STRUCTURAL MATURITY OF BLIND FAULTS IN ZAFROS FOLD AND THRUST BELT

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Keywords: Structural Maturity, Near-field Ground Motion, Zagros, Seismotectonic

ABSTRACT

Structural maturity is a determinant parameter in seismic hazard assessment and is less considered. It is qualified by surface rupture conditions (segmentation, rupture length and displacement value on the rupture), earthquake recurrence pattern and the ground motions produced by earthquake. While surface faulting of earthquakes is extremely rare in the Zagros, therefore in this region, we just used strong ground motion to determine the degree of structural maturity of the faults.

Our study shows that nearlly N-S trending faults which are the old faults that govern the structure are the most mature faults. Whereas with change in direction of faults toward NW-SE, the degree of maturity is decreased. Reverse faults have a least degree of maturity and they are the young faults that are govern with structure have a more immature structure in depth.

INTRODUCTION

Active deformation in Iran is caused by the convergence of Arabian- Eurasian plate (Fig. 1) that deforms an area of ~3,000,000 km^2 of continental crust (Allen, 2004). The Iranian plateau accommodates different convergence rates of 35mm yr^{-1} at N-S - N15°E (Berberian, M and Yeats, 1999) to 22± 2mm yr^{-1} at N8±5°E (Vernant et al., 2004). Zagros accommodates an important part of the overall convergence (Allen, 2004).

The present structure of Zagros Folded Belt is qualified by the major thrust fault (fronts) that are parallel to the belt and transfer fault zones or lateral ramps oblique to the belt and Hormoz Salt domes (Sepehr 2005, Berberian, 1995). There are several incompetent layers in the Zagros which cause that earthquakes not be able to rupture the surface in the Zagros (Berberian, 1995). However InSAR studies show that some recent earthquakes ruptured the Competent Group in the lower sedimentary cover (Nissen et al., 2011). In the NW Zagros (west of the Kazerun fault) shortening is accommodated mainly along the Mountain front fault where most of major earthquakes occur. The change in direction and magnitude of velocity vectors occurs across the N-S trending Kazerun and Kerebas faults (Hessami et al., 2006).

The Kazerun Line accommodates some of the shortening between Arabia and central Iran by an elongation of the Zagros Mountains parallel to strike (Baker et al., 1992). GPS measurements suggest that these faults have a combined right-lateral slip-rate of 6±2 mm/ yr on the Kazerun strike-slip fault system,