INTERNATIONAL ASSOCIATION

FOR MATHEMATICAL GEOLOGY

NEWSLETTER

MARCH 1991 ISSUE NO. 42

THIS NEWSLETTER IS A BIANNUAL PUBLICATION OF IAMG
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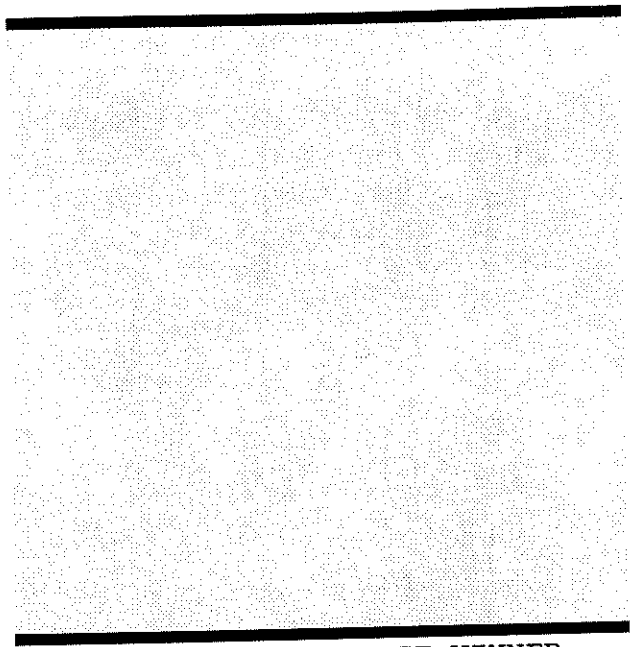


1988 PRESIDENT'S PRIZE WINNER

IAMG President, Dick McCammon, is pleased to announce that the recipient of the 1988 IAMG President's Prize is Dr. Andrew R. Solow, Woods Hole Oceanographic Institute. Dr. Solow is a graduate of Stanford University, a former student of Dr. Andre Journel. A complete biography of Dr. Solow will appear in the next issue of the Newsletter, Issue No. 43.

1989 PRESIDENT'S PRIZE

DR. OLIVIER DUBRULE

Dr. Olivier Dubrule

IAMG President, **Dick McCammon**, has announced that the recipient of the 1989 President's Prize is **Dr. Olivier Dubrule.** Born in 1956, Olivier graduated from Ecole des Mines de Paris in 1978 with a degree in civil engineering. Upon graduation, he entered the Centre de Geostatistique (Fontainebleau), earning a Docteur-Ingenieur degree in 1981. His course of study, directed by **Dr. Georges Matheron**, culminated in a thesis on the relationship between kriging and other mapping techniques, such as splines.

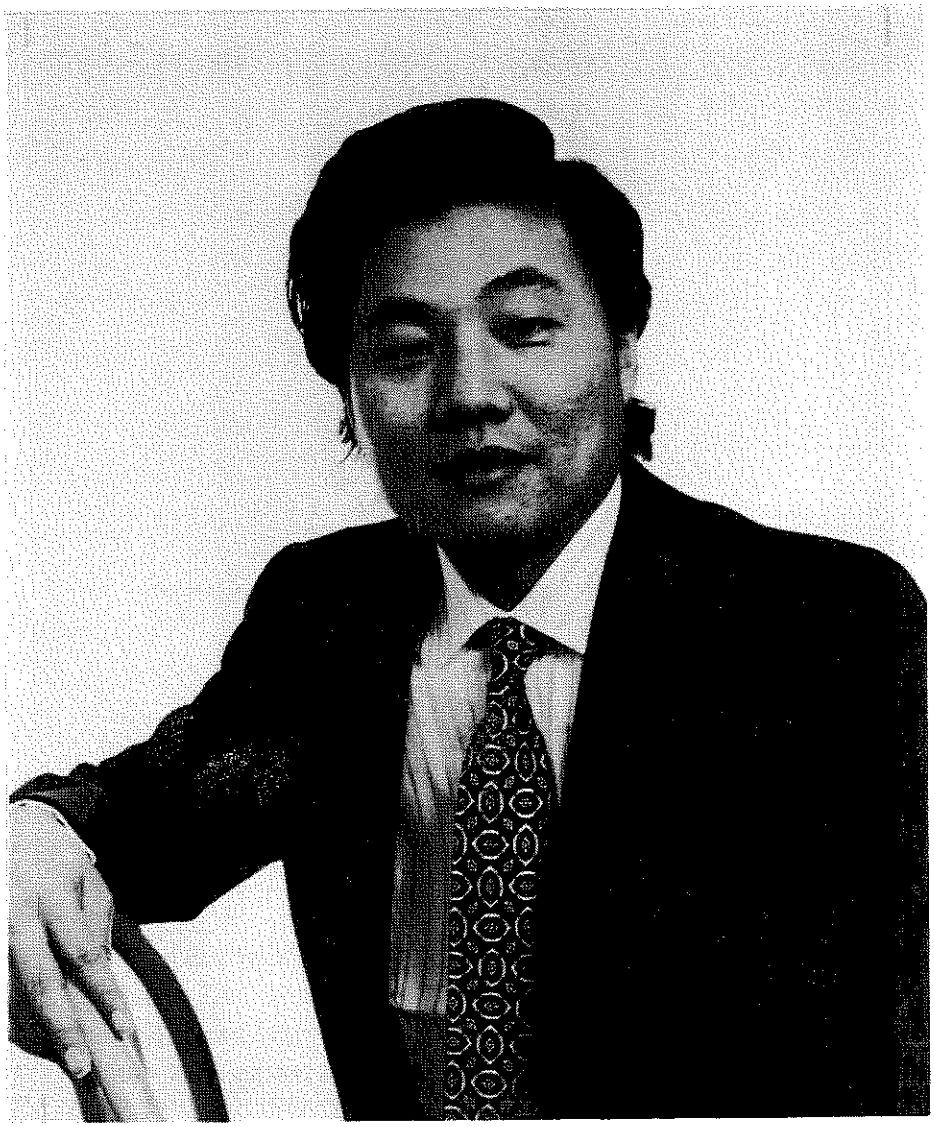
Olivier began his professional career in 1982 with Fluor Mining and Metals in California (U.S.A.), where he was a geostatistician involved with large mining projects. Later, Olivier joined Sohio Petroleum Company in San Francisco, California where he developed new geostatistical methods for the geological modeling of the Prudhoe Bay field (Alaska, U.S.A.). In 1984, he transferred to Sohio's Dallas, Texas (U.S.A.) Technology Center, where he worked on various research topics, such as the evaluation of errors affecting directional surveys of deviated wells, or the quantitative analysis of pore image data.

In 1986, Olivier joined Shell International in the Netherlands and spent three years at KSEPL, the Shelkl E&P Research Lab, first in the Lateral Prediction Group, working on various techniques for deriving reservoir quality information from seismic data. Then, Olivier started the development of Monarch, the Shell 3-D reservoir modeling computer program. In 1989, he was transferred to Shell Headquarters where he worked on various Operational Research projects and developed new uncertainties. Olivier recently joined ELF Aquitaine (PAU, France), to head up a research project in the modeling of reservoir heterogeneities.

Olivier is married to Anne, who will soon give birth to their fourth child. He enjoys golf, and is a big fan of Lewis Carroll's books.

1990 PRESIDENT'S PRIZE

DR. GUOCHENG PAN



Dr. Guocheng Pan

IAMG President, **Dick McCammon**, has announced that the recipient of the 1990 President's Prize is **Dr. Guocheng Pan**. Born in 1957, Guocheng graduated with a Bachelor's degree in petrology from Beijing University, China, in 1981; he later earned a Master's in geomathematics from Changchun College of Geology, China, in 1985. In 1986, Guocheng entered the University of Arizona's Department of Mining and Geological Engineering, earning a Doctorate in 1989 in mineral economics and mineral resource estimation. His doctoral research was guided by **Dr. DeVerle P. Harris.**

Guocheng has worked as a consultant for the World Bank on long term forecasting of mineral demands and supplies for ten different mineral commodities. Moreover, he was a lecturer at Changchun College of Geology, primarily lecturing on geostatistics, prior to coming to the U.S. for his doctoral studies. He was also one of three main investigators in the Project of National Nb-Ta Mineral Resource Assessment in China.

Guocheng is currently employed with Nerco Minerals, Vancouver, Washington (U.S.A.). His position, however, is only a temporary one and he is eagerly seeking permanent employment.

FURTHER DEVELOPMENT OF MATHEMATICAL GEOLOGY IN CHINA

by
Liu Chengzuo, President
Specialized Committee for Mathematical Geology
of the Geological Society of China

Since the publication of the paper which is titled "Development of Mathematical Geology in China" by Liu and Li, 1983, mathematical geology in China has developed more deeply and widely. It is necessary to give some new information to the geomathematicians of other countries.

