

Study of the effect of the oceanic water layer on the strong ground motion simulation

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We studied effect of the oceanic water layer on the strong ground motion simulations. Source of the subduction zone earthquakes, like Nankai-Tonankai earthquake, are situated in the offshore area under a thick water layer. It was debated, is it necessary to include oceanic water layer into the velocity model for the simulations employing the finite difference method, or maybe it is possible to neglect by this layer and to reduce the velocity model size and the computation time. Although having low density, water layer can affect the surface wave simulations. In this study, for demonstration purpose, we calculated and compared strong ground motions from the 2004 off Kii peninsula earthquake, for two realistic three-dimensional velocity models: with and without oceanic water layer. Model without oceanic water layer was constructed simply by subtracting depth of the oceanic layer from the depth of all velocity interfaces under the ocean. This procedure keeps thickness of layers (oceanic sediments, surface low-velocity layer, upper crust and lower crust) the same as in model with oceanic layer, and reduces simulation errors. Simulations are made for the set of sites on a line from source region to the Osaka basin. Figure below shows results for three inland sites. The results show that, considering uncertainties inherent to the 3D velocity modeling, effect of water layer is small and can be neglected.

Acknowledgments. This study was supported by the DAIDAITOKU-1 project by MEXT.

