Geophysical Research Abstracts
Vol. 13, EGU2011-4554, 2011
EGU General Assembly 2011

Upper crust velocity anomaly resolved using local travel-time tomography, in the Central Alborz, Iran

Tayyebe Akbari (1) and Hossein Shomali (2)

(1) Institute of Geophysics, University of Tehran, Seismology, Tehran, Islamic Republic Of Iran (akbari.tayyebe@ut.ac.ir), (2) Department of Earth Sciences, Uppsala University, Uppsala, 752 36, Sweden (hossein.shomali@geo.uu.se)

The Alborz Mountain Ranges (located on the southern margin of the Caspian Sea, and the part of the folded-belt Alpine-Himalayan) is an arc of parallel synclines and anticlines. The Damavand Cone and active, seismic faults such as Mosha and Northern Tehran are two of the most outstanding tectonic and geological features of the Alborz Mountains. Located 65 kilometres north of Tehran, Damavand Cone is the highest quaternary stratigraphic mountain in Iran and the Middle East. It is dormant now with the exception of some volcanic gases and smoke in the vicinity of the cone. There has been no sign of an eruption in the last millennium. Damavand is 5670 metres above the sea level but only 1600 – 2000 metres from the surrounding area. It is located in the eastern part of the Central Alborz. A data set of about 770 earthquakes recorded on a local 19 short period station between 2006 and 2010 provided by the Iranian Seismological Center (ISC) is used for inversion in a well constrained and worldwide adopted code (SIMULPS). Seismic inversion for three-dimensional variations of velocity and attenuation are often used to delineate magma bodies in the crust and upper mantle. A 3-D P-wave velocity model was obtained for the upper crust in the Central Alborz Mountains in the north Iran using the local travel-time earthquake tomography method. About 770 seismic events distributed around Alborz Mountain Ranges from surface up to a depth of about 40 km had been used to infer the P-wave velocity structure. The seismic arrival times were directly inverted using a 1D velocity model optimally representing the background structure.The simultaneous inversion of hypocentral and velocity model parameters had a remarkable impact on improving the location of earthquakes and producing a better constrained velocity model. The optimal networking and other such regularization parameters were estimated via synthetic modeling. Experimental tests and modeling were implemented to select the optimal model and its resolution. Tomography results show considerable velocity anomaly in Damavand Cone nearby region. On the northern side of Damavand there is a mass with positive velocity anomaly. Due to its close affinity with the position of the old Damavand Cone, this mass has been attributed to Damavand's old, crystallized magma chamber. A low velocity anomaly beneath the present cone in shallow deep also indicates its magma chamber.