

IAMG NEWSLETTER

NO. 48, MARCH, 1994

BEST PAPER AWARD FOR 1994 COMPUTERS AND GEOSCIENCES

The best paper award for 1994 in the journal, **Computers and Geosciences**, goes to **James W. Johnson, Eric H. Oelkers, and Harold C. Helgeson**. Their paper, "**SUPCRT92: A Software Package for Calculating The Standard Molal Thermodynamic Properties of Minerals, Gases, Aqueous Species, and Reactions From 1 to 5000 Bar and 0 to 1000°C**," appeared in *C&G* in 1992, Vol. 18, No. 7, pp. 899-947. **James Johnson** is with the Earth Sciences Department, L-219, of the **Lawrence Livermore National Laboratory**, Livermore, California (U.S.A.). **Eric Oelkers** is with **Laboratoire de Geochimie, Universite Paul Sabatier**, 38 rue des Trente-six Ponts, 31400 Toulouse Cedex, France. **Harold C. Helgeson** is with the Department of Geology and Geophysics, **University of California, Berkeley**, California (U.S.A.).

As with past winners of this award, the abstract of the winning paper is reproduced in this **Newsletter**:

Abstract—Recent advances in theoretical geochemistry permit calculation of the standard molal thermodynamic properties of a wide variety of minerals, gases, aqueous species, and reactions from 1 to 5000 bar and 0 to 1000°C. The SUPCRT92 software package facilitates practical application of these recent theories, equations, and data to define equilibrium constraints on geochemical processes in a wide variety of geologic systems.

The SUPCRT92 package is composed of three interactive FORTRAN 77 programs, SUPCRT92, MPRONS92, and CPRONS92, and a sequential-access thermodynamic database, SPRONS92.DAT. The SUPCRT92 program reads or permits user-generation of its two input files, CON and RXN, retrieves data from the direct-access equivalent of SPRONS92.DAT, calculates the standard molal Gibbs free energy, enthalpy, entropy, heat capacity, and volume of each reaction specified on the RXN file through a range of conditions specified on the CON file, and writes the calculated reaction properties to the output TAB file and, optionally, to PLT files that facilitate their graphical depiction. Calculations can be performed along the liquid side of the H₂O vaporization boundary by specifying either temperature (*T*) or pressure (*P*), and in the single-phase regions of fluid H₂O by specifying either *T* and *P*, *T* and H₂O density, *T* and log *K*, or *P* and log *K*. SPRONS92.DAT, which contains standard molal thermodynamic properties at 25°C and 1 bar, equation-of-state parameters, heat capacity coefficients, and phase transition data for approximately 500 minerals, gases, and aqueous species, can be augmented or otherwise modified using MPRONS92, and converted to its direct-access equivalent using CPRONS92.

Key Words: SUPCRT92, Equations of state, Standard molal thermodynamic properties, Chemical equilibrium, Minerals, Gases, Aqueous species, H₂O, Thermodynamics, Geochemistry.

INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY

Council Members and Officers, 1992-1996:

Council Members:

Vera Pawlowsky, Departament de Matematica Aplicada III, E.T.S. d'Enginyers de Camins, Canals i Ports, Universitat Politecnica de Catalunya, Gran Capitan, s/n, 08034 Barcelona, Spain.

Georges Verly, B.P. Research Center, Chertsey
Road Sunbury-on-Thames, Middlesex TW 167 LN, England

John Tipper, Geologisches Institut der Albert-Ludwig-Universitat,
d-7800 Freiburg, IM. Breisgau, Albertstrasse 23B, GERMANY

Eric Grunsky, Geological Survey Branch, Ministry of Energy,
Mines and Petroleum Resources, 553 Superior St., Victoria,
B.C., Canada, V8V 1X4.

Zhou Di, No. 164, W. Xinggang Rd., S. China Sea
Oceanographic Inst., Ocean Structure Section, Guangzhou,
Guangdong, P.R. of China.

Marco Alfaro, CODELCO-CHILE, Division Chuquicamata
Plantification Mina CHUCHICAMATA, Chile

Zhao Pengda, China University of Geosciences, Wuhan, People's
Republic of China; Special Councillor for the 30th IGC.

Officers

President: Michael Ed. Hohn, West Virginia Geological
Survey, P.O. Box 879, Morgantown, WV 26505

Past President: Richard B. McCammon, U.S. Geological
Survey, National Center 920, Reston, VA 22092

Vice President: Chang-Jo Chung, Geological Survey of Canada,
Booth Street, Ottawa, Ontario K1A 0E8, Canada.

Secretary General: Ricardo Olea, Kansas Geological Survey, 1930
Constant Avenue, Campus West, Lawrence, KS
66046-2598;

Eastern Treasurer: Vaclav Nemeč, K Rybnickum 17, Praha 10 -
Strasnice, Czechoslovakia

Western Treasurer: John Kork, U.S. Geological Survey, Mail Stop
937, Box 25046, Denver Federal Center, Denver,
CO, 80225-0046

Editors

Mathematical Geology: Robert Ehrlich, Department of
Geology, University of South Carolina,
Columbia, SC 29208

Computers and Geosciences: Daniel F. Merriam, Stratigraphic
Studies Group, Box 153, Wichita State
University, Wichita, KS 67208;
dan_merriam@msmail.kgs.ukans.edu

Nonrenewable Resources: Richard McCammon, U.S.
Geological Survey, National Center 920,
Reston, VA 22092

Newsletter: James R. Carr/168, University of Nevada
Reno, NV 89557; carr@equinox.unr.edu
telefax: 702-784-1766.

**HAS YOUR ADDRESS
CHANGED LATELY?**

**SEND YOUR ADDRESS CHANGE
TO:**

**JOHN KORK
U.S. GEOLOGICAL SURVEY
MAIL STOP 937
BOX 25046
DENVER FEDERAL CENTER
DENVER, CO 80225-0046**

**MOREOVER
OF LATE
JOHN KORK IS
FACING COMPUTER
PROBLEMS AT THE
USGS FACILITY IN
DENVER, CO (USA).
THUS, PLEASE
ANTICIPATE SOME
DELAYS WHEN
CORRESPONDING WITH
HIM.**

CALL FOR NEWSLETTER EDITOR, IAMG

After five years of producing the **IAMG Newsletter**, the present editor, **James Carr**, is stepping down to assume other roles within IAMG. Last May, Carr took over as **Bookreview Editor** for the journal, **Mathematical Geology**, succeeding **Tom Jones**, of Exxon Production Research, Houston, Texas. In two years, Carr will become the **Editor-in-Chief** for the journal, **Mathematical Geology**, succeeding **Bob Ehrlich** of the University of South Carolina; Carr will remain as **Bookreview Editor** at that time, at least for the initial year of transition.

