

Density of hydrous ultramafic silicate melt at 410km discontinuity

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The density of silicate melts controls the evolution of our planet. Silicate melts are less dense than surrounding rocks under shallow Earth. Under ultra-high pressure, silicate melt could be denser than surrounding rocks. In this study, density of hydrous silicate melt was determined under the conditions equivalent to 410 km depth in the Earth. The density of an ultramafic melt containing 5wt% of water is comparable to surrounding solid rocks in the upper mantle at ~1800 K. Melt with lower water contents, or at lower temperatures will be denser than the surrounding solid materials in the upper mantle, although these melts are always less dense than the transition zone minerals. Under these conditions, the melt will be trapped near the 410 km discontinuity.