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Editors

# Progress of Geo-Disaster Mitigation Technology in Asia

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# Preface

Japan Sea Region Research Institute was established 9 years ago in 2003 with the sole objective of bringing geoscience and geotechnically based researchers together. The founding members shared the idea of having an international research meeting which would accommodate other research areas that are related to the field of geotechnical engineering. Target participants and contributors were Japanese and foreign researchers around Japan Sea. The first international symposium was held in December 2003, in Kanazawa University Japan, under the title: “First International Symposium on Mitigation of Geo-hazards in Areas around the Japan Sea”. Though the opening ceremony was missed by some foreign researchers due to heavy snowfall in and around the venue city, the symposium recorded huge success as everyone, through lively discussions, shared views and opinions on current scientific problems, and the participants unanimously decided to make the symposium an annual event.

With success established, there was need to expand the research area to accommodate studies in geohazard mitigation and prevention like seismology and earthquake, building and pipeline engineering, and the target area was expanded beyond the countries around Japan Sea to larger areas including Indonesia, Iran, and so on.

Scientific research has no end. The more we probe and solve environmental problems, the more we discover more unsolved problems. This is why we must not relent in providing answers and solutions to pertinent geoenvironmental challenges. In commemoration of the tenth annual symposium, we are very happy to present to you the results of our latest research works. On behalf of the first chairpersons of the Steering and Organizing Committee in 2003, I would like to thank everybody so far present at the symposium and those who have in one way or the other contributed to the success of this event.

## 序文

今から9年ほど前、筆者らの何名かが所属していた金沢大学に日本海域研究所があった。地盤の研究をしている仲間で、研究所の名前に相応しい国際的な研究集会を始めようと図り、知っている外国の研究者に声をかけ、12月に金沢で、第一回日本海域地盤破壊軽減国際シンポジウムを開催した。あいにく豪雪が金沢を来襲し、外国の研究者の中には開会式に間に合わなかった人もいた。活発な討議を通じて、多くの課題のあることをみんなが認識し、来年以降も開催することを決めた。その後、研究のテーマは地盤のみでなく、地域も日本海域にとどまることはなかった。今回、第10回を記念して、われわれの最近の到達点を紹介できることを非常にうれしく思う。しかし研究に終わりはない。研究を進めると、また新しい課題が出てくる。われわれはこれからも研究を続ける。

これまでにこのシンポジウムで発表し、サポートして下さったみなさまに心からの感謝を捧げる。

第一回目の実行委員会と組織委員会を代表して  
金沢大学名誉教授 北浦 勝



Japan, May 22, 2012

Masaru Kitaura  
Chairperson of the First Steering and  
Organizing Committees  
Professor emeritus of Kanazawa University

# Foreword

This book presents up-to-date research results of geo-disaster mitigation technologies in Asia. Most of the contributions in this paper are from the core members and participants of the International Symposium on Mitigation of Geo-disasters in Asia (MGDA) in the 10 years, with some keynote papers from notable researchers who are very active in this region.

As rightly introduced by Prof. Emeritus M. Kitaura, the first International Symposium on Mitigation of Geo-disasters in Areas around Japan Sea was held in 2003 at Kanazawa University, Japan. This pioneer event drew the attention of researchers and engineers from China, Korea, and Japan who were then interested or working on disaster mitigation around the Japan Sea region. The second, third, and fourth symposiums were held in the Kanazawa University while the fifth and sixth symposiums were held in 2007 and 2008 in Xi'an and Kunming cities both in China. In 2009, the name of the symposium was changed to "The International Symposium on Mitigation of Geo-disasters in Asia" to include more countries. The seventh event was held in Harbin city of China. Then, the eighth and ninth symposiums were held in Vladivostok city of Russia in 2010, and Yogyakarta city of Indonesia in 2011, respectively.

