Kinematics of the faults cutting the Pliocene deposits in the Gulf of Izmit and surroundings

Ufuk TARI[1] and Okan TÜYSÜZ[2]
1) ITU, Faculty of Mines, Department of Geology, 34469, Maslak, Istanbul, utari@itu.edu.tr
1) ITU, Eurasia Institute of Earth Sciences, 34469 Maslak, Istanbul

The North Anatolian Fault splays into two main branches in the Northwestern Anatolia. According to GPS measurements, the northern branch is the most active with a movement of ~20 mm per year. The Sea of Marmara and the Gulf of Izmit forming its eastern tip, were developed as pull-apart basins on this branch from Late Pliocene onward.

The study area is located along the western part of the North Anatolian Fault Zone between Gulf of Izmit and Adapazari is represented by an east-west trending narrow depression, filled by Late Pliocene and younger alluvial fan deposits. The depression started to form under the control of NE-SW and NW-SE trending faults having dominantly normal component during the Late Pliocene. This period is characterized by the development of series of pull-apart basins. In the mature stages of these pull-apart basins younger active faults cut the older basin sediments. Recent Izmit-Adapazari depression is formed by joining of these small pull-apart basins. Recent sediments are still depositing the Izmit-Adapazari depression and were cut by E-W trending active northern branch of the North Anatolian Fault.

The faults cutting the Pliocene deposits follow many small scale NE-SW and NW-SE trending faults having dominantly oblique-normal component, as is well displayed in the study area. The goal of this study is to describe the nature of this fault pattern in the light of the structural measurements of kinematic indicators. Basically, the faults cutting the Pliocene deposits shed light onto the kinematics evolution of North Anatolian Fault in the region.

Paleostress orientations and relative stress ratios determined by using different methods are used to improve the understanding of the kinematic characteristics of the study area. Two different dominant extension directions were determined using fault-slip data, NE-SW extension direction in the east and NNE-SSW extension direction in the west of the study area.