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Melt segregation and magma interactions during crustal melting:
breaking out of the matrix

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Abstract

Differentiation of the continental crust begins with its partial melting. The products of crustal melting are silicic, hydrous, H₂O-undersaturated, granitic liquids that are generated within matrices of residual crystals. Crustal differentiation requires that felsic magmas form and escape from these solid residua. An important question is whether granitic magmas collect into large batches, within or near their sources, which then give rise to ascent or, alternatively, bleed out of the sources in smaller streams or pulses. We demonstrate that the physical reality is closer to the second alternative, and thus question the validity of the concepts of magma segregation and source fertility, as they are sometimes visualised.

Granitic plutons contain chemically distinct sub-populations formed by source-level entrainment of the peritectic assemblages into the melts. Rapid evacuation at source levels and high ascent rates protect the magmas from wall-rock interactions during their tenure at

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