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Basal Shear-Zone of the Lower allochthon in the Morais complex (Portugal): microstructural and neutron diffraction constraints.

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The NW Iberian Massif represents a segment of the Variscan Belt, where several allochthonous complexes crop out: : Cabo Ortegal, Ordenes and Malpica-Tuy, in Spain, and Bragança and Morais in Portugal. These allochthonous complexes comprise allochthonous units, overthrusting parautochthonous and autochthonous units. The suture zone of the Variscan orogeny in the NW Iberia preserves the testimony of the collisional dynamics between Gondwana and Laurussia during the Carboniferous. The stacking of allochthonous units into an accretion wedge, and their subsequent incorporation by thrusts into the continental margin of Gondwana, resulted in polyphasic tectonothermal evolution. Different units record valuable information about the deformation mechanisms, rheological behaviour and the configuration of plates during the Palaeozoic.

The kinematic and deformational evolution of major tectonic boundaries of the Variscan Allochthonous units, as well as their mutual relationship in Iberia is critical, in order to constrain their regional meaning and correlation with similar units along the European Variscan Belt. In shear-zones, plastic deformation of polycrystalline aggregates result into microstructural and textural fingerprints that need to be interpreted. Quantitative analyses of fabrics has been crucial in untangling complex tectonothermal evolutions. In this case neutron diffraction experiments have been conducted in transmission mode in the Institute Laue-Langevin (ILL) (France), to characterize mylonites from the basal shear zone of the Lower Allochthon in Morais Complex. Two different experimental sets have been tested in D1B and D20 beamlines, comparing textural standards and new vanadium sample holders in order to optimize the procedure. Diffraction data were refined with Rietveld software MAUD to obtain quantitative texture information and orientation distribution functions (ODF) for main phases. Afterward, pole figures of relevant planes were interpreted in terms of slip-system activity to understand deformation conditions. Overall, microstructural data and fabric analysis points to a top-to-the SE shearing with a pure-shear component in the mylonitic flow.

Keywords: Shear zones, texture analysis, neutron diffraction, Rietveld method, Variscan orogeny, Morais complex.