



No earthquake with characteristic slip on the North Anatolian Fault, Turkey

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The North Anatolian Fault is well-known for its remarkable sequence of westward propagating earthquakes of magnitude greater than 7, which occurred between 1939 and 1999. In the last decades, numerous studies have focused on this active fault to further characterize its seismic behavior. Paleoseismic data (see EGU presentation: Paleo-earthquake timing on the North Anatolian Fault: Where, when, and how sure are we? by J. Fraser, K. Vanneste, A. Hubert-Ferrari in session SM4.4/NP3.7) are suggesting that the North Anatolian Fault ruptured in similar burst of seismicity every 300 to 600 years. Geomorphological data and cosmogenic dating of Kozaci et al. (2007, *Geology* 35, p.867-870) have highlighted the simple kinematics of the North Anatolian Fault where stress loading and strain release are relatively constant. The North Anatolian Fault thus has a simple seismic behavior, which could be linked to its relative structural simplicity. However we present here geomorphological data and radiocarbon dating showing that the North Anatolian Fault does not exhibit characteristic slip (Schwartz and Coppersmith, 1984, *JGR* 89, p.5681-5698).

We focus on the central part of the North Anatolian Fault affected by the 280 km long 1943 earthquake rupture. In the study area located near Kamil, the fault forms a small pull-apart exploited by the Kizilirmak River to cross the fault and reach the Black Sea. Two measurements of the 1943 rupture suggest very small amount of dextral slip. To confirm the 1943 slip and to constrain slip associated with previous 1668 and 1050 historical earthquakes, we study a set of human and geomorphological markers systematically offset along a 15km long fault stretch. We documented field boundaries offset by 1.5 to 2.5 m during the 1943 earthquake. This low slip is in contradiction with the very large dextral slip associated with the 1668 earthquake on both sides of the small pull-apart.

In the west of our study area, a terrace riser adjacent to a large south-flowing river has an offset of 12 to 15 m and radiocarbon dating of the terrace above the riser suggests a maximum age of 400 years. To the East, a water channel in the village of Kuz is offset by about 15 m. Further to the East, larger geomorphological offsets were also documented near the Elmacik paleoseismic trench site (see EGU presentation: A relict sedimentary record of 7 earthquakes between 600AD and 2000BC on the central North Anatolian Fault at Elmacik, near Osmancik, Turkey. by J. Fraser, K. Vanneste, A. Hubert-Ferrari and S. Altinok in TS7.1). The age of the observed offset geomorphology is constrained using the trench data, terrace ages and the age of an abandoned stream bed. Most of the local geomorphology is relict due to stream incision which began around 700 AD. The 22 to 27 m offset geomorphology in that area suggests about 7 to 12 m dextral slip associated with the 1050 earthquake, an amount similar to the slip in 1668.