
Landslide Science and Practice

Claudio Margottini • Paolo Canuti • Kyoji Sassa
Editors

Landslide Science and Practice

Volume 5: Complex Environment



Editors

Claudio Margottini
ISPRA - Italian Institute for
Environmental Protection and Research
Geological Survey of Italy
Rome, Italy

Paolo Canuti
ICL - International Consortium on Landslides
Florence, Italy

Kyoji Sassa
UNITWIN Headquarters Building
Kyoto University Uji Campus
Uji, Kyoto, Japan

Associate Editors

Filippo Catani
Department of Earth Sciences
University of Florence
Firenze, Italy

Alessandro Trigila
ISPRA - Italian Institute for
Environmental Protection and Research
Geological Survey of Italy
Rome, Italy

Additional material to Volume 1 can be downloaded from <http://extras.springer.com>

ISBN 978-3-642-31426-1 ISBN 978-3-642-31427-8 (eBook)
DOI 10.1007/978-3-642-31427-8
Springer Heidelberg New York Dordrecht London

Library of Congress Control Number: 2013932640

© Springer-Verlag Berlin Heidelberg 2013

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

Landslide Science and Practice

Proceedings of the Second World Landslide Forum

The Second World Landslide Forum (**WLF**) was organized at the headquarters of the Food and Agriculture Organization of the United Nations (FAO), Rome, Italy, on 3–9 October 2011. WLF is a triennial mainstream conference of the International Programme on Landslides (**IPL**) which is jointly managed by the IPL Global Promotion Committee consisting of the International Consortium on Landslides (**ICL**), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Meteorological Organization (WMO), the Food and Agriculture Organization of the United Nations (FAO), the United Nations International Strategy for Disaster Risk Reduction (UNISDR), the United Nations University (UNU), the International Council for Science (ICSU), and the World Federation of Engineering Organizations (WFEO).

Background to the World Landslide Forums

The International Consortium on Landslides (ICL) was established by the 2002 Kyoto Declaration “Establishment of an International Consortium on Landslides,” with the Statutes adopted in January 2002. The Statutes defined the **General Assembly** of ICL: In order to report and disseminate the activities and achievements of the consortium, a General Assembly shall be convened every 3 years by inviting Members of the International Consortium on Landslides, individual members within those organizations, and all levels of cooperating organizations and individual researchers, engineers, and administrators. The General Assembly will receive reports on Consortium activities and provide a forum for open discussion and new initiatives from all participants.

The First General Assembly 2005 to the First World Landslide Forum 2008

The First General Assembly was organized at the Keck Center of the National Academy of Sciences in Washington D.C., USA, on 12–14 October 2005. At this Assembly, the first full-color book reporting consortium activities for the initial 3 years, 2002–2005, was published as “Landslides-Risk analysis and sustainable disaster management” through Springer. The 2006 Tokyo Round-Table Discussion – “Strengthening Research and Learning on Earth System Risk Analysis and Sustainable Disaster Management within UN-ISDR as Regards Landslides” – toward a dynamic global network of the International Programme on Landslides (IPL) was held at the United Nations University, Tokyo, on 18–20 January 2006. **The 2006 Tokyo**

Action Plan – Strengthening research and learning on landslides and related earth system disasters for global risk preparedness – was adopted. The Tokyo Action Plan established a new global International Programme on Landslides (IPL) including holding World Landslide Forums. Accordingly, the Second General Assembly 2008 was replaced by the **First World Landslide Forum** and held at the United Nations University, Tokyo, Japan, on 18–21 November 2008.

Report of the Second World Landslide Forum

The Second World Landslide Forum – *Putting Science into Practice* – was organized at the Headquarters of the Food and Agriculture Organization of the United Nations (FAO) on 3–9 October 2011. It was jointly organized by the IPL Global Promotion Committee (ICL, UNESCO, WMO, FAO, UNISDR, UNU, ICSU, WFEO) and two ICL members in Italy: the Italian Institute for Environmental Protection and Research (ISPRA) and the Earth Science Department of the University of Florence with support from the Government of Italy and many Italian landslide-related organizations.

