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MICROSEISMICITY AND SHEAR WAVE SPLITTING IN WESTERN PART OF NORTH ANATOLIAN FAULT ZONE

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In order to comprehensively investigate the shallow and deep crustal strucrure beneath the western segment of North Anatolian Fault (NAF), a temporary dense seismic network consisting of 70 broadband sensors were deployed in early May 2012 with support from The Natural Environment Research Council (NERC) (Figure 1a) and Boğaziçi Research Fund (BAP, Project No:6922). This joint project (FaultLab Project) involves researchers from University of Leeds, UK and Bogazici University, Kandilli Observatory and Earthquake Research Institute (KOERI). Permanent stations of KOERI were also included to further enhance the station coverage. This temporary network was dismantled in late September 2013 after operating for nearly 18 months.

One of the primary objective is to reveal the micro seismicity beneath the northern and Southern branches of the NAF. Initially, 850 events were located using the first six months of the data as a part of the ongoing microseismicity analysis.The minimum calculated M_L magnitude is found to be 0.1 that strongly points out the significance and necessity of having such a dense seismic network. Overall, magnitudes vary between 0.1 and 4.2. Several foreshocks and aftershocks related to the ML:4.2 Serdivan earthquake (occured on 07.07.2012) were accurately located, clearly revealing the most recent tectonic activity in this region. Our future goal is to construct the high resolution maps of the velocity variations beneath this array via Local Earthquake Tomography (LET). Secondly, fault plane parameters for the well located earthquakes were determined by picking the first motion. Furthermore, Moment Tensor Inversion method (Dreger, 2002) was applied to events with magnitudes greater than 3.4. Fault plane solutions mainly indicate right lateral strike slip faulting.

We also investigated the crustal anizotropy using the local shear wave splitting method (Silver and Chan, 1991). This method is applied to 55 local earthquakes with magnitudes greater than 2.0 (Figure 2) Basically, two essential parameters for each station-event pair is needed for shear wave splitting calculations. One of them is fast polarazition direction (ϕ) and the other is delay time (δ_t) between the fast and slow components of the shear wave. In this study, delay times vary between 0,02 and 0,25 seconds clearly reveals the existence of crustal anisotropy. We are planning to make many more reliable splitting measurements as the rest of the data is currently being processed. We are also going to try to correlate the fast directions obtained for the group of stations with the tectonics of the region taking into account these parameters.

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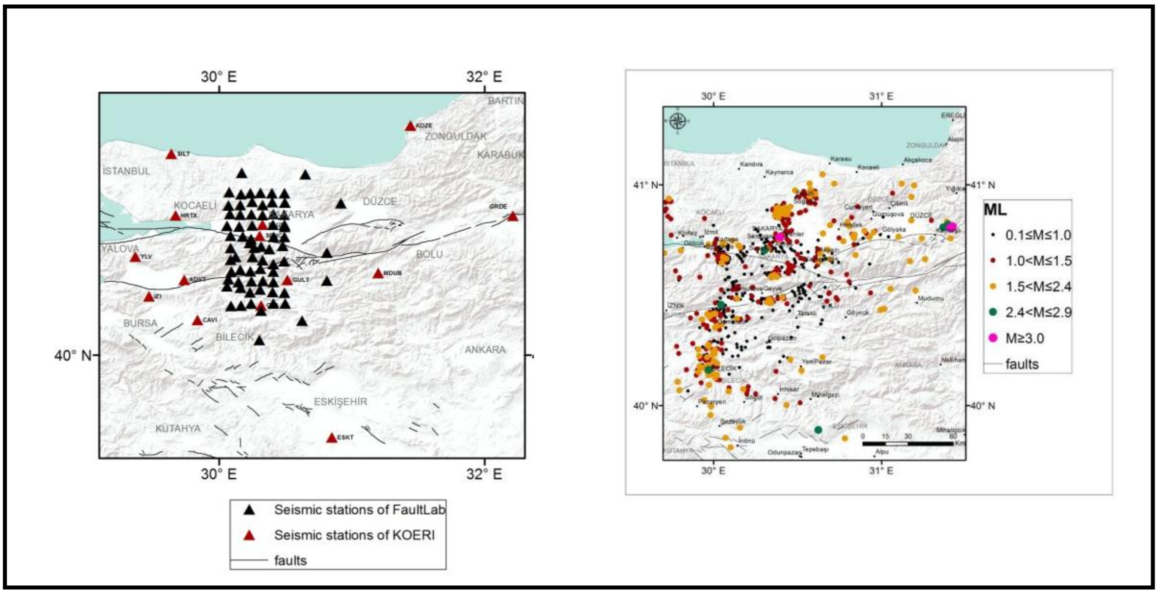

Figure 1. a) Map of station distribution b) Located earthquakes for the first six months.

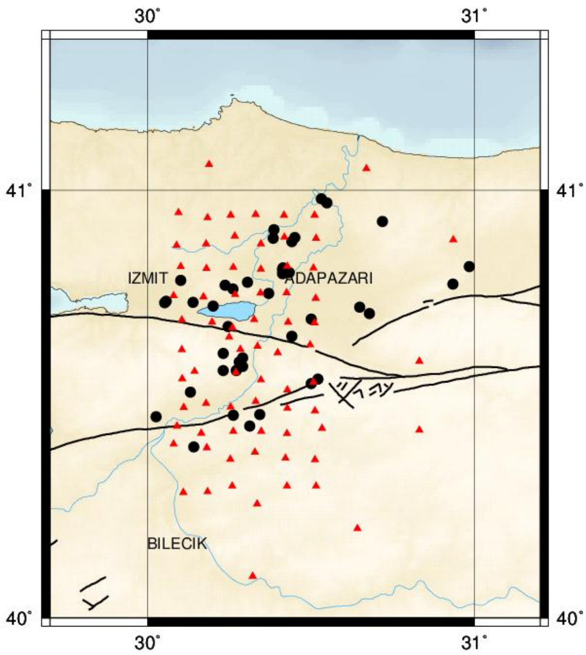

Figure 2. Local events used for Shear Wave Splitting analysis. Red triangles indicate the BB stations

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