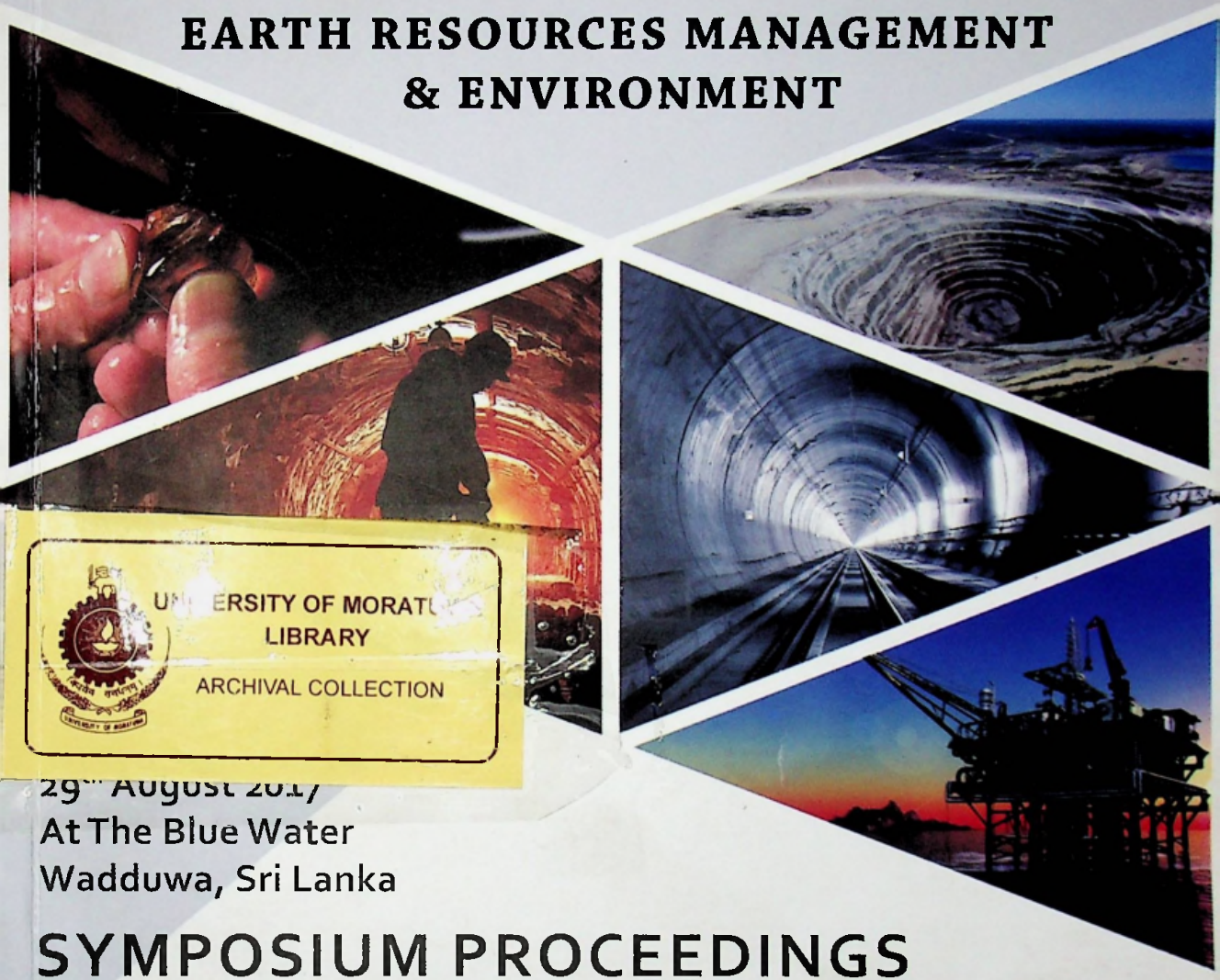
ISERME 2017

INTERNATIONAL SYMPOSIUM ON EARTH RESOURCES MANAGEMENT & ENVIRONMENT



29th August 2017
At The Blue Water
Wadduwa, Sri Lanka

SYMPOSIUM PROCEEDINGS

JOINTLY ORGANIZED BY

DEPARTMENT OF
EARTH RESOURCES ENG.
UNIVERSITY OF MORATUWA, SRI LANKA

HOKKAIDO UNIVERSITY
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DIVISION OF
SUSTAINABLE RESOUCES ENG.
HOKKAIDO UNIVERSITY, JAPAN

ISERME 2017

International Symposium

on

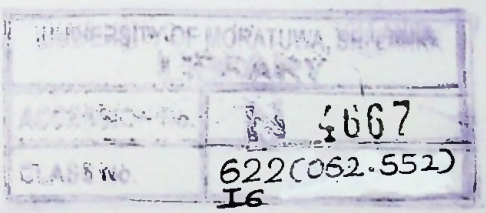
Earth Resources Management & Environment

Jointly Organized by

Department of Earth Resources Engineering
Faculty of Engineering
University of Moratuwa
Sri Lanka

Division of Sustainable Resources Engineering
Faculty of Engineering
Hokkaido University
Japan

29th August 2017, The Blue Water Hotel, Wadduwa, Sri Lanka



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Message from Dr. HMR Premasiri - Symposium Co-chair

It is indeed a great pleasure in issuing this message for the International Symposium on Earth Resources Management & Environment (ISERME 2017) jointly organized by the Department of Earth Resources Engineering, Faculty of Engineering, University of Moratuwa and Division of Sustainable Resources Engineering, Hokkaido University, Japan.

The Department of Earth Resources Engineering, University of Moratuwa has been conducting the ERE-Annual Conference for ten years. In the year 2017, the department has joined hand with Division of Sustainable Resource Engineering, Hokkaido University, Japan and being organized the international symposium as a result of signing a Memorandum of Understanding between University of Moratuwa and, Hokkaido University, Japan.

