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The possible eastward continuation of the 17 August 1668 Anatolian Earthquake on the North Anatolian Fault (NAF), Turkey

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One of the largest historical earthquakes associated with the North Anatolian Fault Zone (NAFZ) is thought to have a rupture length as long as more than 400 km at 17th of August 1668 (Ambraseys and Finkel, 1988). Due to heavy damage distribution, probable extent of faulting should be between east of Ismetpasa (Karabuk) in the west and Koyulhisar (Sivas) in the east. However some other earthquake catalogues such as Ergin et al. (1967) and Soysal et al. (1982) do not share the idea of a single large earthquake and mention a series of events between July 1668 and September 1668. Beside clarifying this phenomena, we made paleoseismological studies to understand the spatial distribution of historical earthquakes on the probable eastern part of the 17 August 1668 earthquake surface rupture in the framework of T.C. DPT project no. 2006K120220. We excavated five trenches in four different sites between Resadiye (Tokat) in the west and Golova (Sivas) in the east. Umurca site (40.32N, 37.57E) is located at the edge of alluvial fan deposits which were cut by a N80E trending fault segment of NAF. Both walls of the trench expose a good stratification and clear structural relations indicating 3 (possible 4) events including 1939 Erzincan earthquake. A prior event (UMURCA-2) with respect to 1939 earthquake (UMURCA-1) was dated to be just after AD 1625-1644 calibrated ages from a charcoal sample on the west wall.

Also another charcoal was dated to be AD 1409-1455, from the last faulted stratum of UMURCA-3 event. The next site was located at the eastern exit of the town Resadiye (40.38N, 37.57E). Here we excavated two trenches, one on a depression plane (Resadiye-1) and other just next to an offset agriculture field boundary (Resadiye-2). There are two main fault zones at the northern and southern edges of the Resadiye-1 trench, which bound Plio-Quaternary and late Holocene sediments. Three earthquakes (possible four) are seen to effect the stratification of the trench wall in and between these fault zones, including 1939 Erzincan event. Resadiye-2 was excavated just 400 m east of Resadiye-1 next to an offset agricultural field boundary of 5 m. The trench wall exposes two fault strands. While the first strand is reaching to the ploughed zone, second one terminates before reaching to the surface and is overlain by undeformed strata. Here we interpreted as to have two events including 1939 Erzincan earthquake and a prior one. Asagiyeniköy trench is located at the east of town Akincilar, Sivas (40.05N, 38.51E). There are two steep scarps parallel to each other probably indication two sub-segments of the fault. Some morphotectonic features such as sagponds and offset channels are observed on the continuation of these scarps. We excavated two individual trenches on each scarp to understand if they have ruptured both or not at the late Holocene. There are no sign of any event at the southern trench Asagiyeniköy-2, while the northern trench Asagiyeniköy-1 exposes faulted stratification. Lacustrine sediments starts just after the 1st meter under the surface indicating the bed rock of a prior sedimentation environment. Beside the lack of enough young sedimentation, two events are defined including 1939 earthquake. At the most eastern site, Asagi Tepecik trench is located at 3 km SW of the town Gölova (40.05N, 38.51E). Stratification and clear structural relations indicate three events including 1939 Erzincan one. Altough we have some preliminary dating results from charcoal and gastropoda shell samples which were taken from these trenches, the dating process for new samples is still ongoing. After having all dating results, we will be able to understand timing of identified paleoevents for the each trench. It is known that paleoseismological trenching results do not show any sign of 1668 earthquake at 35 km east of Gölova (Hartleb et al., 2006). We will have chance to clarify and compare the spatial distribution of the 17 August 1668 Anatolian earthquake with historical data by trenching results at its eastern part.

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