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**KEY=LANDSLIDES - ANAYA HOLDEN**

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## Introduction to the Physics of Landslides

### Lecture notes on the dynamics of mass wasting

*Springer Science & Business Media* **Landslides represent one of the most destructive natural catastrophes. They can reach extremely long distances and velocities, and are capable of wiping out human communities and settlements. Yet landslides have a creative facet as they contribute to the modification of the landscape. They are the consequence of the gravity pull jointly with the tectonic disturbance of our living planet. Landslides are most often studied within a geotechnical and geomorphological perspective. Engineering calculations are traditionally applied to the stability of terrains. In this book, landslides are viewed as a physical phenomenon. A physical understanding of landslides is a basis for modeling and mitigation and for understanding their flow behavior and dynamics. We still know relatively little about many aspects of landslide physics. It is only recently that the field of landslide dynamics is approaching a more mature stage. This is testified by the release of modelling tools for the simulation of landslides and debris flows. In this book the emphasis is placed on the problems at the frontier of landslide research. Each chapter is self-consistent, with questions and arguments introduced from the beginning.**

## Shear Band Propagation in Soils and Dynamics of Tsunamigenic Landslides

*vdf Hochschulverlag AG*

## Landslide Science and Practice

### Volume 5: Complex Environment

*Springer Science & Business Media* **This book contains peer-reviewed papers from the Second World Landslide Forum, organised by the International Consortium on Landslides (ICL), that took place in September 2011. The entire material from the conference has been split into seven volumes, this one is the fifth: 1. Landslide Inventory and Susceptibility and Hazard Zoning, 2. Early Warning, Instrumentation and Monitoring, 3. Spatial Analysis and Modelling, 4. Global Environmental Change, 5. Complex Environment, 6. Risk Assessment, Management and Mitigation, 7. Social and Economic Impact and Policies.**

## Landslide Hazards, Risks, and Disasters

*Elsevier* **Landslide Hazards, Risks and Disasters 2nd edition makes a broad but detailed examination of major aspects of mass movements and their consequences, and provides knowledge to form the basis for more complete and accurate monitoring, prediction, preparedness and reduction of the impacts of landslides on society. The frequency and intensity of landslide hazards and disasters has consistently increased over the past century, and this trend will continue as society increasingly utilises steep landscapes. Landslides and related phenomena can be triggered by other hazard and disaster processes - such as earthquakes, tsunamis, volcanic eruptions and wildfires - and they can also cause other hazards and disasters, making them a complex multi-disciplinary challenge. This new edition of Landslide Hazards, Risks and Disasters is updated and includes new chapters, covering additional topics including rockfalls, landslide interactions and impacts and geomorphic perspectives. Knowledge, understanding and the ability to model landslide processes are becoming increasingly important challenges for society extends its occupation of increasingly hilly and mountainous terrain, making this book a key resource for educators, researchers and disaster managers in geophysics, geology and environmental science. Provides an interdisciplinary perspective on the geological, seismological, physical, environmental and social impacts of landslides Presents the latest research on causality, impacts and landslide preparedness and mitigation. Includes numerous tables, maps, diagrams, illustrations, photographs and video captures of hazardous processes Discusses steps for planning for and responding to landslide**

hazards, risks and disasters

## Landslide Databases as Tools for Integrated Assessment of Landslide Risk

*Springer* This doctoral thesis presents a novel approach to landslide risk assessment that explores the various dimensions of landslide risk in an integrated perspective. The research approach introduced here is tailored for use with landslide databases and Geographic Information Systems (GIS). A landslide susceptibility model is at the heart of this new approach, enabling to identify and delineate areas at risk of landslides and to assess infrastructure exposure. Landslide risk is a pressing societal issue that is still poorly understood. Temporal landslide hazard is derived from landslide frequency statistics and a hydrological simulation approach to estimate triggering thresholds. These methods are integrated into a powerful toolset for cost modeling that uses historical data to compile, model, and extrapolate damage costs on different spatial scales over time. The combination of this toolset with techniques to analyze fiscal cost impacts supports integrated risk assessment by quantifying the economic relevance of landslide losses.

## Laser Scanning Applications in Landslide Assessment

*Springer* This book is related to various applications of laser scanning in landslide assessment. Landslide detection approaches, susceptibility, hazard, vulnerability assessment and various modeling techniques are presented. Optimization of landslide conditioning parameters and use of heuristic, statistical, data mining approaches, their advantages and their relationship with landslide risk assessment are discussed in detail. The book contains scanning data in tropical forests; its indicators, assessment, modeling and implementation. Additionally, debris flow modeling and analysis including source of debris flow identification and rockfall hazard assessment are also presented.

