



Geology and seismotectonics of the Gulf of Saros (NE Aegean Sea) along the North-Anatolian Fault system

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The Gulf of Saros is a triangular-shaped basin between the Gelibolu and the Thrace peninsulas, widening and deepening toward west. Since the earliest geological works, its formation has been related to the activity of the North-Anatolian Fault (NAF) system. Different mechanisms have been proposed for its development, ranging from pure extension to strike-slip and trans-tensional tectonic processes.

We carried out marine geological surveys in the Gulf of Saros during MARMARA-2005 and -2011 cruises, on board of the R/V *Urania* of the Italian CNR, with the purpose to: reconstruct the structural setting of the basin; define the spatial-temporal distribution and the style of deformation; identify and date active ruptures on the seafloor; estimate slip-rates during the Holocene; and acquire elements useful for assessing seismic hazards at the same scale of paleoseismology on land.

Multibeam bathymetry, seismic reflection profiles and side-scan sonar images enabled us to describe the structural setting of the NAF in this region. The integrated, multiscale interpretation of geophysical data indicates that, similarly to what was observed in the Sea of Marmara, the principal displacement zone of the NAF in the Gulf of Saros is not located along the southern edge of the basin, as previously proposed, but rather at the toe of the northern continental slope. It is represented by right-lateral overstepping strike-slip fault segments as also suggested by location and focal mechanism of recent major events. Conversely, the southern margin is site of trans-tensional conjugate faults accommodating mainly extension.

High-resolution acoustic images allowed to estimate fault-related offsets of dated sedimentary features, including a submerged canyon. We estimated a slip-rate of about 10 mm/y at the scale of the last 10,000 years, significantly lower than that estimated onshore through paleoseismological studies carried out at a shorter time-scale and GPS-based measures.

A high resolution side-scan sonar mapping along the NAF trace carried out from the deep basins to the inner shelf suggests the presence of fresh morphological scarps, possibly related to the 9 August and 13 September 1912 Mürefte (Ganos) earthquakes. This indicates that the surface rupture related to these events extended over 40 km inside the gulf.

High-resolution seismic images penetrated the entire Holocene sequence, indicating that the gulf is filled by well-layered turbidites interbedded with mass transport deposits and more transparent hemipelagic units. Some gravity cores were collected in different parts of the basin to determine how the 9 August 1912 earthquake is recorded in the sedimentary section.