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Determination of S-Wave structure beneath Istanbul, by using Love wave and by Joint Inversion of Rayleigh Wave and H/V

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On August 17, 1999, a devastating earthquake with a moment magnitude of Mw=7.4 struck the Kocaeli and Sakarya (Adapazari) provinces, and part of suburbs of Istanbul in the northwestern of Turkey, a very densely populated region in the industrial heartland of Turkey. This earthquake is considered to be the largest event to have devastated a modern, industrialized area since the 1923 Great Kanto earthquake. This earthquake caused about 30.000 losses of life and collapsed thousands of buildings. Thus, total loss figure amounted to about US\$ 16 Billion. Following the losses during this large earthquake, there has been a broad recognition among Turkey governmental, non-governmental and academic organizations of the need for extensive response planning based on detailed risk analysis of likely seismic hazard, microzonation studies and ground-motion researches in Turkey, in general and, Istanbul particular. In this frame, we have been performing a project on the determination of S-wave velocity structure beneath the European side of Istanbul, Turkey. One of the aims of the project is to improve the knowledge about the influence of local geology in the city on the expected earthquake ground motion. In this project , we conducted both array measurements and single station microtremor measurements at 30 sites. We applied SPAC method for the inversion, and used both Love and Rayleigh waves, and H/V technique, as well, to determine the S-wave velocity structure. Furthermore, we compared S-wave velocity-depth model obtained from the inversion of Love wave dispersion curve with that obtained by joint inversion of Rayleigh wave dispersion curve and H/V curve. As a conclusion, we have found that Love waves are more sensitive to shallower parts than Rayleigh waves, since penetration depth of Love waves are shallower than Rayleigh waves. Contrarily, deeper parts are modelled more presizely by the joint inversion of Rayleigh waves and H/V curves.

: Microtremor, SPAC, Love waves, Rayleigh wave, H/V technique, Istanbul
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