## Engineering Geology for Society and Territory - Volume 2

### Landslide Processes

*Springer* This book is one out of 8 IAEG XII Congress volumes, and deals with Landslide processes, including: field data and monitoring techniques, prediction and forecasting of landslide occurrence, regional landslide inventories and dating studies, modeling of slope instabilities and secondary hazards (e.g. impulse waves and landslide-induced tsunamis, landslide dam failures and breaching), hazard and risk assessment, earthquake and rainfall induced landslides, instabilities of volcanic edifices, remedial works and mitigation measures, development of innovative stabilization techniques and applicability to specific engineering geological conditions, use of geophysical techniques for landslide characterization and investigation of triggering mechanisms. Focuses is given to innovative techniques, well documented case studies in different environments, critical components of engineering geological and geotechnical investigations, hydrological and hydrogeological investigations, remote sensing and geophysical techniques, modeling of triggering, collapse, run out and landslide reactivation, geotechnical design and construction procedures in landslide zones, interaction of landslides with structures and infrastructures and possibility of domino effects. The Engineering Geology for Society and Territory volumes of the IAEG XII Congress held in Torino from September 15-19, 2014, analyze the dynamic role of engineering geology in our changing world and build on the four main themes of the congress: environment, processes, issues, and approaches. The congress topics and subject areas of the 8 IAEG XII Congress volumes are: Climate Change and Engineering Geology. Landslide Processes. River Basins, Reservoir Sedimentation and Water Resources. Marine and Coastal Processes. Urban Geology, Sustainable Planning and Landscape Exploitation. Applied Geology for Major Engineering Projects. Education, Professional Ethics and Public Recognition of Engineering Geology. Preservation of Cultural Heritage.

### Geohazards

## Proceedings of IGC 2018

*Springer Nature* This volume comprises select papers presented during the Indian Geotechnical Conference 2018. This volume discusses concepts of soil dynamics and studies related to earthquake geotechnical engineering, slope stability, and landslides. The papers presented in this volume analyze failures connected to geotechnical and geological origins to improve professional practice, codes of analysis and design. This volume will prove useful to researchers and practitioners alike.

## Modeling Gravity Hazards from Rockfalls to Landslides

*Elsevier* Gravity hazards are a major concern to those living in mountainous areas. To protect infrastructure and human life in these areas, engineers require numerical tools for trajectory analysis, for application from fragmental rockfalls to large-scale avalanches or landslides. This book explores state-of-the-art methods to model the propagation (flows and stops) of masses, using the discrete element method (DEM) to study the evolution of kinetics during an event.

Taking into account the shape of the blocks and the topology of the terrain provides an explicit and sophisticated consideration of geometries, eliminating the need for stochastic inputs to rockfall simulations. This method is validated experimentally, before the authors apply it to real case studies. The book ends with an introduction to and comparison with the material point method (MPM), a new and promising approach able to bridge the gap between cases dominated by discreteness and those involving a very large number of elements. Engineering consulting firms, researchers and students should find the approaches outlined in this book useful, whether designing prevention and protection systems for gravity hazards, or exploring new ways to model gravity hazards. Covers conventional methods used to study gravitational phenomena using empirical parameters Presents a new numerical tool taking account of the physical phenomenon (friction, dissipation, realistic block shapes) and a methodology for parameter calibration and the achievement of numerical simulations Applies the numerical model to real cases with a critical analysis of its applicability in the field of engineering Emphasizes the discrete element method (DEM)

## Landslides: Global Risk Preparedness

*Springer Science & Business Media* This book presents the global landslide risk preparedness implemented through the International Programme on Landslides (IPL). IPL was initiated by the International Consortium on Landslides (ICL) in 2002, and developed to a joint international programme by the IPL Global Promotion Committee (UNESCO, WMO, FAO, UNISDR, UNU, ICSU and WFEO as well as ICL) through the 2006 Tokyo Action Plan. The materials consists of four parts: Outline of the International Programme on Landslides & IPL Global Promotion Committee; Achievements of major IPL projects in research and capacity building; World Centres of Excellence on Landslide Risk Reduction (WCoEs) and Landslide School Network; Key documents of IPL and ICL including Tokyo Action Plan, Application of ICL, IPL Projects, WCoEs and Landslide School Network