Because of these other roles Carr is playing within IAMG, he feels that he cannot give adequate attention to the **Newsletter**. Therefore, a call for a new editor of the **Newsletter** is issued. Any interested persons are encouraged to contact **Mike Hohn**, IAMG President (address is shown on page 2 of this Newsletter). The new **Newsletter Editor** should plan on taking over production beginning with issue No. 50 (Spring, 1995).

Some information regarding production of the Newsletter should be useful for consideration. The **IAMG Newsletter** is produced twice per year, one issue around March, the other around November. When Carr took over as Newsletter Editor from **John Davis** in 1989, the Newsletter was funded by a grant through the **Kansas Geological Survey**. Carr's original dilemma was how to fund the Newsletter. Now, IAMG pays all costs for the Newsletter. Hence, finding a source of funding for the Newsletter is not a responsibility of the Editor. Furthermore, an international mailing service, **Quick International Couriers**, out of Dallas, Texas was found by **Ricardo Olea**, Kansas Geological Survey; this organization handles all aspects of the international mailing of the Newsletter, including labeling. Thus, the work performed by the Newsletter Editor includes: typesetting the manuscript using a wordprocessor, designing the page layout, including masthead, arranging for printing, and affixing mailing labels (for U.S. mailing only). This statement is not meant to preclude non-USA citizens from assuming the role of Newsletter Editor; non-USA citizens will face different mailing requirements and challenges than what are faced by the current Editor. Mailing labels are supplied by **John Kork**, IAMG Western Treasurer. The present Editor, J. Carr, will help the new Editor with the transition, including suggestions for typesetting, printing, and mailing. Contact J. Carr before contacting M. Hohn should you want more information before deciding to volunteer to be the new Editor.

MORE EDITORIAL CHANGES

Graeme Bonham-Carter, of the Geological Survey of Canada, is now the Deputy Editor of **Computers and Geosciences**, a journal whose current Editor-in-Chief is **Dan Merriam**, Kansas Geological Survey. The eventual goal is for Bonham-Carter to assume the role of Editor-in-Chief of C&G during 1995.

IAMG SPONSORED FTP SITE

IAMG will establish an ftp site effective June 1, 1994. This service will provide internet users access to programs and test data that have been published in the journals, **Computers and Geosciences** and **Mathematical Geology**. The service is intended to assist members in obtaining programs and data that have been perhaps difficult or time consuming to obtain in the past. Currently, it is planned that the site will be "read only" through anonymous ftp access. Users will not be able to submit programs or data at this site. The ftp site will be known as "iamg.org" and will be set up to operate as an anonymous ftp site only. Initially, only programs published after June 1, 1994, will be included in the distribution list. Programs and data that are available for distribution will be noted in IAMG journals and this Newsletter.

Programs and test data should be submitted to **Computers and Geosciences** in the usual manner. If a contributor wants to make program code and accompanying test data available through ftp access, diskettes should be submitted along with the manuscript as indicated below. Authors may also continue to distribute their programs in other ways as previously established (private diskette distribution, private ftp distribution, etc.). Submissions to **Mathematical Geology** should also include program code or data. Although the programs or data will not be published in **Mathematical Geology** (unless formally submitted as such) they will be submitted to the ftp site.

Programs submitted prior to June 1, 1994, will not be available. However, it is anticipated that program code and data earlier than June 1, 1994, will be made available in the future. Requests for programs on diskette that have been published after June 1, 1994, may be obtained from Ramshaw's Computer Solutions for a nominal fee. The price list will be available from the FTP server or by mail and is also listed below. For further information contact Spencer Ramshaw at Ramshaw's Computer Solutions.

Programs will be stored in both tar (UNIX) and zip (PKZIP-DOS) forms. Code access will be by Volume and Number. Thus, directory Vol19-9 will contain programs published in Volume 19, Number 9.

COSTS FOR DISKETTES

The cost for the first diskette is \$10 (Canadian currency). Each additional diskette will be an additional \$5 (Canadian) charge. Diskettes will be packed so that as many programs as possible will be included (in zipped or tar format). When ordering diskettes please indicate whether zip or tar format is preferred. Please note that payments must be made by check drawn from a Canadian or United States bank. Postal money orders will also be accepted. Checks drawn on non-Canadian or non-US banks will require an additional \$15 surcharge to cover bank charges.

Comments or questions about this service can be directed to:

Eric Grunsky
Geological Survey Branch
Ministry of Energy Mines and Petroleum Resources
1810 Blanshard St.
Victoria BC, CANADA V8R 3H4
Tel: 604-952-0424 FAX: 604-952-0381
Internet: egrunsky@mp.gsb.empr.gov.bc.ca

NOMINATIONS SOUGHT FOR IAMG PRESIDENT'S PRIZE

Nominations are sought for the **IAMG President's Prize**. This award is made to an individual, 35 years old or younger, who has made an outstanding application of mathematics to the study of geological sciences. IAMG President, **Mike Hohn**, is presently assembling the committee to select this award; at the time the **Newsletter** went to press, a chair has not been determined for this committee. Therefore, please forward nominations for this award to **Mike Hohn**, President, IAMG, or Vera Pawlowski whose addresses are shown on page 2 of this Newsletter.

REPORTS AND MEETINGS

Appended to this issue of the Newsletter are the following:

1. a detailed announcement regarding the **IAMG 1994 Annual Meeting**; please note that one additional session has been added to this meeting on **Basin Analysis**.
2. the body of the report sent by IAMG Secretary General, **Ricardo Olea**, to the IUGS Secretariat;
3. notes regarding informal IAMG Council Meetings at the Silver Anniversary Meeting.
4. an announcement regarding the 1994 and 1995 Pribram meetings.

These reports are appended as received, but photographically reduced in size.

EDITOR'S NOTES

1. True, abstract deadlines for the **IAMG 1994 Annual Meeting** are past. Please still send an abstract if you are interested in presenting a paper.
2. Please note that the announcement for the Pribram meetings is actually an announcement for two meetings, one in 1994, another in 1995. Please still contact Vaclav Nemeč if you are interested in attending and would like to present a paper.



International Association of Mathematical Geology

1994 Annual Meeting - October 3-5, 1994

Le Club Tremblant, Mont Tremblant, Québec, Canada

Final Call for Papers

DEADLINES AND KEY DATES

Abstract Due: February 28, 1994

Author Notification: March 1994

Camera-Ready Paper Due: June 24, 1994

Registration & payment by authors: ... June 24, 1994

Workshop Registration: June 24, 1994

You are invited to participate in the 1994 Annual Meeting of the International Association of Mathematical Geology (IAMG'94). The International Symposium for Mineral Exploration (ISME'94), organized by the Mining and Materials Processing Institute of Japan (MMIJ), will also be held as a part of IAMG'94.