As you know, the main academic organization for mathematical geology in China is the Specialized Committee for Mathematical Geology of the Geological Society of China (SCMG of GSC). It has promoted many scientific activities of mathematical geology in China. Due to its successful works, SCMG is considered as one of the best affiliated organizations of the Geological society of China. The Chinese geomathematicians are very active. Many meetings and symposiums on mathematical geology have been held in China (see Table 1).

During the last year, we have published the following important books on mathematical geology:

1) Zhao Pengda, 1983, Statistical prediction of mineral deposits (in Chinese), Geological Publishing House, 272p.

2) Zhao Pengda, and others, 1990, Statistical analysis in geological exploration (in Chinese, with English abstract), Press of China University of Geosciences, 288p.

3) Wang Shicheng and others, 1989, Principles of synthetic information interpretation and methods of compiling synthetic prognostic map (in Chinese, with English abstract), Press of Jilin University.

4) Liu Chengzuo and Tang Shenghuang, 1989, Mathematical methods in ore prediction (in Chinese, with English title), Geological Publishing House, 188p.

5) Liu Chengzuo and others, in press, Geological expert systems (in Chinese), Ocean Press.

We have also published a series of monographs containing 14 books. Some of these are listed below:

1) Fang Kaitai and Pan Enpei, 1982, Cluster Analysis, 281p.

2) Hou Jingru and Huang Jingxian, 1981, Geostatistics and its applications in ore reserve estimation, 193p.

3) Yao Xiaohuang, 1984, Programs for estimation of ore reserve of solid ore deposits, 750p.

4) Yu Jinsheng and Li Yuwei, 1985, Factor analysis in geology, 421p.

5) Zhao Xudong, 1988, Quantitative evaluation of petroleum resources, 323p.

6) Zhu Yusheng, 1984, An introduction to methodology of mineral resource evaluation, 494p.

These six (6) books are written in Chinese (with English titles); all were published in China.

Aside from the publications listed above, we are publishing one kind of nonperiodic successive publications on mathematical geology (4 issues have been published, 2 issues shall be published). The early three issues of them entitled, "Special issue on mathematical geology (1), (2), (3)" respectively. The fourth issue has been renamed as "Mathematical Geology of China (1)" Moreover, hundreds of papers on mathematical geology have been published in China during this period.

For Chinese geomathematicians, the coming event is "Symposium on Theory and Methods of Quantitative Prediction of Ore Deposits in Large and Middle Scale and Their Case Studies" will be sponsored jointly by SCMG and GSC and Geomathematician Center of General Company of Nonferrous Metal Industry of China in the fall, 1991, in Lianshan county, Guangdong province.

References:

Merriam, D.F., 1981, Use of Computers by Geologists in China, Computers and Geosciences, Vol. 7, No. 4, pp. 427-432.

Liu Chengzuo and Li Yuwei, 1983, Development of mathematical geology in China, Mathematical Geology, Vol. 15, No. 3, pp. 483-492.

Liu Chengzuo, 1990, State of the art of mathematical geology in China and analysis of character of mathematical geology as a discipline, Fourth National Conference on Mathematical Geology in China.

Table 1. Conferences and Symposiums on Mathematical Geology held in China.

Subjects	Date	Location	Attendees	Papers	Notes
First National Conf. Math. Geol.	10/78	Hangzhou	195	131	A
Second Nat. Conf. on Math. Geol.	04/81	Changsha	300	213	B
Symposium on Recent Trends in Math. Geol.	10/82	Beijing	24		C
Symposium on App. of Math. Geol. in Petrol. Resources Assess. and Expl.	04/83	Leshan	157	117	C,D
Symposium on Database of Geol. and Min. Deposits	10/84	Nanjing	73	32	C,E
Symposium on					

App. of Math. Geol. in Geol. Expl. of Coal Deposits	04/85	Jiahe, Suburb of Guangzhou	128	102	C,F
Third Nat. Conf. on Math. Geol.	11/86	Yichang	214	272	C
Symposium of Young Geo-Mathematicians	10/87	Taian	123	152	C
Symposium on Resources Assess. of Uranium and Gold Deposits	10/88	Shijiazhuang	83	97	C,G
Symposium on Geostatistics	11/89	Jioujang	47	28	C,H
Fourth Nat. Conf. on Math. Geol.	04/90	Chengdu	191	226	C,I,J

Codes for Notes:

A. Convener: Institute of Geology, Academia Sinica Institute of Mineral Deposits of Ministry of Geology.
B. Convener: Preparotory group of SCMG of GSC.
C. Convener: SCMG of GSC.
D. Convener: Committee of Petroleum Geology of Petroleum Society of China.
E. Convener: Computer Division, Data Bureau of Ministry of Geology.
F. Convener: Committee of Coal Geology of GSC.
G. Convener: Committee of Uranium Geology of Nuclear Society of China.
H. Convener: Metal Society of China.
I. Convener: Chengdu Geological College.
J. Convener: Committee of Mathematical Geology of Geological Society of the Province of Sichun.

IAMG To Launch New Journal in 1992 and A Call for Manuscripts

On August 9, 1990, IAMG entered into an agreement with Oxford University Press, Inc. to publish a journal entitled Nonrenewable Resources. The first issue will appear in 1992 and will be published as a Quarterly. The aim of the new journal is to provide an international forum for contributions of papers in mineral and energy exploration, resource assessment, the economics of resource supply, recovery, restoration, and conservation. This marks the third time in its history that IAMG has engaged in publishing a new journal. This activity is all a part of the further quantification of geoscience which is the primary goal of IAMG. It is intended that the new journal will appeal to a broad-based audience of exploration geologists, resource analysts, corporate energy and mineral management personnel, and others dealing with risk analysis or cost/benefit studies on nonrenewable resources.

R. B. McCammon will serve as Editor-in-Chief, M.E. Hohn, as Deputy Editor, and C. D. Masters, as Book Review Editor. An Advisory Board made up of an international panel of experts has been selected whose interests cover a broad range of activities in the field of nonrenewable resources. The current members of the Advisory Board are as follows:

Frits P. Agterberg	Geological Survey of Canada	Canada
F. Barthel	Federal Institute for Geosciences and Natural Resources	Germany
Robert L. Bates	Emeritus, Ohio State University	USA
Spero Carras	Carras Mining and Associates	Australia
Timothy C. Coburn	Marathon Oil Company	USA
J. M. Coudert	Bureau de Recherches Geologiques et Minieres	France
John DeYoung, Jr.	U.S. Geological Survey	USA
Rao S. Divi	Osmania University	India
Lawrence J. Drew	U.S. Geological Survey	USA
Kim Esbensen	Norwegian Computing Center	Norway
Donald L. Everhart	Consulting Geologist	USA
Warren I. Finch	U.S. Geological Survey	USA
David Forman	Bureau of Mineral Resources, Geology & Geophysics	Australia
Gabor Gaal	Geological Survey of Finland	Finland
John Grace	ARCO	USA
Mario Gunther	Bundesanstalt fur Geowissenschaften und Rohstoffe	Germany
Thomas M. Gunther	U.S. Bureau of Mines	USA
Jan Harff	Zentralinstitut fur Physik der Erde	Germany
DeVerle Harris	University of Arizona	USA
Ryoichi Kouda	Geological Survey of Japan	Japan
Vello A. Kuuskraa	ICF Energy Resources	USA
Brian W. MacKenzie	Queens University	Canada
Graeme McLaren	Ministry of Energy, Mines and Petroleum Resources, British Columbia	Canada
Zhao Peng Da	China University of Geosciences (Wuhan)	China
Sonke Rehder	Bundesanstalt fur Geowissenschaften und Rohstoffe	Germany
Alan Shapiro	Vulcan Materials Company	USA
Yoshihiko Shimazaki	Nikko Exploration & Development Co., Ltd.	Japan
Richard Sinding-Larson	Geologisk Institutt	Norway
Donald Singer	U.S. Geological Survey	USA

William Size	Emory University	USA
Wolfdietrich Skala	Frei University of Berlin	Germany
Carl Smith	West Virginia Geological Survey	USA
T. K. Wignall	University of Guam	Guam

Further information about the new journal will be sent to IAMG members later this year. Right now, the Editors are seeking manuscripts to complete Volume 1 of the new journal. For this purpose, the following guidelines to authors are provided for anyone wishing to submit a manuscript in time for Volume 1. Like its predecessors, Mathematical Geology and Computers & Geosciences, IAMG hopes that the new journal will find its place on the shelves of those engaged in furthering the quantification of the geosciences.

