Geophysical Research Abstracts
Vol. 12, EGU2010-4537, 2010
EGU General Assembly 2010

Typology of lozenges and their development in anastomosing shear zones in foliated rocks

Carlos Ponce, Jordi Carreras, and Elena Druguet
MIET research group, Departament Geologia, Universitat Autònoma de Barcelona, Barcelona, Spain (carlos.ponce@uab.es)

Lozenges are characteristic common structures related to anastomosing networks of shear zones. They are ellipsoid-shaped bodies of undeformed (or less deformed) country rock bounded by mylonites. They have been studied since the 1980's (Bell and Rubenach 1980, Bell 1981, Simpson, 1982, Choukroune and Gapais 1987, Hudleston 1999, Fusseis 2006), and various formation processes have been proposed. However, the lack of a systematic typology has led to confronting interpretations about their origin, development and significance in the context of anastomosing shear zones. A typology of shear zone-related lozenges is proposed with regard to the pre-shearing rock properties:

1) Lozenges in rheologically heterogeneous rocks. Their development is related to the presence of volumes of rock that behave more competent than the surrounding media. These are therefore typically developed in shear zones affecting rocks with a marked competence constrast. This is the case e.g. of a sheared competent dyke in a less competent schistose matrix.

2) Lozenges in homogeneous (2a, isotropic or 2b, anisotropic) rocks that arise from the confluence of differently oriented shears. The development of this type of lozenges is at present less understood than type 1 lozenges.

The present work is focused in the formation and development of type 2 lozenges. The here presented preliminary results are based on a 2D approach (sections parallel to the shear direction) and supported by the analysis of natural examples from the Cap de Creus shear belt Eastern Pyrenees).

Two main variables are taken into account for the interpretation of this type of lozenges. First, the relative kinematics of the bounding shear zones, i.e., shear zones have the same shear sense or, instead, they have opposite shear sense (conjugate sets). Second, only for foliated rocks, the relative orientation of the previous foliation with regard to the lozenge major axis.

Furthermore, some models are presented to explain the development of type 2 lozenges considering initial orientation of individual shear zones and their propagation and interaction.

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