Earth and Marine Sciences Institute has been a science and technology center conducting cutting-edge researches on natural hazards and resources with an accelerating pace since 1984. The Institute develops and coordinates multi-disciplinary projects with participation of universities and various private/governmental institutions. Along with the increasing availability of R&D funds in Turkey since the early 2000s, the Institute has been involved in competitively funded projects and has become a center of attraction in its areas of studies by bringing together and pioneering various private/governmental institutions and universities.
TÜBİTAK MARMARA RESEARCH CENTER
EARTH AND MARINE SCIENCES INSTITUTE
FIELDS OF ACTIVITY

01 Active Tectonics Research Technologies

02 Geophysical Imaging Technologies

03 Advanced Geology Technologies
TÜBİTAK, the Scientific and Technological Research Council of Turkey, with its vision to be an innovative, guiding, participating and cooperating institution in the fields of science and technology, serves for the improvement of society’s life standards and for sustainable development of Turkey by supporting innovation through academic and industrial R&D studies, conducting research and development activities in accordance with national priorities and by determining the science and technology policies of Turkey.

Marmara Research Center (MAM) is one of the oldest and largest research centers of TÜBİTAK, and conducts applied research and development activities.

Earth and Marine Sciences Institute is one of the seven institutes of TÜBİTAK MAM, and conducts project-based studies in the field of geosciences.

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SINCE 1972

TÜBİTAK MAM MAKES IT POSSIBLE TO ACHIEVE MORE
Expert R&D Staff

87% Researcher
10% Technician
3% Administrative Staff

31 PERSONNEL

42% PhD
25% MSc
20% BSc

Multidisciplinary Research Staff:
- Geophysical Engineering
- Geological Engineering
- Geodesy and Photogrammetry Engineering
- Physics Engineering
- Chemical Engineering
- Chemistry
Turkey’s Largest R&D Infrastructure In The Field

- Digital Earthquake Monitoring Network
- Measurement and Data Processing For Site Classification
- Gravity Measurement and Data Processing
- Magnetic Gradiometry Measurement and Data Processing
- Active Tectonics Research Laboratory
- Seismic Data Collection and Processing
- GPS Data Collection and Processing
- Magnetotelluric Measurement and Data Processing
- Remote Sensing and Geographic Information Systems Applications
- National 1 MV Accelerated Mass Spectroscopy Laboratory
TECHNOLOGY DEVELOPMENT AND APPLIED R&D ACTIVITIES
EARTH AND MARINE SCIENCES
INSTITUTE
ACTIVE TECTONICS
RESEARCH TECHNOLOGIES
MULTI-DISCIPLINARY EARTHQUAKE RESEARCH BY ADVANCED TECHNOLOGIES
Active Tectonics Research Technologies

Multi-disciplinary Assessment and Modelling of Geological Hazards

- Monitoring and modelling of earthquake, landslide, volcano, tsunami and geothermal activities
- Province and country based seismic hazard assessment
- Geological and seismic hazard assessments for nuclear and geothermal power plants, dams, bridges, tunnels etc.

Earthquake Research

- Seismotectonic Research
- Earthquake source modelling
- Crustal deformation, fault slip
- Earthquake cycle and stress interaction, long-term earthquake forecasting
- Paleoseismology

Postseismic Emergency Observations

- Real-time earthquake aftershock studies
- Deformation monitoring by geodetic methods (GPS, PSInSAR, SAR, LIDAR)
- Coulomb stress modelling and earthquake triggering hazard
- Surface rupture and active fault mapping
In order to ensure dissemination of comprehensive partnership across Europe in earth sciences, the Institute has been involved in studies for an integrated cyber infrastructure that combines multi-disciplinary data coming from existing research infrastructure, observation networks and experimental laboratory studies. For instance, the Institute has been developing methods to determine the seismic hazard for Marmara Sea and surrounding area with space-based and terrestrial observations as part of the project (MARsite) on "New Directions in Seismic Hazard Assessment Through Focused Earth Observation in the Marmara Supersite". This project aims to contribute to the minimization of the earthquake induced damages by creating new earth-science models for seismic hazards through integrated data.
The studies for determining site assessment parameters for the site license of Sinop Nuclear Power Plant has been conducted in accordance with an international quality assurance program.

