

2008 Fall Meeting  
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Cite abstracts as **Author(s) (2008), Title, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract xxxxx-xx**

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HR: 0800h

AN: **T21A-1919**

TI: [Sedimentological Fingerprints of Recent Earthquakes in Lake Sediments: A Case Study on the North Anatolian Fault \(NAF\), Turkey](#)

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AB: Detection of past earthquakes spatially and temporally is vital to characterize fault systems. Seismological records and GPS measurements during the instrumental period provide precise information about time, location and magnitude of earthquakes, and also slip-rates on fault zones. However, limited observation period of these techniques prevents us from long-term faulting history. For pre-instrumental period, paleoseismic data is mainly obtained from two sources; historical records and paleoseismic trenching. Both methods have constraints in terms of time and location of fault rupturing. Historical records provide relatively precise information about time of earthquakes, however they are generally not long enough and location of rupturing is not that clear. On the other hand, paleoseismic trenching precisely locates the rupture but dating of earthquakes is still problematic because of difficulties in determining the exact boundaries of event horizons in sediment sequence. Similar to fault-related sediment traps used in conventional paleoseismic trenching, lakes have potential to record earthquakes. Since depositional environment in lakes is more

stagnant compared to terrestrial environments, lake sediment sequences provide more well-preserved event horizons. Detailed dating of these horizons can improve the quality of paleoseismic records. Based on this idea, lacustrine environments have frequently been investigated to reveal paleoseismic records in different places on earth such as; Chile, Dead Sea and Switzerland. In order to contribute these investigations, sedimentology of short cores from two shallow lakes located on the NAF has been studied. This part of the NAF ruptured two times in the instrumental period, in 1942 ( $M_s=7.1$ ) and in 1943 ( $M_s=7.3$ ). High precision fallout radionuclide ( $^{210}\text{Pb}$  and  $^{137}\text{Cs}$ ) dating techniques provide us with the exact location of these dates in the sediment cores. Hence, sedimentological changes around 1940s are investigated by means of physical, mineralogical and geochemical properties of the sediments. Measurements reflecting the physical properties of the sediment include magnetic susceptibility, water content, bulk density, electrical resistivity, p-wave velocity. Mineralogical and geochemical properties have been constrained using X-ray diffraction, micro-XRF (ITRAX), loss-on-ignition, atomic carbon/nitrogen and carbon isotope ratios. Ladik Lake is located in a pull-apart basin and the main strand of NAF defines the northern margin of the lake. Rupturing on the fault is expected to affect sediment source/flux to the lake and drastic changes in sedimentation are observed in the core at depths corresponding roughly to 1940s. Boraboy Lake, which is a landslide-dammed lake in origin, is not located exactly on the fault. So, drastic changes in sediment source are not as susceptible as Ladik Lake. Instead, changes in physical properties due to cyclic loading and earthquake-triggered seiche are more probable. An unusual change in bulk density trend around 1940s without any compositional change may reflect the effect of 1942 and 1943 earthquakes in Boraboy Lake. If we understand the effects of recent earthquakes on lake sedimentation, extensive earthquake chronologies far back in time can be constructed by investigating lake sediments.

DE: 8100 TECTONOPHYSICS

DE: 8199 General or miscellaneous

DE: 9810 New fields (not classifiable under other headings)

SC: Tectonophysics [T]

MN: 2008 Fall Meeting

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