

# **8<sup>th</sup> Asian Rock Mechanics Symposium – ARMS 8 “Rock Mechanics for Global Issues- Natural Disasters, Environment and Energy”**

**ISRM International Symposium  
14-16 October 2014  
Sapporo, Japan**

The 8th Asian Rock Mechanics Symposium (ARMS8): Rock Mechanics for Global Issues– Natural Disasters, Environment and Energy-, was held at the Royton Sapporo Hotel and Convention Center in Sapporo, Japan, on 14-16 October as the 2014 ISRM International Symposium, organized by the Japanese Committee for Rock Mechanics. The total number of participants was 620. They came from 35 countries and regions. The participants included more than 130 students from 17 countries and regions.

The Board and Council Meetings were held on 12 and 13 October, respectively, in advance of the symposium. Additionally, seven Workshops and a Short Course were organized before the symposium to update everyone on the activities of the ISRM commissions on DDA, Rock Dynamics, the Preservation of Ancient Sites, Design Methodology, Underground Nuclear Power Plants and the Application of Geophysics to Rock Engineering, and to discuss recent progress in related fields.

The symposium started on 14 October. Seven excellent keynote lectures were delivered on matters associated with the main themes of the symposium “Rock Mechanics for Global Issues–Natural Disasters, Environment and Energy-”, namely, “Tunneling and underground construction in China-challenges and progress” by Prof. Xia-Ting Feng, “Contributions of rock physics to carbon dioxide capture and sequestration” by Prof. Toshifumi Matsuoka, “Key coupled processes related to gas-fracturing in unconventional reservoirs” by Prof. Derek Elsworth, “Geohazards risk management in India” by Prof. Surya Parkash, “Environmental impact of nuclear waste management - Concerns from intermediate storage to final disposal” by Mr. Rolf Christiansson, “Performance assessment of a rock cutting tool” by Prof. Seokwon Jeon and “A reinforcement design methodology for highly stressed rock masses” by Prof. Ernesto Villaescusa. And, the 2014 ISRM Franklin Lecture “Drying-induced deformation characteristics of rocks” by Prof. Masahiko Osada and the 2014 ISRM Rocha Medal Lecture “Effects of Carbon Dioxide Sequestration on Coal's Hydro-Mechanical behaviour” by Dr. Mandadige Samintha Anne Perera were also presented.

A total of 329 excellent papers were presented on 14 topics in 39 oral sessions, on 3 topics in 3 other organized sessions, and in two days of poster sessions. Those topics of the sessions covered the main theme of the symposium and the related fields as follows: 1) Rock Properties, 2) Earthquakes and Rock Dynamics, 3) Tunnels and Underground Spaces, 4) Mining Engineering, 5) Petroleum Engineering, 6) Slope Stability, 7) Radioactive Wastes, 8) Site Characterization and Design, 9) Field Measurements and Tests, 10) Rock Mechanics at Great Depth, 11) Risk Management and Disaster Mitigation, 12) Environmental Aspects of Mining and Construction Engineering, 13) Reservoir Engineering, 14) Carbon Dioxide Capture and Storage, 15) Organized Session: Rock Engineering Risk, 16) Organized Session: Underground Nuclear Power Plant/Underground Research Laboratory, 17) Organized Session: DDA/MM. Well-prepared and interest presentations were performed and active

discussions were exchanged to understand and share recent progress and experiences on each topics.

The ISRM Board decided that the awards to be given at ISRM-sponsored international symposia would be named the "ISRM Awards" starting at this symposium. The 2014 ISRM Outstanding Paper Award and the Outstanding Paper Award for Young Scientists and Engineers were presented to general authors (Sakaguchi, K., et al.) and a young author (Phueakphum, D.), from the orally presented best papers, respectively. In addition, the 2014 ISRM Outstanding Poster Award and the Outstanding Poster Award for Young Scientists and Engineers were presented to general authors (Lo, C., et al) and a young author (Furuyama, Y.) of the best papers presented at the poster session, respectively. The winners were commended at the Closing Ceremony.

A technical exhibition was held in the spaces just outside of the conference rooms by 25 companies and groups. Coffee breaks were also held in the same spaces as the technical exhibition, and participants and exhibitors had a chance to get together and exchange information and opinions on the recent technologies in Rock Mechanics and Rock Engineering. The ARMS8 Exhibition Awards were given to four exhibitors: On Site Visualization, OYO Corporation, a group of RaaX Co., Ltd., Earth Scanning Association and MALÅ GeoScience AB, and A-TiC Co., Ltd.

Encouraging the young generation to take a more active role in the field of Rock Mechanics is an important issue for ISRM. ARMS8 provided two activities for this purpose. One was the scholarships and the other was "Students' Night". The scholarships provided young members with the financial support to attend ARMS8. The 11 winners were selected from Australia, China, India, Indonesia, Malaysia, Portugal, Singapore and Taiwan from among the young participants who applied to the program, and they were commended at the symposium Banquet by representatives of the donor companies.

The "Students' Night" program provided a meeting to encourage the establishment of networks among young members supported by the ISRM Young Members Presidential Group. More than 150 young members applied to attend this event. Due to space limitations, only about 50 students could be selected from all the applicants by a random selection process. They all enjoyed this program together with the ISRM Board members, Prof. Feng, Mr. Lucas, Dr. Zhou and Dr. Lamas.

As social activities, the Welcome Reception and the symposium Banquet were held at the venue on 13 and 15 October, respectively. The banquet started with "Kagamiwari", the breaking open of a ceremonial barrel of sake by a wooden hammer. 300 delegates got together and enjoyed modern dancing performed by children and music provided by an ensemble of flutes, piano and percussion, played by ladies wearing beautiful "Kimono". A one-day tour of Otaru Bay City, a one-hour drive northwest of Sapporo, was given as part of the Accompanying Persons' Program on 15 October. 12 persons attended it.

Two technical excursions were conducted after the symposium. Tour A was a visit to the Horonobe Underground Research Laboratory (URL) of the Japan Atomic Energy Agency (JAEA). JAEA has been carrying out research and development there on the geological disposal of high-level radioactive waste. This tour included a visit to a road tunnel disposal site and observation of the facilities for heavy metal-rich muck. 30 delegates participated in Tour A. Tour B was a visit to the Kyogoku Pure Pumped-storage Hydro-electric Power Plant, including two rockfill dams for the upper and lower reservoirs, the 3-km tailrace tunnel and the underground power station constructed 430 m from the ground surface. 39 delegates took part in this Tour B.

The booklet of the ARMS8 Program and Abstracts, and the Proceedings on USB flash memory were distributed to the participants. The digital version of the Proceedings, which is about 3000 pages in length, has been published in December, 2014. Participants can download it from the web. All papers included in the Proceedings will be introduced into the ISRM Digital Library.

On behalf of the Organizing Committee, we extend our appreciation to all the participants and contributors who supported us and helped to bring success and joy to the symposium.

Norikazu Shimizu  
Chairman of the Organizing Committee  
Katsuhiko Kaneko  
Chairman of the Scientific Committee

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