

**Proceedings of the  
Third European Conference  
on  
Earthquake Engineering and Seismology –  
3ECEES**

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## Preface

The Third European Conference on Earthquake Engineering and Seismology (3ECEES) was organized in Bucharest (Romania) in September 2022 by the Romanian Association for Earthquake Engineering (ARIS), Technical University of Civil Engineering of Bucharest (UTCBS) and National Institute for Earth Physics (NIEP). This outstanding scientific event is the third in a series started in 2006 in Genève, Switzerland and continued in 2014 in Istanbul, Turkey.

On average, Bucharest experienced two strong devastating earthquakes per century. In the twentieth century, the capital city of Romania was severely exposed to November 10, 1940 and March 4, 1977 Vrancea intermediate-depth earthquakes. The November 10, 1940 earthquake, with a moment magnitude of 7.7, is the strongest seismic event in the past 100 years in Romania and it ranks as the largest intermediate-depth earthquake that occurred in Europe in the twentieth century. This seismic event caused a high death toll (more than 550 people) and more than 1200 casualties, as well as very heavy damage in the epicentral region and hundreds of kilometers away from the epicenter. In Bucharest, the tallest reinforced concrete structure at that time – Carlton building – completely collapsed. The March 4, 1977 earthquake, with a moment magnitude of 7.4, was Romania's largest natural disaster in the twentieth century. Thirty-two medium- and high-rise buildings collapsed in Bucharest, killing more than 1400 people and injuring more than 7000 residents. The seismological and engineering lessons bitterly learnt at that time were immediately embedded in a completely revised compulsory building code for seismic design, constantly improved since then.

This electronic volume presents the proceedings of the Third European Conference on Earthquake Engineering and Seismology and collect the accepted contributions submitted by the participants in the 3ECEES. More than five hundred papers share the collective wisdom in the fields of earthquake engineering and seismology. The topics addressed by the accepted contributions cover a wide variety of issues and challenges for both engineers and seismologists listed in a non-exhaustive manner as follows: seismicity, engineering seismology, seismic hazard, fragility/vulnerability, risk and resilience, geotechnical and structural earthquake engineering,

The Third European Conference on Earthquake Engineering and Seismology (3ECEES) fully benefited of the outstanding cooperation of the International Organizing Committee, International Scientific Committee, International Advisory Committee and Local Organizing Committee. The editors of this proceedings volume extend their gratitude to all the members of the 3ECEES Committees.

We acknowledge the incredible hand extended by the European Association for Earthquake Engineering (EAEE) and European Seismological Commission (ESC) by entrusting Romania to organize the Third European Conference on Earthquake Engineering and Seismology (3ECEES) in Bucharest.

A final word of gratitude is for the reviewers of the contributions submitted to 3ECEES who performed an outstanding task in enhancing the quality of the submitted manuscripts.

Cristian Arion

Alexandra Scupin

Bucharest, July 2022

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