



U-Pb zircon geochronology of amphibolites: new insight on the tectonic evolution of the southwestern Ossa Morena Zone, Portugal

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The tectonic evolution of the Évora - Beja domain, in the southwestern Ossa Morena Zone, is disputed because of the scarcity of integrated structural, petrological and geochronological data. Therefore, no strong correlation exists between terranes of the Ossa Morena Zone. We combine geochronological data and geochemistry with the structural and metamorphic evolutions in order to constrain the geological history of the Évora - Beja domain, between the ophiolitic units of the Pulo du Lobo and the Beja - Acebuches complexes, to the south, and the Central Portuguese Zone, to the north. The rocks in the Évora - Beja domain include marbles, micaschists and quartzites, a volcano- sedimentary sequence and phyllites, with local occurrences of amphibolites. New U-Pb age dating on zircons of amphibolites yield upper Proterozoic protolith ages of 789.3 ± 4.5 Ma. Accordingly, most of the marbles, the micaschists and quartzites in the Évora - Beja domain can be ascribed to the Série Negra formation. The geochemical characterization of the amphibolites, which shows a basaltic protolith with subalkaline affinity, suggest a back-arc setting related to the oldest part of the tectonic evolution in the late Neoproterozoic. Phase equilibria modelling of amphibolites shows a metamorphic path consisting of three parts: (1) high pressure/low temperature event of ca $480 \pm 20^\circ\text{C}$ and 1.04 ± 0.06 GPa, (2) medium pressure/high temperature event of ca $550 \pm 20^\circ\text{C}$ and 0.72 ± 0.06 Gpa, and (3) retrogression into the greenschist facies, at less than 425°C and 0.7 GPa. The second stage is closely related to the magmatic emplacement of the Beja Igneous Complex and related deformation in the late Paleozoic. The geodynamic evolution of the Ossa Morena Zone is reportedly affected by two orogenic cycles, the Cadomian and Variscan orogenies, recording a geological history which goes back to Proterozoic times. The geology of the Évora - Beja domain contributes to this history.