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Comment on "Geodynamic evolution of the SW Europe Variscides" by António Ribeiro et al.

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[1] *Ribeiro et al.* [2007] have presented a geodynamic view of the SW Iberia Variscides based on data from Portugal. Their treatment of already published data is commendable, and the knowledge gained will surely encourage the discussion of the SW Europe Variscides. However, in our opinion, Ribeiro et al.'s modeling and interpretation of the Ediacaran–Lower Ordovician (~560–470 Ma) geodynamic evolution are of limited value. In this regard, they based their analysis of the Ossa-Morena Zone (OMZ) on assumptions which are contradicted by recent published data. Ribeiro et al. ignored recent progress in the OMZ Ediacaran-Ordovician stratigraphy and, as a consequence they misunderstood the structure of domains overprinted by strong Variscan (Carboniferous) deformation and metamorphism.

[2] The first arguable point of *Ribeiro et al.*'s [2007] work is the possibility of occurrence of a likely Grenville inlier in the OMZ. Until now, no rocks older than the Ediacaran have ever been proven to exist in the OMZ (Portugal and Spain). The oldest dated rocks are Ediacaran felsic dykes with 623 ± 3 Ma (U-Pb TIMS/zircon, Loma del Aire rhyolites [*Sánchez-García et al.*, 2007]). The most representative Ediacaran rocks constitute the Série Negra succession [*Eguiluz et al.*, 2000; *Pereira et al.*, 2006b]. Regardless of the Cambrian and Carboniferous high-grade metamorphism with anatexis, zircons from the Ediacaran Série Negra metasediments preserve older cores and metamorphic overgrowths [*Ordóñez-Casado*, 1998; *Fernández-Suárez et al.*, 2002; *Chichorro*, 2006; *Chichorro et al.*, 2006; *Pereira et al.*, 2008; *Linnemann et al.*, 2008]. The obtained ages for the metamorphic overgrowths are mainly Carboniferous, but also Ediacaran, Cambrian and Ordovician. U-Pb SHRIMP and LA-ICP-MS dating on detrital zircons from the Série Negra metasediments indicate maximum age of deposition ranging from ~560 to 540 Ma [*Ordóñez-Casado*, 1998; *Fernández-Suárez et al.*, 2002; *Pereira et al.*, 2006a, 2008; *Linnemann et al.*, 2008]. A common feature of all investigated samples is an "age gap" between ~1.7 and 1.0 Ga. This age gap with no sign of Grenvillian zircon forming events is a characteristic of a Cadomian/West African provenance and distinguishes Cadomia/West Africa from Amazonia and Baltica. These Ediacaran sediments represent the infill of basins related to dismantling of a Cadomian continental arc [*Pereira and Chichorro*, 2004; *Pereira et al.*, 2006b, 2007; *Linnemann et al.*, 2008]. *Ribeiro et al.*'s [2007] statement that the Ediacaran calc-alkaline plutons are spatially limited to the northern margin of the Coimbra-Córdoba shear zone is not correct. It was recognized as plutonism of Ediacaran age in the northern margin of this major Variscan shear zone with ~580 Ma (Pb-Pb Kober/zircon, Aljucen granodiorite [*Talavera et al.*, 2008]), 573 ± 14 Ma (U-Pb SHRIMP/zircon, Valle de la Serena porphyritic granitoid [*Ordóñez-Casado*, 1998]) and ~555 Ma (Sm-Nd/garnet, Mérida-Montoro gabbro-diorite [*Bandrés et al.*, 2002]) but also toward the south with 552 ± 10 Ma (U-Pb SHRIMP/zircon; Ahillones granite [*Ordóñez-Casado*, 1998]). The Cadomian back-arc basin was active longer, at least until ~545 Ma. The final magmatic pulse of the Cadomian magmatic arc at ~550 Ma (coeval with the crystallization of the Ahillones granite) is documented by new U-Pb LA-ICP-MS zircon data [*Pereira et al.*, 2006a; *Linnemann et al.*, 2008]. Closure of the Cadomian back-arc basin and final events of arc-continent collision in the OMZ occurred probably between ~545 Ma and the overall onset of Cambrian intracontinental rift-related plutonism at ~530 Ma [*Sánchez-García et al.*, 2003, 2008].

[3] The second debatable point is the assertion of *Ribeiro et al.* [2007] that continental rifting on the Cambrian platform of northern Gondwana started around the Middle Cambrian. New zircon U-Pb zircon dating indicates an early igneous event with calc-alkaline signature and peraluminous tendency in the OMZ during the Lower Cambrian (~530–515 Ma) associated with rift-related carbonate and siliciclastic deposition: 532 ± 4 Ma (U-Pb TIMS/zircon, Mina Afortunata leucogranite [*Sánchez-García et al.*, 2008]), 530 ± 3 Ma (U-Pb SHRIMP/zircon, Bodonal porphyroid [*Romeo et al.*, 2006]) and ~529–527 Ma (U-Pb SHRIMP/zircon, Alcáçovas and Santiago do Escoural orthogneisses [*Chichorro*, 2006; *Chichorro et al.*, 2008]). This igneous event that seems to represent last residual melts of high-temperature, zircon-undersaturated mafic magmas later affected by crustal contamination, while others indicate partial melting of crustal metasediments variably contaminated by basaltic liquids, is interpreted as the result of an extensional tectonic process accompanied by strong thermal rise [*Sánchez-García et al.*, 2003, 2008; *Chichorro et al.*, 2008]. This situation was probably connected to an underlying mantle plume or simply

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