

Effects of plate-like behavior and material recycling on lateral variation of CMB heat flux Effects of plate-like behavior and material recycling on lateral variation of CMB heat flux

中川 貴司^{1*}
NAKAGAWA, Takashi^{1*}

¹IFREE, JAMSTEC
¹IFREE, JAMSTEC

We studied the relationship between heat flux across the core-mantle boundary (CMB) and seismic anomalies in the CMB region in numerical mantle convection simulations in a 3-D spherical shell with a simple temperature- and depth-dependent viscosity [Nakagawa and Tackley, 2008]. That study suggested that the relationship between CMB heat flux and seismic anomalies was not simple linear function because of the post-perovskite phase transition and/or compositional heterogeneous structure in the deep mantle. However, in that study, we did not include the complicated rheology that occurred to the plate tectonics-like behavior and the segregation of oceanic crust in the deep mantle because they would be important for regulating the heat flux across the CMB [e.g. Nakagawa and Tackley, 2010].

Here we revisit to investigate the relationship between heat flux across the CMB and seismic anomalies in the deep mantle including plate tectonics-like behavior and material recycling. Preliminary result suggests that the heat flux tends to be more linear relationship with seismic anomalies in the deep mantle including plate tectonics-like behavior and material recycling but the uncertainty of this relationship between two quantities is very strong. The peak-to-peak of lateral variation of CMB heat flux is much larger than that obtained from our previous study. This is still problematic for magnetic field generation caused by geodynamo.

キーワード: CMB heat flux, lateral variation, plate tectonics, material recycling
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