RELATION BETWEEN THE RUPTURE OF SEDIMENTARY ROCK AND THE RUPTURE OF BASEMENT IN THE ZAGROS SIMPLY FOLDED BELT, IRAN

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Keywords: Simply Folded Belt, Relocation, Focal Mechanism, Zagros

Zagros is a young fold and reverse belt (ZFTB) in the south west of Iran formed by the collision of Arabian and Eurasian plates (Berberian and King, 1981; Falcon, 1974). The ZFTB is subdivided into two main structural zones distinguished by different topographies and styles of deformation: the Zagros Simply Folded Belt (ZSFB) to the SW and the High Zagros Belt (HZB) to the NE where the High Zagros Fault (HZF) is the boundary between the two zones. The Hormoz salt layer as one of the detachment horizons is a lower incompetent layer between basement and crust that has an exposure in SE of Zagros as salt plugs and salt domes. The relation between surface and basement hitherto is a matter of debate.

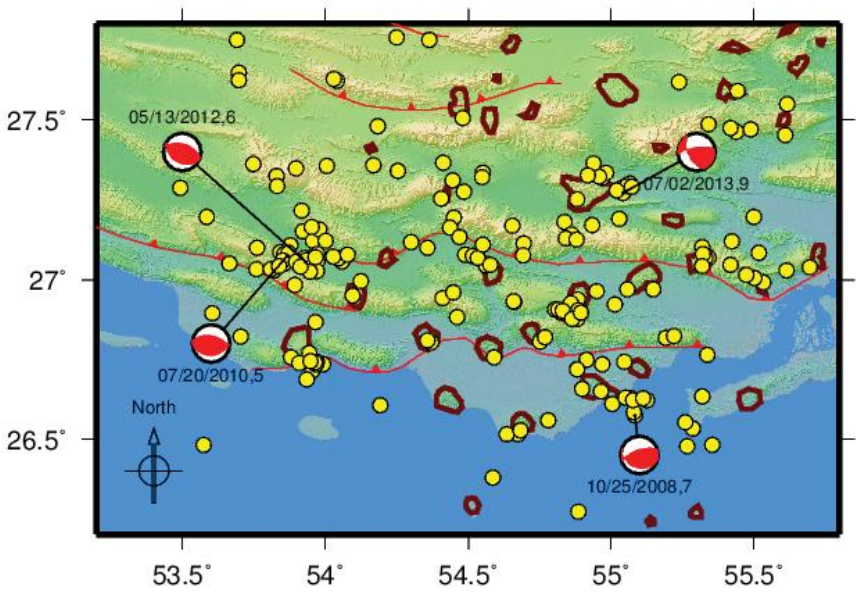

Figure 1. Yellow circles show epicentres for cluster in SFB obtained by HDC method with focal depth larger than 15 km. Beach balls display calculated moment tensor solution with shallower and next to each beach ball the event time and depth are shown. Crimson polygons are the location of salt dome (Jahani et al., 2007) and fault data are from Hesami et al., 2001

In this study, we have applied a multiple-event relocation analysis named the hypocentroidal decomposition (HDC) algorithm (Jordan and Sverdrup, 1981) to a cluster of events in ZSFB. We also used S-P difference times of close BHRC accelerometer stations to have proper control on focal depths. Figure 1 displays the result of this process. One of the

observations is the correlation between some of earthquake location and salt domes. Furthermore, the most of focal depth using this method illustrate that the beginning of rupture is in the basement (focal depths are larger than 15 km).

In addition, we calculated moment tensor for some of the larger events using mtinvers program (Dahm, and Kruger, 1999). We used regional data from Iranian National Seismological Network (INSN), Iranian Seismological Center (IRSC) and Global Seismograph Network (GSN) which provided a good coverage for these events. We separately did inversion in time and frequency domain while using frequency range between 0.017 and 0.04 Hz. Note that moment tensor inversion in frequency domain is applicable for regions with less well-developed crustal velocity model and low signal-to-noise ratio (Herman, 2011). For solving the ambiguity of solution in frequency domain, we also retrieved solutions in time domain. Dispersion curves derived from data shows that our velocity model is reliable at studied range of frequency. Furthermore, inversion is less sensible to deviation from earth structure in this frequency range. We also applied Jacknife test and calculated Kagan angle for each event as a sensitivity analysis.

Inversion results for both waveform and spectrum data show much shallower centroid depth (in the sediments) that cannot be explained by error or difference between centroid depth and focal depth. Furthermore dominant mechanism for these events is reverse with strike slip components for some of them (Figure 1).

These results suggest that also rupture begins at the basement; most of moment release is in the shallower depth within the sedimentary column. But yet we need to find better ways to understand the relation between the rupture of the sedimentary rock and the rupture of the basement in ZSFB and probably the role of salt domes. This may lead us to elucidate the large difference between focal depth and centroid depth.

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