



CONSIDERATION ON FREQUENCY DEPENDENCES OF NEAR-SURFACE ATTENUATION OF S-WAVES BASED ON VERTICAL ARRAY RECORDS

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ABSTRACT: Frequency dependences of near-surface attenuation of S-waves based on the vertical array records were examined to clarify their physical mechanisms using the data collected at the KiK-net Narita observatory site. The attenuation was estimated as a function of frequency by matching the SH-wave transfer function to the observed spectral ratio using the subsurface velocity structure derived from the PS logging profile. In addition to these examinations, numerical experiments with synthetic pseudo spectral ratio, which was calculated by use of the subsurface model constructed from the velocity and attenuation structure estimated at the Narita observatory, were performed to make clear the cause of frequency dependences of S-wave attenuation from an analytical point of view. The estimated S-wave attenuation of the sedimentary layer-basement system at the Narita observatory has a constant value of about 0.004 - 0.005 ($h=0.4 - 0.5\%$) with its lower limit at frequencies higher than 4 - 5Hz. On the other hand, the attenuation strongly increases with decreasing frequency below around 2 - 3Hz. It is quite likely that selection of the time window for picking out the S-waves portion may lead to artificial frequency dependence of attenuation at these lower frequency ranges. The attenuation value and its frequency dependence tend to decrease as the length of time window increases. In other words, the S-wave attenuation evaluated from the vertical array records seems to have some artificial frequency dependences, especially at lower frequencies. It is therefore important to carefully check errors in estimating attenuation.

Key Words: Attenuation, Frequency dependence, Vertical array, Estimating attenuation, Time window