



## **Paleoseismic Trenching on 1939 Erzincan and 1942 Niksar-Erbaa Earthquake Surface Ruptures, the North Anatolian Fault (Turkey)**

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Two devastating earthquakes occurred between Erzincan (39.75N, 39.49E) and Erbaa, Tokat (40.70N, 36.58E) just three years one after another in 1939 and 1942. While 1939 Erzincan earthquake ( $M=7.8$ ) ruptured nearly 360 km, 1942 Erbaa-Niksar earthquake ( $M=7.1$ ) has a length of 50 km surface rupture. Totally, more than 35000 citizens lost their lives after these events. Although Turkey has one of the richest historical earthquake records, there is no clear evidence of the spatial distribution of paleoevents within these two earthquake segments of the North Anatolian Fault. 17 August 1668 Anatolian earthquake is one of the known previous earthquakes that may have occurred on the same segments with a probable rupture length of more than 400 km. It is still under debate in different catalogues, if it was ruptured in multiple events or a single one. We achieved paleoseismic trench studies to have a better understanding on the recurrence of large earthquakes on these two faults in the framework of T.C. DPT. Project no. 2006K120220. We excavated a total of 8 trenches in 7 different sites. While three of them are along the 1942 Erbaa-Niksar Earthquake rupture, others are located on the 1939 Erzincan one. Alanici and Direkli trenches were excavated on the 1942 rupture. Direkli trench site is located at the west of Niksar, Tokat (40.62N, 36.85E) on the fluvial terrace deposits of the Kelkit River. Only one paleoevent could be determined from the structural relationships of the trench wall stratigraphy. By radiocarbon dating of charcoal sample from above the event horizon indicates that this earthquake should have occurred before 480-412 BC. The second trench, Alanici, on the same segment was located between Erbaa and Niksar (40.65N, 36.78E) at the western boundary of a sag-pond. While signs of two (possible three) earthquakes were identified on the trench wall, the prior event to 1942 Earthquake is dated to be before 5th century AD. We interpreted this to have possibility of missing intermediate events or dating of reworked samples. To resolve this problem, another trenching (Gunese trench; 40.67N, 36.68E) was done close to western end of 1942 Earthquake rupture. Three events were logged on the trench wall, which was exposed by excavating a linear depression. Penultimate event horizon contains many of small ceramic pieces, which may mark a large hazard. Umurca trench excavated on the 1939 Erzincan earthquake surface rupture. From three (possible 4) paleoevents of Umurca Trench (40.32N, 37.57E), penultimate event, UMURCA-2, was determined to be after 1625- 1644 AD) and UMURCA-3 to be after 1409-1455 AD with radiocarbon dating. In addition to that, some preliminary dating results of Resadiye-2 trench (40.38N, 37.34E) give a panultimate event, RES-2, to be before 1423-1522 AD and a prior one RES-3 to be after 894-1045 AD. Radiocarbon dating of samples from the project's last year trenches and some more from the previous ones are still underway. There will be a clearer picture in terms of understanding recurrence character of the North Anatolian Fault along these segments after having of all dating results.