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Fate of anti-continent: D" and EM1 connection

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The continental crust with an intermediate composition has been created mostly at intra-oceanic arcs via basaltic underplating, anatexis of an initial basaltic arc crust and magma mixing. During this process, the mafic to ultramafic crustal components are transformed to subarc mantle across the chemically transparent Moho. The 'anti-continent' formation could thus play the key role in the creation of differentiated continental crust. High-pressure experiments of this anti-crustal component, together with petrological modeling, indicate that the anti-continent delaminates from the arc lithosphere and falls headlong towards the base of the mantle without stagnation at the 650 km discontinuity. An estimate of the total volume of anti-continent, based both on the current continental volume and the melting regime, suggests that the anti-continent may be a major constituent of the D" layer. Geochemical modeling further leads to speculate that the anti-continent having been created since 3 Ga could have isotopically evolved into an enriched geochemical mantle reservoir, known as EM1.

Keywords: anti-continent, delamination, D" layer, EM1