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Preliminary results on the deformation rates of the Malatya Fault (Malatya-Ovacık Fault Zone, Turkey)

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The complex tectonic architecture of the eastern Mediterranean is mainly shaped by the interaction between the Eurasian, African, Arabian plates and smaller Anatolian Scholle. Ongoing post-collisional convergence between Eurasian and Arabian plates causes; (1) the westward motion of the Anatolia and and (2) the formation of four neo-tectonic provinces in Turkey: (a) East Anatolian Province of Shortening (b) North Anatolian Province (c) Central Anatolian "Ova" Province (d) West Anatolian Extensional Province. The Central "Ova" Province, which defines a region between the Aegean extensional regime in the west, the North Anatolian Shear Zone (NASZ) in the north and the East Anatolian Shear Zone (EASZ) in the east, is deformed internally by a series of NW-striking dextral and NE-striking sinistral strike-slip faults. The Malatya-Ovacık Fault Zone (MOFZ) is one the sinistral faults of the "Ova" province, located close to its eastern boundary. In order to understand not only the spatio-temporal behaviour of the MOFZ, but also its role in the internal deformation of the Anatolian Scholle we started to study the southern section, the Malatya Fault (MF), of this strike-slip fault zone in the framework of the TÜBITAK project no. 114Y580. The scope of the study is to calculate (a) the horizontal geologic slip rate, (b) the uplift rate, and (c) the cumulative displacement of the Malatya Fault (MF) that constitute the southwest part of MOFZ.

Offset streams between 20-1700 m, pressure ridges, hot springs and small pull-apart basin formations are clear geological and geomorphological evidences for fault geometry along the MF. Among them the ∼1700 m offset of the Tohma River (TR) presents unique site to understand deformational characteristics of the MF. Three levels of strath terraces (T1 to T3) identified along the both flanks of the TR by analyses of aerial photos and the field observations. The spatial distribution of these terraces are well-constrained by using the high resolution aerial photo-based DEMs and Terrestrial LiDAR measurements. In order to understand the temporal relationships of these different terrace treads, we collected samples for cosmogenic dating. Treads T2 and T4 were sampled for 10Be and 26Al isochron-burial dating method whereas T2 and T3 was sampled for 36Cl depth-profile. Also additional sampling was performed from T2 and T3 for U-Th analysis. The spatio-temporal relationships of these terrace treads will not only provide an understanding on the key faulting parameters such as horizontal and vertical deformation rates of the MF, but also will contribute to understanding of internal deformation of the Anatolian Scholle.