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Urban Geological Mapping in Tekirdag Region (NW of Turkey) by Integrated Geophysical methods for Disaster Mitigation

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Urban geological mapping issue is a key to assist management of land-use, new developed areas, assessment of urban geological hazards. This study has been performed in the frame of an national project, which is a complimentary project of the cooperative project between Turkey and Japan (JICA&JST), named as Earthquake and Tsunami Disaster Mitigation in the Marmara Region and Disaster Education. Integrated geophysical methods can have an important role to yield subsurface information in urban areas provided that geophysical methods are capable of dealing with challenges related to these scenarios. With this principal aim, the results from several geophysical methods (microgravity, magnetic) is evaluated to characterize lithological changes, to image fault zones and to delineate basin geometry in the urban areas. The process uses the combination of passive and active techniques as complementary data: magnetotelluric method (MT), microtremor H/V analysis and ambient noise array measurements to overcome the limitations of traditional geophysical methodology. This study is focused on Tekirdag and its surrounding region (NW of Turkey) where some uncertainties in subsurface knowledge (maps of bedrock depth and the isopach maps of thickness of quaternary sediments) need to be resolved to carry out the urban geological mapping. The subsurface structure can be estimated using integrated methods. (1) Acoustic impedance contrast between Eocene sediments and Metamorphic or Paleozoic bedrock is detected through microtremor H/V analysis that provides the soil resonance frequency. The predominant frequencies in the region range from 0.5 Hz to 8 Hz in Tekirdag city. The results of H/V technique is a fast scanner of the geometry of basement. (2) Ambient noise array measurements constrain the bedrock depth using the measurements of 1D-shear-wave velocity of soft soil. (3) Finally, the microgravity data analysis contribute mapping basin geometry and bedrock depth. The Eocene basin- Paleocene basement boundary is constrained between surface and 400m depth, approximately. The integrated geophysical measurements presented is an optimized and fast tool to refine geological mapping by adding 2D information to traditional geological data and improving the knowledge of subsoil structure in Tekirdag and its surroundings. The preliminary results will be presented.

Keywords: Geophysical Methods, Microtremor, Microgravity, Magnetic, NW Turkey