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Validation of subsurface structure in Kanto basin by surface wave tomography using seismic interferometory

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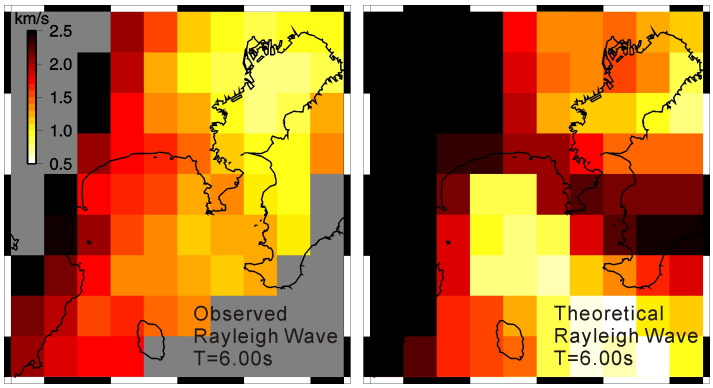
It is important to estimate appropriately the effect of sediment layers for strong motion prediction in a large basin, such as Kanto basin. Accordingly some S-wave velocity structure models have been proposed (e.g. Koketsu, 2009). Although they carried out validation of the model by simulating observed ground motion during small events, it is still a difficult task because of uncertainty of source and subsurface structure out of the basin. Seismic interferometory is used for estimation of surface wave Greens function (e.g. Shapiro and Campillo, 2004). Seismic interferometory is useful to estimate subsurface structure between two stations. Dense observation sites is enable to conduct tomographic inversion using seismic interferometory (e.g. Shapiro, 2005).

We started long time continuous microtremor observation at 16 sits around Tokyo and Sagami bay. Then we applied seismic interferometory to estimate group velocities of fundamental Rayleigh and Love waves (Yamanaka et al., 2010). The comparison between the observed and calculated group velocities suggests that the model is appropriate in general. However, there is discrepancy between observed and theoretical ones in the Region of Izu Peninsula and Sagami bay. It may attribute the theoretical model of those areas because of difficulty to conduct geophysical explorations in such area.

Surface wave tomographic analysis for the group velocity of the surface waves was conducted to validate the model regionally. We divided the area into 0.125 degree meshes large, the size which can be covered well by the ray paths. We assumed a straight path for the analysis and estimated surface wave group velocities at periods of 2-6s at each cell. We used Simultaneous Iterative Reconstruction Technique for tomographic analysis and iterative calculation was conducted to estimate cell slowness until the residuals of traveltimes become the minimum. The result was compared with the calculated one from theoretical model (Yamanaka and Yamada, 2006). Although the observed velocity of the surface waves are slow overall, both two maps explain the difference of topographic character well. However, we found a discrepancy in Izu peninsula and Sagami bay area. It suggests a necessity of the modification of the model in those areas.



Keywords: seismic interferometory, tomography, microtremor, Kanto basin, group velocity