Microtremors are caused by various natural and artificial signals. ~~Those~~These signals ~~always~~ exist perpetually and thus the time of measurements is very short in comparison with that for earthquakes. After Nakamura (1989) proposed the HVSR method, ~~microtremor~~microtremors became a popular tool to assess site response to ground motions, i.e., the resonance frequency and amplification factor at a specific site. The EGDT ~~is~~was constructed by the NCREE and CWB, ~~including~~and includes logging data at over 400 stations~~,~~. The Vs30 data and site classification of the drilled stations has also ~~has~~ been accomplished (Kuo et al., 2011; 2012) according to the criteria of the Building Seismic Safety Council (BSSC) (2001). The site classification is a pre-requisite for the present study of developing HVSR models ~~on~~for different seismic site conditions ~~and~~. 61 stations ~~are included~~classified in the area were used in this study.

~~Microtremor was~~In this study, microtremors were measured at 74 free-field TSMIP stations in Kaohsiung and Pingtung ~~in this study~~ (Fig. 1). ~~We reviewed old~~Old data ~~of~~from the EGDT in the area~~. –~~ was reviewed, the Vs30 value of the station KAU048 was corrected, and the site ~~is~~was reclassified from class E to class D. The Vs30 ~~of~~value of the station KAU086 ~~is~~was derived from the N-value and was classified as class D. Finally, ~~we have~~the Vs30 ~~at~~data for 62 stations in the area ~~including~~was used in this study. This included 6 stations of class B, 10 stations of class C, 44 stations of class D, and 2 stations of class E.

Microtremor measurements and data processing

A SAMTAC-801B (recorder) and a VSE311C (sensor) manufactured by Tokyo Sokushin ~~are~~were the two instruments used in the study. ~~Sampling~~The sampling rate ~~is~~was 200 ~~point~~points per second and the recording period ~~is~~was 18 minutes for each measurement. The ~~locations of the~~ microtremor measurements were ~~on~~located at the side of ~~stations~~each station to ensure that the geological conditions ~~are~~were identical. The instrumental response was eliminated in the HVSR procedure ~~of HVSR~~. Multi-windows with a length of 8192 points ~~was~~were utilized to partition the microtremor recordings, and a 6% cosine taper was implemented at both ends of each window. The recordings ~~must~~should be checked ~~and~~so that the windows contaminated by unusual noise can be deleted in advance; however, the number of selected windows should be more than 20 to make sure that the averaged result will be stable. A geometric mean of the horizontal Fourier spectra was calculated, smoothed 5 times, and then divided by the smoothed vertical Fourier spectrum to derive a single HVSR. After averaging the single HVSR of each window, the mean HVSR at a station was finally derived.

註解 [Editor1]: Golden English Editing
Physical Science
Earth Science
Sample of work

註解 [Editor2]:

CHECK: It is unclear what is meant by this phrase. Does the author mean that measuring microtremors is easier than taking measurements during earthquakes because they are always present unlike the tremors caused by an earthquake event? Please consider revising, noting that the current wording is unclear.

註解 [Editor3]:

CHECK: Please check that this edit conveys the intended meaning of the sentence.

註解 [Editor4]:

CHECK: Perhaps it would be useful to define the term Vs30.

註解 [Editor5]:

CHECK: Please check that this edit conveys the intended meaning of the sentence. It is unclear from this section whether different types of data were obtained from different stations as the number of stations where measurements were taken is not consistent.

Properties of a microtremor

In the ~~research~~studied area, most of the strong motion stations are located in ~~plain area~~plane areas and are classified as class D without significant variation ~~of~~in Vs at depths. Stations of class C are mainly ~~distribute~~distributed in piedmonts with larger ~~variation of~~variations in Vs. ~~The class~~Class B stations have relatively low ~~velocity~~velocities; only one station has a Vs30 higher than 1000 m/s (Fig. 2).