- 864 people from 63 countries participated. Attendance was larger than expected, and twice the attendance at the First World Landslide Forum 2008 in Tokyo (430 participants: 175 from Japan and 255 from abroad).
- 25 technical sessions were held, and 465 full papers were submitted. All accepted papers were edited in 7 volumes including this volume:
 1. Landslide Inventory and Susceptibility and Hazard Zoning
 2. Early Warning, Instrumentation and Monitoring
 3. Spatial Analysis and Modeling
 4. Global Environmental Change
 5. **Complex Environment – this volume**
 6. Risk Assessment, Management and Mitigation
 7. Social and Economic Impact and Policies

Requests of Cooperation for Further Development of ICL and IPL

ICL and IPL are global multidisciplinary and cross-sectoral initiatives to promote landslide science and capacity-development to reduce landslide disasters. The core activities of ICL and IPL are *Landslides*: Journal of International Consortium on Landslides, World Landslide Forum, and IPL projects. Thanks to worldwide support of the journal, the Impact Factor of *Landslides* was 2.216 for 2011 which is the highest within 30 ISI journals in category of Engineering, Geological. The journal will develop from a quarterly journal to a bimonthly journal from Vol. 10 in 2013. The Third World Landslide Forum – Landslide risk mitigation toward a safer geo-environment – at the China National Convention Center, Beijing, China, on 2–6 June (conference) and 7–11 June (Field Trip) 2014. The ICL entered into the second decade of its activities and organized a 10th anniversary Conference on 17–20 January 2012, in Kyoto, Japan. ICL adopted the ICL Strategic Plan 2012–2021, *To create a safer geo-environment*- as an outcome of this conference.

ICL is an international nongovernmental and nonprofit scientific organization promoting landslide research and capacity-building for the benefit of society and the environment, and is

the thematic landslides platform in the UNISDR Global Platform for Disaster Risk Reduction. ICL activities are supported by voluntary efforts of ICL members and supporting organizations. All people involving in landslide research and landslide disaster mitigation activities are requested to cooperate for the development of this initiative through its second decade 2012–2021. (<http://www.iplhq.org/> and <http://icl.iplhq.org/>).

We are deeply appreciative of all the Second World Landslide Forum participants and of the contributions from our UNESCO, WMO, FAO, UNISDR, UNU, ICSU, WFEO partners and all of our colleagues in ICL for the development of IPL up to now. Finally we address our sincere thanks to Filippo Catani and Alessandro Trigila (the associate editors) for their extensive efforts covering the technical sessions, and reviewing and editing the papers.

Claudio Margottini
Forum Chair



Paolo Canuti
President of ICL



Kyoji Sassa
Executive Director of ICL



ICL and IPL Secretariat

IPL office: UNITWIN headquarters Buildings, Kyoto University Uji Campus,
Uji, Kyoto 611-0011, Japan

ICL office: The Association for Disaster Prevention Research,
138-1 Tanaka Asukai-cho, Sakyo-ku, Kyoto 606-8226, Japan

Email: secretariat@iclhq.org

URL: <http://www.iplhq.org/> and <http://icl.iplhq.org/>

Organizational Structure of the Second World Landslide Forum

Organizers

IPL Global Promotion Committee including:

- International Consortium on Landslides (ICL) *
 - United Nations Educational, Scientific and Cultural Organization (UNESCO)
 - World Meteorological Organization (WMO)
 - Food and Agriculture Organization of the United Nations (FAO)
 - United Nations International Strategy for Disaster Risk Reduction (UNISDR)
 - United Nations University (UNU)
 - International Council for Science (ICSU)
 - World Federation of Engineering Organizations (WFEO)
 - Italian Institute for Environmental Protection and Research (ISPRA)
- (* Members are listed in the last page of this book)

Co-sponsors

- International Union of Geological Sciences (IUGS)
- International Union of Geodesy and Geophysics (IUGG)
- International Geographical Union (IGU)
- International Flood Initiative (IFI)

Under the Auspices of

- International Association for Engineering Geology and the Environment, Italian Section (IAEG)
- Italian Association of Engineering Geologists (AIGA)
- Italian Association of Geotechnique (AGI)
- Italian Association for Mining Engineers, Environment and Territory (ANIM)
- Italian Georesources and Environment Association (GEAM)

International Organizing Board

Honorary Chairpersons

- Irina BOKOVA (UNESCO Director-General)
- Catherine BRECHIGNAC (ICSU President)
- Jacques DIOUF (FAO Director-General)

- Michel JARRAUD (WMO Secretary-General)
- Maria P. LAFFARGUE (WFEO President)
- Konrad OSTERWALDER (UNU Rector)
- Bernardo DE BERNARDINIS (ISPRA President)
- UNISDR Director

