Geophysical Research Abstracts
Vol. 18, EGU2016-392, 2016
EGU General Assembly 2016

Crustal Structure of the Central Anatolia – Eastern Mediterrenean, Turkey and Cyprus from Wide-Angle Seismic Data

Alper Denli (1), Cemil Gürbüz (1), James Mechie (2), and Michael Weber (2)

(1) Bogazici University, Kandilli Observatory and Earthquake Research Institute, Geophysics, Istanbul, Turkey (alper.denli@boun.edu.tr), (2) Deutsches GeoForschungsZentrum (GFZ), Section 'Geophysical Deep Sounding', Potsdam, Germany

As a part of the CyprusArc project, a seismic wide-angle reflection/refraction profiles were carried out in March 2010. The 300 km and 45 km long north–south trending profiles extended from Cihanbeyli in Central Anatolia to Anamur in eastern Mediterranean, Turkey and in southern Cyprus, respectively. The purpose of the project is to observe the impact of the transition from subduction to continent-continent collision of the African plate with the Anatolian plate. The field experiment comprised two land shots (1125 kg explosives) in Turkey and airguns (98 cubic liters) on the Mediterranean sea, beneath Cyprus. 244 stations were installed on land for data acquisition. 77 three-component sensors and 167 vertical-component sensors were installed along $\sim$300 km distances between Cihanbeyli and Anamur with an average spacing of 1.25 km, on Turkey. 24 three-component sensors and 21 vertical component sensors were deployed along 45 km distances on land at southern Cyprus with an average spacing of 1.25 km. To reveal a good data quality, a visual quality check, frequency analysis and filtering were applied to the seismic data. Two land shots on Turkey (also recorded on Cyprus) and airgun shots on the Mediterranean sea beneath Cyprus, geological and previous seismic investigations provide information to derive a layered velocity models beneath from the Anatolian plateau to eastern Mediterranean, Turkey and for the ophiolite complex on Cyprus. After picking observed seismic phases, finite-differences ray tracing of the wide-angle data leads a 2-D crustal P-wave velocity models. The results show moho depth increases from 38 km to 45 km depth along north–south trending profile on Turkey and crustal thinning between south Turkey and Cyprus from 40 km to 36 km. Obtained models were further refined using forward modeling to generate synthetic seismograms for individual shot gathers. Thus, by varying the velocity structure, the theoretical times and amplitudes of the various arrivals could be matched to the observed times and amplitudes. Additionally, 2-D gravity modelling was done by using the obtained final crustal models to check robustness of the unresolved part of models by seismic phases. Obtained theoretical gravity anomalies were compared with the observed gravity anomalies and the all results were correlated with geology, tectonics and previous investigations in the study area.