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Mississippian synorogenic sedimentation in the Variscan belt: Why are NW and SW Iberia flysch basins so different and yet so similar?

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Devonian-Carboniferous synorogenic sedimentation is described across the Variscan orogen, as well-preserved exposures in late orogenic structures between continental blocks. Variscan marine sedimentary sequences are described in both colliding continents: Gondwana representative of the southern subducting super-plate, and Laurussia considered as the overriding block. The Variscan synorogenic basin distribution on both sides of the alleged Rheic Ocean suture zone raised questions regarding the basin geodynamic classification and possible geographycal and temporal connections. The Devonian-Carboniferous turbiditic basins of the Variscan belt have been classified as foreland, forearc, or backarc, in line with their relative geographical position in the convergent plate boundary. However, the same Variscan basin may have different classifications depending on the proposed tectonic model and its current geographic position. The standard classification of the Variscan synorogenic basins fails due to a poor understanding of their relationship with the tectono-metamorphic and magmatic evolution of their basement, which means ambiguity and controversy in defining global tectonic models.

As a world-class natural laboratory, the Iberian Massif (Portugal and Spain), at the westernmost tip of the Variscan Belt, presents itself as a place to study orogenic processes, from depth (ductile deformation, metamorphism and plutonism) to shallow (synorogenic sedimentation and volcanism) crustal levels. Recent studies in NW and SW Iberia have revealed a regional-scale relationship between Mississippian turbiditic (flysch) basins and magmatic flare-ups. Although there are many similarities between the stratigraphy of NW and SW Iberia synorogenic basins and the tectono-metamorphic and magmatic evolution of their basements, there are still many unexplored features that must be envisaged to get a better understanding of the tectonic evolution of the Variscan belt. The Mississippian basins of NW and SW Iberia show the typical rhythmic sedimentation of turbiditic sequences that are locally disturbed by large olistostrome bodies bearing different-sized olistoliths derived from the previously deformed metamorphic basement. While NW Iberia Variscan flysch-type basins have been associated with the formation of an accretionary wedge, later incorporated at the base of an unrooted slice of allochthonous units, those from SW Iberia seem to reflect their original position, only locally detached at the base due to the relative motion of their basement. SW Iberia flysch basins are also contemporaneous with voluminous bimodal volcanism, more important but not confined to the base of the synorogenic

sequences. The Mississippian volcanic rocks are one of the primary sources of Variscan flysch, as evidenced by the widespread occurrence of weakly deformed olistoliths of mafic and felsic volcanic rocks and the significant input of Mississippian zircon grains found in the flysch sequences, when compared with their NW Iberia correlatives. So, considering the geological information that is known and may be used for a preliminary comparative analysis of the Mississippian NW and SW Iberia flysch basins, the following doubt stands: Did they have a common spatial and temporal geodynamic evolution? If so, what is the geological meaning of this assumption?

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