Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SSS35-03 Room:502 Time:May 2 14:50-15:05

Estimating composition of ambient noise from three-component records at Tono array

TAKAGI, Ryota[1*] ; NAKAHARA, Hisashi[2] ; KONO, Toshio[1] ; OKADA, Tomomi[1]

[1]RCPEV, Graduate School of Sci., Tohoku Univ., [2]Geophysics, Graduate School of Sci., Tohoku Univ.

Ambient noise methods have become common tools to explore and monitor subsurface structure. However, effective uses of ambient noise should stand on the knowledge of a nature of ambient noise. In order to reveal the composition of ambient noise quantitatively, we extend the SPAC method to body wave incidence. Applying the extended SPAC method to the observation at Tono array, northeast Japan, we shows a good agreement between the theoretical cross spectra and the observed cross spectra. By fitting the theoretical cross spectra to the observed cross spectra, we estimated the composition ratio of Rayleigh, Love, and P waves. The characteristics of the composition ratio show a significant change at 1 Hz. While the P wave composition in total power is 5-15% and the lowest one below 1 Hz, the P wave composition suddenly increases above 1 Hz and reaches 50% and the highest one in those of the three wave modes. The change at 1 Hz is attributed to attenuation of high-frequency surface waves because the decay rate of the absolute value of power spectra of surface waves gets steeper around 1 Hz as compared with the constant decay of P wave. We also examine the temporal variation of the composition of ambient noise. Whereas power spectrum of each mode shows long-term and short-term temporal variations coincident with offshore significant wave height, the ratio between power spectra varies little with time. The constant composition ratio suggests that the mechanism and the source-receiver distance are stable in time. Accordingly, near coastal region is a possible region of the dominant source of the observed ambient noise. For applications of ambient noise, we should take account of the composition of ambient noise.

Keywords: ambient noise, SPAC, three-component array observation