Earthquake Microzoning

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Earthquake Resistant Design and Risk Reduction - David J. Dowrick 2009-07-20
Earthquake Resistant Design and Risk Reduction, 2nd edition is based upon global research and development work over the last 50 years or more, and follows the author's series of three books Earthquake Resistant Design, 1st and 2nd editions (1977 and 1987), and Earthquake Risk Reduction (2003). Many advances have been made since the 2003 edition of Earthquake Risk Reduction, and there is every sign that this rate of progress will continue apace in the years to come. Compiled from the author's wide design and research experience in earthquake engineering and engineering seismology, this key text provides an excellent treatment of the complex multidisciplinary process of earthquake resistant design and risk reduction. New topics include the creation of low-damage structures and the spatial distribution of ground shaking near large fault ruptures. Sections on guidance for developing countries, response of buildings to differential settlement in liquefaction, performance-based and displacement-based design and the architectural aspects of earthquake resistant design are heavily revised. This book: Outlines individual national weaknesses that contribute to earthquake risk to people and property Calculates the seismic response of soils and structures, using the structural continuum "Subsoil – Substructure – Superstructure – Non–structure" Evaluates the effectiveness of given design and construction procedures for reducing casualties and financial losses Provides guidance on the key issue of choice of structural form Presents earthquake resistant design methods for the main four structural materials – steel, concrete, reinforced masonry and timber – as well as for services equipment, plant and non-structural architectural components Contains a chapter devoted to problems involved in improving (retrofitting) the existing built environment This book is an invaluable reference and guiding tool to practising civil and structural engineers and architects, researchers and postgraduate students in earthquake engineering and engineering seismology, local governments and risk management officials.
Development of Techniques for Earthquake Microzonation Studies in Different Urban Environment - Angelo Strollo 2010
The proliferation of megacities in many developing countries, and their location in areas where they are exposed to a high risk from large earthquakes, coupled with a lack of preparation, demonstrates the requirement for improved capabilities in hazard assessment, as well as the rapid adjustment and development of land-use planning. In particular, within the context of seismic hazard assessment, the evaluation of local site effects and their influence on the spatial distribution of ground shaking generated by an earthquake plays an important role. It follows that the carrying out of earthquake microzonation studies, which aim at identify areas within the urban environment that are expected to respond in a similar way to a seismic event, are essential to the reliable risk assessment of large urban areas. Considering the rate at which many large towns in developing countries that are prone to large earthquakes are growing, their seismic microzonation has become mandatory. Such activities are challenging and techniques suitable for identifying site effects within such

contexts are needed. In this dissertation, I develop techniques for investigating large-scale urban environments that aim at being non-invasive, cost-effective and quickly deployable. These peculiarities allow one to investigate large areas over a relative short time frame, with a spatial sampling resolution sufficient to provide reliable microzonation. Although there is a negative trade-off between the completeness of available information and extent of the investigated area, I attempt to mitigate this limitation by combining two, what I term layers, of information: in the first layer, the site effects at a few calibration points are well constrained by analyzing earthquake data or using other geophysical information (e.g., shear-wave velocity profiles); in the second layer, the site effects over a larger areal coverage are estimated by means of single-station noise measurements. The microzonation is performed in terms of problem-dependent quantities, by considering a proxy suitable to link information from the first layer to the second one. In order to define the microzonation approach proposed in this work, different methods for estimating site effects have been combined and tested in Potenza (Italy), where a considerable amount of data was available. In particular, the horizontal-to-vertical spectral ratio computed for seismic noise recorded at different sites has been used as a proxy to combine the two levels of information together and to create a microzonation map in terms of spectral intensity ratio (SIR). In the next step, I applied this two-layer approach to Istanbul (Turkey) and Bishkek (Kyrgyzstan). A similar hybrid approach, i.e., combining earthquake and noise data, has been used for the microzonation of these two different urban environments. For both cities, after having calibrated the fundamental frequencies of resonance estimated from seismic noise with those obtained by analysing earthquakes (first layer), a fundamental frequency map has been computed using the noise measurements carried out within the town (second layer). By applying this new approach, maps of the fundamental frequency of resonance for Istanbul and Bishkek have been published for the first time. In parallel, a microzonation map in terms of SIR has been incorporated into a risk scenario for the Potenza test site by means of a dedicated regression between spectral intensity (SI) and macroseismic intensity (EMS). The scenario study confirms the importance of site effects within the risk chain. In fact, their introduction into the scenario led to an increase of about 50% in estimates of the number of buildings that would be partially or totally collapsed. Last, but not least, considering that the approach developed and applied in this work is based on measurements of seismic noise, their reliability has been assessed. A theoretical model describing the self-noise curves of different instruments usually adopted in microzonation studies (e.g., those used in Potenza, Istanbul and Bishkek) have been considered and compared with empirical data recorded in Cologne (Germany) and Gubbio (Italy). The results show that, depending on the geological and environmental conditions, the instrumental noise could severely bias the results obtained by recording and analysing ambient noise. Therefore, in this work I also provide some guidelines for measuring seismic noise.

