

Public Abstract

First Name:Gleb

Middle Name:Anatolyevich

Last Name:Skobeltsyn

Adviser's First Name:Eric

Adviser's Last Name:Sandvol

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SP 2014

Department:Geology

Degree:PhD

Title:UPPER MANTLE SHEAR WAVE VELOCITY STRUCTURE OF THE EAST ANATOLIAN-CAUCASUS REGION

In the present dissertation, I describe two studies of the regional upper mantle shear wave velocity structure. In order to derive the absolute velocity structure of the upper mantle, I have applied surface wave tomography to model Rayleigh wave phase velocities as a function of period. Then I inverted the Rayleigh phase velocities to obtain shear wave velocities as a function of depth. The resulted high-resolution 3-D shear wave velocity model of the regional upper mantle is characterized by a better depth resolution than any preexisting tomographic models. I also conducted a shear wave splitting analysis using traditional methods and developed a two-layer grid search algorithm in order to infer the upper mantle anisotropic structure. The results of the shear wave splitting analysis for the stations located in Azerbaijan are the first in the region.

My 3-D velocity model shows the depth extent of the asthenospheric layer beneath the Turkish and Iranian Plateaus, which does not exceed 200 km and therefore rejects any suggestions of the existence of deep mantle plums in the area. The deep high velocity bodies beneath the Black Sea and northern Iranian Plateau are identified as the remnant slabs of the northern and southern braches of the Neo-Tethys lithosphere. The widespread volcanism and the uplift within the plateau were the result of a gradual steepening of the subducting slab of the southern branch of Neo-Tethys. The shear wave splitting analysis shows evidence of the two-layer anisotropic structure beneath the eastern Caucasus region. The results presented in the dissertation are crucial for the regional seismic hazard analysis.