Guidelines to Contributors

1. Nonrenewable Resources publishes original articles, reviews, and correspondence on all aspects of mineral and energy exploration, resource assessment, and the economics of resource supply, recovery, restoration, and conservation. All aspects of nonrenewable resources, both metallic and nonmetallic, multidisciplinary studies, land-use policy analysis, long-term domestic and international supply issues, and mineral and energy exploration planning are invited. Manuscripts should be original and submitted in triplicate and in English to:

   Editor, Nonrenewable Resources Journal
   P.O. Box 34600
   Bethesda, MD 20827 USA

2. Submission is a representation that the manuscript has not been published previously and is not currently under consideration for publication elsewhere. A statement transferring copyright from the authors (or their employers, if they hold the copyright) to the Journal will be required before the manuscript can be accepted for publication. The Editor will supply the necessary forms for this transfer.

3. Type double-spaced on one side of the paper only, and submit the original and two copies (including copies of all illustrations and figures).

4. All papers should be in English. Papers should be no longer than 5000 words; papers of less than 1500 words may be considered as Short Notes.

5. An abstract is to be provided, preferable no longer than 300 words; Short Notes do not require an abstract, although it is preferable.

6. A list of 3-6 key words is to be provided directly below the abstract. Key words should express the precise content of the manuscript, as they are used for indexing purposes, both internal and external. The key words should not simply duplicate words in the title.

7. Illustrations (photographs, drawings, diagrams, maps, and charts) are to be numbered in one consecutive series of Arabic numerals. Captions for illustrations should be typed double-spaced on a separate sheet of paper. Photographs should be large, glossy prints, showing good contrast. Drawings should be prepared, if possible, with laser printers and in general should be of professional quality.

8. An illustration is featured on the cover of each issue. Contributors are encouraged to submit high-quality drawings or photographs for possible use as a cover illustration. Do not send original artwork unless specifically requested.

9. Tables should be numbered consecutively in Arabic numerals and referred to by number in the text. Each table should be typed on a separate sheet of paper.

10. List references alphabetically at the end of the manuscript and refer to them in the text by name and year in parentheses. Where three or more authors are involved, only the first author's name is given in the text, followed by et al. References must be complete, including the names of all authors, title of paper, volume and number of journal or bulletin, and page range.

11. The journal makes no page charges. Reprints are available to authors, and order forms with the current price schedule are sent with proofs.

INTERNATIONAL WORKSHOP ON STATISTICAL PREDICTION OF MINERAL RESOURCES (IWSPMR'90)

. . . . . by Frits Agterberg and Zhao Pengda

IWSPMR'90 was hosted by the China University of Geosciences, Wuhan, Hubei Province, China, October 20-26, 1990. The meeting was cosponsored by the IAMG, COGEODATA and the Committee for Mathematical Geology of the Association of Geology of China, and co-organized by the Geological Survey of Canada. The scientific committee for the workshop was chaired by Zhao Pengda and its organizing committee by Yang Weiran. Wang Renduo was secretary-general. In addition to the scientific meetings, there were several social events including a banquet and excursions in Wuhan and Hubei Province.

The workshop was attended by 112 scientists including 13 from outside China (1 from Australia, 3 from Canada, 1 from Czechoslovakia, 1 from India, 1 from Poland, 1 from Spain, 2 from U.S.A., and 3 from U.S.S.R.). In total, 102 papers were submitted. The English version of the Preprint Proceedings consists of 3 volumes containing 75 papers. This meeting provided an excellent overview of the state-of-the-art of quantitative resource assessment in China.

The objective of statistical prediction of mineral resources is to estimate the probability of occurrence of different types of hidden orebodies together with estimates of their sizes and grades. In general, the results are represented on maps by means of patterns, colors, or contours in order to express different degrees of favorability for occurrences of the deposits. These maps are helpful for estimating the potential future supply from a region and in decision-making during target selection for drilling or the planning of detailed local geological, geophysical or geochemical surveys. One can also attempt to estimate the total resources for a region or a country by extrapolating on the basis of frequency distributions for the known resources.

The purpose of the workshop was to provide participants with the opportunity to discuss and exchange ideas, experiences and the latest results crucial to statistical prediction of mineral resources. Significant advances in probabilistic estimation of regional resource potential have been made in China during the past ten years using methods of mathematical geology. IAMG president **Dick McCammon** participated in the meeting as well as **Liu Chengzuo,** chairman of the Chinese association of mathematical geologists. After the Wuhan workshop, 32 colleagues from china joined the IAMG as corresponding members.

IWSPMR'90 was organized as follows. Between the opening ceremony on the first day and the closing ceremony on the sixth day, there were 4 plenary sessions, 16 simultaneous sessions and 4 working group discussions. During the plenary sessions, two review papers were presented by Chinese participants in addition to the papers by the non-Chinese participants. These two review papers were by Zhao Pengda (President, China University of Geosciences) on theory, principles and methods for statistical prediction of ore deposits, and by Wang Shicheng (Director, Geomathematical Institute, Changchun University of Earth Sciences, Jilin Province) on basic theory and methods for comprehensive use of information for prediction of mineral resources. Eight of the simultaneous sessions were in English and eight were in Chinese. The topics discussed by the working groups were: 1) quantitative prediction of mineral resources at various scales and methods to deal with concealed deposits; 2) statistical prediction in unexplored regions without control areas; methods to deal with new types of deposits and giant deposits; 3) methods to improve mathematical modeling in statistical prediction of ore deposits and computer applications; and 4) education in mathematical geology and development of mathematical geology as a discipline. Each working group defined problems pertaining to its topic and determined the directions to be taken in further method development. During the closing ceremony, one of the authors of this report (FPA) gave a summary of the workshop. The following remarks are based on this summary.

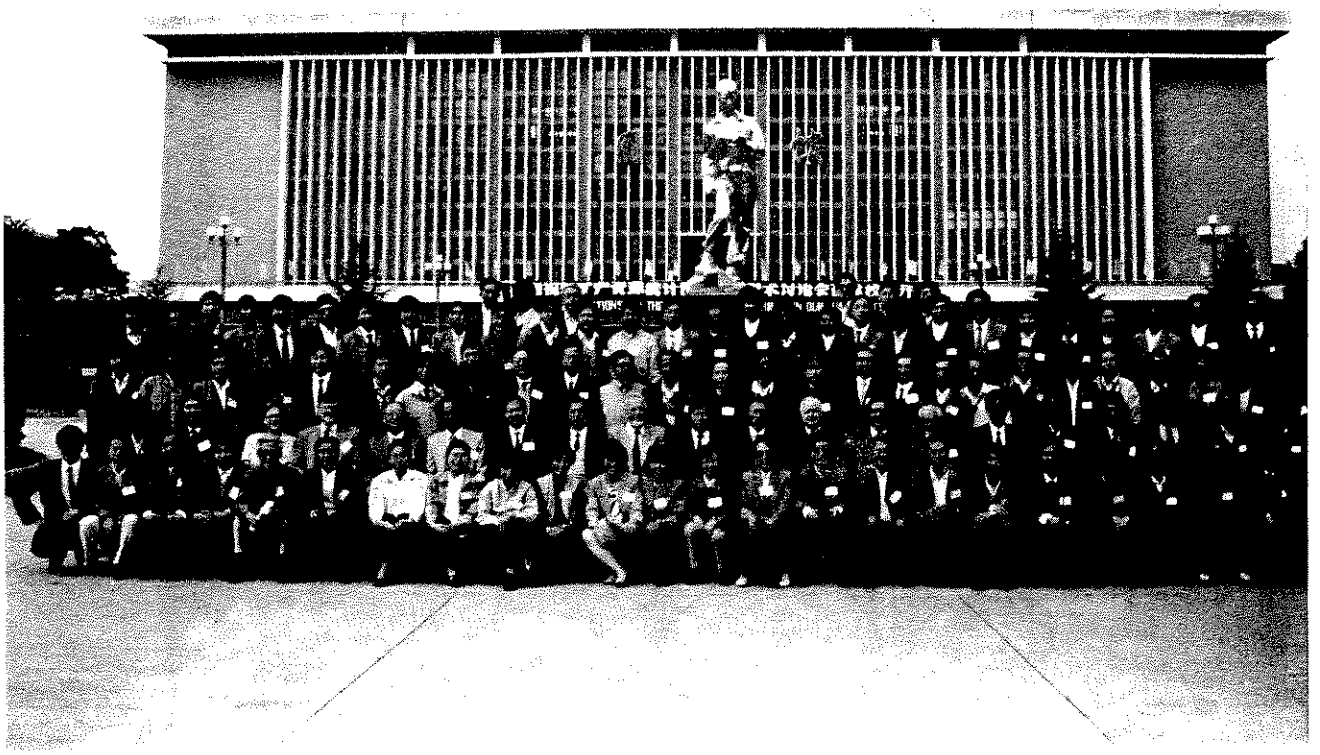
English versions were available for 75 of the 102 papers presented at IWSPMR'90. These papers were classified in four different ways with the frequencies of papers dealing with specific topics shown in Table 1 which is also discussed in the next four paragraphs.