Dr. Chang-Jo F. Chung, Conference Chair, IAMG'94
Geological Survey of Canada
601 Booth Street, Ottawa, Ontario
Canada K1A 0E8
Tel: +1-613-996-3413
Fax: +1-613-996-3726
e-mail: chung@gsc.emr.ca

PRINCIPAL SPONSORS

International Association of Mathematical Geology
Geological Survey of Canada

CONTRIBUTING SPONSORS

Mining and Materials Processing Institute of Japan
Bundesanstalt für Geowissenschaften und Rohstoffe
Geological Survey of Japan
Korea Institute for Geology, Mining and Materials
U.S. Geological Survey

CONFERENCE PROGRAM

This international conference will focus primarily on the use of computer graphics and statistics with special emphasis on mineral and energy exploration, geologic hazards and environmental applications.

Topics and the technical program organizers for *IAMG'94* are:

Resource estimation

Dr. R.B. McCammon, U.S. Geological Survey

Remote Sensing Applications

Dr. A.N. Rencz, Geological Survey of Canada

Geostatistics in geologic image processing

Dr. J.-J. Royer, C.R.P.G., France

Quantitative methods for geologic hazard

Prof. A.G. Fabbri, I.T.C., The Netherlands

GIS Applications

Prof. M.F. Goodchild, University of California

Other Applications

Dr. C.F. Chung, Geological Survey of Canada

Topic and the technical program organizer for *ISME'94* is:

Visualization of spatial geoscience data

Mr. R. Kouda, Geological Survey of Japan

CONFERENCE ORGANIZERS

CONFERENCE CHAIR

Dr. Chang-Jo F. Chung, *IAMG'94*

Geological Survey of Canada tel: +1-613-996-3413

601 Booth Street fax: +1-613-996-3726

Ottawa, Ontario e-mail:

Canada K1A 0E8 chung@gsc.emr.ca

INTERNATIONAL ADVISORY COMMITTEE

Dr. J.M. Duke, Geological Survey of Canada, Canada

Prof. D.P. Harris, University of Arizona, USA

Dr. P.-C. Kang, Korea Institute for Geology, Mining and Materials, Korea

Prof. H.J. Scholten, Free University of Amsterdam, The Netherlands

Prof. T. Shoji, University of Tokyo, Japan

Prof. F.W. Wellmer, Bundesanstalt für

Geowissenschaften und Rohstoffe, Germany

LOCAL ORGANIZING COMMITTEE

D. F. Garson, Geological Survey of Canada, Chair

W. Spirito, Geological Survey of Canada, Treasurer

P. An, Geological Survey of Canada

M.A. Blondin, Geological Survey of Canada

ABSTRACTS

Interested contributors for oral and poster presentations should submit a one-page (8.5 by 11 inch or A-4 paper), single spaced abstract of no less than 200 and no more than 400 words without figures or references before February 28, 1994.

Notification of your paper's acceptance and an author's kit for camera-ready manuscript will be mailed in March 1994.

Final camera-ready copy will be due before June 24, 1994.

Abstract Due:	February 28, 1994
Author Notification:	March 1994
Camera-Ready Paper Due:	June 24, 1994

REGISTRATION

Registration fees can be paid either by VISA or MasterCard, or by cheque or money order in CANADIAN FUNDS at the rates quoted on the registration form.

Scientists who will be presenting an oral paper or a poster paper at the conference must pay their registration fee on or before June 24, 1994.

LOCATION & TRANSPORTATION

The conference will take place at Le Club Tremblant Resort at the foot of Mont Tremblant in the Laurentian mountains, the oldest mountain range on Earth. It is located at Village of Mont Tremblant, Quebec and about 130 Km from both Montreal and Ottawa. Home to one of Canada's oldest and most beautiful parks, this area of the Laurentian Mountains also boasts Canada's oldest major ski resort - the Mont Tremblant Ski Club. During the fall season when the hills are ablaze with the colours of autumn, the ski club plays host to the "Symphony of Colours", a festive celebration which features scenic chair lift rides to the summit of the majestic Mont Tremblant. Complementing the natural beauty of the region is the hospitality and vitality of the local people and the diversity and charm of village boutiques, restaurants and artisans' shops.

Mirabel and Doval airports in Montreal which serve domestic and international flights, are approximately 1.5 hours from Le Club Tremblant. Conference organizers will advise participants and attendees, in a future circular, of transportation media from Montreal to the conference.

ACCOMMODATION

It is **highly recommended** that conference participants stay at **Le Club Tremblant** where a block of approximately 120 rooms has been reserved for the participants but those wishing to investigate other accommodation in the area can contact:

Mont Tremblant Reservations
C.P. 240, 2001 Chemin Principal
Mont Tremblant (Quebec), Canada J0T 1Z0
telephone: +1-800-567-6760 (U.S. and Canada only)
+1-819-425-8681

TUTORIAL WORKSHOPS

One- and two-day tutorial workshops on the following topics will be held (subject to demand) prior to the meeting: All workshops for which sufficient enrollment is obtained (minimum 10 persons per workshop, maximum 20 persons per workshop), will be held on Saturday, October 1, 1994 and Sunday, October 2, 1994. The fee for one two-day workshop or two one-day workshops will be **\$600.00 including the free registration** for the IAMG'94. The fee for one-day workshop will be **\$350.00 including the free registration** to the IAMG'94. In addition to the following ten workshops, two more one-day workshops on **"GIS for geologists"** and **"Multivariate analysis for geologists"** are being also planned.

Data Quality and Accuracy Assessment in GIS.

Leader: Michael F. Goodchild

One-day workshop. October 1, 1994.

Spatial data analysis in geoscience requires careful attention to accuracy, since any digital representation is at best an approximation of ground truth. This workshop will begin with an overview of the accuracy issue for various classes of geodata. Error models will be introduced, with associated measures and parameters of accuracy. Currently implemented capabilities in GIS and related software will be reviewed, along with methods for propagating uncertainty from database to analysis products. The presentation will review existing and proposed standards for geodata quality, methods for visualizing data quality, and research on the implications of spatial data quality for decision making.

Advance Topics in Spatial Data Integration

Leaders: Ping An, Chang-Jo F. Chung

One-day workshop. October 2, 1994.

In this one-day workshop, we will discuss advanced techniques of integrating several data layers using a GIS to predict target areas for mineral exploration and geological hazard zonation. Modeling techniques include Bayesian probability, certainty factor, fuzzy logic, Dempster-Shaffer

evidential theory, artificial neural network and object-oriented spatial reasoning.

Discovery Process Modeling

Leaders: L.J. Drew, J.H. Schuenemeyer

One-day workshop. October 1, 1994.

