Melting of Subducted Basaltic Crust and Chemical Differentiation at the Core-Mantle Boundary

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Melt observed at the base of the mantle could be a partial melt of former oceanic crust. Melting experiments on MORB composition were conducted to determine partial melt compositions and partitioning of trace elements. At 27.5 GPa, Ca-perovskite (CaPv) is the liquidus phase, and partial melt composition is significantly depleted in SiO2 and enriched in FeO*. Partial melt is possibly denser than the surrounding mantle at the core-mantle boundary, and segregates downward, to form Fe-rich dense layer. The CaPv-bearing buoyant residue induce the formation of plumes from that depth. CaPv selectively contains U and Th relative to Pb upon partial melting. The characteristic Pb isotopic compositions of plume magmas (HIMU) can be explained by the melting of this residual material.