Geophysical Research Abstracts
Vol. 19, EGU2017-2943, 2017
EGU General Assembly 2017

Active deformation of the eastern part of the Anatolian scholle: Implications from river long profiles and drainage basins' analyses

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The complex tectonic setting of the eastern Mediterranean region is mainly made by the kinematic interaction along the boundaries of the Eurasian (Eu), African (Af), Arabian (Ar) plates and smaller Anatolian scholle (An). An is being extruded westward as a result of ongoing post-collisional convergence between the Eu and Ar. Although the main deformation accommodated by the North Anatolian Shear Zone (NASZ) and the East Anatolian Shear Zone (EASZ), which delimit the northern and eastern boundaries of the An, the NW-striking dextral and NE-striking sinistral faults represent a remarkable intra-plate deformation within the An. In contrast to studies that suggest no active deformation along the Malatya-Ovacık Fault Zone (MOFZ) and other strike-slip fault within the An, recent geological, geophysical and geodetic studies suggest the opposite.
In this study, I focused on relatively a more complex region of the An that is delimited by the NASZ to the north, the EASZ to the southeast, the MOFZ to the west, and the Nazmiye Fault Zone (NFZ) to the south. In order to examine the recent deformation characteristics of this structurally complex region I studied the geomorphic aspects of rivers longitudinal profiles and drainage basins. First, I extracted drainage systems by using a digital elevation model (DEM) with 10 m ground pixel resolution that is derived from 1:25k scale digital topographic maps of the region. Then, I calculated steepness and concavity indices of the river long profiles, which point out that the current uplift rate of middle part of the region exceeds the rate of the erosion. Despite lithological variations, majority of the channels, which drain the middle part of the region, display a normal range of concavity. The spatial distribution of channel normalized steepness indices show anomalously high values in the middle part of the study region. Moreover, the high SLk values, strong asymmetry and the convex-shaped hypsometric curves indicate a younger morphology in the same region. This relatively more actively deformed region coincides the deformation zone of the NW-striking dextral Nazimiye Fault Zone (NFZ). My preliminary results strongly suggest that the internal deformation of the An is not only represented by strike-slip motion, but it is also accompanied by vertical deformation.