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How earthquake position influences the H/V ratios from TSMIP data in the Taipei basin

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Taiwan is located on the circum-Pacific seismic belt. Consequently, the seismicity in the Taiwan area is very high. Taipei, the capital of Taiwan, is located in the Taipei basin with thick and soft deposits, which caused significant earthquake damage due to site amplifications. Earthquakes are well recorded by the very dense TSMIP (Taiwan Strong Motion Instrumentation Program) strong-motion network. The sufficient records provide an opportunity to analyze the influence of earthquake position on the basin response. We apply single spectral ratio method (H/V ratio) to analyze the records at 32 stations of the Taipei TSMIP network. The database is sorted into deep (> 50 km) and shallow (< 50 km) earthquakes and by earthquake azimuth (south and southeast). In order to reduce the influence of other factors on the analysis, we use earthquakes that occurred within azimuths of 110∼180° and distances of 25∼75 km to analyze the depth influence. The result of site response comparison for deep and shallow earthquakes indicates that the H/V ratios obtained using shallow events are for the most part larger than for deep events at low frequency (<3Hz) when the stations are located near the central basin. The H/V ratios don't show differences when the stations are located near the basin edge. We also compare the H/V ratios for earthquakes of different azimuths. The analysis result indicates that the H/V ratios obtained using earthquakes in the southeast are generally larger than for earthquakes in the south at low frequency (<2Hz) when the stations are located in central basin, but are unapparent for stations near the basin edge.
Analysis of observation show a significant dependence of spectral amplification in the Taipei basin on earthquake depth and azimuth at low frequency (<2∼3Hz). It means that at the same site, dominant frequency or amplification maybe shifted when the earthquake position changes. It is necessary to do more research about the phenomenon, especially 2D or 3D simulation are suggested to model potential large earthquakes.