Detect of Underground Velocity Discontinuity by Autocorrelation of Strong Motion Data in the Osaka and Kyoto Basins

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The Osaka and Kyoto basins in southwest Japan are mainly composed of sedimentary layers called ”the Osaka Group”. Three-dimensional basin velocity models down to the basin basement have been constructed by using geophysical exploration results, such as reflection surveys, microtremor measurements, deep boring, etc. (e.g. Horikawa *et al.*, 2003; Kyoto prefecture, 2006; Iwata *et al.*, 2008; Sekiguchi *et al.*, 2016). It is important to validate those basin velocity models by using other methods or data set. The seismic interferometry technique is used to obtain a seismic response and it can be used to explore the underground structure. For example, Pham and Tkalcic (2017) demonstrated that the autocorrelation function of the seismic waveform observed at a station shows the response of the reflected waves from the velocity discontinuities (Moho discontinuity and ice-rock interface) and they wrote that this method can be applied to more shallow construction (e.g. sedimentary layer). We use autocorrelation functions of strong motion waveform data at some KiK-net strong motion stations in the Osaka plain and Kyoto basin. Since the strongest velocity discontinuity above the crust is the basin basement, dominant signals emerging in the autocorrelation functions would be the reflected S-waves propagating between the ground surface and the basin basement (e.g. Yoshimoto *et al.*, 2007; Watanabe *et al.*, 2011; Chimoto and Yamanaka, 2019). We use the spectral whitening that enlarge high frequency components to detect the response waves more clearly, then we stack the autocorrelation functions of records from local events using the phase weighted stack (PWS) to emphasize the response as with Pham and Tkalcic (2017), pick up the delay time of the reflected waves and estimate the depth of the underground velocity discontinuity surface of the Osaka and Kyoto basins. Acknowledgement: The observed waveform data from KiK-net were used in this study.

Keywords: autocorrelation function, strong motion, reflected wave, the Osaka Group