(I) Type of method: Statistical prediction of mineral resources began in the 1960s with applications of univariate and multivariate statistical analysis. Methods of this type continue to be widely used in China as well as elsewhere in the world, especially in multivariate analysis of map data. Applications of geostatistics presented at the workshop were mainly for the purpose of constructing contour maps of geochemical and geophysical variables. The development of expert systems for mineral exploration and resource evaluation was commenced in the 1970s. Several new expert systems developed in China during the past few years were presented at IWSPMR'90. A number of papers dealt with computer simulation experiments, descriptive geometry of geological objects, and use of differential equations in geophysics. There was considerable interest in the use of Geographic Information Systems (GIS). During the workshop, Graeme Bonham-Carter demonstrated several mineral potential mapping applications of a GIS (TYDAC SPANS) on an IBM compatible microcomputer.

(II) Type of variables: Most methods of mathematical statistics are for variables which belong to populations which are dimension-free in the sense that time or distance are not specifically included as variables in the models. Some IWSPMR'90 papers contained applications of time series analysis. The map coordinates of the study region were used as variables in many more papers. The vertical direction (depth or elevation) generally is not included as a dimensional variable in studies of large areas represented on small-scale maps. Three-dimensional modeling becomes more important when the scale of the study area is increased. This happens especially when studies are made of small target areas selected for further study. It is noted that one of the papers used fractals, which have dimensions that are real numbers exceeding the topological dimensions of 1, 2, 3, and so on.

(III) Resource category: Most IWSPMR'90 participants were primarily concerned with metals, especially gold, the base metals (copper, lead and zinc), and uranium. However, a substantial number of presentations described hydrocarbon resource applications with its basin analysis related approach to problem-solving. This served to stimulate discussion between users of the different methodologies.

(IV) Geoscience data type: The input for statistical prediction of mineral deposits consists of geological, geochemical, geophysical or remotely sensed data. In a number of papers, data from two or more subdisciplines were combined with one another in data integration studies. Variable selection and pre-processing of



Participants in IWSPMR'90 in front of statue of the field geologist with hammer and map on the campus of the China University of Geosciences (Wuhan). The University has 983 professors and lecturers teaching nearly 5000 full-time students.

Opening ceremony in main meeting room of IWSPMR'90. IAMG President Dick McCammon is third person from the right at headtable. Liu Chengzuo, chairman of Chinese mathematical geologists is first on the left. Authors of this report are fourth and fifth from the left.

information were extensively discussed and practiced in many of the papers. The purpose of these procedures is to define variables that reflect metallogenic concepts related to the origin of the deposits or to their geochemical and geophysical signatures. Good variable definition can drastically improve the results of statistical analysis, e.g., when the linear models of multivariate analysis are employed.

IWSPMR'90 was the first international meeting of its type held in China. All participants felt that the meeting was a great success. The non-Chinese participants were impressed by the large scale of geomathematical projects in China and by the interesting new results obtained by systematic application of statistical prediction of mineral resources across many regions. The three volumes of the English version of the Preprint Proceedings represent a valuable storehouse of information. Many papers would be made available to a wider international audience. Plans are being made to prepare material for a special issue of Mathematical Geology with a subset of the 102 papers presented at IWSPMR'90.

Table 1. Classification of 75 IWSPMR'90 papers according to main type of mathematical or statistical method, types of variables and dimensions, resource category, and type of geoscience information. Frequencies are shown in brackets.

(I) Type of Method:

- Basic principles and newly proposed methods (9)
- Multivariate analysis (22)
- Univariate statistical applications (19)
- Geostatistics (4)
- Expert systems (8)
- Computer simulation (2)
- Descriptive geometry of geological objects (5)
- Differential equations (4)
- Geographic information systems, GIS (2)

(II) Type of Variables:

- Dimension-free populations (41)
- Time series (3)
- Two-dimensional map variables (24)
- Three-dimensional modeling (7)

(III) Resource Category:

- Mineral resources, general (25)
- Gold (16)
- Base metals (12)
- Uranium (4)
- Iron (3)
- Other metals (4)
- Oil and gas (9)
- Coal (2)

(IV) Geoscience Data Type:

- Data integration (15)
- Geological and metallogenic data (22)
- Geochemical data including ore assays (21)
- Geophysics (6)
- Remote sensing (2)
- Mineral economics (9)

. . . . . IAMG ARCHIVES

President Richard McCammon has appointed Dan Merriam as acting archivist for the Association. Arrangements have been made with Lee Gerhard, director of the Kansas Geological Survey, to permanently house the archives at the Survey in Lawrence, Kansas (U.S.A.). Janice Sorensen, Survey Librarian, will maintain the collection. Several donations have been made already, including the papers of past-presidents Dick Reyment, Dan Merriam, Tim Whitten, and John Davis. It is hoped to include as much material as possible and donations of correspondence, pictures (especially pictures of people and IAMG activities), and other relevant material is solicited from everyone. This collection will serve future historians with material to chronicle the quantitative revolution that changed the earth sciences starting in the 1960s. The collection will be open to anyone wanting to do research on the subject as soon as the material is indexed and catalogued. If you have material to donate, please contact:

Dr.D.F.Merriam
Kansas Geological Survey
University of Kansas
Lawrence, KS 66047 USA

NEWSLETTER COST REPORT

In the last issue of this Newsletter, I reported on the cost of the first two issues. Subsequent to the publication of these issues, I acquired a laser printer, offering me a variety of fonts, including smaller print types; smaller print allows me to add more information to a single page in comparison to a larger font. Moreover, smaller fonts allow me to print in a double-column fashion, essentially making two pages into one. This is the approach taken in the production of the last issue, No. 41.

In addition, Ricardo Olea, of the Kansas Geological Survey, made me aware of an international mailing service, Quick International Couriers of Dallas, Texas (U.S.A.). With the revised production format, international mailing service, and printing using a lighter weight paper, the costs for the last issue of the Newsletter are as follows:

1. Printing:	$724.32
2. Mailing (U.S.A. only)	175.50
3. Mailing (non U.S.A.)	266.25
Total	$1,166.07

This is compared to the costs for the first two issues I edited:

Issue No. 39:	$1,984.00
Issue No. 40:	$3,764.00

Therefore, production costs for the Newsletter have been reduced substantially.

Early Alert for IGC in '92

The following information is extracted from the galley proofs for the Second Circular for the 29th International Geological Congress from August 24 to September 3, 1992 in Kyoto, Japan. The Second Circular is scheduled for distribution April 1, 1991. Thanks to the magnificent efforts of Niichi Nishiwaki-Nakajima, our IGC Councillor, IAMG has fared unbelievably well for its part in the Scientific Program.

Here is a peek at the Sessions (and their organizers) that relate to IAMG.

Special Symposia (Invited Speakers Only)

B2. Prediction of natural hazards and environmental protection. Yasue Ohki (Niigata U, Jpn), Masakazu Ohtake (Tohoku U, Jpn), Robert L Wesson (USGS, Reston).

B4. Geological disposal of radioactive and hazardous wastes. Neil A Chapman (INTERA-ICL, UK), Ghislain DeMarsily (U P-&-M Curie, Fr), Yoshikazu Hashimoto (PNC, Jpn), Hotoshi Koide (GS Jpn).

Symposia (Invited Speakers and Contributed Papers)

I-2.07 Global carbon cycle and climatic change. Venugopalan Ittekkot (Hamburg U, FRG), Hodaka Kawahata (GS Jpn), Lee R Kump (Penn State U, USA).

I-2.12 Remote sensing methods for evaluation of natural hazards and environments. Andrea G Fabbri (ITC, Neth), David Rothery (Open U, UK), Toshifumi Sakata (Tokai U, Jpn).

I-2.13 Assessment and prediction of natural resources. G Gaal (GS Finland), Ryoichi Kouda (GS Jpn), Donald A Singer (USGS Menlo Park).

I-2.14 Site characterization and natural analogues for radioactive waste disposal. Arnold Bonne (SCK/CEN, Belgium), Hitoshi Koide (GS Jpn), C. John Mann (U Illinois, USA), Yoshiki Wadachi (JAERI,Jpn).

I-3.53 Concepts and methods of mapping in applied geoscience. Yukio Kubo (Ochanomizu U, Jpn), K A Styles (Civil Eng Serv Dept, Hong Kong), Norio Tase (Tsukuba U, Jpn).

I-3.54 Expert systems and artificial intelligence in the applied geosciences. Roussos Dimitrakopoulos (McGill U, Canada), Richard B McCammon (USGS Reston), Tetsuya Shoji (U Tokyo).

