

Introduction to the Special Issue on the “Mathematical Geology for Resource Exploration” Session at IGC32

Katsuaki Koike¹

Published online: 24 March 2006

Many readers probably attended the 32nd International Geological Congress (IGC) held 20–28 August 2004 in Florence, Italy. The scientific program of the IGC was classified into three symposium categories: 14 Special, 38 Topical, and 24 General Symposia including a “Mathematical Geology” symposium. Each Topical and General symposium consisted of several sessions: six sessions were organized for “Mathematical Geology.” This issue of *Natural Resources Research* is composed of papers from one such session; “G-13.06 Mathematical Geology for Resource Exploration,” held the afternoon of 22 August. The session was supported jointly by the International Association for Mathematical Geology (IAMG) and the International Symposium on Mineral Exploration (ISME). Pengda Zhao (China University of Geosciences) and I served as convenors to select abstracts and to create the program.

ISME is an international organization of the Division of Exploration Technology (DETEC) in the Mining and Materials Processing Institute of Japan (MMIJ). Since 1990, symposia sponsored or supported by ISME have been held every 2 years; in Japan, Canada, China, Australia, Brazil, and USA, in conjunction with the annual conferences of IAMG and the IGC. As Singer and Kouda (1993) correctly noted, the purpose of ISME symposia is “to bring together scientists actively working on some diverse fields in order to foster the exchanges of ideas related to the methods of resource exploration.” ISME originally focused on mineral resources, but has since

developed to also focus on solving other natural resources problems involving such areas as coal, natural gas, petroleum, methane hydrate, geothermal, groundwater, and aggregates. Its activities at the last seventh symposium can be seen in the special issues on the application of neural networks to earth sciences in *Natural Resources Research*, v. 12, no. 3 and part of no. 4.

This session presented the eighth ISME symposium, which was intended to cover all aspects of mathematical geology for resource exploration. Initially, the main topics were proposed as; advanced data-analysis methods for exploring and assessing renewable and nonrenewable resources, advanced geostatistics for characterizing petroleum and geothermal reservoirs, remote sensing for detecting mineral manifestations, highly precise methods for modeling geologic structures and, new paradigms for resource assessment.

There were eight oral (two cancelled out of an original 10) and 15 poster presentations. The oral papers could be classified into three topics: (1) geoinformatics and mathematics for mineral-resource explorations, (2) GIS and probabilistic applications, and (3) remote sensing for mineral potential and geologic hazard assessment. Topic (1) presented new paradigms of mathematical geology for mineral-resource exploration by sensitivity analysis of geologic spatial estimation by Koike and Matsuda; quantifying mineral information by Zhao, Chen, and Zhang; and valuing information acquisition by Dimitrakopoulos and Scott. GIS technologies in topic (2) were applied to coastal exploration by Kouda, Kishimoto, and Kusunose; mineral-resource exploration in southwest China by Chen, Wang, and Hou; and a Jurassic petroleum system

¹Department of Civil and Environmental Engineering, Kumamoto University, 2-39-1 Kurokami, Kumamoto, 860-8555, Japan; e-mail: koike@gpo.kumamoto-u.ac.jp.

by Sinding-Larsen and Xu. Satellite remote-sensing technologies in topic (3) were applied effectively to mapping of mineral compositions in porphyry copper belts by Sanga and co-authors; and to detection of highly susceptible landslide areas by Ueki and co-authors.

The posters had wider topics areas than the oral presentations. Main topics were informatic and probabilistic appraisals of natural resources, geostatistical modeling of ore deposits, numerical simulation for basin modeling, integration of diverse geologic information, and statistical characterization of rock fractures and mineral textures. I hope that the participants were able to follow the advances and new trends in mathematical geology for natural resource exploration through both the oral and poster presentations.

As a result of a request made to all session speakers after the 32nd IGC, the papers in this special issue were submitted for peer review. I sincerely thank the authors submitting to this issue for their effort and diligence, and the following reviewers for their valuable comments that contributed greatly to edit this special issue: Tetsuya Shoji (Univ. Tokyo), Donald Singer (USGS), Jorge Yamamoto (Univ. Sao Paulo), Roussos Dimitrakopoulos (McGill Univ.), Scott Margaretha (Univ. Queensland), Sumihiko Murata and Youqing Chen (Kyoto Univ.), Weiren Lin (JAMSTEC),

Shuichiro Yokota (Shimane Univ.), Nina Gorelikova (Russian Acad. Sciences), Sinding-Larsen (Norwegian Univ. Science and Technology), John Schuenemeyer (Southwest Statistical Consulting), and Chen Jianping (China Univ. Geosciences). Sincere thanks are extended to Ryoichi Kouda (Geological Survey of Japan) and Toshiaki Ueki (Ocean High Technology Institute Inc.) for their efforts in making the session a success. Papers late for this issue will appear in a subsequent issue of the journal.

The next ISME symposium (ISME-IX) will be held 19–20 September 2006 at the Institute of Technology Bandung (ITB), Indonesia, with the title “Toward New Frontiers for Resource Exploration & Sustainable Development.” For sustainable development, new technologies of resources exploration are becoming of the utmost importance. The symposium will cover all aspects that contribute to innovative technologies in resource exploration. I encourage readers to take part in the ISME-IX and to exchange ideas on the exploration, development, and the use of natural resources.

REFERENCE

- Singer, D. A., and Kouda, R., 1993, Introduction: Nonrenewable Resources, v. 2, no. 2, p. 65–66.