Individual Studies by Participants at the International Institute of Seismology and Earthquake Engineering - International Institute of Seismology and Earthquake Engineering 1991

Vrancea Earthquakes: Tectonics, Hazard and Risk Mitigation - F. Wenzel 2012-12-06

This volume contains the most relevant peer-reviewed papers presented at The First International Workshop on Vrancea Earthquakes, held in Bucharest on November 1-4, 1997. Strong earthquakes in the Romanian Vrancea area have caused a high toll of casualties and extensive damage over the last several centuries. With a moment magnitude of 7.4, the 1977 earthquake caused more than 1500 casualties, the majority of them in Bucharest. The contributions address key problems of seismotectonics of the Vrancea area and related strong ground motion, hazard assessment, site effects and microzonation, structural damage and earthquake resistant design, risk assessment and disaster management from an international and regional perspective. This list of topics shows the diverse contributions from the multidisciplinary fields of geosciences, geophysics, seismology, geology, civil engineering, city planning, and emergency

relief practices. This book is of value for scientists interested in earthquake hazard and seismic risk research as well as for seismologists, geophysicists and Earth scientists. It is also useful for authorities responsible for public safety and natural hazard mitigation plans and for insurance companies.

Proceedings of the Second International Conference on Microzonation for Safer Construction -- Research and Application, Nov. 26-Dec. 1, 1978 - 1979

Recent Advances in Earthquake Geotechnical Engineering and Microzonation - Atilla Ansal 2006-09-27

Outstanding advances have been achieved on Earthquake Geotechnical Engineering and Microzonation in the last decade mostly due to the increase in the recorded instrumental in-situ data and large number of case studies conducted in analyzing the observed effects during the recent major earthquakes. During the 15th International Conference on Soil Mechanics and Geotechnical Engineering held in Istanbul in August 2001, the Technical Committee of Earthquake Geotechnical Engineering, (TC4) of the International Society of Soil Mechanics and Geotechnical Engineering organised a regional seminar on Geotechnical Earthquake Engineering and Microzonation where an effort has been made to present the recent advances in the field by eminent scientists and researchers. The book idea was first suggested by the participants of this seminar. The purpose of this book as well as of the seminar was to present the broad spectrum of earthquake geotechnical engineering and seismic microzonation including strong ground motion, site characterisation, site effects, liquefaction, seismic microzonation, solid waste landfills and foundation engineering. The subject matter requires multidisciplinary input from different fields of engineering seismology, soil dynamics, geotechnical and structural engineering. The chapters in this book are prepared by some of the distinguished lecturers who took part in the seminar supplemented with contributions of few distinguished experts in the field of earthquake geotechnical engineering. The editor would like to express his gratitude to all authors for their interest and efforts in preparing their manuscripts. Without their enthusiasm and support, it would not have been possible to complete this book.

