

EGU2020-6555

<https://doi.org/10.5194/egusphere-egu2020-6555>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



## Correlation between shear wave velocity, void ratio and effective stress: Mapping Vs30 in Taiwan

Jia Cian Gao<sup>1,2</sup>, Jyun Liang Guo<sup>1</sup>, Jia Jyun Dong<sup>1,2</sup>, and Chyi Tyi Lee<sup>1,2</sup>

<sup>1</sup>National Central University, College of Earth Sciences, Graduate Institute of Applied Geology, Zhongli, Taiwan

<sup>2</sup>National Central University Earthquake-Disaster & Risk Evaluation and Management Center (E-DREaM), Zhongli, Taiwan

Site effect is one of the critical factors influencing the seismic hazard evaluation. Among others, the average shear-wave velocity of the upper 30 meters of a soil profile ( $V_{s30}$ ) has been widely used for assessing the ground-motion amplification. However, spatial resolution of shear wave velocity data is usually poor for regional- or national-wise evaluation. Standard Penetration Test N-value, the most abundant geotechnical data, was then used to estimate the shear wave velocity ( $V_s$ ) empirically and the uncertainty of the  $V_{s30}$  map can be reduced. In this study, we use the state variables of soils (void ratio and effective stress) to evaluate the shear wave velocity and to map the  $V_{s30}$  in Taiwan. Engineering Geological Database for TSMIP (EGDT) comprises soil profile, shear wave velocity measurements, groundwater table, and soil physical properties (such as void ratio, water content, specific gravity, and unit weight), was used to construct the correlation between  $V_s$ , void ratio, and effective stress. The drilling database of Taiwan CGS was then used to estimate the spatial distribution of  $V_{s30}$ , where the  $V_s$  is un-available. The results were compared with the previous version of  $V_{s30}$  map of Taiwan. The uncertainty of the new  $V_{s30}$  map was evaluated and the propagation of uncertainty to the seismic hazard can be evaluated accordingly.