## Introduction to Earth Sciences

### A Physics Approach

*World Scientific Publishing Company* For more than seven decades, geophysicists have made significant contributions to the description of solid Earth and deep space, based on the physical properties; on the exploration and production of the resources deep in the ground; and on an understanding and mitigation of the hazards associated with the Earth's dynamics, such as volcanic eruptions, earthquakes, tsunamis, landslides, hurricanes, droughts, etc. These types of events are so important that they directly affect where we live on the Earth's surface as well as the sources of food, energy resources, and minerals -- and such events can affect our very survival. Yet, most universities still do not have a course focusing on an introduction to geophysics -- the so-called 100-level geophysics course. All of the twelve chapters from the first edition have been improved and/or expanded. In addition to these improvements, six new chapters have been added in this second edition. The new chapters encompass: gravity, microgravity, earthquake cycle, heat variations in the subsurface, Earth's magnetic field, electricity storage, energy prices, and a more detailed description of our current understanding of Solar system and the applications of this understanding to life on Earth. This new edition can also be used in 100-level physics classes. The basic physics of matter is covered in detail along with some highly important problems and questions posed and addressed by modern physics and in Geophysics, which is actually a branch of physics.

## Landslide Science for a Safer Geoenvironment

### Volume 3: Targeted Landslides

*Springer* This volume contains peer-reviewed papers from the Third World Landslide Forum organized by the International Consortium on Landslides (ICL) in June 2014. The complete collection of papers from the Forum is published in three full-color volumes and one mono-color volume.

### Advancing Culture of Living with Landslides

### Volume 2 Advances in Landslide Science

*Springer* This volume contains peer-reviewed papers from the Fourth World Landslide Forum organized by the International Consortium on Landslides (ICL), the Global Promotion Committee of the International Programme on Landslides (IPL), University of Ljubljana (UL) and Geological Survey of Slovenia in Ljubljana, Slovenia from May 29 to June 2,. The complete collection of papers from the Forum is published in five full-color volumes. This second volume contains the following: • Two keynote lectures • Landslide Field Recognition and Identification: Remote Sensing Techniques, Field Techniques • Landslide Investigation: Field Investigations, Laboratory Testing • Landslide Modeling: Landslide Mechanics, Simulation Models • Landslide Hazard Risk Assessment and Prediction: Landslide Inventories and Susceptibility, Hazard Mapping Methods, Damage Potential Prof. Matjaž Mikoš is the Forum Chair of the Fourth World Landslide Forum. He is the Vice President of International Consortium on Landslides and President of the Slovenian

National Platform for Disaster Risk Reduction. Prof. Binod Tiwari is the Coordinator of the Volume 2 of the Fourth World Landslide Forum. He is a Board member of the International Consortium on Landslides and an Executive Editor of the International Journal "Landslides". He is the Chair-Elect of the Engineering Division of the US Council of Undergraduate Research, Award Committee Chair of the American Society of Civil Engineering, Geo-Institute's Committee on Embankments, Slopes, and Dams Committee. Prof. Yueping Yin is the President of the International Consortium on Landslides and the Chairman of the Committee of Geo-Hazards Prevention of China, and the Chief Geologist of Geo-Hazard Emergency Technology, Ministry of Land and Resources, P.R. China. Prof. Kyoji Sassa is the Founding President of the International Consortium on Landslides (ICL). He is Executive Director of ICL and the Editor-in-Chief of International Journal "Landslides" since its foundation in 2004. IPL (International Programme on Landslides) is a programme of the ICL. The programme is managed by the IPL Global Promotion Committee including ICL and ICL supporting organizations, UNESCO, WMO, FAO, UNISDR, UNU, ICSU, WFEO, IUGS and IUGG. The IPL contributes to the United Nations International Strategy for Disaster Reduction and the ISDR-ICL Sendai Partnerships 2015-2025.

## Introduction To Earth Sciences: A Physics Approach (Second Edition)

*World Scientific*

### Storm-triggered Landslides in Warmer Climates

*Springer* This volume discusses the general physics of debris flows and various approaches to modeling - including the SEGMENT-Landslide approach - as well as the pros and cons of these approaches and how other approaches are subsets of the SEGMENT-Landslide approach. In addition, this volume will systematically unify the concepts of vadose zone hydrology and geotechnical engineering, with special emphasis on quantifying ecosystem consequences of storm-triggered landslides in a warmer climate setting. The reader will find a comprehensive coverage of concepts ranging from hillslope hydrology, porous granular material rheology and the fundamentals of soil properties, to state-of-the-art concepts of enhanced hydrological cycle with climate warming and a discussion of new approaches for future research.

