project 4

Deformation induced subgrain scale heterogeneity

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Aims & objectives

The Individual Project Deformation induced subgrain scale heterogeneity will provide the boundary conditions for substructure formation in minerals via an integrated numerical and experimental study of the subgrain scale heterogeneity of:

- The deformation field
- The misorientation the deformed lattice and
- The variation in defect densities.

One key to our understanding of substructure evolution in minerals is our ability to translate our understanding of the plastic anisotropy of minerals into predictions of the subgrain scale heterogeneities that govern the subsequent evolution within individual grains. Until recently despite our observations of natural (Tullis et al 2001) and experimentally deformed polycrystals (Jessell 1986) that the measured plastic anisotropy result in grain and subgrain scale heterogeneities, the tools to predict these variations were not available (Lebensohn et al 2004). The advent of 2D and then 3D crystal plastic FEM and related techniques allowed us to predict the heterogeneity of the deformation field, and associated variations in lattice orientation (Raabe et al 2000).

The primary objective of this study is to provide a capacity for numerical prediction of the spatial variation of these three parameters, which are crucial inputs to the investigation of the substructure evolution of minerals. We will also update the grain boundary migration algorithms so that they can account for this intragranular variation. This Individual Project will draw upon the results from all other projects to produce a complete description of substructure development in minerals to high strain.