

2-D FEM simulation for seismic cycle of great interplate earthquakes following a friction law

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Implementing a friction law in a general-purpose FEM code, ABAQUS, we simulate seismic cycles of interplate great earthquakes following a friction law, in a 2-D laterally heterogeneous viscoelastic medium under gravitation. We construct a 2-D FEM model in northeast Japan, where the Pacific plate is subducting with a rate of 9 cm/yr. For this model, we compare simulation results for cases of simple friction and rate- and state-dependent friction in a purely elastic or a viscoelastic medium. We discuss several technical problems for simulation such as gravitation in a viscoelastic medium, and implementation of plate-interface and friction law.