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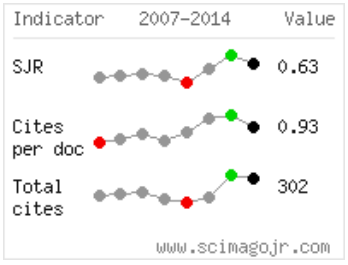

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Local earthquake tomography of the Erzincan Basin and the

surrounding area in Turkey

H. Gökalp

Abstract

In this study, selected travel time data from the aftershock series of the Erzincan earthquake (March, 1992, Ms=6.8) were inverted simultaneously for both hypocenter locations and 3D Vp and Vs structure. The general features of the 3D velocity structure of the upper crust of Erzincan Basin and the surrounding area, one of the most tectonically and seismically active regions in Turkey were investigated. The data used for this purpose were 2215 P-wave and 547 S-wave arrival times from 350 local earthquakes recorded by temporary 15 short-period seismograph stations. Thurbers simultaneous inversion method (1983) was applied to the arrival time data to obtain a 3D velocity structure, and hypocentral locations. Both 3D heterogeneous P and S wave velocity variations down to 12 km depth were obtained. The acquired tomographic images show that the 3D velocity structure beneath the region is heterogeneous in that low velocity appears throughout the basin and at the southeastern flank, and high velocities occur at south and east of the basin. The low velocities can be related to small and large scale fractures, thus causing rocks to weaken over a long period of the active tectonic faulting process. The ophiolitic rock units mostly occurring around the basin area are the possible reason for the high velocities. The validity of 3D inversion results was tested by performing detailed resolution analysis. The test results confirm the velocity anomalies obtained from inversion. Despite the small number of inverted S-wave arrivals, the obtained 3D S velocity model has similar anomalies with lower resolution than the 3D P-wave velocity model. Better hypocenter locations were calculated using the 3D heterogeneous model obtained from tomographic inversion.

Keywords

local earthquake tomography;Erzincan Basin;3D velocity structure

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