

# The NCORES program: HARPS follow-up of TESS discoveries near the photoevaporation gap

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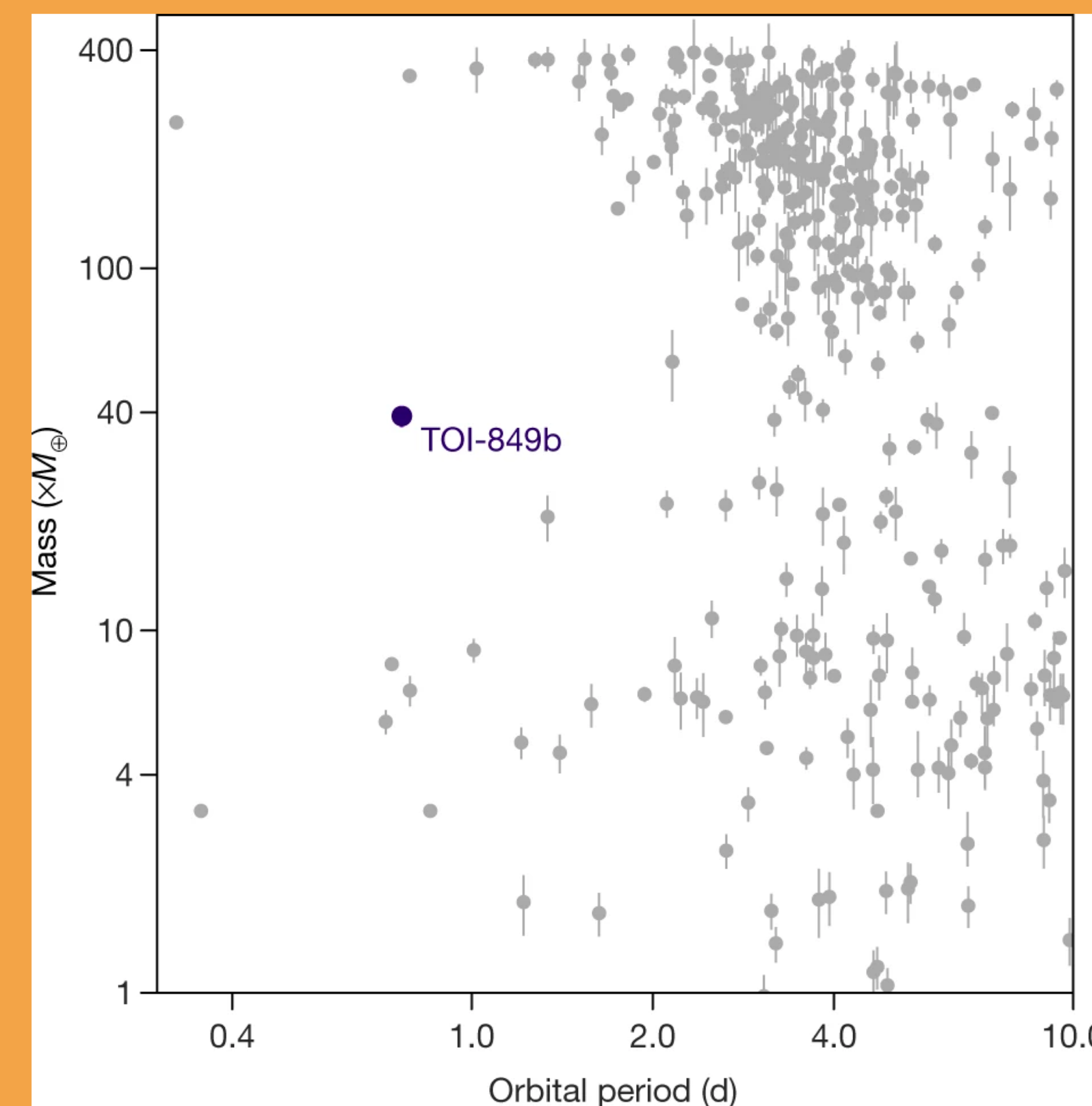
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## The Survey

The NCORES program uses HARPS data to measure the masses of TESS planets near the photoevaporation gap. Our goal is to investigate the mass dependence of the gap at small planet-star separation. We are coming to the end of the survey, with 26 precise (<20% error) masses published or in prep, some in collaboration with other teams such as KESPRINT and Chile-MPIA. We are a member of TFOP, and almost all of our targets will contribute to the TESS Level 1 science requirement to measure masses for planets smaller than  $4R_{\oplus}$ .

