Geoid computations in support of the reply to comments on 'On the impact of true polar wander on heat flux patterns at the core-mantle boundary' submitted to Solid Earth by Thomas Frasson, Stéphane Labrosse, Henri-Claude Nataf, Nicolas Coltice and Nicolas Flament'

November 24, 2023

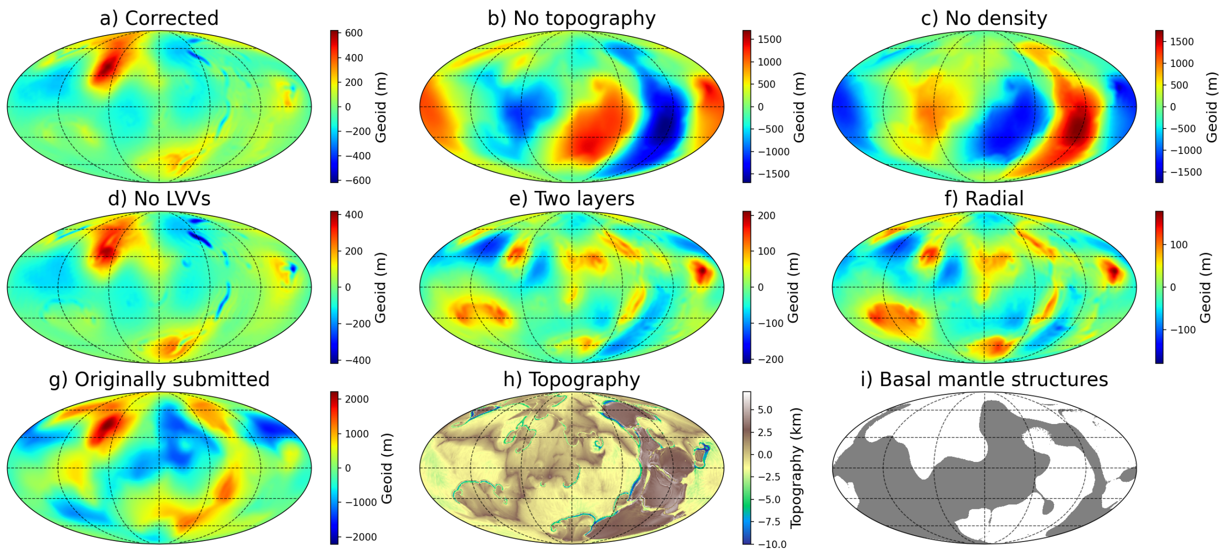

Figure 1: a) Corrected geoid newly computed for the snapshot at -250 Myr in model MC. b-f) Test geoids obtained for the same snapshot as a) following different methodologies. No topography: geoid computed without taking the topography into account (i.e. geoid signal produced by the density distribution only). No density: geoid computed without taking the density into account (i.e. geoid signal produced by the topography only). No LVVs: geoid computed after canceling the lateral variations of viscosity and density in the upper 350 km (same as the No LVVs geoid of the MF model in the manuscript). Two layers: the viscosity is taken homogeneous in the upper mantle and in the lower mantle, with an increase of viscosity only at 670 km depth by a factor 30. Radial: geoid computed using the radial viscosity profile shown in Figure 2, corresponding to the laterally-averaged viscosity in model MF at time t = 0 Myr. g) Originally submitted geoid shown in the manuscript. h) Surface topography for the snapshot at -250 Myr in model MC. i) Position of the basal mantle structures (shown in gray) at the CMB for the snapshot at -250 Myr in model MC.

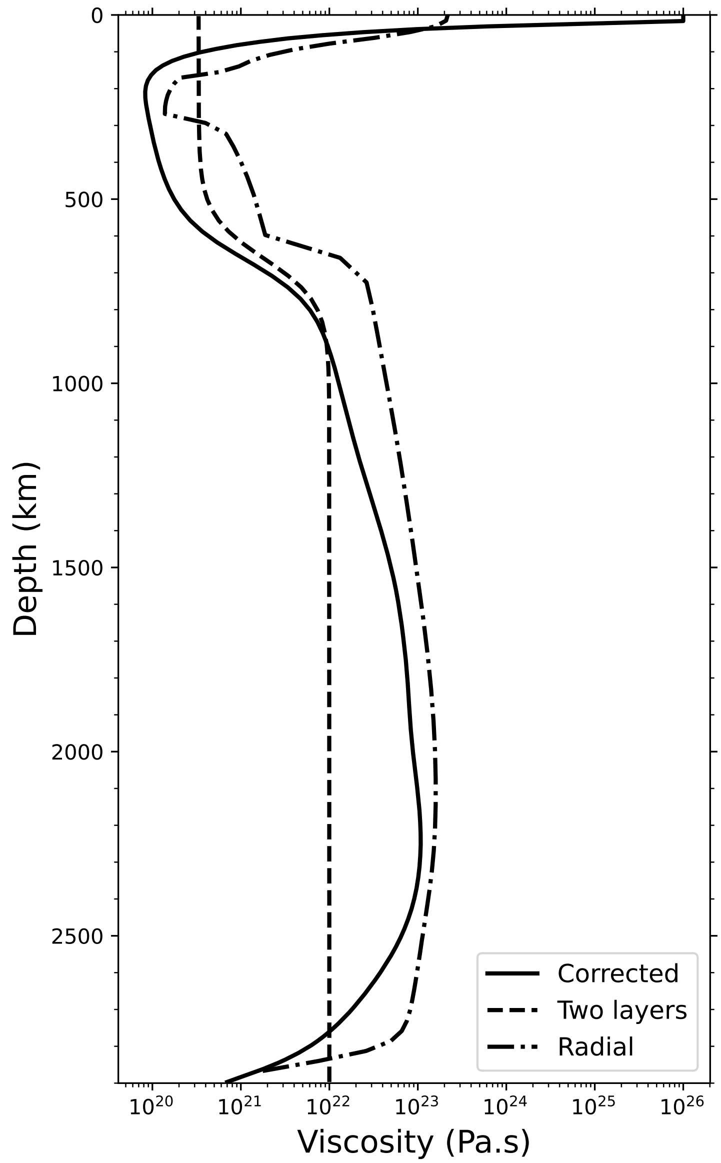

Figure 2: Viscosity profiles in the different geoid tests shown Figure 1. The 'Corrected' profile corresponds to the viscosity associated with the mean temperature profile in model MC. The centers and rims of continents have a viscosity respectively 100 times and 50 times higher than this profile. The basal mantle structures are 10 times more viscous that this profile. The 'Two layers' viscosity profile imposes a viscosity 30 times higher in the upper mantle than in the lower mantle. The 'Radial' profile is the laterally-averaged viscosity in model MF at time t = 0 Myr. On Figure 1, the 'Corrected' profile corresponds to cases a-d, the 'Two layers' profile corresponds to case e, and the 'Radial' profile corresponds to case f.