

Validation of S-wave velocity structure of sedimentary layers of the Kanto basin using strong motion records applied to seismic interferometry

*Kosuke Chimoto¹, Hiroaki Yamanaka¹

1. Tokyo Institute of Technology

By using ground motion records, the seismic interferometry is applied to estimate the Green's function and it is used for the estimation of the depth to the layer discontinuity. The strong ground motion is also used to estimate the depth to the seismic bedrock (e.g., Yoshimoto et al., 2009; Watanabe et al., 2011). We have also applied this technique to estimate the Green's function of the sedimentary layers which has multiple reflected waves in the Shimousa area of the Kanto basin.

Since there is a lot of strong motion observation station in the Kanto basin and many of its records are available. MeSO-net is one of the strong motion networks operated in the Kanto basin (NIED, 2019). We then applied the seismic interferometry to those records and estimated Green's function in the Kanto basin. For the autocorrelation analysis of seismic interferometry, we used transverse components of whole strong motion records. The bandpass filter and spectral whitening were also applied before autocorrelation (Oren and Nowack, 2017; Chimoto and Yamanaka, 2019).

Along the observation line of the MeSO-net from Hidaka to Asahi, we compared the autocorrelation functions with the theoretical Green's function. We calculated the Green's function theoretically by using the integrated underground model of Kanto area provided by J-SHIS (NIED, 2019). The travel time of significant reflected wave from seismic bedrock compares favorably with that calculated theoretically in the Shimousa region. The trend of arrival times of reflected wave along the line was same as the Yoshimoto et al. (2009).

Not only the reflected wave from the bedrock, the autocorrelation function has several arrivals from other layer boundaries and multiple reflected waves as well. We understand the validity of the structure model from this comparison. This comparison can also be done to other observation lines in the Kanto basin, we also investigated the north-south line from Fujisawa to Tsukuba.

Keywords: autocorrelation, seismic interferometry, strong ground motion, Kanto basin, Green's function