Simulation of earthquake cycle along the Nankai Trough using a simplified-cells model

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Large earthquakes at the subduction zone along the Nankai trough occur repeatedly and bring about serious damage. Several previous studies suggest that the earthquakes occurred on five segments. Recently improvement of analysis of observed data such as GPS data reveals occurrences of slow slip events without radiating seismic wave. In order to investigate the mechanism of the earthquake cycle, simulations are performed with a large-scale model based on the rate and state friction law using Earth Simulator. However it takes long time to estimate the model parameters reproducing the realistic earthquake cycle, estimation of model parameters is needed using simplified fault model. For the purpose we simulate the features of earthquake cycle on five segments A-E from the west to the east along the Nankai trough using a block-spring model (Mitsui and Hirahara, PAGEOPH, in press). Considering the actual fault parameters for five segments, we physically calculate the model parameters for the corresponding blocks in the simulation.

Though the features of the observed earthquake cycle are almost reproduced, we must further consider the following points

1. Detailed estimation of stress interaction among the segments
2. Change of the normal stress on the fault surface
3. Stress change due to afterslip at the transition zone
4. Stress change due to viscoelastic medium in the lower crust

Thus we improve the model especially Green's functions among the faults.