Chairpersons

- Claudio MARGOTTINI (ISPRA, Forum Chair)
- Paolo CANUTI (ICL President)
- Kyoji SASSA (ICL Executive-Director)

Deputy Chairpersons

- Peter BOBROWSKY (IUGS Secretary General)
- Deliang CHEN (ICSU Executive Director)
- Peter LYTTLE (ICL Vice President, US Geological Survey)
- Eduardo ROJAS-BRIALES (Assistant Director General of FAO)
- Badaoui ROUHMAN (Director of UNESCO's Section for Disaster Reduction)
- Yueping YIN (ICL Vice President, China Geological Survey)

Scientific Advisory Board

Representing Organisation

- Irasema ALCANTARA-AYALA (Vice President of International Geographical Union - IGU)
- Walter AMMAN (President Davos Forum)
- Michael CROZIER (President of International Association of Geomorphologists - IAG)
- Carlos DELGADO (President of International Association of Engineering Geology - IAEG)
- Luca DEMICHELI (Secretary General of EuroGeoSurveys)
- John HARDING (United Nations Secretariat to International Strategy for Disaster Reduction - UNISDR)
- Srikantha HERATH (Senior Academic Programme Officer of the United Nations University - UNU)
- Thomas HOFER (Forestry officer, Food and Agriculture Organization of the United Nations - FAO)
- Yumio ISHII (Chair of the Committee on Disaster Risk Management of The World Federation of Engineering Organizations WFEO)
- Derek MARTIN (Vice President for North America of International Society for Rock Mechanics - ISRM)
- Howard MOORE (Senior Advisor, International Council for Science - ICSU)
- Pedro SECO E PINTO (Past President of International Society for Soil Mechanics and Geotechnical Engineering - ISSMGE)
- Luciano PICARELLI (Chairperson of the Joint Technical Committee on Landslides and Engineered slopes - JTC1 of ISSMGE, ISRM, IAEG)
- Kaoru TAKARA (Vice chairperson of the Intergovernmental Council of the International Hydrological Programme of UNESCO - IHP)
- Kuniyoshi TAKEUCHI (President of GeoRisk Commission of International Union of Geodesy and Geophysics - IUGG)

Landslide Experts

- Giovanni BARLA (Politecnico di Torino, Italy)
- R.K. BHANDARI (Consultant, India)
- Christophe BONNARD (Swiss Federal Institute of Technology, Lausanne, Switzerland)
- Nicola CASAGLI (University of Florence, Italy)
- Leonardo CASCINI (University of Salerno, Italy)
- Giovanni CROSTA (University of Milano Bicocca, Milano, Italy)
- Jordi COROMINAS (Technical University of Catalonia, Barcelona, Spain)
- Dave CRUDEN (University of Alberta, Edmonton, Alberta, Canada)
- Thomas GLADE (University of Vienna, Austria)
- Jerome DE GRAFF (United States Department of Agriculture , Fresno - Ca - USA)
- Michel HERMELIN (Universidad EAFIT, Medellin, Colombia)
- Ken HO (Hong Kong Geotechnical office, Hong Kong, China)
- Jurgen KROPP (Potsdam Institute for Climate Change - PIK, Potsdam, Germany)
- Richard M. IVERSON (United States Geological Survey - Vancouver, WA , USA)
- C. F. LEE (Hong Kong University, China)
- Jacques LOCAT (University of Laval, Canada)
- Paul MARINOS (University of Athens, Greece)
- Hideaki MARUI (Niigata University, Japan)
- Hormoz MODARESSI (BRGM, Orléans, France)
- Farrouk NADIM (Norwegian Geotechnical Institute - NGI, Oslo, Norway)
- Gabriele SCARASCIA MUGNOZZA (University of Rome, Italy)
- Wang SIJING (Tsinghua University, China)
- Vern SINGHROY (Canada Centre for Remote Sensing, Ottawa, Canada)
- Alexander STROM (Institute of Geospheres Dynamics, RAS, Moscow, Russia)
- Ikuo TOWHATA (University of Tokyo, Japan)
- Keith TURNER (Emeritus Professor, Colorado School of Mines, Denver, Colorado USA)
- Keizo UGAI (Gunma University, Kiryu, Gunma, Japan)
- Roger URGELES (Institut de Ciències del Mar - CSIC, Barcelona, Spain)
- Yasser el SHAYEB (Cairo University, Egypt)
- Sergio SEPULVEDA (University of Chile, Santiago)
- Mauro SOLDATI (University of Modena and Reggio Emilia, Italy)
- Pasquale VERSACE (Calabria University, Cosenza, Italy)
- Cees van WESTEN (ITC, Enschede, Netherlands)
- Kifle WOLDEAREGAY (University of Mekelle, Ethiopia)