Discovery process models have been used successfully to estimate the number and the size distribution of undiscovered oil and gas fields. Many of the procedures used in oil and gas forecasting can be adapted to the estimation of undiscovered mineral deposits for which drilling and discovery data are available. This short course will examine the purpose, the use, and the basic structure of the modified Arps-Roberts Discovery System (ARDS). Real examples will be used to illustrate the use of this model, and a variety of graphical tools will allow the participants to understand it, as well as its assumptions and limitations. Participants will have the opportunity to get hands-on experience using ARDS on personal computers.

Quantitative Estimation of Undiscovered Mineral Resources

Leaders: D.A. Singer, W.D. Menzlie, J.H. DeYoung Jr.

One-day workshop. October 2, 1994.

This workshop is intended to acquaint participants with the principles and practices of quantitative estimation of undiscovered mineral resources. The workshop will begin with a discussion of the purposes, the limitations, the information needs, and the products of regional resource assessments. This will be followed by discussions of descriptive mineral deposits models and their associated grade and tonnage relations, the use of models to integrate diverse types of geoscience data for the purpose of delineating tracts that may contain undiscovered deposits, and the task of estimating the number of undiscovered deposits. The workshop will conclude with an overview of how economic analysis can be applied to resource assessments.

Spectral Data: From Ground to Air

Leaders: A. Rencz, B. Rivard

One-day workshop. October 1, 1994.

This course will focus on the acquisition, analysis and interpretation of high resolution data in the 0.4-2.5 μ m range plus gamma ray data. Hand-held instruments for data acquisition will be demonstrated. Data characteristics, botanical spectra, rock and mineral spectra will be discussed. Methods of spectral analysis including mixing models will be reviewed. Several case studies will be presented.

Visualization: Display of Remotely-Sensed, Geological and Topographic Data

Leaders: to be announced

One-day workshop. October 2, 1994.

The effective use of remote sensing requires the appropriate analytical tools for the visual enhancement of

data. This course will feature a variety of techniques that enhance data prior to interpretation and techniques that enhance the display of classified images. Presentations will focus on multivariate satellite data (LANDSAT, ERS1 and SPOT) and the incorporation of ancillary data including: geochemical, geophysical, orthophotographic and topographic data. Discussion of color space and color transformations including RGB and IHS will be included. There will be presentations of 3D techniques include image draping, fly through and virtual reality. Case studies and manual with imagery will be provided.

Quantitative Estimation of Undiscovered Industrial Mineral Resources

Leaders: G.J. Orris, J.D. Bliss, K.L. Long
One-day workshop. October 1, 1994.

Quantitative estimation of industrial mineral resources often requires consideration of a different set of variables than estimation of most metallic mineral resources. This one-day workshop will address methods peculiar to descriptive and quantitative modeling of industrial mineral deposits and methods for assessing undiscovered industrial minerals. Topics include the growing importance of industrial minerals, the significance of transport costs, methods of assessing "bedded" minerals and materials, material quality concerns, information sources, and data problems. The course will conclude with some techniques for performing simple economic analyses of deposit significance and viability. During the course, participants will have the opportunity to delineate permissive tracts, and construct simple grade, tonnage, and economic models.

Influence Allocation Processes: Integrating Opinions of Geoscience Experts

Leaders: DeVerle P. Harris, Josef E. Marlow, Michael C. Stanley

Two-day workshop. October 1 and 2, 1994.

Recent research has demonstrated that group decisions about complex and uncertain phenomena are clearly superior to decisions by individual experts only when group expertise and information are highly diverse. As an example, for mineral resource assessments, a diverse group may include expertise in geophysics, geochemistry, regional geology, economic geology, remote sensing, and assessment methodology. However, the very requirement for group superiority, namely, diversity of scientific expertise and information, is an impediment to group decisions. This is especially so when the synthesis of diverse science and information is left to informal group analysis. Without a means for eliciting relevant expertise, and a structure for integrating diverse information and judgements, resource assessments and exploration decisions by groups may fall far short of their potential. New decision analysis technology, known as "influence allocation processes", can be very helpful in realizing the potential of diverse groups in resource assessment and exploration decisions. This short course will examine the

use of two influence allocation tools, SPAN and RCON, as they can be applied in mineral resource assessment. A case study will be presented in which these techniques are used to obtain a probability distribution for number of undiscovered deposits.

Image processing for Geoscientists

Leaders: J.-J. Royer

Two-day workshop. October 1 and 2, 1994.

This two days workshop intends to address the application of image processing to geoscience spatial data for exploration, resource evaluation and environmental problems. It consists of mainly four components: (i)types of geoscience digital images from thin sections by CCD video camera to remotely sensed spatial data by satellites; (ii)basic and advanced techniques of encoding, visualization and enhancement of the images; (iii)morphological processing of binary images and numerical processing of multi-class images; and (iv)pattern recognition. We will also discuss future of image processing including geostatistical techniques, fractals and 3-D image processing.

Quantitative Methods in Environmental Impact Assessment

Leader: Andrea G. Fabbri

Two-day workshop. October 1 and 2, 1994.

The workshop offers an integrated methodology for EIA. From raw data analysis, to the ranking of alternatives, a case study permits the evaluation of the ecological impact of a freeway. The combined use of field data capture with remotely sensed images leads to spatial modeling in the study area and to the application of computer programs for ecological characterization, area/noise pollution assessment, etc. A PC-based GIS, a spreadsheet and EIA decision-support software will be used in hands-on practical.

Computer-based geological field mapping

Leader: Boyan Brodaric

Two-day workshop. October 1 and 2, 1994.

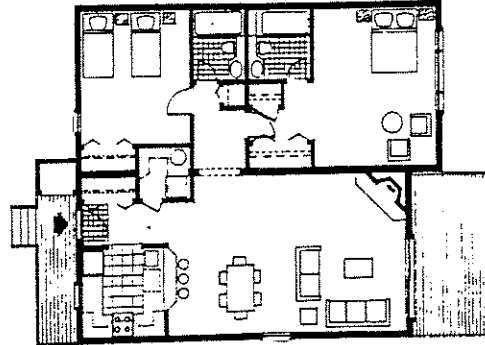
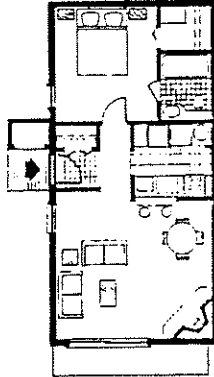
In this workshop, participants will design a database suitable for input of field observations and export to GIS systems. A sample field project will be provided and data will be entered by the participants from air photos, topo maps and GPS systems to the database. This data will be exported to a CAD system where the geological map will be refined and then transferred to GIS format for query. Issues addressed will be basic geomatics for digital mapping, database techniques for geological observations, usage of CAD in geological mapping and integration with GIS systems. Participants will use GSC's Fieldlog software for database construction and input, AutoCAD for map construction and ArcView for map query. No previous experience with any of these systems is required, although general PC literacy would be an asset.



