Comparing the paleoseismic record obtained by coring a sag-pond and by classical trenching along the eastern segment of the North Anatolian Fault

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Shallow lakes along minor structural bends or discontinuities of strike-slip fault are not usually paleoseismological target sites. In the present talk we show that a 2m deep, 700m long lake crosscut by the eastern segment of the North Anatolian Fault contains a reliable paleoseimological record obtained through coring. The North Anatolian Fault, a major strike-slip fault in Turkey, last ruptured across the Aşağıtepecik Lake in 1939 with a slip of about 6 m. Seismic lines still show remains of the fault rupture forming minor scarps across the lake. Collected short cores display a set of sedimentary sequences. Each sequence is composed of similar organic rich sedimentary units. The lower unit is dark and fibrous, and is similar to the present sedimentation at the top of the core. The upper unit is disturbed and has anomalous organic matter content, grain size and mineralogy. It is interpreted as an earthquake induced sedimentary event. The 2.5 m long AT2007LG core comprises four sequences, and four sedimentary events. Radiogenic 210Pb and 137Cs data obtained in Boes et al. (2009) imply that the shallowest event 1 was triggered by the 1939 M=7.9 Erzincan earthquake. Radiocarbon dating suggest that events 2 and 4 were initiated by the 1668 and 1254 historical earthquakes. The event 3 does not correspond to a large historical earthquake on the NAF. The record can be compared to a classical paleoseismological study located about 2.5 km more to the east. The investigation comprised three paleoseismic trenches located along about 2km of the principal fault strand. Trench T1 revealed clear evidence for one earthquake interpreted to be the 1939 Erzincan earthquake. Trench T2 revealed evidence of three earthquakes. Trench T3 revealed a record of colluvial wedges that interfinger with fine-grained inter-fan deposits. We interpreted a sequence of six earthquake event horizons including the 1939 Erzincan earthquake. The first three earthquakes are correlated to historical earthquakes in A.D. 1668, 1254, 499 and two further events were identified at 881 – 673 B.C. and 1406 – 1291 B.C. (2σ age ranges). By comparing all available earthquake timing studies,we conclude that the 1939 earthquake segment does not always rupture in unison.