Informal Settlements, Environmental Degradation, and Disaster Vulnerability - Ronald Parker 1995-01-01

The collection of papers in the book Property Rights and the Environment: Social and Ecological Issues, (*) and this companion volume examine the relationships between people, the environment, and property rights and the ways in which a given social and ecological context affects those relationships. The papers are products of a research program at the Royal Swedish Academy of Sciences, Stockholm. The main objective of the program was to convene social scientists and natural scientists to address research questions in their full social and ecological dimensions. The program's participants addressed five general issues related to property rights and the environment: (1) the design of governance systems for sustainability; (2) the relationship between equity, stewardship, and environmental resilience; (3) the use of traditional knowledge in resource management, (4) the mechanisms that link people to their environments, and (5) the role played by population and poverty. This volume presents case studies that address questions of design application in those five areas. (*) Also available: Property Rights and the Environment: Social and Ecological Issues. (ISBN 0-8213-3415-8) Stock No. 13415.

NASA Technical Translation - 1966

Earthquake Geotechnical Engineering for Protection and Development of Environment and Constructions - Francesco Silvestri 2019-10-22

Earthquake Geotechnical Engineering for Protection and Development of Environment and Constructions contains invited, keynote and theme lectures and regular papers presented at the 7th International Conference on Earthquake Geotechnical Engineering (Rome, Italy, 17-20 June 2019. The contributions deal with recent developments and advancements as well as case histories, field monitoring, experimental characterization, physical and analytical modelling, and applications related to the variety of environmental phenomena induced by earthquakes in soils and their effects on engineered systems interacting with them. The

book is divided in the sections below: Invited papers Keynote papers Theme lectures Special Session on Large Scale Testing Special Session on Liquefact Projects Special Session on Lessons learned from recent earthquakes Special Session on the Central Italy earthquake Regular papers Earthquake Geotechnical Engineering for Protection and Development of Environment and Constructions provides a significant up-to-date collection of recent experiences and developments, and aims at engineers, geologists and seismologists, consultants, public and private contractors, local national and international authorities, and to all those involved in research and practice related to Earthquake Geotechnical Engineering.

Proceedings of the World Conference on Earthquake Engineering - 1992

Each of the volumes for the 1984 conference deals with one or more topics related to earthquake engineering.

Historic Cities in the Face of Disasters - Fatemeh Farnaz Arefian 2021-10-15

This book examines reconstruction and resilience of historic cities and societies from multiple disciplinary and complementary perspectives and, by doing so, it helps researchers and practitioners alike, among them reconstruction managers, urban governance and professionals. The book builds on carefully selected and updated papers accepted for the 2019 Silk Cities international conference on 'reconstruction, recovery and resilience of historic cities and societies', the third Silk Cities conference held in L'Aquila, Italy, 10-12 July 2019, working with University of L'Aquila and UCL. This multi-scale, and multidisciplinary book offers cross-sectoral and complimentary voices from multiple stakeholders, including academia, urban governance, NGOs and local populations. It examines post-disaster reconstruction strategies and case studies from Europe, Asia and Latin America that provide a valuable collection for anyone who would like to get a global overview on the subject matter. It thereby enables a deeper understanding of challenges, opportunities and approaches in dealing with historic cities facing disasters at various geographical scales. Additionally, it brings together historical approaches to the reconstruction of historical cities and those of more recent times. Thus, it can be used as a reference book for global understanding of the subject matter.

Bibliography and Index of Geology - 1990

Earthquake Engineering - Y-X. Hu 1996-07-18

A unified presentation of engineering seismology and earthquake-resistant design, this book presents a wide ranging coverage of the whole subject of earthquake engineering so that the reader is given a clear appreciation of earthquakes before dealing with their effects on structures. In addition, newer mathematical modelling techniques are introduced which can be powerful tools for assessing and dealing with the risks associated with design and construction in seismic regions.

