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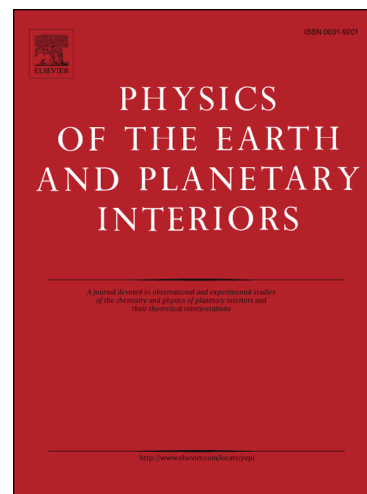
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Mainshocks/aftershocks study of the August 2012 earthquake doublet on Ahar-Varzaghan complex fault system (NW Iran)

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Abstract

Seismotectonic features of the Ahar-Varzaghan complex fault system are reviewed by the mainshocks/aftershocks study of the 2012 Ahar-Varzaghan earthquake doublet ($M_w=6.5$ & $M_w=6.3$). The early aftershocks were accurately monitored by a dense local seismological network. The mainshocks hypocenters were relocated using a new velocity model for the area. The regional displacement waveforms of the mainshocks and large aftershocks were jointly inverted for their moment tensors and centroids.

Precisely located aftershocks are mostly distributed in three distinct clusters. These E-W trending clusters are situated to the north of the surface rupture over a ~30 km long and 10 km wide zone, extending from the ground surface down to the depth of ~15 km. Based on our results, the first mainshock (M1) with $M_w=6.5$ nucleated 3 km east of the surface rupture at a depth of 10 km. The rupture evolved toward the west and shallower depths on an almost E-W striking right-lateral strike-slip vertical fault plane and produced ~12 km surface rupture. Its main energy was released at about 5 km west of the hypocenter at an average depth of 5 km. About 11 minutes later, the second mainshock (M2) with $M_w=6.3$ nucleated 5 km northwest of the M1 hypocenter and at a depth of 15 km. It occurred on an ENE-WSW striking, north-dipping (65° to 70°) fault plane with a dominant reverse mechanism and strike-slip component. The M2 related rupture

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