

Quantifying the Effects of Temperature on Short Period Rocky Planets

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1. Introduction

Rocky planets can be very diverse in structure and composition compared to the Earth. Their temperature profiles could also differ greatly from Earth's depending on their mass and distance from their host stars. Interior structure models of rocky exoplanets have not yet studied the full range of possible temperature profiles. We develop a simulation, PyPlanet, for a rocky planet with an arbitrary number of layers and equations of state. We apply this model to explore many possible temperature profiles and quantify the thermal effects on the mass-radius relations of rocky planets. We also couple this model with a simple thermal evolution model of rocky planets to gain intuition as to how the initial thermal conditions of a rocky planet can affect its overall properties. This detailed modeling will be crucial for making robust inferences about rocky planet structure and composition from transit and radial velocity observations.

2. References

- [1] Kenyon, S. et al: Rocky Planet Formation: Quick and Neat, *The Astrophysical Journal*, Volume 831, pp. 8-19, 2016.
- [2] Seager, S. et al: Mass-Radius Relationships for Solid Exoplanets, *The Astrophysical Journal*, Volume 669, pp. 1279-1297, 2007.
- [3] Valencia, D. et al: Internal structure of massive terrestrial planets, *Icarus*, Volume 181, pp. 545-554, 2006
- [4] Zeng, L. and Jacobsen, S.: A Simple Analytical Model for Rocky Planet Interiors, *The Astrophysical Journal*, Volume 837, pp. 164, 2017.

Short Summary

Interior structure models of rocky exoplanets have not yet studied the full range of possible temperature profiles. We develop a simulation for rocky planets with an arbitrary number of layers and equations of state. This detailed modeling will be crucial for making robust inferences about rocky planet structure and composition.