Recent Seismic of Marmara Region and Seismotectonic Implications

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Abstract

The recent seismicity of Marmara Region is monitored by TÜBİTAK-MRC since mid-2006 using new Marmara array of TURDEP Project which consists of thirty-four 3D broad-band seismographs. Double-difference methodology is applied to arrival times to increase the accuracy of epicenters and focal depths of microearthquakes. The new fault mechanism solutions of 98 earthquakes in addition to previously published earthquakes that occurred in the Marmara region in the time period between 1943 and 2009 were reviewed and collected. Epicentral and hypocentral patterns of microearthquakes combined with the horizontal and vertical projections of fault mechanism solutions were correlated with seismic reflection sections crossing the major fault zones and basins. Fault mechanism solutions were regionalized and used to determine principal stress distribution in the Marmara region.

It is suggested that strike slip motion along the western extension of North Anatolian Fault in the Sea of Marmara (namely North or Main Marmara Fault) continue, south of İstanbul metropolitan area based on the pattern of recent seismic activity, mechanism solutions of active faults and stress tensor analysis. Some localities close to Çınarcık and Central Marmara Basins display normal fault activity. Geophysical studies, particularly powerful seismic reflection surveys that will map and display the deep-seated character of North Marmara Fault in the Sea of Marmara should be intensified. Seismological data do not give sound information about the southern strand of the North Anatolian Fault in the Marmara region.