

Pre-folding fracture development in the Lurestan region of the Zagros Fold and Thrust Belt: constraints from early fracture sets in the Shabazan and Asmari Formations

Amerigo Corradetti (1), Stefano Tavani (1), Francesco D'Assisi Tramparulo (1), Ernesto Paolo Prinzi (1), Stefano Vitale (1), Mariano Parente (1), Davoud Morsalnejad (2), and Stefano Mazzoli (1)

(1) DiSTAR, Università Federico II, Napoli, Italy (amerigo.corradetti@unina.it), (2) N.I.O.C., Tehran, Iran

In the Zagros Fold and Thrust Belt (FTB), the timing of fracture development with respect to folding is debated. Multiple fracture systems occur in the area. These include “typical” fracture systems that are oriented parallel and orthogonal to the NW-SE strike of the belt, as well as sets oriented N-S and E-W. The interpretation of the N-S and E-W sets is controversial. Despite the general consensus about the first-order relationship between these fractures and inherited N-S striking basement faults, their timing and kinematic significance is not yet fully understood. The ambiguous crosscutting/abutting relationships with the NE-SW and NW-SE sets, together with the difficulty of framing them into the classical scenario of fracturing in foreland basin systems, has led to the development of different hypotheses about the timing of N-S and E-W sets. For the generation of these structures, both pre- and syn-thrusting interpretations have been proposed.

In this work, we report on the occurrence of bed-perpendicular fracture sets in the upper part of the Shabazan (Eocene) and in the Asmari (Oligo-Miocene) Formations of the Zagros FTB. These fractures have the peculiarity of being filled with karst material. Such filled fractures are preserved in beds showing variable angles of dip, ranging from horizontal to vertical. Their homogeneous distribution in variably dipping beds around folds undoubtedly point to an origin of these fracture sets predating the tilting of the strata in which they are contained. Therefore, fracture development and related infilling occurred at an early stage, in still flat lying strata, following the deposition of the top Shabazan and Asmari Formations. Such a deposition took place within the general framework of ongoing shortening in the Zagros. This process, occurring since the Late Cretaceous, progressively led to folding of the syn-orogenic Shabazan and Asmari Formations subsequently to the development of the studied filled fractures.