



A reappraisal earthquake focal mechanisms and active faulting in the central Alborz mountains, Iran

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The tectonic activity in the Alborz mountains, northern Iran, is due both to the northward convergence of central Iran toward Eurasia, and to the northwestward motion of the South Caspian Basin with respect to Eurasia inducing a left-lateral wrenching along this range. These two mechanisms give rise to a NNE-SSW transpressional regime. Considering the high seismicity of Alborz mountains, understanding active crustal deformation and fault behavior using focal mechanism of the earthquakes is necessary. This has also implications in terms of understanding the recent geodynamical evolution of the central Alborz–South Caspian region.

We analyze all recorded earthquakes with $M > 4$ during the last 10 years in central Alborz, using the online databank of the Iranian Seismic Telemetry Network (ISTN) and Iranian National Seismic broadband Network (INSN). The events have been relocated and their focal mechanisms are determined, based on the first motion polarities. According to this preliminary study, most of the reliable solutions can be classified into three groups. The first category shows a dominantly reverse mechanism, which is compatible with the regional NNE-SSW compression along the E-W trending faults. The second category includes the oblique (reverse or strike-slip) motions with either a component of right-lateral on the NW-SE trending faults or a component of left-lateral on the NE-SW striking faults. As a third group, some fault plane solutions show predominantly normal faulting, which reveal a regional NNW-SSE transtensional regime in the internal domain of central Alborz. Most of the focal mechanisms are consistent with the Holocene morphotectonic features and present-day motion of the faults, constrained by recent Global Positioning System (GPS) studies.