

Disaster Mitigation and Microzonation Studies in Istanbul

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On August 17, 1999, a devastating earthquake with a moment magnitude of $M_w=7.4$ 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, the metropolitan municipality of Istanbul, in cooperation with Japan International Cooperation Agency (JICA), implemented a project on disaster prevention/mitigation basic plan in Istanbul. The main objective of this project is to develop seismic microzonation maps which will serve as the basis for disaster prevention and mitigation plan for Istanbul city. On the other hand, as part of the preparations for the future earthquake in Istanbul, Kandilli Observatory and Earthquake Research Institute of Bogazici University (KOERI) in cooperation with other agencies have installed a Rapid Response and Early Warning system (IERRS) in the metropolitan area. In addition to ground motion research, the data from this dense urban network is used to provide rapid post-earthquake loss information. Substantial effort has been devoted to the analysis and interpretation of field-data in view of earthquake source parameters, source models, local site effects and near-field effects. Besides, KOERI, in co-operation with German scientists has implemented another multi-disciplinary projey Istanbul 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. For this purpose, both single station measurements and array measurements of microtremors were conducted at each IERRS site (hundred sites). Furthermore, in one of district of Istanbul, Atakoy, where site effects were observed during the past events, four boreholes were drilled, and accelerometers placed at 25, 50, 75 and 150 m depths to study the wave propagation and attenuation through the uppermost crustal layers. In addition to these projects, a complimentary project funded by Bogazici University was implemented at the IERRS sites to study the distribution of the fundamental frequencies beneath these stations using microtremors and small magnitude events recordings.