Seismic Hazard Estimation Of Northern Iran Using Smoothed

Summarizes probabilistic seismic hazard assessment as it is practiced in various countries throughout the world. 59 reports are included covering 88 countries, which comprise about 80% of the inhabited land mass of the Earth. Over 100 maps.

Given the tremendous toll in human lives and attendant economic losses, it is appropriate that scientists are working hard to understand better earthquakes, with the aim of forecasting and, ultimately, predicting them. In the last decades increasing attention has been paid to the coseismic effects on the natural environment, creating a solid base of empirical data for the estimation of source parameters of strong earthquakes based on geological observations. The recently introduced INQUA scale (Environmental Seismic Intensity-ESI 2007 Scale) of macroseismic intensity clearly shows how the systematic study of earthquake surface faulting, coseismic liquefaction, tsunami deposits and other primary and secondary ground effects can be integrated with 'traditional' seismological and tectonic information to provide a better understanding of the seismicity level of an area and the associated hazards. At the moment this is the only scientific means of equating the seismic records to the seismic cycle time-spans extending the seismic catalogues even to tens of thousands of years, improving future seismic hazard analyses. This Special Publication covers some of the latest multidisciplinary work undertaken to achieve that aim. Eighteen papers from research groups from all continents address a wide range of topics related both to palaeoseismological studies and assessment of macroseismic intensity based only on the natural phenomena associated with an earthquake.

Earthquakes and Sustainable Infrastructure: Neodeterministic (NDSHA) Approach Guarantees Prevention Rather Than Cure communicates in one comprehensive volume the state-of-the-art scientific knowledge on earthquakes and related risks. Earthquakes occur in a seemingly random way and, in some cases, it is possible to trace seismicity back to the concept of deterministic chaos. Therefore, seismicity can be explained by a deterministic mechanism that arises as a result of various convection movements in the Earth’s mantle, expressed in the modern movement of lithospheric plates fueled by tidal forces. Consequently, to move from a perspective focused on the response to emergencies to a new perspective based on prevention and sustainability, it is necessary to follow this neodeterministic approach (NDSHA) to guarantee prevention, saving lives and infrastructure. This book describes in a complete and consistent way an effective explanation to complex structures, systems, and components, and prescribes solutions to practical challenges. It reflects the scientific novelty and promises a feasible, workable, theoretical and applicative attitude. Earthquakes and Sustainable Infrastructure serves a “commentary role” for developers and designers of critical infrastructure and unique installations. Commentary-like roles follow standard, where there is no standard. Mega-installations embody/potentiate risks; nonetheless, lack a comprehensive classic standard. Every compound is unique, one of its kind, and differs from others even of similar function. There is no justification to elaborate a common standard for unique entities. On the other hand, these specific installations, for example, NPPs, Naval Ports, Suez Canal, HazMat production sites, and nuclear waste deposits, impose security and safety challenges to people and the environment. The book offers a benchmark for entrepreneurs, designers, constructors, and operators on how to compile diverse relevant information on site-effects and integrate it into the best-educated guess to keep safe and secure, people and environment. The authors are eager to convey the entire information and explanations to our readers, without missing either accurate information or explanations. That is achieved by “miniaturization,” as much is possible, not minimization. So far, the neodeterministic method has been successfully applied in numerous metropolitan areas and regions such as Delhi (India), Beijing (China), Naples (Italy), Algiers (Algeria), Cairo (Egypt), Santiago de Cuba (Cuba), Thessaloniki (Greece), South-East Asia (2004), Tohoku, Japan (2011), Albania (2019), Bangladesh, Iran, Sumatra, Ecuador, and elsewhere. Earthquakes and Sustainable Infrastructure includes case studies from these areas, as well as suggested applications to other seismically active areas around the globe. NDSHA approaches confirm/validate that science is looming to warn. Concurrently, leaders and practitioners have to learn to use rectified science in favor of peoples' safety. State-of-the-art science does have the know-how to reduce casualties and structural damage from potential catastrophes to a bearable incident. The only book to cover earthquake prediction and preparation from a neo-deterministic (NDSHA) approach Includes case studies from metropolitan areas where the neo-deterministic method has been successfully applied Editors and authors include top experts in academia, disaster prevention, and preparedness management

