

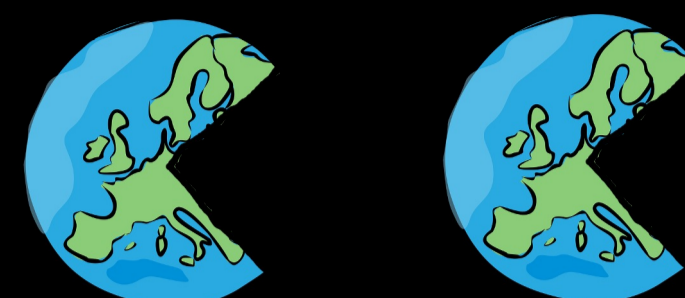
Vapor equilibrium models of rocky planets growing by pebble accretion

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score 1.24 M_{earth}



High score 13.31 M_{earth}

Link to paper



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Motivation

- Planet differentiates during formation
→ envelope in vapor equilibrium with underlying magma ocean

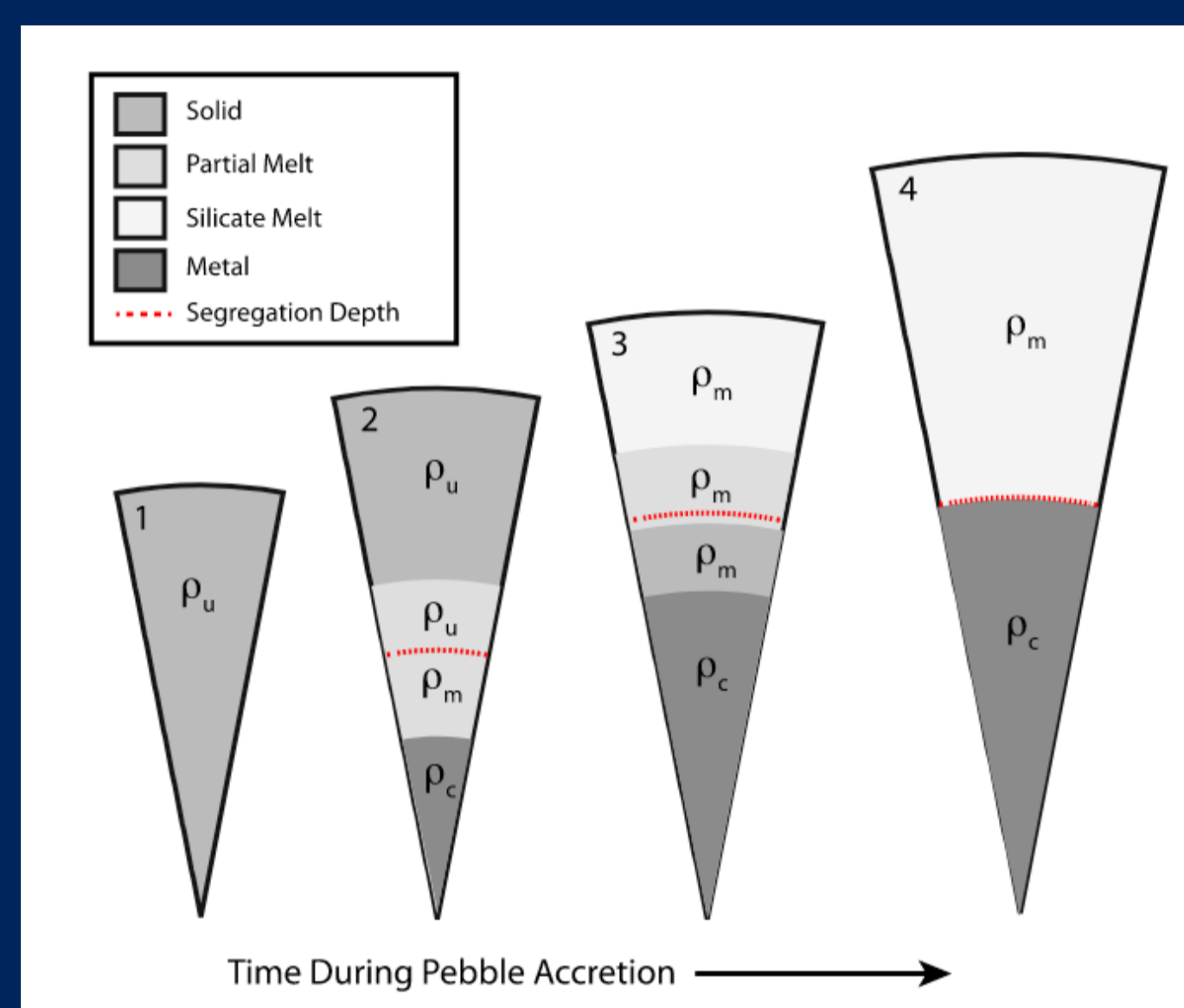


Figure 1: Evolution of a terrestrial protoplanet interior during pebble accretion by Olson et al. 2022.