II-1.7 Quantitative stratigraphy: New developments in litho- and biostratigraphy. Felix M Gradestein (GS Canada), Cedric M Griffiths (U Trondheim, Norway), Kyoichi Nagata (JAPEX, Jpn), Niichi Nishiwaki (Nara U, Japan).

II-22.1 Computer simulation of geological processes and events. John Harbaugh (Stanford U, USA), Yusaku Tominaga (Hokkaido U, Jpn), Syuichiro Yokota (Kagoshima U, Jpn).

II-22.2 Computer graphics and three dimensional analysis in geosciences. Makoto Inoue (DIA Consul Co, Jpn), Pierre Leymarie (U Nice, Fr), Reinhard Pflug (U Greiburg, FRG), Kiyoshi Wadatsumi (Osaka City U, Japan).

II-22.3 Mathematical and statistical analyses of geological data. Chang-Jo Chung (GS Canada), Daniel F Merriam (Wichita State U, USA), Kaichiro Yamamoto (Koka Women Jr Coll, Jpn), Satoshi Yamamoto (Ryukyu U, Japan).

II-22.6 Digital mapping in geosciences. G Gabert (Niedersach Land Bodenforsch, FRG), Harold R Lang (Jet Prop Lab. USA), Kiyoji Shiono (Osaka City U, Japan).

II-25.2 Fifty years of mathematical geology: A golden anniversary. Michael Ed Hohn (West Virginia Geol & Econ Surv, USA), Niichi Nishiwaki (Nara U, Japan), Andrew B Vistelius (Inst Geol Geochr Precam, Acad Sci, USSR).

As you can see, this is a grand opportunity for IAMG to present the results of research and to be represented at our main meeting. The Officers and Councillors of IAMG strongly encourage all the members to give serious consideration to submitting an abstract. The success of IAMG's participation in the 29th IGC depends upon you. Abstracts are to be submitted to:

IGC-92 Office
P.O. Box 65
Tsukuba, Ibaraki 305 JAPAN

The deadline for abstracts is December 1, 1991.

(Ed. note: This report was filed by R.B. McCammon).

Report on
International Symposium on Mineral Exploration (ISME):
The use of Artificial Intelligence (AI),
Tokyo, Tsukuba, JAPAN,
October 29-November 2, 1990

Over 150 participants representing 15 different countries attended ISME-AI'90 held last October-November at the University of Tokyo and the Geological Survey of Japan at Tsukuba (see accompanying photo). The sponsors included the Mining and Materials Processing Institute of Japan (MMIJ), Japan Society of Geoinformatics (JSG), Society of Mining Geologists of Japan (SMGJ), International Association for Mathematical Geology (IAMG), U.S. Geological Survey (USGS), Geological Survey of Japan (GSJ), and COGEODATA. The first three days of the meetings were held at the University of Tokyo. The last two days were held at the Geological Survey of Japan. The participants represented a broad spectrum of interests ranging from exploration to mining to geomathematics to computer science. As pointed out by **Yukio Kasahara**, President, MMIJ, the more conventional methods for the discovery and development of new deposits may no longer be effective in future explorations of deeper ore deposits, and the application of Artificial Intelligence to mineral resources exploration may well be one of the very methods we have been looking for. This view was seconded by **Shunso Ishihara**, Director General, Geological Survey of Japan, who urged the participants to review and reorganize the knowledge acquired from past exploration, and to integrate more completely the methods of geology, geochemistry, and geophysics in the search for new deposits at depth. Professor **Tetsuya Shoji**, University of Tokyo, who presided over the opening ceremony, added that our knowledge should be reduced to general rules for each type of ore deposit and that the field of artificial intelligence offered promise in accomplishing this task. The point is that, in all likelihood, our future mineral resources will be supplied from blind deposits occurring in deep levels of the crust.

The topics covered at the meeting included special contributions in artificial intelligence, applications of artificial intelligence in the earth sciences, and a special short course on mineral resource assessment. On the first day, **Shun-ichi Amari**, University of Tokyo, presented a unified theory of neural learning. The idea was to establish a mathematical foundation based on neural computing. This was followed by a special talk by **Eiiti Wada**, University of Tokyo, on Internet: How it works and what it gives us. It was remarkable to learn the Prof. Wada foresaw in 1964, the possibility of personal computers that could be linked by computer networks. Today's networks not only accelerate speed-mailing services but also guarantee reliable file transfers. This has a particular importance in remote sensing applications. **Toshio Yokoi**, EDR, described the Very Large Knowledge Base (VLKB) and Electronic Dictionary (ED) Project now in its 4th year. The view expressed was that it soon be may possible to generate summaries of documents which can be understood by computers directly and that these summaries can be added to the VLKB thereby making the VLKB more "intelligent." Use of such an ED and VLKB opens new possibilities. In the mineral industries, the possibilities range from inventory control to geological mineral deposit modeling. The fourth speaker, **Haruki Ueno**, Tokyo Denki University, proposed a new concept of object-oriented expert systems. For example, mineral deposits may be described as a frame-base system. The final speaker of the day, **Dick McCammon**, U.S. Geological Survey, gave a brief history of the Prospector expert system that was designed to assist geologists in the search for hidden mineral deposits. During the years of its development, the system has evolved from a rule-based expert system composed of a few ore deposit models to a full-sized knowledge based system composed of 86 different mineral deposit models.

The second day of ISME-AI'90 began with short reviews of computer demonstrations followed by the demonstrations. Parallel with the demonstrations was a special short course: Mineral Resource Assessment presented by **David Menzie** and **Don Singer**, U.S. Geological Survey, with a special lecture by **Chang-Jo Chung**, Geological Survey of Canada. The course stressed the assessment of undiscovered resources. The types of problems requiring the assessment of undiscovered resources include: 1) planning of exploration programs, 2) estimation of long-term mineral supply, 3) decisions regarding land use, 4) planning infrastructure, 5) devising strategies for economic development, and 6) identifying possible alternative supplies of strategic minerals. The course utilized mineral deposit models as the keystone to performing assessments. A number of different examples were used to illustrate the concepts. In the afternoon, 4 papers describing different applications of expert systems were presented. **Takafumi Tsujimoto**, Metal Mining Agency of Japan, and his colleagues described a prototype expert system for discriminating rock units in the Nishiura area, southern Japan. Rules were defined for identifying 20 different rock units based on their appearance in the field. **Koji Tsubota**, Power Reactor and Nuclear Fuel Development Corporation (PNC), and his colleagues described the program Micro-DdM patterned after the data-directed numerical method for estimating the undiscovered uranium endowment in partially explored areas. The program was applied to exploration data collected in the Arnhemland area, Northern Territory, Australia which contains known large uranium deposits. **Kazuo Hiyane**, Mitsubishi Research Institute, Inc., and his colleagues, described a model that combined rule-based reasoning with hypothesis reasoning applied to geothermal fluid circulation. Using the data taken from a geothermal field located in the south-western part of Hokkaido, the model inferred the same fluid routes as those inferred by experts. The final paper, presented by **Li Gonshi**, Department of Geology, CSUT, Changsha, Hunan, PRC and a colleague, described an expert system called GGCS: a gold geology consultant system. The system has been used to classify the types of gold deposit most likely to be discovered given the geologic characteristics of the area.

A special lecture on the third day was given by **Katsumi Nitta**, Institute for New Generation Computer Technology, on the Fifth Generation Computers. He gave a brief history of the Fifth Generation Computer Systems (FGCS) Project started in 1982 as a 10 year project in Japan. The FGCS project is aimed at the development of new computer hardware based on highly parallel architecture and related techniques of knowledge and software engineering. An experimental parallel inference computer Multi-PSI was recently developed for investigating programming techniques of a parallel logic language, called KL1. The current effort is directed at implementing several knowledge-based applications written in KL1 for the Multi-PSI computer. Other talks during the day included presentations on a variety of expert systems developed specifically for mineral exploration and regional resource assessment.

On the 4th day, the meetings were moved to Kyo-yo Conference Hall, Tsukuba-Home of the Geological Survey of Japan. **Katsuro Ogawa**, Deputy Director General of the Geological Survey of Japan, in his welcoming remarks, suggested

that Artificial Intelligence innovative ideas should include those that can be incorporated into main-stream activities in the geoscience community. A number of presentations followed that stressed the importance of incorporating human judgement in the application of computerized techniques. Included among these were 1) **Masaharu Kamitani**, Geological Museum, Geological Survey of Japan, who described the mineral deposits and small-scale (1:10,000,000) geological features of the Western Pacific region, 2) Prof. Shoji, who discussed an innovative computer system to assist mineral identification from petrographic microscopic observations, 3) **Rao Divi**, Osmania University, India, who described the experiences he and his colleagues encountered in applying the Delphi approach using fuzzy set reasoning, 4) **Wooil Moon**, University of Manitoba, Canada, who used fuzzy set reasoning in integrating geologic, geochemical, and geophysical data, 5) **Harushira Shimoda**, Tokai University, who applied the Dempster-Shafer rule for identifying hydrothermal zones in mineralized rocks, and 6) papers by **Michael Hohn**, West Virginia Geological Survey, and **Peter Brooker**, University of Adelaide. The final paper of the day was presented by **Hideyuki Nakashima**, Electrotechnical Laboratories, on cooperative architecture for computing.

