

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

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ABSTRACT

Zagros is a fold and thrust belt in the southwest of Iran and is also a very unique place on the earth that we can study a young continental collision zone. Different studies have been focussed on the deformation of the sedimentary cover and the basement. Yet the relation between the deformation at the surface and in the bedrock is a matter of debate. Earlier studies in the Zagros Simply Folded Belt (ZSFB) using local, teleseismic and Interferometric Synthetic Aperture Radar (INSAR) data have proposed that most of moderate earthquakes (M_w 5-6) occur in the lower sedimentary column while microseismicity is related to the basement. In this study, we have applied a multiple-event relocation analysis to a cluster of events in ZSFB. We also used S-P difference times of close BHRC accelerometer stations to have a proper control on the focal depths. Most of the focal depths illustrate that the beginning of rupture happens in the basement. In addition, we calculated moment tensor solution for some of large events using regional data obtained from the Iranian National Seismological Network (INSN), Iranian Seismological Center (IRSC) and Global Seismograph Network (GSN). These data provided the proper good azimuthal coverage for large events. Moment tensor inversion results are in consistency with previous results provided by body wave modelling and INSAR in which they show shallower centroid depths. Therefore, there is a discrepancy between the focal depth and the centroid depth that cannot be explained either by considering the error bars or the difference of two based on their definitions. We thereafter suggest that although the rupture begins at the basement, most of the moment release is in shallower depths and within the sedimentary column.

INTRODUCTION

Zagros is a young fold and thrust belt (ZFTB) in the southwest of Iran formed by the collision between Arabia and Eurasia 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 south west and the High Zagros Belt (HZB) to the north east. The High Zagros Fault (HZF) is the boundary between these 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 south east of Zagros as salt plugs and salt domes. The relation between the surface structures and basement is not crystal