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Relationship between microtremor H/V spectral ratios and basin structure model in the Osaka sedimentary basin

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The Osaka sedimentary basin is filled by the Pleistocene Osaka group and the Quaternary sediments with thickness of 1 to 2 km over the bedrock, and it is surrounded by the Arima-Takatsuki Tectonic Line and the Ikoma active fault system. The Uemachi active fault system underlies the Osaka urban area. In order to predict the strong ground motions from a future event of the Uemachi fault, the precise underground velocity structure model is indispensable as well as the detailed source fault model (e.g., Iwata *et al.*, 2012, this meeting). The underground velocity structure of the Osaka sedimentary basin has been well investigated by using techniques such as gravity anomaly measurements, refraction surveys, seismic reflection surveys, boring explorations, and microtremor measurements. Based on these surveys and ground motion simulations, the three-dimensional basin velocity structure models of the Osaka basin have been developed and improved for decades (e.g., Kagawa *et al.*, 1993; Horikawa *et al.*, 2003; Iwata *et al.*, 2008; Iwaki and Iwata, 2011). In the present study, we conducted microtremor measurements in and around the Osaka basin, and obtained H/V spectral ratios of microtremor in order to contribute to the further improvement of the three-dimensional basin structure model.

The microtremor measurements are conducted from August to December, 2011 at one hundred strong motion stations in and around the Osaka basin. These stations consists seventy-three stations belong to the seismic intensity observation network of the Osaka prefecture, 9 JMA, 11 K-NET, 5 KiK-net, one BRI, and one PARI stations. We measured microtremor at each site more than 30 minutes using the Lennartz velocity sensor LE-3D/20s and the 24bit A/D data logger LS-7000XT. The target period range of this measurement is up to 10 s. We selected more than 10 segments with duration of 81.92 s by eliminating non-stationary noise, calculated their Fourier amplitude spectra, and obtained the ensemble average of the horizontal-to-vertical (H/V) spectral ratios. We identified the dominant periods of the H/V spectral ratios. The dominant periods of the H/V spectral ratios are e.g. approximately 7s around the Osaka port and 3-4 s on the Uemachi platform.

We referred to two three-dimensional basin velocity structure models in Osaka by Iwata *et al.* (2008) and Horikawa *et al.* (2003). The sites with deeper sediments have tendency to show longer dominant periods as partly reported previously by Miyakoshi *et al.* (1997). We extract one-dimensional velocity structure model beneath each site from the original three-dimensional structure models, and calculate the theoretical ellipticity of the Rayleigh-wave. We regard the peak period of the ellipticity as a theoretical dominant period of the H/V spectral ratio for that model. For most stations, theoretical dominant periods agree well to those of the observed H/V spectral ratios. However, the theoretical H/V spectral ratios have longer dominant periods than the observed microtremor H/V spectral ratios at some station in the footwall side of northern part of the Uemachi fault system and Senboku and Habikino Hills. Some sites in Minoh and Shijonawate cities located close to the basin edge where bedrock depth changes steeply. It might be due to inappropriate setting of bedrock depth or three-dimensional wave propagation effects. We will make further analysis to solve them.

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Keywords: Osaka sedimentary basin, microtremor, H/V spectral ratio, basin velocity structure model, dominant period