THE EXOPLANET CASE FOR VENUS

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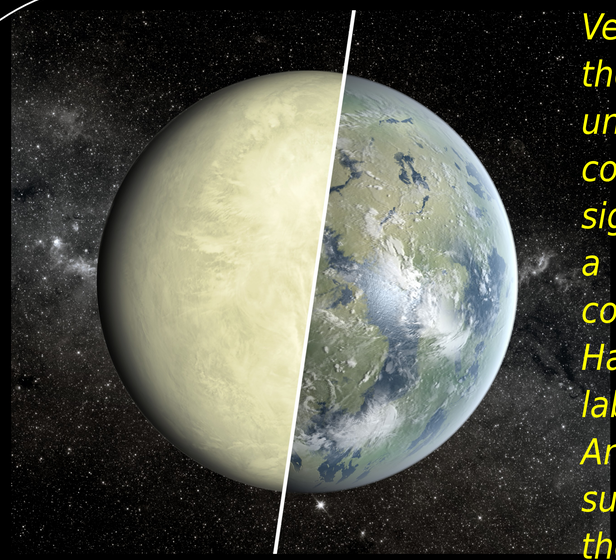
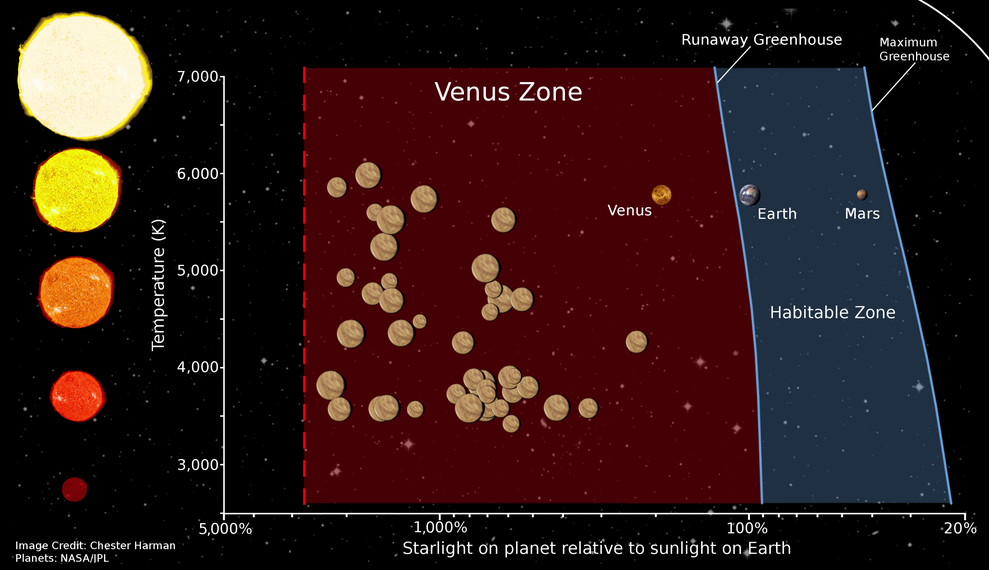


Venus provides a unique opportunity to explore the processes that created a completely uninhabitable environment and thus define the conditions that can rule out bio-related signatures. Indeed, Venus is the type-planet for a world that has transitioned from habitable conditions, through the inner edge of the Habitable Zone (HZ); thus it provides a natural laboratory to study the evolution of habitability. An incomplete understanding of the Venusian surface and atmospheric evolution will hinder the interpretation of exoplanet observations.



Many significant questions remain on the current state of Venus that effectively inhibit our ability to model exoplanet environments. These questions include:

- *Did Venus have a habitable period (e.g. Way et al. 2016)?*
- *Where did the water go? Was hydrogen loss and abiotic oxygen production rampant, or did surface hydration dominate?*
- *What has the history of tectonics, volatile cycling, and volcanic resurfacing been (Ivanov & Head 2011)? When did Venus enter its present stagnant-lid regime? Does any subduction occur today?*
- *What is the detailed composition and atmospheric chemistry within the Venusian middle and deep atmosphere and how does it interact with the surface?*

In-situ Venusian surface/atmospheric data is critical to address these questions and permit detailed modeling of exoplanets environments.