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Melt migration in super-solidus regions : development of a thermal disequilibrium and implications for transport evolution.

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Within partially molten regions, the melt originally present at grains junctions migrates and segregates into highly porous channels, allowing for its fast ascent towards the surface. Two main scenarios have been invoked for explaining melt channeling in super-solidus regions : (i) a compositional Reactive Infiltration Instability mechanism and (ii) stress-driven melt segregation. As melt pathways merge and widen, not only a compositional but also a thermal disequilibrium may build up between the melt and the matrix. Such a thermal disequilibrium may add to the channeling dynamics due to feedback effects between melting and enhanced melt porous flow. Here we investigate its possible impact on melt segregation and transport evolution. Using a 1D model of melt porous flow into an anastomosing network, that accounts for Local Thermal Non Equilbrium, we first characterize the conditions for thermal disequilibrium development in super-solidus regions. We then discuss the influence of thermal disequilibrium on porous flow evolution and melt focusing into channels, and its implication for dike initiation at the transition to sub-solidus regions.