

Ultra Short Period Exoplanets are Born Dry

What is the science question? What are ultra-short period (USP) exoplanets made of and how did they form?

What are the findings?

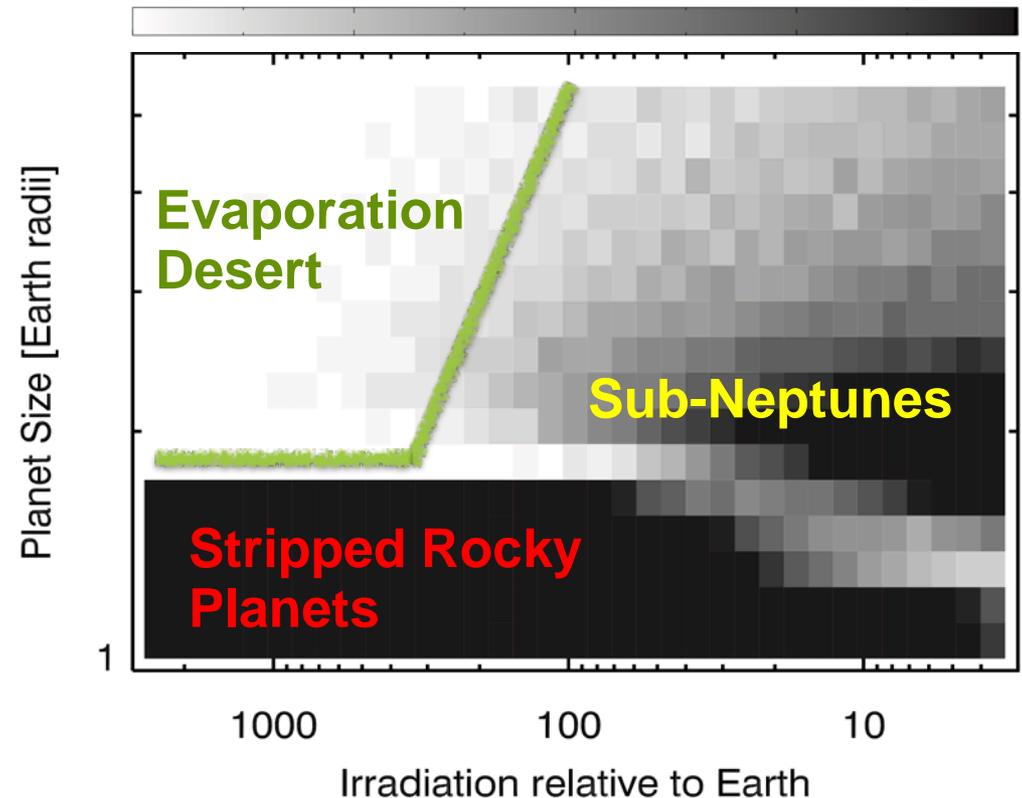
- Because they are so close to their star, USP planets are vulnerable to extreme atmospheric photo-evaporation that can strip the gas from hot Neptune-like planets.
- Photo-evaporation models can reproduce the observed planet distribution found by the Kepler Space Telescope.
- However, this only works if USP planets have rock/iron cores, not if they have large amounts of water like the ice giants.

What is the impact? Many of the known rocky exoplanets likely formed as the stripped cores of gaseous hot Neptune-like planets. However, these planets likely contained little water and therefore must have formed well within the distance where it's cold enough for volatile compounds to condense into solid ice grains (i.e., the “snow-line”).

Why does it matter to non-scientists?

This discovery provides clues about the formation and frequency of Earth-like rocky planets.

Darker Areas = More Planets Predicted



The darker areas of this plot show a higher number of planets predicted by the photo-evaporation models. These models predict two distinct exoplanet populations: hot bare rocky planets that have lost all their gas and cooler sub-Neptunes that have retained significant amounts of gas.

Eric Lopez (693), 2017: “Born Dry in the Photo-Evaporation Desert: Kepler’s Ultra-Short-Period Planets Formed Water-Poor,” *Monthly Notices of the Royal Astronomical Society*