

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

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We carried out a marine geological survey of the Gulf of Saros during MARMARA2011 cruise, on board of the R/V Urania of the Italian CNR. Multibeam bathymetry, seismic reflection profiles, side-scan sonar images, as well as a number of sediment cores, enabled us to describe the structural setting of the NAF in this region.

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 NAF system. Different mechanisms have been proposed for its development, ranging from pure extension to strike-slip and trans-tensional tectonic processes. The morphobathymetric maps compiled after MARMARA2005 and 2011 expeditions, indicate that, similarly to what was observed in the Sea of Marmara, the principal displacement zone of the NAF in the Saros Gulf is located at the toe of the northern shelf, and is made of E-W aligned strike-slip overstepping segments, as also suggested by location and focal mechanism of recent major events, while the southern en-echelon alignments consists mainly of trans-tensional conjugate faults accommodating mainly extension. As a consequence, although we cannot exclude that the en-echelon fault alignment in the south of the Saros Basin could accommodate part of the strike-slip motion, a number of independent studies and observations suggest that most of the transcurrent deformation is confined along the main NAF to the north. Based on the analysis of an abandoned canyon cut by the NAF main strand, 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, although at a shorter time-scale.

According to such studies, the 150 ± 30 km-long rupture of the 1912 Mürefte (Ganos) earthquake did not reach the depocenter of the Saros Basin. A 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 1912 earthquake (either the 9 Aug., or the 13 Sep. shocks). This might indicate that the surface rupture of this event could have reached over 40 km inside the gulf.