



The 20th anniversary of the Eastern Marmara Earthquakes: active tectonics of continental strike-slip faults

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Accepted: 29 March 2021 / Published online: 11 April 2021
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Nowadays, it is well known that the North Anatolian Fault (NAF) experienced large and destructive earthquakes in the past and provided a wealth of data and knowledge on the seismic behaviour of continental strike-slip faults. The Marmara Sea region became the focus of major concern in the aftermath of the 17 August (Mw 7.4) İzmit and 12 November (Mw 7.1) Düzce 1999 earthquakes, which caused casualties of more than 20,000 people and a significant economic loss. Twenty years after, this special issue commemorates the earthquake sequence and represents a cornerstone in our understanding of the processes of active deformation associated with large seismic events along the NAF and similar tectonic environments. Most contributions in this special issue were presented at the 23rd Active Tectonics Research Group Meeting (October 2019, İstanbul Technical University), which was dedicated to the 20th anniversary of the 1999 Marmara Earthquakes.

Two papers by Geli et al. and Gasperini et al. describe the tremendous effort made in the oceanographic research by launching large TUBITAK and EU-funded cooperative

projects on the geophysical, geological and bathymetric data collection for a better study of sub-marine fault segments and a better understanding of the tectonic evolution of the Marmara Sea. From the paleoseismological results, historical catalogues and GPS velocities, Meghraoui et al. compute an estimate of the seismic slip deficit in the sea, pointing out the central segment of the Main Marmara Fault. As the seismic cycle became a major scientific debate, Özbey et al. address the issue of interseismic deformation employing sea bottom geodetic data and block models in the sea. Lazos et al. document the crustal deformation with the 7-year record of GPS data across the North Aegean Sea as the western continuation of the NAF. Aksoy provides a detailed account of the damage distribution and surface faulting data associated with the 9 August 1912 large earthquake (Mw 7.4) that affected the westernmost region of the Marmara Sea. The interest in other fault segments nearby the sea remains, and Civico et al. present a paleoseismic study with late Holocene faulting events and their comparison with the historical catalogue of the İzmit section of the NAF's southern strand. The tectonic geomorphology and long-term slip rate are documented by Hubert-Ferrari et al. using cosmogenic dating and fault offset of river terraces along the central NAF. All contributions mark the step forward in the study of crustal deformation with the high-resolution marine geophysics and bathymetry, detailed and constant seismic monitoring, offshore and inshore paleoseismological results coupled with an improved historical earthquake catalogue, and dense geodetic network. Twenty years after, the Marmara Sea region became one of the well-known active zones worldwide, ready for a realistic seismic hazard and risk assessment.

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