Local Organizing Board

Forum Chairs

- Paolo CANUTI (ICL President - WLF2 Chairperson)
- Claudio MARGOTTINI (ISPRA - WLF2 Chairperson)
- Kyoji SASSA (ICL Secretary General - WLF2 Chairperson)

Scientific Programme Committee

- Luciano PICARELLI (Second University of Napoli)
- Marco AMANTI (ISPRA)
- Filippo CATANI (University of Firenze)
- Fausto GUZZETTI (CNR-IRPI)
- Javier HERVAS (JRC)

- Thomas HOFER (FAO)
- Carla IADANZA (ISPRA)
- Claudio MARGOTTINI (ISPRA - WLF2 Chairperson)
- Paolo TOMMASI (CNR-IGAG)
- Alessandro TRIGILA (ISPRA)

Editorial Committee

- Filippo CATANI (University of Firenze)
- Riccardo FANTI (University of Firenze)
- Fausto GUZZETTI (CNR-IRPI)
- Javier HERVAS (JRC)
- Irene RISCHIA (ISPRA)
- Gabriele SCARASCIA MUGNOZZA (Università di Roma "La Sapienza")
- Alessandro TRIGILA (ISPRA)

Logistic Committee

- Thomas HOFER (FAO)
- Claudio MARGOTTINI (ISPRA - WLF2 Chairperson)
- Orlando PANDOLFI (ECN)
- Luna GUBINELLI

Field Trips

- Gabriele SCARASCIA MUGNOZZA (University of Roma "La Sapienza")
- Giuseppe DELMONACO (ISPRA)
- Riccardo FANTI (University of Firenze)
- Irene RISCHIA (ISPRA)
- Daniele SPIZZICHINO (ISPRA)
- Paolo TOMMASI (CNR-IGAG)

Fund Raising and Exhibition

- Claudio MARGOTTINI (ISPRA - WLF2 Chairperson)
- Paolo FARINA (IDS SpA)
- Giorgio LOLLINO (CNR-IRPI)

Secretariat

ISPRA, Italian Institute for Environmental Protection and Research
Dept. Geological Survey of Italy, Via Vitaliano Brancati, 48-00144 Rome, Italy.

Logistics and Administration

Orlando PANDOLFI - ECN yourLIFE Foundation

Contents

Part I Submarine Landslides and Tsunamis

Introduction by Roger Urgeles, Paolo Mazzanti, and Jacques Locat

Submarine Landslides and Their Consequences: What Do We Know, What Can We Do?	5
Maarten Vanneste, Carl Fredrik Forsberg, Sylfest Glimsdal, Carl B. Harbitz, Dieter Issler, Tore J. Kvalstad, Finn Løvholt, and Farrokh Nadim	
Model Test of Submarine Landslide Impact Forces Acting on Cables	19
Fawu Wang, Tomokazu Sonoyama, and Mitsuki Honda	
Güímar and La Orotava Mega-Landslides (Tenerife) and Tsunamis Deposits in Canary Islands	27
Mercedes Ferrer, Luis González de Vallejo, Julia Seisdedos, Juan J. Coello, J. Carlos García, Luis E. Hernández, Ramón Casillas, Candelaria Martín, Jose A. Rodríguez, José Madeira, César Andrade, M. Conceição Freitas, Alejandro Lomoschitz, Jorge Yepes, Joaquín Meco, and J. Francisco Betancort	
The Dynamics of Subaqueous Rock Avalanches: The Role of Dynamic Fragmentation	35
Paolo Mazzanti and Fabio Vittorio De Blasio	
Submarine Slope Failures Along the Northern Sicilian Continental Margin (Southern Tyrrhenian Sea) and Possible Implications for Geo-Hazard	41
Attilio Sulli, Mauro Agate, Claudio Lo Iacono, Valeria Lo Presti, Valentina Pennino, and Sabrina Polizzi	
Interaction of Landslide Mass and Water Resulting in Impulse Waves	49
Giovanni B. Crosta, Silvia Imposimato, and Dennis Roddeman	
Dynamics, Velocity, and Run-Out of Subaqueous Rock Avalanches	57
Fabio Vittorio De Blasio	
Simulation of Submarine Landslides by Cellular Automata Methodology	65
V. Avolio Maria, Bozzano Francesca, Di Gregorio Salvatore, Lupiano Valeria, and Mazzanti Paolo	
Modelling of the 1888 Landslide Tsunami, Trondheim, Norway	73
Sylfest Glimsdal, Jean-Sebastien L'Heureux, Carl B. Harbitz, and Geir K. Pedersen	
Landslides Along Norwegian Fjords: Causes and Hazard Assessment	81
Jean-Sebastien L'Heureux, Louise Hansen, Oddvar Longva, and Raymond S. Eilertsen	
Mapping of Subaqueous Landforms for Near-Shore Landslide Susceptibility Assessment Along Norwegian Fjords	89
Louise Hansen, Jean-Sebastien L'Heureux, Oddvar Longva, Raymond S. Eilertsen, and Reidulv Bøe	

