# Thermo-chemical constrains of magma mixing: Implications for timescale and lifetime in magmatic systems

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The evolution of an igneous system experiencing the interaction between two different crystal-bearing magmas is studied numerically in order to unravel the evolution and the timescales of the mixing process. The non-Newtonian behavior of magmas below the liquidus temperature is considered for the rheology of the system. Different statistical mixing and energy indicators are used to characterize the efficiency of magma mixing. The timescales of mixing are evaluated by comparing two different fluid-dynamics configurations: 1) a buoyancy driven convection, 2) a system experiencing chaotic dynamics.

Results from this study will help refining the conditions under which magma mixing proceeds efficiently and will constrain the timescales of magmatic hybridization as a function of the rheology of the interacting magmas and the dynamics occurring within the system. This study has potential implications in both plutonic and volcanic environments. In plutonic setting, it could help in deciphering the occurrence of magma mixing and, therefore, constraining the origin and evolution of the system. In volcanic environment, it might be helpful in constraining the composition of the erupted magmas as a function of time and degree of magma mixing.