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Constraints on Early Miocene paleogeography and paleoenvironments of the northern Zagros from sedimentary petrography and detrital AFT dating

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The Zagros collision belt results from the closure of the Neo-Tethys ocean during the Arabia/Eurasia plate convergence. According to recent magnetostratigraphic dating of the Zagros foreland-basin deposits, collision-related folding of the Arabian margin started in the High Zagros ca. 13.9 Ma (Khadivi et al., 2009). U-Th(He) thermochronological data reveal consistent age for thrusting in the High Zagros (Gavillot et al., 2010). Because facies/sedimentological studies reveal that the Bakhtyari conglomerates of this age were deposited below sea level, the onset of Zagros uplift should necessarily be younger than 13.9 Ma.

However, prior to this stage, the Arabian margin recorded successive episodes of subsidence related to flexure induced by Late Cretaceous-Early Tertiary (Paleocene-Early Eocene) deformation and related exhumation, whose origin is still debated.

The goal of this study is to provide constraints on the type of source rocks, the age of exhumation and paleoenvrionmental conditions associated with deposition. In this aim, we conducted a petrographic analysis and AFT dating on sediments deposited in Zagros foreland basin (Razak, Agha Jari and Bakhtyari Formation) in the interval 20-13.9 Ma. MEB analysis and optical studies on point-counted thin sections reveal a complex source of sediments including mixed detrital magmatic and carbonaceous rocks source with little (or absent) elements from granitoid rocks. The main fraction is represented by magmatic lithics (chromite or magnetite) and secondary sediment lithics (paleogene bioclasts and cherts). These data point to the magmatic basement and associated Meso-Cenozoic sediment cover eroded from ophiolitic units. In the same studied section, preliminary AFT dating show consistent grain populations of 88 ± 12 Ma and 70 ± 17 Ma. These ages suggest that the Miocene foreland basin has not been buried enough to reset the apatites (Tc$\sim$110°C). This age also points to the obduction of neo-tethyan ophiolites as the main cooling event recorded by the studied detrital grain and thus points the northern Zagros as the main source of Miocene sediments. In the studied Fars catchment, south-flowing rivers cutting through ophiolitic rocks are found few 100 km to the east. This suggests either a reorganization of the drainage system due to tectonics or climatic after 13.9 Ma.