Geophysical Research Abstracts
Vol. 13, EGU2011-5702-2, 2011
EGU General Assembly 2011

The Tuzgölü Fault Zone in the Light of Geological and Geophysical Data, Central Anatolia, Turkey

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Turkey is located in one of the most seismically active continental regions of the Eastern Mediterranean Region. The activity is driven by the westward movement of the Anatolian Platelet along two major fault systems, namely the dextral North Anatolian Fault System (NAFS) and the sinistral East Anatolian Fault System (EAFS), presumably as it is compressed between the northward moving Arabian plate and the relatively stable Eurasian plate. The neotectonic regime of Turkey mainly controlled by the ongoing convergence of the African, Arabian and Eurasian plates that began by the end of Middle Miocene, and resulted in the westward migration of the Anatolian Platelet.

The Tuzgölü Fault Zonu (TFZ) is one of the most important intracontinental structures in the Anatolian Platelet. Both morphotectonic features and the distribution of the recent earthquake epicenters with magnitude up to 5, strongly suggest that the Tuzgölü Fault Zone is still active.

In this study, structural and neotectonic features of the TFZ have been investigated using the geological and geophysical (Vertical Electrical Sounding and 2D High Resolution Seismic Reflection Profile) methods.

Within this study, eight ASTER Level 3A satellite images that comprise TFZ were used. According to the field confirmations of linear structures identified from ASTER Level 3A satellite images, TFZ is composed of a series of NW-SE trending fault segments, extending from north of Tuzgölü in the northwest to Kemerhisar (Niğde) in the southeast. The width of TFZ of which total length is about 200 km, varies from 2 km to 25 km.

According to the structural observations on the TFZ, the fault zone consists of high-angle normal faults dip to the southwest (dip angle is differs from 65° to 85°) with minor right lateral strike slip component (rake angle is differs from 75° to 85°). Strike of these faults varies from N 25° to 65° W. A streographic plot of fault plane slip data points to a NE-SW directed extension.

Active fault mapping studies have revealed that TFZ is consisted of geometric fault segments parallel or subparallel to each other. The length of fault segments differs from 4 to 28 km.

Deformation on the TFZ were investigated in detail around Şereflikoçhisar town. In this region, basement rocks (Pre-Pliocene) are folded due to the NE-SW directional compressional regime and Cihanbeyli Formation (Pliocene) overlies these units with angular unconformity. Beds of the Cihanbeyli Formation are horizontal and this formation is not effected by this compressional regime. Hence, this data is an important evidence for showing that the compressional regime (palaeotectonic period) ended at the end of Miocene. Within this study, beginning of Neotectonic period for study area has been recommended as Pliocene.

In this study, 114 vertical electrical soundings designed as perpendicular profiles to TFZ which the average depth was 2000 m. According to the electrical resistivity sections derived from vertical electrical soundings, the amount of cummulative dip-slip offset on the TFZ ranges between 1000 to 1400 meters.

Within this study, totally 22.5 km length 2D high resolution seismic reflection profile study has been conducted on the six profiles across to the TFZ. The 2D high resolution seismic reflection data obtained along the TFZ have revealed the near-subsurface geometry of this active fault zone, and allowed to determine the fault location precisely which the surface geological data are insufficient.

Key words: Tuzgölü Fault Zone, Central Anatolia, Neotectonic, Vertical Electrical Sounding, 2D High Resolution Seismic Reflection.