

Stepover Geometry in the Gemlik Bay on the Southern Strand of the NAF

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The southern branch of the North Anatolian Fault emerges west of Mudurnu town and extends almost in east-west direction along the Geyve-Pamukova basin, the Lake İznik basin and the Gemlik Bay where it enters the Sea of Marmara. It is then again observed on land on the southern shores of the Sea of Marmara between Sigiköy and Mudanya and extends westward bounding the Karadağ in the north and the alluvial plain surrounding the Lake Dalyan (MTA, 2001). GPS measurements, paleoseismic data and historical records indicate that most of the westward motion of the Anatolian Plate occurs and probably has occurred along the northern strand of the North Anatolian Fault rather than that along the southern strand and consequently the seismic activity is at lower levels.

High-resolution shallow seismic data were collected along 61 lines by *Ustalar*, a 10-m-long boat, in August - September 2002. The aim of the study was to trace the active faults and collect piston cores in the Gemlik Bay. The seismic profiles were taken generally with a N-S direction and with an interval of 500 m. A bathymetric chart of which contour intervals are at every 2 m of the study area was prepared based on the sounding data obtained during the cruise.

The Gemlik Bay which is an approximately 35-km-long and 15-km-wide basin lying in east-west direction is located in the southeastern corner of the southern shelf of the Sea of Marmara and to the south of the Armutlu peninsula. The maximum depth in the bay is approximately 110m. Two morphological features at the bottom of the study area are much striking: (i) the northwest-southeast trending elliptic depression in the centre of the bay, situated roughly between Kapaklı and Burgaz (*Burgaz Trough*), and (ii) the adjacent E-W oriented submarine rise between Karacaali and Kurşunlu (*Gemlik High*).

Detailed examination of the seismic profiles has shown that there are three sets of faults in the Gemlik Bay: 1) prominent (with south-dipping normal fault component) faults along the southern coast of the Armutlu Peninsula 2) several continuous (with north-dipping normal fault component) along the southern coast of Gemlik Bay, 3) normal faults bounding the small central basin. Geometrically, the faults in the first two sets bound the Burgaz Trough and their right stepping pattern explains the opening of the basin by pull apart mechanism. Conversely, to the east, the left stepping faults on both side of the Gemlik High, the Gemlik Fault (running in the easternmost Gemlik Bay) and the Gençali Fault (running along the Kocadere stream) have led the formation a push-up structure mainly offshore, the Gemlik High, adjacent to the Burgaz Trough in the east. The bathymetry of the study area supports this idea.