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

SSS24-P12 Room:Convention Hall Time:May 20 18:15-19:30

Validation of S-wave velocity structure in the southern Kanto based on Green's functions with seismic interferometry

Kosuke Chimoto[1*], Hiroaki Yamanaka[1]

[1]Tokyo Tech

Seismic interferometry is known to provide Green's functions between the stations pairs by using the long-term microtremors obtained at both stations. Surface-waves are expected to be dominant in the Green's functions from microtremors observations on the earth surface. Since surface-waves provide the information about the near surface structures, we use Green's functions estimated with seismic interferometry for validation of the S-wave velocity structures in the southern Kanto.

We have constructed the network for long-term microtremors observation in the southern Kanto, and applied it to seismic interferometry. We have also estimated the S-wave velocity structures with tomographic inversion based on the slowness of the cross correlation functions. Recently, the amplitudes of cross correlation functions are also studied to reconstruct the amplitude of Green's function (e.g. Tsai, 2011; Prieto et al., 2009). Seismic interferometry is often applied to the microtremors of which amplitudes are normalized to 1 bit (Campillo and Paul, 2003) or with threshold clipping (Shapiro and Campillo, 2003). However, these procedures distort the amplitudes of microtremors and the distortion of the amplitudes of reconstructed Green's functions, accordingly. Chimoto and Yamanaka (2012) used the data processing by Prieto et al. (2011), which applies no normalization for microtremors, and showed the possibility in the use of the information about the amplitudes. They also demonstrated to obtain the appropriate signals of Green's functions from the cross correlation with the data processing.

In this study, we also used the data processing denoted by Chimoto and Yamanaka (2012) to use the information about the amplitude of Green's functions. Since surface-waves of Green's functions of which amplitudes preserved provide the useful information about the near surface structure, we use them to validate the S-wave velocity structures in the southern Kanto. We compare the estimated Green's functions with seismic interferometry and the theoretical Green's functions from the empirical S-wave velocity models proposed by Yamanaka and Yamada (2006) to validate it.

In the southern Kanto plane, where the dense microtremor array observation has been conducted, the appropriate S-wave velocity structures would have been estimated, because both Green's functions show the similarity. However, there also existed the difference in the later phases due to the scattering in the short period range, indicating that the further modification of the models is needed. We then focus on Sagami bay and Tokyo bay, because the model is still unknown due to the difficulty of conducting the geophysical exploration. We found that both Green's functions had difference and show the complexity due to the complexity of the subsurface structures in such areas. The difference in Green's functions was not only in direct wave but also in later phases. The difference was significant in the short period range. This suggests that the further modification of the models is required in such areas.

Keywords: Seismic interferometry, Green's function, S-wave velocity structure, Southern Kanto, Cross correlation function, Microtremor