Geophysical Research Abstracts
Vol. 17, EGU2015-181-1, 2015
EGU General Assembly 2015

Microzonation Studies In District of Dikili, Izmir (Turkey) In The Context of Social Responsibility by Using GIS Tecniques

Savas Karabulut (1), Mualla Cinku (1), Okan Tezel (1), Mumtaz Hisarli (1), Ferhat Ozcep (1), Muammer Tun (2), Ugur Avdan (2), Oguz Ozel (1), Ahmet Acikca (1), Ozan Aygordu (1), Aral Benli (1), Arda Kesisyan (1), Hakan Yilmaz (1), Cagri Varici (1), Hasan Ozturkan (1), Cuneyt Ozcan (1), and Ali Kivrak (1)

(1) Istanbul University, Faculty of Engineering, Geophysical Engineering, Istanbul, Turkey (savask@istanbul.edu.tr, +902124737180), (2) Anadolu University Earth & Space Sciences Institute, Eskisehir, Turkey

Social Responsibility Projects (SRP) are important tools in contributing to the development of communities and applied educational science. Researchers dealing with engineering studies generally focus on technical specifications. However, when the subject depends on earthquake, engineers should be consider also social and educational components, besides the technical aspects. If scientific projects collaborated with municipalities of cities, it should be known that it will reach a wide range of people.

Turkey is one of the most active region that experienced destructive earthquakes. The 1999 Marmara earthquake was responsible for the loose of more than 18.000 people. The destructive damage occurred on buildings that made on problematic soils. This however, is still the one of most important issues in Turkey which needs to be solved.

Inspite of large earthquakes that occurred along the major segments of the North and East Anatolian Fault Zones due to the northwards excursion of Anatolia, the extensional regime in the Aegean region is also characterized by earthquakes that occurred with the movement of a number of strike slip and normal faults. The Dikili village within the Eastern Aegean extensional region experienced a large earthquake in 1939 (M: 6.8). The seismic activity is still characterised by high level and being detected. A lot of areas like the Kabakum village have been moved to its present location during this earthquake. The probability of an earthquake hazard in Dikili is considerably high level, today. Therefore, it is very important to predict the soil behaviour and engineering problems by using Geographic Information System (GIS) tools in this area. For this purpose we conducted a project with the collaboration of the Dikili Municipality in İzmir (Turkey) to determine the following issues:

a) Possible disaster mitigation as a result of earthquake-soil-structure interaction,
b) Geo-enginnering problems (i.e: soil liquefaction, soil settlement, soil bearing capacity, soil amplification),
c) The basin structure and possible fault of the Dikili district,
d) Risk analysis on cultivated areas due to salty water injection,
e) The tectonic activity of the study area from Miocene to present.

During this study a number of measurements were carried out to solve the problems defined above. These measurements include; microtremor single station (H/V) method according to Nakamura's technique, which is applied at 222 points. The results provide maps of soil fundamental frequency, soil amplification and soil sedimentary thickness by using developed amprical relationships. Spatial Autocorrelation Technique (SPAC) was carried out in 11 sites with Guralp CG-5 seismometer to predict the shear wave velocity-depth model towards the sismological bedrock. Multi-channel analysis of Surface Wave (MASW), Microtremor Array Method (MAM) and Seismic Refraction Method were applied at 121 sites with SARA-Doremi Seismograph. The soil liquefaction-induced settlements are determined in the frame of shallow soil engineering problems. Vertical Electrical Sounding (VES) was carried out to define the presence of saltly and drinkable and hot/cold underground water, the location of possible faults and the bedrock depth which was estimated with a Scientrex Saris Resistivity Equipment. To define the areas which are influenced by salty water, induced polarization (IP) method was applied at 34 sites. The basin structure and the probably faults of the study area were determined by applying gravity measurements on 248 points with a CG-5 Autogravity meter. Evaluation of the combined data is very important for producing microzonation maps. We therefore integrated all of the data into the GIS database and prepared large variety of maps.