



Newsletter

Official Newsletter of the International Association for Mathematical Geology

Contents

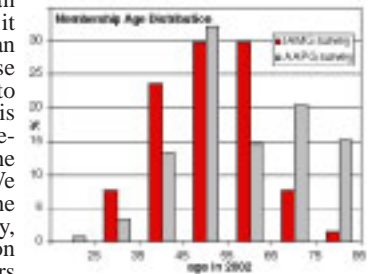
Call for Award Nominations	1
Call for Proposals to Organize the IAMG 2006 Conference	1
President's Forum	3
Association Business	4
2003 Student Grant Awards	4
Call for Nominations for Distinguished Lecturer 2005	4
2003 Felix Chayes Prize Laudatio	4
IAMG 2004 ELECTIONS	5
Candidates for IAMG Council 2004-2008	5-9
IAMG 2003 at Portsmouth	10-13
Computers & Geosciences Best Paper Award, 2002	14
IAMG Journal Report	14
Journal Contents	14
Member News	14
Conference Reports	15
Compositional Data Analysis Workshop 2003	15
ISI Berlin	15
Georeasoning Workshop	15
IUGS-CGI:	16
Upcoming Meetings	18
Announcements	20
International Clearinghouse for Geologic Map Databases	20
Mathematical Methods and Models in the Geosciences	20
News from Freiberg	20

The greying of IAMG? This year I turned 65 and, looking around me, I noticed more and more seniors. A graph in "The Correlator" (AAPG's September DPA Newsletter) caught my eye: it showed the age distribution of AAPG and DPA members in 2002 and bemoaned the fact that "in 10 years, about 50 percent of the membership will be over 65 years of age".

**From the Editor
From the Editor
From the Editor**

The AAPG age distribution displays three modes at 21-25, the major mode at 46-50 and another one at 71-75. How does IAMG compare? Using the returns from the 1999 IAMG questionnaire (see IAMG Newsletter 60)

we can overlay the results of the AAPG survey 2002 in Explorer, June 2003 (see figure). Both datasets are biased samples: the AAPG survey participation was only about 5% of the total membership whereas IAMG's was about 30%, however, AAPG had ten times more respondents than IAMG (132). In the AAPG survey it is clear that respondents younger than 35 are underrepresented and those over 65 overrepresented relative to the total membership. Perhaps it is skewed towards the older ages because fewer young people take the time respond to questionnaires. We have to assume this bias works the same way in the IAMG data. Finally, the IAMG membership composition may have changed in the three years since the data were taken. As the graph indicates, IAMG respondents are definitely younger than AAPG's by about four years on average, but that average is still about 51 years of age (in 2002).



But there is hope for IAMG. Although at this year's IAMG meeting in Portsmouth (see p. 10-13) I saw a large number of gray heads, they were mixing with many younger people. One hopes that enough of these are or will become members of the Association. And, looking at the age distribution of the Board: IAMG members ages running for council average about 48 years, both in 2000 and 2004. Of course, these data include some pretty wild guesses because many didn't give their age. So, let's support the trend toward a younger IAMG and help recruit new members to keep IAMG going for a long time.

Harald S. Poelchau

Call for Award Nominations

The Association invites all members to submit nominations for the **2004 Griffiths Teaching Award and the Krumbein Medal**

Deadline: January 15, 2004

See the "Guidelines for Awards within the IAMG" section of "Guidelines and Procedures" on the Organization's web page http://iamg.org/awards_guidelines.html

The documents which should accompany each proposal are:

- a short statement summarizing the relevant qualifications of the nominee
- a curriculum vitae of the nominee.

Please submit documentation in electronic format (preferably in .rtf format) to:

Heinz Burger - Chair, Awards Committee
Freie Universität Berlin - Geoinformatik
Malteserstr. 74-100
12249 BERLIN, Germany
E-mail: hburger@zedat.fu-berlin.de

Please help your Awards Committee by proposing many candidates!!!

Call for Proposals to Organize the IAMG 2006 Conference

The Association is now accepting proposals for organizing the tenth annual IAMG conference during the summer or fall of 2006.

The deadline for proposals is **February 15, 2004**. Individuals or organizations interested in organizing IAMG 2006 should follow the instructions in "Guidelines to prepare IAMG conferences" available at the web site

<http://iamg.org/conference.html>.

Bids should be sent to the IAMG President. In addition, it would be helpful for planning purposes for the President to receive some forewarning — a notice of intent to submit a proposal — ahead of the official deadline, preferably by December 25, 2003.

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PRESIDENT'S FORUM

One of the key activities of IAMG is the sponsorship of our three international journals, *Mathematical Geology*, *Computers & Geosciences* and *Natural Resources Research*. The papers published in these journals in some way reflect what is going on in our discipline. Our publications are probably the most potent mechanism for promoting geomathematics and IAMG to the geoscientific community at large. Membership of IAMG brings substantial discounts on personal subscriptions to the journals in comparison to non-member subscriptions. In the IAMG questionnaire conducted in 1999, most members cited the journals as being the most important reason for membership. Furthermore, royalties on *Computers & Geosciences* and *Mathematical Geology* bring in a significant income to the Association (currently nearly \$60,000 pa), without which IAMG could not afford to sponsor activities such as the Student Grant and Distinguished Lecturer programs, nor provide financial assistance to conferences, both our own and others. It is therefore of considerable interest to the Association to know something about the impact of electronic publishing on our journals, both from the viewpoint of access to papers in libraries, as well as the effect on our royalty income.

To find out more about this, I recently attended a one-day Editor's Conference organized by Elsevier (publisher of *Computers & Geosciences*) in Philadelphia. It attracted about 80 editors-in-chief from a wide range of journals, everything from veterinary science to economics to psychotherapy, including the editors of five geological journals. Over the day, we listened to presentations both from Elsevier staff, and from various non-Elsevier speakers. During the last hour of the morning and afternoon sessions we were divided into several breakout groups to discuss topics such as "what do you do to increase the quality and reputation of the journal". Naturally, we heard a lot about Elsevier successes, but we did hear some other opinions about the general situation of journal publishing. In particular, we learned something about the most important issue in today's publishing world: the impact of electronic publishing on the pricing and access to journals. The main message was that electronic publishing has greatly increased access to research papers, and has made it much less expensive, at least on a per article basis, than previously. This optimistic view contrasts rather strongly with opinions that are widely held amongst many people in universities: that the uptake of electronic journals is slow, and that the electronic revolution has driven prices through the roof, mainly because of the 'bottom-line' approach of a few large commercial publishers.

A recent article by Professor Tjeerd van Andel in *GeoCam* (an Earth Sciences Alumni magazine from Cambridge University) perhaps typifies the pessimistic view. This is that commercial publishers are gouging the research community, increasing the price of their journals at a far greater rate than journals published independently by member societies, and this causes a price spiral with even greater increases as libraries cancel subscriptions. The end result is an unsustainable situation of reduced access to articles, and sky-high prices that are not good ultimately for anyone. This view is accompanied by a concern that print is disappearing, and that the eyestrain and inconvenience of reading on-screen is both damaging to health and inconvenient.

A much more optimistic view was expressed in a talk at the conference by David F. Krohl, Dean and University Librarian, Emeritus, at University of Cincinnati. Electronic access has rapidly and almost totally changed the journal world. By and large, students simply don't read printed works any more. The subscriptions by libraries to journals have increased extraordinarily rapidly, owing to the deals worked out between library consortia and publishers. Groups of libraries now subscribe to a far greater number of journals than was possible be-

fore, and at a total cost that is the same as for the smaller number of previously held print journals. Costs per article read have dropped dramatically. The access to articles, now easily monitored from 'download' statistics, has mushroomed exponentially. Interlibrary loans, and associated costs have also dropped. The benefits of the changes to electronic publication are so great that major investments are now being made by governments to catalyze the change. For example, Krohl cited a program in Canada (similar projects are under way in several other countries), the Canadian National Site Licensing Project (CNSLP), which has put together an initial deal bringing \$50M in new money to support Canadian academic collections, and is now working on a follow-up of another \$100M (see <http://www.cnslp.ca/pr/>) to continue this expansion (it always amazes me how often I have to be abroad to find out what is going on at home!) There is a general recognition that the transition from print to electronic media is expensive, particularly in up-front costs, but the long-term benefits are great.

There is a major 'disconnect' between these two views. Of one thing we can be certain: the electronic revolution is here to stay, and there are many benefits, such as ease of access, increased connectivity, greatly improved search capability and automatic monitoring, to name a few. There are also some outstanding problems, not the least of which is the security of archiving, and the health impact of reading on a monitor.

