Geophysical Research Abstracts
Vol. 14, EGU2012-3354, 2012
EGU General Assembly 2012

Structural and seismic data on a new branch of the North Anatolian Fault: A reworked Tertiary thrust fault in northwestern Turkey

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The North Anatolian Fault (NAF) is an over 1200 km long dextral strike-slip fault in the eastern Mediterranean. The North Anatolian Fault (NAF) and its related branches together make up the North Anatolian Shear Zone (NASZ). The NASZ has two well known active segments in Adapazarı - Sakarya - Bolu region, northwestern Turkey. We provide new structural, stratigraphical and seismic data showing that a previously unknown third segment also exists and created as a result of reworking of Cenozoic thrust faults by the recent deformation of the NAF, in northwest Turkey. Our study area is within Sakarya Basin which consists of $\sim$6 km thick Jurassic - Lower Tertiary sediments, located between the main branch of the NAF in the north and a Mesozoic suture zone in the south. During Tertiary the units in the Sakarya Basin is folded and faulted as a result of north - south shortening. Interestingly one of these thrust faults, so called Pirler Fault, is a deep angle fault dipping 70° south. Later regional analysis on the Pirler Fault shows that this fault is approximately 200 km long, extended southwest to northeast, from the southern border of a Quaternary basin (Gölpazarı Basin of Sakarya city) to the main segment of the NAF (Gerede region of Bolu city). Distribution of the epicenters of recent earthquakes also shows that there is much activity going on the Pirler Fault, generating Mw = 2 - 4 earthquakes.