The final day of ISME-AI'90 began with a presentation by **Ryoichi Kouda**, Geological Survey of Japan and principal organizer of ISME-AI'90, and his colleague, **Suwijanto**, of the Indonesian Research and Development Center for Geotechnology, on an automated lineament recognition technique in combination with a geologic interpretation for identifying gold mineralization associated with a caldera. This was followed by a paper by **Vaclav Nemec**, IAMG, on the need for a proper understanding of regional and local tectonic structure. This was followed by Chang-Jo Chung and Wooil Moon who discussed combination rules of spatial geoscience data for mineral exploration. Don Singer and Ryoichi Kouda presented the results of a test of the Finder system on data from the Kushikino gold deposits in Japan. The final talk of the day was presented by **Kiyoji Shiono** and **Kiyoshi Wadatsumi**, Osaka City University, on binary relations and related mathematics for logical formulation of basic concepts in geology. They discussed a geologic-oriented logical system which uses binary relation to describe the relationships of geologic events.

All in all, it was a most significant event in the application of artificial intelligence. However, all must come to an end. Shown in the accompanying photo are the survivors at the final get-together in Tsukuba. Seated at the center is Ryoichi Kouda. Immediately behind him is **"Nora" Kishii**, his secretary, and without whom this meeting probably would not have taken place. At the far left is Shunso Ishihara, Director General, Geological Survey of Japan, and third from the left in the front row is Tetsuya Shoji, University of Tokyo, co-chairman of the meeting. The papers presented at the meeting will be published as a special volume in the Journal of the Mining and Materials Processing Institute of Japan. Abstracts of the meeting may be obtained by writing directly to Ryoichi Kouda, Geological Survey of Japan, 1-1-3, Higashi, Tsukuba 305 JAPAN.

(Note: This report was prepared by compiling the daily reports filed by Chang-Jo Chung, Dick McCammon, David Menzie and Don Singer.)

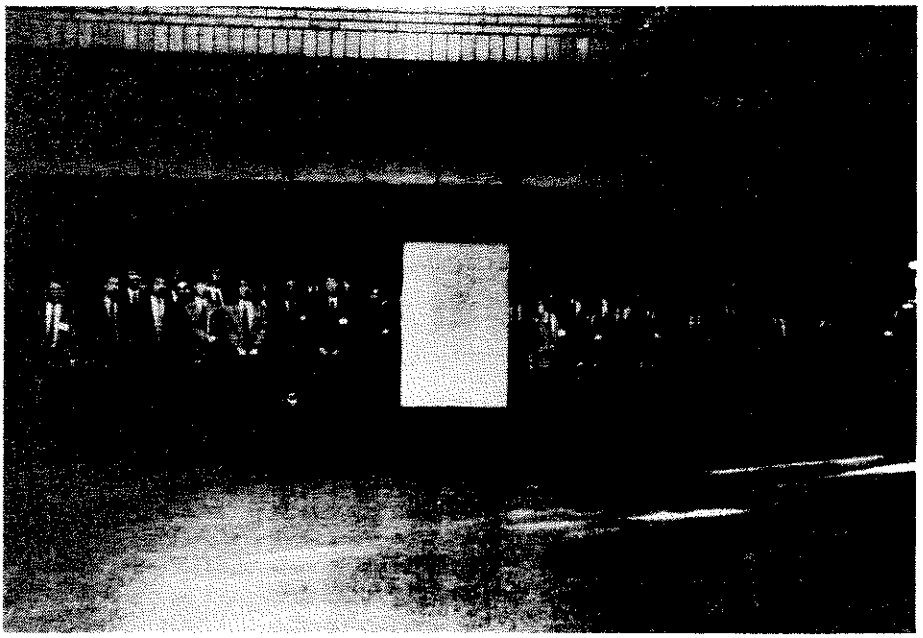
IN CLOSING: AN EDITORIAL

One of the aspects of IAMG I enjoy most is the openness to new ideas and new members. Further, the President's Prizes, reported in this issue, encourage and provide valuable recognition to our young members. I feel we can be very proud of our organization, a truly international blend of talented individuals.

There is, however, always darkness looming on the horizon. For example, it is our responsibility to prevent IAMG from devolving into a collection of cliques as has happened to other professional organizations. We professionals are creative thinkers, but this can be a problem because with creative thought comes the notion that each idea we conceive is a correct one and should be accepted by everyone; this is not always the case. The challenge is to develop the ability to accept criticism and still remain a valuable, contributive member of IAMG, rather than taking exception to criticism, thus either dropping out of IAMG or redirecting a small group of individuals along a path towards elitism and isolationism. I challenge each of you not to follow the latter path.

Enveloped as well in this darkness is the disproportionate membership of IAMG given its international directive. Citizens of the U.S.A. dominate IAMG membership. Other nations, such as Canada, Australia, Germany [no longer designated east or west], Austria, Japan and Great Britain also are represented well among our members. In contrast, the continents of South America and Africa are poorly represented among our members. Likewise is southwest Asia, sadly embroiled in war; we have [or had] one member from Kuwait. [As an aside, I recently received a reprint request from a researcher with the University of Mosul in Iraq and attempted to honor the request; the U.S. postal service refused to forward the reprint.] I tender this challenge to you, our members: help us expand our international representation. Earlier in this Newsletter, you read about aspects of mathematical geology in China; this has expanded our membership in that nation; let's follow this example. Further, let's expand our membership by recruiting members from new fields, such as forestry, fisheries, and soil science, as well as other aspects of geosciences, such as petrology and engineering geology. As Woody Allen said about his relationship with Diane Keaton in the movie, Annie Hall, "A relationship is like a shark. If it doesn't move forward, it dies." It is up to us to keep IAMG moving forward!

James R. Carr
Mackay School of Mines
University of Nevada, Reno
February, 1991



ISME - AI'90

FAREWELL GET-TOGETHER

A Rare Occurrence

It isn't often when the Councillers and Officers of IAMG get together these days what with the distances involved and the number of different meetings that IAMG cosponsors throughout the year. However, at the recent International Symposium on Mineral Exploration held in Tokyo and Tsukuba, JAPAN from October 29 to November 2, 1990 (see this Newsletter for a report of the meeting), there were six (count'em in the accompanying photo) Councillers and Officers in attendance. From left to right, **Vaclav Nemec**, Eastern Treasurer; **Michael Hohn**, Secretary-General; **Peter Brooker**, Councillor; **Chang-Jo Chung**, Councillor; **Niichi Nishiwaki-Nakajima**, 29th IGC Councillor; and **Richard McCammon**, President. In between the presentations, there was time to conduct some IAMG business. In particular, the symposia to be sponsored by IAMG at the 29th IGC in Kyoto in 1992 were finalized and the Councillors present agreed to the proposal by President McCammon to create a new membership category in IAMG, that of Corresponding Member, for individuals from countries with controlled currencies. These individuals have in the past found it difficult to pay for the IAMG Journals. A Corresponding Member will be entitled to receive the IAMG Newsletter through the regional organization within his or her country. In this way, IAMG becomes truly a worldwide organization.

McGILL UNIVERSITY
Department of Mining and Metallurgical Engineering

Professional Development Seminars

EXPERT SYSTEMS IN THE MINERALS INDUSTRY

April 15th - 17th, 1991

Seminar Leader: R. Dimitrakopoulos

This three day seminar reviews the principles and practice of artificial intelligence technologies and particularly expert systems in the minerals industry. The topics presented include: potential for expert systems in the industry, knowledge representation, symbol manipulation, search strategies and problem-solving, logic and deduction for problem-solving, inference strategies, design and application of expert systems, case studies, and a quick review of AI technologies for vision and robotics in mining. Seminar participants will, in addition, experiment with building their own expert system prototypes in a computer laboratory.

The course is designed for both operations and research personnel interested in the application of advanced computer technologies in the minerals industry.

Invited speakers are John Meech, University of British Columbia, and Gregory Caraylannis, McGill University.

