

Investigation of tectonic stress implication in southwest Japan using three-dimensional finite element model

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Many earthquakes were occurred in and around Japan where is consist of multiple plates. These plates interact with each other, such as subduction and/or collision zones. Under the complex tectonics, we are deeply concerned with occurring a megathrust earthquake along Nankai Trough in the near future. However, in the Nankai Trough, slow earthquakes including the long-term slow slip event (SSE) and the low frequency tremor (VLF) are also occurring besides the earthquake. We also mention that seismic activity in inland is decreasing before a giant earthquake occurs, and the interaction between the subduction zone and the inland fault is not well understood. Therefore, in this study, we try to understand interaction of plates using three-dimensional finite element method (FEM) considering inhomogeneous underground structure and complicated subduction plate, such as the Philippine Sea plate .

In this study, we make a FE mesh of southwest Japan region using meshing software Cubit ver 13.0. The upper surface of the Philippine Sea plate is based on Hirose et al (2008). To obtain the internal stress and/or deformation, we use FEM software PyLith ver 2.2.1, which is a finite-element code for dynamic and quasistatic simulations of crustal deformation. Using FEM, we try to investigate tectonics implication in southwest Japan from the stress field created by the subduction of the Philippine Sea plate. We also consider to effect of historical large earthquakes along the Nankai Trough. We simulate time evolution of stress field since about 1000 years ago. In this presentation, we will discuss the characteristic features, such as stress shadow of subducting plate, in our simulated result.

Keywords: southwest Japan, Philippine Sea plate, stress field, finite element method (FEM)