Zircon Hf isotopic constraints on the petrogenesis of the Dzirula complex in Georgian Caucasus: the existence of Arabian micro-continents

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Micro-continents, or continental fragments, that rifted from the northern margin of Gondwana have been involved in several stages of the Tethyan evolution with the development of multiple magmatic events since the Paleozoic time. The tectonic relationship among the Greater Caucasus terrane, Transcaucasus basement and Laurussia supercontinent remains controversial due to poor age and geochemical constraints. Herein we present new zircon Hf isotopic analyses for seventeen magmatic rocks, mainly from the Dzirula complex, in Georgian Caucasus. The analytical results represent significant Carboniferous (332-309 Ma) magmatism of less radiogenic zircon Hf isotopic signatures to suggest a dominant crustal contribution with less depleted-mantle involvement in the magma genesis. These granitoids, exposed both in the Greater Caucasus and Transcaucasus domains, contain numerous inherited zircons of a major age distribution at ca. 700-500 Ma and strongly various Hf isotope compositions, indicating an affiliation with magmatic activities that produced the juvenile Arabian-Nubian Shield crust and reworked Neoproterozoic materials in the northern Gondwana. We thus confirm the existence of Arabian-derived micro-continents which had played an important role on the crustal evolution in the region. Furthermore, the Triassic (~222 Ma) gabbros that intruded into the Dzirula complex and the Late Cretaceous (86±1 Ma) rhyolite from the Lesser Caucasus yielded zircon Hf isotopes that can imply the juvenile mantle component to have highly contributed to the magmatic evolution in Georgian Caucasus during the Paleo- and Neo-Tethyan subductions.