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Characteristics of Offshore Microseism Excitations Revealed by Noise Correlations

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Taking advantage of a unique opportunity provided by a dense array of coastal short-period seismic stations and the diverse bathymetry around Taiwan, we examine how the long-range coherent ambient noises are influenced by surrounding ocean settings using the cross-correlation functions (CCFs) between pairs of stations. The effective energy of the CCFs derived from three components of short-period seismometer data falls within the frequency range of the short period secondary microseism (SPSM). The spatial variations mapped from the amplitude asymmetry of CCFs and source migration images evidently demonstrate that the SPSM strengths are closely linked to the drastic changes in offshore ocean characteristics and result in much stronger SPSM in the shallow and narrow Taiwan Strait than in deep open seas of eastern Taiwan. The temporal variations of the CCF strengths exhibit very good correlations with the wind speeds and wave heights, explicitly indicating the observed SPSM is dominated by local sources generated from wind-driven ocean waves around offshore Taiwan. We also look into the long-period microseism excitations from the continuous data recorded by broad-band stations in Taiwan, Japan and Korea. We present the preliminary results on how the microseism excitations of different frequency bands are influenced by the nearby offshore settings.

Keywords: short period secondary microseism, noise correlation, microseism excitations