In this report we present new probabilistic seismic hazard maps for Guam and the Northern Mariana Islands (fig. 1). These two United States territories, together composing the Mariana Islands group, lie in the western North Pacific Ocean along the Mariana arc about three quarters of the distance from Hawaii to the Philippines and halfway between Japan and New Guinea.

The seismic hazard at Vandenberg AFB was investigated using both statistical analysis of the temporal and spatial distribution of historic earthquake activity within 500 km of Point Arguello, California, and deterministic methods based on knowledge of earthquake faults and recency of faulting near the installation. The results of these studies included probabilistic estimates of peak ground motions and maximum credible ground motions at Vandenberg AFB. This information was used to generate horizontal design response spectra which are more directly applicable for the analysis of the behavior of engineering structures to earthquake induced motions.

Aqaba and Elat are very important port and recreation cities for the Hashemite Kingdom of Jordan and Israel, respectively. The two cities are the most susceptible to damage from a destructive future earthquake because they are located over the tectonically active Dead Sea transform fault (DST) that is the source of most of the major historical earthquakes in the region. The largest twentieth century earthquake on the DST, the magnitude Mw 7.2 Nuweiba earthquake of November 22, 1995, caused damage to structures in both cities. The integration of geological, geophysical, and earthquake engineering studies will help to assess the seismic hazards by determining the location and slip potential of active faults and by mapping areas of high liquefaction susceptibility. Ground Penetrating Radar (GPR) as a high resolution shallow geophysical tool was used to map the shallow active faults in Aqaba, Taba Sabkha area, and Elat. The GPR data revealed the onshore continuation of the Evrona, West Aqaba, Aqaba fault zones, and several transverse faults. The integration of offshore and onshore data confirm the extension of these faults along both sides of the Gulf of Aqaba. A 3D model of GPR data at one site in Aqaba indicates that the NW-trending transverse faults right laterally offset older than NE-trending faults. The most hazardous fault is the Evrona fault which extends north to the Tabs Sabkha. A geographic information system (GIS) database of the seismic hazard was created in order to facilitate the analyzing, manipulation, and updating of the input parameters. Liquefaction potential maps were created for the region based on analysis of borehole data. The liquefaction map shows high and moderate liquefaction susceptibility zones along the northern coast of the Gulf of Aqaba. In Aqaba several hotels are located within a high and moderate liquefaction zones. The Yacht Club, Aqaba, Ayla

archaeological site, and a part of commercial area are also situated in a risk area. A part of residential site of the Saraya Development and the southern part of Ayla Oasis Development project area are located within a high susceptibility zone In Elat, the seaport and most hotels are located within a high susceptibility zone. Fortunately most residence areas, schools, and hospitals in both cities are located within zones not susceptible to liquefaction. A setback, or no build zone, is delineated around active faults to allow a suitable level of conservatism or factor of safety, residential, hotels, commercial buildings, schools, and other facilities are located inside this buffer in Aqaba area. These data will help planners, engineer instructions within the rapidly developing the northern Gulf of Aqaba.

A summary of the current state-of-the-art in volcanic and tectonic hazard assessment of nuclear facilities for researchers, geologists and engineers.

