

## Can we analyse a correlation function of stochastic stationary waves as the Green functions?

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From 0.05 to 0.2 Hz random excited surface waves, known as microseisms, are dominant, and they mask seismic signals of earthquakes as noise. The microseisms are excited by oceanic disturbances at random. Recently using their random excitation properties, researchers (e.g. Shapiro et al., 2005) measured group velocity anomaly of Rayleigh waves, which is shown by cross-correlation functions between pairs of stations. They assumed that the correlation functions is the Green function. However, this assumption is valid only for homogeneous and isotropic sources. Here we reported validity of this assumption.

We assume that the fundamental Rayleigh waves from 10 to 20 mHz are excited by spatially isotropic but heterogeneous dynamic pressure disturbances at the Earth's surface. Following Fukao et al. [2002] we evaluate a synthetic cross-spectrum with an assumption that coherence length is much shorter than the wavelengths of the waves. At first we approximate power spectra of pressure disturbances in the series of spherical harmonics up to angular degree 10 with an assumption that the spectra can be separated into spatial part and frequency part. The cross-correlation function between two stations can be represented by convolution between spatial function of source intensities and response function. We can categorize the response functions into two cases. The first case is that separation distance between two stations is shorter than wavelength of the excited waves, and next one is that the distance is longer than the wavelength. In the first case, response function has sensitivity near the two stations and it decays with distance. In the second case, the response function has sensitivity along the great circle for two stations, in particular along their minor arc. This result shows that for heterogeneous sources the cross-correlation function exhibits fast phase velocity apparently, in particular in a case that two stations are closed. For precise determination of phase or group velocity, we had better use some pairs of cross-correlation functions like SPAC method [Aki, 1957].