

Depleted mantle plumes

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Depleted geochemical signatures in the melt products of mantle plumes have several plausible origins. In this study, we use geodynamic simulations to track the history of oceanic crust and its depleted, lithospheric residue. Our simulations show that the depleted residue becomes a substantial component of all mantle plumes, and the mantle more generally, over time. We use a simple model of partial melting to show that its comparative rarity in lavas may be explained by the sampling bias towards more fusible components in the source during partial melting. Our results have implications for the mantle's compositional evolution and interpreting variations in plume buoyancy flux.