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Minimum 1D velocity model in Central Alborz from local earthquake data

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Central Alborz is the convergence point of the eastern and the western parts of the Alborz Mountains where great earthquakes have made a lot of fatalities. The central Alborz faults, especially around Tehran, are from mountain bordering type building heights and troughs that are mostly compressive or showing a great compressive component. After 1996 a new digital seismic network equipped with three component short period seismometers and high quality digitizers has been installed around this area to monitor microearthquakes for better understanding of local seismic characteristics. As the accuracy of earthquake locations is linked to the used velocity model so different efforts were made to study the seismic velocity structure of this zone. A one dimensional seismic velocity model including station corrections can weaken the effects of the layers close to the stations and may greatly improve the accuracy of locations and justify the variations caused by lateral velocity changes. In this study the concept of minimum 1D model has been employed to minimize the average RMS of a set of well located earthquakes recorded by Tehran Digital Seismic Network(TDSN) that compute solutions for the coupled hypocenter and 1D velocity seismic model. From the whole event set the quakes from 1996 to 2005 recorded by at least six stations with RMS less than 0.5 s and ERH and ERZ smaller that 5 km and a maximum gap of 180 degree were selected. Consequently a separate P and S velocity model has been determined. To examine the stability of the inversion process several starting models were employed using the same dataset and the same inversion steps but different control parameters. The new model shows overall improvement in locations in comparison with previous models.