Geophysical Research Abstracts, Vol. 5, 10125, 2003


# SIMULATION OF SEISMIC AMBIENT VIBRATIONS: CHARACTERISTICS OF NOISE SOURCES AND RELIABILITY OF H/V AND ARRAY PROCESSING TECHNIQUES

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Ambient vibration techniques such as the H/V method (ŞNakamuraŤ) and the more advanced array technique have the potential to significantly contribute to effective seismic risk mitigation, in particular in urban areas. However, physical basis and actual relevancy for site effect estimates of such methods (especially the H/V one) have never reached a scientific overall agreement. Within the SESAME project we have simulated ambient seismic noise in order to investigate the reliability of these techniques and to understand the nature and composition of the noise wave field. These simulations are performed using a Finite-Difference technique (4th order staggered-grid finite difference displacement-stress scheme) with spatially and temporally random sources. A set of canonical models (large sedimentary basins, deep sedimentary basins, unbounded sedimentary layers, velocity gradient) has been defined for a parametric study of the effects of the source distribution (density, time function, spatial location) and the structural feature on H/V ratios and spatial correlations. Tests on a single layer model have shown that surface sources provide results in agreement with what is usually observed using real noise. Source time functions and spatial location of surface sources play a weaker role in shaping the H/V curves and spatial correlation features. Finally, we apply H/V and array techniques on synthetic noise computed on more complex canonical models. Results outline their capability to provide qualitative and/or quantitative information on site conditions

and site effects.