9th FTSES 2024 Penghu, Taiwan

9th France-Taiwan Symposium in Earth Sciences
Session: General Session

Characteristics of microseism observed at the densely distributed Formosa Array in Taipei Metropolitan Area

Chun-Cheng Kuo[1], Kate Huihsuan Chen[1], Cheng-Horng Lin[2], Ya-Chuan Lai[3], Min-Hung Shih[4]

[1] Department of Earth Sciences, NTNU, Taipei, Taiwan
[2] IES, Academia Sinica, Taipei, Taiwan
[3] NCREE, Taipei, Taiwan
[4] TVO at Tatun, Taipei, Taiwan

With high levels of background noise found in urban areas, urban seismology has become an active research field due to the increasing number of seismic arrays located in and around the cities (e.g., Groos and Ritter, 2009; Diaz, 2016). Using the seismic data from a densely distributed seismic array (Formosa Array, FA) with 5 km spacing and total stations of 114 stations, we analyze the 12- month data to better understand the spatiotemporal characteristics of microseism around Taipei. In Taipei Metropolitan Area, we observed the splitting of double frequency microseism into high frequency (0.2-1 Hz) and low frequency (< 0.2 Hz) bands. The amplitude of microseism is found to be largest at the stations where the tidal variation is largest, indicating the high correlation with ocean wave dynamics. The median amplitude of two microseisms bands reveals nearly identical patterns at all stations, suggesting that the sources are persistent across a large area.

We further conducted moving window cross-correlation coefficients between continuous seismic data and meteorological/tidal data. We found that the median amplitude of microseism is strongly controlled by the air pressure and temperature, while the maximum amplitude is more correlated with wind gusts and tidal change. This suggests that the coupling of atmospheric and oceanic phenomena plays a crucial role in microseism characters. Further exploration on the regional dependence of microseism behavior is needed, to better understand the nature and effect of seismic noise.

Keywords: Microseism, seismic noise, Formosa array