

## Estimation of deep S-wave velocity structure at the Kashiwazaki-Kariwa NPP from microtremor array measurements

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During the 2007 Niigataken Chuetsu-oki earthquake, strong ground motion with the peak acceleration of 680cm/s/s which was larger than the empirical prediction was recorded at the base mat of the No.1 reactor building of Kashiwazaki-Kariwa Nuclear Power Plant (NPP). Furthermore, in the Kashiwazaki-Kariwa NPP, over twice difference of 680 vs. 322 cm/s/s of peak acceleration between the No.1 and the No.6 reactor buildings was appeared on the base mat. From the results of recent research, it is suggested that the deep sedimentary layers can be one of the important factors to elucidate these phenomena.

In this study, microtremor array measurements were conducted at the Kashiwazaki-Kariwa nuclear power plant to estimate deep S-wave velocity structure down to seismic basement layer. Vertical microtremors were observed in three arrays with the maximum station spacings of 3.04km, 1.49km and 0.75km, respectively. The Rayleigh wave phase velocity in a frequency range from 0.3Hz to 1.5Hz was estimated from frequency-wavenumber (F-K) spectral analysis. The phase velocity was inverted to a 1D S-wave velocity structure consisted of 9 layers using a heuristic search technique by simulated annealing. The structure of deep sedimentary layers at the Kashiwazaki-Kariwa NPP is mainly characterized by the Nishiyama, Shiiya, Upper Teradomari, Lower Teradomari, Nanatani-Green tuff layers with S-wave velocities of 0.75km/s, 1.2km/s, 1.7km/s, 1.9km/s and 2.6km/s, respectively. The basement depth is about 4km, and the thickness of each layer was consistent with the previous survey around the Kashiwazaki-Kariwa NPP.