- SiO has a stabilizing effect on envelope (Leconte et al. 2017)

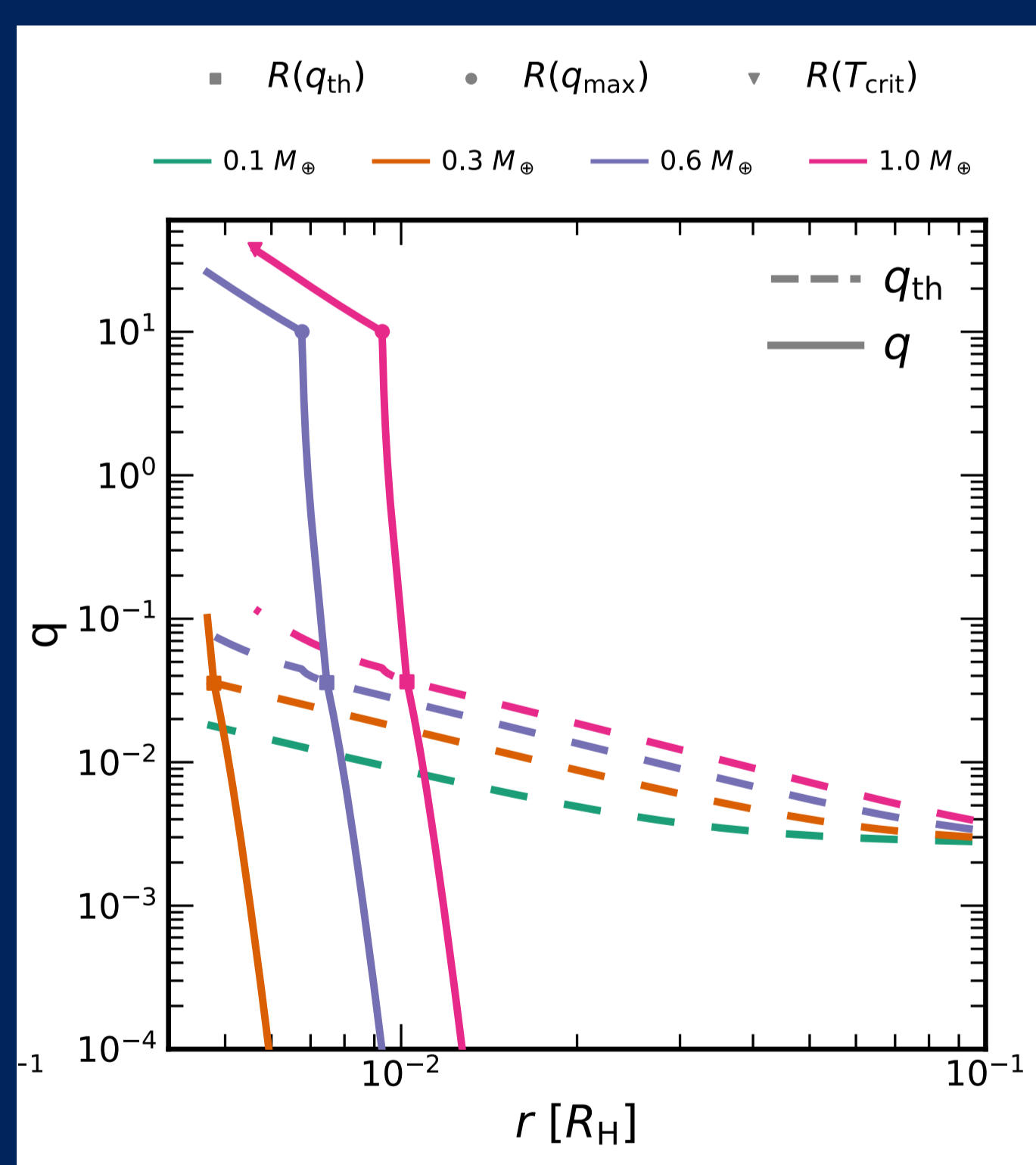
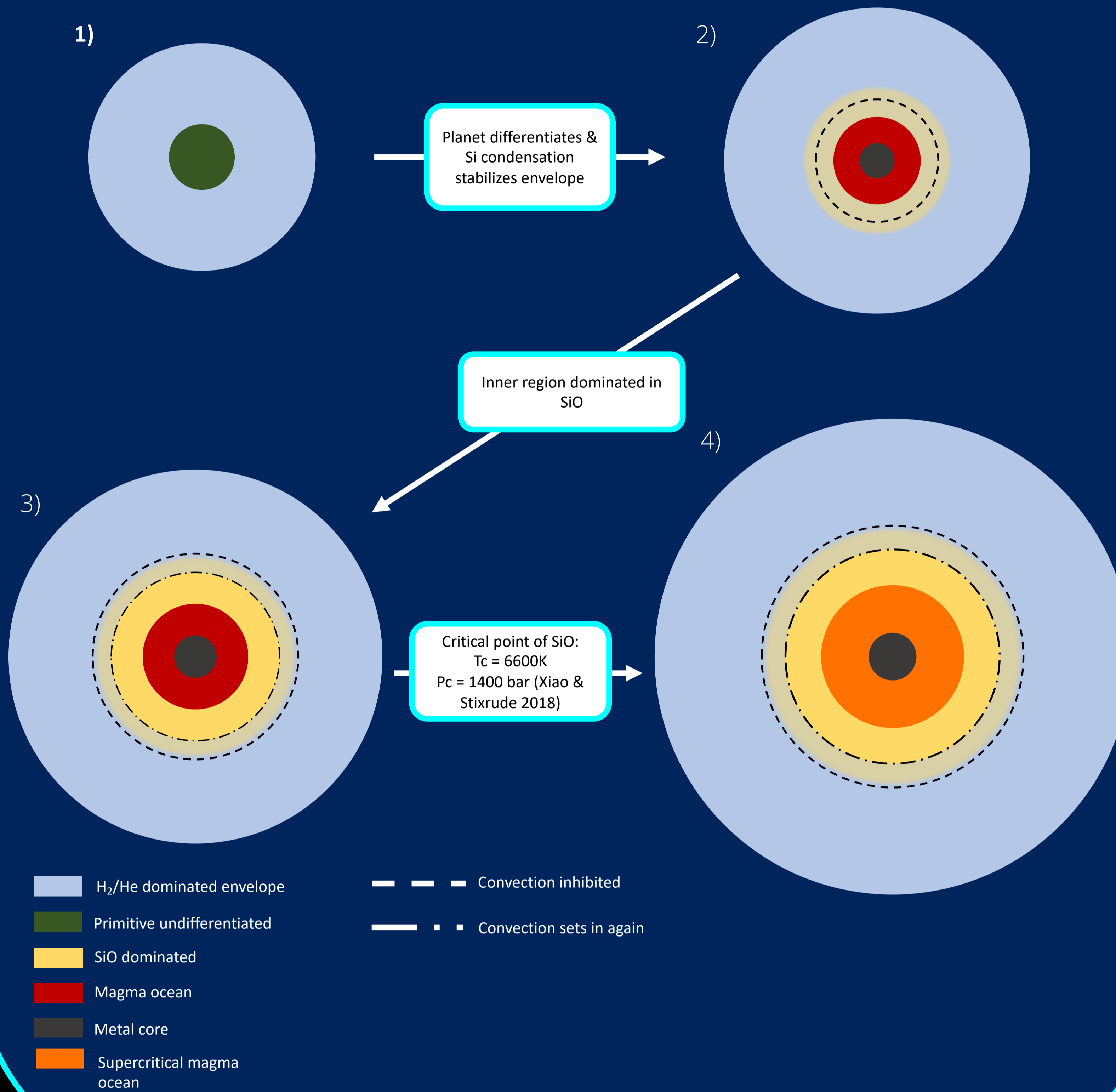


