
The Interseismic Coupling along the Main Marmara Fault Using 3D Elastic Structure

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Abstract

In this study, we analyze the interseismic behavior of the Main Marmara Fault (MMF) using the 3D geometry and 3D heterogeneous structure. We build a finite element model of the Marmara region specifically focusing on the deep basins surrounding the MMF. We compare the best-fitting average coupling beneath the Sea of Marmara for both homogeneous and heterogeneous structure using the interseismic GNSS velocity data. We infer that the average coupling is underestimated by ~ 2.5 km due to the basins localizing the shear strain. We also calculate a best-fitting model by performing a grid search and conclude that the coupling is close to zero in the Western Marmara, while further west, Ganos segment is locked. It is challenging to constrain the coupling beneath the Central Marmara; however, stress inversion from focal mechanisms off the MMF main fault are consistent with a transition from weakly coupled Western Marmara to higher coupling beneath Central Marmara. The location of the repeating earthquakes are also consistent with the location of the possible creeping zone. Finally we will discuss possible future research to improve our understanding of the seismic coupling beneath the Sea of Marmara.

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