In some circles there is an undercurrent of resentment and hostility in the relationships between academics and commercial publishers. This is mainly because of the price-spiral argument, but it's also not clear why prices of journals (or bundles of journals) should continue to be subject to annual increases greater than increases in cost of living, even if the increases are now much lower than they were a decade ago. This is something that even with the new investment in electronic delivery is in the long-term unsustainable, however great are the benefits.

Not clear also is the effect of the change to electronic publication on professional associations like our own. As long as publishing contracts cover royalties on electronic distribution, the royalty income from publications seems to be secure. It should actually increase (and has a little in the case of C&G), because of the greater access. I know that the number of libraries with access to *Computers & Geosciences* has increased from a maximum of about 600 (1990) to about 1800 (2003), after a steady decline in subscriptions to the print edition in the mid- to late-90s. I believe that *Mathematical Geology* has undergone a similar transition. Battles in the commercial publishing market continue—I gather that Springer and Kluwer are now merged, so that MG and NRR (currently both published by Kluwer) will now be in this larger publishing camp. It is to be hoped that market forces will still operate to keep prices within bounds, despite large-scale conglomeration.

There are many aspects to this story not covered here. However, I am inclined to be in the optimistic camp. Publishers are not so stupid that they will kill the goose that lays the golden egg and keeps them in business. Anyone using a library that provides access to journals through Science Direct and other similar packages can attest to the benefits to their research. We can only hope that mutually beneficial deals will be worked out in the near future between publishers and library consortia in economically disadvantaged countries. This would be hugely beneficial to the research community at large, and perhaps would bring our Association's journals to many of those who have no possibility of access at present.

Graeme Bonham-Carter

IAMG Newsletter No. 66
Association Business

2003 Student Grant Awards

The IAMG Student Grants Committee (Tim. C. Coburn (chair), Clayton Deutsch (University of Alberta, Edmonton), Peter Atkinson (Southampton University, UK), Fred Delay (University of Poitiers, France) has completed its work for 2003 and is pleased to announce the results of the competition. Fourteen applications were received this year, including many good proposals. After considerable deliberation, the Committee has made awards to four students. This year's winners and the titles of their proposals are listed below:

Ranie Lynds, Department of Geology and Gophysics, University of Wyoming:

Quantifying depositional slope in sandy braided rivers: predicting skin frictional shear stress from sedimentary structures

Kurt Steffen, Department of Earth and Planetary Science, University of New Mexico:

Modeling the interaction of metamorphism and deformation using numerical techniques

Amanda Ellison, Department of Geology, University of Colorado:
Analysis and modeling of stratigraphic architecture in the Upper Cretaceous Williams Fork Formation, Piceance Basin, Colorado from outcrop studies and high-resolution Lidar imaging

Tristan Wellman, Department of Geology and Geological Engineering, Colorado School of Mines:

Relating known fracture architecture to fluid flow and pressure distribution, using high-resolution computed tomography, laboratory experiments, and deterministic numerical simulation

T. C. Coburn

Call for Nominations

The Association invites nominations for
The 2005 IAMG Distinguished Lecturer

Deadline : March 31, 2004

It is already time to seek nominations for the 2005 Distinguished Lecturer, who will be announced at the IAMG meeting in Florence, August 20-28, 2004. In 2000, the IAMG council voted to establish a Distinguished Lecture series. Dr. John Davis and Dr. Frits Agterberg are the IAMG Distinguished Lecturers for 2003 and 2004, respectively.

The purpose of the IAMG Distinguished Lecture series is to demonstrate to the broader geological community the power of mathematical geology to address routine geological interpretation and to deliver this knowledge to audiences in selected parts of the world. Therefore, the IAMG Distinguished Lecture Series Committee is seeking nominations for outstanding individuals who meet the following criteria:

- A demonstrated ability to communicate mathematical concepts to a general geological audience.
- A clear enthusiasm for mathematical geology.
- Recognition for work in their field.
- Established skill in working with individuals and in group discussions on geological problems.

The Distinguished Lecturer must be ready to travel and to perform the following duties:

- Prepare and present a lecture suitable for a general geological audience.
- Prepare and present one or two lectures on a more specialized topic.
- Interact and hold discussions with individuals, both professionals and students, on applications of mathematical geology to local problems of interest.

Letters of nomination should include a curriculum vitae of the nominee and a short statement summarizing the ways in which he or she fulfills the nomination criteria.

Letters should be directed to the Chair of the Distinguished Lecture Series Committee by e-mail
to : desbarat@NRCan.gc.ca

Alexandre Desbarat

Distinguished Lecture Committee Chair

Geological Survey of Canada

601 Booth St. Ottawa, ON, K1A 0E8, Canada

<>

Awards Committee

Council selected two new members for the Awards Committee, Qiuming Cheng (Canada) and Steve Henley (UK), who will serve until 2006, replacing John Cubitt and John Davis. This is in accordance with Bylaw 11, which specifies that terms of membership should overlap. They join previous committee members Andre Journel (USA), Hugh Rollinson (UK) and Heinz Burger (Germany, chair).

The committee is looking for new award candidates for the Krumbein Medal and the Griffiths Award for 2004. See call on p. 1

IAMG financially supports meetings

During the past year, Council voted to provide financial support for the following conference sessions and workshops:

1. 8th South African Geophysical Association (SAGA) meeting in Pilanesburg, South Africa, October 7-10, 2003. (\$2,000 to bring a visiting speaker for an IAMG-sponsored session—see http://www.sagaonline.co.za/2003conference/geo_technique_dev.htm).

2. Compositional Data Analysis Workshop, October 15-17, 2003. Girona, Spain (\$2,000).

3. Workshop entitled "Analogue and numerical forward modelling of sedimentary systems; from understanding to prediction", October 9-11, 2003, Utrecht, The Netherlands (\$2,000).

2003 Felix Chayes Prize Laudatio: Antonella Buccianti

I met Antonella for the first time 1994 in Mont Tremblant during that year's IAMG meeting. She talked about the geochemistry of fumarolic fluids in a passionate, gesticulating way, which reminded me of classical Italian films. I liked her way to use mathematics as a tool to better understand geochemical phenomena and she was interested in compositional data. It was the beginning of a fruitful academic cooperation and a lasting friendship.

Antonella was born in Firenze, Italy, on August 7th, 1960. She lived there, right in the middle of the town, until her marriage in 1989 with Renato Magli, a physicist associate professor at the University of Milan. They live in a wonderful place, surrounded by olive trees and vineyards, close to a small village in the Chianti area, the famous Toscana, near Firenze; they even own some land of their own and dedicate part of their free time to produce wine and oil, but only for themselves and a few privileged friends! I have the luck to belong to this select group, and I can assure you: the wine and the oil are just great!



Antonella likes animals, in particular cats, with which she has a particular affinity. They have two: Cirila, the queen in the house, and Picchio, the king of the garden. Antonella does not only work in the field as a geologist; she also grows vegetables and fruit. Her life is in permanent contact with nature, both at home and at work. Even though she likes classical music, she reserves a particular passion for the music of Keith Jarrett.

Antonella Buccianti studied in Florence from primary school until university. Her family's background is not academic, but rather working class. Nevertheless, her parents supported their talented daughter in her tenacious way first through school and later through university. Despite her early interest in mathematics, her choice for geology was influenced by her fascination for seismic and volcanic phenomena, born during secondary school. After the compulsory syllabus at university she finally could devote her time and effort to her dream: she developed a master's thesis in seismic stratigraphy under the auspices of the Italian petroleum company Agip, which gave her the chance to work for one year in Milan on the mathematical functions relating time to petrophysical properties in acoustic logs. This was her first conscious acquaintance with the use of mathematical and statistical tools for solving geological problems, a path she has never abandoned since then.

continued on p. 16

IAMG 2004 ELECTIONS

The term of the present (2000-2004) Board of IAMG is ending next year. Elections for the Officers and Council (2004-2008) will be held in the spring of 2004, and the elected officers and councilors will be installed at the General Assembly in fall of 2004. In August 2003 the IAMG Council appointed the following Nominating Commission: **Richard Howarth** (UK), **Heinz Burger** (Germany), **Ute Herzfeld** (USA), **Roy Kouda** (Japan), **Jaime Gomez-Hernandez** (Spain) and **Graeme Bonham-Carter**. (Canada) non-voting chairman. The following slate of candidates emerged from the deliberations of the Commission. The names are listed in alphabetical order by office:

PRESIDENT:

Agterberg, Frits (Canada)
Fabbri, Andrea (The Netherlands)
Gotway-Crawford, Carol (USA)

VICE PRESIDENT:

Fisher, Nick (Australia)
Shoji, Tetsuya (Japan)

TREASURER:

Caers, Jef (USA)
Ross, Gina (USA)

SECRETARY GENERAL:

Deutsch, Clayton (Canada)
Schafmeister, Maria-Theresia
(Germany)

ORDINARY COUNCILORS: (6)

Buccianti, Antonella (Italy)
Chen, Yongqing (China)
Cheng, Qiuming (Canada)
Dibiasi, Angela (Argentina)
Dimitrakopoulos, Roussos (Australia)
Doligez, Brigitte (France)
Jackson, Ian (UK)
Kotov, Sergey (Russia)
Pereira, Maria João (Portugal)
Schaben, Helmut (Germany)

IGC COUNCILOR: (conditional if Norway gets IGC 2008)

Gradstein, Felix (Norway)

All individuals in the list are members of the Association and have confirmed their willingness to run. In the selection, the Commission considered multiple factors to generate a list of meritorious candidates as balanced as possible. The Commission took care to include candidates from all of the countries with the largest national memberships and it was generous with respect to representation of women. Although 20 percent female candidates is below the average world proportion, its record number on the slate is several times greater than the more relevant proportion of female members in the IAMG, which is only five percent.