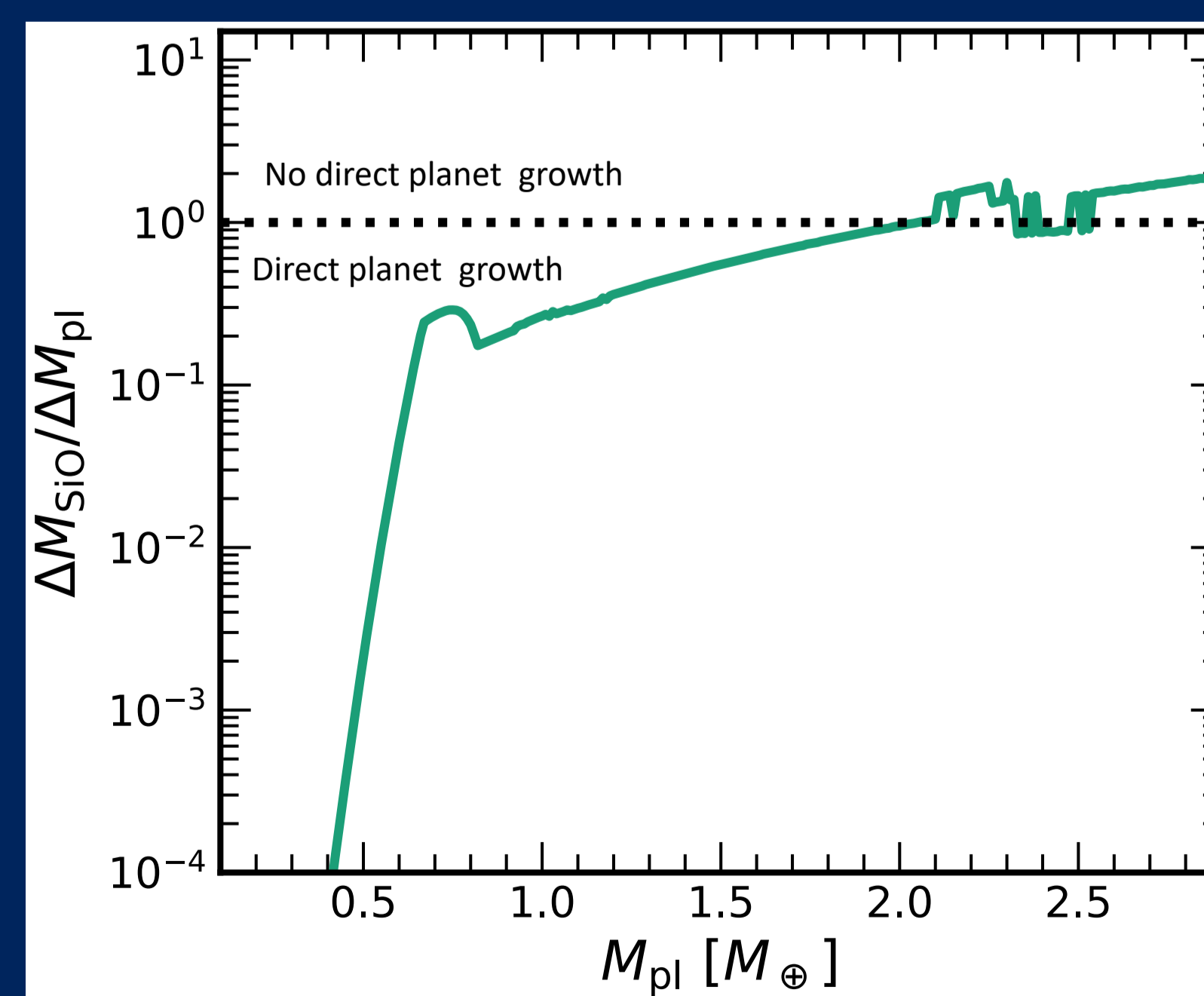
Figure 2: Threshold mass mixing ratio needed to stabilize the envelope

The model



Teaser Results

Figure 3: Comparing the change in SiO in the envelope, $\Delta M_{SiO}/\Delta M_{pl}$, between two consecutive masses to the accreted mass ΔM_{pl} .



References:

Steinmeyer, M.-L. and Johansen, A. (2024). Vapor equilibrium models of accreting rocky planets demonstrate direct core growth by pebble accretion.
Xiao, B. and Stixrude, L. (2018). Critical vaporization of MgSiO₃. Proceedings of the National Academy of Science
Leconte, J., Selsis, F., Hersant, F., and Guillot, T. (2017). Condensation-inhibited convection in hydrogen-rich atmospheres. Stability against double-diffusive processes and thermal profiles for Jupiter, Saturn, Uranus, and Neptune. A&A