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New clues for the plate tectonic assembly of the Betic Cordilleras from age constraints of pre-Triassic metamorphic sequences

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Pre-Mesozoic reconstructions of the Betic Cordilleras and other Alpine orogenic belts, scattered around the Alboran Sea and the western Mediterranean, are controversial due to the variable imprint of the Alpine tectonics. For instance, the main orogenic reworking of the Betic Cordillera is a consequence of a short but severe Alpine event of Aquitanian to Burdigalian age that almost erased any evidence of pre-Mesozoic orogenies. Trying to detect evidences of pre-Mesozoic orogenies in the Betic Cordillera, forty spots on zircons were analyzed on a SHRIMP-II SIMS at VSEGEI (Saint Petersburg). The studied samples are high-grade metamorphic rocks underlying the Ronda subcontinental peridotites, located in the western Internal Zones of the Betic Cordillera. The results yield mostly Neoproterozoic (c. 624 Ma) and Paleoproterozoic (2000 to 2500 Ma) inherited ages, with minor Variscan (c. 292 Ma) and Miocene (20.1 to 21.9 Ma) components.

According to recent reassessments, the peri-Gondwanan terranes are divided into two groups displaying basements of either West African Craton or Grenvillian affinities, and characterized by their magmatic and metamorphic events of $\sim$ 2000 Ma and $\sim$ 1000 Ma, respectively (Keppie et al., 2003). The lack of inherited Mesoproterozoic ages of $\sim$ 1000 Ma in the selected samples allows us to discard the Grenvillian belts as the provenance area for these detrital zircons. Alternatively, the occurrence of Neoproterozoic ages clustering around 624 Ma and Paleoproterozoic ages ranging between 2500 Ma and 2000 Ma suggest that the sedimentary protoliths might have been derived from regions located in northern Gondwana such as the West African Craton and its enveloping Panafrican orogenic belts, which could supply Eburnian ($\sim$ 2100 Ma and older) and Ediacaran (630-544 Ma) zircons, respectively.

After the Precambrian, the northern edge of Gondwana behaved repeatedly as an active margin that evolved into spreading conditions promoting the opening of the -successively younger - Rheic, Paleotethys and Neotethys Oceans. The sedimentary protoliths of these metamorphic rocks of the Internal Betic Zone could have been deposited on passive paleomargins developed during the spreading process that generated these oceans. From the lack of evidence about Ordovician magmatic events in the analyzed samples (and in the Betic Cordilleras) we tentatively propose that during Early Ordovician times the proto-Alboran microplate could have been positioned on the northern edge of Gondwana, along the southern margin of the Paleotethys. The new data presented here can help us to improve the pre-Mesozoic geodynamic history of the Western Mediterranean puzzle.

Keppie et al., 2003. Tectonophysics 365, 195-219.