The main topics of the project include detailed observation of micro-earthquakes and earth deformations through seismological and geodetic networks, paleo-seismological studies to determine historic earthquakes on the faults, seismic reflection studies to characterize the fault structures at shallow depths, and oceanographic studies to introduce the details of Black Sea’s current system in the region. The basic design and construction of Sinop Nuclear Power Plant will be based on the data obtained with this project.

Research Studies For The Site Assessment Parameters of Sinop Nuclear Power Plant

As part of the Earthquake Aftershock Monitoring Project (DEPAR), the Earth and Marine Sciences Institute’s organizational structure has become capable of reaching the zone of an earthquake greater than MW=6.0 immediately after the main shock in any region of Turkey and establishing a temporary seismological monitoring network around the epicenter within 24 hours. The data collected from such seismological networks provide valuable information about the active faults in regions (as in the earthquakes in Ankara-Bala [2007] and Elazığ-Karakoçan [2010]). This information is shared with Disaster and Emergency Management Presidency (AFAD) in order to contribute to proper management of life saving activities.
Research on Geothermal Potential and Reservoir Capacity

Production capacities of geothermal reservoirs are highly variable, depending on the terrestrial, geological and geographical conditions of the site. Therefore, detailed Management Plans must be prepared for sustainable use of geothermal resources. The Institute develops projects to estimate the energy potentials and capacities of geothermal sites. With these projects, we will make an integrated implementation of the geological and geophysical methods for tourism-oriented operation of geothermal energy for the first time in Turkey.
EARTH AND MARINE SCIENCES INSTITUTE

GEOPHYSICAL IMAGING TECHNOLOGIES
GEOPHYSICAL IMAGING BY ADVANCED TECHNOLOGIES
Geophysical Imaging Technologies

Shallow (<1km) Research Activities

- Three dimensional imaging of coal seams, geological storages, buried faults and archeological sites by seismic refraction/reflection, surface waves, microgravity, magnetic, electromagnetic and ground penetrating radar (GPR) methods.
- Engineering seismology, micro-zonation, site classification based on Vs30, Vp/Vs, bedrock depth
- Landslide, active fault mapping and monitoring, borehole geophysics, ground based SAR, LIDAR

Deep Research Activities

- Studies on basin, crust and upper mantle structure by active/passive seismic tomography, surface waves, receiver functions, anisotropy, gravity, magnetotelluric (MT) methods
- Geothermal reservoir imaging and monitoring by active/passive seismology, seismic, electromagnetic, gravity and magnetic methods

Marine geophysics

- Sea bottom bathymetry
- Marine seismic, gravity and magnetic measurements
- Seismological observations of sea bottom
The Institute continues its studies on urban transformation for Balıkesir Province after Kocaeli and Bursa Provinces. The studies focus on where and how an earthquake energy could be felt in the region considering the site properties of the province. Also, the activities of the existing and potential faults are continuously observed with the local seismological observation stations established in the scope of the project. Seismic Hazards of these fault systems, namely, how earthquakes would affect the regions, are determined with earthquake scenarios. The project’s outputs contribute much to the formation of an Earthquake Master Plan. It constitutes the background for engineering activities like planning residential areas, seismic reinforcement and design of buildings, and identifies the safe areas in all aspects as a basis for urban transformation.

**LANDSLIDE**

**Investigation, Monitoring and Assessment of Various Landslide Areas in Beylikdüzü and Büyükçekmece Districts**

Within the scope of the project, the ground movements (landslides) are identified and their sliding surfaces/depths are classified in the research areas. In addition, we have monitored the landslides by various methods to determine their sizes, structures and mechanisms. Throughout the project, we have realized LiDAR surveys and mappings, GPS and ground-based SAR and PS-InSAR studies, geophysical site measurements, and drilled wells where we have made downhole inclinometer, piezometer and TDR measurements periodically.

