

Urgent issues on the paleoseismology of the North Anatolian fault

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For better understanding the recurrence behavior of large earthquakes from the North Anatolian fault, it is very necessary to examine following five issues.

1) The completeness of historic catalogs are seldom questioned by paleoseismology though it is the only way to supplement incomplete historic records. Many paleoseismological works just confirm catalogs based on historic records. However, the author's studies on 1944 and 1939 segment eventually excavated earthquakes without any historic reference. On the 1944 segment an event in 12 to 13 century with no records have been very unequivocally confirmed. Though they are less reliable, the time series from Tanyeri trench on 1939 segment suggests one or more events without historic records. Historic records must be unreliable during warfare and disruption. Historic records are reliable only 500 years in Japan and it is presumably the case for Turkey.

2) The variability and repeatability of slip-per-event have been studied by Kondo et al. (2005) on 1944 segment and further studies are ongoing on 1943, 1942, and 1939 segments. Based on Kondo et al. (2010), the small slip in 1942 seems to be owing to the east-to-west rupture of 1939 earthquake breaking up continuous strand of Kelkit Çay in the east toward the Amasya branch in the east. Large slip on 1942 from west may trigger the rupture on the Kelkit Çay strand in east. Rupture direction across large jog / segment boundary may be the cause of slip variability.

3) repeatability of segmentation and rupture sequence.

Judging from the rupture history in and around the 1944 segment, the extent of seismic ruptures differ from one event to another. Kondo et al. (2005) hypothesized characteristic slip in each behavioral segment and combination of the behavioral segment as a segment of an earthquake. Okumura (2007) recognized stationary and variable segment boundaries based on structural significance or size of discontinuity affecting rupture propagation.

4) The cumulative offset and slip-rate in hundreds of years are rather well studied. Therefore the issue 2) has been rather well discussed in western segments. However, the offset in 1999 and 1939 segments are poorly dissolved yet.

5) The cumulative offset and slip-rate in thousands of years h