

Tectonic Crossroads: Evolving Orogens of Eurasia-Africa-Arabia

Paper No. 31-5

Presentation Time: 11:10-11:30

SEDIMENTOLOGICAL FINGERPRINTS OF PALEOSEISMIC ACTIVITY REVEALED FROM LAKE SEDIMENTS: A CASE STUDY FROM THE NORTH ANATOLIAN FAULT (NAF), TURKEY

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For several decades, trenching on faults has been the main method applied in order to obtain seismic activity of prehistoric times. During the last decade, paleoseismic investigations on aquatic environments have become more and more popular since they provide relatively continuous and well-preserved sedimentary archives compared to terrestrial environments. Recent lacustrine sedimentary sequences have frequently been investigated to reveal paleoclimatic and paleoseismic records at different locations such as; Chile, Dead Sea and Switzerland. Almost all of the studies in the literature trace the fingerprints of earthquakes in terms of earthquake-induced deformations within lake sediments (e.g. mass-wasting events or in-situ soft sediment deformations). However, earthquakes may have other (indirect?) consequences that can not be observed in terms of sediment deformation. If the lake basin and the catchment are mainly controlled by tectonic activity, the lake may become a potential sedimentary trap, which records tectonic events in terms of primary sedimentation (rather than secondary sedimentary processes). Based on this idea, two shallow/small lakes (Yenicaga and Ladik) located in pull-apart basins on the North Anatolian Fault (NAF) have been investigated for sedimentary paleoseismic records within the scope of a EC-Marie Curie Excellence Grant Project entitled "Understanding the irregularity of seismic cycles: a case study in Turkey". Both lakes have maximum water depth of 5 meters and very flat basin geometries. The corresponding segments of the NAF ruptured in 1944 ($M_s=7.6$) and 1943 ($M_s=7.3$). Those earthquakes were resulted in approximately 1.5 meters vertical displacement, which is significant for lakes having maximum 5 meters of water depth. A wide spectrum of analyses has been applied on the short gravity cores (~1 m.) and longer piston cores (~4.5 m.). The analyses include ^{210}Pb and ^{137}Cs radionuclide dating, ^{14}C radiometric dating on bulk samples and pollen extracts, Geotek MSCL core logging, ITRAX micro-XRF core scanning, XRD mineralogical measurements, Loss-on-Ignition, C/N atomic ratios, $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotopic ratios. A significant sedimentary event in Ladik Lake is dated to early 1940s by high resolution radionuclide dating. This event almost doubled the sedimentation rate by significant increase in terrestrial organic matter influx. In the piston core from Yenicaga Lake, four significant events are observed similar to the event in Ladik Lake. However, radiocarbon dating on bulk samples and on different organic fractions of the Yenicaga sediments (pollen, seeds, charcoals and phragmites) provides an ideal example of reservoir effect.

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Session No. 31

[Seismicity, palaeoseismicity & archaeoseismology of the Mediterranean region. Part 1](#)

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