Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SSS35-11 Room:103 Time:May 23 15:15-15:30

Long-period ground motion for megathrust earthquakes at the Sagami Trough: Effects of source variety on ground motion

Asako Iwaki[1*], Nobuyuki Morikawa[1], Takahiro Maeda[1], Shin Aoi[1], Hiroyuki Fujiwara[1]

[1]NIED

Two types of earthquakes, the 1923 Taisho- and the 1703 Genroku-type Kanto earthquakes, have been well known as the historical megathrust earthquakes at the Sagami Trough and considered as future scenario earthquakes. However, a new long-term evaluation for Sagami Trough megathrust earthquake currently under discussion by the Headquarters for Earthquake Research Promotion (HERP) considers the earthquake source region which extends to the outside the source areas of the two types where no historical megathrust event is known to have taken place.

In this study, we perform long-period ground motion simulations by 3D finite-difference method for Sagami Trough earthquakes based on the source region proposed by HERP. As for Sagami Trough, lack of accumulated historical earthquake records prevents us from obtaining knowledge of the source model for the next anticipated event. Therefor it is important to consider as many choices as possible of the unknown outer and inner source parameters.

To construct our source models, the maximum source region is divided into six segments, each of which composes a number of scenario cases by itself or in combination with other segment(s). We compared ground motions for several scenario cases with different magnitudes, including Taisho-type (M_W7.9), Genroku-type (M_W8.3), and the largest case (M_W8.6). Peak ground velocity (PGV) within the Kanto area, including Tokyo metropolitan area, differs by several to several to several ten times depending on the choice of the scenario case.

We also studied the effects of variety in inner fault parameters, such as rupture starting points and asperity patterns. They can greatly vary the ground motion within Kanto area, especially in the direction of rupture propagation, suggesting the sever impact of directivity.

Then we studied heterogeneous models by introducing multi-scale spatial heterogeneity (e.g. Sekiguchi and Yoshimi, 2006) to rupture velocity and rake angle distribution. PGV for the heterogeneous models are reduced by up to 1/5 compared to that for the homogeneous models, indicating that the heterogeneity in rupture propagation reduces the directivity effects.

Keywords: megathrust earthquake, long-period ground motion, Sagami Trough