

A comprehensive site database for Taiwan strong ground motion network

^a Chun-Hsiang Kuo, ^a Che-Min Lin, ^b Shun-Chiang Chang, and ^b Kuo-Liang Wen

^a *National Center for Research on Earthquake Engineering, Taiwan, chkuo@ncree.narl.org.tw*

^b *Department of Earth Science, National Central University, Taiwan*

Site effect is usually treated as a simple site parameter like V_{s30} , which is a value of average shear wave velocity for the top 30 m of layers, in Ground Motion Prediction Equations (GMPEs). Although debates on usage of V_{s30} for its advantage and disadvantage are still an open question, it has become the most widely used site parameter in ground motion prediction, seismic hazard analysis, and building codes. In order to make up for the insufficiency of V_{s30} especially in regions covered by large thickness of sediments, depth to the horizons with shear wave velocity of larger than 1.0 km/s (or 1.5 km/s, 2.5 km/s), the so called Z1.0 (or Z1.5, Z2.5), was recently introduced to the GMPEs of the Next Generation of Attenuation Equations (NGA) project. However this kind of data is still rare and quite difficult to be acquired in most region of the world. This parameter is only available in Japan, California, and part region of Turkey at present. The high-frequency attenuation factor, i.e. κ , is considered a significant parameter controlling attenuation of high-frequency seismic waves. High correlation is believed between κ and local site conditions. S-wave velocity profiles of the Engineering Geology Database for TSMIP (EGDT) were measured using suspension PS-logging at more than 450 strong ground motion stations throughout Taiwan. Accurate V_{s30} is therefore provided by the site database. In addition, two estimated V_{s30} models were tested and included for those stations without velocity log. Although the depths of most stations were only 35 m, Z1.0 still can be derived at dozens of stations near basin edges or piedmont area from EGDT. Several techniques including microtremor array, receiver function, and HVSR inversion have been used to obtain S-wave velocity profiles at strong motion stations and thus the parameter Z1.0 can be derived. A relationship between V_{s30} and Z1.0 for Taiwan is consequently evaluated and further compared with those for Japan and California. κ at strong motion stations was calculated and a special correlation with V_{s30} is found. The comprehensive site database for a national strong motion network is quite important for engineering seismology and national seismic hazard analysis.