IAMG'94/ISME'94 ACCOMMODATION FORM



Suites have been reserved for conference participants and their guests at the exclusive Club Tremblant Resort in the heart of the Laurentian Mountains, Québec. There are two types of suites available: the one-bedroom Executive Suite and the two-bedroom Deluxe Suite.



Please indicate the type of accommodation you wish to reserve, by marking the appropriate line:

Executive Suite (1 bedroom)

(based on occupancy of 1 registrant per suite; rate for spouse/companion assumes they are sharing room with registrant))

registrant Cdn. \$169.00.....
 spouse/companion Cdn. \$79.00.....

Deluxe Suite (2 bedrooms & 2 bathrooms)

(based on occupancy of 1 registrant per room (2 per suite); rate for spouse/companion assumes they are sharing room with registrant))

registrant Cdn. \$139.00.....
 spouse/companion Cdn. \$68.00.....

Rates quoted above are per person, per night in Canadian currency and include 3 meals daily, access to all on-site recreational activities, service charges and a banquet dinner. 11.28% provincial tax is not included.

In order to reserve your accommodation, contact:

Attention: Reservations
IAMG'94 Conference
Club Tremblant Resort
avenue Cutlè
Mont Tremblant (Québec)
Canada J0T 1Z0
téléphone: 1-800-567-8341 (Canada only)
1-800-363-2413 (USA only)
1-819-425-2731
telecopieur: 1-819-425-8903

All payments can be made either by VISA or MasterCard, or in the form of check or money order payable to CLUB TREMBLANT RESORT in CANADIAN FUNDS.

Total amount due in Canadian Funds: \$100.00

Name: _____

Address: _____

Cheque or money order enclosed..... (check here)
 or, please bill to my credit card as follows:

VISA Card #: _____ Expire date: _____

MasterCard #: _____ Expire date: _____

Signature: _____ date: _____

Arrival date: _____

Departure date: _____

A non-refundable deposit of \$100.00 per conference registrant must be forwarded to Club Tremblant before June 24th, 1994 in order to secure your accommodation.



IAMG'94/ISME'94 REGISTRATION FORM



REGISTRANT INFORMATION

Surname: _____
 First name: _____ Initials: _____
 Organization: _____
 Address: _____

 City: _____ Stat/Prov: _____
 Postal Code: _____ Country: _____
 Phone: _____
 Facsimile: _____
 e-mail: _____

WORKSHOP REGISTRATION

The workshop fee of Cdn \$600 for one two-day workshop or two one-day workshops and Cdn \$350 for one-day workshop includes a free registration to IAMG'94.

Workshop fees are *not* refundable, unless the workshop is canceled due to insufficient number of participants.

Data quality and accuracy assessment in GIS	\$350.00 <input type="checkbox"/>
Advance topics in spatial data integration	\$350.00 <input type="checkbox"/>
Discovery process modeling	\$350.00 <input type="checkbox"/>
Quantitative estimation of undiscovered mineral resources	\$350.00 <input type="checkbox"/>
Spectral data: from ground to air	\$350.00 <input type="checkbox"/>
Visualization: display of remotely-sensed, geological and topographic data	\$350.00 <input type="checkbox"/>
Quantitative estimation of undiscovered industrial mineral resources	\$350.00 <input type="checkbox"/>
Influence allocation processes: integrating opinions of geoscience experts	\$600.00 <input type="checkbox"/>
Image processing for geoscientists	\$600.00 <input type="checkbox"/>
Use of portable computers for geologic field mapping	\$600.00 <input type="checkbox"/>
Quantitative methods in environmental impact assessment	\$600.00 <input type="checkbox"/>
Multivariate analysis for geologist	\$350.00 <input type="checkbox"/>
GIS in geologists	\$350.00 <input type="checkbox"/>

Total amount for workshops: _____

REGISTRATION FEE

Registration fee is *not* refundable

Non-member registration fee includes 1995 IAMG membership and one year's free subscription to the Journal of Mathematical Geology. Note that the workshop fee includes a free registration.

Payment received: *on/before* *after*
 June 24, 1994 June 24, 1994

IAMG/MMIJ members: Cdn. \$185 Cdn. \$210 _____
 non-members: Cdn. \$220 Cdn. \$245 _____

Students/retired scientists/scientists from "developing" countries

IAMG/MMIJ members: Cdn. \$50 Cdn. \$70 _____
 non-member Cdn. \$85 Cdn. \$105 _____

PAYMENT

All payments can be made either by VISA or MasterCard, or in the form of check or money order payable to IAMG'94 in CANADIAN FUNDS.

Total amount due in Canadian Funds: _____

Cheque or money order enclosed..... (check here)
 or, please bill to my credit card as follows:

VISA Card #: _____ Expire date: _____

MasterCard #: _____ Expire date: _____

Signature: _____ date: _____

Please check where applicable: :

I wish to present an oral/poster presentation: _____

An abstract is enclosed _____

Authors: To be included in the Program, an advanced registration fee must be paid by June 24, 1994.

Return this form to:
 Dr. Chang-Jo F. Chung
 Conference Chair, IAMG'94
 Geological Survey of Canada
 601 Booth Street, Ottawa, Ontario
 Canada K1A 0E8
 TEL: 1-613-996-3413
 FAX: 1-613-996-3726
 e-mail: chung@gsc.emr.ca

ADDITIONAL TOPIC FOR IAMG '94

BASIN ANALYSIS: CONCEPTS, CONCERNS, AND CONSTRAINTS

Organizers: **D.F. Merriam** and **A. Forster**

BASIN ANALYSIS will be the subject of one session to be held as part of the 1994 Annual Meeting of the **International Association for Mathematical Geology** in Mont Tremblant, Quebec, Canada 3-5 October 1994. It will concentrate on the how to model basins rather than the interpretations and applications. New approaches, recent advances, and latest developments will be emphasized. Oral presentations can be supplemented by posters and demonstrations. This session will constitute the 23rd Geochautauqua and we plan to publish the results.

We invite you to take part in this important session. A 1-page (8.5x11 inch) Abstract single spaced of no less than 200 and no more than 400 words without figures or references is due 28 February 1994. Notification of paper's acceptance and an author's kit for camera-ready copy will be due 24 June 1994.