### Landslides and Climate Change: Challenges and Solutions

### Proceedings of the International Conference on Landslides and Climate Change, Ventnor, Isle of Wight, UK, 21-24 May 2007

*CRC Press* Understanding the relationship between landslides and climate change is crucially important in planning a proactive approach to hazard and risk management. Advances in geohazard modelling and prediction enable us to be better prepared for the impacts of climate change, but there is still a need for effective risk management and informed planning policy to improve the safety and sustainability of communities at risk. The increasing frequency of extreme weather events has highlighted our vulnerability to the impact of climate change, and has resulted in enormous human and economic loss. This book presents the Proceedings of the International Conference on 'Landslides and Climate Change - Challenges and Solutions', which was held in Ventnor, Isle of Wight, UK in May 2007. The volume considers the practical experiences of hazard management, risk governance and response to climate change, and will be of interest to engineers, planners, practitioners, regional and local authorities, academics and politicians.

### Submarine Landslides and Tsunamis

*Springer Science & Business Media* Tsunamis are water waves triggered by impulsive geologic events such as sea floor deformation, landslides, slumps, subsidence, volcanic eruptions and bolide impacts. Tsunamis can inflict significant damage and casualties both nearfield and after evolving over long propagation distances and impacting distant coastlines. Tsunamis can also effect geomorphologic changes along the coast. Understanding tsunami generation and evolution is of paramount importance for protecting coastal population at risk, coastal structures and the natural environment. Accurately and reliably predicting the initial waveform and the associated coastal effects of tsunamis remains one of the most vexing problems in geophysics, and -with few exceptions- has resisted routine numerical computation or data collection solutions. While ten years ago, it was believed that the generation problem was adequately understood for useful predictions, it is now clear that it is not, especially nearfield. By contrast, the runup problem earlier believed intractable is now well understood for all but the most extreme breaking wave events.

# Landslide Dynamics: ISDR-ICL Landslide Interactive Teaching Tools

## Volume 2: Testing, Risk Management and Country Practices

*Springer* This interactive book presents comprehensive information on the fundamentals of landslide types and dynamics, while also providing a set of PPT, PDF, and text tools for education and capacity development. It is the second part of a two-volume work created as the core activity of the Sendai Partnerships, the International Consortium of Landslides. The book will be regularly updated and improved over the coming years, based on responses from users and lessons learned during its application.

## The Dynamics of Disaster

*W. W. Norton & Company* Contrary to popular belief, humans have almost no control over Mother Nature. Yet we persist in building centers of civilization in places of past disasters. When they are destroyed again, we rebuild in the same place, believing that our technology will do better next time. But we rarely win these battles with the earth. Susan W. Kieffer has two goals for her unique book. The first is to show how the dynamics—the workings—of disasters are connected by a small number of natural laws. The second is to show how the greatest damage and loss of life are caused by unrecognized aspects of these events. For example, the heartwrenching destruction in Haiti was caused when an earthquake transformed the solid ground into something like quicksand. Only by deeply understanding the dynamics of natural disasters can we begin to institute engineering and policy practices to minimize their impact on our lives.