PROGRAM

Monday - April 15th:

a.m. GENERAL INTRODUCTION AND PERSPECTIVES IN THE MINERALS INDUSTRY.
HISTORY AND EVOLUTION OF EXPERT SYSTEMS.
AN INTUITIVE VIEW OF KNOWLEDGE: Concepts, descriptions, organization, constraints, and reasoning.
KNOWLEDGE REPRESENTATION: Predicate logic, rules, semantic networks, frames and objects, attached procedures, inheritance, and hypertext.

p.m. SYMBOLIC CALCULATIONS: Symbols, symbolic structures, and symbol processing.
INTRODUCTION TO SOFTWARE FOR EXPERT SYSTEM DEVELOPMENT.
COMPUTER EXERCISES.

Tuesday - April 16th:

a.m. SEARCH STRATEGIES: Depth-first, breadth-first, beam search, branch and bound, A^*, minimax search, progressive deepening, and heuristic pruning.
KNOWLEDGE INFERENCE: Logic and deduction, pattern matching, forward chaining, and backward chaining.

For further information: Department of Mining & Metallurgical Engineering
McConnell Engineering Building
3480 University Street
Montreal, PQ
Canada H3A 2A7

PROBABILISTIC REASONING AND UNCERTAINTY: Certainty factors, Bayesian logic, Fuzzy logic, and examples.

p.m. COMPUTER EXERCISE: Building an expert system prototype.

Wednesday - April 17th:

a.m. SYSTEM OVERVIEW: The expert, and the knowledge engineer.
OVERVIEW OF EXPERT SYSTEMS IN MINING AND METALLURGY: MMX - Assistance in selecting underground mining methods; ROX - Classification of rock mass in underground mines; GEOSTAT - Ore reserve assessment; CRAX/X - Trouble-shoot problems in continuous casting of steel billets; GOLDTECH - Guidance in cyanidation testwork on an unknown gold ore; FLOAT - Operation of a Cu/Pb/Zn flotation circuit; and others.

p.m. FUNDAMENTALS OF VISION AND ROBOTICS IN MINING.
INTELLIGENT DATABASES.
HYPERMEDIA.

GENERAL INFORMATION

REGISTRATION

Registration Fees. **$750**

The fees include course notes, coffee breaks, cocktail party, and a closing luncheon or dinner. The McGill Faculty Club and Currie Gym facilities will be made available to participants on request. Certificates for each seminar will be presented to participants who attend the entire seminar. **Cheques made payable to McGill University, in Canadian funds, should accompany the application.** All registrations will be confirmed. There is no cancellation charge provided the Department is notified at least ten working days in advance of the seminar. **If there is a withdrawal less than ten working days before the seminar, there will be a cancellation charge of one-third the seminar fee unless a substitute is provided. The full fee is payable if the registrant fails to attend without notice.**

Early registration is recommended. The Department reserves the right to limit registration to ensure effective discussion. In the event that a seminar is cancelled, participants will be notified at least one week prior to the beginning of the seminar.

LOCATION

McGill University is situated in the heart of downtown Montreal, near hotels, shops, restaurants and a metro (subway) line. All sessions will be held in the Department's seminar facilities in room 1612 at 550 Sherbrooke Street West, near the university campus, at the corner of Sherbrooke and Aylmer streets, in downtown Montreal.

Morning Session: 9:00 – 12:30 Afternoon Session: 2:00 – 5:15

McGill University
DEPARTMENT OF MINING AND METALLURGICAL ENGINEERING

REGISTRATION FORM

Please register me in:

Seminar title EXPERT SYSTEMS IN THE MINERALS INDUSTRY - April 15-17, 1991

Your name . . . . . First name (for name card) . . . . . .

Your position . . . . . .

Name, address, and postal code of company or organization . . . . . .

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Fax or Telex . . . . . Business telephone . . . . . .

☐ I enclose a cheque for $ . . . . . (Cdn) payable to McGill University.

☐ I will be sponsored by UN ☐ / CIDA ☐ and enclose documents supporting my sponsorship.

Signed . . . . . .

Date . . . . . .

If you wish us to make a hotel reservation for you, please indicate the name of the hotel, the type of accommodation desired, and the dates of your arrival and departure.

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Return to:
Lorna McFadden
Department of Mining and Metallurgical Engineering
McGill University
3480 University Street
Montreal, Quebec, Canada H3A 2A7

Tel.: (514) 398-4383
Fax: (514) 398-7099
Telex: 05-268510

McGILL UNIVERSITY
Department of Mining and Metallurgical Engineering

Professional Development Seminars

GEOSTATISTICS FOR THE MINING INDUSTRY: THE-STATE-OF-THE-ART

May 13th - 17th, 1991
Seminar Leader: R. Dimitrakopoulos

A five day seminar for mining geologists and engineers presents a comprehensive review of state-of-the-art geostatistical techniques and their practice in optimal sampling, ore reserve estimation, grade control, and mine design. More specifically, the seminar covers the basic data preparation and statistical description, spatial continuity and variogram analysis, proportional effect, block grade estimation and block variances, estimation of block recoveries (Indicator Kriging and other methods), geostatistical grade control in open pit and underground mines, geostatistical tools for mine design, planning, and production scheduling. Furthermore, participants will be using interactive software to experiment with the practical aspects of geostatistics on a variety of real data sets. Participants are encouraged to bring their own data.

Invited lecturers for the seminar are Michel Dagbert, senior consultant with Geostat Systems Int. and responsible for mining projects throughout the world, and Prof. Michel David, a world-wide known expert in geostatistics.

PROGRAM

Monday - May 13rd:

a.m INTRODUCTION: Course outline; Sampling, data preparation and reliability; Parametric and non-parametric descriptive statistics; Data statistics and ore reserve estimation; Spatial continuity.

p.m. COMPUTER EXERCISES I: Introduction to geostatistical software used in the course; Exercises on descriptive statistics (Gold, Uranium, Copper, or Coal data sets).

Tuesday - May 14th:

a.m. FUNDAMENTAL GEOSTATISTICAL CONCEPTS: Introduction to random functions; Geostatistical models and assumptions; Variogram types, models and inference; An intuitive look on ore reserve estimation.

p.m. COMPUTER EXERCISES II: Variogram calculation and modelling; Dealing with complex anisotropies.

Wednesday - May 15th:

a.m. GEOSTATISTICAL ESTIMATION: Ordinary point and block kriging; Effects of Variogram on Estimation; Indicator kriging and variations; Comparing ordinary and indicator kriging.

p.m. COMPUTER EXERCISES III: Estimation of a deposit using ordinary kriging; Estimation of a deposit with indicator kriging.

For further information:

Department of Mining & Metallurgical Engineering
McConnell Engineering Building

Telephone: (514) 398-4383

3480 University Street
Montreal, PQ
Canada H3A 2A7

Thursday - May 16th:

a.m. ORE RESERVE AND GRADE CONTROL APPLICATIONS: Precision of reserve estimates and optimum drilling; Prediction of R.O.M. variability; Estimation of block recovery; Dealing with outlier sample data in precious metal deposits; Geostatistical grade control in open pit mines: blast hole sampling error and blast hole kriging.

p.m. COMPUTER EXERCISES IV: Ore reserve estimation of a low grade gold-copper deposit, and interactive manipulation of small block values; Grade control in a low grade open pit mine; Grade control in an underground cut-and-fill gold mine.

Friday - May 17th:

a.m. TWENTY YEARS OF MINING GEOSTATISTICS: The practice of geostatistics - The uncertainty of real life situations; Techniques, advances and perspectives.

p.m. ADVANCED TOPICS: Conditional simulations; Tools for in mine planning and production scheduling; Quantitative modelling of ore deposit geology; Artificially intelligent geostatistics.

GENERAL INFORMATION

REGISTRATION

Registration Fees: **$975**

The fees include course notes, coffee breaks, cocktail party, and a closing luncheon or dinner. The McGill Faculty Club and Currie Gym facilities will be made available to participants on request. Certificates for each seminar will be presented to participants who attend the entire seminar. **Cheques made payable to McGill University, in Canadian funds, should accompany the application.** All registrations will be confirmed. There is no cancellation charge provided the Department is notified at least ten working days in advance of the seminar. **If there is a withdrawal less than ten working days before the seminar, there will be a cancellation charge of one-third the seminar fee unless a substitute is provided. The full fee is payable if the registrant fails to attend without notice.**

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Morning Session: 9:00 – 12:30 Afternoon Session: 2:00 – 5:15

McGill University
DEPARTMENT OF MINING AND METALLURGICAL ENGINEERING

REGISTRATION FORM

Please register me in

Seminar title GEOSTATISTICS FOR THE MINING INDUSTRY: THE STATE OF THE ART - May 13-17, 1991

Your name . . . . . First name (for name card) . . . . . .

Your position . . . . . .

Name, address, and postal code of company or organization . . . . . .

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Fax or Telex . . . . . Business telephone . . . . . .

☐ I enclose a cheque for $ . . . . . (Cdn) payable to McGill University.