RESPONSIBILITIES OF OFFICERS AND COUNCILORS

The IAMG Council is the board of directors of the IAMG. The President, Vice President, Secretary General, and Treasurer and six **Ordinary Councilors** are all voting members of the Council. Any IAMG member, the President, or any of the Council members can bring a concern before the Council. Council members are expected to provide opinions, propose solutions, and participate in voting to select alternatives.

The President, Vice President, Secretary General, and Treasurer have the following additional executive duties: The IAMG **President** is the head of the organization and Chairman of the governing Council. S/he serves as ex officio member of some Committees and Commissions, as an ambassador to other professional organizations, as legal representative of the Association in dealing with publishers and other groups, and as a Solomonic judge to resolve conflicts when disputes become personal. A good president should foresee opportunities and difficulties, rather than react when situations have reached a crisis status.

The **Vice President** is supposed to step in as President in case of an unexpected departure of the President from office, but in practice, it is the Secretary General who is expected to replace the President in an orderly succession. The Vice President is the IAMG representative before the International Statistical Institute (ISI)—to which IAMG has been an affiliated society since its foundation. ISI meetings are held every odd year. The main responsibility of our Vice President is to organize a joint session at every ISI meetings.

The IAMG **Secretary General** is the operational officer of the Association. The main duties are to make arrangements and prepare minutes for every live meeting of Council and for every meeting of the General Assembly. Each year the Secretary General has to schedule the presentations of major IAMG awards. The Secretary General is also the IAMG representative before the International Union of Geological Sciences (IUGS) and prepares an annual report of the main Association activities. Moreover, the Secretary General is in charge to prepare and collect ballots for amendments to the Constitution and for elections to the Council.

The **Treasurer** is the Chief financial officer of the organization and deals with our money, disburses funds that we owe, looks after investments, prepares annual accounts, and supervises the activities of the IAMG office in Kingston, Ontario which is now responsible for membership dues, subscription payments and the membership database; so the Treasurer's job is much lighter than in the past.

Candidates for IAMG Council 2004-2008

Mini CVs and pictures submitted by the candidates

President

Frederik P. "Frits" Agterberg

Born in 1936 in the Netherlands, I studied geology and geophysics at Utrecht University obtaining my PhD in 1961. After a postdoctoral fellowship at the University of Wisconsin, I joined the Geological Survey of Canada, initially as petrological statistician. Later I helped form and headed the Geomathematics Section (1971/96) in Ottawa. In 1996, I commenced a phased retirement from the Geological Survey of Canada where I remain as emeritus research scientist. I have authored or co-authored over 200 scientific papers including the textbook "Geomathematics" (1974) and the monograph "Automated Stratigraphic Correlation" (1990). In 1978, I became the third W.C. Krumbein medalist of the IAMG. I continue to be associated with the University of Ottawa where I commenced teaching statistics in geology and directing the research of graduate students in 1968. I have lectured in more than 50 short courses worldwide. Recently, I was appointed second IAMG Distinguished Lecturer. An early DL lecture tour to China, New Zealand, Australia, South Africa and Brazil is planned from mid-February to May 2004. Organizational activities include: Committee founding the IAMG in 1968; IAMG Council Member (1968/72; 1976/80); Leader of IGCP Project 148 (1979/85); Chair, Committee for Quantitative Stratigraphy (1992/2000); and Chair, first IAMG Publications Committee (1997/2000); for *Mathematical Geology*: Associate Editor (1995/97), Guest Editor of three special issues, and incoming Book Editor; *Computers & Geosciences*: Editorial Board (1976/88), Associate Editor (1989-present), and Guest Editor or Co-Editor of two special issues; *NRR*: Editorial Advisory Boards (1992-present). I am currently Vice President.



I am running for the office of President to serve the organization that was prominent in shaping my professional career. I can help further the implementation of changes initiated within the IAMG during the past seven years and, through new initiatives, ensure that the IAMG continues to flourish and broaden its membership.

Andrea G. Fabbri obtained his M.Sc. in geology from the University of Bologna in Italy and his Ph.D. from the University of Ottawa in Canada. For fourteen years he held the position of research scientist at the Geological Survey of Canada (GSC) in Ottawa, and later in 1983 he became employed as senior researcher at the Bologna's Institute of Marine Geology of the Italian National Research Council. In 1985 he moved to the Canada Centre for Remote Sensing (CCRS) in Ottawa where he remained until 1989 when he was awarded the chair of geology at ITC, now International Institute for Geo-Information Science and Earth Observation, in Enschede, The Netherlands. There he directed the Division of Geological Survey until 2002. He is now international advisor of the Spatial Information Laboratory, or SPINlab, of the Vrije Universiteit in Amsterdam, The Netherlands. Also, in 2002 he was awarded the chair of environmental geology at the University of Milano-Bicocca in Milan, Italy. Before 1977 he worked on quantification of geological variables and the construction of computerized databases for statistical analysis to support the assessment and prediction of mineral potential. Later he moved to development of methods of digital image analysis and processing for the integration of spatially distributed data and for predictive spatial modeling



continued on p. 6

Candidates - Vice President: Nick Fisher continued from p. 5

using remotely sensed data and geographical information systems. Since 1990 he has contributed to the development of quantitative approaches for spatial data analysis and modeling in the geo-environmental sciences. Prof. Fabbri has authored or co-authored over 120 scientific papers and several volumes, including the book entitled "Image Processing of Geological Data" (1984, New York, van Nostrand-Reinhold). His present research interest is in the digital representation of environmental indicators and predictive modeling of environmental impacts. He has directed a NATO Advanced Study Institute on "Geo-environmental Deposit Modeling for Resource Exploitation and Environmental Security" that was held in Mátraháza, Hungary, in September 1999. He has been the coordinator and one of the principal investigators of the GETS Research Network of the European Commission's Programme on Training and Mobility of Researchers (T&MR) on "Geomorphology and Environmental Impact Assessment of Transportation Systems in Europe" (1999-2001). In July 2003 Prof. Fabbri has been appointed as President Spatial Models Inc., in Ottawa, Canada.

Carol A. Gotway Crawford

I am a mathematical statistician in the National Center for Environmental Health (NCEH), Centers for Disease Control and Prevention, USA, and an Adjunct Associate Professor in the Department of Biostatistics, Emory University, USA. I received a B.S. in Geology and a B.S. in Mathematics from Bradley University in 1984 and M.S. and Ph.D. degrees in Statistics from Iowa State University in 1989.

I enjoy interdisciplinary collaboration and I have been fortunate to work with outstanding scientists on projects involving nuclear waste disposal, geostatistics and geostatistical simulation, precision agriculture, environmental engineering, spatial statistics and GIS, and environmental health and medicine. I have recently completed a book titled Applied Spatial Statistics for Public Health Data (co-authored with L.A. Waller, to be published in 2004 by John Wiley & Sons) and have over 50 publications in a variety of journals.



My service to the IAMG includes Secretary General 2000-2004, Vice President 1996-2000, and USA representative to the IAMG's membership committee 1999-2000, as well as serving as a reviewer for both Mathematical Geology and Computers & Geosciences. Recent honors include: Fellow of the American Statistical Association, 2002; CDC/NCEH Director's Award, 2000, for outstanding achievement in scientific program support; ASA/ENVR Distinguished Achievement Medal, 1999; and Who's Who in Science and Engineering, 1998.

My main reason for standing for the office of President is my desire to actively promote the IAMG and all areas of mathematical geology throughout the world. Since becoming an officer in 1996, I have helped to foster several important initiatives within the IAMG: the Student Grants Program, The Distinguished Lecturer Series, the creation of a permanent IAMG office, and reconnection to the International Statistical Institute. I would like to help these initiatives continue to flourish. I would also like to increase the IAMG's interaction with other professional societies such as The International Environmental Society and the International Union of Geological Sciences. I believe such increased collaboration will benefit all of these organizations and make the IAMG an even stronger association. I appreciate the nomination to stand for the office of the IAMG President.