## Understanding and Reducing Landslide Disaster Risk

### Volume 1 Sendai Landslide Partnerships and Kyoto Landslide Commitment

*Springer Nature* This book is a part of ICL new book series “ICL Contribution to Landslide Disaster Risk Reduction” founded in 2019. Peer-reviewed papers submitted to the Fifth World Landslide Forum were published in six volumes of this book series. This book contains the followings: • Four Forum lectures and one award paper • Sendai Landslide Partnerships, Kyoto Landslide Commitment, and International Programme on Landslides. • Landslide-induced tsunamis • Landslides at UNESCO designates sites and contribution from WMO, FAO, and IRDR • Education and Capacity Development for Risk Management and Risk Governance Prof. Kyoji Sassa is the Founding President and the Secretary-General of International Consortium on Landslides (ICL). He has been the Editor-in-Chief of International Journal Landslides since its foundation in 2004. Prof. Matjaž Mikoš is the Vice President of International Consortium on Landslides and Vice President of Slovenian Academy of Engineering. He is a Professor and Dean of Faculty of Civil and Geodetic Engineering, University of Ljubljana, Slovenia. Dr. Shinji Sassa is Head of Soil Dynamics Group and Research Director of International Research Center for Coastal Disasters, Port and Airport Research Institute, National Institute of Maritime, Port and Aviation Technology, Japan. Prof. Peter Bobrowsky is the President of International Consortium on Landslides. He is a Senior Scientist of Geological Survey of Canada, Ottawa, Canada. Prof. Kaoru Takara is the Executive Director of International Consortium on Landslides. He is a Professor and Dean of Graduate School of Advanced Integrated Studies (GSAIS) in Human Survivability (Shishu-Kan), Kyoto University. Dr. Khang Dang is the Secretary General of the Fifth World Landslide Forum. He also serves as the Research Promotion Officer of ICL and a Lecturer at the University of Science, Vietnam National University, Hanoi.

## Catastrophic Landslides

### Effects, Occurrence, and Mechanisms

*Geological Society of America* This volume documents advances in our knowledge of catastrophic landslides, providing a worldwide survey of catastrophic landslide events. It draws on South America to illustrate dramatically the impact of these phenomena on human populations. The occurrence of catastrophic landslides, including site-specific insights, is shown through six events of the past 20 years. Several other chapters focus on the mechanisms involved with catastrophic landslides both in relation to geologic factors in a particular geographic area as well as to specific geologic processes.

## Landslides and Engineered Slopes. From the Past to the Future, Two Volumes + CD-ROM

Proceedings of the 10th International Symposium on Landslides and Engineered Slopes, 30 June - 4 July 2008, Xi'an, China

*CRC Press* 270 Expert contributions on aspects of landslide hazards, encompassing geological modeling and soil and rock mechanics, landslide processes, causes and effects, and damage avoidance and limitation strategies. Reference source for academics and professionals in geo-mechanical and geo-technical engineering, and others involved with research, des

## Environmental Physics

*Routledge* **Environmental Physics** is a comprehensive introduction to the physical concepts underlying environmental science. The importance and relevance of physics is emphasised by its application to real environmental problems with a wide range of case studies. Applications included cover energy use and production, global climate, the physics of living things, radioactivity, environmental remote sensing, noise pollution and the physics of the Earth. The book makes the subject accessible to those with little physics background, keeping mathematical treatment straightforward. The text is lively and informative, and is supplemented by numerous illustrations, photos, tables of useful data, and a glossary of key terms.

## Building Knowledge for Geohazard Assessment and Management in the Caucasus and other Orogenic Regions

*Springer Nature* This volume is aimed at providing a comprehensive overview of the state of art of research related to geo-related hazards in the Caucasus and other orogenic regions; it is also devoted to shedding light on a broad array of geological phenomena as well as discussing innovative tools and strategies for geohazard assessment. Additional emphasis is placed on preventive and mitigation measures, which might be helpful in tackling seismic, volcanic and landslide risks affecting major lifelines and infrastructures. The innovative, multidisciplinary methodologies illustrated in this volume may be successfully applied to other orogenic regions across the globe. The book features major scientific contributions from experts working on different Earth Science topics, such as seismology, structural geology, applied geology and volcanology. Its chapters describe a wide gamut of cutting-edge research methodologies and are thus intended to be read and shared by the worldwide Earth Science community. In particular, the readers will have a chance to gain a thorough knowledge of a number of key geological features that can be observed across both the Greater and Lesser Caucasus. Moreover, the volume provides a thorough description of the techniques employed to assess seismic hazard in major cities - such as microzonation - and an overview of the efforts taken to monitor and prevent seismic and landslide hazard posed to vital energy infrastructures in the Caucasus region.

