



Intraplate Deformation of the Anatolian Scholle: Insights from morphochronology-based uplift and slip rates of the Malatya Fault, Eastern Turkey

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The Malatya-Ovacık Fault Zone (MOFZ) is about 270 km-long sinistral strike-slip tectonic structure within the Anatolian Scholle. This zone has a key role in evaluating the initiation and style of the deformation within the Anatolian Scholle. Although the MOFZ is claimed to be an inactive structure since 3 Ma or 4 Ma in some previous studies, recent geologic studies, GPS measurements and micro seismicity strongly suggest considerable amount of strain accumulation along this tectonic structure and propose that the Malatya Fault (MF) has potential to produce an earthquake in near future. The GPS-based elastic block model results yield horizontal slip rates of about 1.6 and 1.2 mm/a for the MF. Morphochronology-based slip rate calculations on the OF, which highly exceeds the geodetic values, suggest a rate of 2.5 ± 0.7 - 0.6 mm/a. Moreover, new paleoseismic studies on the Ovacık Fault (OF) and the MF yield average earthquake intervals of 1600 ± 515 and 2275 ± 605 years, respectively. In the frame of the TÜBİTAK project no 114Y580, we studied (a) the horizontal slip rate (b) the uplift rate, and (c) the cumulative displacement of the MF in order to understand not only the spatio-temporal behaviour of this 165 km-long strike slip fault, but also its role in the internal deformation of the Anatolian Scholle.

We separated five sub-segments along the MF according to its surface geometry, which is characterized by strike-slip related landforms such as; offset drainages between 20 m - 7 km, pressure ridges, hot springs and pull-apart basins. We applied cosmogenic ^{36}Cl , ^{26}Al and ^{10}Be dating on the offset Tohma River terraces, where the deformation of the MF is mainly localized along a single strand and generates a total horizontal slip of about 1.7 km. Our results provide not only the first morphochronology-based horizontal slip rate of about 1.2 mm/a, but also yield 92 m/Ma mean incision and hence uplift rate for the last 1.4 Ma. The measured maximum left lateral offset, 7.3 km, and 1.2 mm/a horizontal slip-rate for the last 1,4 Ma support a minimum age of about 6 Ma for the MF. The slip rate and average earthquake interval of the MF and the OF together suggest that these structures are part of the plate boundary-related intraplate deformational structures of Anatolia. This study supported by TÜBİTAK project no:114Y580.