Whats up with Mercury?

Team Mercury

July 21, 2014

1 BIG QUESTIONS:

- What is the large scale internal structure (e.g. Inner Core Radius, does a high density layer exist)?
- Alternative ways to power the dynamo (e.g. Precession Drive Dynamo from tidal resonance versus Double diffusive convection)

1.1 Internal Structure

What is the first order radial structure?

- What is the depth of the inner core?
- What can we say about the proposed high density layer at the base of the mantle?
- Can we use 1-D parameterized models of convection and dynamo energetics to connect these two ideas and better constrain them?
- How do these two tradeoff?

1.1.1 Known Constraints:

- Radius of Mercury: 2440 km
- CMB: 2020 km [1]
- Elastic Thickness: 25-30 km [2]
- Crustal Thickness: 140 km [2]

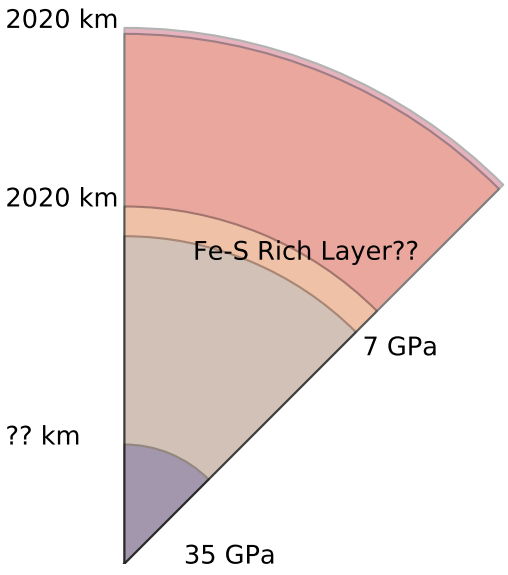

Figure 1: default

1.2 Powering the Dynamo

- Convection Driven
- Precession Driven

References

[1] Steven A Hauck, Jean-Luc Margot, Sean C Solomon, Roger J Phillips, Catherine L Johnson, Frank G Lemoine, Erwan Mazarico, Timothy J McCoy, Sebastiano Padovan, Stanton J Peale, et al. The curious case of mercury's internal structure. *Journal of Geophysical Research: Planets*, 118(6):1204–1220, 2013.

[2] F Nimmo and TR Watters. Depth of faulting on mercury: Implications for heat flux and crustal and effective elastic thickness. *Geophysical research letters*, 31(2), 2004.