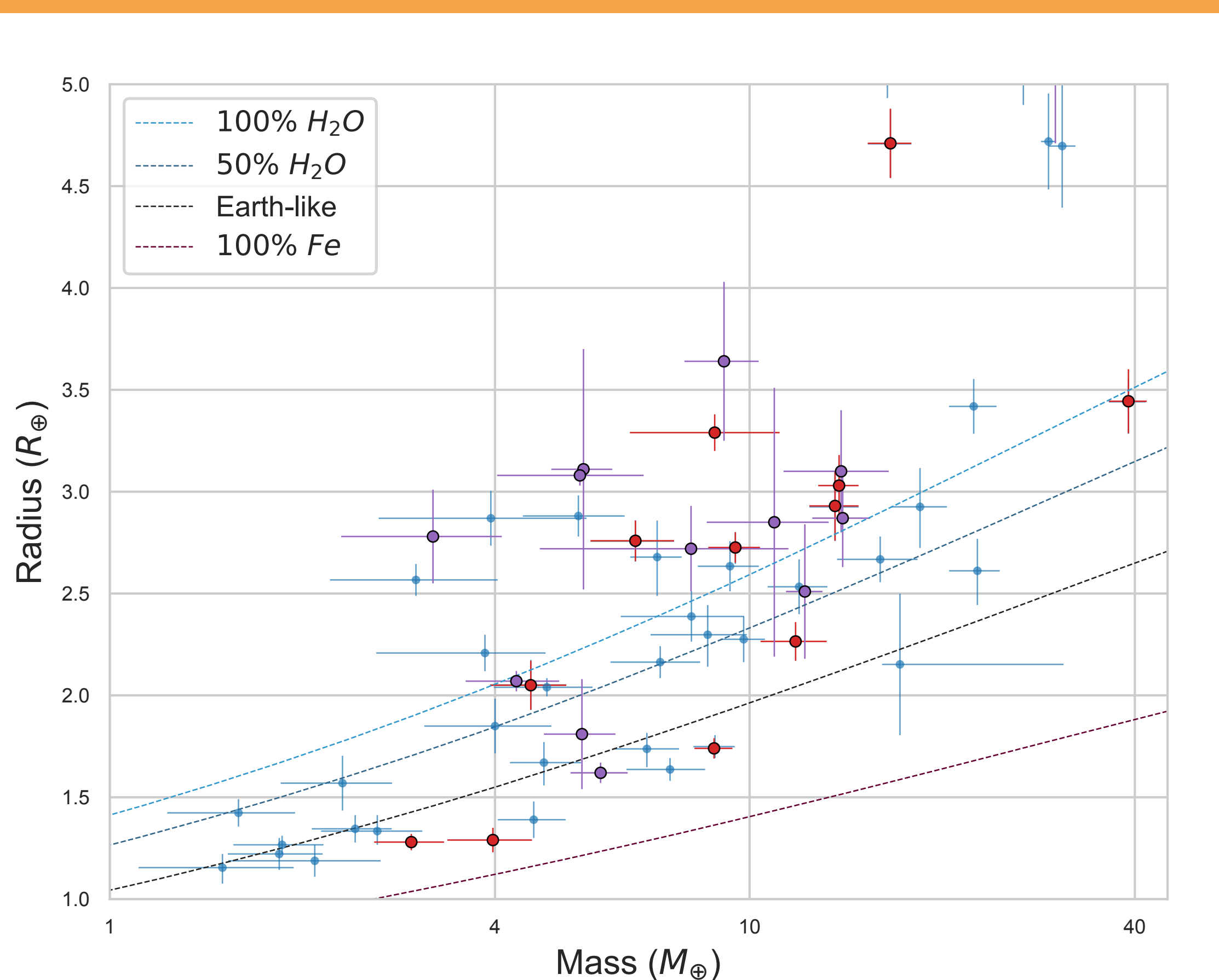
## TOI-849b

TOI-849b is a standout discovery from the program, the remnant core of a giant planet found inside the Neptunian desert. The planetary core may have been exposed through tidal disruption, planetary impacts, or extremely gas-poor formation. See *Armstrong et al (2020), Nature 583, 39-42* for details.



