The 9 August 1912 Mürefte Earthquake

Aksoy, M.E. (1), Meghraoui, M. (2), Cakir, Z. (3), Battlo, J. (4)

(1) Mugla University, Department of Geology, Mugla, Turkey
(2) Institut de Physique du Globe, UMR 7516, Université de Strasbourg, France
(3) Istanbul Technical University, Department of Geology, Istanbul, Turkey
(4) Instituto Dom Luis, Portugal

On 9 August 1912 at 03:29 a.m. a large earthquake hit the western region of the Sea of Marmara. The tremor was felt in a wide area including İzmir, Athens, Bucharest and up to Vienna. On the morning of the 9th it appeared that the event was one of the largest destructive earthquakes of the 20th century, in the whole Balkan region. Heavy damage occured in the western part of the Sea of Marmara, especially between Tekirdağ and Çanakkale, but some destruction took also place in Istanbul, Edirne, Enez, Adapazarı, Ayvalık and Bursa. The Mürefte village at Ganos suffort most with maximum intenstiy IX-X MSK. The damage at Mürefte and the smaller nearby village Şarköy was exacerbated by fires. The number of destroyed houses is 12600, while damages beyond repair are 12100. The tremor caused serious damage to another 15,400. 2800 killed people got killed and 7000 got injured because of the earthquake and the following fire.

The large shock occurred on the westernmost segment of the North Anatolian Fault (NAF), that lies between the Sea of Marmara and the Aegean Sea. Landslides, liquefaction, surface faulting and co-seismic slip along the onland section has been reported by contemporary accounts. The distribution of slip measued in recent studies implies that faulting extends towards the two seas. Up to date several faulting scenarios have been proposed for this event claiming surface ruptures ranging from 50- 150 km.

The 9 August shock is considered to be near the Gaziköy village with a magnitude M 7.4. Another large tremor occurred on 13 September 1912 (01:32). This shock was recorded at 17 worldwide seismic stations at least and affected mainly the southwestern part of the epicentral area of the 9 August event. The existence of two consequent shocks resamble the sequence of the 1999 İzmit and Düzce earthquakes, both in location and size.

This setting, makes the study of 100 year old event(s) rather complex. Nevertheless, recent onland trenching studies exposed the 1912 rupture on the eastern and western tips of the Ganos fault. A rupture map and a co-seismic slip distribution has been revealed from measurements at 45 sites. Besides, fresh fault scarps have been identified in the Tekirdağ and Central basins of the Sea of Marmara that have been related to the 9 August shock. Similar observations and analysis are in progress for the Saros bay section. In addition to geology observations, historical seismograms have been collected to re-evaluate the source characteristics of the earthquakes. Today, the combined results of all these studies improve our understanding of a 100 year old seismic event and allow us better constrains for seismic hazard assesments in the densely populated and industrialized Marmara Region.