stellar samples

- Planetary transit candidates
- Results of asteroseismic analysis
- Stellar rotation periods and activity
- Stellar masses, radii, and ages
- Planetary systems confirmed through TTV

Level-3

Prime sample

- Catalogue of confirmed planetary systems combining transit and ground-based RV observations

+ Additional Data Products from the Stellar and Exoplanet pipelines

credit: A. Heras

DATA PRODUCTS RELEASE

Level-0, Level-1, and Level-2 released every three months

Statistical sample >150 000 targets

- Q1 data released Q1 + 9 months
- Qn data released Qn + 6 months

first half 2028

Prime sample <20 000 targets

- Q1 data released Q1 + 1.5 years
- Qn data released Qn + 1.25 years

second half 2028

Level-3

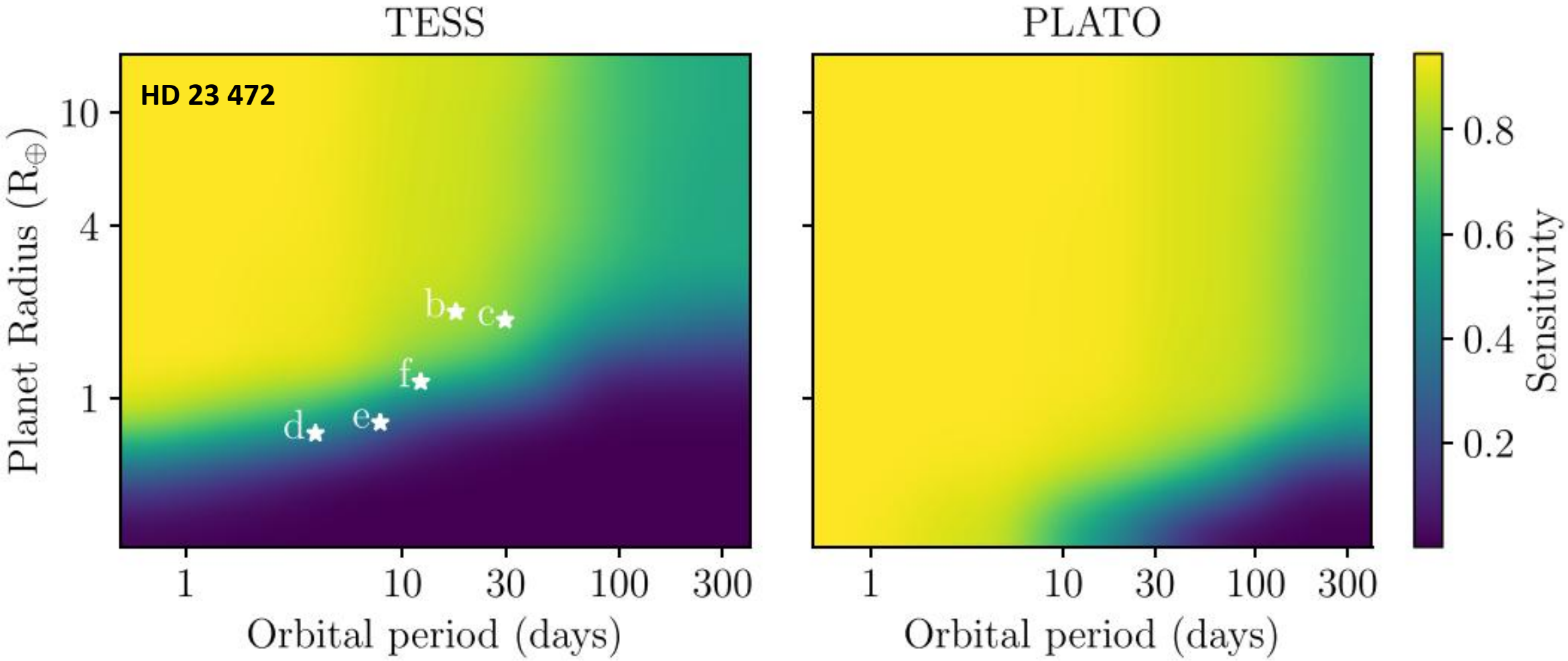
Prime sample

When ground-based observations are complete

for launch beginning 2027 d.m.