Urban seismic risk is growing worldwide and is, increasingly, a problem of developing countries. In 1950, one in four of the people living in the world's fifty largest cities was earthquake-threatened, while in the year 2000, about one in two will be. Further, ofthose people living in earthquake-threatened cities in 1950, about two in three were located in developing countries, while in the year 2000, about nine in ten will be. Unless urban seismic safety is improved, particularly in developing countries, future earthquakes will have ever more disastrous social and economic consequences. In July 1992, an international meeting was organized with the purpose of examining one means ofimproving worldwide urban safety. Entitled "Uses ofEarthquake Damage Scenarios for Cities of the 21st Century," this meeting was held in conjunction with the Tenth World Conference ofEarthquake Engineering, in Madrid, Spain. An earthquake damage scenario (EDS) is adescription of the consequences to an urban area of a large, but expectable earthquake on the critical facilities of that area. In Californian and Japanese cities, EDSes have been used for several decades, mainly for the needs of emergency response officials. The Madrid meeting examined uses of this technique for other purposes and in other, less developed countries. As a result of this meeting, it appeared that EDSes bad significant potential to improve urban seismic safety worldwide.

Seismic Hazards Estimation Study for Vandenberg AFB

This book addresses applications of earthquake engineering for both offshore and land-based structures. It is self-contained as a reference work and covers a wide range of topics, including topics related to engineering seismology, geotechnical earthquake engineering, structural engineering, as well as special contents dedicated to design philosophy, determination of ground motions, shock waves, tsunamis, earthquake damage, seismic response of offshore and arctic structures, spatial varied ground motions, simplified and advanced seismic analysis methods, sudden subsidence of offshore platforms, tank liquid impacts during earthquakes, seismic resistance of non-structural elements, and various types of mitigation measures, etc. The target readership includes professionals in offshore and civil engineering, officials and regulators, as well as researchers and students in this field.

Ocean closure involves a variety of converging tectonic processes that reshape shrinking basins, their adjacent margins and the entire earth underneath. Following continental breakup, margin formation and sediment accumulation, tectonics normally relaxes and the margins become passive for millions of years. However, when final convergence is at the gate, the passive days of any ocean and its margins are over or soon will be. The fate of the Mediterranean and Persian Gulf is seemingly known beforehand, as they are nestled in the midst of Africa-Arabia plate convergence with Eurasia. Over millions of years through the Cenozoic era they progressively shriveled, leaving only a glimpse of the Tethys Ocean. Eventually, the basins will adhere to the Alpine-Himalaya orogen and dissipate. This book focuses on a unique stage in the ocean closure process, when significant convergence already induced major deformations, yet the inter-plate basins and margins still record the geological history.

This is the twenty-sixth volume in the Earthquake Engineering Research Institute's series, Connections: The EERI Oral History Series. EERI began this series to preserve the recollections of some of those who have had pioneering careers in the field of earthquake engineering.Mete Sozen (1932-2018) is the Karl H. Kettelhut Distinguished Professor Emeritus of Civil Engineering at Purdue University, Indiana, United States.Besides his academic interest in the development of design codes for concrete structures, Sozen is notable for his contributions to the official post 9/11-government studies of terrorist attacks, including the Oklahoma City bombing, and The Pentagon. Sozen also led a team that created an engineering simulation of American Airlines Flight 11 crashing into the North Tower of the World Trade Center. The computer-animated visualizations were made entirely from the simulation data. He was elected to the National Academy of Engineering in 1977 for contributions to understanding the structural design and behavior of buildings and bridges subjected to earthquake motions.Sozen received his undergraduate education at Robert College (Turkey, 1951) and his master's (1952) and doctoral degrees (1957) from the University of Illinois at Urbana-Champaign.

