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Earthquake and Tsunami in Turkey: A Case From Izmir

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Abstract

With a coastline more than 8.300 km, the Turkey shows high seismicity rate and is under tsunami threat originated from the Aegean Sea. Broad tsunami researches conducted along the coasts of the country reveal 137 tsunamis during the last 3500 years. Data on sea level changes shows remarkable tsunami evidences in the Black Sea (Fatsa-Ordu, Amasra-Bartin), Marmara Sea (Istanbul, Kocaeli), Aegean Sea (Ayvalik-Balikesir, Izmir, Kusadasi-Aydin, Gulluk Bay-Fethiye-Mugla) and the Mediterranean (Antalya, Iskenderun-Hatay). But it can be claimed according to the literature review that tsunamis mostly effect the Aegean coasts with 20 strong events. The level of seismic activity and tsunami potential are influenced by the presence of pure or dominant normal faults. The earthquakes that occurred on 15 August 0554, 27 August 1886 and 23 July 1949 have strongly felt and caused tsunami damages from North to South coasts. Izmir has the longest coastline of the Middle Aegean region and is an earthquake-prone city by experienced the 20 March 1389 Chios Island, 10 July 1688 Izmir Bay, 12 May 1852, 08 September 1852, 13 November 1856, 19/22 January 1866 and 03 April 1881 Chios Island earthquakes. The 12 June 2017 (Mw=6.2) Mytilene Island-Karaburun (Izmir) and 21 July 2017 (Mw=6.5) Kos Island-Bodrum (Mugla) earthquakes were recent events in the region that has caused damage and loss of life. In addition, tourism mobility in the region due to human behavior has been seriously affected and significant economic losses have been reported. A strong normal-faulting earthquake has occurred between Samos Island and Izmir city on 30 October 2020 resulting in 117 casualties (two of them are caused by the tsunami in Turkey and Greece). This event has generated a tsunami that hit the Sigacik Bay of Izmir city. The first field survey was performed in the frame of a TUBITAK project between 30 August and 10 September 2020 starting from Ayvalik-Balikesir (in Northern) to Kusadasi-Aydin (in Southern) coastlines, and recorded the morphology of coast structures before the tsunami. Understanding the regional effects of this tsunami will definitely help in developing necessary tools for tsunami risk reduction in the project area. Hence, the second field study was initiated on 31 October 2021 (just after the tsunami). Detailed measurements and investigations were conducted in more than 120 points at different locations along 110-km coasts extending from Alacati-Cesme to Gumuldur-Menderes of Izmir city. The largest tsunami runup height among the surveyed locations was measured as 3.8 m in Akarca. Another tsunami height of 2.3 m was measured at Kaleici area in Sigacik district where the most substantial tsunami damage was observed. Investigations have also reported gradual decrease in the impact towards Gumuldur regions in further southeast. Acknowledgements: This study is supported by TUBITAK (Project Nr. 119Y419). Ahmet Cevdet Yalciner, Gozde Guney Dogan, Ergin Ulutas and many other people have provided enormous contribution and huge supports in improving this study.