Supporting Information for "Effects of the compositional viscosity ratio on the long-term evolution of lower mantle's thermo-chemical piles: insights from 2-D spherical annulus simulations"

Yang Li[1,2,3], Frédéric Deschamps[4], Jianfeng Yang[2,3], Lin Chen[2,3], Liang Zhao[2,3],Paul J.Tackley[5]

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[1]Key Laboratory of Earth and Planetary Physics, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China

[2]State Key Laboratory of Lithospheric Evolution, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China

[3]Institutions of Earth Sciences, Chinese Academy of Sciences, Beijing, China

[4]Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan

1. Table S1

2. Figures S1 to S3

[5]Institute of Geophysics, Department of Earth Sciences, ETH Zurich, Zurich, Switzerland

Introduction

This supporting information file provides the parameters of the numerical models (Table S1) and supporting figures (Figure S1 to S3).

Table S1. Parameters of the numerical models

Parameter	Symbol	Value
Acceleration of gravity	g	9.81 m s^{-2}
Mantle thickness	D	2891 km
Super-adiabatic temperature difference	ΔT_S	2500 K
Reference adiabatic temperature	T_{as}	1600 K
Surface density	ρ_S	3300 kg m^{-3}
CMB density	ρ_b	5500 kg m^{-3}
Surface thermal expansion	α_S	5.0×10^{-5} K^{-1}
CMB thermal expansion	α_b	1.0×10^{-5} K^{-1}
Surface thermal diffusivity	κ_S	6.24×10^{-7} m^2s^{-1}
CMB thermal diffusivity	κ_b	8.74×10^{-7} m^2s^{-1}
Clapeyron slope at z=660km	Γ_{660}	-2.5 MPa K^{-1}
Reference thermal viscosity	η_0	1.6×10^{21} Pa s
Viscosity ratio at z=660km	η_{660}	30
Reference internal heating rate	Rh_{ref}	4.0×10^{-12} W kg^{-1}
Surface yield stress	σ_0	200 MPa
Pressure gradient of the yield stress	σ_i	2.5×10^{-3} Pa/Pa

