

Cenozoic Dextral Shear in the Zagros: What we know and some viable models

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Abstract

Key questions relevant to the kinematic evolution of the Arabia-Eurasia collision include: What role has dextral shear played in controlling the architecture of the high Zagros folds and thrusts? And how has the dextral shear been accommodated through time. The major active dextral fault in the High Zagros is the Main Recent Fault (MRF) which accommodates a maximum of 4 +/- 2.5 mm/yr of dextral shear and which offsets a gabbro body in the NW Zagros by about 25 km. The MRF system is about 600 km long and is composed of several segments ranging from 100 to ~150 km in length. The Southwestern most, and longest segment (Ardal segment) is generally thought to be broken into two strands and links to the Kazarun Fault (KF) in an enigmatic way near its SE termination. The NW end of the MRF is also enigmatic; It has been shown as connecting directly to the Karlova triple junction through Lake Van in E. Turkey and, alternatively, as a continuation of the Zagros-Bitlis suture zone which joins the Taurus thrust belt of SE Turkey and N Iraq. Our recent work in the Zagros confirms the dextral and youthful nature of the MRF and defines the MRF segments. Furthermore, we show that the SW MRF (Ardal segment) is more likely composed of a single stand rather than two and that it locally cuts older thrust faults, which suggests a transition from a earlier dip-slip or oblique slip kinematic regime to strike slip regime. The nature of the link between the MRF Ardal segment and the KF, which cuts obliquely across the orogen from the high Zagros to the Persian gulf remains enigmatic, though we argue based on offset geomorphology that the KF has also accumulated ~25 km of dextral offset suggesting that much of the slip on the MRF is transferred to the KF with the remainder being absorbed by SE striking fan of long-lived strike-slip faults in the western Fars salient. Our data and observations constrain the total offset of the MRF to be ~25 km which is consistent with the initiation of slip on the MRF at ~6 Ma assuming that the ~4 mm/yr slip rate is valid. This timing places the initiation of the MRF within error of the timing of a long recognized tectonic reorganization of the middle east and is consistent with our data shoeing that the dominantly strike slip kinematic regime overprinted an earlier oblique- to dip-slip kinematic regime.