Geophysical Research Abstracts
Vol. 18, EGU2016-7995-2, 2016
EGU General Assembly 2016

Low frequency signals analysis from broadband seismometers records

Po-Chin Hsu
Taiwan (jackcaj57438801027@gmail.com)

Broadband seismometers record signals over a wide frequency band, in which the high-frequency background noise is usually associated with human activities, such as cars, trains and factory-related activities. Meanwhile, the low-frequency signals are generally linked to the microseisms, atmospheric phenomena and oceanic wave movement. In this study, we selected the broadband seismometer data recorded during the pass of the typhoons with different moving paths, such as Doksuri in 2012, Trami and Kong-Rey in 2013, Hagibis and Matmo in 2014. By comparing the broadband seismic data, the meteorological information, and the marine conditions, we attempt to understand the effect of the meteorological conditions on the low-frequency noise. The result shows that the broadband station located along the southwestern coast of Taiwan usually have relatively higher background noise value, while the inland stations were characterized by lower noise energy. This rapid decay of the noise energy with distance from the coastline suggest that the low frequency noise could be correlated with the oceanic waves. In addition, the noise energy level increases when the distance from the typhoon and the station decreases. The enhanced frequency range is between 0.1∼0.3 Hz, which is consistent with the effect caused by the interference of oceanic waves as suggested by the previous studies. This observation indicates that when the pass of typhoon may reinforce the interaction of oceanic waves and caused some influence on the seismic records. The positive correlation between the significant wave height and the noise energy could also give evidence to this observation. However, we found that the noise energy is not necessarily the strongest when the distance from typhoon and the station is the shortest. This phenomenon seems to be related to the typhoon path. When the typhoon track is perpendicular to the coastline, the change of noise energy is generally more significantly; whereas less energy changes are observed when the typhoon path is subparallel to the coastline. On the other hand, sometimes the energy of low frequency signal could increase without the inference of typhoons. After comparing the noise energy density with different metrological and precipitation data, we found that the pressure change and the consecutive landfall could be the main factors which affect the energy distribution. In summary, our result confirm that the broadband seismic data could indeed be influenced by the metrological conditions and marine environments. The contribution of each effect may vary. However, the main factors which control the low frequency noise energy should still be the wave height, pressure and the rainfall.