



Mesozoic and Eocene ductile deformation of western Central Iran: from Cimmerian collisional orogeny to Eocene extension and exhumation

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To advance our understanding of the Mesozoic to Eocene tectonics and kinematics of basement units exposed in the south-western Central Iran plateau, this paper presents new structural and thermochronological data from the Chapedony metamorphic core complex and hangingwall units, particularly from the Posht-e-Badam complex. The overall Paleogene structural characteristics of the area are related to an oblique convergent zone. The Saghand area represent part of a deformation zone between the Arabia and Eurasia plates, and can be interpreted as a product of the Central Iran intracontinental deformation as a weak zone during Mesozoic to Paleogene times. Field and microstructural evidence reveals that the metamorphic and igneous rocks in the study area suffered a ductile shear deformation including mylonitization at the hangingwall boundary of the Eocene Chapedony metamorphic core complex. The shear zone is subhorizontal low-angle normal fault and the shear direction of the hangingwall unit is towards NE, based on the attitude of foliation and lineation of ductility deformed rocks and shear sense indicators. Comparison of deformation features in the described mylonites and other structural features within the footwall unit lead to the conclusion that the mylonites were formed in a subhorizontal shear zone by NE-SW stretching in the extension tectonics during Middle to Late Eocene. The Chapedony metamorphic core complex is characterized by amphibolite-facies metamorphism and development of S and S-L tectonic fabrics.

The Posht-e-Badam complex is deformed by two stages during Cimmerian tectonic processes forming the Paleo-Tethyan suture. The Posht-e-Badam complex is overprinted by two stages of metamorphism. White mica ages at 203 and 181 Ma are related to cooling after medium-grade metamorphism respectively ductile shearing. These ages are variably overprinted by low-grade metamorphism also affecting Jurassic metasediments in the Polo area. Consequently, these are younger, and plateau ages at 140 and 90 Ma have been found.

The new age data from the Boneh Shurow and Posht-e-Badam complexes argue for a distinct history of these two complexes. Taking the model of Bagheri and Stampfli (2008), the Boneh Shurow complex can be placed together with Variscan accretionary complex. Since the benchmark paper of Sengör (1979), the Cimmerian orogeny is considered to represent the suture of Paleo-Tethys. The Cimmerian orogeny is obviously multiphase, and the Posht-e-Badam complex with its Middle Triassic medium-grade metamorphism and granite intrusions record the main stage of plate collision. The significance of the second, much later event at the Jurassic/Cretaceous boundary remains unclear, but it is compressional as the intercalation of the Raetoliassic phyllites records.

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