Vice President

Nick Fisher

My formal studies were in Statistics at Sydney (BSc, MSc) and UNC-Chapel Hill (PhD), after which I took a research position at the CSIRO Minerals Research Laboratories. I was immediately confronted with a range of problems involving orientation data, and spent the best part of the next 20 years working in this area, leading to the award of a DSc in 1995 for

my published research on directional statistics. With a couple of colleagues, I established a company-sponsored quarterly newsletter (BANG – Bulletin of Australian News in Geomathematics) that was distributed free to subscribers, to facilitate communication in the small geomathematics community in Australia; we also ran workshops and symposia connecting academic statisticians to users.

Apart from a number of visiting appointments at overseas universities, I visited the Geostatistics group at Fontainebleau in 1981. Subsequently, Richard Tweedie and I arranged for one of the CGMM's leading geostatisticians, Daniel Guibal, to establish a geostatistical consultancy in Sydney. Daniel Guibal is still here, a principal in a larger and thriving consultancy based in Perth.

More recently, I've worked with Jerry Friedman on modern statistical approaches to multivariate geochemical data, in collaboration with earth scientists at Oxford and Macquarie.

Two years ago, I left my final position as a Chief Research Scientist in CSIRO to set up a consultancy focusing on Performance Measurement. Honorary professorial positions at Sydney University and the School of Earth Sciences at Macquarie University allow me to continue work in the earth sciences.

Amongst a number of professional society positions, one I hold now (Vice-President of the International Statistical Institute) is likely to be helpful to me in promoting interaction between statisticians and earth scientists, which is one way I should like to contribute if elected as Vice-President of the IAMG.



Tetsuya Shoji was born in 1941 in Tokyo, Japan, and received his bachelor (1965), master (1967) and doctor (1975) degrees in engineering at The University of Tokyo. He has worked at The University of Tokyo as a



research associate (from 1969), an associate professor (1975) and a professor (1990). He was also invited as visiting professor of China University of Geoscience (Beijing and Wuhan) and Central South University of Technology (Changsha). He taught mainly mining geology and industrial mineralogy at Department of Geosystem Engineering, School of Engineering, and now teaches Geoinformatics at the Department of Environment Systems, School of Frontier Sciences. He was Chief Editor of "Mining Geology" (presently "Resource

Geology"), Chief Editor of Journal of Mining and Material Processing Institute of Japan, President of Japan Society of Geoinformatics, Vice President of Japan Society of Geothermal Research, Councilor of IAMG, Vice President of Mining and Material Processing Institute of Japan. His research started with revealing formation of skarn type ore deposits from the viewpoints of structural geology and hydrothermal geochemistry, and moved to optimization of mineral exploration including resource assessments. He has proposed some ideas and concepts for optimizing exploration and survey such as optimistic and pessimistic resources based on grade-tonnage models, prize-penalty function for quantifying exploration purposes, and information-cost function to best combine many techniques in a geoscience survey system. Mathematical geology is one of the most powerful tools to best collect and treat geoinformation which has always geometric coordinates as an essential character. His main reason for standing as a candidate for vice-president is his desire to contribute to the promotion of the IAMG activities from engineering fields and Asia.

Treasurer

Jef Caers received a MS (1993) and PhD (1997) in Mining Engineering from the Katholieke Universiteit Leuven, Belgium. Currently, he is assistant professor of Petroleum Engineering at Stanford University, California, USA. He is also Director of the Stanford Center for Reservoir Forecasting, a large industrial affiliates program in Reservoir Characterization and Modeling with over 20 members from the Energy Industry. Jef Caers' research interests are in the area of geostatistics, extreme value statistics and pattern recognition methods applied to all forms of Earth Science problems. He served on the "Membership Commission" of the IAMG in 2002 and was awarded the Vistelius Research Award by the IAMG in 2001. In 2003, Jef Caers was awarded the "Frederic E. Terman" Fellowship award for the most promising young Faculty at Stanford University.



Jorgina Ross

I began my university studies at the Universidad Nacional Autonoma de Mexico (UNAM) where I received a bachelors degree in business administration and a masters in business law. Following graduate school, I was manager of the export division of Asturiano Corporation, the largest textile company in Mexico. After coming to the United States, I studied computer science and French, with graduate studies radio and TV at the University of Kansas. In 1986 I joined the Advanced Projects/Mathematical Geology Section of the Kansas Geological Survey as a research assistant to Dr. John C. Davis. In 1989 I became manager of Automated Cartography, a position I still hold. In 1996, I was appointed to the Data Captured Working Group of the National Geologic Map Database Project, a project of USGS and the American Association



of State Geologist. I served as the General Chair of IAMG2001 in Cancun, Mexico.

Secretary General

Clayton V. Deutsch

Dr. Deutsch is a Professor in the School of Mining and Petroleum Engineering, Department of Civil & Environmental Engineering at the University of Alberta. Dr. Deutsch is the Canada Research Chair in Natural Resources Uncertainty Characterization and the Alberta Chamber of Resources Industry Chair in Mining Engineering. He received a Doctor of Philosophy in Geostatistics from Stanford University in 1992, a Master of Science in Geostatistics from Stanford University 1987, and a Bachelor of Science, Mining Engineering (With Distinction) from the University of Alberta in 1985.

He teaches and conducts research into better ways to model heterogeneity and uncertainty in petroleum reservoirs and mineral deposits. Prior to joining the University of Alberta, Dr. Deutsch was an Associate Professor (Research) in the Department of Petroleum Engineering at Stanford University and Director of the Stanford Center for Reservoir Forecasting (SCRF). His employment history also includes three years with Exxon Production Research Company as a Research Specialist in the Reservoir Division and three years of experience with Placer Dome Inc. conducting ore reserve valuations.

Dr. Deutsch has published two books, over 45 peer-reviewed technical papers, and over 40 papers in conference proceedings. He has served the IAMG as an



assistant editor for the past seven years. He has served the Society of Petroleum Engineers, Society of Mining Engineers, and the Association of Professional Engineers, Geologists, and Geophysicists of Alberta for many years.

Maria-Theresia Schafmeister holds a full professorship in Applied Geology at the Ernst Moritz Arndt University in Greifswald, Germany, where she is also the Geology Department Chairman. She has been IAMG member since 1993, Councilor since 2000, and IAMG Allies Manager in 1999 and 2000.

Academic record: From 1977 to 1984 Maria-Theresia studied Geology and Paleontology at Kiel and Berlin, Germany. In 1989 she completed her PhD in Geology (Hydrogeology/ Geostatistics) at the Freie Universität Berlin. In 1998 she obtained her habilitation, and her work was published under the title "Geostatistik für die hydrogeologische Praxis" (Geostatistics for the Practice of Hydrogeology). Between 1990 and 1997



she was Assistant Professor at the Institute for Geology, Geophysics, and Geoinformatics, Dept. of Mineral Resources and Environmental Geology. Her teaching responsibilities included: mathematical geology, geostatistics, groundwater modeling, hydrogeology for undergraduate and postgraduate students in Germany and abroad.

Professional interests: hydrogeology, environmental and engineering geology, Quaternary geology. Special research topics: groundwater modeling, parameter identification, uncertainty in model prediction, regionalization, soil/groundwater pollution, groundwater management in coastal areas.

Since 2001 Maria-Theresia organizes an interdisciplinary graduate program in Vietnam, with special concerns on Geosciences and Environment; within this framework she offers special courses on geostatistics.

Reason for running for Secretary General: I want to help bring the IAMG into a new era by encouraging the active participation of geologists, geostatisticians, geophysicists, and interdisciplinary earth modelers from industry and academia to create a more dynamic environment with practical benefits to all members. At the same time, as Secretary general, I want to be organized, meticulous, and cautious in keeping the records of our organization.

Ordinary Councilors (6 positions)

Antonella Buccianti was born in Florence, Italy, in 1960 and completed the Degree in Geological Sciences in 1988 at the University of Florence followed in 1994 by the Ph.D. in Geochemistry. In 1996 she won a two-year post-doctoral grant of the University of Florence, and during 1998 she received a one-year NATO-CNR grant to work at the Department of Applied Mathematics III of the Polytechnic University of Barcelona (Spain). Since November 2000 she is a researcher at the Department of Earth Sciences, University of Florence.

Since 1988 the scientific activity of Antonella Buccianti has been focussed on the application of univariate and multivariate statistical methodologies to analyze geochemical data (compositional data analysis of fluids and geochemical modelling).

In 1994 Buccianti became a member of IAMG and Italian representative in the Membership Committee. Since November 1998 she is a member of the Editorial Advisory Board of Computers & Geosciences and during this year she organised the fourth IAMG Conference held in Ischia (Italy). She was awarded the 2003 Felix Chayes Prize of IAMG.

