EGU21-13090
https://doi.org/10.5194/egusphere-egu21-13090
EGU General Assembly 2021

Simulation of Instant and Delayed Seismic Triggering Observed After the 30 October 2020 Samos Earthquake at Nearby Faults

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The 30 October 2020 Samos Earthquake (Mw=7.0) ruptured a north-dipping offshore normal fault, north of the Samos Island with an extensional mechanism. Aftershocks mainly occurred at the western and eastern ends of the rupture plane in agreement with the Coulomb static stress changes. Mechanism of aftershocks located west of the rupture area supported activation of the neighboring strike-slip fault almost instantly. In addition, a seismic cluster including events with magnitudes reaching close to 4 has emerged fifty hours later at the SE side of Samos Island. This off-plane cluster displays a clear example of delayed seismic triggering that produced small magnitude earthquakes at nearby active faults. In this study, numerical simulations are conducted using rate-and-state friction dependent quasi-static&full-dynamic spring slider model with shear-normal stress coupling to mimic the instant and delayed seismic triggering observed after this event. Coulomb static stress changes and seismic waveforms recorded at nearby strong-motion stations are used as static and dynamic triggers during simulations. According to our results, earthquakes with Mw<3.5 can be triggered almost instantly at the rupture edge and failure time of earthquakes with Mw>3.5 advances for both strike-slip and normal faults which may explain the delayed triggering observed SE of Samos Island. Moreover, simulations revealed that the shear-normal stress coupling increases the triggering potential.