



Zagros fold belt: orogenic accretion from obduction to collision

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The Zagros orogenic system comprises an exceptionally wide deformation zone between Arabia and Eurasia, embracing the entire Iran, and resulting from the closure of the Neotethys Ocean through its protracted NE-dipping subduction beneath Eurasia. The ~2000-km long, NW-SE trending Zagros fold belt is at the front of this orogenic system formed by the Sanandaj–Sirjan Zone and the Urumieh–Dokhtar Magmatic Arc, which are parallel to the main tectonic grain and have different geodynamic significance. The Zagros fold belt deforms 10-12-km thick Arabian sedimentary cover, which records compressive deformation since Late Cretaceous times. These tectonic events and their sequence have been studied in greater detail in the last ten years, mainly due to the profusion of dating of the syntectonic marine and non-marine sediments in the foreland basin. Despite these new data, and taking in account that there is a general consensus that the Zagros orogeny occurred during the complete consumption of the Neotethys Ocean, tectonic interpretations differ and ages of major geodynamic events remain controversial.

Our studies confirm that the early Amiran foreland basin depocenter migrated from Campanian to Eocene (c. 83–52.7 Ma) after the onset of young Tethyan intra-oceanic obduction on top of the Arabian plate margin at the Cenomanian–Turonian boundary (~93 Ma). This migration is coeval with a mild but far-reaching deformation as indicated by punctuated growth strata patterns. A younger deformation event shaped the present geometry of the magnificent Zagros fold belt, overprinting the previous phase. Deformation along the High Zagros Fault was active from 20 Ma to at least 7.5 Ma. Folding in the Lurestan was active from at least ~13.5 Ma in the NE, migrating to the SW where it possibly terminated at about 2.5-1.5 Ma. In the Fars, deformation onset is dated at 14.5 Ma migrating SW-wards to the Persian Gulf coastline where the folds are still active.

We propose a simple 2D kinematic model accounting for the existing Arabia-Eurasia plate tectonic convergence models and constrained by the well-calibrated deformation periods from both Amiran and Mesopotamian foreland basins to characterize the crustal accretion shaping the widespread Zagros collisional domain.