

# Preface

The November 10, 1940 Vrancea intermediate-depth earthquake, with a moment magnitude  $M_W = 7.7$ , 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 *National Symposium 75 Years from November 10th 1940 Vrancea Earthquake* took place on November 10, 2015 at the *Technical University of Civil Engineering of Bucharest (UTCB)*. The symposium aimed at sharing the lessons learnt after 1940 Vrancea earthquake and the research progresses in seismology and earthquake engineering in Romania 75 years after. The event was jointly organized by *UTCB* (through the *Seismic Risk Assessment Research Center*) and *National Institute for Earth Physics (INFP)* with the support of *Romanian Association of Civil Engineers (AICR)*.

The symposium greatly benefited from the comprehensive and professional support of the Scientific and Organizing Committees. The full list of the Committees' members is given in Appendix A.

The symposium's Scientific and Organizing Committees invited specialists from academia, researchers, and practitioners to participate and to contribute with scientific papers to this event. At the time of the symposium, a Book of Abstracts published by CONSPRESS (the publishing house of the Technical University of Civil Engineering of Bucharest) was distributed to the participants. Fifty-two abstracts were received and published. The distribution of the abstracts in between the topics was as follows:

- 11 in Topic 1—Effects and Lessons from November 10th, 1940 Vrancea Earthquake
- 20 in Topic 2—Seismicity of Romania. Seismic Hazard Assessment; Local Soil Conditions Effect

- 12 in Topic 3—Structural Design in Seismic Areas; Performance-Based Design
- 9 in Topic 4—Seismic Evaluation and Rehabilitation. Seismic Risk Assessment.

A very well-balanced distribution of contributions between seismology and earthquake engineering was achieved during the symposium. The detailed program of the symposium is presented in Appendix B.

Because of the harsh times in the fifth decade of the past century, the lessons learnt after 1940 Vrancea earthquake were not extensively and completely shared with the international scientific community and thus, this book is trying to fill a gap in the knowledge acquired after major disasters.

Most of the original relevant literature concerning the 1940 Vrancea earthquake is in Romanian, so it is not available for the international scientific community. Moreover, even though the relevant scientific information in the past 25 years is in English, each journal article considers the November 10, 1940 Vrancea earthquake as a piece in the great puzzle that represents the intermediate-depth seismicity of Vrancea. This book gathers altogether the relevant information about this destructive earthquake in one compelling piece and offers to the international scientific community the opportunity to study in depth one of the most important earthquakes in Europe in the twentieth century. To this aim, the seismic effects of 1940 Vrancea earthquake are revisited with the state-of-the-art knowledge to acquire and share the most important lessons.

The lessons learnt and the current understanding of the 1940 Vrancea earthquake are presented to the reader along with state-of-the-art information on the seismicity of Romania, seismic hazard and risk assessments and seismic evaluation and rehabilitation of buildings and structures. Moreover, a collection of genuine information from Romanian post-disaster reports and textbooks concerning the 1940 Vrancea earthquake, compiled and translated into English, accompanies the book. An English translation of the chronicle of the aftermath of November 10, 1940 disaster is presented in Appendix C.

The most valuable full papers submitted were selected by the international reviewers and members of Scientific Committee and are published in this contributed volume. The book contains the Proceedings of the Symposium Commemorating 75 years from November 10, 1940 Vrancea Earthquake and includes, inter alia, most of the available information on this major seismic event and its consequences. The proceedings are structured in four parts, namely:

1. Effects and Lessons from November 10, 1940 Vrancea Earthquake
2. Seismicity of Romania. Seismic Hazard Assessment; Local Soil Conditions Effect
3. Structural Design in Seismic Areas; Performance-Based Design
4. Seismic Evaluation and Rehabilitation. Seismic Risk Assessment.

The sharing of the 34 chapters in between the parts is as follows: eight in Part I, twelve in Part II, six in Part III, and eight in Part IV. Again, a very good balance between the chapters addressing engineering seismology (Part II) and earthquake

engineering (Parts III and IV) is achieved. Each chapter starts with an overview that provides a summary of the papers included.

Each chapter has benefitted from the professional input and hard work of the following coordinators: Alexandru Aldea and Mircea Radulian (Part I), Mihaela Popa and Florin Pavel (Part II), Viorel Popa (Part III) and Carmen Cioflan and Mihail Iancovici (Part IV). The coordinators liaised with the authors and the reviewers and ensured the scientific quality and relevance of the manuscripts. The full list of the reviewers, to whom we are deeply indebted for their excellent timely work, is given as follows:

- Alexandru Aldea (Technical University of Civil Engineering of Bucharest, Romania)
- Anastasios Anastasiadis (Aristotle University of Thessaloniki, Greece)
- Luminița Ardeleanu (National Institute for Earth Physics, Magurele, Romania)
- Andrei Bala (National Institute for Earth Physics, Magurele, Romania)
- Alex Barbat (Universitat Politècnica de Catalunya • BarcelonaTech, Spain)
- Virgil Breabăn (“Ovidius” University of Constanta, Romania)
- Mihai Budescu (Technical University “Gheorghe Asachi” of Iasi, Romania)
- John Douglas (University of Strathclyde, Glasgow, Scotland, United Kingdom)
- Emil-Sever Georgescu (National Institute for Research and Development in Constructions, Urbanism and Sustainable Land Planning URBAN-INCERC, Bucharest, Romania)
- Athanassios Ganas (Institute of Geodynamics, National Observatory of Athens, Greece)
- Daniel Grecea (Politechnica University of Timisoara, Romania)
- Marian Ivan (Faculty of Geology and Geophysics, University of Bucharest, Romania)
- Mihaela Kouteva-Guentcheva (Faculty of Structural Engineering, University of Architecture, Civil Engineering and Geodesy, Sofia, Bulgaria)
- Grzegorz Lizurek (Institute of Geophysics PAS, Warszawa, Poland)
- Eugen Lozincă (Technical University of Civil Engineering of Bucharest, Romania)
- Gheorghe Mărmureanu (National Institute for Earth Physics, Magurele, Romania)
- Öcal Necmioğlu (Department of Geophysics, Boğaziçi University, Istanbul, Turkey)
- Florin Pavel (Technical University of Civil Engineering of Bucharest, Romania)
- Mircea Petrina (Technical University of Cluj-Napoca, Romania)
- Radu Petrovici (University of Architecture and Urbanism “Ion Mincu”, Bucharest, Romania)
- Kyriazis Pitilakis (Aristotle University of Thessaloniki, Greece)
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- Viorel Popa (Technical University of Civil Engineering of Bucharest, Romania)
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- Peter Varga (MTA CSFK Geodetic and Geophysical Institute, Budapest, Hungary)
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Radu Vacareanu  
Constantin Ionescu

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