Bulletin of the New Zealand National Society for Earthquake Engineering - 1997

Proceedings of the Second International Conference on Microzonation for Safer Construction--Research and Application, San Francisco, California, U.S.A., November 26-December 1, 1978 - 1978

Recent Advances in Earthquake Geotechnical Engineering and Microzonation - Atilla Ansal 2006-04-11

Outstanding advances have been achieved on Earthquake Geotechnical Engineering and Microzonation in the last decade mostly due to the increase in the recorded instrumental in-situ data and large number of case studies conducted in analyzing the observed effects during the recent major earthquakes. During the 15th International Conference on Soil Mechanics and Geotechnical Engineering held in Istanbul in August 2001, the Technical Committee of Earthquake Geotechnical Engineering, (TC4) of the International Society of Soil Mechanics and Geotechnical Engineering organised a regional seminar on Geotechnical Earthquake Engineering and Microzonation where an effort has been made to present the recent advances in the field by eminent scientists and researchers. The book idea was first suggested by the participants of this seminar. The purpose of this book as well as of the seminar was to present the broad spectrum of earthquake geotechnical engineering and seismic microzonation including

strong ground motion, site characterisation, site effects, liquefaction, seismic microzonation, solid waste landfills and foundation engineering. The subject matter requires multidisciplinary input from different fields of engineering seismology, soil dynamics, geotechnical and structural engineering. The chapters in this book are prepared by some of the distinguished lecturers who took part in the seminar supplemented with contributions of few distinguished experts in the field of earthquake geotechnical engineering. The editor would like to express his gratitude to all authors for their interest and efforts in preparing their manuscripts. Without their enthusiasm and support, it would not have been possible to complete this book.

Applied Mechanics Reviews - 1993

Seismic Ground Motion In Large Urban Areas - Giuliano F. Panza 2004-04-23

The accelerated, and often uncontrolled, growth of the cities has contributed to the ecological transformation of their immediate surroundings. Factors contributing to the urban vulnerability include: lowering or rising of the water table, subsidence, loss of bearing capacity of soil foundations and instability of slopes. Recent catastrophic earthquakes highlight the poor understanding by decision makers of seismic related risk, as well as the tendency of some builders to use the cheapest designs and construction materials to increase short-term economic returns on their investment. Losses from earthquakes will continue to increase if we do not shift towards proactive solution. Disaster reduction is both an issue for consideration in the sustainable development agenda and a cross-cutting issue relating to the social, economic, environmental and humanitarian sectors. As location is the key factor, which determines the level of risk associated with a hazard, land-use plans and mapping should be used as tools to identify the most suitable usage for vulnerable areas.

National Clearinghouse for Loma Prieta Earthquake Information Catalog - 1991

Earthquake Hazards and Mitigation - R. Ayothiraman 2008

discusses the new developments in the field of earthquake engineering and allied areas, " gives information about present state-of-the-art and current practices adopted globally in prediction and mitigation of earthquake hazards, " explores novel and innovative methods for prediction and mitigation of hazards considering the future earthquakes for building sustainable/ safe infrastructures and ensuring safety of community.

Proceedings of the Seventh European Conference on Earthquake Engineering - 1982

Earthquake Risk Reduction - David J. Dowrick 2003-09-12

Encompassing theory and field experience, this book covers all the main subject areas in earthquake risk reduction, ranging from geology, seismology, structural and soil dynamics to hazard and risk assessment, risk management and planning, engineering and the architectural design of new structures and equipment. Earthquake Risk Reduction outlines individual national weaknesses that contribute to earthquake risk to people and property; calculates the seismic response of soils and structures, using the structural continuum 'Subsoil - Substructure - Superstructure - Non-structure'; evaluates the effectiveness of given designs and construction procedures for reducing casualties and financial losses; provides guidance on the key issue of choice of structural form; presents earthquake resistant designs methods for the four main structural materials - steel, concrete, reinforced masonry and timber - as well as for services equipment, plant and non-structural architectural components; contains a chapter devoted to problems involved in improving (retrofitting) the existing built environment. Compiled from the author's extensive professional experience in earthquake engineering, this key text provides an excellent treatment of the complex multidisciplinary process of earthquake risk reduction. This book will prove an invaluable reference and guiding tool to practicing civil and structural engineers and architects, researchers and postgraduate students in seismology, local governments and risk management officials.

