LOCAL BODY WAVE TOMOGRAPHY IN NW IRAN

Farzam FEIZAGHAEE
M.Sc. Student in Geophysics, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, Iran
f.feiz@iasbs.ac.ir

Khalil MOTAGHI
Assistant Professor, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, Iran
kmotaghi@iasbs.ac.ir

Mohammad TATAR
Associate Professor, IIEES, Tehran, Iran
mtatar@iiees.ac.ir

Ali MORADI
Assistant Professor, Institute of Geophysics, University of Tehran, Tehran, Iran
asmoradi@ut.ac.ir

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Iran is an active continental domain accommodating the convergence between the Arabian and Eurasia. In northwestern Iran, deformation between the Central Iran and the Caucasus domain is mainly accommodated by right lateral strike-slip on North Tabriz Fault (NTF). This area is part of Eurasian and Arabian plate's collision zone that the orogenic activities are not finished yet.The area is active and right lateral movement ~7 mm/year reported for NTF(Djamour et al., 2011) is the largest record for a fault in Iran.There are significant seismicity observed around the cities and villages in NW Iran, including Tabriz which destroyed several times by strong historical earthquakes (e.g. Rizza et al., 2013). In this study, to better understand the fault we calculated a 3D crustal velocity model at NW Iran using P and S arrival times of local earthquakes.

The Data set used here are P and S arrival times recorded by 30 temporary seismic stations installed in April-July 2004 around NTF by International Institute of Earthquake Engineering and Seismology (IIEES). The data from 8 permanent stations of Tabriz Network governed by Institute of Geophysics, University of Tehran (from 1997 to 2013) merged to our data set to improve ray coverage. The approach for resolving velocity structures is simultaneous solution of the coupled hypocenter and velocity model problem. The tomographic images obtained from such linearized inversion are dependent on the initial reference models and hypocentral locations. Here, we use the 1D velocity model and improved locations of Moradi et al. (2011). The simultaneous inversion is operated by SIMULPS14.

The obtained tomogram shows clear velocity contrast around the NTF (Figure 1). It should be noted that the resolution of resolved velocities is fair only around the fault trace marked by pink line in Figure 1. At layer z = 0 km, velocity is higher southeast of fault where topography has higher elevation and sedimentary layer is thin while in northwest area velocity is lower probably due to the thicker sedimentary cover. At greater depth the velocity transitions coincides with the fault trace at surface. At z= 4 km, velocity is lower in south of the fault while at greater depth (i.e. 8 and 12 km depth) the lower velocity can be observed at north of the fault. These changes in velocity are well consistent with the fact that NTF is a vertical strike slip fault. The polarity change of velocity across the fault from 4 to 8 km depth might be due to change of layering and penetrating to basement.

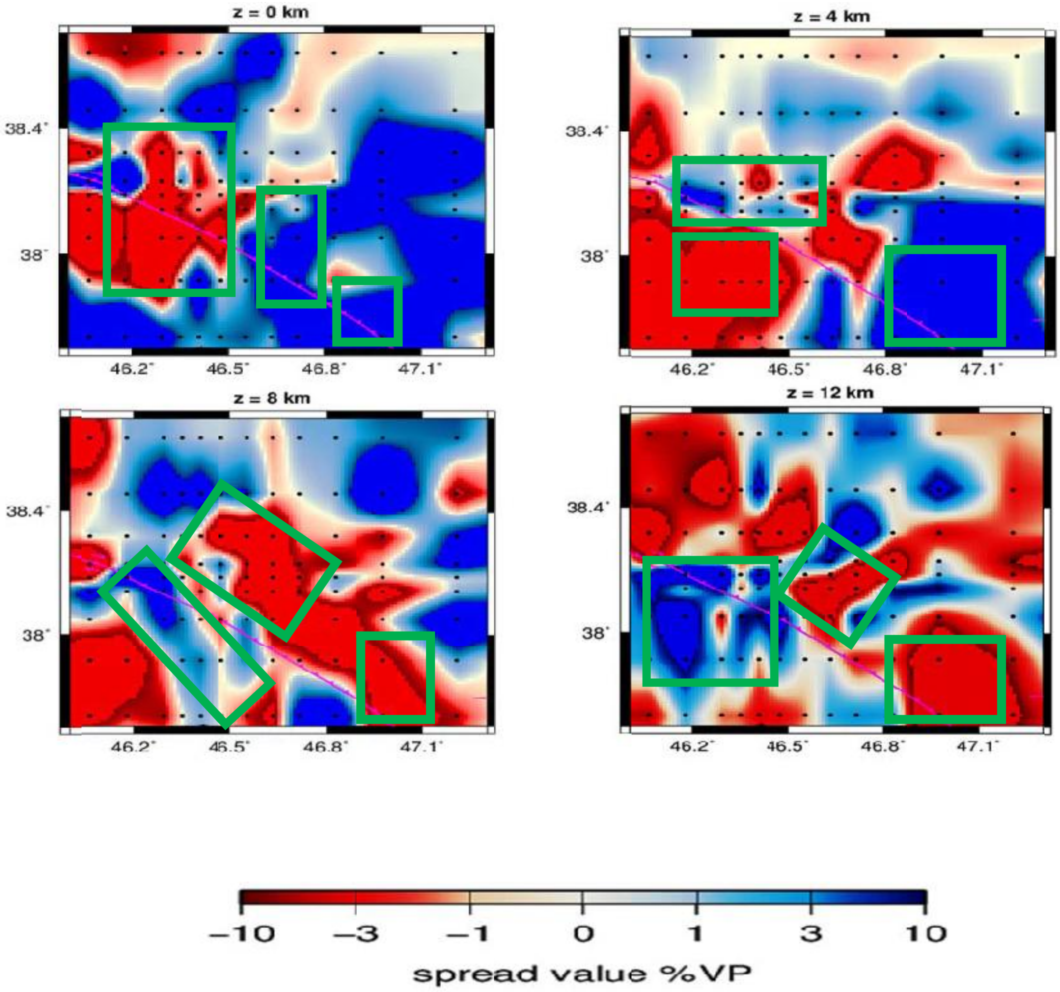

Figure 1. Obtained 3D velocity model. Tomograms are in depths 0km, 4km, 8km and 12km.
High resolution areas of tomograms in the figures are separated from low resolution area by green rectangular

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