In the past four years Buccianti has worked to serve IAMG as Special IGC Councilor and has contributed to organise the scientific presence of IAMG in the 32nd International Geological Congress. In the future she wishes to continue to promote the mathematical and statistical culture in the geological community, from a geological point of view.



continued on p. 8

Candidates - Councilors: continued from p. 7

Yongqing Chen was born in 1960 in Stoneforest town, the eastern China, and received his MSc(1987) in Exploration Geochemistry and PhD(1994) in Mathematical Geology at Changchun University of Earth Sciences. He spent three years at China University of Geosciences as a post-doctoral fellow working with Prof. Pengda Zhao to do research on the methodology of quantitative assessment of mineral resources based on the geo-anomaly principle. During the early 1980s he was engaged in geochemical exploration for gold deposits as an engineer in eastern China, and by the end of 1980s and 1990s, he taught exploration geochemistry at Changchun University of Earth Sciences and taught quantitative assessment of mineral resources at China University of Geosciences, respectively. At the beginning of this century he joined the China Geological Survey in Beijing, and is responsible for assessments of mineral resources in western China. He has authored or co-authored over 30 scientific papers and two academic works "Theory and Practice of Geo-anomaly in Mineral Exploration" (138 p., China University of Geosciences Press, 1999) and "An Introduction to Non-traditional Mineral Resources" (254 p., Geological Publishing House, 2003). He is now a leader of a research group for geological survey methodology of China Geological Survey. He has been associated with China University of Geosciences, teaching quantitative methods of mineral exploration and directing the research of graduate students.



His main reasons for running for the office of councilor are that he wants to serve the organization and make IAMG continue to flourish; that he wants to improve mathematical geology's ability to describe quantitatively great geological events, particular in reducing uncertainty of mineral exploration and hazard forecast.

Qiuming Cheng, Ph.D. Full Professor, Department of Earth and Atmospheric Science, Department of Geography, Faculty of Pure and Applied Science, Director of CFI Geomatics Research Lab, York University. Currently holds an honorable Changjiang Scholar Special Professorship in China University of Geosciences.



Research interests involve spatial analysis/fractal modeling earth systems and development of GIS technology for mineral exploration and environmental impact assessment. He has published more than 150 journal and conference proceeding papers plus more than 40 posters with abstracts at international conferences. He has been a convener for numerous international conferences. He is the recipient for a numbers of prestigious awards including the IAMG's President Prize, 1995; Canada Foundation for Innovation Researcher (CFI), 1998; Ontario

Primer Research Excellent Award (PREA), 2000; and Foreign Researcher by Japan Society for the Promotion of Science (JSPS), 2002; Changjiang Scholar by Chinese Ministry of Education, 2003. Currently his research group includes 11 graduate students, 2 PDFs, 1 research associate, 2 visiting fellows and 1 technician.

Dr. Cheng has been actively involved in participation of IAMG activities including as convener and co-convener for annual conferences, currently serves on the Awards Committee (term 2003-2006). He is on the editorial board of "Mathematical Geology", "Geochemistry: exploration, environment and analysis", and "Earth Sciences", and regular paper reviewer for "Computers&Geosciences" and numerous other journals. His proposal for holding the IAMG2005 Annual Conference as conference chair has been accepted by IAMG. It will be held in Toronto from August 14-19, 2005.

He received B.Sc. in mathematics, M.Sc. in mathematical geology from Changchun University of Earth Science, China, 1982 and 1985, Ph.D. from the Department of Geology of University of Ottawa, Canada, 1994.

Angela M. Diblasi

Currently I am a Mathematical Statistician at the Economic Faculty, Universidad Nacional de Cuyo, Mendoza, Argentina. My university degrees are: BS and MS in Mathematics at Universidad Nacional de San Luis, Argentina, Ph.D. in statistics at Glasgow University, U.K. My areas of professional interest are: geostatistics, spatial statistics, and applications of statistics in geology, environmental and economic sciences. I teach statistics at the Faculty of Economics, Universidad Nacional de Cuyo. At this University I work on research and consulting in spatial statistics and geostatistics. Between 1999 and 2003 I have been the Secretary General of the Argentinian Statistical Society and I am, at present, the Head of the Statistics and Mathematics Department of the Universidad Nacional de Cuyo in Mendoza, Argentina.



Since 1998 I have been a member of the Editorial Advisory Board of Computers & Geosciences. I am running for a councilor of the IAMG in order to increase and promote collaborative opportunities between statisticians, environmentalists, and geoscientists working in Latin American countries with other people around the world.

Roussos Dimitrakopoulos moved to Australia in 1996 to undertake his current position as Professor and Director of the WH Bryan Mining Geology Research Centre (BRC) at the University of Queensland. He holds a PhD in Geostatistics from École Polytechnique, Montreal, where he studied under Professor Michel David, and a MSc in Geostatistics from the University of Alberta, Edmonton. He has been working in stochastic simulation since 1983, both in developing new methods and applications. The early part of his professional work was in petroleum reservoir geostatistics; subsequently, he moved to mining geostatistics and risk-based optimization. Roussos has been a Senior Geostatistician with Newmont Mining Co., Denver; Senior Consultant with Geostat Systems Int., Montreal; and professor at McGill University, Montreal.



Main themes in his current work are the development of new, efficient simulation methods and risk-based mine production forecasting. He sees ore body simulation and stochastic mathematical methods as key elements in integrating geological uncertainty with engineering needs and financial assessments. In the last few years, his research in this area has been funded from competitive research grants in the order of \$2.5 million, including funding from BHP Billiton, RioTinto, Anglo Gold, MIM, and BeDeers. Research and graduate studies at the BRC have attracted a number of young and talented researchers, who have contributed to new research outcomes and a steadily growing research and teaching university group since 1996.

Roussos serves as Associate Editor of Mathematical Geology, and Computers & Geosciences, and the Editorial Boards of mining journals such as IJSM, MRE and JCSE. He has published extensively and was the editor of the book "Geostatistics for the Next Century", Kluwer (1994). He has been working and teaching internationally, including Australia, North America and South America, Europe, Middle East, South Africa and Japan. He is a member of IAMG, AusIMM, SME, CIM, and SPE.

Roussos serves as Associate Editor of Mathematical Geology, and Computers & Geosciences, and the Editorial Boards of mining journals such as IJSM, MRE and JCSE. He has published extensively and was the editor of the book "Geostatistics for the Next Century", Kluwer (1994). He has been working and teaching internationally, including Australia, North America and South America, Europe, Middle East, South Africa and Japan. He is a member of IAMG, AusIMM, SME, CIM, and SPE.

Brigitte Doligez graduated from the Nancy School of Mines in 1977.

She joined IFP (Institut Français du Pétrole) in 1984 as a research scientist. Until 1990 her main activities have been focussed on the developments of basin models, the dynamic reconstruction of the thermal history, and the maturation and fluid transfers in sedimentary basins.

Since 1990 she has worked with IFP's reservoir geology group and has been involved in the development of geostatistical models of reservoir architecture, validation of new algorithms and in application studies. In particular, she has been in charge of the research collaboration between IFP and Centre de Géostatistique of École des Mines. Since 1999 she leads a research project on the integration of constraints in reservoir models. Since January 2003 she is half-time working with ENSPM (IFP school), to teach geostatistics and manage field cases studies for the students.



She is author/co-author of more than 80 publications and international scientific presentations and co-organized two IFP Exploration and Production research conferences, one focussed on migration of hydrocarbons in sedimentary basins (1987), and the second one on subsurface reservoir characterization from outcrop observations (1992).

With her experience in both basin and reservoir modeling, and her actual position in both research and teaching areas, she wants to contribute to IAMG, and in particular promote the earth modeling science in the geological society.

Ian Jackson has been the Director of Information Services and Management at the British Geological Survey since April 2000. Ian has worked for BGS for over 30 years; initially on industrial minerals assessment programmes in the UK and



overseas and from 1983 as a field geologist, undertaking applied geological mapping in the north-east England coalfield. Use of relational database and CAD systems to handle the large borehole and mine plan datasets associated with these projects, was a precursor to his appointment as the manager of the BGS Digital Map Production Implementation project in 1990. This was followed by responsibility for BGS Information Systems. During this period he also undertook geoscience information systems consultancy in South America and Europe. Between 1997 and 1999 he was the Project Manager of a major EU funded project that created a pan-European geoscience metadata service - GEIXS. Other current responsibilities include: Secretary General of the IUGS Commission for the Management and Application of Geoscience Information; member of FOREGS Contact Group on European Standards for Digital Geological Cartography and Computer Modelling; member of the World Working Group on Digital Map Standards; member of Steering Group of the UK Intra-Governmental Group on Geographic Information; member of the UK Natural Environment Research Council Information Strategy Group.