credit: A. Heras

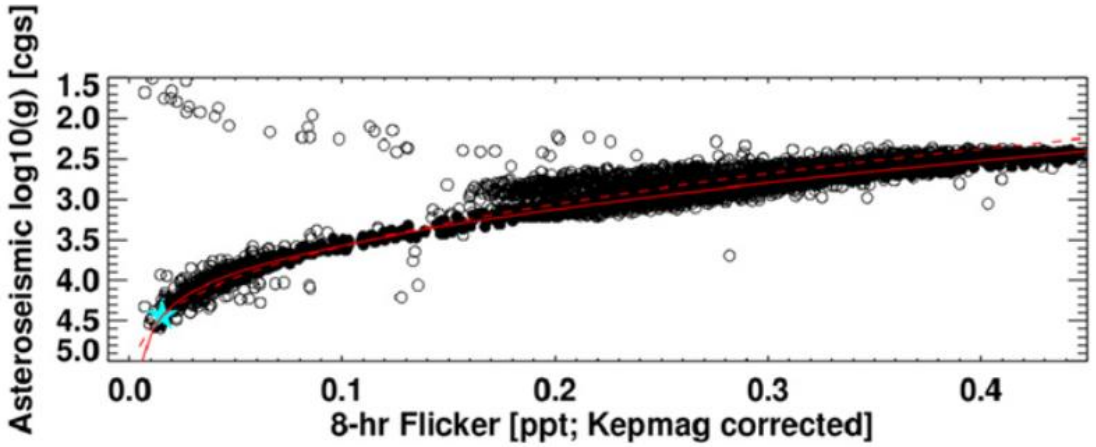
which strategy?



Eschen et al. (2024)

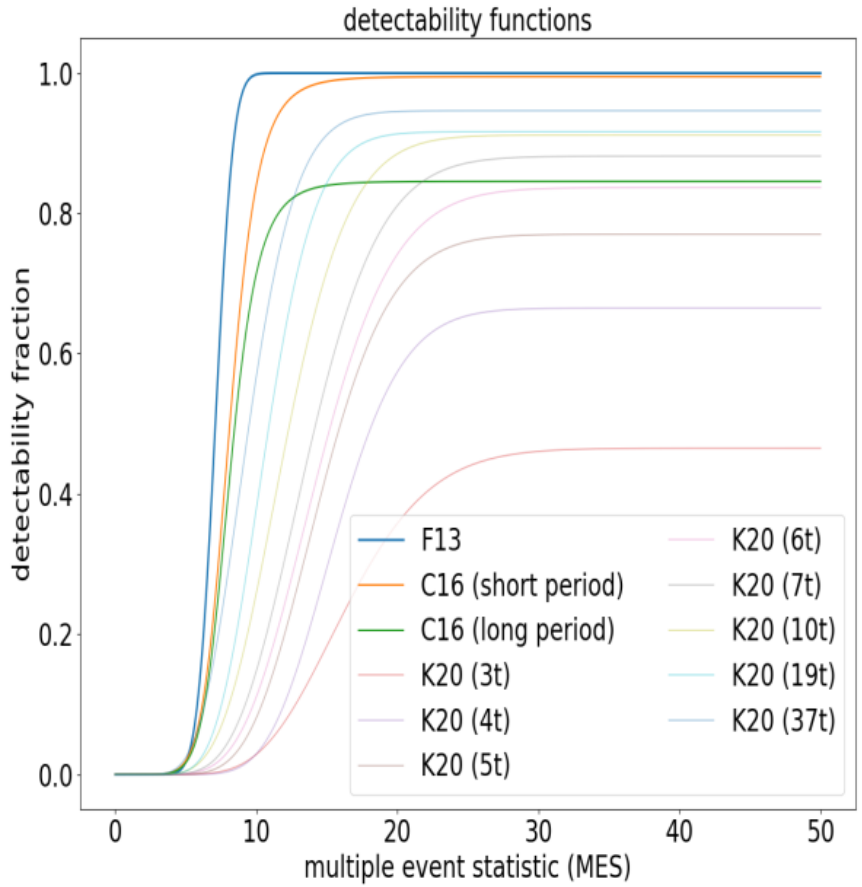
stellar variability

Granulation noise including at system level following the prescription of Bastien et al. (2016)



Bastien et al. (2016)

Magnetic activity noise (spot induced) included impact using empirical recovery fractions by Hsu et al. 2019 and Kunimoto & Matthews (2020)



take home message

- PLATO is getting ready for launch in early 2027. Challenges remain, but goal is feasible.
- The mission will change the way we study exoplanets by providing a large number of well characterized planets
  - Orbiting bright stars that will be better characterized by previous missions
  - Smaller planets than previous missions, orbiting at longer orbital periods
- First public data in 2028, but the PLATO Mission Consortium is getting ready to work from day 0.
- You can join the PLATO Consortium (see https://warwick.ac.uk/fac/sci/physics/research/astro/plato-science/)

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