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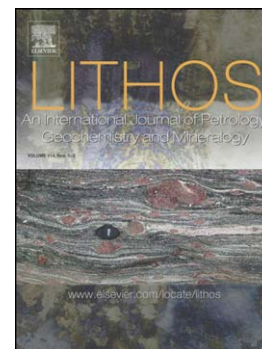
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with implications for crustal-scale melt transfer

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Melt production, redistribution and accumulation in mid-crustal source rocks, with implications for crustal-scale melt transfer

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Abstract

Ascent of granitic melt initiates under suprasolidus conditions in the mid- to lower crust before continuing through subsolidus rocks to higher crustal levels. Whereas migration of melt in suprasolidus rocks can occur in pervasive net-like structures and involve relatively small melt volumes, ascent through the subsolidus crust requires more focused, dyke-like structures and larger volumes to prevent freezing. Migmatites in the Aus granulite terrain, southern Namibia, preserve evidence that large-scale melt redistribution and accumulation occurred in the near-source region under suprasolidus conditions. Melt that was mainly produced in metapelitic rocks utilised pervasive small-scale leucosome networks to migrate to areas surrounding pre-tectonic granite sheets. These areas are dominated by metapsammitic rocks, and abundant and voluminous leucogranite sheets attest to melt accumulation and residence occurring over a protracted period while the area was undergoing anatexis. However, the leucogranites have an anhydrous mineralogy and the surrounding rocks only preserve evidence for limited, high-temperature retrogression, consistent with substantial melt loss from the accumulation structures. We speculate that melt batches leaving the accumulation sites are likely to have been large, allowing for substantially more efficient ascent through subsolidus crust. Our results suggest that a degree of near-source melt accumulation is likely to occur during the early stages of melt migration, and that this can significantly enhance the effectiveness of subsequent melt ascent.

Keywords: melt accumulation, Namaqua metamorphic complex, pervasive migration, melt ascent

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