Signed . . . . . .

Date . . . . . .

If you wish us to make a hotel reservation for you, please indicate the name of the hotel, the type of accommodation desired, and the dates of your arrival and departure.

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☐ I will be sponsored by UN ☐ / CIDA ☐ and enclose documents supporting my sponsorship.

Return to:
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Department of Mining and Metallurgical Engineering
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Montreal, Quebec, Canada H3A 2A7

Tel.: (514) 398-4383
Fax: (514) 398-7099

INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY

WHAT IS THE IAMG?

The International Association for Mathematical Geology is an organization of geoscientists, statisticians, and other interested individuals dedicated to the advancement of mathematics in geological research and technology. To promote the international development of mathematical geology, the IAMG sponsors meetings and discussion, issues publications, and cooperates with other organizations with related goals.

The IAMG was founded in 1968 at the 23rd International Geological Congress in Prague, Czechoslovakia and is an affiliate of the International Union of Geological Sciences (IUGS) and the International Statistical Institute (ISI).

ACTIVITIES

The IAMG sponsors meetings, edits two journals and a monograph series, and organizes symposia at major conferences. For nearly twenty years, the IAMG has sponsored the Geochautauquas, annual symposia covering topics of current interest in mathematical geology. Recent Geochautauquas have treated quantitative methods in oil and gas exploration, mining for coal, mineral exploration, and use of microcomputers. Many papers given at these meetings have been published subsequently in the association's two journals.

In 1989, the IAMG is sponsoring several symposia and workshops in conjunction with the International Geological Congress.

The IAMG recognizes significant contributions to mathematical geology in several ways. The William Christian Krumbein Medal is given to an individual who has made important contributions to the field over a period of time. The Presidents Prize recognizes originality and excellence in published research by a young scientist each year. Best Paper Awards are given for outstanding articles published in the association's two journals.

OUR MEMBERS

The interests of our members range from the theory of fractals, to the application of geostatistics to mining gold. Our members work for universities, governments, or private companies. Areas of academic research include all disciplines within the geological sciences, such as geochemistry, geomorphology, oceanography, geophysics, paleontology, hydrology, and so forth. Members in industry are employed by mining companies, oil and gas producers, and consultants on environmental problems.

We are truly international, with about half the membership from the United States, 20% from Europe, 10% from Asia, and the rest from Canada, South and Central America, Australia and New Zealand.

PUBLICATIONS

The IAMG edits two journals that complement each other in scope and content: Mathematical Geology, published by Plenum Corporation, and Computers and Geosciences, published by Pergamon Press. The Association has also started a monograph series, published by Oxford Press.

In addition to the two journals, members receive a newsletter informing them of IAMG activities, meetings announcements, and news relevant to the membership.

HOW TO JOIN

Anyone with an interest in the work of the association and its publications may join. There are no requirements for membership. The IAMG has three levels of membership, depending upon the journals you wish to receive.

To join, submit the form below to:

Dr. John Kork
Western Treasurer, IAMG
c/o U.S. Geological Survey
P.O. Box 25046, Mail Stop 937
Denver, CO 80225

INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY

Enclosed are my 1991 dues in the amount of $ U.S.

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International Assn. for Math. Geology

Mailing address

CALL FOR PAPERS

The Organising Committee is calling for papers on all aspects of the theory and practice of Geostatistics.

DEADLINES

Deadline for Abstracts ..... 15 Jun. 1991

Notification of Acceptance
of Abstracts ..... 15 Nov. 1991

Deadline for Papers ..... 15 April 1992

The number of participants will be limited to 250.

FURTHER INFORMATION

A second circular will be sent to all who return the reply form contained in this brochure. Any additional inquiries should be addressed to:

Dr. Amilcar Soares

Centro de Valorizacao de Recursos Minerais -IST

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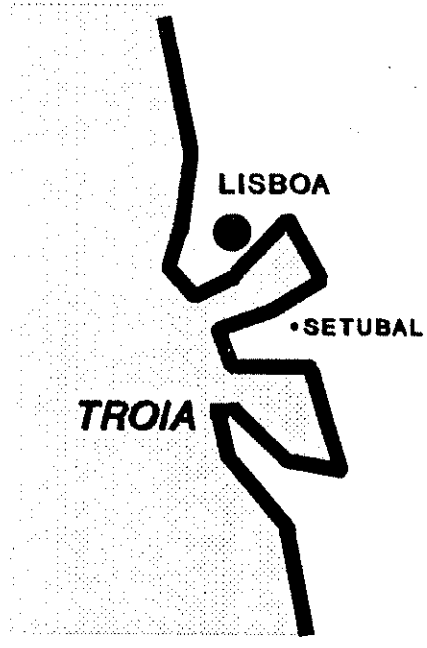

FOURTH INTERNATIONAL GEOSTATISTICS CONGRESS

TROIA 13 -18 SEPTEMBER 1992

TROIA '92

PRELIMINARY ANNOUNCEMENT
AND CALL FOR PAPERS

CVRM - Centro de Valorizacao de Recursos Minerais

IST - Instituto Superior Tecnico-University of Lisbon

The Fourth International Geostatistics Congress will be held in Troia, near Lisbon, from 13-18 September 1992.

The aim of the congress is to establish the State of the Art in Geostatistics, including: major new theoretical results obtained since the last congress in Avignon in 1988, new avenues of research, new interdisciplinary approaches (geology, geophysics ,etc.), new applications in mining, petroleum, soil science, water resources, the environment and other fields.

The Congress will be based on the following format:

All accepted papers will be published in a bound volume.

There will be just two kind of presentations of the accepted papers: plenary sections and poster sections with the presence of the authors being compulsory.

Each session will be chaired by an eminent expert who will organise discussions on the topic after presentation of all the papers.

TRAVEL INFORMATION AND ACCOMMODATIONS

The Troia peninsula lies between the river Sado and the sea, 50 Km south of Lisbon.

Transport to and from Lisbon will be arranged by special buses.

Accommodation to suit all tastes and budgets will be available in the Troia Touristic Complex.

APPLICATION FORM

September 13-18 , 1992

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I Intend to submit an abstract ...

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Please put me on mailing list ...

Please return abstracts and application forms to:

Geostat Congress 1992

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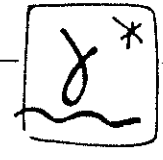

THE MINING PRIBRAM SYMPOSIUM - CZECHOSLOVAKIA

The international section on **MATHEMATICAL METHODS IN GEOLOGY** will be held under the co-sponsorship of IAMG from 14 to 18 October, 1991. Already obtained abstracts indicate a considerably growin interest of specialists from various countries of the world to take an active part in the meeting. Also, our session in 1993 commemorating the 25th anniversary of the IAMG evidently will bring together almost all leading specialists from the whole world. In order to assure all technical conditions for both meetings we need to receive from you the preliminary registration [shown to the right of the PF 91 figure] before April 30, 1991. Thanks for your help. Complete programs with final registration form will follow the April deadline.

Please mail the form to: Dr. Vaclav Nemec
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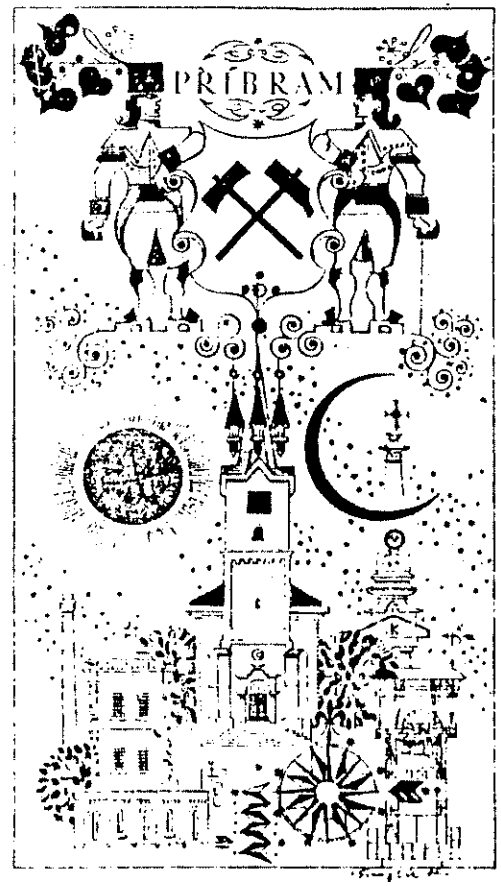
100 00 Praha 10-Strasnice
CZECHOSLOVAKIA



PF 91

THE MINING PŘÍBRAM - MATH.METHODS IN GEOLOGY
Preliminary Registration

ГОРНОРУДНЫЙ ПРИБРАМ - МАТ.МЕТОДЫ В ГЕОЛОГИИ
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