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The Juzbado-Penalva do Castelo wrench ductile shear zone: a major structure oblique to the main Iberian Variscan trend

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The ENE-WSW Juzbado-Penalva do Castelo Shear Zone (JPCSZ), 200 km long and 5-15 km wide, is a first order structure of the Iberian Variscides with a sinistral component emphasized by a 65 km ductile reject of the major D1 structures (Iglesias & Ribeiro, 1981); the NW-SE regional trend (e.g. Marão and Tamames structures) changes to E-W (e.g. Moncorvo and Poiares synclines) when approaching the JPCSZ and even to ENE-WSW along it (e.g. Marofa syncline). Although this sigmoidal pattern clearly post-dated the early structures of the first and main Variscan event (D1), some evidence show that the JPCSZ should have been active since the early Variscan collision (e.g. D1 kinematics changes in both sides of the shear zone), or even earlier (e.g. it is the most plausible boundary between two major pre-Ordovician lithostratigraphic domains - the Beiras and Douro Groups). We present preliminary structural and petrological data for the Figueira de Castelo Rodrigo area (a key region to study the E-W to ENE-WNW transition) in order to constrain its Variscan evolution.

In the northern part of the studied area, several syn-tectonic granitoids crop out, whereas to the south migmatites, probably part of the Pre-Cambrian to Cambrian Excomungada Formation (Ribeiro, 2001), predominate. These granulite-facies migmatites (T ≥ 800 ºC) contact, to the south, with Ordovician low-grade (biotite zone) metapelites and metaquartzites, materializing a "temperature jump" of at least 400 ^{o}C, which, considering a barrovian-type geothermal gradient of about 25 ^{o}C.km^{-1}, suggests a vertical offset of 16 km (or 8 km for a 50 ^{o}C.km^{-1} geothermal gradient). In the autochthon of the Central Iberian Zone, it is solely along the JPCSZ that high grade metamorphic rocks are exhumed.

At the Figueira de Castelo Rodrigo area two segments were identified in the Marofa Syncline. The western segment has a clear ENE-WSW direction trend coincident with the JPCSZ, whereas at the eastern segment, E-W trends predominate. The deformation is much more intense in the western segment, giving rise to a pervasive sub-vertical slightly wavy fold axis associated with a sub-horizontal to slightly northeast dipping stretching lineation; this deformation is coeval with significant recrystallization and the development of a mylonitic foliation. These strong fabrics, better observed in the metapelites and metapsamites interlayered in the Ordovician metaquartzite sequence, show widespread sinistral shear criteria structures (e.g. C-S shear bands, distorted/rotated porphyroclast and consistent asymmetrical folds). This shear sense, also observed in the diatexite lenses inside the JPCSZ, is congruent with the inferred movement from the analysis of the regional structures. The eastern segment is characterized by a less intense deformation, where folds and other related mesoscopic structures are almost absent. Nevertheless, a stretching lineation is often found, ranging from low dip to 50^{o} towards SW. This behavior shows that the eastern segment (E-W trend) has had a predominant thrusting with a sinistral component. The kinematics preserved in this segment was the result of the reworking of previous structures oblique to the main sinistral ENE-WSW shear (JPCSZ), with the consequent induction of a restraining zone along the E-W trend.

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