The Workshop on the Seismicity and Seismic Risk in the Off shore North Sea Area was intended to bring together experts from a variety of disciplines as well as interest groups with involve ment in siting, design and construction of offshore structures in the region. Participants came from the fields of geology, seismology, oceanography, geotechnical and structural engineering and risk analysis. The wide range of participant affiliations included institutes, Observatories, universities, oil companies, consultants and insurance firms. All nationalities around the North Sea were present, in addition to some experts from outside the region. All participants were present on the basis of personal invitation. The idea of organizing the Workshop stemmed from conside- tions, such as: the rapidly increasing material and personel investments and versatility of type of structures in the basin.during the past decade; - the present-day important role Jf the North Sea oil and gas production in the economy of Western Europe; and - the increase of potential environmental risks in the region. Although devastating earthquakes are almost unknown in the area and seismic hazard is not great, the seismic risk grows with the growing size and number of structures in the area. The study of the potential seismic risks, therefore, cannot be neglected any more. The siting and design of offshore platforms and submarine pipelines are controlled by the degree of their vulnerability as well as the seismic hazard. in the region.

This book includes a collection of chapters that were presented at the International Conference on Earthquake Engineering and

Structural Dynamics (ICESD), held in Reykjavik, Iceland between 12-14 June 2017. The contributions address a wide spectrum of subjects related to wind engineering, earthquake engineering, and structural dynamics. Dynamic behavior of ultra long span bridges that are discussed in this volume represent one of the most challenging and ambitious contemporary engineering projects. Concepts, principles, and applications of earthquake engineering are presented in chapters addressing various aspects such as ground motion modelling, hazard analysis, structural analysis and identification, design and detailing of structures, risk due to non-structural components, and risk communication and mitigation. The presented chapters represent the state-of-the-art in these fields as well as the most recent developments.

This book presents a comprehensive topical overview on soil dynamics and foundation modeling in offshore and earthquake engineering. The spectrum of topics include, but is not limited to, soil behavior, soil dynamics, earthquake site response analysis, soil liquefactions, as well as the modeling and assessment of shallow and deep foundations. The author provides the reader with both theory and practical applications, and thoroughly links the methodological approaches with engineering applications. The book also contains cutting-edge developments in offshore foundation engineering such as anchor piles, suction piles, pile torsion modeling, soil ageing effects and scour estimation. The target audience primarily comprises research experts and practitioners in the field of offshore engineering, but the book may also be beneficial for graduate students.

Issues pertaining to urban risks are a pressing concern for those involved in disasters mitigation. Development of effective mitigation strategies requires sound seismic hazard information that is commonly derived through a seismic hazard assessment (SHA). The purpose of SHA is to provide a scientifically consistent estimate of seismic hazard for engineering design and other considerations. The time is ripe to move beyond the old paradigms of the traditional Probabilistic Seismic Hazard Analysis (PSHA). This two-part volume advocates advanced methods for SHA that utilize up to date earthquake science and basic scientific principles to derive the seismic hazard in terms of a ground motion or related quantity and its occurrence frequency at a site, as well as the associated uncertainty. It aims to: (1) identify the issues in the current SHAs, (2) facilitate the development of a scientifically consistent approach for SHA and (3) disseminate, both in scientific and in engineering practice societies, advanced reliable tools for independent hazard estimates, like NDSHA (neo-deterministic SHA), which incorporates physically based ground motion models. It provides a fresh approach to seismic hazard analysis. Part 2 provides advanced SHA case studies, concerning regional national and metropolitan estimates for different parts of the world, including Asia, Europe, North and South America. It is addressed to seismologists, engineers and stake-holders, and aims to contribute to bridging between modern interdisciplinary research and practitioners.

"The 2011 Mineral, Virginia, earthquake, the largest to occur in the Appalachian region in more than 100 years, provided new seismologic, engineering, geologic, hydrologic, and geophysical data. This volume makes these results available for geoscientists, engineers, and decision makers interested in understanding earthquakes and seismic hazards in eastern North America and other intraplate settings"--

"This volume focuses on the continental intraplate region of the United States and provides an update and overview of documented Quaternary faulting and paleoseismic liquefaction east of the Rocky Mountains, and of the application of these results to seismic hazard and risk assessments. Contributions include papers that describe zones of newly recognized Quaternary deformation such as the East Tennessee Seismic Zone, as well as reinterpretations of well-known areas such as the New Madrid Seismic Zone. The chapters make important contributions to the recognition of earthquake sources active during the Quaternary and assess the seismic hazards posed by these sources. This volume should interest a wide range of readers from geology, seismology, hazard assessment, and emergency management"--Provided by publisher.