The Department of Geoscience in Shimane University, Japan got the chance to organize the tenth event of the symposium in 2012. To celebrate the tenth anniversary of the symposium, we made a proposal to publish a book with Springer to show the progress we have made in the past 10 years in the geo-disaster mitigation technologies in Asia. The idea was approved by the current steering committee which is made up of Prof. M. Miyajima (Kanazawa University, Japan), Prof. T. L. Li (Chang'an University, China), Prof. W. Shan (Northeast Forestry University, China) and Associate Professor T. F. Fathani (Gadjah Mada University, Indonesia), and an editorial committee for the book was formed.

For the past 10 years, the continent of Asia has experienced a lot of geohazards like earthquakes, typhoons, and volcanic eruptions which have caused serious disasters. The reader is therefore enjoined to see some contributions made by the core members as we try to improve our efforts in providing timely results and suggestions on hazard assessment and disaster prevention.

It is very important to acknowledge that all scientific approaches and methods employed in the study of hazard analysis and risk management are relevant in disaster mitigation. In Asia, many research institutes and investigation centers have presented diverse research methods and results based on their specific areas of interest. Our core members also made important contributions to geo-disaster mitigation. For example, the Kanazawa University research group concentrated on earthquakes and seismology and made major progress in lifeline earthquake engineering; the Chang'an University research group has made enormous contributions on disasters associated with loess deposits; the Northeast Forestry University research group are working on landslide disasters in cold regions; the Gadjah Mada University research group concentrated on tsunami caused by earthquakes, lahar by volcano eruption and landslide warning; the Jilin University research group conducted many research works on geotechnical and civil engineering problems, while the Shimane University group are working on submarine to localized landslides through experimental approach to numerical analysis, and the complex earthquake/rainfall-triggered landslides. It is our belief that the results and conclusions presented in these research areas will be of great benefit to the readers of the book.

We also admitted the limitation of our existing network formed in the annual events, and are trying to enlarge the network so that we can include the key researchers of geo-disaster in the Asian region. So, in addition to the core members in our network, we invited Dr. A. Strom from Russia, Dr. Z. Q. Yue from University of Hong Kong, Dr. K. F. Liu from National Taiwan University, Dr. R. K. Dahal from Tribhuvan University, and so on to contribute some very comprehensive research results for the book.

We appreciate the financial support from Kanazawa University, Chang'an University, and Northeast Forestry University which made it possible for us to publish this book. The Tenth International Symposium on Mitigation of Geo-disasters in Asia is also supported by a joint research fund courtesy of Disaster Prevention Research Institute, Kyoto University, and a germinating research project for disaster prevention of Shimane University. The San'in Disaster Prevention Forum based on Shimane University fully supported this important event. Mr. Austin Chukwueloka Okeke, Mr. Fikri Faris, and Mr. Hufeng Yang of Graduate School of Shimane University assisted the editing committee in editing this book.

To celebrate the tenth anniversary of this annual event, we are organizing a field trip from Sendai city to investigate the 2011 disaster triggered by tsunami in the coastal area of eastern Japan, and also, analyze the achievements of Japan in earthquake-proof building designs. We enjoin everybody to join us to Mt. Bandai to see a deep-seated landslide triggered by volcanic eruption, and then move to Hotaka town to see debris flow countermeasures and monitoring systems. The field excursion will end with a trip to Shimane Prefecture to see the peaceful countryside and a world heritage center: the Iwami Silver Mountain, where participants will directly feel the local people's keenness to harmoniously live with natural hazards.

Finally, we would like to dedicate this book to the founding members of the symposium: Prof. M. Kitaura and Prof. M. Miyajima for their academic foresight, leadership ability, and courage in mitigating disasters in Asia. We also appreciate the continued participation of our core members who have contributed so much to the success of this professional body. We believe that in the nearest future, our network will be much stronger, so that our scientific findings will not only benefit Asia, but will also be usefully applied in global disaster mitigation.



May 28, 2012

Fawu Wang  
On behalf of the Chairpersons of the Tenth Steering  
and Organizing Committees



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