



Strike-slip deformation in a converging setting: Insights from the Ovacık Fault (Anatolia, Turkey)

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The post-collisional convergence (Eurasian and the Arabian plates) and subduction along the Hellenic trench (Eurasian and African plates) are the main driving mechanisms for the deformation of Anatolia, which is mainly accommodated along the North (NASZ) and East (EASZ) Anatolian Shear Zones as this block escapes to the west with respect to Eurasia. Anatolia incorporates almost all kind of structural elements from strike-slip to extensional and compressional tectonic features within this complex tectonic regime. In addition to plate boundary elements, the NASZ and the EASZ, Anatolia is also internally deformed by many NE-striking sinistral and NW-striking dextral faults.

In the frame of TUBITAK project no. 114Y227, we studied one of these NE-striking sinistral faults, the Ovacık Fault (OF), close to the eastern boundary of Anatolia. Our field observations, structural data, palaeoseismological trench exposure and geomorphological studies clearly show that the western/southwestern parts of the OF, where it meets with the Malatya Fault, have a significant compressional component in addition to strike-slip motion. The cause of relative youngness in the topography, which extracted from the hypsometric analysis, is related to the uplift in the region according to steepness and concavity indexes. Along with the uplift, kinematic features of fault surfaces and the faulting pattern of a single palaeoseismological trench at the Yukarı Yuvacık site (39.17°N, 38.565°E) reflect the compressional deformation in this salient region. This first palaeoseismological study along the OF, revealing four palaeoevents within the fluvial sediments. The radiocarbon dating of faulted stratigraphic layers yields an average recurrence interval of 1600 ± 515 years, which suggests a higher seismic potential for the OF than the previous thoughts that are mostly based on field and remote sensing observations.

Furthermore, our main motivation is to understand the role of the OF in the deformation of Anatolia together within the other intra-plate structures. Although there are still many missing points, one of the possible mechanism can be the existence of a higher compressive strain zone as a result of convergence between Eurasia and Arabia. This zone is not responsible only for the rotation of the OF and making it to gain a compressional component of motion, but also it affects other parallel/sub-parallel fault zones in the same sense. Further studies, such as more structural field observations, palaeoseismological trenches, and analog models are mandatory in order to supply more information on this problem.