Please notify either one of the conveners of your interest as soon as possible and the Final Call for Papers with additional information will be sent to you. Addresses: **Dan Merriam, Kansas Geological Survey, The University of Kansas, Lawrence, KS 66047; tel: 913-864-3965; FAX: 913-864-5317; e-mail: dan_merriam@msmail.kgs.ukans.edu.** Or: **A. Forster, GeoForschungsZentrum Potsdam, Telegrafenberg A3, D-14473 Potsdam, Germany; tel: 49-331-288-1242; fax: 49-331-288-1202; e-mail: for@gfz-potsdam.de.**

Following topics are to be discussed:

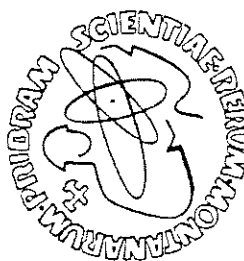
- Use and protection of nonrenewable geological resources
- Ethical problems in exploitation and treatment of mineral resources
- Ethics in geological and mining entrepreneurship
- Geoethics and history (mining traditions etc.)
- Geoethics in the education process
- Ethics in international scientific contacts (with special regard to West/East and North/ South relations)
- Other problems of interest.

DEADLINES:
FEBRUARY 28, 1994: submission of ABSTRACTS and of preliminary registration cards,
MAY 31, 1994: submission of PAPERS (instructions will be sent to authors of abstracts),
SEPTEMBER 15, 1994: final registration,
OCTOBER 9-10, 1994: arrival to Příbram.

The international section on MATHEMATICAL METHODS IN GEOLOGY will be co-organized by the newly established REGIONAL CENTER OF THE INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOLOGY. It will focus its attention on problems of exploration and exploitation strategy with special regard to nonrenewable resources and environmental protection but any topic related to mathematical geology (incl. geostatistical and computer applications) will be accepted. We want to promote large international East-West and North-South contacts relatively easily accessible to all colleagues from any part of the world.

DEADLINES:
FEBRUARY 28, 1994: submission of preliminary registration cards,
NOVEMBER 15, 1994: submission of abstracts,
MARCH 31, 1995: submission of papers (instructions will be sent to authors of abstracts),
JUNE 30, 1995: final registration (later registration will be possible with increased registration fees),
OCTOBER 8 - 9, 1995: arrival to Příbram or Prague

It is our intention to organize the section in Příbram, however our recent experience from Prague does not exclude to move the meeting to Prague again. For that reason we would like to receive your pre-registration cards already in February 1994. Languages: the abstracts can be submitted in English or Russian language, for using other language contact the convener.



I am really pleased to inform you that the Silver Anniversary Meeting of the international section on MATHEMATICAL METHODS IN GEOLOGY organized in Prague in October 1993 as part of our Symposium was a success. Altogether 90 abstracts have been published, 51 contributions presented orally or as posters, we had 110 registered participants coming from 18 countries of Europe and Asia but the total number of persons who attended at least some of our meetings reached 135. (About 40 persons of them were taking part also at the immediately preceding Silver Anniversary Meeting of the International Association for Mathematical Geology). Just in this year we have reached - since our first meeting in 1968 more than 1000 published contributions and more than 1000 authors and co-authors of them. Many repeated thanks to all of you who helped us as sponsors (International Association for Mathematical Geology, International Science Foundation, Ministry of Environment of the Czech Republic), authors, co-organizers or participants. We shall try to do the best to keep the tradition in the future.

On behalf of the Executive Committee and of the Scientific Council of our Mining Příbram Symposium I have the privilege to invite you to two INTERNATIONAL SECTIONS to be organized in next two years:

OCTOBER 10 - 12, 1994 at PŘÍBRAM (Czech Republic) on G E O E T H I C S
OCTOBER 9 - 14, 1995 at PŘÍBRAM (or in Prague) on MATHEMATICAL METHODS IN GEOLOGY.

The first meeting on GEOETHICS was organized already in October 1992. That was probably the first international session dedicated to problems of how to apply ethical principles in geology, mining activities, energy etc. In 1994 we want to organize a complete international section. Many serious problems are to be discussed and it seems that our long experiences with geomathematical meetings can help to establish Příbram also as a very convenient center for productive and effective exchange of ideas on a new field which should be promoted to help the human survival in next centuries.

Dear Colleague,

THE MINING PŘÍBRAM SYMPOSIA 1994 AND 1995 - PREREGISTRATION CARD

(Mark the appropriate answer by a circle)

Name: _____

Address: _____

Fax No. (incl. country and city codes): _____

Telephone No. (incl. codes): _____

I will attend the international section on GEOETHICS in OCTOBER 1994:
 YES NOT YET DECIDED NO

Number of accompanying persons: _____

Short abstract: _____
 ENCLOSED WILL BE SENT BEFORE FEBRUARY 28, 1994

I will attend the section on MATH. METHODS IN GEOLOGY in OCTOBER 1995:
 YES NOT YET DECIDED NO

I would prefer the meeting in PŘÍBRAM Prague

Date: _____

Signature: _____

Office of the Secretary General
Kansas, Oklahoma, Ohio
1930 Constant Avenue
Lawrence, Kansas 66044 U.S.A.
Telephone: (785) 864-1991
Internet: oia@bva.igp.uni-erz.de



International Association for Mathematical Geology

NOTES OF AN INFORMAL MEETING OF COUNCIL MEMBERS OCTOBER 11, 1993 CHARLES UNIVERSITY, PRAGUE

PRESENT:

Michael E. Hohn, President
Ricardo A. Olea, Secretary General
Eric Grunsky, Councilor
Vera Pawłowski, Councilor
John Tipper, Councilor
Zhou Di, Councilor

1. The president announces that he has approved the organization of an IAMG technical meeting from October 3-5, 1994. The meeting aims to continue having annual international meetings in between the quadrennial International Geological Congresses and to replace several smaller meetings directly or indirectly organized by the IAMG. The IAMG 94 meeting will be at Le Tremblant Club, Mont Tremblant, Quebec, Canada, jointly with the International Symposium for Mineral Exploration (ISME94) organized by the Mining and Material Institute of Japan. IAMG 94 will focus primarily on the use of computer graphics and statistics with special emphasis on mineral and energy exploration, geologic hazards, and environmental applications. The head of the organizing committee is our vice-president, Chang-jo Chung, with the Geological Survey of Canada. The dead line for papers is January 28, 1994. Notification of acceptance will come within a month. Final camera-ready copies for the selected papers will be due June 24, 1994.

There has been no decision about other future sites, but there is interest by several groups to organize the next meetings for 1995 and 1997. In 1996 we will have our traditional meeting in conjunction with the XXX International Geological Congress to be held in Beijing.

2. The IAMG has several committees. J. Harfif is in charge of the Membership Committee; P. Dowd chairs the Geostatistics Committee; and A. Fabbri is the head of the Environmental Geology Committee. We need to nominate a representative to the National Research Council and the president would like to add an Education Committee. J. Tipper accepted the responsibility to start and steer the new committee on education. Important reasons for him to accept the position were his desire to advance mathematical geology in the university curricula and make our publications more attractive to students and useful teaching aid material.

