



# Turkish-German Symposium on Seismotectonic Research in the Marmara Region

## Organizers

Ministry of Interior  
Disaster and Emergency Management Authority (AFAD)

&

German Research Center for Geosciences (GFZ)

16-17 August 2022  
İstanbul  
Türkiye

## **Aim and Objectives of the Symposium**

Turkish-German cooperation in the field of earthquake risk mitigation and seismology has long been successfully implemented by Research Institutions and Governmental Authorities on both sides since the early 1980s. The very first cooperation dates back to 1984 with the establishment of nine micro earthquake stations deployed over the Western Segment of the North Anatolian Fault Zone between Adapazarı and Mudurnu within the frame of the 'Turkish–German Joint Project for Earthquake Research'. In the frame of the Turkish and German joint project on earthquake prediction, in the western part of the North Anatolian fault zone, around the İzmit-Bolu area, a multidisciplinary earthquake research study was carried out since 1984. Since then, the collaboration has been intensified and expanded to many geoscientific disciplines with a focus on earthquake research. These activities ultimately led to implementing the downhole Geophysical Observatory at the North Anatolian Fault (GONAF) in the eastern Marmara region.

The Symposium celebrates four decades of joint Turkish-German seismotectonic research collaboration. The international partnership and joint achievements will be reviewed, current efforts will be presented and discussed, and future challenges of seismotectonic and seismological studies in the Marmara region will be envisioned. The symposium serves to present and discuss novel research results and identify knowledge gaps in order to define the objectives for future geoscientific research in this region. The Symposium will offer a good venue and opportunity for creating synergies between Turkish, German and international scientists.

The technical sessions to be held during the Symposium address the key topics covering, among others, studies to characterize the overdue Main Marmara fault to improve quantitative seismic hazard, and risk assessments, lessons learned from the last major earthquake in the region, the August 17, 1999, Kocaeli/İzmit Mw 7.6 earthquake. Participants are also expected to discuss further research topics and possibilities in the field of seismotectonics, monitoring seismic and aseismic deformation, earthquake physics, geodesy, seismic hazard assessment, earthquake engineering, and ultimately earthquake risk mitigation.

**Honour Committee / Onur Komitesi**

Gov. Mr. Yunus SEZER (President, AFAD)  
Prof. Dr. Susanne BUITER (Director, GFZ)

**Organization Committee / Organizasyon Komitesi**

Dr. Murat NURLU (AFAD)  
Prof. Dr. Marco BOHNHOFF (GFZ)  
Kerem KUTERDEM (AFAD)  
Dr. Patricia MARTÍNEZ-GARZÓN (GFZ)  
Meltem TÜRKOĞLU (AFAD)  
Prof. Dr. Fabrice COTTON (GFZ)  
Ayşe Sezin YILMAZ (AFAD)  
Turgay KURU (AFAD)  
Selim SEZER (AFAD)  
Bekir Murat TEKİN (AFAD)  
Teoman Selçuk KÖKSAL (AFAD)

**Local Organization Committee / Yerel Organizasyon Komitesi**

AFAD İstanbul

**Venue/Hotel:** The Symposium will take place in Istanbul at the GORRION HOTEL İSTANBUL (<https://www.gorrion.com>).

**Language:** Official Language of the Symposium is English. Turkish-English and English-Turkish translation will be provided.

# Day 1

## 16 August 2022

### Registration

09:00 – 10:00 | Registration

### Welcome Speeches

10:00-10:30 | Gov. Mr. Yunus SEZER (President, AFAD)  
Prof. Dr. Susanne BUITER (Director, GFZ)  
Gov. Mr. Ali YERLİKAYA (Governor of İstanbul), tbc  
H.E. Mr. Süleyman SOYLU (Minister, Republic of Türkiye, Ministry of Interior), tbc