Sergey Kotov was born in Saint Petersburg (Russia) in 1961.

Education: Diploma of geologist (Geol. Dept. of St-Petersburg State Univ., 1979-1984); diploma of engineer-mathematician (Special Faculty. of St-Petersburg State Univ., 1990-1993); PhD in petrology and volcanology (St-Petersburg, 1999).

Experience: Present: researcher in the Institute of Precambrian Geology and Geochronology (IPGG) of Russian Academy of Science, Saint Petersburg, Russia. May 2003: visiting fellow of the Baltic Sea Research Institute (Rostock-Warnemünde, Germany), was occupied with the problem of comparative analysis of dynamical features of climatic and sedimentological conditions during Holocene using Baltic Sea and Greenlandic ice data. Apr. 2002 – June 2002: visiting scientist in the section of Marine Geology of the Baltic Sea Research Institute (Rostock-Warnemünde, Germany), investigated problems of marine sedimentology using methods of mathematical geology and developed special software for the automatic correlation of sea sediments. Nov. 1999- Sep. 2000: visiting scientist in Mathematical Geology section of the Kansas Geological Survey (USA), investigated the problem of climate prediction in terms of the Theory of Dynamical Systems and distributions of xenoliths in Kansas kimberlites in terms of the Theory of Breakage. 1998-1999: worked at the laboratory of Metallogenesis (IPGG), defended PhD thesis entitled "The structure of contrast layering of "critical" zones in mafic-ultramafic massifs Kivakka and Bushveld: characteristics, origin", January 1999. 1989-1997: worked at the laboratory of Mathematical Geology under Prof. A.B. Vistelius supervision. Was involved with the simulation of endogenous processes of granite formation and metasomatism in terms of Markov processes; investigated layering of Bushveld-type intrusions: stochastic and geometrical features of contrast layering, mathematical models of their formation. 1984-1989: worked at the laboratory of Magmatism and Paleovolcanology (Karelian Branch of Academy of Sciences, Petrozavodsk, Russia), was occupied with Early Precambrian problems, geology of Precambrian mobile zones.

Professional interests: Geomathematics, petrology, development of software for geological modeling.

Maria João Pereira

Researcher at the environmental group of the Centre for Modelling Petroleum Reservoirs (CMRP) of the Instituto Superior Técnico (IST) in Lisbon. She was Professor of the Faculty of Engineering/Universidade Católica Portuguesa between 2001-2003, where she coordinated a Post-Graduate Course in Natural Resources Planning and Engineering. In 1999 she obtained her Ph.D. at IST with a thesis entitled *Air Quality Modelling and Simulation* (Geostatistics). She has published more than 25 papers in Scientific Journals, Books and International Conference Proceedings. She has been a member of Scientific Committees of several geoENV - European Conferences of Geostatistics for Environmental Applications and International Geostatistics Congress. The main research activity is Geostatistics for Environmental Applications. She has co-ordinated/participated in several national and international R & D Projects, such as: Sinesbioar-



Helmut Schaeben

By education, I am a mathematician trained in analysis and stochastics. I received my diploma in mathematics in 1976, my Ph.D. in science in 1981, and my "venia legendi" for "Mathematical models for the geological and material sciences" in 1993 from the department of Geosciences of RWTH Aachen University of Technology (Germany).

I have been working with geo- and material scientists for more than 20 years. At RWTH Aachen I received my initiation to Geomathematics by Heinrich Siemes working on crystallographic preferred orientation. After a short while working on groundwater flow models I pursued texture analysis with Rudy Wenk at UC Berkeley, CA, USA (1982-84). At Bonn University, Germany (1984-89), I have been involved in the DFG priority programme on "digital geoscience map compilation" with "computer aided geometric modeling of geologic surfaces and solids". At Metz University, France (1989-93), I have been working with material scientists on texture analysis again. Since 1996 I hold the chair of "Geoscience Mathematics and Informatics" at Freiberg University of Mining and Technology (Germany).

My favorite topic is the mathematics for the analysis of preferred crystallographic lattice orientation measured by x-ray, neutron, synchrotron or electron diffraction. My other favorite, as vivid as the one mentioned first, is the generalization of two-dimensional geographic information systems to spatio-temporal geoscience information systems including the development of data models and data structures for geoscience data.

I have been involved in cooperative projects with the universities of Metz, Nancy (France), and Hanoi (Vietnam), the International Centre for Diffraction Data, USA, and the Joint Institute of Nuclear Research, Dubna (Russia).

I am a member of „Deutsche Geologische Gesellschaft“ and head of its special interest group „Geoinformatik“; moreover, I am a member of „Gesellschaft für Geowissenschaften“ and „Society of Industrial and Applied Mathematics“ and its special interest group “Geosciences”.

As a councilor I would focus on winning new members for our association by way of advocating the applications of mathematics and informatics in the geosciences and emphasizing the development of corresponding curricula.

IGC Councilor: (conditional on Norway getting IGC 2008)

Felix M. Gradstein is retired from the Geological Survey of Canada and Saga Petroleum, Norway, and Professor II in Stratigraphy/Micropaleontology with the Geological Museum, University of Oslo, where he leads the offshore relational stratigraphic database, funded by a petroleum consortium. From 1985 - 1989, he was chairman of IGCP Project 181 on Quantitative Stratigraphy, and from 1989 - 1993 chairman of the ICS-IUGS committee on the same; he has published extensively on the theory and applications of probabilistic biostratigraphy (often with Frits P. Agterberg). He is chair of the International Commission on Stratigraphy and senior author of several Mesozoic and Phanerozoic Geologic Time Scales, incl. GTS2004 (Cambridge Univ. Press).



IAMG 2003 at Portsmouth



Registration and Icebreaker took place at the ancient "New Theatre Royal"



Chairman John Cubitt and Dan Merriam with a welcome drink



Most attendees stayed at Rees Hall



IAMG board meeting
l.to.r: Ed Sharp, Carol Gotway Crawford, Mike Hohn, Antonella Bucciatti, Graeme Bonham-Carter, John Cubitt, Geoff Bohling, Dan Merriam, Frits Agterberg, John Davis, JoAnne DeGraffenreid, Harald Poelchau



Opening Session



Lobby and Poster Area of the Portland Building





The Portland Building of the University of Portsmouth, location of the lectures



Steve Henley



President Bonham-Carter presents the Vistelius Award to van den Boogart and the Chayes Prize to Buccianti



Richard Howarth



Frits Agterberg



IAMG history session



Ian Jackson



Highly paid techs consulting on the projection system



The MG special issue of Vistelius Papers : Melinda Paul (Kluwer), Sergey Kotov (St.Peterburg), Steve Henley (translator), Ed Sharp (editor)



Photo Op



Lord Mayor's Reception at "The Castle"



Conference dinner aboard the historic ship HMS Warrior



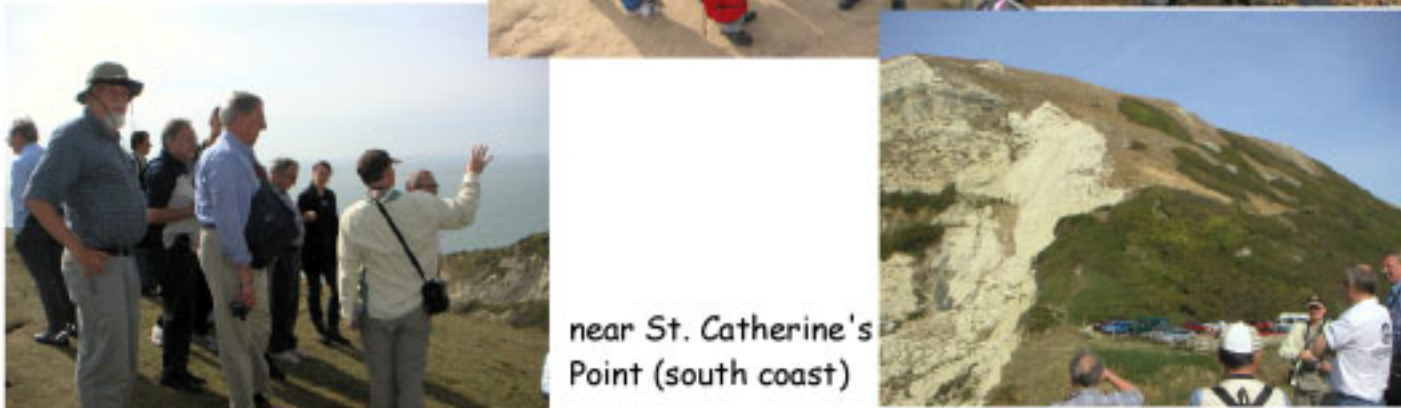
Recognition Award to the organizers: Howarth, Whalley, Trudy Bradbury, Henley and Cubitt

