

Lateral variation of V_{S30} structure in the Korean Peninsula and site-dependent characteristics

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V_{S30} , the average shear wave velocity for the upper 30m depth, is used to represent the site characteristics such as soil classification and site amplification. The National Earthquake Disaster Reduction Program (NEHRP) and the American Society of Civil Engineers (ASCE) use V_{S30} to provide building-code. The V_{S30} structure can vary from site to site. However, the spatial distribution of the V_{S30} structure on the Korean Peninsula has hardly been solved. We make a V_{S30} map of the Korean Peninsula. We calculate the H/V ratio, the horizontal-to-vertical spectral ratio, from ambient seismic noise. To find an optimal shear wave velocity structure, we compare the synthetic H/V ratios from the equivalent linear method with the observed H/V ratios. We evaluate the correlation between shear wave velocity and standard penetration test N (SPT-N) values by comparing the optimal shear wave velocity structure with SPT-N values in adjacent boreholes. We apply the process to all available velocity seismometers on the Korean Peninsula. We collect seismic data from about 10 seismic stations on the Korean Peninsula. We also collect SPT-N values at ~180,000 boreholes. We calculate the spatial variation of V_{S30} over the Korean Peninsula. We determine an empirical correlation between V_{S30} and SPT-N values by region. The correlation allows us to determine the geology-dependent relationships. We use the geology-dependent relationship to determine the V_{S30} from the SPT-N value, which enables us to obtain a detailed map of the site properties of the Korean Peninsula. The V_{S30} map may help us to build a systematic seismic design and soil classification.