Supplementary Videos

Each regime discussed in this paper has been represented by a selected numerical model, displayed in all of the figures. For each of them, a video has been made showing the evolution through time of the primordial composition field as well as the potential temperature field. For the discussion of the evolution of these models, the reader is referred to the paper.

Supplementary video 1 – evolution of Model M_{100k} (D_{prim} = 2230 km, λ_{prim} = 100 and B = 0.78; **regime *II.T***)

Supplementary video 2 - evolution of Model M_{10b} (D_{prim} = 2230 km, λ_{prim} = 10 and B = 0.14; **regime *II.R$_S$***)

Supplementary video 3 - evolution of Model M_{50a} (D_{prim} = 2230 km, λ_{prim} = 50 and B = 0.07; **regime *II.R$_E$***)

Supplementary video 4 - evolution of Model M_{300i} (D_{prim} = 2230 km, λ_{prim} = 300 and B = 0.64; **regime *III.P***)

Supplementary video 5 - evolution of Model M_{300d} (D_{prim} = 2230 km, λ_{prim} = 300 and B = 0.28; **regime *III.B***)

Supplementary video 6 - evolution of Model M_{100d} (D_{prim} = 2230 km, λ_{prim} = 100 and B = 0.28; **regime *III.B***)

Supplementary video 7 - evolution of Model M_{30c} (D_{prim} = 2230 km, λ_{prim} = 30 and B = 0.21; **regime *III.M***)

Supplementary video 8 - evolution of Model M_{10f} (D_{prim} = 2230 km, λ_{prim} = 10 and B = 0.42; **regime *III.D***)

Supplementary video 9 - evolution of Model M_{100dD} (D_{prim} = 1650 km, λ_{prim} = 100 and B = 0.28; **regime *III.B***)

Supplementary video 10 - evolution of Model M_{50eD} (D_{prim} = 1695 km, λ_{prim} = 50 and B = 0.35; **regime *III.B***)

Supplementary video 11 - evolution of Model M_{30cD} (D_{prim} = 1583 km, λ_{prim} = 30 and B = 0.21; **regime *III.B***)

Supplementary video 12 - evolution of Model M^{B1}_{100dD} ($D_{FeO\text{-}rich\_layer}$ = 200 km D_{prim} = 1546 km, λ_{prim} = 100 and B = 0.28; **regime *III.B***)