### Seismotectonic setting of the Marmara region and current monitoring efforts

**Chair** | **Prof. Dr. Şerif BARIŞ (Kocaeli University)**

10:30-12:00

- Dr. Murat NURLU (Head, AFAD Earthquake Department)
- Prof. Dr. Marco BOHNHOFF (Head, Geomechanics and Scientific Drilling at GFZ)

### Lunch

12:00-14:00 | Lunch

### Session 1: Deformation Features along the Main Marmara Fault

**Chair** | **Prof. Dr. Leni SCHECK-WENDEROTH (GFZ)**

14:00-15:45  
(15 Min for each presentation)

- Deformation mechanisms along the Main Marmara Fault (Prof. Dr. Leni Scheck-Wenderoth & Dr. Mauro Cacace, GFZ)
- A new seismotectonic framework of the Marmara Sea in the light of 3D fault map and 3D Coulomb stress analysis (Prof. Dr. Cenk YALTIRAK, İstanbul Technical University)
- Seismic and aseismic fault slip during the inter-seismic period: observations from the Marmara region of the North Anatolian Fault (Dr. Patricia Martinez-Garzon, GFZ)
- Heterogeneous Interseismic Coupling along the Main Marmara Fault (Prof. Dr. Semih ERGİNTAV, BOUN-KOERI)
- Spatial variations of tectonic and postseismic fault creep along the Marmara seismic gap, north-western Turkey, based on high-resolution analysis of earthquake repeaters (Dr. Dirk Becker, GFZ)
- DISCUSSION

### Break

15:45-16:15 | Coffee / Tea Break

## Session 2: Seismic Hazard and Risk Assessment in the Marmara Region

**Chair**

**Prof. Dr. Ayşegül ASKAN (ODTU)**

16:15-18:00  
(15 Min for each  
presentation)

- Earthquake risk in Marmara Region (Prof. Dr. Mustafa ERDİK, TDV)
- Toward better predictions of future ground-motions and their variabilities. Lessons learned from “big-data” analysis and the development of the new generation of European seismic hazard and risk models (Prof. Dr. Fabrice Cotton, GFZ)
- Earthquake Hazard map of Türkiye (Dr. Nazan KILIÇ, AFAD)
- Factors influencing fault strength and its long-term seismic behavior - constraints from 3D thermo-hydraulic-mechanical modelling (Dr. Mauro Cacace, GFZ)
- Physics-based real-time ground motion modelling (Dr. Marco Pilz, GFZ)
- Analysis of the MW 5.8 Silivri Earthquake Ground Motions: Evidence of Systematic Azimuthal variations associated with directivity effects (Elif Türker, GFZ)
- DISCUSSION

## Dinner

18:30-21:00

Dinner

## Day 2 17 August 2022

### Session 3: 23rd Anniversary of the 17 August 1999 Marmara Earthquake & Studies on NAFZ

<b>Chair</b>	<b>Prof. Dr. Levent GÜLEN (Sakarya University )</b>
09:30-11:15 (15 Min for each presentation)	<ul style="list-style-type: none"><li>• Lessons learnt from 17 August 1999 Marmara Earthquake: How Türkiye progressed on earthquake risk management (Hamza TAŞDELEN, AFAD)</li><li>• Estimating Earthquake Source Parameters in the Sea of Marmara (Dr. Xiang Cheng , GFZ)</li><li>• Characteristics of South Marmara active fault segment of the North Anatolian Fault. (Dr. Selim ÖZALP General Directorate of Mineral Research and Expl. MTA)</li><li>• Earthquake faulting complexity in the Sea of Marmara: 2019 Mw=5.7 Silivri earthquake (Dr. Diğdem Acarel, Gebze Technical Univ.)</li><li>• Spatio-temporal evolution and stress perturbation of the September 2019 Silivri earthquakes on the semi-realistic 3D fault surfaces along the northern branch of the NAFZ (Dr. Murat ŞAHİN, Istanbul Technical University)</li><li>• Spatio-temporal variations of the seismic coupling along the western segment of the North Anatolian Fault, Turkey. (Amandine Amemoutou, GFZ)</li><li>• DISCUSSION</li></ul>