## Advancing Culture of Living with Landslides

### Volume 4 Diversity of Landslide Forms

*Springer* This volume contains peer-reviewed papers from the Fourth World Landslide Forum organized by the International Consortium on Landslides (ICL), the Global Promotion Committee of the International Programme on Landslides (IPL), University of Ljubljana (UL) and Geological Survey of Slovenia in Ljubljana, Slovenia from May 29 to June 2, 2017. The complete collection of papers from the Forum is published in five full-color volumes. This fourth volume contains the following: • Earthquake-Induced Landslides • Rainfall-Induced Landslides • Rapid Landslides: Debris Flows, Mudflows, Rapid Debris-Slides • Landslides in Rocks and Complex Landslides: Rock Topples, Rock Falls, Rock Slides, Complex Landslides • Landslides and Other Natural Hazards: Floods, Droughts, Wildfires, Tsunamis, Volcanoes Prof. Matjaž Mikoš is the Forum Chair of the Fourth World Landslide Forum. He is the Vice President of International Consortium on Landslides and President of the Slovenian National Platform for Disaster Risk Reduction. Prof. Nicola Casagli is Founding member of the International Consortium on Landslides (ICL), professor at the University of Florence and founder of the UNESCO Chair on geohydrological hazards at the same University. Prof. Yueping Yin is the President of the International Consortium on Landslides and the Chairman of the Committee of Geo-Hazards

Prevention of China, and the Chief Geologist of Geo-Hazard Emergency Technology, Ministry of Land and Resources, P.R. China". Prof. Kyoji Sassa is the Founding President of the International Consortium on Landslides (ICL). He is Executive Director of ICL and the Editor-in-Chief of International Journal "Landslides" since its foundation in 2004. IPL (International Programme on Landslides) is a programme of the ICL. The programme is managed by the IPL Global Promotion Committee including ICL and ICL supporting organizations, UNESCO, WMO, FAO, UNISDR, UNU, ICSU, WFEO, IUGS and IUGG. The IPL contributes to the United Nations International Strategy for Disaster Reduction and the ISDR-ICL Sendai Partnerships 2015-2025.

## Landslides

### Proceedings of the First European Conference on Landslides, Prague, Czech Republic, 24-26 June 2002

*Routledge* The proceedings contain five invited lectures and 99 papers relevant to landslide occurrence and problems from Europe, Asia, America, Africa and Australia and New Zealand. The five special invited lectures deal with a variety of important aspects of landslides.

### Fault-Zone Guided Wave, Ground Motion, Landslide and Earthquake Forecast

*Walter de Gruyter GmbH & Co KG* The book covers multi-disciplinary topics in observational, computational and applied geophysics in aspects of solid earth system. The authors provide an up-to-date overview for methods and techniques in seismology, with a focus on fault structure, strong ground motion and earthquake forecast based on full-3D earth structure models. Abundant of case studies make it a practical reference for researchers in seismology and applied geophysics.

### Introduction to Earth Sciences: a Physics Approach (Second Edition)

*World Scientific Publishing Company* For more than seven decades, geophysicists have made significant contributions to the description of solid Earth and deep space, based on the physical properties; on the exploration and production of the resources deep in the ground; and on an understanding and mitigation of the hazards associated with the Earth's dynamics, such as volcanic eruptions, earthquakes, tsunamis, landslides, hurricanes, droughts, etc. These types of events are so important that they directly affect where we live on the Earth's surface as well as the sources of food, energy resources, and minerals -- and such events can affect our very survival. Yet, most universities still do not have a course focusing on an introduction to geophysics -- the so-called 100-level geophysics course. All of the twelve chapters from the first edition have been improved and/or expanded. In addition to these improvements, six new chapters have been added in this second edition. The new chapters encompass: gravity, microgravity, earthquake cycle, heat variations in the subsurface, Earth's magnetic field, electricity storage, energy prices, and a more detailed description of our current understanding of Solar system and the applications of this understanding to life on Earth. This new edition can also be used in 100-level physics classes. The basic physics of matter is covered in detail along with some highly important problems and questions posed and addressed by modern physics and in Geophysics, which is actually a branch of physics.

## Landslides

### Types, Mechanisms and Modeling

*Cambridge University Press* Landslides have geological causes but can be triggered by natural processes (rainfall, snowmelt, erosion and earthquakes) or by human actions such as agriculture and construction. Research aimed at better understanding slope stability and failure has accelerated in recent years, accompanied by basic field research and numerical modeling of slope failure processes, mechanisms of debris movement, and landslide causes and triggers. Written by seventy-five world-leading researchers and practitioners, this book provides a state-of-the-art summary of landslide science. It features both field geology and engineering approaches, as well as modeling of slope failure and run-out using a variety of numerical codes. It is illustrated with international case studies integrating geological, geotechnical and remote sensing studies, and includes recent slope investigations in North America, Europe and Asia. This is an essential reference for researchers and graduate students in geomorphology, engineering geology, geotechnical engineering and geophysics, as well as professionals in natural hazard analysis.