Part II Landslide in Coastal Area

Introduction by Crescenzo Violante

- State of the Art for Landslides Along the North Bulgarian Black Sea Coast . . .** 97
 Boyko Berov, Plamen Ivanov, Nikolai Dobrev, Rosen Nankin,
 and Miroslav Krastanov
- Flood Historical Data for Flood Risk Estimation in Coastal Areas,
 Eastern Tyrrhenian Sea, Italy** 103
 Sabina Porfido, Eliana Esposito, Flavia Molisso, Marco Sacchi,
 and Crescenzo Violante
- Contribution of Physical Modelling to Landslide Hazard Mapping:
 Case of the French Basque Coast** 109
 Marc Olivier, Olivier Sedan, and Bernard Monod
- Landslides in Sea Cliffs Area Along the Capri Coast (Gulf of Naples, Italy) . . .** 119
 Micla Pennetta and Elio Lo Russo
- Large Landslides in Sea-Cliff Areas of the Central Adriatic Coast (Italy)** 129
 Domenico Aringoli, Marcello Buccolini, Marco Materazzi, Bernardino Gentili,
 Gilberto Pambianchi, and Nicola Sciarra
- Coupling On-Land and Marine Investigations to Assess Coastal Instability
 in the Napoli and Salerno Bays (Campania, Southern Italy)** 135
 Crescenzo Violante
- Identification of Hydro-Meteorological Triggers for Villerville
 Coastal Landslide** 141
 Thom Bogaard, Laxmi Devi Maharjan, Olivier Maquaire, Candide Lissak,
 and Jean-Philippe Malet
- Statistically Based Sea Cliff Instability Susceptibility Assessment at Regional
 Scale, at the Burgau-Lagos Coastal Section (Algarve, Portugal)** 147
 Fernando Marques, Rita Matildes, and Paula Redweik

Part III Seismically Induced Landslides and Seismic Landslide Hazard Analysis

Introduction by Ed Harp, Hideaki Marui, and Luca Guerrieri

- The Effect of Complex Fault Rupture on the Distribution of Landslides
 Triggered by the 12 January 2010, Haiti Earthquake** 157
 Edwin L. Harp, Randall W. Jibson, and Richard L. Dart
- Numerical Analysis of Two Wooden House Damages Induced by Dune
 Liquefaction during the 2007 Niigata Chuetsu-Offshore Earthquake** 163
 Fei Cai, Keizo Ugai, Akihiko Wakai, Seiichiro Kuroda, Atsuo Onoue,
 and Kunihiro Higuchi
- The Recent Activities in the Earthquake-Induced Landslides Research
 Project Carried Out by the Japan Landslide Society: The Interim Report . . .** 171
 Akihiko Wakai, Keizo Ugai, and Committee Members of ELRP
- Environmental Impact of the Landslides Caused by the 12 May 2008,
 Wenchuan, China Earthquake** 179
 Lynn Highland and Ping Sun
- Mechanism of Landslide Composed of Strongly Weathered Mudstone
 Induced by the 2004 Mid-Niigata Earthquake** 185
 Keizo Ugai, Akihiko Wakai, Fei Cai, and Seiichiro Kuroda

