The Transitional zone between the Extensional and Strike-slip neotectonic regimes in southern Marmara region: Bursa Graben

Ali KOÇYİĞİT, Erdin BOZKURT and Şule DEVECİ
Middle East Technical University, Engineering Faculty, Department of Geological Engineering, Active Tectonics and Earthquake Research Lab. akoc@metu.edu.tr

Bursa Graben is a 2-36 km wide, 150 km long and approximately E-W-trending major depression subdivided into a series of sub-grabens and horsts. Its evolutionary history is episodic as indicated by two graben infills separated from each other by an intervening angular unconformity. These are the underlying and deformed (folded) infill of Miocene-Lower Pliocene age and the overlying and undeformed Plio-Quaternary neotectonic infill. The Bursa graben is also asymmetrical in nature. This is indicated by: (a) a big relief differences between the graben floor and the surrounding fault-controlled mountain fronts; these are the ~2.4 km (2542 m- 100 m) for southern margin, and ~1 km (1108 m-100 m) for northern margin; (b) a big difference in slip amounts along its northen and southern margin-boundary faults, and (c) the occurrence of two large lakes (Lake Manyas and Lake Ulubat) leant their one margins against the southern fault–controlled margin of the graben.

The southern margin of the Bursa major graben is bounded by the northerly-dipping Bursa fault zone. It is about 30 km wide, 150 km long and approximately E-W-trending oblique-slip normal fault zone located Kınık (Inegöl) in the east and Gönen in the west. The Bursa fault zone consists of a series of parallel to sub-parallel, closely-spaced and diverse-sized normal fault segments. In general, the Bursa fault zone displays a curvilinear and northerly-facing step-like normal faulting pattern characterized by steep fault scarps and well-preserved slickensides. The northern margin of the Bursa graben is bounded by the southerly-dipping Karacabey-Demirtaş fault zone. This is a 1-10 km wide, 140 km long, discontinuous and E-W-trending oblique-slip normal fault zone located between Gölbaşı (Gürsu) in the east and Buğdaylı in the west. It also consists of a number of parallel to sub-parallel, diverse-sized and discontinuous normal fault segments. It displays a relatively gentle fault scarp but well-preserved slickensides in places.

In the previous literatures, both of these two fault zones were informally named and misinterpreted to be the southern Marmara sub-strands of the North Anatolian right-lateral strike-slip fault system (NAFS). In contrast to this previous informal naming and misinterpretation, the recent detailed field geological mapping, palaeo-stress analyses of slip-planes of fault segments and the focal mechanism solution of surface rupture-forming devastative earthquakes, such as the 1964.10.06 Ms = 7.2, and also the historical earthquakes clearly indicated that both the Bursa and the Karacebey-Demirtaş fault zones are oblique-slip normal faults in nature, and they determine northernmost limit of the southerly operating extensional neotectonic regime. In this frame, southern sub-strand of the NAFS, which is here termed as the Geyve-İznik right lateral strike-slip fault zone, is approximately confined to the southern margin of Sea of Marmara, and it is dominated by a number of parallel to sub-parallel, closely-spaced, diverse-sized strike-slip fault segments, compressional to extensional double bendings, extensional step-overs, pull-

apart basins of Quaternary age, well-preserved slickensides and deflected to offset drainage systems.