



Discovery of a Triassic magmatic arc source for the Permo-Triassic Karakaya subduction complex, NW Turkey

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The Permo-Triassic Karakaya Complex is well explained by northward subduction of Palaeotethys but until now no corresponding magmatic arc has been identified in the region. With the aim of determining the compositions and ages of the source units, ten sandstone samples were collected from the mappably distinct Ortaoba, Hodul, Kendirli and Orhanlar Units. Zircon grains were extracted from these sandstones and >1300 were dated by the U-Pb method and subsequently analysed for the Lu-Hf isotopic compositions by LA-MC-ICPMS at Goethe University, Frankfurt. The U-Pb-Hf isotope systematics are indicative of two different sediment provenances. The first, represented by the Ortaoba, Hodul and Kendirli Units, is dominated by igneous rocks of Triassic (250-220 Ma), Early Carboniferous-Early Permian (290-340 Ma) and Early to Mid-Devonian (385-400 Ma) ages. The second provenance, represented by the Orhanlar Unit, is indicative of derivation from a peri-Gondwanan terrane. In case of the first provenance, the Devonian and Carboniferous source rocks exhibit intermediate eHf(t) values (-11 to -3), consistent with the formation at a continental margin where juvenile mantle-derived magmas mixed with (recycled) old crust having Palaeoproterozoic Hf model ages. In contrast, the Triassic arc magma exhibits higher eHf(t) values (-6 to +6), consistent with the mixing of juvenile mantle-derived melts with (recycled) old crust perhaps somewhat rejuvenated during the Cadomian period. We have therefore identified a Triassic magmatic arc as predicted by the interpretation of the Karakaya Complex as an accretionary complex related to northward subduction (Carboniferous and Devonian granites are already well documented in NW Turkey). Possible explanations for the lack of any outcrop of the source magmatic arc are that it was later subducted or the Karakaya Complex was displaced laterally from its source arc (both post 220 Ma). Strike-slip displacement (driven by oblique subduction?) can also explain the presence of two different sandstone source areas as indicated by the combined U-Pb-Hf isotope and supporting petrographic data.

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