The 2020 Mw 7.0 Néon Karlovásion (Samos) Earthquake: Source characteristics from joint inversion (GNSS, InSAR and ground motion) and tsunami energetics

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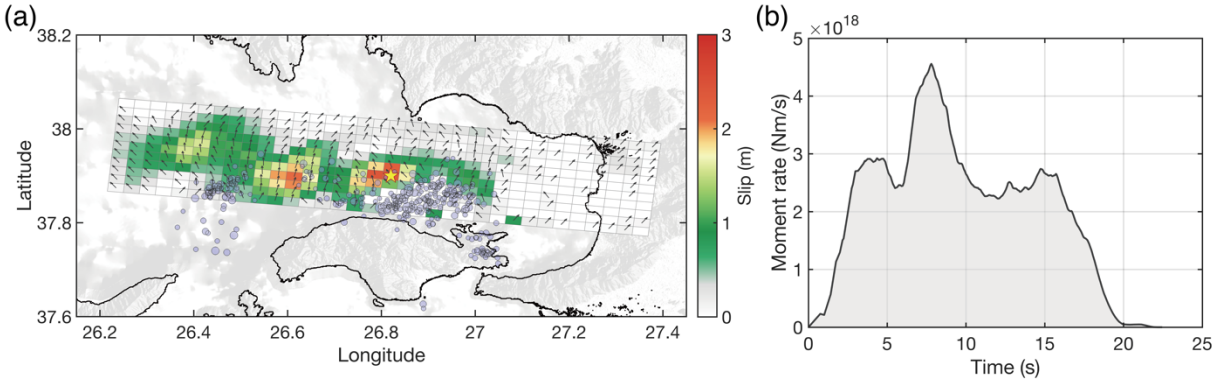
On 30 October 2020, a Mw 7.0 earthquake, occurred in the eastern Aegean Sea nearby Samos Island, struck Samos Island in Greece and İzmir Province in Turkey. It caused total of 119 deaths, more than 1,000 injuries, and several structural damages and collapse in both areas. The ensuing tsunami impacted and flooded southern coastal area of İzmir and Samos Island and hit other eastern Aegean Sea islands. This normal faulting earthquake is related to the upper plate extension caused by the rollback of subducting African Plate. In this study, we present a kinematic rupture model for the Samos earthquake by joint inversion, including GNSS, ground motion and InSAR dataset. We also analyze tsunami records from the gauges in the Aegean Sea and based on joint inversion results simulate tsunami wave propagation. From the inversion result, the source time function shows that the total rupture duration is ~20 s, and there are three main peak moment rates corresponding the three asperities on the rupture plane. For tsunami, the records show that the responded period of tsunami is approximately from 10 to 35 min, and the duration lasts from 18 to 30 hours. The synthetic tsunami waveforms remarkably match the first 4-6 hours wave behaviors. This indirectly proves the accuracy of the inverse slip model. Moreover, our digital elevation model (DEM) resolution test for tsunami simulation shows that the finer DEM could produce and reach longer tsunami duration, which is important to assess tsunami hazard and risk.



(a) Total slip pattern of the joint inversion. The arrow represents the rake direction. The yellow star is the epicenter. The purple circle is aftershocks within 30 days. (b) Source time function.