Modeling of postseismic deformation caused by the 2004 off Kii peninsula earthquake and Tokai slow slip

Hisashi Suito[1]; Shinzaburo Ozawa[1]

[1] GSI

Analysis of Global Positioning System (GPS) data shows clear transient crustal deformation in the Tokai region, central Japan, from the fall in 2000. This transient crustal deformation is explained by the occurrence of an aseismic slip on the plate interface between the Philippine Sea plate and the overriding continental plate. This slow slip is considered to have been ended in summer 2005. However, the transient crustal deformation observed in the Shima peninsula and west part of Aichi prefecture seems to be lasting although its trend seems to have been changed at the occurrence of the 2004 off Kii peninsula earthquake.

In this study, we assume that the transient crustal deformation in the Tokai region after the occurrence of the 2004 off Kii peninsula earthquake contains the effect of three mechanisms; Tokai slow slip, viscoelastic postseismic deformation caused by the 2004 off Kii peninsula earthquake and afterslip of the 2004 earthquake. Then we try to evaluate each effect and estimate the mechanisms.

First, we estimate viscoelastic postseismic deformation caused by the 2004 off Kii peninsula earthquake, using 3-D Finite Element Method (FEM). Key parameters for estimating the viscoelastic postseismic deformation are reproduction of the coseismic displacement, subducting slab structures and viscosity of the viscoelastic material of the upper mantle.

The total viscoelastic postseismic deformation in three years after the earthquake is estimated at about 1cm in the south direction around the Shima peninsula and a few mm in the southwest direction in the Tokai region.

We are analyzing the postseismic deformation caused by an afterslip of the 2004 Kii peninsula earthquake and the afterslip model. Then we will report slip distribution of the Tokai slow slip using the data without the effect of postseismic deformation in the meeting.