Ground type classification for strong ground motion prediction based on characteristics of phase-velocity curves from microtremor explorations

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For the purpose of strong ground motion evaluation and prediction, subsurface velocity structures in sedimentary layers have ever been modeled and sophisticated for Kanto, Tokai and Kumamoto region in the national investigation conducted by SIP (Cross-ministerial Strategic Innovation Promotion Program) of Council for Science, Technology and innovation.

There, spatially dense array-microtremor explorations also have been conducted at more than 27,500 sites in the regions, as of February 2019. They consist of miniature and irregular array measurements made at interval of about 1 km and standard-sized array ones made at interval of about 5 km. As a result, shallow S-wave velocity structures were modeled in detail, which can affect ground amplification, building and human damage.

In this study, regarding characteristics of phase-velocity (hereinafter called Pv) curves from array microtremor explorations, it was attempted to investigate relationships with geomorphologic land classification [Wakamatsu et al., 2013] and geological constitution of ground.

Pv curves can be usually obtained 2Hz to 30Hz in frequency from miniature and irregular array microtremor explorations. In general, Pv in higher frequency corresponds to velocity structures in the depth of a few of meters to 10 meters and that in lower frequency corresponds to those in the depth of dozens of meters below ground surface. Here, Pv at wave length of 40 meters or C40 [Konno et al., 2000] was extracted and made use of at each microtremor measurement site. C40 can be regarded as AVS30.

As a result, useful information was able to be acquired to model subsurface velocity structures in addition to new knowledge which was not able to be obtained from only bore-hole exploration data. Also, C40s vary due to different-sized plains and different sedimentary environment despite the same geomorphologic land classification. This presentation will report the results in detail.

Keywords: Ground type classification, phase-velocity curve, microtremor exploration, strong ground motion