Application of shearband boudins analysis to understand ductile shear zones

João P. Sousa[1], Benedito C. Rodrigues[2], Jorge Pamplona[13]
[1]*Centro de Investigação Geológica, Ordenamento e Valorização de Recursos, Universidade do Minho, Portugal*
[2]*Centro de Geologia da Universidade do Porto, Portugal*
[3]*Departamento de Ciências da Terra, Universidade do Minho, Portugal*
jpns@portugalmail.pt

The methodology used for the kinematic analysis of H-T ductile shear zones developed by Rodrigues and Pamplona (2009), based on geometric analysis of boudins, proved to be a easy application tool.
The boudin analysis begans with the measurement of the Lb (boudin axis) orientation, as a fundamental element of the kinematic analysis in simple shear – Lb proved always to be perpendicular to a local displacement plane (Sx) that is defined as the plane that contains different lineations (*e.g.*, stretching lineation in the host rock) and so, validates the orientation of the outcrop plane. The methodology also includes the measurement of several angular and dimensional parameters, some of them adapted from Goscombe and Passchier (2003).
The main objective of this study deals with the validation of the broad utility of this methodology in shear zones with different P-T conditions. It was studied a shearband boudin field on a Grt-St shear zone whose comparison with previous studies (Sil shear zone) allows to state the following observations issues:

- Sill shear zone has three main shearband boudins generations: (i) pegmatite granitic dykes, quartz aluminous veins and milky quartz veins, with no geometric and angular parameters distinction between these different lithologies;
- Grt-St shear zone has three main shearband boudins generations: (i) granitic and pegmatite granitic dykes; (ii) foliated gray quartz veins; (iii) milky quartz veins, but with geometric distinction between them: milky quartz veins has has greater L/W, angle Sn^Bbs and D'/W values;
- On both shear zones, the shearband boudins analysis has been approved as kinematic tool, with coherent sinextral kinematics at Sill shear zone and dextral kinematics at Grt-St shear zone.

These observations seems to point that the P-T conditions (the jump between Grt-St to Sill conditions) has strong effect on rheological contrasts between matrix and boudins (rigid bodies embed in a ductile matrix), drastically reducing this contrast.
The deformation conditions at ductile shear zones cores promote the development of shearband boudins trains. The analysis of shearband boudins allows the individualization of zones with sharp contrasts in the values of geometrical parameters, reflecting situations of strain partitioning.
The morphological development of shearband boudins is consistent on middle to lower crustal deformations conditions. However, at lower crustal conditions is greater the ability to the development of bilateral symmetric shearband boudins.

Rodrigues, B.C. & Pamplona, J., 2009. How "to see" boudins in HT shear zones? An expeditious method of boudins kinematics interpretation. In: The 17th Deformation Mechanisms, Rheology & Tectonics 2009, Martin Casey Memorial Meeting 7th-9th September, Liverpool, Abstratct Volume. Liverpool - Manchester Universities, Liverpool, s/pp.