IAMG Conference Fieldtrip to the Isle of Wight

Alum Bay near The Needles (western tip)

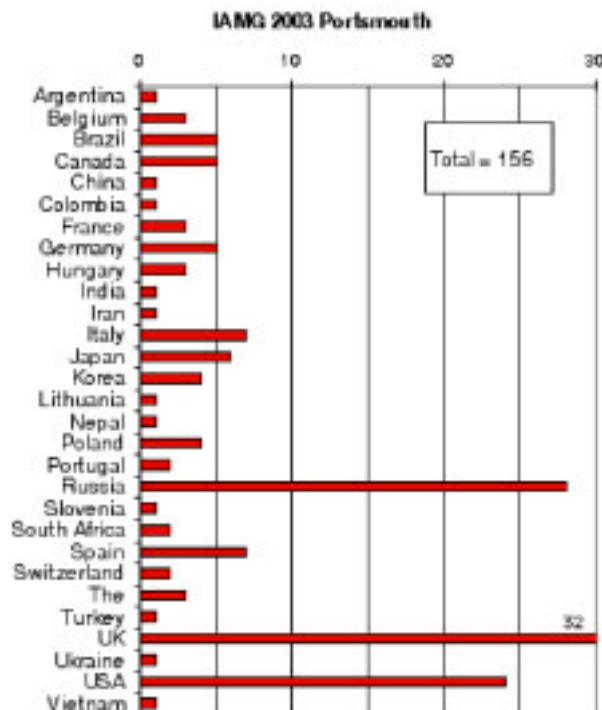


near St. Catherine's Point (south coast)

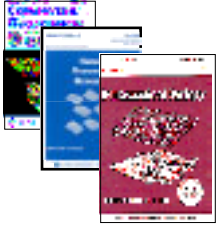


This years Annual IAMG Conference took place in the lovely resort town and port city of Portsmouth on the southern coast of England. The organizers, John Cubitt and John Whalley with the able assistance of Steve Henley, Richard Howarth, David Giles, and Malcolm Whitworth had arranged a good mix of sessions, symposia and social events. The venue was the very modern Portland Building of the University of Portsmouth with several conference rooms, access to computers and a lobby for posters and gatherings. Hundred and fifty-six scientists from 29 countries attended the meeting with large groups coming from UK, Russia and US (see figure). The conference started with several addresses and a keynote lecture by Ian Jackson on the aphorism by W. B. Yeats “*Think like a wise man but communicate in the language of the people*” that set the tone for the rest of the meeting. . Besides the plenary session with several good keynote speeches there were three parallel sessions in order to accommodate the many papers that had been submitted. The conference website <http://home.btconnect.com/SiliconDale/iamg2003/detailprog.htm> has further details.

Social events included an Icebreaker at the New Theatre Royal, a Civic Reception by the Right Worshipful the Lord Mayor of Portsmouth at the Southsea Castle, and the Conference Dinner aboard the iron-hulled battleship HMS Warrior. The conference finished with great field trip to the Isle of Wight with stops for geological outcrops, environmental concerns, and local color.



IAMG Journal Report



Computers & Geosciences Best Paper Award, 2002

Witten, A., 2002. Geophysica: MATLAB-based software for the simulation, display and processing of near-surface geophysical data. *Computers & Geosciences* 28(6), 751-762.

Alan Witten received BS, MS, and Ph.D. degrees in 1971, 1972, and 1975, respectively, all from the University of Rochester. From 1975 until 1994 he was employed as a research scientist at Oak Ridge National Laboratory, a US Department of Energy research institution in Tennessee. In 1994, Witten accepted the Schultz Chair in Geophysics in the School of Geology and Geophysics at the University of Oklahoma.

For the past 15 years Witten's research interests have focused on the development and applications of signal processing algorithms in near-surface geophysics. This work has involved magnetics, electromagnetic induction, ground penetrating radar, electrical resistivity, and seismic methods. At the University of Oklahoma, Witten teaches courses on environmental geophysics, geophysical imaging, computer graphics, field geophysics, and an introductory course in geophysics for non-science majors. In addition, he was the founding editor of the *Journal of Environmental and Engineering Geophysics*.

Witten has done extensive field work at archaeological sites. He has worked at Biblical sites in Israel and Jordan, was part of a team that located the remains of Captain Kidd's pirate ship, the Adventure Galley, and in the summer of 2003 applied geophysical methods to map the buried remains of the classical Greek city of Helike that sank during an earthquake in 373 BCE. He is author of the book *Geophysics and Archaeology* to be published this year.

His paper, "Geophysica: MATLAB-based software for the simulation, display and processing of near-surface geophysical data," was motivated by the need for a computer-based teaching tool in near-surface and environmental geophysics. Specifically, there was a need to expose students to how various subsurface features are manifested in geophysical data, the influence of spatial and temporal sampling, and basic methods of data processing.



JOURNAL CONTENTS

MATHEMATICAL GEOLOGY

Volume 35, Number 6 - August, 2003

Estimating Pearson's correlation coefficient with bootstrap confidence interval form serially dependent time series — M. Mudelsee

Characterization of distributional forms for compositional data and associated distributional tests — J. Aitchison, G. Mateu-Figueras and K.W. Ng

Gaussian co-simulation: Modeling of the cross-covariance — D.S. Oliver

Disjunctive kriging with hard and imprecise data — X. Emery

Parameterization of particle size distributions by three methods — T. Lwin

Fracture length estimation from borehole image logs — S. I. Ozkaya

BOOK REVIEW

A New Kind of Science by S. Wolfram — Reviewed by L.R. Gardner

MG Volume 35, Number 7 - October, 2003

Special Issue: BioGeoImages — Guest Editor: Eric P. Verrecchia

Forward: Image analysis and morphometry of geological objects — E.P. Verrecchia

Is it possible to characterize the geometry of a real porous medium by a direct measurement on a finite section? (1) The phase-retrieval problem — Y. Anguy, R. Ehrlich & C. Mercet

Mathematical and image analysis of stromatolite morphogenesis — M.T. Batchelor, R.V. Burne, B.I. Henry & S.D. Watt

Multiscale roughness analysis of particles: Application to the classification of detrital sediments — H. Drolon, B. Hoyez, F. Druaux & A. Faure

Morphometry of quartz aggregates in granites: Fractal images referring to nucleation and growth processes — Y.L. Gulbin & E.B. Evangelova

Morphological characteristics of till formations in relation with mechanical parameters — T. Lebourg, J. Riss, R. Fabre & B. Clement

Elliptical descriptors: Some simplified morphometric parameters for the quantification of complex outlines — M. Schmittbuhl, B. Allenbach, J.-L. Le Minor & A. Schaaf

Elliptical Fourier functions as a morphological descriptor of the genus *Stenosaria* (Brachiopoda, Terebratulida, New Caledonia) — A. Tort

Geometrical measurement analysis versus Fourier series analysis for shape characterization using the gastropod shell (*Trivia*) as an example — E. Dommergues, J.-L. Dommergues, F. Magniez, P. Neige & E.P. Verrecchia

ASSOCIATION ANNOUNCEMENT

2003 A.B. Vistelius Research Award — Helmut Schaeben

MG Volume 35, Number 8 - November, 2003

Stochastic structural modelling — L. Holden, P. Mostad, B.F. Nielsen, J. Gjerde, C. Townsend & S. Ottesen

Spatial connectivity: From variograms to multiple-point measures — S. Krishnan & A.G. Journel

Compositional geometry and mass conservation — R.F. Shurtz

A wavelet analysis-based new approach for interference elimination in geochemical hydrocarbon exploration — L. Zhang, G. Bai & Y. Xu

Geostatistical analysis of inverse problem variables: Application to seismic tomography — J.L. Fernandez Martinez, C.O. Menendez Perez, L.M. Pedruelo Gonzalez, J.P. Fernandez Alvarez & P. Cienfuegos Suarez

BOOK REVIEW

Geostatistics for Environmental Scientists by R. Webster & M. Oliver — Reviewed by D.E. Myers

Reviewers for 2002 Author Index

Subject Index



Member News

Clayton Deutsch receives Canada Research Chair in Uncertainty Management

Effective July 1, 2003, Dr. Clayton Deutsch, of the School of Mining and Petroleum Engineering at the University of Alberta, was awarded a Tier 1 Canada Research Chair in Natural Resources Uncertainty Management. Dr. Deutsch was also appointed the Alberta Chamber of Resources Industry Chair in Mining Engineering on October 31, 2003. A consortium of Canadian corporations provided \$1.4 million for the position. Additional funds from the Canada Research Chairs Program and the Canadian Foundation for Innovation, and other sources, make the total investment in the chair greater than \$5 million. This partnership between industry and government provides clear and enormous recognition of the importance of uncertainty assessment and characterization for natural resources management.