Tien-Shan Landslides Triggered by Earthquakes in Pamir-Hindukush Zone	191
Isakbek Torgoev, Rustam Niyazov, and Hans-Balder Havenith	
Inferring Seismic Response of Landslide-Prone Slopes from Microtremor Study	199
Vincenzo Del Gaudio, Janusz Wasowski, and Chyi-Tyi Lee	
Evaluation of the Temporal Probability of Earthquake-Induced Landslides in the Island of Lefkada, Greece	211
George Papathanassiou, Sotiris Valkaniotis, and Spyros Pavlides	
Building Vulnerability to the 2008 Iliia-Achaia Earthquake Induced Slides . . .	219
Stavroula Fotopoulou, Anastasios Anastasiadis, and Kyriazis Pitilakis	
Seismic Slope Performance: Comparison of FEM Results to Displacement-Based Methods	227
Carolina Sigaran-Lorıa, Robert Hack, and Jan D. Nieuwenhuis	
Possible Vapor Lock Generation Near a Sliding Surface as a Mechanism of Huge Earthquake Landslides	237
Eisaku Hamasaki, Osamu Watanabe, Syuichi Hashimoto, Shinichi Yamashina, Toyohiko Miyagi, and Norio Takeuchi	
Statistical Analysis of Deep-Seated Landslides Induced by Recent Strong Earthquakes in Eastern Japan: An Approach Based on Pre-Existing Landslide Topography	241
Bateer Hasi, Kiyoteru Maruyama, Akira Nakamura, and Tomoyuki Noro	
Susceptibility Mapping of Deep-Seated Landslides Around Active Fault System, a Case Study of Western Niigata, Japan	249
Akira Nakamura, Bateer Hasi, Tomoyuki Noro, and Kiyoteru Maruyama	
Effect of the Thickness of Geological Strata on Seismically-Induced Slope Failure in IMN Earthquake, 2008 in Japan	255
Shiho Asano	
Landslides Induced by the 1908 Southern Calabria: Messina Earthquake (Southern Italy)	261
Valerio Comerci, Anna Maria Blumetti, Elisa Brustia, Pio Di Manna, Luca Guerrieri, Mauro Lucarini, and Eutizio Vittori	
Earthquake Damage Zone GIS Modelling: A Modulation Between Co-Seismic Deformation and Landslide Susceptibility	269
Jian Guo Liu, Philippa J. Mason, Eric Yu, Meng-Che Wu, Tang Chuan, Huang Runqiu, and Liu Hanhu	
Spatial Distribution of Landslide Dams Triggered by the 2008 Wenchuan Earthquake	279
Xuanmei Fan, Cees J. van Westen, Qiang Xu, Tolga Gorum, Fuchu Dai, Gonghui Wang, and Runqiu Huang	
Geological and Structural Control of Earthquake-Induced Landslides in El Salvador	287
Ignacio Garcıa-Florez and Meaza Tsige	
Landslides Induced by Historical and Recent Earthquakes in Central-Southern Apennines (Italy): A Tool for Intensity Assessment and Seismic Hazard	295
Eliana Esposito, Luca Guerrieri, Sabina Porfido, Eutizio Vittori, Anna Maria Blumetti, Valerio Comerci, Alessandro M. Michetti, and Leonello Serva	

Slope Stability of Continental Megalandslides	305
Nguyen Anh Tuan, José Darrozes, Jean-Claude Soula, Marianne Saillard, Frédéric Christophoul, Nicole Guerrero, and Pierre Courjeault-Radé	
Seismically Induced Landslides in Abruzzo (Central Italy): Morphostructural Control	315
Enrico Miccadei, Tommaso Piacentini, Nicola Sciarra, and Rosamaria Di Michele	
Semi-Empirical Assessment of Road Vulnerability to Seismically Induced Slides	321
Sotiris Argyroudis, Stavroula Fotopoulou, and Kyriazis Pitilakis	
Earthquake Related Landslides in the Indian Himalaya: Experiences from the Past and Implications for the Future	327
Surya Parkash	
Relationships Between Slope Instabilities, Active Tectonics and Drainage Systems: The Dúdar Landslide Case (Granada, Southern Spain)	335
Martín Jesús Rodríguez-Peces, José Vicente Pérez-Peña, José Miguel Azañón, and Alicia Jiménez-Gutierrez	
Modern Seismogenic Landslides Caused by the Pamir-Hindu Kush Earthquakes and Their Consequences in Central Asia	343
Rustam Niyazov and Bakhtiar Nurtaev	
Hazard and Risk Scenarios of Landslides Triggered by Earthquakes	349
Roberto W. Romeo, Milena Mari, Giulio Pappafico, Pierpaolo Tiberi, Umberto Gori, Francesco Veneri, Gianluigi Tonelli, and Carmela Paletta	