Geophysical Research Abstracts
Vol. 18, EGU2016-6541, 2016
EGU General Assembly 2016


# Preliminary results on the tectonic activity of the Ovacık Fault (Malatya-Ovacık Fault Zone, Turkey): Implications of the morphometric analyses

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The Anatolian 'plate' is being extruded westward relative to the Eurasia along two major tectonic structures, the North Anatolian and the East Anatolian shear zones, respectively making its northern and eastern boundaries. Although the main deformation is localized along these two structures, there is remarkable intra-plate deformation within Anatolia, especially which are characterized by NE-striking sinistral and NW-striking dextral strike-slip faults (Şengör et al. 1985). The Malatya-Ovacık Fault Zone (MOFZ) and its northeastern member, the Ovacık Fault (OF), is a one of the NE-striking sinistral strike slip faults in the central 'ova' neotectonic province of Anatolia, located close to its eastern boundary. Although this fault zone is claimed to be an inactive structure in some studies, the recent GPS measurements (Aktuğ et al., 2013) and microseismic activity (AFAD, 2013) strongly suggest the opposite. In order to understand rates and patterns of vertical ground motions along the OF, we studied the certain morphometric analyses such as hypsometric curves and integrals, longitudinal channel profiles, and asymmetry of drainage basins.

The Karasu (Euphrates) and Munzur rivers form the main drainage systems of the study area. We extracted all drainage network from SRTM-based Digital Elevation Model with 30 m ground pixel resolution and totally identified 40 sub-drainage basins, which are inhomogeneously distributed to the north and to the south of the OF. Most of these basins show strong asymmetry, which are mainly tilted to SW. The asymmetry relatively decreases from NE to SW in general. The only exception is at the margins of the Ovacık Basin (OB), where almost the highest asymmetry values were calculated. On the other hand, the characteristics of hypsometric curves and the calculated hypsometric integrals do not show the similar systematic spatial pattern. The hypsometric curves with convex-shaped geometry, naturally indicating relatively young morphology, are mostly seen at the NE part of the study region. We observe several knick points along the longitudinal channel profiles that mostly fits to the surface trace of the OF. The existence of multiple knick points along the same channel profiles on the southwestern sections of the fault are interpreted to be the result of multiple parallel/sub-parallel branches of the OF in this region. The integrated preliminary results of all applied methods indicate the evidence of a stronger deformation at the northeastern part of the OF, in addition to the OB section. The deformation significantly diffuses to the southwest of the OB, where the main fault bifurcates into several branches. In order to explain the distribution of the deformation style along the OF, we suggest three hypotheses: (a) the OF is confined within a very narrow zone in its most northeastern parts, and the total strain is distributed at its southwestern section (especially to the southwest of the OB), (b) The high asymmetric values, calculated at the northeastern OF, are mainly affected by another major tectonic structure, the North Anatolian Shear Zone, at this region or (c) the combined effect of these two settings. Our further studies, which will include the analyzing the lithological properties of drainage basins, detailed fault mapping, and understanding the cumulative horizontal slip by constructing and comparing the pseudo-palaeotopography at both sides of the fault, are going to provide more detailed information on the activity and the style of deformation along the OF. This study is supported by TÜBİTAK project no. 114Y227.

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