H/V spectral ratio of microtremors in irregular structure and the limit ofthe estimation of the structure using the 1-D models

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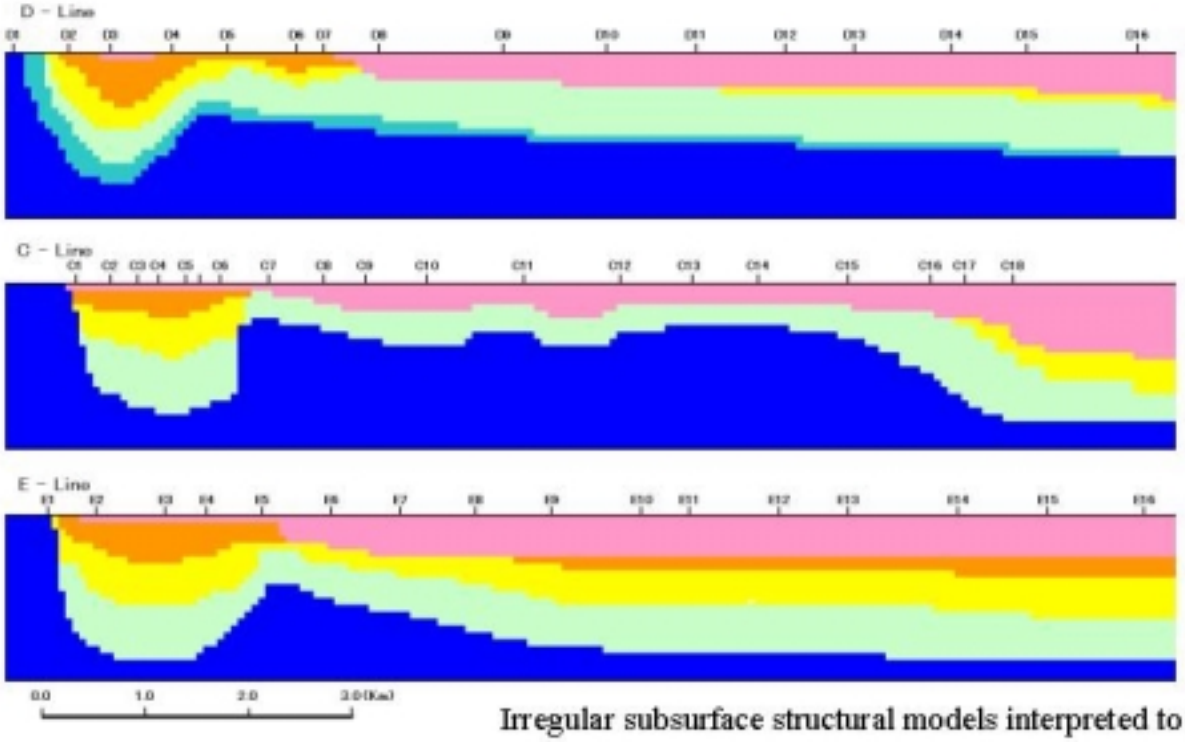
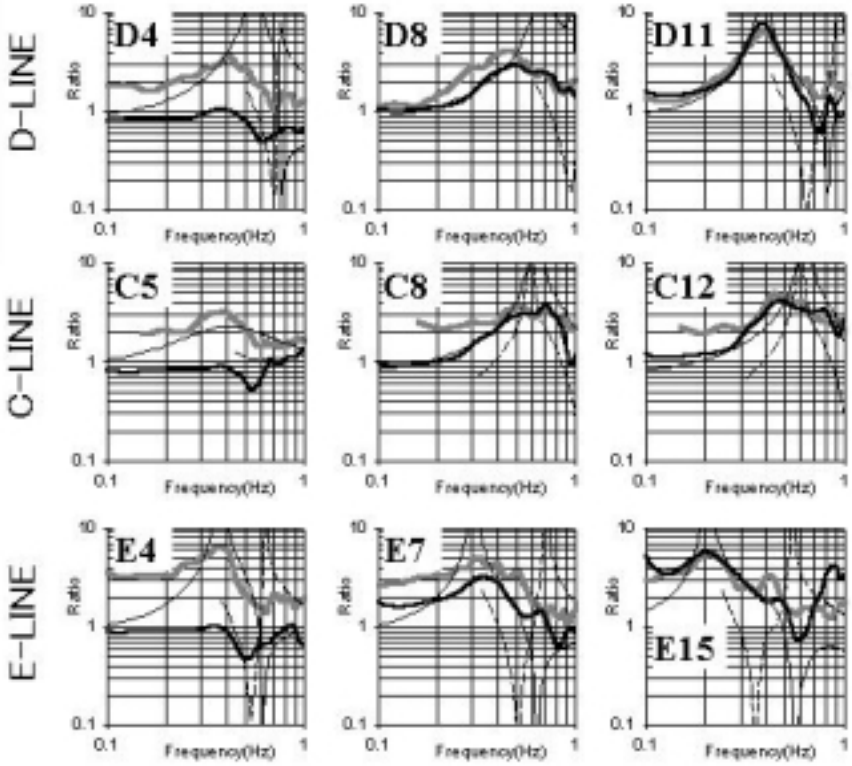
Recently, subsurface structures are estimated by using the H/V spectral ratios of microtremors. However, the application limit of those to an irregular subsurface structure is not discussed based on a theoretical background. In this study, up to now, the numerical experiment of wave propagation of long-period microtremors has been done for the 2-D irregular subsurface structural model. As the results, the irregular subsurface structures in the Hokusetsu region located in the northern part of the Osaka Plain, Japan were estimated from the comparison of the spatial variation of the H/V spectral ratios between the numerical experiment and the observation.

In general, the subsurface structure is estimated from the comparison of the fundamental predominant frequency of the spectra between the H/V ratios of the observed microtremors and the Rayleigh ellipticity curves based on the 1-D horizontally stratifield structural model. In this study, it differ from the Rayleigh ellipticity curve though the features such as the fundamental predominant frequency and the spectral shapes of the H/V spectral ratios for the observations are corresponding to those for the numerical experiment of the 2-D finite element method in the neighborhood of the irregularity structure(see the figures). It particularly was shown that the H/V spectral ratios of sites around the irregularity structure had the shapes of a broad peak. These results imply that the velocity structures beneath the observation points cannot necessarily be estimated from the comparison of the fundamental predominant frequency between the Rayleigh ellipticity curve and the H/V spectral ratio of the observed microtremors in the vicinity of the irregularity structure.



Irregular subsurface structural models interpreted to three parallel survey lines

	Vs(Km/s)	Vp(Km/s)	ρ(tf/m3)	Q
	0.55	1.90	1.85	30
	0.85	2.10	1.90	35
	1.10	2.30	2.00	40
	1.70	3.10	2.30	45
	3.00	5.80	2.60	100



Comparison of the theoretical ellipticity curves for the 2-D(bold black lines) and the 1-D(fine lines) structures with the observed ellipticity curves(bold gray lines).