



Effects of typhoons on microseisms observed from the short period array records

Woo-Dong Lee, Bong-Gon Jo, Sat-Byul Jung, Min-Seok Ko, and Seok-Tae Lee

Dept. of Earth and Environmental Sci. Chonbuk National University, Jeonju, Chonbuk, Republic Of Korea (udongi@jbnu.ac.kr)

We analyze seismic noise recorded on the 19 short-period vertical component seismometers of the Korean seismic array (KSRS) to investigate the effects of 2 consecutive tropical low-pressure systems (typhoon), named Danas (Sep. 7, 2007 ~ Sep. 12, 2007) and Narit (Sep. 13, 2007 ~ Oct. 16, 2007), on the background noise fields of the Korean peninsula. Danas, a mid-size typhoon, was formed and disappeared in the middle of northeastern Pacific, while Narit, a strong typhoon, developed in the middle of the Philippine sea and vanished after passing through the Korean peninsula. The spectrogram obtained from the records during the days of the two typhoons shows that the microseisms are closely related to the typhoons, as indicated by the increase of spectral amplitude as much as 20 times during the development of typhoon, and most of the background noise energy is found at 0.15 hz to 0.5 hz. One of the striking features observed in the seismic record is a sudden increase of amplitude when it is approaching the Cheju island, indicating the bathymetry of ocean bottom is a critical factor on the microseism excitation. We calculate frequency-wave number spectra for nearly 3700 evenly selected time windows, each with a length of 6 seconds, to determine the directions of the typhoon passage and velocities. The frequency-wavenumber analysis reveals directional constraints of the storms, showing satisfactory means to track directions of each storms. Variance of backazimuths of Danas is larger than that of Narit indicating that the strength of typhoon seems to influence directional resolution of typhoon location. From the apparent velocities determined in this analysis for each time windows, it is found that the seismic noise caused by the two typhoons consists mainly of surface waves with velocities between 2.5~5 km/s, and occasionally body waves with velocities higher than 5 km/s, which are considered to be regional or teleseismic P waves. The dominant velocities of the surface waves are found to be 3.5 km/s for both typhoons, while it shows higher surface wave velocities for the Danas which is mostly developed in the pelagic ocean.