



Strain localisation: Interplay between thermal and chemical softening

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Localisation of strain is a ubiquitous feature in rocks that can happen at any scale and in either brittle and ductile portions of the lithosphere. In ductile rocks, strain localisation is induced by local reduction of rock viscosity. While shear heating (thermal softening) and grain size evolution have been emphasized as potential causes of strain localisation, the role of compositional variations (chemical softening) has been less explored.

We establish a closed system of equations that incorporates thermo-mechanical-chemical coupling and apply dimensionalisation to identify governing dimensionless numbers. Using two-dimensional models, we investigate the relative importance of thermal and chemical softening on the development of ductile strain localisation.