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The NW Iberia Allochthonous domain envisaged as a Variscan lateral extrusion fan-like structure: local and orogenic-scale implications

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The European Variscan belt is composed of several tectonic terranes juxtaposed at the Laurussia/Gondwana northward collision that formed Pangea. This orogeny led to a continuous deformation in a time spam of over 90 Ma, with diachrony and interplay of compressional and extensional phenomena, revealing the migration of the tectonic front along and across the trend of the belt, possibly related to the irregular outline and oblique convergence of the opposing margins.

At NW Iberia, pieces of an unrooted accretionary prism were grouped in the Galicia Trás-os-Montes Zone (GTMZ). The internal structure reveals a piggy-back imbricated sequence of thrusted terranes with increasing allochthonism towards the top of the tectonic pile. From top to bottom they have been interpreted as: 1) ensialic arc drifted away from Gondwana and added to Laurussia while the Rheic Ocean opened; 2) Ordovician and Devonian ophiolitic sequences related to the Rheic and other oceanic basins; and 3) North-Gondwana passive margin, partially subducted under Laurussia and incorporated in the Variscan accretion prism. These units recorded Middle-Upper Devonian (early-Variscan) subduction zone metamorphism and obduction-related retrograde processes in the accretionary prism that overrode northern Gondwana. The "allochthons" preserve key indicators (e.g. kinematic, thermo-barometric) to understand this stage regionally, as they are not present in the autochthonous domains of Iberia, but are described in west-central Europe where are commonly associated to the main Variscan continental collision.

In the Upper Devonian-early Carboniferous, the continuous deformation produced a regional orogenic collapse in the more unstable regions (innermost, most active orogenic areas) while the orogenic front migrated towards west and to the gondwanan hinterland (Iberian autochthon) producing gentle and locally tight folding and low-grade Barrovian metamorphism. The gravitational collapse in the axial zone formed anathectic core complexes and the partial fragmentation of accretion prism, pushing it in a fan-like thin-skinned extrusion wedge that advanced along the orogen, following the main extension vector (E-W direction). The sense of emplacement was constrained by the westward closure of the Rheic and, possibly, the gentle indentation of Laurrusia by Gondwana to the E. Therefore, the extrusion fan advanced towards less deformed areas located to W and hinterland of Gondwana (to SE, actual coordinates), incorporating at the base the more external domains of the Iberian autochthon (Upper Parautochthon) and the foreland synorogenic basins (Lower Parautochthon) in a piggy-back imbricated thrust sequence.

The emplacement of the extrusion fan produced the compressional dragging of the precursory Variscan structures and stratigraphic sequences, nucleating the so-called Central Iberian Orocline (CIO). The extra load produced by the allochthonous sheet, increased the metamorphic Barrovian peak in the Iberian autochthon and triggered the Mississippian regional syn-orogenic collapse and Buchan event, with new along-orogen extensional structures, parallel to those described for the GTMZ lowermost thrusts.

Tightening of the CIO occurred in the Pennsylvanian late-Variscan compressive stage, as it was wrapped around the Ibero-Armorican Orocline, thus rotating the extrusion fan kinematic criteria from W to its S in the latest Paleozoic (early-Mesozoic position).

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