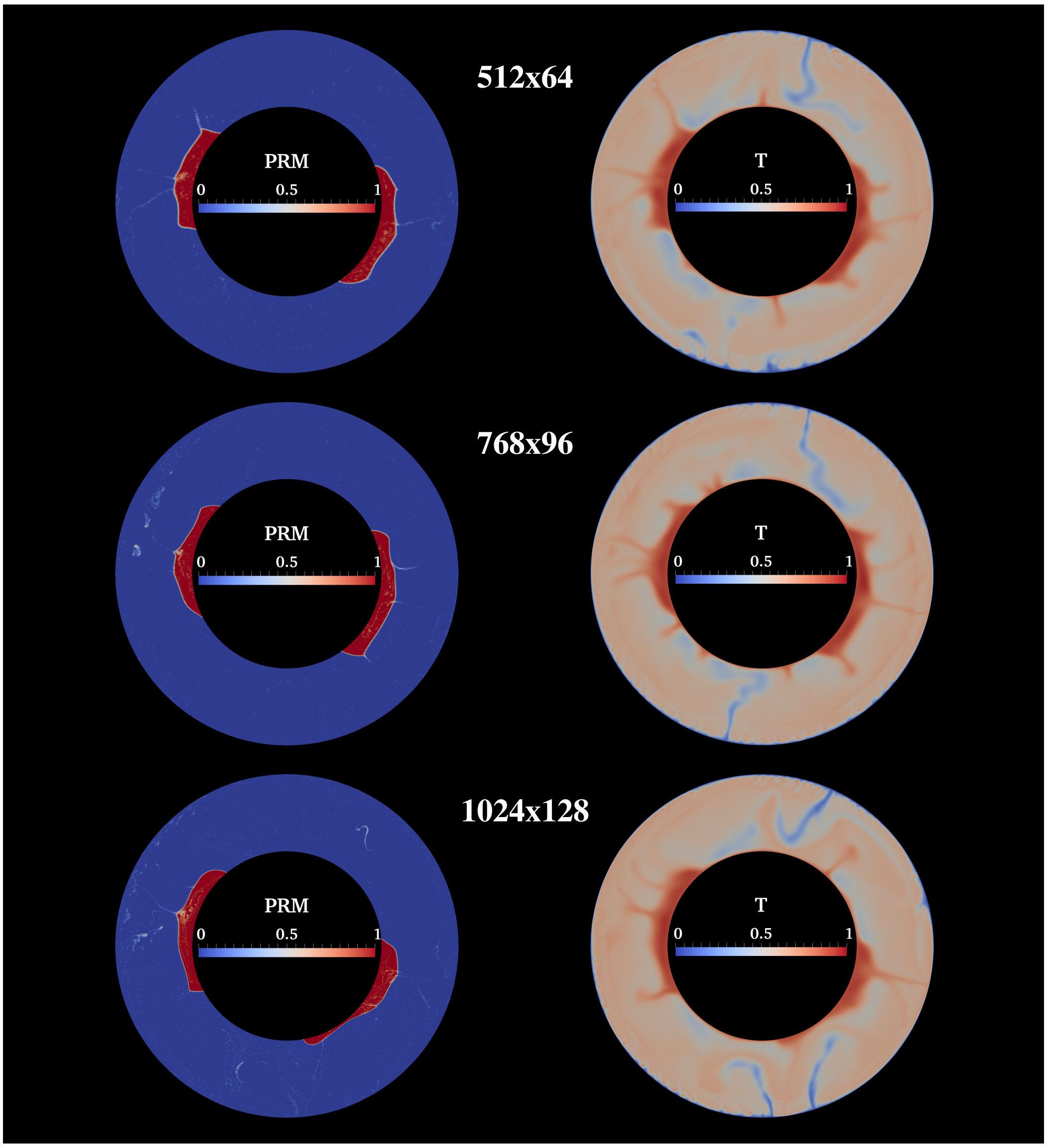

Figure S1. Snapshots of composition (left) and temperature (right) fields of B=0.32 at t=4.5 Gyrs, the lateral and vertical resolutions from top to bottom are: 512×64, 768×96, and 1024×128, respectively.

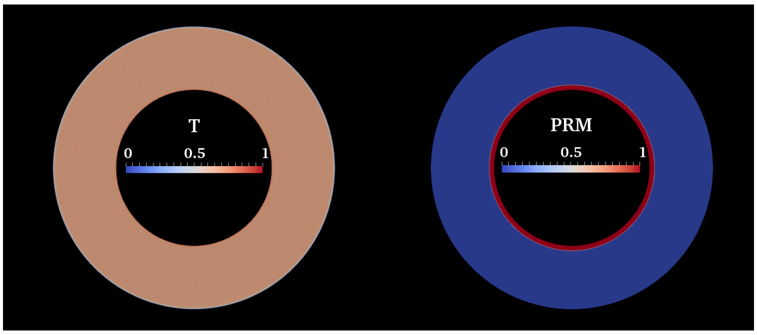

Figure S2. Initial conditions of superadiabatic temperature (left) and composition (right) fields

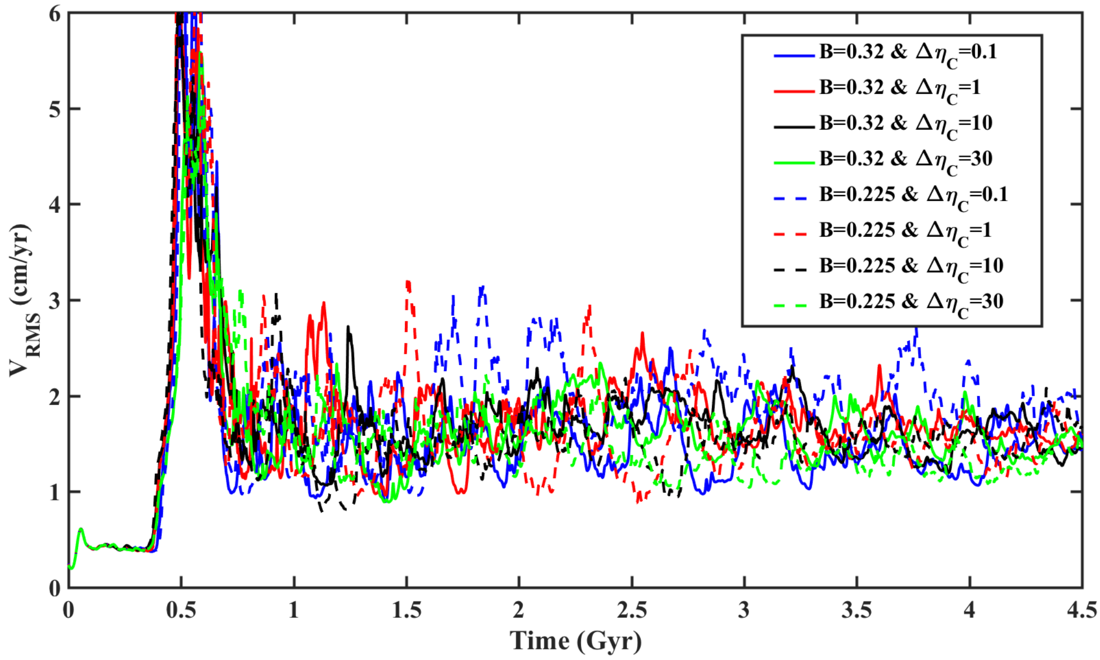

Figure S3. V_{RMS} as a function time for all the 8 calculations in this study.