Earthquake Hazard, Risk, and Disasters presents the latest scientific developments and reviews of research addressing seismic hazard and seismic risk, including causality rates, impacts on society, preparedness, insurance and mitigation. The current controversies in seismic hazard assessment and earthquake prediction are addressed from different points of view. Basic tools for understanding the seismic risk and to reduce it, like paleoseismology, remote sensing, and engineering are discussed. Contains contributions from expert seismologists, geologists, engineers and geophysicists selected by a world-renowned editorial board Presents the latest research on seismic hazard and risk assessment, economic impacts, fatality rates, and earthquake preparedness and mitigation Includes numerous illustrations, maps, diagrams and tables addressing earthquake risk reduction Features new insights and reviews of earthquake prediction, forecasting and early warning, as well as basic tools to deal with earthquake risk

Earthquakes are nearly unique among natural phenomena - they affect virtually everything within a region, from massive buildings and bridges, down to the furnishings within a home. Successful earthquake engineering therefore requires a broad background in subjects, ranging from the geologic causes and effects of earthquakes to understanding the imp

The Balkans are seismically the most active part of Europe due to plate interactions in the Aegean Sea. This book gives a good account of past, present and likely future seismological developments in this area. It describes the tectonic evolution and on-going geodynamic deformations. Coverage also discusses earthquake hazard analysis, topographic site effects, and examines large earthquake hazards in the Aegean and the Marmara seas as practical applications of such procedures.

For many years, the two subjects of (1) postglacial rebound and its potential for generating earthquakes and (2) the seismicity of passive continental ml!rgins have been of interest and concern to earth scientists on both sides of the North Atlantic. New data and theoretical interpretations have given rise to vigorous discussions on how much the two phenomena inter-relate and whether a significant controlling factor on seismicity in northeastern North America and Scandinavia is the crustal uplift that has been occurring since the latest ice age. The lack of a good understanding of these phenomena presented a particular problem for engineering seismologists attempting to prepare accurate seismic hazard estimates for facili ties both on land (e. g. , nuclear power stations and radioactive waste repositories) and offshore (e. g. , petroleum production facili ties) . The NATO Advanced Research Workshop programme provided an opportuni ty to bring together a group of relevant geophysicists, geologists and geodesists from both sides of the North Atlantic, and a workshop on "Causes and Effects of Earthquakes at Passive Margins and in Areas of Postglacial Rebound on both Sides of the North Atlantic" was held in Vordingborg, Denmark, 9-13 May 1988. The sup port of the NATO Science Committee is gratefully acknowledged.

This volume collects several extended articles from the first workshop on Best Practices in Physics-based Fault Rupture Models for Seismic Hazard Assessment of Nuclear Installations (BestPSHANI). Held in 2015, the workshop was organized by the IAEA to disseminate the use of physics-based fault-rupture models for ground motion prediction in seismic hazard assessments (SHA). The book also presents a number of new contributions on topics ranging from the seismological aspects of earthquake cycle simulations for source scaling evaluation, seismic source characterization, source inversion and physics-based ground motion modeling to engineering applications of simulated ground motion for the analysis of seismic response of structures. Further, it includes papers describing current practices for assessing seismic hazard in terms of nuclear safety in low seismicity areas, and proposals for physics-based hazard assessment for critical structures near large

earthquakes. The papers validate and verify the models by comparing synthetic results with observed data and empirical models. The book is a valuable resource for scientists, engineers, students and practitioners involved in all aspects of SHA.