**SEISMIC HAZARD**

**Province Based Site Classification and Seismic Hazard Assessment**

The Institute continues its studies on urban transformation for Balıkesir Province after Kocaeli and Bursa Provinces. The studies focus on where and how an earthquake energy could be felt in the region considering the site properties of the province. Also, the activities of the existing and potential faults are continuously observed with the local seismological observation stations established in the scope of the project. Seismic Hazards of these fault systems, namely, how earthquakes would affect the regions, are determined with earthquake scenarios. The project’s outputs contribute much to the formation of an Earthquake Master Plan. It constitutes the background for engineering activities like planning residential areas, seismic reinforcement and design of buildings, and identifies the safe areas in all aspects as a basis for urban transformation.
We have monitored the lignite elongation in Soma Tertiary Basin, as the pilot study area, by integrated seismic methods. We have used a seismic vibrator with no harmful effect on environment in this method as a seismic source for the first time in Turkey; and achieved to minimize the need for drilling, which is widely applied in coal exploration activities, for fast and economical detection of lignite resources. This method can provide savings about 90% in cost and 75% in time in lignite exploration.
EARTH AND MARINE SCIENCES INSTITUTE
ADVANCED GEOLOGY TECHNOLOGIES
GEOLOGICAL RESEARCHES
BY ADVANCED TECHNOLOGIES
Advanced Geology
Technologies

Geochemical Researches
• Natural gas, shale gas, coal gas
• Geothermal and water geochemistry
• Health hazards of geological origin
• Stable isotope studies

Marine Geology
• Sedimentology
• Continental shelf studies
• Gas hydrate
• Sea bottom classification

Dating By Accelerated Mass Spectroscopy (AMS)
• Geological, archeological, hydrological and climatological dating
NATIONAL 1MV AMS LABORATORY
Turkey’s First National 1MV Accelerated Mass Spectroscopy Laboratory has been established in the Earth and Marine Sciences Institute so as to contribute to geological and archeological research. Thanks to this infrastructure, Turkey is now capable of dating research samples by Accelerated Mass Spectroscopy (AMS), which is currently the most sensitive analysis method in the world. Radiocarbon method makes it possible to date organic samples tracing back up to 50,000 years ago, and on various rock samples tracing back up to several million years ago, through the rare isotope analysis of longer half-life isotopes (10Be, 26Al and 41Ca). Also, as the first in the Middle East and Balkans, this laboratory is expected to eliminate foreign dependency in the field, to pave the way for novel and multi-disciplinary research and to allow domestic production of strategic data on Turkey’s cultural heritage, tectonic and environmental properties.

Establishment of National 1MV Accelerated Mass Spectroscopy Laboratory for Dating of Geological and Archeological Samples

Turkey’s First National 1MV Accelerated Mass Spectroscopy Laboratory has been established in the Earth and Marine Sciences Institute so as to contribute to geological and archeological research. Thanks to this infrastructure, Turkey is now capable of dating research samples by Accelerated Mass Spectroscopy (AMS), which is currently the most sensitive analysis method in the world. Radiocarbon method makes it possible to date organic samples tracing back up to 50,000 years ago, and on various rock samples tracing back up to several million years ago, through the rare isotope analysis of longer half-life isotopes (10Be, 26Al and 41Ca). Also, as the first in the Middle East and Balkans, this laboratory is expected to eliminate foreign dependency in the field, to pave the way for novel and multi-disciplinary research and to allow domestic production of strategic data on Turkey’s cultural heritage, tectonic and environmental properties.
TEST AND ANALYSIS SERVICES

Active Tectonics Research Laboratory Analyses

- Gravity measurements
- Seismic reflection data collection and evaluation
- Active multi channel 1-dimensional surface wave measurements (MASW)
- Passive multi channel 2-dimensional array based surface wave measurements (SPAC, FK)
- Microtremor H/V measurements
- Magnetic gradiometry measurements
- Continuous or campaign-type GPS measurements
- Magnetotelluric measurements
Accelerated Mass Spectroscopy Laboratory Analyses

