Background Love waves from 10 to 50 mHz observedby Hi-net tiltmeters

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Recently, even on seismically quiet days Earth's background free oscillations were confirmed firmly (Kobayashi and Nishida, 1998; Suda et al., 1998]. Their excitation amplitudes and statistical features of the excitation show that their excitation source is persistent disturbance at or just above the whole Earth's surface. The observed amplitudes also show clear annual variations and acoustic resonance between the solid Earth and the atmosphere. They show that the probable excitation sources are atmospheric disturbance (Kobayashi and Nishida, 1998) and/or oceanic disturbance (Watada 2002; Rhie and Romanowicz 2004). The probable sources cannot excite background Love waves but background Rayleigh waves. In order to investigate their excitation mechanism, we try to detect background Love waves using Hi-net tiltmeters.

We first divided the whole record in a time period from June 2004 to December 2004 into 4096 sec segments with an overlap of 8192 sec, and calculated radial and transverse components of the cross-spectra of microseisms for every pair of 679 stations from 5 to 50 mHz. We modeled the cross spectra by linear combination of horizontal components of vector spherical harmonics. By minimizing square difference between the data and the model we obtained wavenumber–frequency spectra of transverse and radial components.

Resultant spectra show a clear fundamental Rayleigh wave branch and a background Love wave branch. Excited amplitudes of the Rayleigh waves are consistent with those of background free oscillations by Nishida et al. 2002. On the other hand excited amplitudes of background Love waves are two time larger than those of background Rayleigh waves despite of the initial hypothesis. This observation shows that we must consider other factors such as sharp lateral boundary between the ocean and the land.