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New Insights on the Crustal Structure beneath the Western Segment of NAF: Preliminary Results from a Dense Seismic Array

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North Anatolian Fault (NAF) is one of the major strike slip fault systems on earth comparable to San Andreas Fault some ways. Devastating earthquakes have occurred along this system causing major damage and casualties. In order to comprehensively investigate the shallow and deep crustal structure beneath the western segment of North Anatolian Fault (NAF), a temporary dense seismic network consisting of 73 broadband sensors was deployed in early May 2012 with support from The Natural Environment Research Council (NERC) and partial support from Bogazci University Research Fund. This joint project involves researchers from University of Leeds, UK and Bogazici University, Kandilli Observatory and Earthquake Research Institute (KOERI). In addition to the 63 sensors provided by SEIS-UK instrument pool and three permanent KOERI sites in the region, another seven stations of KOERI-Department of Geophysics were installed surrounding the rectangular grid with the aim of further enhancing the detection capability of this dense seismic array (map). Six months of seismic data have been collected and initial analysis underway.

This research focuses on upper crustal studies such as earthquake locations (especially micro-seismic activity), moment tensor inversions and ambient noise correlations. Accurate earthquake locations will eventually lead to high resolution seismic images of NAF including both the northern and the southern branches in the upper crust. In order to put additional constraints on the active tectonics of the western part of NAF, we determined fault plane solutions using Regional Moment Tensor Inversion (RMT) and P wave first motion method. For the analysis of high quality fault plane solutions, data from KOERI and the DANA project were merged. Furthermore, detailed Moho topography will be revealed via receiver function method. Iterative time domain deconvolution was used to obtain receiver functions and H-K stacking was applied to calculate crustal thickness values. The preliminary results indicate that Moho is located at roughly 26 – 28 km depth with Vp/Vs ratios higher than 1.98. We also present the observed Moho depth variations along N-S and E-W profiles beneath the western segment of NAF.