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Testing alternative tectonic models of Palaeotethys in the E Mediterranean region: new U-Pb and Lu-Hf isotopic analyses of detrital zircons from Late Carboniferous and Late Triassic sandstones associated with the Anatolide and Tauride blocks (S Turkey)

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Alternative tectonic models of Palaeotethys during Late Palaeozoic-Early Mesozoic time infer: 1. southward subduction beneath the north margin of Gondwana; 2. northward subduction beneath the south margin of Eurasia, or 3. double subduction (northwards and southwards), at least during Late Carboniferous. U-Pb and Lu-Hf isotopic analysis of detrital zircons, extracted from sandstones, can provide strong indications of age and identity of source terranes. Here, we consider the provenance of both Late Carboniferous and Late Triassic sandstones from both relatively allochthonous and relatively autochthonous units that are all spatially associated with the Anatolide and Tauride continental blocks. The relatively allochthonous units are sandstones (3 samples) from the Late Carboniferous Aladağ Nappe (Tauride; in the east), the Konya Complex (Anatolide; central area) and the Karaburun Mélange (Tauride-related; in the west). The relatively autochthonous units are Late Triassic sandstones (4 samples) from the Üzümdere Formation, the Kasımlar Formation (both western Taurides) and the Güvercinlik Formation (Karaburun Peninsula-Tauride related; far west). The Late Carboniferous sandstones from the three relatively allochthonous units are dominated by Precambrian zircon populations, the age distribution of which suggests derivation from two contrasting source regions: First, a NE African-type source (i.e. Saharan craton) for the sandstones of the Konya Mélange and the Aladağ Nappe because these sediments have prominent zircon populations dated at 0.5-0.7, 0.8 and 0.9-1.1 Ga. Palaeozoic zircons are minimal in the sandstones of the Aladağ Nappe and the Konya Complex (3 and 5% of the whole data, respectively) and are confined to Cambrian to Ordovician. Secondly, a contrasting NW African-type source is inferred for sandstone from the Karaburun Mélange because of the marked absence of Tonian-Stenian zircons and the predominance of ∼2 Ga zircons over ∼2.5 Ga zircons. In addition to Cambro-Ordovician zircons, the Karaburun mélange sandstone includes a prominent Devonian zircon population. The Devonian zircon populations differ significantly from those of Devonian igneous rocks from the Sakarya continent (Pontides) (eHf(t) values from -9 to -4), in terms of Hf isotope signatures (eHf(t) values from -2.1 to +5.4; 65% of which is positive) (Ustaömer et al. 2015). The relatively autochthonous Late Triassic sandstones exhibit similar Precambrian zircon populations to those of the Late Carboniferous sandstones. However, Palaeozoic and Early Mesozoic zircons are relatively more abundant (ranging from 14 to 33%) in the Triassic sediments. Triassic zircons (n=3) only occur in one of sample from the Kasımlar Formation. Palaeozoic zircons are dominated by Cambrian and Ordovician zircons. Devonian and Carboniferous zircon populations are evident in the Güvercinlik Formation sandstone (Karaburun Peninsula). The new isotopic data do not support derivation of any of the sandstones from Eurasian units (i.e. Pontides) to the north, neither do they support simple derivation of all the sandstones from Gondwana (North Africa) to the south. Instead, the presence of only limited amounts of Carboniferous zircons in some of the Late Triassic sandstones (i.e. Karaburun Peninsula) can be explained by derivation of detritus from Cadomian terranes, of the Variscan belt to the west.

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