

## Paleoseismology of the North Anatolian Fault from lake Sapanca records.

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Recent earthquakes on the Eastern Anatolian fault (EAF) in February 2023, with major human losses, remind us that this region is vulnerable to such catastrophic events. The seismic hazard in the northwestern part of Turkey is mainly linked to the North Anatolian Fault (NAF), a 1,500 km long right-lateral strike-slip fault, which accommodates the westward migration of the Anatolian microplate, away from the Eurasian/Arabian collision, with a relative horizontal motion of 25mm/yr. This is also reflected by the recent seismicity of the NAF: from 1939 to 1999, a sequence of large earthquakes (moment magnitude  $M_w > 6.8$ ) shifted westward from Erzincan to Düzce and Izmit. The last major earthquake on the NAF occurred in 1999 along the Izmit-Sapanca rupture and was a 7.6  $M_w$  event. A ground-motion study revealed that this fault segment broke with a supershear velocity during the earthquake (Bouchon, 2002). However, instrumental records associated to historical, archaeological data over the last 2000 years (Ambraseys, 2002) do not allow to record the long-term seismic cycle. This is why geological data are needed to better understand the full seismic cycle.

Over last year's our group worked on lacustrine paleoseismology on the Izmit lake located on the middle Branch of the NAF (Gastineau et al., 2021, 2023, Duarte et al., submitted). We develop a specific methodology through a multiproxy approach with sedimentological data (grain size, smear slice, Loss On Ignition, hyperspectral data), geochemistry (XRF core scanner, SEM analyses) associated to geochronology (short-lived radionuclides and radiocarbon) to identify and reconstruct long-term earthquakes history. In this internship we propose to work on the Sapanca lake located along the NAF where earthquake deposits were already identified (Leroy et al., 2010; Schwab et al., 2009). The student will have access to 6 sediment cores from 3 to 6 m long sampled in the Sapanca Lake. He/she will open these cores and describe them before applying the multiproxy approach cited above to provide paleoseismology constraint on the NAF.

**Prerequisites:** knowledge of sedimentology, geochemistry and ideally active tectonics

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