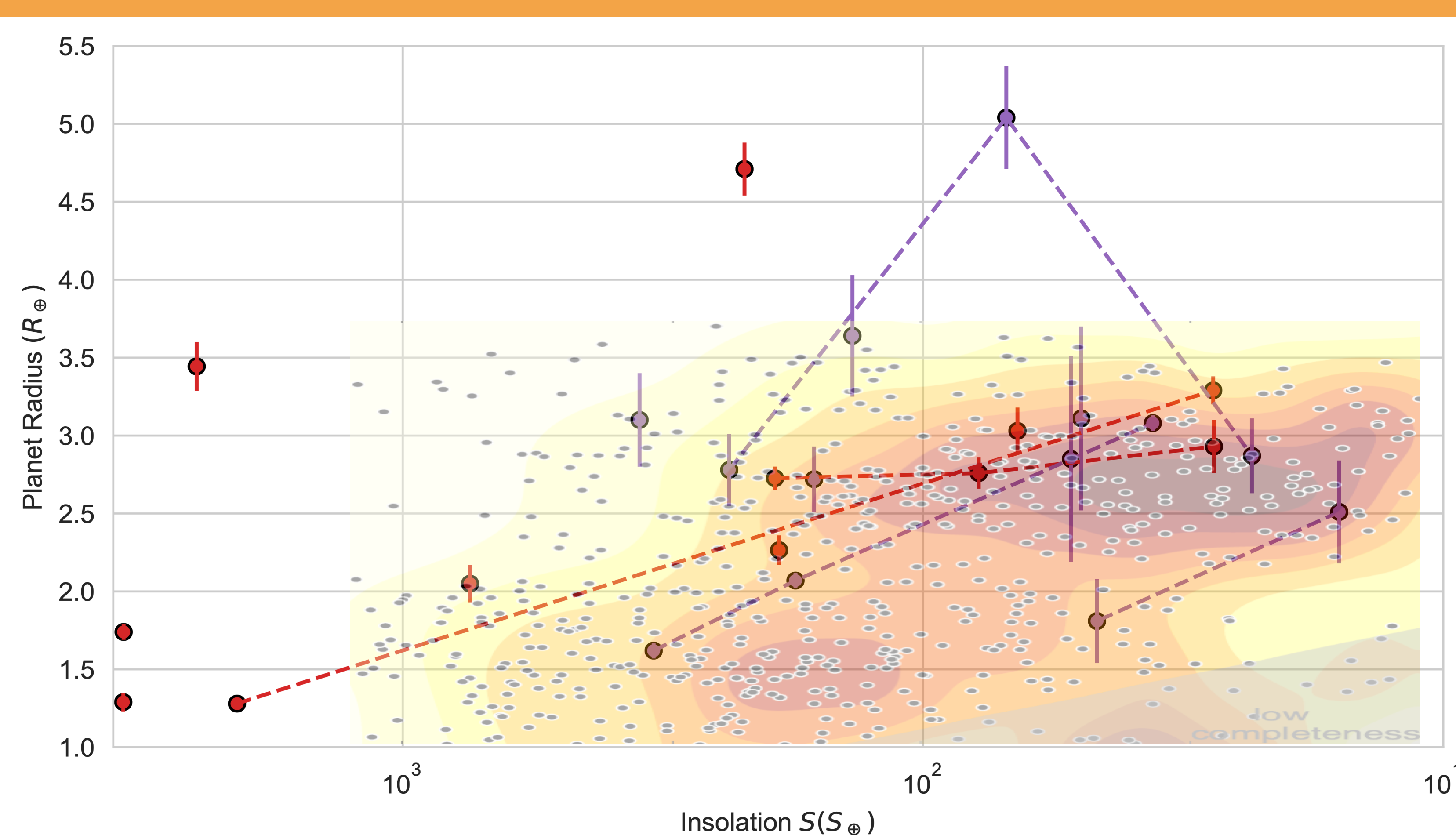
TOI-849b in the context of the Neptunian desert. The planet is near the size of Neptune but as dense as the Earth, implying an unusual formation or evolution pathway, particularly combined with its desert location..

