Geophysical Research Abstracts
Vol. 13, EGU2011-588, 2011
EGU General Assembly 2011

Integrated Use of Geophysical and Geotechnical Data for Seismic Urban Planning Studies: Bursa (Nilufer, Osmangazi and Yildirim) City Case

Ferhat Ozcep, Savas Karabulut, and Guldane Boyraz
Istanbul University, Geophysics, Istanbul, Turkey (ferozcep@istanbul.edu.tr)

The planning of man's environment is a complex operation which requires the interaction of many disciplines. Geophysical and geotechnical data are of fundamental importance both the planning of physical facilities and the structures that allows efficient use of urban and rural land. As land is the surface expression of the underlying geo-factors, city planning should not proceed without fully appreciating these geological, geophysical and geotechnical conditions. The interaction of geophysical and geotechnical considerations with the structural requirements of buildings or other facilities which fulfil planning objectives has a strong influence on the ultimate cost of city development. Microzonation has generally been recognized as the most accepted tool in seismic hazard assessment and risk evaluation and it is defined as the zonation with respect to ground motion characteristics taking into account source and site conditions .Main purpose of this study is to provide the integrated use of geophysical and geotechnical data in context of urban planning as a case history of Bursa (Nilüfer) City. For the study area, the probabilistic seismic hazard analysis was determined by using Poisson probabilistic approach. By using the analysis, magnitude and acceleration values of design earthquake were estimated for several distances by several attenuation relations. In the second phase of the study, by using the multichannel analysis of surface waves, (MASW), shear wave velocities of the region up to 50 meters were determined for 154 sites. As it is known, MASW method originated from the traditional seismic exploration approach that employs multiple (twelve or more) receivers placed along a linear survey line. Main advantage is its capability of recognizing different types of seismic waves based on wave propagation characteristics such as velocity and attenuation. MASW technique has important tools for obtaining shear wave velocity. By shear wave velocities, soil amplification factors and site characteristic periods were determined. Geotechnical test data from boreholes and laboratory measurements were evaluated with geological and geophysical data. By using geotechnical data, liquefaction potential index (PL) and liquefaction induced settlements were estimated in the study area.Seismic microzonation in the context of urban planning can be considered as the preliminary phase of earthquake risk mitigation studies. In the last phase of the study, with three zones of hazard, a microzonation map is prepared by considering the earthquake effect (such as soil amplification and liquefaction). Finally, generally speaking, the physical development of society occurs by the implementation of a series of separate, but converging, aims which may be expressed in terms of, for instance, improvements to living conditions, public health or mobility. A city plan usually attempts to achieve these aims at minimum financial cost. In these context, geophysical and geotechnical studies are one of the important factors to minimize the financial cost. This study are supported by Istanbul Univeristy Research Unit (Project Number 5582 and Project Number YADOP-670).