

Cimmerian and pre-Cimmerian tectonics in the NW part of the Central-Eastern Iran Microcontinent: the Jandaq Complex

Andrea Zanchi (1), Stefano Zanchetta (1), Fabrizio Berra (2), and Hamid Reza Javadi (3)

(1) University of Milano-Bicocca, Department of Earth and Environmental Sciences, Milan, Italy , (2) University of Milano, Department of Earth Sciences, Milan, Italy , (3) Geological Survey of Iran, Tehran, Iran

Central Iran is a tectonic puzzle that consists of several, mainly Gondwana-derived, terranes. The accretion of these terranes to the Eurasia margin resulted from the superposition of several orogenic events culminating with the Late Triassic Cimmerian orogeny. Dismembered ophiolites occur within several metamorphic complexes in the NW part of Central Iran and have been generally interpreted to represent suture zones that separate distinct crustal blocks. Only some of these ophiolites have been studied in detail until now, like those of the Anarak complex, which has been interpreted to represent a fragment of the accretionary wedge developed on the southern Eurasia margin during the end of the Palaeozoic before the Cimmerian collision. The complex was later displaced to its current position in response of large-scale tectonic deformation that affected Iran during Mesozoic and Cenozoic times. The age and paleogeography of other ophiolite-bearing complexes, like the Jandaq and Posht-e-Badam ones, is instead still largely unknown.

The Jandaq Complex consists of two units: an ophiolite-bearing one (the Arusan mélange) and a second unit made of amphibolite facies gneiss, schists and amphibolites (the Jandaq unit s.s.). The complex is in tectonic contact to the north with heterogeneously deformed lower Cambrian granites (Airekan terrane) and it is intruded by Upper Triassic (porphyric) granites and slightly younger pegmatite swarms (Early Jurassic), according to our new radiometric ages. The Chah-Palang conglomerate (Upper Jurassic – Lower Cretaceous) rests in non-conformity on all intrusive and metamorphic units.

Partly serpentинized peridotites, metagabbros and low grade metabasalts, with minor quartzite and marble lenses, form the ophiolitic unit of the Arusan mélange. Petrographic analysis showed that the Arusan ophiolites were largely re-equilibrated at greenschist-facies conditions, whereas the continental crust-derived rocks of the Jandaq unit s.s. display phase assemblages typical of the garnet amphibolite facies (Grt+St+Ky in micaschists and Amp+Grt+Pl in amphibolites). The two units of the Jandaq complex thus experienced different tectonometamorphic evolutions and were tectonically coupled and juxtaposed to the Airekan granite at later stages. The age of metamorphism of the ophiolites and of the other metamorphic rocks is still unknown, but the intrusion of the non-metamorphosed Upper Triassic granites provides a minimum age constrain, suggesting that metamorphism and deformation of the Jandaq complex could be related to the Cimmerian or to an older orogenic event. In the last case, it could represent a fragment of the upper Palaeozoic to Triassic accretionary units of NE Iran, together with the Anarak Complex, which were displaced to their present-day position along the GreatKavir fault system during Mesozoic and Cenozoic times. Dextral shearing along Cenozoic precursors of this important intracontinental fault system were recognized by us and other authors all along the northern margin of Central Iran, suggesting that large dextral displacements may have occurred along this structure before its recent switch to left-lateral shearing.