## Targets and Current Results



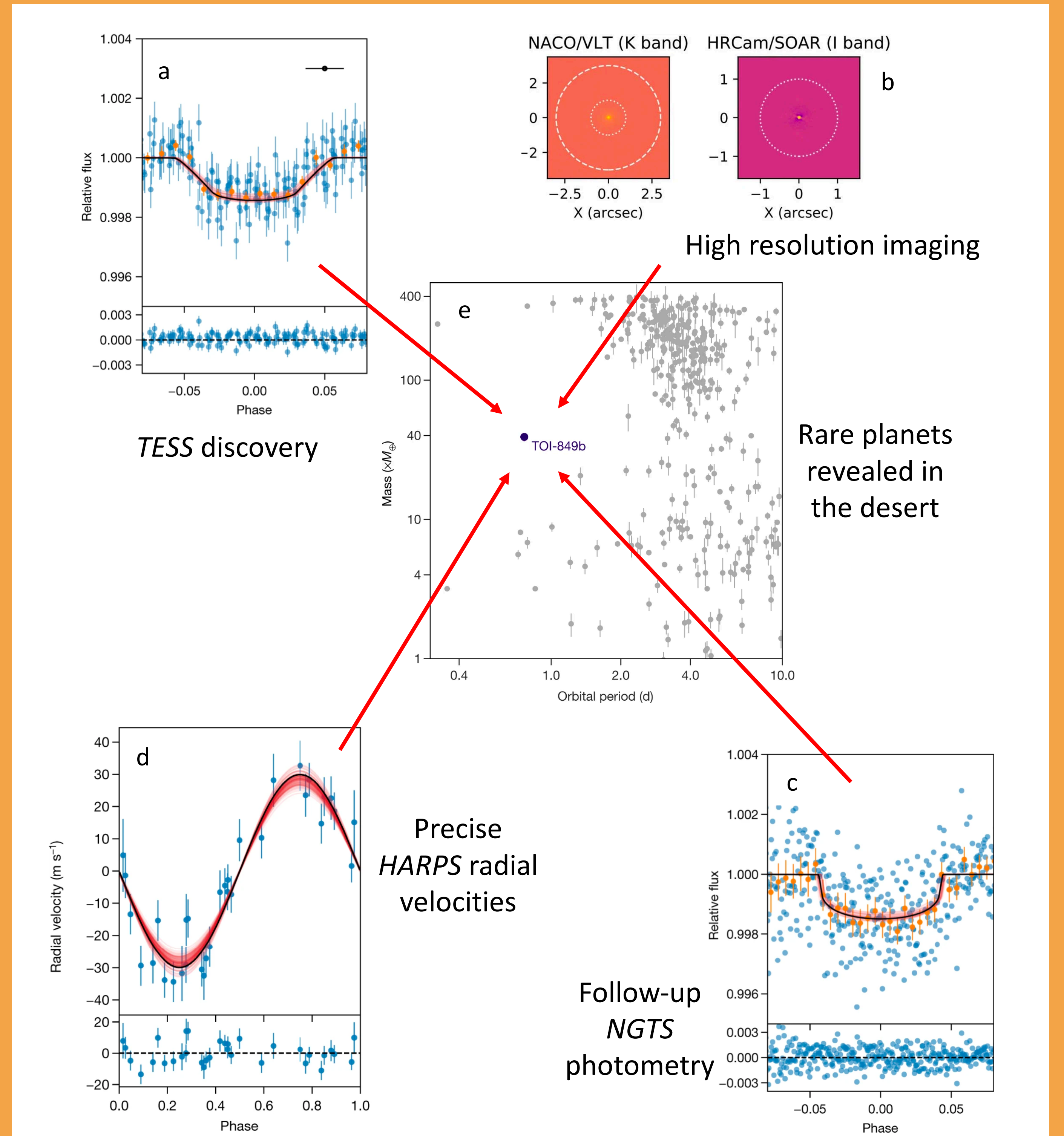
Current targets in the mass-radius diagram. Published or submitted NCORES targets are in red, in prep is purple. The background of TESS planets is in blue.

Planets span the range from terrestrial to Neptune-like, and include planets with masses of 3-10M\_Earth in the 'fully evaporated' region below the gap.



Current targets as a function of insolation and planet radius, as compared to the original photoevaporation gap detection in *Fulton et al (2017), AJ 154, 3*. Planets in multiple systems are joined by dashed lines, some of which cross the gap.

## Multi-instrument follow-up



TFOP and data from multiple instruments like the NGTS facility is critical to the program. This figure shows the combination of data used to characterize TOI-849b.