



The Eocimmerian history of Central Iran: the accretionary wedge of Anarak

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The Anarak region of Central Iran is a key area for the understanding of the Late Palaeozoic to Triassic Cimmerian evolution of Iran. The Anarak Metamorphic Complex (AMC) forms an E-W trending mountain ridge, which separates the Triassic of Nakhvak to the north from a continuous non-metamorphic Palaeozoic to Mesozoic sedimentary succession to the south and was interpreted as an accretionary wedge active from Late Palaeozoic to Triassic times. The AMC is sharply cross-cut westward by the Upper Cretaceous "Coloured Melange", consisting of low- to medium-grade metamorphic rocks with tectonically intercalated slivers of serpentinite often associated to blue schists. The occurrence of this rock association in Central Iran poses several questions regarding its evolution and especially on the number of Cimmerian (Palaeotethys) sutures (single rather than multiple) between Eurasia and Iran.

The AMC includes several subunits (Morghab, Chah Gorbeh, Patyar, Palhavand Gneiss, Lakh Marble and Doshak) which differ for composition and/or metamorphic evolution. Based on field observations, the Morghab and Chah Gorbeh units suggest a common deformation and a similar metamorphic history, characterised by three major folding events. The first two events developed pervasive axial plane foliations causing a complete transposition of the primary stratigraphic characters. Folding was accompanied by two main metamorphic events, the latter showing retrogression from possible medium to low grade conditions. During the third folding stage, large-scale plunging to vertical open folds were superposed on previous folds in the area north of the Kuh-e Chah Gorbeh, deforming the previous penetrative foliations. In this frame, the Palhavand Gneiss can be considered as part of the same metamorphic unit which escaped a more pervasive low grade retrogression. Concerning the Patyar unit, previous studies considered the Lakh Marble as the lagoonal sediments of an atoll. Field analyses indicate that the contact between the Lakh Marble and the Patyar unit is invariably tectonic. The Lakh Marble occupies the upper structural position and forms a huge nappe, extending for tens of kilometres across the area. Also, the strong deformation, low grade metamorphism and the occurrence of serpentinite tectonic slices in the footwall of this nappe, evidence that the emplacement of the Lakh nappe postdated the metamorphic event.

The observed relationships between the Chah Gorbeh unit and the mafic/ultramafic rocks exposed in the Anarak mountain indicate that they were tectonically juxtaposed after reaching high pressure peak conditions. This is evidenced by the occurrence of blue schist mineral assemblages in metabasites which preserve pillow basalts. Geochemical analyses of these rocks indicate a relative depletion in HREE, different from the flat patterns of metabasites from Chah Gorbeh. Greenschist facies ductile shear zones evolving into discrete semi-brittle to brittle fault zones indicate different PT-paths. The occurrence of late Tertiary sediments within the main thrust contacts suggest that the entire nappe pile was reactivated causing further complexity in the final tectonic structure.

The results of our fieldwork carried out during the last years in Central Iran in the Anarak region add several new constraints on the evolution of the area which can be now directly compared with the history of the Palaeotethys suture zone in NE Iran.