Geodynamic evolution of Ossa-Morena Zone in a SW Iberian context during the Variscan cycle

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Ossa-Morena Zone (OMZ) is crucial to understanding the geodynamic evolution of the Variscan cycle in SW Iberia. We review previous data, from Early to Late Paleozoic.

The early Cambrian (conglomeratic and felsic metavolcanic units) lies unconformably upon Neoproterozoic formations and shows a carbonate sequence with bimodal volcanic rocks, accompanied by intrusion of plutonic bodies (535–520 Ma). This could be interpreted as result of rifting process (Sánchez-García *et al.,* 2010). The middle Cambrian is marked by a significant crustal stretching episode: siliciclastic sedimentation is accompanied by bimodal volcanism, with transitional alkaline geochemical features, symptomatic of an intra-plate environment. The Cambrian–Ordovician transition is marked by the absence of sedimentation and/or an erosional episode. This period is concomitant with large plutonic intrusions (~ 510–485 Ma). This is related to opening of the Rheic Ocean: geochemical (N- and T-MORB signatures) and geochronological data support the existence of anorogenic oceanic magmatic activity during this period (~ 485–480 Ma). From the Mid Ordovician until the end of Silurian, magmatic features are related to passive margin evolution and tectonic stability.

Rheic Ocean subduction begins in SW Iberia in the early Devonian(Emsian or earlier). Four major tectono-metamorphic episodes (TM) are identified:

TM_1 – the first episode, related to northward subduction, as evidenced by the geochemical signatures of volcanic rocks: proximal tholeiitic to distal calc-alkaline (Odivelas) and shoshonitic (Veiros–Vale Maceira). The age of this orogenic magmatism is in accord with that of a high pressure metamorphic event (eclogitic facies) in the south-west border of the OMZ (≈370 Ma; Araújo *et al*., 2013).

TM_2 –is characterized by transtensional kinematics and the exhumation of the high pressure rocks (≈360 Ma; Araújo *et al.,* 2013). It resulted from locked subduction and subsequent slab break-off, leading to asthenospheric upwelling and crustal melting recorded in the first pulses of the Beja igneous complex and Iberian pyrite belt volcanism (360–345 Ma).

TM_3 – is characterized by the presence of first order sub-vertical folds (*e.g.* Estremoz anticline). Metamorphism is low-grade, although it can be high-grade in the Évora–Beja–Aracena massif. This indicates a high thermal flux in the southern border of the OMZ, in accordance with the presence of 340–320 Ma plutonic bodies.

TM_4 – the last episode, during post-collisional crustal thickening, led to the formation of NNE–SSW sinistral shear zones, accompanied by the last magmatic intrusions in the OMZ (300–270 Ma).

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