3. IAMG members outside North America complain about the mailing of the newsletter. The editor sends the newsletters by surface mail for economic reasons, thus delivery takes up to four months. After such long delays many of the announcements are overdue, missing one of the most important reasons to distribute a newsletter. E. Grunsky suggests that the editor should explore more modern means of communication, such as posting the newsletter in an electronic board, which would eliminate the postage and would make the newsletter available instantly to those able to access the board.

4. According to clause 12 of our statutes, the council conducts the work of the IAMG between meetings of the general assembly. The president informs that our vice-president, Chang-jo Chung, would like to enforce this clause in particular for the nomination of the editors of our journals, valuable assets whose royalties are our main source of income. In that respect, the president informs that D. F. Merriam is planning to step aside as editor of Computers & Geosciences and has made arrangements to start sharing responsibilities with Graeme Bonham-Carter during 1994 and completely transfer responsibilities in 1995. The council endorses Graeme as the next editor of Computers & Geosciences.

5. New journals usually have a slow start and Nonrenewable Resources is not an exception. Differently from our other two journals, we are co-owners of the publication, privilege that demands the obligation of assuring the publisher a minimum profitability specified by publication targets. For the second year in a row, in all likelihood we will not be able to reach the targets agreed with Oxford University Press, which for this year are 600 individual subscribers and 150 library subscriptions. The IAMG should have to pay a penalty that should be close to the \$12,848 that we had to pay last year. The president assures that R. McCannan, editor of the journal, is working hard to attract papers and new subscribers. The president intends to keep the journal for at least the five-year duration of the contract.

NOTES OF DISCUSSIONS BETWEEN COUNCIL MEMBERS AND INTERESTED PARTIES OCTOBER 12, 1993 HOTEL KRYSZAL, PRAGUE

PRESENT:

Michael E. Hohn, President
Ricardo A. Olea, Secretary General
Eric Grunsky, Councilor
Vera Pawłowski, Councilor
John Tipper, Councilor
Zhou Di, Councilor
Jan Harfif, Chairman, Membership Committee

1. The Baltic Sea is a small interior body of water in northern Europe. Most of its waters are within national jurisdiction of the nine surrounding countries. Coordination is important for the exchange of information, which is happening at a faster pace now that the political situation has changed in most countries in the region. Research institutes in the area are working in the preparation of an international data base to aid global study of the Baltic. In the past the group worked under the umbrella of the defunct COGEO DATA. Jan Harfif would like to have the approval for the group to work under the umbrella of the IAMG, which mostly means using our stationery for the correspondence. The council approves of the idea and suggests to Jan to formalize the request by sending a letter to our president.

2. Zhou Di would like to learn about the role that she should play in the organization of the next International Geological Congress. She has never been contacted by the organizers and as a Chinese national and IAMG councilor she would like to be involved in the preparation of the congress. The president declares that the IAMG has nominated Prof. Zhao Pengda as our special councilor to work with the organizers of the congress. The president has not heard from Prof. Zhao Pengda either. The IAMG is not in a position to make demands because we do not contribute financially to the organization of the congress. Since our first session in Montreal in 1972, however, the organizers of the international congress have scheduled sessions on mathematical geology whose technical organization has been shared with the IAMG. There is no reason to fear that the same will not happen in Beijing. The president will contact Prof. Zhao Pengda and will let him know the desire of Zhou Di to collaborate.

International Union of Geological Sciences

REPORTING FORM FOR CONSTITUENT BODIES

1993

1. TITLE OF CONSTITUENT BODY: International Association for Mathematical Geology (IAMG).

2. OVERALL OBJECTIVES:
Our statutes read: "The aim of IAMG is to promote international cooperation in the application and use of mathematics in geological research and technology:"
- (a) the organization of meetings (commonly in association with the International Geological Congress), of field excursions, and of visits to centers of research and technology;
 - (b) the issue of publications on the application of mathematics in the geological sciences, and discussions thereon;
 - (c) cooperation with other organizations professionally concerned with applications on mathematics and statistics to the biological sciences, earth sciences, and planetary sciences."

3. FIT WITH IUGS SCIENCE POLICY (please quote IUGS scientific objectives): The IAMG promotes international cooperation for the advancements of quantitative geology.

4. ORGANIZATION (please describe):
The IAMG is governed by six officers and a council of six members. Standing committees carry out specialized tasks such as membership drives and bestowing awards. Members elect the officers and council members through mail balloting every four years.

5. EXTENT OF NATIONAL/REGIONAL/GLOBAL SUPPORT FOR SOURCES OTHER THAN IUGS: By November of 1993, the IAMG had 540 full members from 52 countries. The IAMG encourages members to form regional organizations such as the Deutsches Arbeitskreis für Mathematische Geologie und Geoformatik. In addition to the main international IAMG meetings, regional groups received limited support from the parent organization to organize meetings and workshops. The IAMG receives no financial support from these regional groups.

6. INTERFACE WITH OTHER INTERNATIONAL PROJECTS: The IAMG has cosponsored meetings with NATO Advanced Study Institute and IGCP.

7. CHIEF ACCOMPLISHMENT IN 1993: We celebrated 25 years of the IAMG with a congress in Prague, 10-14 October, 1993. The silver anniversary meeting included two short courses, 11 technical sessions and a field trip. Registration reached 165 participants. Oxford University Press released the fifth volume in the *Studies in Mathematical Geology* monograph series. The title of the new book is *Computers in Geology—25 Years of Progress*, edited by John C. Davis and Ute C. Herzfeld.

The council approved the organization of an Educational Committee for the advancement of mathematical geology in the university curriculum world wide and endorsed revitalization of regional groups.

3. Jan Harff reports that a regional group of the IAMG has been established in Germany. The group is off to an active start. Prof. Peter Smolka, elected head of the local group, has been able to compile a list of a thousand people interested in mathematical geology in Germany. With the occasion of the IAMG Silver Anniversary in Prague, the journal *Die Geowissenschaften* devoted the entire October-November issue to publish eight papers on mathematical geology work done in Germany magnificently illustrated with numerous color figures. Encouraged by the experience with the German group and in accordance with clauses 10 to 18 of the IAMG by-laws, Jan would like to promote the organization of more local groups that he will be willing to start and coordinate as part of the activities of the Membership Committee. The idea is accepted and Jan is commissioned to work out the details with a broader scope than recruiting new members.

It would be to the IAMG's advantage to have every local representative collecting the dues and send the treasurer a single check, something occasionally done in the past according to clause 17 of the by-laws. Most of the dues paid by each member are used to pay the publisher for the journal subscriptions that are included in the dues—the actual IAMG membership fee is \$3.00. Banks in the United States sometimes charge a service fee for overseas checks, even if they are in American dollars. Because such a charge is larger than \$3.00 dollars, when that charge is done the IAMG loses money with every cashed check. A single check covering the dues of several members would help to minimize this problem.