HVSRs at the 61 strong motion stations were derived following the standard data processing steps introduced in the above section. ~~We~~The HVSRs were plotted ~~the HVSRs~~ using different colors according to the Vs30 values from logging data (Fig. 3). The dominant frequencies ~~are increasing~~increased with Vs30. Moreover, ~~we~~these HVSRs were categorized ~~these HVSRs~~ into classes of B, C, D, and E according to the site classification of Kuo et al. (2011; 2012~~) as well as the corrections at~~); in addition, two stations were reclassified by N-value ~~that we did in this study~~as explained above (Fig. 4). ~~Similarity~~The similarity of HVSRs in each class is ~~well~~consistent and the differences between each class are also quite clear.

Stations ~~of~~in class B are situated on hard rocks or sometimes covered with a thin regolith and ~~as such~~therefore, the dominant frequencies of HVSR are unremarkable or relatively higher than those at other stations. The stations of class C, which are situated on soft rocks or stiff soils, have obvious amplification at comparatively lower resonant ~~frequency~~frequencies than ~~the~~those of class B. The HVSRs of classes D and E are evidently amplified at relatively lower resonant frequencies.

Additionally, Fig. 4 also shows the phenomenon of "deamplification", which could be observed in many of the HVSR curves ~~of~~in class D, class E, and several ~~of~~ in class C (Kuo et al., 2013).

Fig. 5 shows the average HVSR of the four classes. In this figure, the ~~difference of~~differences in shape and dominant ~~frequency~~frequencies are very clear. However, the HVSR of class E ~~is~~was only available at two stations~~, so that~~; therefore, the average HVSR in ~~the~~this class ~~maybe~~may not be very reliable. The deamplification of HVSRs ~~is~~was also averaged ~~and~~but cannot be seen in Fig. 5. However, the trend of decreasing ratios is still ~~able to be seen~~apparent in the deamplification curves of class D and E.

註解 [Editor6]:

CHECK: Please check that this edit conveys the intended meaning of the sentence.

Dominant frequency and Vs30 maps

The dominant frequencies of ~~microtremor's~~the microtremor HVSRs are proportional to the measured Vs30 values in the KaoPing area as shown in Fig. 6. Our recent study (Kuo et al., 2013) in the Taipei area showed the outstanding reliability of site classification using HVSRs of ~~microtremor~~microtremors. This approach analyzed the similarity of HVSRs between the site of interest and the average HVSRs of each class using the Spearman's rank correlation coefficient as well as adopting the dominant frequency, deamplification, and relative amplification as weightings to assess the site class of a station. The accuracy of this approach is better than previous results ~~of~~ using surface geology parameters.

Conclusions

This study conducted microtremor measurements in Kaohsiung and Pingtung, ~~considering~~and considered the EGDT logging data to analyze the site effects. Fig. 7 shows the distribution of ~~microtremor's~~the dominant frequency ~~by~~of microtremors at 74 measured KAU stations. The pattern is comparable with the surface geology in Fig. 1. The dominant frequency ~~is~~was lower than 2 Hz in the ~~plain~~plane area, over 4 Hz in the mountains, and lower than 1 Hz for several near the coast ~~are lower than 1 Hz.~~. One exception is station KAU003 ~~with~~that is located near the coast but had a dominant frequency of over 10 Hz ~~but located in the coast.~~. The geology at the station is mainly limestone with higher velocity characteristics.

The Vs30 map (Fig. 8) in this area ~~is~~was plotted ~~by~~using the ~~result~~results of Kuo et al. (2012). However, it also includes the stations in Tainan and Taitung. It ~~is~~ also ~~similar~~displays similarities to the distribution pattern in Fig. 7, indicating that the dominant frequencies of ~~microtremor~~microtremors are ~~really~~ able to detect the variation ~~of~~in the main interface of different velocities. When the sedimentary depth of a site is less than 30 meters, it ~~could~~may be class B or C; on the contrary, when the sedimentary depth ~~becoming~~becomes larger than 30 meters, it ~~might~~may be class D or E. The HVSRs indicate several stations with dominant frequencies lower