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Abstract book

Variscan tectono-metamorphic recrystallization of Cambro-Ordovician feldspathic rocks from SW Iberia

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The alkaline magmatic rocks emplaced during the Cambro-Ordovician rifting of north Gondwana consist of alkaline granites, syenites and albitites variably deformed during the Variscan Orogeny. They are located in the central-northern domains of the Ossa-Morena Zone (SW Iberia), within areas that experienced varying tectono-metamorphic conditions during the late Palaeozoic, ranging from low-grade to high-grade and high-strain, and divided by major transpressional shear zones. A detailed analysis of microdeformation features in these rocks provides valuable insights into the deformation mechanisms operating in lithologies with low quartz content (majorly composed of plagioclase, K-feldspar and Na-amphibole), which are often underrepresented in deformation studies. Furthermore, such characterization will reflect the regional metamorphic gradients and the structural imprint of nearby high-strain zones, contributing to a more comprehensive understanding of the tectono-metamorphic evolution of the area.

The Alter do Chão-Elvas domain, bounded by two large low grade shear zones, underwent greenschist facies conditions, and exhibits features of two Variscan deformation stages: 1st development recumbent folds associated with thrust faults, facing towards the S–SW, and 2nd folding with vertical to steeply inclined WSW-dipping axial planes. The intensity of deformation increases towards the shear zones. In this domain, magmatic textures, including primary mineral assemblages and magmatic flow structures, are generally well preserved in the alkaline rocks. In general, plagioclase is the major rock forming mineral, showing bulging, kinking and intense fracturing (sometimes "bookshelf" microfracturing)- cataclasis. Also, tapering and bent twins are common, typical of low-medium metamorphic grades (< 400°C). Alkaline massifs located nearby the boundaries are characterized by the presence of mesoscale ductile strike-slips usually sinistral, with contractional bends and horsetail splay terminations and, more rarely, feldspar growth (porphyroblasts). Other rock-forming minerals do not show evidence of ductile deformation.

In the Central Unit (Tomar-Badajoz-Córdoba Shear Zone), the alkaline rocks are orthogneisses that show high-strain sinistral deformational features due to transcurrent tectonics under variable metamorphic grades, from amphibolite to low granulite facies. The presumed protolith, based on geochemical and mineralogical data prone to resist the tectonometamorphic recrystallization, are alkaline granites, syenites and nepheline syenites, with plagioclase and K-feldspar. The mylonitic fabric is usually S-L, though rarely dominant L-fabrics occur. Augen development is also common, represented by core-mantle structures within a plagioclase-feldspar matrix. Recrystallization by grain boundary migration and flame perthites are often evident, indicating high temperature conditions. Polygonization of the groundmass may occur, displaying uniform recrystallization.

The microstructural analysis of feldspathic magmatic rocks in the central-northern domains of the Ossa-Morena Zone reflect the regional tectono-metamorphic regimes during the



Variscan deformation phases, corroborating the previous works that addressed the Variscan overprint. Additionally, the variability of deformation features found may infer the behaviour of feldspars from low grade to high grade conditions.

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