

Density of basaltic magma at high pressure, and stability of the magma at the core-mantle boundary

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A density of a model MORB magma was measured up to the pressure of the transition zone depths by using the floating diamond method. The compression behavior of the basaltic melt can be expressed by the Birch-Murnaghan equation of state with the parameters, bulk modulus $K=16.8\text{GPa}$ and its pressure derivative $K'=6.2$, at around 2473K . There is a density crossover between the basaltic melt and the mantle peridotite at the base of the lower mantle. The ultralow velocity zone in the D" layer is explained by existence of the gravitationally stabilized basaltic melt. This region may become unstable by progressive melting and/or supply of some volatile components such as H_2O from the Earth's core.