This book represents a significant contribution to the area of earthquake data processing and to the development of region-specific magnitude correlations to create an up-to-date homogeneous earthquake catalogue that is uniform in magnitude scale. The book discusses seismicity analysis and estimation of seismicity parameters of a region at both finer and broader levels using different methodologies. The delineation and characterization of regional seismic source zones which requires reasonable observation and engineering judgement is another subject covered. Considering the complex seismotectonic composition of a region, use of numerous methodologies (DSHA and PSHA) in analyzing the seismic hazard using appropriate instruments such as the logic tree will be elaborated to explicitly account for epistemic uncertainties considering alternative models (for Source model, Mmax estimation and Ground motion prediction equations) to estimate the PGA value at bedrock level. Further, VS30 characterization based on the topographic gradient, to facilitate the development of surface level PGA maps using appropriate amplification factors, is discussed. Evaluation of probabilistic liquefaction potential is also explained in the book. Necessary backgrounds and contexts of the aforementioned topics are elaborated through a case study specific to India which features spatiotemporally varied and complex tectonics. The methodology and outcomes presented in this book will be beneficial to practising engineers and researchers working in the fields of seismology and geotechnical engineering in particular and to society in general.

The primary goals of this brief are to invoke alertness and solidarity among the public in earthquake prone areas of India, and to empower the community to prepare themselves to face and manage the aftermath of an earthquake. The work presented here sheds new light on the action plans to be taken by the common public and public agencies, before, during and after earthquakes to safeguard lives of people and minimize loss of assets. This carefully presented book articulates various factors related to earthquake preparedness, and develops guidelines and useful tips for communicating them to relevant stakeholders. The book has been divided into three parts: (i) the first providing background which explains earthquakes in general and seismicity of India (ii) the second explores earthquake preparedness intended for individuals, families and various stakeholders, and (iii) the final section which describes various strategies for communities to prepare themselves for a future earthquake.

Seismic hazard and risk analyses underpin the loadings prescribed by engineering design codes, the decisions by asset owners to retrofit structures, the pricing of insurance policies, and many other activities. This is a comprehensive overview of the principles and procedures behind seismic hazard and risk analysis. It enables readers to understand best practises and future research directions. Early chapters cover the essential elements and concepts of seismic hazard and risk analysis, while later chapters shift focus to more advanced topics. Each chapter includes worked examples and problem sets for which full solutions are provided online. Appendices provide relevant background in probability and statistics. Computer codes are also available online to help replicate specific calculations and demonstrate the implementation of various methods. This is a valuable reference for upper level students and practitioners in civil engineering, and earth scientists interested in engineering seismology.

This book first focuses on the explanation of the theory about focal mechanisms and moment tensor solutions and their role in the modern seismology. The second part of the book compiles several state-of-the-art case studies in different seismotectonic settings of the planet.The assessment of seismic hazard and the reduction of losses due to future earthquakes is probably the most important contribution of seismology to society. In this regard, the understanding of reliable determination seismic source and of its uncertainty can play a key role in contributing to geodynamic investigation, seismic hazard assessment and earthquake studies. In the last two decades, the use of waveforms recorded at local-to-regional distances has increased considerably. Waveform modeling has been used also to estimate faulting parameters of small-to-moderate sized earthquakes.

This book presents a summary of the important outcomes of the SIGMA project related to all aspects of Probabilistic Seismic Hazard Assessment: source characterization, rock motion characterization, site response characterization, and hazard calculations, with for all of them emphasis on the treatment of uncertainties. In recent years, attempts have been made to identify and quantify uncertainties in seismic hazard estimations for regions with moderate seismicity. These uncertainties, for which no estimation standards exist, create major difficulties and can lead to different interpretations and divergent opinions among experts. To address this matter, an international research project was launched in January 2011, by an industrial consortium composed of French and Italian organizations. This program, named SIGMA (Seismic Ground Motion Assessment) lasted for five years and involved a large number of international institutions. This book is intended for instructors running courses on engineering seismology, graduate students in the same field and practicing engineers involved in Probabilistic Seismic Hazard Analyses.