

## **POLICY, PLANS OR STATEMENTS**

- **TITLE** : THE EARTHQUAKE ACTIVITY OF THE MARMARA REGION AND INVESTIGATION OF POSSIBLE EFFECTS ON THE ISTANBUL COASTLINE/CONTINENTAL SHELF GROUND WITH USING MULTI-DISCIPLINARY METHODS
- **LANGUAGE** : TURKISH
- **PUBLICATION TYPE** : PROJECT
- **ORGANIZATION** : ISTANBUL METROPOLITAN MUNICIPALITY
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- **REGION & COUNTRY** : ISTANBUL / TURKEY
- **HAZARDS** : EARTHQUAKES
- **OPEN TAG** : earthquakes, İstanbul, coastlines,

## **INTRODUCTION**

The work packages defined in the service protocol signed between Istanbul Metropolitan Municipality, Earthquake and Soil Investigation Directorate (İBB DEZİM) and the Scientific and Technological Research Council of Turkey, Marmara Research Center (TÜBİTAK MAM) and entered into force on April 18, 2007, the realization stages were prepared by TÜBİTAK MAM with the cooperation of IMM DEZİM personnel are reported to IMM DEZİM. This report (Final Report) covers all the work carried out within the scope of the 1st, 2nd, 3rd, 4th, 5th and 6th work packages defined in the work program and provides information about the results of the project.

## **INTRODUCTION OF WORK PACKAGES AND SUMMARY RESULTS**

The brief introduction of the work packages with reference to the protocol and the work carried out within the framework of the project are summarized below in general terms. Details are given in the following sections.

### **a) Definition of Micro Earthquake Activity (42.3.1.; Page 12)**

In the microseismological stations of TÜBİTAK MAM YDBE, which is located in the Marmara Region and is the only one on a national basis, the data of earthquakes with a

local magnitude greater than 1 were interpreted and the results obtained, It has been included in the scope of the weekly reports to be given to IMM DEZİM within the scope of the work package number 42.3.2. In addition, the earthquake activity in our study area has been described in detail in order to create guiding findings for the fourth work package.

**b) Creating Weekly Evaluation Reports and Transferring them to IMM (42.3.2.; Page 12)**

Observations made by TÜBİTAK MAM YDBE with geochemical methods were associated with the micro-earthquake activity defined within the scope of the work package no. 42.3.1 and IMM DEZİM was informed with weekly reports. In the reports, all the information coming from the observation stations operated by TÜBİTAK MAM YDBE within the scope of different projects in the region were interpreted and conveyed.

**c) Microtremor Index Measurements (42.3.3; Page 12-13)**

Microtremor Spectral Ratio Measurements and Microtremor Index Measurements of 35 measurements were carried out in accordance with the work program, the analyzes were completed, the behavior parameters of the ground such as soil amplification curves, soil quality, main vibration period were determined, and 2-dimensional data of the study area were determined by using the obtained S-wave velocity profiles and findings for hip-base geometry were obtained. In addition, an international guidelines for Microtremor Index measurements course was organized and an expert from IMM DEZİM was ensured to attend the course.

**d) Investigation of the Shallow Sea (0-100m) Area Between Silivri-Sarayburnu by Geophysical Methods (42.3.4; Page 13-15)**

The seismic, side-scan sonar and water depth data collected in order to determine the morphology and structure of the seabed in shallow areas, to identify possible landslide areas that may occur in the sea, and to reveal the relations of these areas with the land were processed in accordance with the purpose, and each data group was presented in a standardized format within itself, formatted and evaluated. With the help of these data; Maps such as

detailed depth map, sediment thickness map, old shoreline, acoustic base map and structure map for faults in the region were created. These maps and other work packages with the supporting findings, the sea extension of the landslide area between Büyükçekmece and Küçükçekmece was studied, and the relationship between faults and landslides in the region was questioned.

In order to define the activity of the faults, Radon gas measurements were taken on the extensions of the faults in the sea, which are not within the scope of the project, and additional geological studies were carried out to define the extension of the faults on land has been carried out.

In order to classify the sediment thickness map created with the help of the seismic data collected, 15 weighted cores (10 defined in the project) were taken. With the help of macroscopic observations made on the cores, the sediment thickness distribution map based on shallow seismic data was created in a controlled manner.

**e) Identifying the Size of the Deformations in the Landslides in the Coastal Area Between Avcılar and Büyükçekmece and Determining the Influence Areas on the Continental Shelf (42.3.5; Page 15-17)**

In the GPS observation network created to determine the time-dependent deformations in the landslide areas between Büyükçekmece and Avcılar in Istanbul. 4 repeated measurements were made at more than 50 points in total (static+fast static). Although it was aimed to take measurements RTK (real-time kinematics) on the shores in the project proposal, the data were collected with a rapid static approach in order to increase the quality of the measurements. The analysis of the collected data was carried out, time-displacement graphs showing the changes between the measurement periods of each point were prepared, the velocity changes of the static points were given, and the deformations in the coastal area were classified regionally with the help of fast static points. Findings for deformations, as integrated with the package fourth job interpreted.

**f) Transferring Information to IMM DEZİM on Scientific Subjects (42.3.6; Page 17)**

When deemed necessary and upon the request of İBB DEZİM, meetings, phone calls and e-mails on subjects falling under the expertise of TÜBİTAK MAM YDBE gave scientific opinion within the framework of they correspondence. In addition, IMM DEZİM took advantage of this work package and received consultancy service from TÜBİTAK MAM YDBE and will prepare the specifications for the new micro-zoning studies. Upon the request of İBB DEZİM, basic trainings were given for the purpose of measuring/evaluating GPS, Marine geology/geophysics and soil classification.