Geophysical Research Abstracts
Vol. 18, EGU2016-14974, 2016
EGU General Assembly 2016

Low magnification EBSD mapping of texture distribution in a fine-grained matrix

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The study of texture (CPO) in rocks is often restricted to individual phases within a given sample or specific area of said sample. Large scale EBSD mapping of the matrix of a greenschist facies albite mylonite has shown that an overall significant CPO within albite grains is strongly domainal, and each domain has a unique CPO that is independent of both common slip systems in plagioclase and the specimen geometry (i.e. foliation and lineation).
Observational evidence suggests the metamorphic breakdown of plagioclase to albite (Ab) plus a Ca-bearing phase (clinozoisite, Cz) has produced a two phase mixture in which each phase has a contrasting solubility. New grains of albite are thought to nucleate epitaxially from original plagioclase as a reaction front passes through parent grains. A pseudomorphic region of Ab plus Cz after an original plagioclase crystal, protected from intense deformation by enclosure in a cm-scale augite clast, gives insight into pre-deformation daughter grain distributions. The albite in the region inherits a strong CPO and 180° misorientation peak from a relict twin pattern due to epitaxial growth while clinozoisite is randomly distributed and oriented (despite some grains nucleating from the plagioclase parent twin boundary).
In the deformed matrix, daughter Ab is seen to be the more mobile phase, having undergone obvious dissolution, transport and reprecipitation into fractures and pressure shadows, whereas Cz grains are relatively insoluble and rotate into parallelism with the foliation, forming bands that anastamose around Cpx porphyroclasts. Despite this modification, albite in the matrix retains significant CPOs that comprise distinct domains with sharp boundaries. A 180° misorientation peak thought to be a signature of twinning inherited from parent plagioclase is also observed in each domain. Why a CPO should be preserved under these conditions (contrary to our traditional understanding that CPOs are a signature of dislocation creep and diffusional processes weaken or destroy any existing CPO) is the context of wider study.
The extent and form of the CPO domains can be clearly and simply resolved by thin section scale mapping. Interestingly, although each domain inherits a unique CPO from its parent (i.e. adjacent domains do not share similar CPOs), all domains have been modified to lie broadly parallel to the sample foliation plane. Additionally, distribution of Cz, which is heterogeneous throughout the matrix, appears to correlate with specific CPO domains, and may exert an influence on domain boundaries. Information such as this about the larger-scale relationships between phase distribution and texture development and/or preservation cannot easily be resolved in smaller fields of view. Datasets like those presented are becoming increasingly easy to collect due to advances in EBSD data acquisition speed and indexing quality, and can add useful insight into how phases may have interacted during deformation.