



The Mississippian Pedroches Basin: A failed attempt to propagate a Palaeotethys Arm across Southern Iberia?

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The Pedroches basin, straddling the boundary between the Ossa Morena (OMZ) and the Central Iberian (CIZ) zones of the Iberian Massif, forms one of the largest exposures of Mississippian rocks in the Iberian Peninsula. With the only exception of transitional facies near the northern and southern margins, the basin fill mostly consists of volcanic and sedimentary rocks deposited in relatively shallow continental shelf environments, in which storm activity was the main process of sediment supply and dispersal. Significantly, the Pedroches basin is split into several compartments (structural units), among which three syn-sedimentary, sigmoidal shape igneous belts, produced the most severe facies, structural and palaeogeographic changes.

Owing to its timing of formation during the period of Variscan convergence, its location within an area undergoing active Variscan deformation, and the fact that the basin fill was itself affected by the Variscan orogeny, the Pedroches basin was considered a typical example of a syn-orogenic, peripheral foreland basin. Recent stratigraphical, sedimentological and isotope geology work has allowed a reinterpretation of the basin fill, in which two different sequences may be distinguished, with distinct tectono-stratigraphic significance.

Above a basal conglomerate, the several hectometres thick lower part of the basin fill succession shows the highest variability among the various structural units in terms of lithology, facies and thickness. Most volcanic rocks are located within this lower part, within and in between the igneous belts, suggesting the important role of lithosphere-through, extension-related faulting in the origin of the basin. Significant across-strike thickness changes attest for syn-sedimentary horst and graben formation at this stage. On the contrary, the upper part of the basin fill is very similar in all units and corresponds to flyschoid greywacke-mudstone alternations (Culm facies).

The change between the lower and the upper parts of the basin fill is interpreted as evidence for a transition from an overall extensional (transtensional?) regime during basin generation to an overall transpressional one, during which the basin was transformed into a sort of peripheral foreland basin and inverted soon after. A possibility opened to further research, here outlined as a provocative hypothesis, is that during the Variscan collision between Laurussia and Gondwana the latter might have been pushed southeastwards and eventually collided with a Palaeotethys spreading ridge or, perhaps, a branch departing from it. In this context, the first part of the evolution of the Pedroches basin could in fact be the consequence of a combination of both transtension and the overriding of a slab window developed as a result of ridge-trench collision, itself inducing rifting in the upper (Iberian) plate. Final collision of the southern margin of the OMZ (south Iberian part of Gondwana) with Laurussia by the late Viséan, which culminated the closure of this part of the Rheic Ocean, imposed a change to more orthogonal strain conditions that may have caused the abortion of the propagating rift and also triggered subsequent basin inversion.