Lateral variation and regional characteristics of V_{S30} structure in the southern Korean Peninsula

Byeongwoo Kim

Seismology and Geophysics Lab.

The average shear wave velocity of the top 30m from the surface, V_{S30}, is used to represent site characteristics such as soil classification and site amplification. The V_{S30} is an important parameter for building code and seismic design. However, the lateral variation of the V_{S30} structure in the Korean Peninsula has rarely been studied. In this study, we construct a V_{S30} model for the Korean Peninsula. We calculate the horizontal-vertical spectral ratio (H/V ratio) from the ambient seismic noises. To determine an optimal shear wave velocity structure, we compare the H/V ratios with the synthetic site amplification that is calculated by one-dimensional equivalent linear method. We evaluate the correlation between shear wave velocity and standard penetration test N value (SPT N). We proceed the comparion to 20 broadband seismic stations in the Korean Peninsula. We collect ambient seismic noises from seismic stations, and SPT N values at 175,619 boreholes. We calculate the lateral variation of V_{S30} over the Korean Peninsula. We determine an empirical correlation between V_{S30} and SPT N value based on the geotechnical and geoseismic data from the Korean Peninsula. We obtain a V_{S30} model from the relationship between V_{S30} and SPT N values. The V_{S30} is relatively low in coastal regions, while relative high in inland regions. The V_{S30} model is expected to be useful for systematic seismic design and soil classification.