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# 3D Dynamic Earthquake Rupture Simulations In The Sea Of Marmara

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The center of the Sea of Marmara, the region between the locations of 1912 Mürefte and 1999 Izmit M_w7.4 earthquakes, is prone to creating a large earthquake. The main objective of our study is to determine 3D dynamic earthquake rupture scenarios, considering non-planar and heterogeneous stress distribution in the Sea of Marmara. In this study, it is the first time that we attempt to generate realistic earthquake scenarios by putting constrains on initial stress on the fault using regional stress from earthquake focal mechanisms, in addition to stress release during past earthquakes and strain accumulation during interseismic period using geodetical measurements on slip-rate and locking depth at various segments. We use 3D Finite Element Method (PyLith) for dynamic earthquake simulations and tetragonal mesh for better smoothing at the fault bends, which allows us to implement nonplanar fault geometry and initial stress heterogeneity using slip-weakening friction law. We place constraints on initial shear stress from geodetic and seismic studies of locking depth and interseismic strain accumulation. We consider more than a hundred rupture scenarios and calculate slip distribution, rupture velocity and moment magnitude in addition to slip-rate and traction on the fault surface, and displacement and velocity on the ground surface.

## Promotional text

We derive 3D dynamic earthquake fracture simulations for the nonplanar and heterogeneously stressed Main Marmara Fault which is prone to a large event and located very close to İstanbul Metropolitan.

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