

EVOLUTION OF BASINS ALONG THE WESTERN PART OF THE NORTH ANATOLIAN FAULT

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Basin evolution along the western termination of the North Anatolian Fault has been investigated using bathymetry in the Marmara and northern Aegean Seas, available onshore and offshore seismic profiles, onshore fault patterns from northwest Turkey and northeast Greece, surface rupture associated with earthquakes, and a number of earthquake focal plane solutions. Based on these data we synthesize the architecture of the prominent basins and reassess their relationships to the tectonic framework of the region.

Bathymetric data show that the Marmara and northern Aegean seas are divided into major and individual basins. Post-Miocene sediment thickness differences in these basins, offset of distinct horizons related with glacial periods, and frequent seismicity along basin bounding faults indicate that sediment accumulation in the area is fault controlled. Offshore seismic profiles show that these faults are offsetting the entire sedimentary pile and the sea bottom topography with dominantly apparent normal components and occasionally strike-slip components, the latter inferred from flower structures. Evidence for the type of faulting along the fault attests to complex kinematics with areas of prominent strike-slip faulting, areas with prominent normal faulting and restricted areas with reverse faulting. We refined the pattern and kinematics of the faults controlling the basins and classified them into two major groups: The faults in the first group trend NE-SW and E-W, are defining the North Anatolian Fault (NAF) Zone, and are here interpreted to be dominantly right-lateral strike-slip with normal or reverse components. The faults in the second group trend NW-SE and are dominantly normal with occasional left-lateral component. These faults are believed to manifest the termination of either the individual strands or the entire zone of the NAF. Due to the segmentation of the right-lateral strike-slip faults and the pre-existing N-NE trending tectonic framework, the major basins are compartmentalized into smaller depocenters with their long axes parallel to the major faults, while individual basins are located near fault tips.

The interpretation regarding the kinematics of the faults and their spatial relationships are consistent with the data compiled from the northwestern Turkey and northeast Greece and the mechanical principles of strike-slip tectonics.