Geophysical Research Abstracts
Vol. 14, EGU2012-5292, 2012
EGU General Assembly 2012
© Author(s) 2012

Crustal P and Pn Wave Velocity Perturbations Beneath Caucasus Region

T. Mumladze (1,2) and Y.M. Wu (1)

(1) Department of Geosciences, National Taiwan University, Taipei, Taiwan(R.O.C.) (tea_mumladze@yahoo.com), (2) Institute of Earth Science, Ilia State University, Tbilisi, Georgia

In presented study we invert crustal P and Pn velocities as well as Moho depth simultaneously applying the joint inversion method developed by Zhen et al. (2009). In this method all those three parameters are jointly inverted. It's using a spherical pseudo-bending ray tracing method and includes secondary Pg wave data at large distances. We applied the method to the Caucasus region and adjusted territories for reconstruction of the crust structure and uppermost mantle. New digital seismic network in Georgia was developed from 2003 and because of that we selected data from 2004 to 2010. Also we add data of past earthquakes from the time interval 1960-1990, with local magnitude more than 3.5. Before 1960 and during 1990-2004 seismic station coverage and hypocenter determination were very poor, so it was better not to use data from this time windows to avoid big errors in hypocenter locations. Final data set includes information about more than six thousand earthquakes. It includes Pg and Pn wave arrivals from the seismograms recorded by seismic stations of the regional seismic network of Georgia, Central Caucasus Local Network (installed in 2007), regional seismic networks of Turkey, Azerbaijan and Armenia. We applied the checkerboard resolution test to estimate the spatial resolution of the tomographic images. The results of the checkerboard test indicate that the initial model with passive and negative values is well reconstructed for all depths. The results of tomography show some significant features, well seen heterogeneities in upper crust, high and low Pn velocity zones. The depth of Moho discontinuity is relatively big in northern and southern part of Georgia, beneath the Greater and Smaller Caucasus, it has relatively large variations in this region. We can see the similar results in previous studies. Our tomography results in upper crust also show correlation among the velocity variations, seismicity, active faults and quaternary volcanic centers. At shallow depth are visible low velocity zones, which may be related to the thick sedimentary layer. The biggest depth of earthquakes in this region is about 40 kilometers, from our study is clearly shown that they are related with high velocity area at that depth.