### Break

11:15-11:30 Coffee / Tea Break

### Session 4: Disaster Management in the Marmara Region

<b>Chair</b>	<b>Dr. Murat NURLU (AFAD)</b>
11:30-13:00 (15 Min for each presentation)	<ul style="list-style-type: none"><li>• Installing and Operating Earthquake Early Warning System in Bursa (Prof. Dr. Şerif BARIŞ, Kocaeli Univ.)</li><li>• Tomorrow's Cities (2019 – present) Urban Disaster Risk Hub Project, (Prof. Dr. Eser ÇAKTI, BOUN-KOERI)</li><li>• AFAD-RED Software: Tool for Preliminary Earthquake Damage Assessment (Yasin Fahjan, Istanbul Technical University)</li><li>• Tsunamis in Marmara Region (Prof. Dr. Ahmet Cevdet YALÇINER, ODTU)</li><li>• Istanbul is getting ready for the Big One: Reinforcement Activities of Schools and Hospitals. Studies of ISMEP (Kazım Gökhan ELGİN, İstanbul Project Cord. and Imp. Unit.)</li><li>• DISCUSSION</li></ul>

### Lunch

13:00-14:00 Lunch

### Session 5: Geomechanical models of the crust and lithosphere

<b>Chair</b>	<b><i>Dr. Patricia MARTÍNEZ-GARZÓN (GFZ)</i></b>
14:00-15:45 (15 Min for each presentation)	<ul style="list-style-type: none"><li>• Observations of the Contrasting Source mechanics of On-fault and Off-fault Earthquakes (Prof. Dr. Peter Malin, ASIR Seismic, USA)</li><li>• Seismic velocity contrast on the Ganos segment of the North Anatolian Fault Zone (Eşref YALÇINKAYA, Cerrahpaşa University)</li><li>• Kinematics and mechanics of the North Anatolian Fault in the Sea of Marmara: combining land and sea data (Prof. Dr. Pierre HENRY, CEREGE, France)</li><li>• Composite pull-apart structure development and cross basin fault generation around Bursa along the southern branch of North Anatolian Fault Zone (Prof. Dr. Gürol SEYİTOĞLU, Ankara University)</li><li>• Insights into the 3D lithospheric structure below the Sea of Marmara region from seismic tomography and forward gravity modeling (Dr. Naiara Fernandez, GFZ)</li><li>• Deciphering aseismic deformation along submarine fault branches below the eastern Sea of Marmara (Turkey): insights from seismicity, strainmeter, and GNSS data (Dr. Virginie Durand, ETH Zurich)</li><li>• DISCUSSION</li></ul>

### Break

15:45-16:00 | Coffee / Tea Break

### Session 6: Fault-zone characterization based on novel seismic processing techniques

<b>Chair</b>	<b><i>Prof. Dr. Fabrice COTTON (GFZ)</i></b>
16:00-17:45 (15 Min for each presentation)	<ul style="list-style-type: none"><li>• Seismogeodesic earthquake observation studies (Prof. Dr. Bahadır AKTUĞ, Ankara University)</li><li>• Spatial and temporal distribution of aseismic slip along the central North Anatolian Fault (Prof. Dr. Romain Jolivet (Ecole Normale Supérieur, France)</li><li>• Distributed Acoustic Sensing (DAS): Overview and potential of new subsurface sensing method (Prof. Dr. Charlotte Krawczyk, GFZ)</li><li>• Structures of database earthquake analysis system in AFAD (Meltem TÜRKOĞLU, AFAD)</li><li>• The future of strainmeter technology. (Dr. Wade Johnson, Dr. Dave Mencin (UNAVCO, USA)</li><li>• DISCUSSION</li></ul>

### Closing Session

17:45-18:30 | Prof. Bohnhoff & Dr. Nurlu

### Dinner

19:00-21:00 | Dinner