

Discovery of ANS-derived ribbon continent in Georgian Caucasus: Zircon Hf isotopic constraints and implications for the Cimmerian orogeny

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The Carboniferous igneous rocks, widely distributed in the Caucasian region and along the north of Izmir-Ankara-Erzincan suture in Turkey, have long been considered as parts of the Variscan orogeny which is linked to the formation of Pangea. However, the coeval Carboniferous magmatism from the neighboring region, in the northwestern part of Iran, was suggested to occur in an extensional environment. Herein we present new zircon U-Pb and Hf isotopic analyses for seventeen magmatic rocks mainly from the Dzirula complex of Georgia, eight rocks from NE Turkey, and four others from NW Iran to decipher their correlation and provide a new tectonic interpretation. The widespread Carboniferous granitoids that crop out in Georgia (the Greater Caucasus and Transcaucasus) and NE Turkey (the Eastern Pontides) show similar ages of 332-309 and 340-313 Ma, respectively, and compatible zircon Hf isotopic features of dominant crustal contribution and less depleted-mantle involvement. They contain numerous inherited zircons of a major age distribution at ca. 700-500 Ma that yielded Hf isotope compositions indicative of the presence of relict old continental crust and the injection of significant depleted-mantle component forming the juvenile Arabian-Nubian Shield (ANS) crust. It is confirmed the existence of Arabian-derived micro-continent had played an important role on the crustal evolution in these regions. Besides, the Carboniferous (349-311 Ma) intrusions in NW Iran were defined their emplacement in association with the initial opening of the Neotethys during that time. Our results thus suggest that these concurrent magmas intruded the northern, and ANS-involved, part of Gondwana in the Carboniferous and then rifted together with the so-called Cimmerian continent.