Spatiotemporal Variations of PM Excitation in the Northern Okinawa Trough Revealed by OBS Array

*Chih-Chieh Chien⁶, Ying-Nien Chen³, Yuancheng Gung⁶, Ban-Yuan Kuo¹, Shu-Huei Hung⁶, Eh Tan¹, Kate Huihsuan Chen⁵, Shuichi Kodaira², Yasushi Ishihara², Mamoru Nakamura⁸, Chau-Chang Wang^{4,7}, Ching-Ren Lin¹

1. Academia Sinica, Taipei, Taiwan, 2. Japan Agency for Marine-Earth Science and Technology, Yokohama, Japan, 3. National Chung Cheng University, Chiayi, Taiwan, 4. National Sun Yat-sen University, Kaohsiung, Taiwan, 5. National Taiwan Normal University, Taipei, Taiwan, 6. National Taiwan University, Taipei, Taiwan, 7. Taiwan Ocean Research Institute, National Applied Research Laboratories, Kaohsiung, Taiwan, 8. University of the Ryukyus, Okinawa, Japan

The amplitude asymmetry between the causal and acausal signals of noise cross-correlation functions (NCFs) is closely related to the characteristics of the source excitations of ambient noises. In this study, we explore the spatiotemporal variations of the primary microseism (PM) excitations in the Northern Okinawa Trough using the data recorded by a newly deployed array in this area. The seismic array, composed by 32 ocean bottom seismometers (OBSs), was deployed from September, 2018 to June, 2019. With the recorded continuous data, we first compute NCFs of the Z-Z component for each station pair. During the calculation, the signal is whiten in frequency. The spectra of the resulting NCFs indicate that the major energy is dominated by PM (10 –20 s) energy, and the amplitude asymmetry in NCFs also suggests that there are strong spatial variations in its source excitations. We then apply the migration technique to image both the spatial and temporal distributions of the contributed PM sources. Such an approach is also applied to examine its temporal variations by taking a shorter term (monthly) stacking of NCFs. The results suggest that the strong PM sources are located around the offshore in Kyushu, and it is more energetic during the spring.

Keywords: ocean bottom seismometer, source excitation of ambient noise, Northern Okinawa Trough