

SOURCE OF THE EARTHQUAKE DOUBLET OF 11TH AUGUST 2012, NORTHWESTERN IRAN, FROM OBSERVATION OF GLOBAL SEISMIC ARRAYS AND LOCAL NETWORKS

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ABSTRACT

On August 11, 2012 two catastrophic earthquakes with moment magnitudes of 6.4 and 6.2, respectively, only 11 minutes and circa 5 kilometers apart, struck northwestern Iran which caused hundreds of casualties and left thousands of people homeless.

Based on the analysis of data from global seismic arrays and also those of the local and regional seismic networks, the hypocentral depth and mechanism of the first event and also the mechanism of the second earthquake have been determined. While the first event with complex rupture history, unusual for an earthquake of such magnitude, released the bulk of its energy through a mainly strike-slip dislocation in a second subevent, approximately 5 seconds following the P onset and at a depth of around 5 kilometers, the second earthquake, shows a mainly reverse faulting and seemingly simple rupture history and deeper hypocentral depth.

Both events have occurred where no active fault had been mapped in their vicinity and once again questions have been raised as to how much weight in seismic hazard assessments should be placed on known active faults.

INTRODUCTION

The studied doublet has occurred in a region which is seismically active and seismotectonically located in a complex interaction of Zagros subduction remnants, Talesh and Alborz mountains and east and north Anatolian faults regime. Proximity of such varying tectonic provinces has given the earthquakes in this region a varied and complex nature (Fig 1).

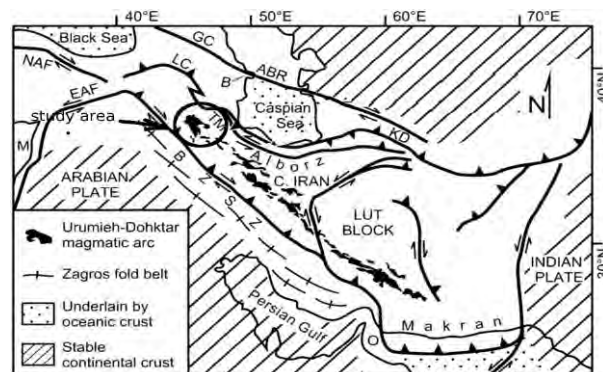


Figure 1. The location of the epicentral region (circle) in a simplified map of major tectonic elements such as East and North Anatolian faults, Alborz mountains and Zagros main thrust. (after Axen et al, 2001)