The local representatives could also help to speed up the distribution of the newsletter at a reduced cost. There have been complaints about the long time it takes the Newsletter to reach its destination outside North America because of surface mailing. If Jan can succeed in mounting his network of correspondents, in the future the editor of the Newsletter could send the letter by air mail to the local representatives, who will duplicate the newsletter and mail it to the members in the area.

At the release of these notes, Jan has offered the position and received the acceptance to serve from the following individuals:

- Czech Republic: Václav Nemeč
- Germany: Peter P. Smolka
- India: S. Divi Rao
- Japan: Nishi Nishiwaki
- Russia: Dmitry Rodionov
- Slovakia: G. M. Timcak
- South Africa: Isobel Clark
- Spain: Vera Pawlowsky
- Ukraine: B. V. Smirnov

and is searching for representatives for Australia, China, Israel, United Kingdom, and Venezuela. Currently the IAMG has 541 regular members. The largest concentration is in the United States with 275 members, followed by Canada with 45, Australia 31, Germany 29 and Spain 15.

4. The IAMG should be flexible enough to adapt to new circumstances keeping the traditions of the past. The president encourages the council to let him know of any part of the statutes or the by-laws in need of a new wording, expansions, or deletions.



Ricardo A. Olea
Secretary General

Grants and prizes 3,000
 Nonrenewable Resources low subscription penalty 12,000
 Annual meeting 10,000
 TOTAL 60,000

16. POTENTIAL FUNDING SOURCES OUTSIDE IUGS.
 The royalties generated by publications are our principal source of income. Of secondary importance are the dues paid by our members. We receive no funding from sources other than the IUGS.

17. REVIEW CHIEF ACCOMPLISHMENTS/RESULTS OVER THE LAST 5 YEARS: PERIOD 1988-1993

- We reached an agreement with Oxford University Press to start publishing a new journal, *Nonrenewable Resources*, to appear four times a year.
- Pergamon agreed to increase the number of annual issues of *Computers and Geosciences* from six to eight in 1989 and from eight to ten in 1990. In addition, the journal absorbed the Computer Oriented Society (COCS) programs and now COCS papers come through a special *Computers and Geosciences* editor.
- Oxford published four more monographs during the period, increasing to five the total number of volumes in the series.
- We modified our by-laws to create a new category of members: corresponding member. Corresponding members must live in countries with restricted foreign currencies and do not pay membership fee. The new category intends to extend the reach of the association regardless of the economic conditions of the people interested in mathematical geology.
- The IAMG newsletter has a new format and is now published regularly twice a year.

18. SUMMARIZE ANTICIPATED OBJECTIVE AND WORK PLAN FOR THE NEXT 5 YEARS PERIOD 1993-1997

- Increase the membership. Once we broaden our base it will be easier for the association to expand programs and services.
- Expand the number of regional groups. As the membership grows, it will be necessary to decentralize the association.
- Increase the subscription to *Nonrenewable Resources* to at least the minimum circulation agreed with Oxford Press.
- Prepare sessions, excursions, and trips for the 30th International Geological Congress to be held in Beijing, China, in 1996.
- Have a closer contact with academia to create awareness about the need to offer more courses in mathematical geology.
- Secure submission of good papers to our journals in order to maintain or increase the quality of our publications.
- Publish at least one monograph a year.

NAME (of person preparing form, please print):

Ricardo A. Olea

SIGNATURE: 

POSITION: Secretary General

DATE: November 24, 1993

ADDRESS: Kansas Geological Survey
 1930 Constance Avenue
 Lawrence, Kansas 66047
 United States of America

TELEPHONE: 913 864 4991
 TELEFAX: 913 864 5317

Submit copies of completed form by 30 November to the IUGS Secretariat

IUGS Secretariat
 Geological Survey of Norway
 P. O. Box 3006 Lade
 N-7002 TRONDHEIM, NORWAY

Telephone: (+47-7) 904315
 Telefax: (+47-7) 904304
 or 921620

8. CHIEF PROBLEMS ENCOUNTERED IN 1993 (if any):
 Efforts to recruit more members in countries of the Third World are not producing results. Difficult economic times, due to the world recession, seem to be replacing perennial problems in foreign exchange restrictions.
 Nonrenewable Resources—our newest publication now in its second year—most likely will not reach the minimum circulation guaranteed to the publisher. The IAMG would have to pay a compensation.

9. CHIEF PRODUCTS (ie publications, maps) IN 1993:

- Our main products are our publications:
 (a) *Mathematical Geology*, 8 issues a year.
 (b) *Computers and Geosciences*, 10 issues a year.
 (c) *Nonrenewable Resources*, 4 issues a year.
 (d) John C. Davis and Ole C. Hertzfeld, editors, 1993, *Computers in Geology—25 Years of Progress*: Oxford University Press, 298 P.

10. SUMMARY EXPENDITURES IN 1993:

Printing and mailing of journals	US\$ 22,602.81
Monograph orders	3,096.95
Postage	1,294.45
Miscellaneous printing and supplies	2,670.07
Printing and mailing of newsletter	1,370.01
Legal & accounting	520.00
Promotion and Membership Committee	657.82
Bank charges & investment expenses	758.30
Grants and prizes	5,287.64
Monograph #5 start-up	4,321.00
Nonrenewable Resources low subscription penalty	12,848.00
Prague meeting	22,916.22
TOTAL	78,343.27

11. WORK PLAN FOR NEXT YEAR:

Preparations are already underway to have a technical meeting next year in Mont Tremblant, Canada. This meeting marks a departure from the traditional policy of the past. The old practice was to limit the IAMG technical conventions to the quadrennial International Geological Congresses and to sponsor meetings in between instead of having our own meetings.

12. CRITICAL MILESTONES TO BE ACHIEVED NEXT YEAR:

We need to increase the subscription to *Nonrenewable Resources* or to absorb another publication to turn *Nonrenewable Resources* into a profitable journal.

13. ANTICIPATED RESULTS/PRODUCTS NEXT YEAR:

We will continue with the publication of our three journals and we anticipate the publication of a volume with the proceedings of our next meeting in Canada.

14. COMMUNICATION PLANS:

The IAMG intends to stay active promoting the existence of the IAMG and the benefits of its activities. We will prepare exhibits at important meetings held by related organizations, such as the American Association of Petroleum Geologists (AAPG), and organize membership drives through the mail and announcements in professional journals.

15. SUMMARY BUDGET FOR NEXT YEAR (If IUGS support is requested, please specify):

Printing and mailing of journals	US\$ 25,000
Monograph orders	3,500
Postage	1,500
Miscellaneous printing and supplies	1,000
Printing and mailing of newsletter	1,500
Legal & accounting	500
Promotion and Membership Committee	1,000
Bank charges & investment expenses	1,000