Associated Project 1

On the nature and mechanical significance of deformation induced substructures in minerals: An electron microscopy study using new orientation mapping methods

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Project overview

In this project, in collaboration with Prof. C.J. Spiers, the real nature and the mechanical significance of deformation-induced substructures in experimentally deformed minerals (calcite and olivine) is being investigated. New electron microscopy methods are used with a novel combination of scanning and transmission electron microscopy techniques. The evolution of substructure with strain will be studied to assess if misorientation data can be used to estimate the strain accommodated by dislocation creep. Information on the partitioning of strain between dislocation creep and other mechanisms is crucial in the description of rock flow by multiple mechanisms. We will also study the effect of temperature, water content and initial grain size on substructures in olivine and calcite. The overall aim is to develop micro-physically based scaling laws suitable for reliable paleo-stress analysis of naturally deformed rocks.