Venus: A Thick Basal Magma Ocean May Exist Today

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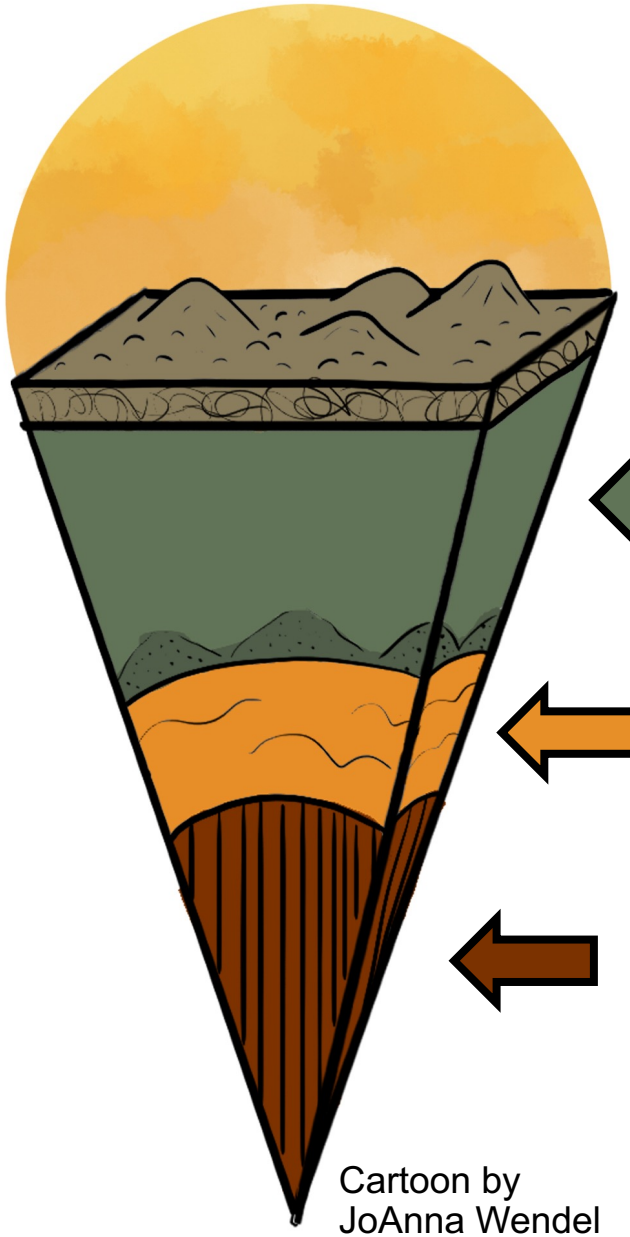
Silicate mantles may crystallize from the middle outwards

- Unlike surficial magma oceans that solidify within <100 Myr, a **basal magma ocean (BMO)** takes billions of years to cool—limited by mantle convection and coupling to the core
- Assuming the interior of Venus cools slowly now in the absence of plate tectonics, **a BMO that solidified in Earth after ~2 Gyr could still exist with a thickness of >200 km in Venus**, which would provide invaluable insights into the accretion and internal differentiation of terrestrial planets

A basal magma ocean has implications for future missions

- **New geophysical orbiters (VERITAS/EnVision)** can detect (or rule out) a thick basal magma ocean by measuring the gravity field and tidal deformation
- **Noble gases in the atmosphere (DAVINCI+)** would be interpreted differently if a hidden internal reservoir exists
  - The basal magma ocean hides the “missing” argon-40?



O’Rourke, J. G. (2020). *Geophysical Research Letters*, *47*(4). https://doi.org/10.1029/2019GL086126