- Carbon-14 dating by AMS
- Chemical pretreatment of samples like carbonized plants, seeds and woods, with standard acid-base-acid protocols and AMS dating
- Protein extraction from bone samples by ultrafiltration and AMS dating
- Alpha cellulose extraction from wood samples and age determination by AMS dating
- Chemical pretreatment of seashell samples and AMS dating
OUR PIONEERING PROJECTS

**2001-2003**
Urgent Observational Studies For The Earthquake Risk In Marmara Region And Istanbul Metropolitan Area. Continuous Seismological Observation Network For Marmara Region (MARSİS)

**2003-2005**
Seismic Zonation and GIS Studies For Yalova City Center

**2004-2006**
Frequent Observation-Driven Realistic Evaluation and Simulation of Interacting Geophysical Hazard Triggers (FORESIGHT) – EU FP6

**2005 - 2008**
Site Classification and Seismic Hazard Assessment for Kocaeli Province

**2006-2008**
Monitoring The Earthquake Activities of Marmara Region By Multi-disciplinary Methods And Surveying Their Potential Effects On The Coastline/Shelf Ground of Istanbul

**2006-2008**
Earthquake Aftershock Monitoring Project (DEPAR)

**2007 - 2008**
Monitoring The Earthquake Risk In Marmara Region And Istanbul Metropolitan Area. Continuous Seismological Observation Network For Marmara Region (MARSİS)

**2009 - 2015**
Establishment of National 1MV Accelerated Mass Spectroscopy Laboratory (AMS)

**2005 - 2010**
Multi-disciplinary Investigation of Earthquake Mechanisms In Turkey’s Various Geostrategic Regions Having High Risks of Earthquake But Different Tectonic Regimes (TÜRDEP)

**2001-2004**
Continuous GPS Observation Network of Marmara Region

**2006 - 2009**
Project For Improving Seismological Observation Infrastructure in Marmara Sea
2009-2012
Determination of Coal Seam Elongation In Soma Tertiary Basin By Integrated Seismic Methods, and Surveying and Modelling of the Coal Gas Potential

2010 - 2014
European Plate Observing System (EPOS) - EU FP7

2011-2013
Site Classification and Seismic Hazard Assessment for Bursa Province

2012-2016
New Directions in Seismic Hazard Assessment Through Focused Earth Observation in the Marmara Supersite (MARsite) - EU FP7

2013-2016
Investigation, Analysis And Monitoring of Various Landslide Areas In Beylikdüzü And Büyükçekmece Districts (HEYZEP)

2014-2015
Imaging of Test System Site’s Underground Structure By Geophysical Methods

2015-2019
Site Classification and Seismic Hazard Assessment for Balıkesir Province

2009-2012
Investigation of Possible Active Faults In The Land Areas of Istanbul And Development of Landslide Detection And Monitoring Methods Through Multi-disciplinary Studies On First Priority Landslide Areas

2012-2016
Research Studies For The Site Assessment Parameters of Sinop Nuclear Power Plant

2013-2016
“Seismology At School” Project (SİSMOKUL)
OUR COOPERATION MODELS

R&D PROJECTS WITH PRIVATE SECTOR COMPANIES
R&D PROJECTS WITH PUBLIC INSTITUTIONS
JOINT PROJECTS WITH INTERNATIONAL R&D INSTITUTIONS
TEST AND ANALYSIS SERVICES
TECHNOLOGY TRANSFER

National Funding Programs
• TÜBİTAK ARDEB (1003, 1004, 1007)
• TÜBİTAK TEYDEB (1501, 1505, 1511)

International Funding Programs
• TÜBİTAK BILATERAL/MULTILATERAL COOPERATION PROJECTS
• EU PROJECTS

For Further Information: www.mam.tubitak.gov.tr

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FOR R&D COOPERATIONS

If you have projects on which we can cooperate, please visit: dahaiyisimumkun.com/anket