

Preliminary Results from the North Anatolian Fault Passive Seismic Experiment: Seismicity and Anisotropy

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The North Anatolian Fault (NAF) is one of the world's largest continental strike-slip faults. Despite much geological work at the surface, the deep structure of the NAF is relatively unknown. The North Anatolian Fault Passive Seismic Experiment is mainly focused on the lithospheric structure of this newly coalescing continental transform plate boundary. In the summer of 2005, we deployed 5 broadband seismic stations near the fault to gain more insight on the background seismicity, and in June 2006 we deployed 34 additional broadband stations along multiple transects crossing the main strand of the NAF and its splays. In the region, local seismicity is not limited to a narrow band near the NAF but distributed widely suggesting widespread continental deformation especially in the southern block. We relocated two of the largest events ($M > 4$) that occurred close to our stations. Both events are 40-50km south of the NAF in the upper crust (6-9 km) along a normal fault with a strike-slip component that previously ruptured during the June 6, 2000 Orta-Cankiri earthquake ($M = 6.0$). Preliminary analysis of SKS splitting for 4 stations deployed in 2005 indicates seismic anisotropy with delay times exceeding 1 sec. The fast polarization directions for these stations are primarily in NE-SW orientation, which remains uniform across the NAF. This direction is at a high angle to the surface trace of the fault and crustal velocity field, suggesting decoupling of lithosphere and mantle flow. Our SKS splitting observations are also similar to that observed from GSN station ANTO in central Turkey and stations across the Anatolian Plateau in eastern Turkey indicating relatively uniform mantle anisotropy throughout the region.