## Coupled DEM-CFD Analyses of Landslide-Induced Debris Flows

*Springer* This book reflects the latest research results in computer modelling of landslide-induced debris flows. The book establishes an understanding of the initiation and propagation mechanisms of landslides by means of numerical simulations, so that mitigation strategies to reduce the long-term losses from landslide hazards can be devised. In this context, the book employs the Discrete Element Method (DEM) and Computational Fluid Dynamics (CFD) to investigate the mechanical and hydraulic behaviour of granular materials involved in landslides - an approach that yields meaningful insights into the flow mechanisms, concerning e.g. the mobilization of sediments, the generation and dissipation of excess pore water pressures, and the evolution of effective stresses. As such, the book provides valuable information, useful methods and robust numerical tools that can be successfully applied in the field of debris flow research.

## Application of Remote Sensing and GIS in Earthquake-Triggered Landslides

*Frontiers Media SA*

## Subaqueous Mass Movements and Their Consequences Assessing Geohazards, Environmental Implications and Economic Significance of Subaqueous Landslides

*Geological Society of London* The challenges facing submarine mass movement researchers and engineers are plentiful and exciting. This book follows several high-profile submarine landslide disasters that have reached the world's attention over the past few years. For decades, researchers have been mapping the world's mass movements. Their significant impacts on the Earth by distributing sediment on phenomenal scales is undeniable. Their importance in the origins of buried resources has long been understood. Their hazard potential ranges from damaging to apocalyptic, frequently damaging local infrastructure and sometimes devastating whole coastlines. Moving beyond mapping advances, the subaqueous mass movement scientists and practitioners are now also focussed on assessing the consequences of mass movements, and the measurement and modelling of events, hazard analysis and mitigation. Many state-of-the-art examples are provided in this book, which is produced under the auspices of the United Nations Educational, Scientific and Cultural Organisation Program S4SLIDE (Significance of Modern and Ancient Submarine Slope LandSLIDEs).

## Landslides and Engineering Geology of the Seattle, Washington, Area

*Geological Society of America*

## Journal of Physics of the Earth

## Rainfall Thresholds and Other Approaches for Landslide Prediction and Early Warning

*MDPI* Landslides are destructive processes causing casualties and damage worldwide. The majority of the landslides are triggered by intense and/or prolonged rainfall. Therefore, the prediction of the occurrence of rainfall-induced landslides is an important scientific and social issue. To mitigate the risk posed by rainfall-induced landslides, landslide early warning systems (LEWS) can be built and applied at different scales as effective non-structural mitigation measures. Usually, the core of a LEWS is constituted of a mathematical model that predicts landslide occurrence in the monitored areas. In recent decades, rainfall thresholds have become a widespread and well established technique for the prediction of rainfall-induced landslides, and for the setting up of prototype or operational LEWS. A rainfall threshold expresses, with a mathematic law, the rainfall amount that, when reached or exceeded, is likely to trigger one or more landslides. Rainfall thresholds can be defined with relatively few parameters and are very straightforward to operate, because their application within LEWS is usually based only on the comparison of monitored and/or forecasted rainfall. This Special Issue collects contributions on the recent research advances or well-documented applications of rainfall thresholds, as well as other innovative methods for landslide

prediction and early warning. Contributions regarding the description of a LEWS or single components of LEWS (e.g., monitoring approaches, forecasting models, communication strategies, and emergency management) are also welcome. We encourage, in particular, the submission of contributions concerning the definition and validation of rainfall thresholds, and their operative implementation in LEWS. Other approaches for the forecasting of landslides are also of interest, such as physically based modelling, hazard mapping, and the monitoring of hydrologic and geotechnical indicators, especially when described in the framework of an operational or prototype early warning system.

