



Holocene sedimentary processes in the Gemlik Gulf: a transtensional basin on the middle Strand of the North Anatolian Fault, Sea of Marmara

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Gemlik Gulf is an oval-shaped transtensional basin with a maximum depth of 113 m, located on the middle strand of the North Anatolian Fault (NAF) in the eastern part of the Sea of Marmara (SOM). During the last glacial period until the Holocene marine transgression about 12 ka BP, the sea level was below the Çanakkale (Dardanelles) Strait's bedrock sill depth of -85 m, and the Gemlik Basin became a lake isolated lake from the rest of the Sea of Marmara "Lake" and the global ocean.

The high resolution seismic profiles and the multi-beam bathymetric map of the basin show that the basin is characterized by NW-SE trending transtensional oblique faults, delta lobes of the Büyükdere (Kocadere) to the east and an erosional surface below an up to 15 m-thick Holocene mud drape.

The Holocene mud drape was studied in up to 9.5 m-long gravity-piston and 0.84 m-long sediment/water interface cores located at -105 to -113 m in the basin's depocentre. The Holocene mud consists mainly of plastic gray green marine clayey mud that includes thick-red brown clay layers and a laminated organic-rich, dark olive green sapropel in the lower part, which was previously dated at 11.6-6.4 14Ckyr (uncalib) BP.

Multi-proxy analyses of the Holocene mud drape in the sediment cores were carried out using Multisensor Core Logger, XRF Core Scanner equipped with digital X-Ray radiography, and laser particle size analyzer. Seismic-core correlation was made using seismic data of the chirp profiles at the core locations and the synthetic seismograms generated using the MSCL P-wave velocity and gamma density measurements.

The long piston-gravity cores include five 20 to 100 mm-thick "red brown mud layers" in the top 2.5 m of the core. These layers have a sharp basal boundary and gradational upper boundary. The red brown layers consist of 55-75% clay-size material with an average grain size of 3-4 μm , and have relatively a high magnetic susceptibility. They are enriched in K, Fe, Ti and Zr that are the proxy of detrital mineral input, and depleted in Ca, Br, Fe and Mn. Manganese shows a sharp enrichment immediately below the base of the red brown layers. All these features strongly suggest that the red layers represent the distal edges mass flow deposits, possibly sourced from the delta to the east. The distinct Mn enrichments below the base of the red brown layers represent the diagenetic enrichment at the oxic/anoxic boundary near the seafloor, which was later covered by the mass flow deposit. C-14 and radionuclide datings of the mass flow layers and investigation of their possible relation to the past earthquakes are under progress.