Geophysical Research Abstracts,
Vol. 10, EGU2008-A-11393, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-11393
EGU General Assembly 2008

Quantifying complex deformation paths in natural shear zones deformed by general shear using EBSD

B. Hulscher, G. Schreurs

Institute of Geology, University of Bern, Switzerland (bhulscher@geosciencenet.com)

This process-based study aims to constrain the three dimensional kinematic history of transpressional shear zones, and their evolution through time, by integrating a variety of structural geological analytical techniques with the Electron BackScatter Diffraction technique (EBSD). The aim is not only to characterize deformation processes in zones of general shear on the meso- and micro-scale, but also to quantify the deformation path by measuring the rotation axes of deformed minerals, which yield independent constraints on kinematic rotation axes.

Background

Theoretical models for general shear predict that mineral stretching lineations in for example transpression commonly will not correspond to the normal to the kinematic rotation axis in the shear plane. Thus, the main objective is to test the relationship between the vorticity vector as measured through EBSD and the observed mineral stretching lineations for key natural examples of shear zones. These shear zones have been chosen so that they represent different end-member models of general shear.

This study concerns the superbly exposed ductile shear zones in Cap de Creus in Spain and a shear zone in central Madagascar. These shear zones together provide well-constrained samples of high strain zones deformed in general shear as well as a control-study in the form of shear zones deformed by simple shear (both in thrust and strike slip settings).

Data will be presented on:

- the relationship between the vorticity vector as measured through EBSD and the observed mineral stretching lineations in strike slip and transpressional shear zones
- whether *kinematic partitioning* into domains of either wrench-dominated transpression or contraction-dominated transpression as observed on the mesoscopic (field) scale (e.g., Tavarnelli et al., 2004), is also recorded on the micro-scale, by using EBSD to verify whether domains exist on the scale of a thin-section that have recorded either dominantly simple shear, or pure shear;
- whether microstructures in shear zones that underwent *non-partitioned* transpression preserve a record of *progressive stages* of general shear zone development in different microstructural domains, by using EBSD to test if domains recorded changes in vorticity vector;
- to compare observed relationships between vorticity vectors and mineral stretching lineations for various models of general shear to theoretical and analogue models for transpression, and if possible, to provide constraints on the scale of strain partitioning in natural rocks.