## Flow and Transformations in Porous Media

*Frontiers Media SA* Fluid flow in transforming porous rocks, fracture networks, and granular media is a very active interdisciplinary research subject in Physics, Earth Sciences, and Engineering. Examples of natural and engineered processes include hydrocarbon recovery, carbon dioxide geo-sequestration, soil drying and wetting, pollution remediation, soil liquefaction, landslides, dynamics of wet or dry granular media, dynamics of faulting or friction, volcanic eruptions, gas venting in sediments, karst development and speleogenesis, ore deposit development, and radioactive waste disposal. Hydrodynamic flow instabilities and pore scale disorder typically result in complex flow patterning. In transforming media, additional mechanisms come into play: compaction, de-compaction, erosion, segregation, and fracturing lead to changes in permeability over time. Dissolution, precipitation, and chemical reactions between solutes and solids may gradually alter the composition and structure of the solid matrix, either creating or destroying permeable paths for fluid flow. A complex, dynamic feedback thus arises where, on the one hand, the fluid flow affects the characteristics of the porous medium, and on the other hand the changing medium influences the fluid flow. This Research Topic Ebook presents current research illustrating the depth and breadth of ongoing work in the field of flow and transformation in porous media through 15 papers by 72 authors from around the world. The body of work highlights the challenges posed by the vast range of length- and time-scales over which subsurface flow processes occur. Importantly, phenomena from each scale contribute to the larger-scale behavior. The flow of oil and gas in reservoirs, and the flow of groundwater on catchment scale is sensitively linked to pore scale processes and material heterogeneity down to the micrometer scale. The geological features of the same reservoirs and catchments evolved over millions of years, sometimes as a consequence of cracking and fracture growth occurring on the time scale of microseconds. The research presented by the authors of this Research Topic represents a step toward bridging the separation of scales as well as the separation of scientific disciplines so that a more unified picture of flow and transformation in porous media can start to emerge.

## Submarine Landslides

## Subaqueous Mass Transport Deposits from Outcrops to Seismic Profiles

*John Wiley & Sons* An examination of ancient and contemporary submarine landslides and their impact Landslides are common in every subaqueous geodynamic context, from passive and active continental margins to oceanic and continental intraplate settings. They pose significant threats to both offshore and coastal areas due to their frequency, dimensions, and terminal velocity, capacity to travel great distances, and ability to generate potentially destructive tsunamis. *Submarine Landslides: Subaqueous Mass Transport Deposits from Outcrops to Seismic Profiles* examines the mechanisms, characteristics, and impacts of submarine landslides. Volume highlights include: Use of different methodological approaches, from geophysics to field-based geology Data on submarine landslide deposits at various scales Worldwide collection of case studies from on- and off-shore Potential risks to human society and infrastructure Impacts on the hydrosphere, atmosphere, and lithosphere

## Latest Developments in Geotechnical Earthquake Engineering and Soil Dynamics

*Springer Nature* This volume brings together contributions from world renowned researchers and practitioners in the field of geotechnical engineering. The chapters of this book are based on the keynote and invited lectures delivered at the 7th International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics. The book presents advances in the field of soil dynamics and geotechnical earthquake engineering. A strong emphasis is placed on proving connections between academic research and field practice, with many examples, case studies, best practices, and discussions on performance-based design. This volume will be of interest to research scholars, academicians and industry professionals alike.

## Landslide Analysis and Early Warning Systems

# Local and Regional Case Study in the Swabian Alb, Germany

*Springer Science & Business Media* **Recent landslide events demonstrate the need to improve landslide forecasting and early warning capabilities in order to reduce related risks and protect human lives. In this thesis, local and regional investigations were carried out to analyse landslide characteristics in the Swabian Alb region, and to develop prototypic landslide early warning systems. In the local study area, an extensive hydrological and slope movement monitoring system was installed on a seasonally reactivated landslide body located in Lichtenstein- Unterhausen. Monitoring data was analysed to assess the influence of rainfall and snow-melt on groundwater conditions, and the initiation of slope movements. The coupled hydrology-slope stability model CHASM was applied to detect areas most prone to slope failures, and to simulate slope stability using a variety of input data. Subsequently, CHASM was refined and two web-based applications were developed: a technical early warning system to constantly simulate slope stability integrating rainfall measurements, hydrological monitoring data and weather forecasts; and a decision-support system allowing for quick calculation of stability for freely selectable slope profiles. On the regional scale, available landslide inventory data were analysed for their use in evaluation of rainfall thresholds proposed in other studies. Adequate landslide events were selected and their triggering rainfall and snow-melting conditions were compared to intensity-duration and cumulative thresholds. Based on the results, a regional landslide early warning system was developed and implemented as a webbased application. Both, the local and the regional landslide early warning systems are part of a holistic and integrative early warning chain developed by the ILEWS project, and could easily be transferred to other landslide prone areas.**

## Steady Movement of Landslides in Fine-grained Soils

### A Model for Sliding Over an Irregular Slip Surface

**Analysis of a possible mechanism for sliding of landslides on irregular slip surfaces shows how surface roughness can retard movement of landslides in fine-grained soils.**