Earthquakes and Their Impact on Society - Sebastiano D'Amico 2015-09-28

This book provides an integrated approach to the assessment of seismic hazards. The

reduction of losses expected by future earthquakes is probably the most important contribution of seismology to society. Large earthquakes occurred in densely populated areas highlight the dramatic inadequacy of a massive portion of the buildings demonstrating the high risks of modern industrial societies. Building earthquake-resistant structures and retrofitting old buildings on a national scale can be extremely expensive and can represent an economic challenge even for developed western countries. Earthquakes can cause also several psychological problems due to the fact that such kind of disasters will result in casualties, collapsing of houses, strategic buildings and facilities and deeply affect a community. Moreover in our society it is necessary to properly plan emergency responses and rescues taking into account any possible secondary effect in order to avoid more casualties.

The Assessment and Mitigation of Earthquake Risk - Unesco 1978

Proceedings of the Second International Conference on Microzonation for Safer Construction - Research and Application, San Francisco, California, U.S.A. November 26-December 1, 1978 - 1979

Assessing and Managing Earthquake Risk - Carlos Sousa Oliveira 2007-12-04

* Multidisciplinary approach of risk assessment and management, which can provide more efficient earthquake mitigation. * Transfer of Geo-scientific and engineering knowledge to Civil Protection and insurance agents * Approaches and common practices directly related to the preparation of earthquake emergency plans * Illustrated examples of actual applications, including web sites * Case-studies and information on relevant international projects

Bulletin of the New Zealand Society for Earthquake Engineering - 1973

Geotechnical Engineering For Disaster Mitigation And Rehabilitation 2011 - Proceedings Of The 3rd Int'l Conf Combined With The 5th Int'l Conf On Geotechnical And Highway Engineering - Practical Applications, Challenges And Opportunities (With Cd-rom) - S P R Wardani 2011-05-10

This proceedings contains 89 papers from 25 countries and regions, including 14 keynote lectures and 17 invited lectures, presented at the Third International Conference on Geotechnical Engineering for Disaster Mitigation and Rehabilitation (3ICGEDMAR 2011) together with the Fifth International Conference on Geotechnical & Highway Engineering (5ICGHE), which was held in Semarang, Indonesia, from 18 to 20 May 2011. This is the third conference in the GEDMAR conference series. The first was held in Singapore from 12 to 13 December 2005 and the second in Nanjing, China, from 30 May to 2 June 2008.The proceedings is divided into three sections: keynote papers, invited papers and conference papers under which there are six sub-sections: Case Studies on Recent Disasters; Soil Behaviours and Mechanisms for Hazard Analysis; Disaster Mitigation and Rehabilitation Techniques; Risk Analysis and Geohazard Assessment; Innovation Foundations for Rail, Highway, and Embankments; and Slope Failures and Remedial Measures.The conference is held under the auspices of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) Technical Committee TC-303: Coastal and River Disaster Mitigation and Rehabilitation, TC-203: Earthquake Geotechnical Engineering and Associated Problems, TC-302: Forensic Geotechnical Engineering, TC-304: Engineering Practice of Risk Assessment and Management, TC-213: Geotechnics of Soil Erosion, TC-202: Transportation Geotechnics, TC-211: Ground Improvement, Southeast Asian Geotechnical Society (SEAGS), Association of Geotechnical Societies in Southeast Asia (AGSSEA), and Road Engineering Association of Asia & Australasia (REAAA).

Earthquake Microzoning - Antoni Roca 2012-12-06

In many past and recent earthquakes it has been shown that the local conditions and, in particular, the local geology have a great influence on the observed seismic ground motion and, consequently, on the damage distribution in housing, industrial stock, and life-lines. Seismic microzoning is the usual procedure to have these local effects taken into account for

engineering design and land-use planning, being a useful tool for earthquake risk mitigation. This volume presents a collection of papers mainly originated from a workshop on Seismic Microzoning, organized during the 23rd General Assembly of the European Geophysical Society (EGS) in Nice, France in April 1998. The workshop dealt with various geophysical tools for analysing the effects of the local soils of subsurface geology on seismic ground motion, namely the methods using experimental data such as microtremors, and the theoretical/numerical 1-D and 2-D modelling methods. Additional contributions discussing techniques for characterising soil properties, microzoning applications to several urban areas, and others were added to the volume to broaden this important topic.