The Department of Earth Resources Engineering of the University of Moratuwa, is the only department in Sri Lanka, conducting undergraduate and post-graduate levels degree programme in the fields of Earth Resources Engineering and Mining Engineering. This is the first time in the history of the Department, this symposium is held as an international event.

This International Research Symposium is a land-mark event of the history of the department and it is a premier forum for the academics, researchers, industry leaders, geo-professionals to come together and have constructive discussions on Earth Resources and Mining Engineering and related Environmental issues. I am sure that the symposium provides stage to showcase departments' research to the world and to strengthen the international collaboration especially with Hokkaido University Japan. I would like to extend my gratitude to Prof. Mohan De Silva Chairman University Grant Commission Sri Lanka and today's Chief Guest, Prof. Ananda Jayawrdane, Vice- Chancellor, Prof. Kapila Perera, Dean Faculty of Engineering and Key Note Speakers Prof. Tsutomu Sato and Prof. Yoshiaki Fujii for their encouragements to make this event a success and Special thanks goes to Prof. Satoru Kawasaki who was instrumentally involved in singing MOU between two Universities. Also we would like to thanks for Faculty of Graduate Studies, University of Moratuwa and our industry partners for their continuous willingness of financial support to this event.

I take this opportunity to convey my best wishes to all researches who presented their research findings in this symposium.

Dr. HMR Premasiri
Head / Department of Earth Resources Engineering, University of Moratuwa
Sri Lanka
29th August 2017

Message from Prof. Yoshiaki Fujii - Symposium Co-chair

On behalf of the Organizing Committee and as the co-chair of the symposium, I would like to welcome all of you participating the International Symposium on Earth Resources Management & Environment at The Blue Water Hotel, Wadduwa, Sri Lanka which is jointly organized by the Department of Earth Resources Engineering, University of Moratuwa, Sri Lanka and the Division of Sustainable Resources Engineering, Hokkaido University, Japan. It is my great pleasure to organize the symposium to create an international forum for academics, researchers, industry leaders, professionals and alumni to come together sharing latest findings and to have constructive discussions across a broad range of disciplines related to Mining and Earth Resources Engineering. The event also seeks to network with a large number of organizations and individuals at national and international level and be a pioneer in encouraging innovation and sustainability. You are wrong if you think that we have already developed almost everything and there will not be epoch-making inventions in near future. We cannot imagine technologies in 2117 as people in 1917 were not being able to imagine the present technologies. Hair-splitting discussions are not constructive, or rather destructive. I hope this symposium can bring seeds for innovations for the better future world through constructive discussions.

Further I hope that this symposium will provide an ample opportunity to establish international collaboration between Hokkaido University and University of Moratuwa.

Prof. Yoshiaki Fujii
Head / Division of Sustainable Resources Engineering, Hokkaido University
Japan
29th August 2017

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Keynote Address

Social and Economic Impacts of Applied Mineralogy

Prof. Tsutomu Sato
Division of Sustainable Resources Engineering,
Hokkaido University
Japan

Most of us use the products of modern technology without fully appreciating which minerals are required to make a cell phone, a modern internal combustion engine, an aluminum can, ceramics and the concrete used in buildings. For example, in Japan, all students in junior high school should learn "what are minerals" and "what is the definition of minerals" with some examples from rock-forming minerals such as quartz, feldspar, mica, and so on, although the author does not know the situation of minerals in education at other countries. I suppose that the situation is not so different in different countries. However, as stated in the special issue of Elements on "Social and economic impact of geochemistry", minerals are definitely central not only to our natural and technological environments but also to our social and economic environments. Environmental mineralogy is a fast-growing multidisciplinary field, addressing major societal concerns about the impact of anthropogenic activities on the global ecosystem. However, mineralogists are still not very good at communicating the social and economic impacts of mineralogy to the public. Of course, minerals may sometimes inspire us to design new materials for advanced technologies. Minerals and mineralogical processes such as adsorption, sorption, and precipitation may play an important role to solve problems in negative legacy such as pollution, health effect, and waste disposal.

Invited Speech

Geological Disposal of High-Level Radioactive Waste in Japan and the Role of Rock Engineering

Prof. Yoshiaki Fujii
Division of Sustainable Resources Engineering,
Hokkaido University
Japan

High level nuclear wastes are produced during the nuclear cycle of ordinary light water reactors and fast breeder reactors. Japanese government does not encourage the development of fast breeder reactors. Only a few light water reactors are functional since the Magnitude 9 Tohoku 2011 earthquake. The devastating tsunami due Tohoku earthquake destroyed Fukushima Daiichi Nuclear Power Plant and consequently more than half of Japanese are objecting the existence of nuclear power plants. However, there are already huge amount of high level nuclear wastes in Japan and they should be safely stored. Geological disposal of high level nuclear wastes is one of the methods; the nuclear wastes are mixed with glass and filled in stainless canisters to make vitrified radioactive wastes. The canisters are stored for 30 to 50 years for cooling prior to geological disposal. Later on when then they dispose, the canisters are covered by over packs which are made of carbon steel and are buried in underground caverns via Bentonite sealing materials. The geological disposal cavern for high level nuclear wastes should be tight by keeping the low permeability of the surrounding rock mass. The caverns will be constructed more than 300 m deep by Japanese regulations so that the rock stress is enough to create the excavation disturbed zones (EdZ), and the excavation damaged zones (EDZ) in the surrounding rock mass. In geological disposal, the thermal stress due to temperature gradient by the decay heat and chemical reactions should be considered. The sealability of the caverns will significantly control by permeability of rock mass which will change deformation, temperature and chemical reactions.