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## Dissolution precipitation creep as a process for the strain localisation in gabbro

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Strain localisation and fabric development in the lower crust is controlled by the active deformation mechanisms. Understanding the driving forces of such deformation aids in quantifying the stresses and rates of the deformation processes. Here we show that diffusion creep plays a major role in deformation of gabbro lenses at upper amphibolite facies conditions. The Kågen gabbro in the North Norwegian Caledonides intruded the Vaddas Nappe at 439 Ma at pressures of 7-9 kbar, temperatures of 650-900°C (depths of 26-34 km). The Kågen gabbro on south Arnøya is made up of undeformed gabbro lenses with sheared margins wrapping around them. This contribution analyses the evolution of the microstructures and fabric of the low strain gabbro to high strain margins. Microstructural and textural data indicate that preferential crystal growth of amphibole grains in the extension direction has produced the deformation microstructure and the CPO. Dissolution precipitation creep is inferred to be the dominant deformation mechanism, where dissolution of the gabbro took place in reacting phases of clinopyroxene and plagioclase, and precipitation took place in the form of new minerals: amphibole, garnet and zoisite. Synchronous deformation and mineral reactions of clinopyroxene suggests mafic rocks can become mechanically weak during the general transformation weakening process, i.e. the interaction of mineral reaction and deformation by diffusion creep. Deformation and metamorphic reaction were both important transformation processes during diffusion creep deformation of the margins of the gabbro lenses. The weakening is directly connected to a transformation process that facilitates diffusion creep deformation of strong minerals (pyroxene, garnet, zoisite) at far lower stresses than dislocation creep. Initially strong lithologies can become weak, provided that reactions can proceed during deformation, the transformation process itself is an important weakening mechanism in mafic (and other) rocks, facilitating deformation at low differential stresses.