# The depth of post-perovskite phase transition in the lowermost mantle

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The first publication on the post-perovskite phase transition by Murakami et al. [2004 Science] showed that it occurs in MgSiO3 approximately at 125 GPa and 2500 K, corresponding to the 2700-km depth in the mantle, based on the Pt pressure scale (P-V-T equation of state). However, there has been extensive debate on the accuracy of such P-V-T equation of state of internal pressure standard. The MgO pressure scale may be most practical, because it has been well studied and is least controversial. Indeed, experimentally determined post-spinel phase transition pressure based on the MgO scale matches the depth of 660-km boundary [Fei et al., 2004 JGR]. We therefore reexamined the post-perovskite phase transition boundary in MgSiO3 by using MgO pressure standard. Results demonstrate that phase transition occurs at 119 GPa and 2400 K that corresponds to 2600-km depth in the mantle [Hirose et al., 2006 GRL]. The Clapeyron slope was determined to be +11 MPa/K consistently with the previous theoretical calculations.

Compositional effect on the post-perovskite phase transition is also very important to understand the origin of complex topography of the D" region. We determined this phase transition boundary in pure MgSiO3, (Mg0.89Fe0.11)2SiO4 olivine, natural pyrolitic mantle (KLB-1 peridotite), and MORB bulk compositions using identical pressure standard. Results show that the phase transition in all of these natural compositions occurs at pressures very similar to that in Mg-end-member [Hirose et al., 2006]. This indicates that (1) perovskite to post-perovskite phase transition in natural compositions occurs at the D" discontinuity and that (2) chemical heterogeneity in D" has little effect on the post-perovskite phase transition pressure.