Geophysical Research Abstracts
Vol. 18, EGU2016-8828-1, 2016
EGU General Assembly 2016

Crustal anisotropy along the North Anatolian Fault Zone from receiver functions

Andrea Licciardi (1), Tuna Eken (2), Tuncay Taymaz (2), Nicola Piana Agostinetti (1), Seda Yolsal-Çevikbilen (2), Frederik Tilmann (3,4)

(1) Dublin Institute for Advanced Studies, Geophysics Section, Dublin, Ireland, (2) Department of Geophysical Engineering, The Faculty of Mines, Istanbul Technical University, Istanbul, Turkey, (3) Deutsches GeoForschungsZentrum GFZ, Potsdam, Germany, (4) Freie Universität, Berlin, Germany

The North Anatolian Fault Zone (NAFZ) that is considered to be one of the largest plate-bounding transform faults separates the Anatolian Plate to the south from the Eurasian Plate to the north. A proper estimation of the crustal anisotropy in the area is a key point to understand the present and past tectonic processes associated with the plate boundary as well as for assessing its strength and stability. In this work we used data from the North Anatolian Fault (NAF) passive seismic experiment in order to retrieve the anisotropic properties of the crust by means of the receiver function (RF) method. This approach provides robust constraints on the location at depth of anisotropic bodies compared to other seismological tools like S-waves splitting observations where anisotropic parameters are obtained through a path-integrated measurement process over depth.
We computed RFs from teleseismic events, for 39 stations with a recording period of nearly 2 years, providing an excellent azimuthal coverage. The observed azimuthal variations in amplitudes and delay times on the Radial and Transverse RF indicate the presence of anisotropy in the crust. Isotropic and anisotropic effects on the RFs are analyzed separately after harmonic decomposition of the RF dataset (Bianchi et al. 2010). Pseudo 2D profiles are built to observe both the seismic isotropic structure and the depth-dependent lateral variations of crustal anisotropy in the area, including orientation of the symmetry axis. Preliminary results show that the isotropic structure is characterized by a complex crustal setting above a nearly flat Moho at a depth of $\sim$40 km in the central portion of the studied area. Strong anisotropy is present in the upper crust along some portions of the NAFZ and the Ezinepazari-Sungurlu Fault (ESF), with a strong correlation between the orientation of the symmetry axis of anisotropy and the strike of the main geological structures. More complex patterns of anisotropy are present in the middle and lower crust as well as in the upper mantle.

Bianchi, I., J. Park, N. Piana Agostinetti, and V. Levin (2010), Mapping seismic anisotropy using harmonic decomposition of receiver functions: An application to Northern Apennines, Italy, J. Geophys. Res., 115, B12317, doi:10.1029/2009JB007061.