Engineering Geological Mapping - W. R. Dearman 2013-10-22

Engineer Geologic Mapping is a guide to the principles, concepts, methods, and practices involved in geological mapping, as well as the applications of geology in engineering. The book covers related topics such as the definition of engineering geology; principles involved in geological mapping; methods on how to make engineering geological maps; and rock and soil description and classifications. Also covered in the book are topics such as the different kinds of engineering geological mapping; the zoning concept in engineering geological mapping; terrain evaluation; construction sites; and land and water management. The text is recommended for engineers and geologists who would like to be familiarized with the concepts and practices involved in geological mapping.

Proceedings of the International Conference on Microzonation for Safer Construction Research and Application - 1972

Development of Seismic Microzonation Maps Using GIS - Adi Safyan Yahya 2014-05-26

This book demonstrates how to make seismic hazard maps that consists of ground shaking hazard map, liquefaction hazard map, landslides hazard map, surface faulting hazard map and tsunami hazard map by using Geographic Information Systems (GIS). The maps created through series of analysis of parameters that influence the effects of the earthquake such as seismological data (i.e. peak ground acceleration, fault line), geological data (i.e. rock and soil formation), geotechnical data (i.e. soil type, groundwater distribution and depth), geophysical data (contour), and tsunami data. By doing weighting the parameters that influence the effects of the earthquakes, it will generate maps showing the areas that have an earthquake hazard level, identified as low, medium, or high hazard effects. The resulting maps are very useful for the development of a city, where the settlement is directed to areas that have low hazard effects, and some recommendations have to be taken in designing facilities in high or medium hazard effects. This book is very useful for student of GIS, GIS practitioners, urban planner, or those working in the field of disaster management.

Abstract Journal in Earthquake Engineering - 1993

Seismic Hazards and Land-use Planning - Donald R. Nichols 1974

Journal of Earthquake Prediction Research - 2000

Microzoning for Earthquake Effects in Wellington, N.Z. - Thomas Ludovic Grant-Taylor 1974

Comprehensive Seismic Zonation Schemes for Regions at Different Scales - T. G. Sitharam 2018-06-30

This book reviews and assesses the various methodologies for site characterization and site effect estimation to carry out seismic zonation at micro and macro levels. Readers will learn about the suitability of these methodologies for each level of zoning that needs to be assessed in order to optimize the resources for carrying out seismic zonation. The Indian sub-continent is highly vulnerable to earthquake hazards, and past studies have focused primarily on the Himalayan region (inter-plate zone) and the northeast region (subduction zone). The book improves understanding of the Peninsular India that also has significantly high seismicity and is prone to earthquakes of sizeable magnitude. Particular attention is given to the various methodologies for assessing seismic hazards, the

scales at which site characterizations are carried out, and optimal methods for zonation practices using site data and hazard indexes. Aimed at students, this book will be of use to post-graduates and doctoral students researching seismic zonation, hazard assessment and mitigation, and spatial data in earth sciences.
Earthquake Spectra - 1996

Earthquake Microzoning - Antoni Roca 2002-01-01
In many past and recent earthquakes it has been shown that the local conditions and, in particular, the local geology have a great influence on the observed seismic ground motion and, consequently, on the damage distribution in housing, industrial stock, and life-lines. Seismic microzoning is the usual procedure to have these local effects taken into account for engineering design and land-use planning, being a useful tool for earthquake risk mitigation. This volume presents a collection of papers mainly originated from a workshop on Seismic Microzoning, organized during the 23rd General Assembly of the European Geophysical Society (EGS) in Nice, France in April 1998. The workshop dealt with various geophysical tools for analysing the effects of the local soils of subsurface geology on seismic ground motion, namely the methods using experimental data such as microtremors, and the theoretical/numerical 1-D and 2-D modelling methods. Additional contributions discussing techniques for characterising soil properties, microzoning applications to several urban areas, and others were added to the volume to broaden this important topic.
Natural Hazards - 1978