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The Amount of Heat Coming from the Core scales with the Clapeyron Slope of the Post-Perovskite Transition

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Since the post-perovskite phase transition lies close to the core-mantle boundary (CMB), we can expect a significant influence of the phase-change thermodynamics on the heat-transfer from the core. There are two important parameters governing mantle dynamics associated with the post-perovskite transition. The first is the proverbial Clapeyron slope.The second is the temperature intercept, T-int, which is the temperature of the post-perovskite transition at the CMB pressure of 135 GPa. This temperature comes into play because of its relationship to the temperature at the CMB, now designated to be T-cmb.Seismic imaging results from the work of van der Hilst and M. De Hoop reveal the statistical distribution of the post-perovskite lens under the Cocos plate, we can estimate the appropriate heat-transfer from the core ,which can satisfy this regional seismic constraint. We have employed a 3-D spherical compressible anelastic convection model with depth-dependent viscosity and thermal conductivity. We derived a relationship between the fraction of heat coming from the core, called here F, and the Clapeyron slope G. This finding goes something like F˜ Gˆ(-b), where b is around 3.0. For a high Clapeyron slope greater than 10 MPa/K ,most of the heat in the mantle comes from internal-heating due to radioactive elements, for a less steep Clapeyron slope around 7.5 MPa/K the dominant mode of heating in the mantle comes from the core heat. Hence it resembles more like basal-heating.