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## Empirical Site Amplification Modelling for Horizontal and Vertical Ground Motions in Taiwan

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Site amplification behavior are important in ground motion prediction. Seismic waves were amplified and caused significant building damages in the Taipei Basin by the 1986 Hualien offshore (subduction interface) and the 1999 Chi-Chi earthquakes (crustal), for which both of the epicentral distances were nearly 100 km. To understand local site amplifications in Taiwan, empirical site amplification factors for both horizontal and vertical ground motions are studied using recently constructed strong motion and site databases for the free-field TSMIP stations. Records of large magnitude earthquakes of  $M_w$  larger than 5.5 from 1991 to 2016 were selected for this study. Site amplification factors at site conditions with  $V_{s30}$  between 120 m/s to 1600 m/s and bedrock accelerations up to 0.8 g were evaluated using ratios of spectral accelerations at different periods. The reference site condition, i.e. the engineering bedrock, is assumed as  $V_{s30}$  of 760 m/s (B/C boundary) in this study. Our empirical site amplification form are borrowed from the site response function of ASK14 and CY14 ground motion models in NGA-West2 project with slight modification. Therefore our site amplification model includes a linear amplification term and a nonlinear deamplification term. The coefficients of the empirical models were obtained by a nonlinear regression analysis using the selected Taiwan data. Site amplification factor is a function of  $V_{s30}$  and spectral intensity in the model. Similar linear site amplification factor to the NGA models is derived in our model; however, more significant soil nonlinearity behavior than the NGA models is likely captured from the empirical data. The amplification factor in vertical component is smaller than that in horizontal.