Honorary doctorate degree for ...

Jean-Laurent Mallet, Professor at the Ecole Nationale Supérieure de Géologie (ENSG), Nancy, France was awarded an honorary doctorate ("honoris causa") by the Department of Geosciences, Geoengineering and Mining at Freiberg University of Mining and Technology. On the occasion of the award ceremony on June 19, 2003, Jean-Laurent Mallet, heart and soul of the gOcad project, gave a talk on "Geomathematics in the Evolution of Geology".

The gOcad project featuring the common Earth model earned him the Italgaz prize for his work in computer science in 1997, especially for having developed gOcad, a 3D Modeler in Earth Science, and the SPE Anthony Lucas Gold Medal in 2000 for his work in 3D modeling applied to the oil industry.

Helmut Schaeben



Conference Reports

Compositional Data Analysis Workshop 2003

Last October the first Compositional Data Analysis Workshop (CoDaWork'03) took place in Girona (Spain). This Workshop, sponsored among other institutions by IAMG, was intended as a forum for discussion of hot points related to the statistical treatment and modeling, as well as applications and interpretation, of compositional data. The goal of such discussions is to get some insight into the most appealing future lines of research in the field.

There were six sessions: Geometry and statistics in the simplex, Zero replacement strategies, Design of teaching and computing tools, Applications to archeometry, Applications to geology and environment, and Other fields of application.

Without any doubt the format of the sessions, half an hour between presentation and discussion plus a final half an hour for general discussion, as well as the number of participants have allowed for more discussion time than in similar meetings. Thus, a fluid and intense scientific dialog arose.

The presidents of CoDaWork'03 were Dr. Vera Pawlowsky-Glahn and Dr. Carles Barceló-Vidal. The scientific committee was formed by Josep A. Martín-Fernández (Universitat de Girona, Chair), Michael J. Baxter (Nottingham Trent University), Antonella Buccianti (Università degli Studi di Firenze), Jaume Buxeda (Universitat de Barcelona), Juan José Egozcue (Universitat Politècnica de Catalunya) and Hilmar von Eynatten (Universität Göttingen).

The local organizing committee was composed by Santiago Thió-Henstrosa (Chair), Josep Daunis i Estadella, Gloria Mateu-Figueras and Raimon Tolosana-Delgado, all of the Universitat de Girona.

CoDaWork'03 was attended by 38 scientists from all over the world. By countries, the distribution was: Argentina (1); Germany (5); Hong-Kong (1); Italy (1); Poland (2); Slovenia (1); Spain (19); The Netherlands (1); United Kingdom (6); USA (1). Thus, the three part composition of assistants was Spanish 50%, Rest of Europe 42% and Rest of the world 8%.

Invited lectures were presented by Professor John Aitchison, who also was the Honorary Chair, and by Professor John C. Davis, the 2003 IAMG Distinguished Lecturer. Professor Davis held another well attended lecture in the Faculty of Science of the University of Girona.

On October 14 a free one day course on compositional data analysis (CoDaIntro) was offered. It was given by John Aitchison, Josep A. Martín-Fernández and Santiago Thió-Henstrosa. There were 23 assistants with a three part composition of Spanish 57%, Rest of Europe 39% and Rest of the world 4%. By countries they came from Argentina (1); Germany (3); Italy (1); Poland (2); Spain (13); The Netherlands (1); United Kingdom (2).

The web site of CoDaWork'03 includes both invited lectures and proceedings. If you are interested, have a look at:

<http://ima.udg.es/Activitats/CoDaWork03/index.html>

Finally, we are planning the next CoDaWork for 2005. Everyone interested in receiving information on this event, please send your name and address to santiago.thio@ima.udg.es.

Santiago Thió-Henstrosa
Girona, November 6, 2003

ISI Berlin

The 54th Session of the International Statistical Institute (ISI) took place in Berlin, Germany, August 13-20, 2003. As an ISI Sister Organization, the IAMG held an Invited Paper Meeting (IPM) on August 16th. The program of this well-attended event was as follows:

IPM 77 - Recent Statistical Advances in Geological and Environmental Applications

Frits Agterberg (Canada), IAMG Vice President – Introduction

Paul Switzer* (USA), Tapan Mukerji (USA) and Jo Eidsvik (Norway) – Hidden Markov Models for Stratigraphic Sequences with Application to Well-Log Data

Ricardo Olea* (USA) – from left to right: Walther Schwarzacher, Paul Switzer, Frits Agterberg, Ricardo Olea, Felix Gradstein and Nick Fisher.
New Lithostratigraphic Applications of the CORRELATOR System

Felix Gradstein* (Norway) – Quantitative Methods for Geological Time Scale 2004

Nicholas Fisher (Australia) – Remarks by Invited Discussant

Walther Schwarzacher (Northern Ireland) – Remarks by Invited Discussant
General Discussion

Written versions of the three invited papers and comments by the invited discussants are published in the Bulletin of the International Statistical Institute.



Georeasoning Workshop

Ten people participated in the workshop held within the framework of the annual conference of International Association of Mathematical Geology (IAMG) in Portsmouth, UK, 11 September 2003. Six of them gave talks (texts and presentations available in Georeasoning Archives at <http://www.jiscmail.ac.uk/files/GEO-REASONING/papers.html>):

1. *Leo Maslov* (Pacific Oceanological Institute, Russia) Basic Logical Principles for Analysis and Synthesis of Geological Models;
2. *Cyril Pshenichny* (St.Petersburg State University, Russia) A Draft for Complex Formal Approach in Geoscience;
3. *Andrew Curtis* and *Rachel Wood* (Schlumberger Cambridge Research^o-Edinburgh/Cambridge University, UK) Geological Prior Information;
4. *Clinton Smyth* (Georeference Online Ltd., Canada) Distinguishing Partonomies from Taxonomies in Science Languages: A Prerequisite for Computer-Aided Georeasoning;
5. *George Bardossy* and *Janos Fodor* (Hungarian Academy of Sciences, Hungary) Geological Reasoning and the Problem of Uncertainty;
6. *Stephen Henley* (Resources Computing International Ltd, UK) A Rock Is a True Fact – However Inconvenient This Might Be.

Victor Loudon (BGS, UK) contributed a paper to the workshop (Geological Reasoning: Making Sense of Making Sense; see text at <http://www.jiscmail.ac.uk/files/GEO-REASONING/Loudon.pdf>). In addition, a number of talks relating to the subject were given at the conference before the day of the workshop, that by Keith Jeffery (GRIDS and Ambient Computing for Geoscience; <http://www.jiscmail.ac.uk/files/GEO-REASONING/Jeffery.pdf>) to be mentioned first of all.

The talks were followed by general discussion that summarized the workshop and other conference presentations relevant to the subject, as well as the eight-months-long debates on the Internet. The discussion has led to the following understanding of the fundamentals of reasoning research generally accepted by all of the participants. (However, it should be noted that this text is written by only one of them, and some peculiarities of other people's standpoints may have shaded; in this case the author will be obliged for any comments and clarifications from the workshop participants.)

Reasoning in geosciences may deal either with *data* or with *knowledge* (Pshenichny, 2003 a). Data represent properties of individual objects (entities – Smyth (2003), instances – Bardossy and Fodor, (2003), etc.) and can be expressed as singular statements (i.e., those in which the predicate is related to a singular subject), e.g., “the sample 72039 contains 65 wt.% silica”. On the contrary, knowledge is expressed as a general statement (in which the predicate is related to a number of subjects) – e.g., “the rock (meaning “at least some of the studied samples”) contains (contain) 65 wt.% silica” (Pshenichny, 2003 a). A set of general statements (maybe consisting of one) makes up a *concept*. It can be broadly taken as an “expressed thought” (Pshenichny, electronic communication). When a concept is postulated to describe a particular entity, it becomes *model* (Bardossy and Fodor, 2003) – see below.

Correct reasoning must be based on a formal pattern. Different formalisms apply to data and to knowledge. Also, there must be formalisms capable of bringing knowledge and data together.

The approaches applying to data are mostly those considered by Bardossy and Fodor (2003) except, possibly, their favorite approach – fuzzy sets theory (see below): geostatistics, interval analysis, possibility theory. Inductive logic and database theory were added by Pshenichny (2003 a). The list does not pretend to be complete. The common feature of all these approaches, known and possibly yet unknown, is that they enable essentially *inductive* generalization (Pshenichny, 2003 a). Their premises and ideology are different, as different is their account of uncertainty (Bardossy and Fodor, 2003). The results all of them provide are characterized by probability in *statistical sense*. Objects described by the data may exhibit the relationship of *partonomy* (relationship of parts to the whole) that is often erroneously taken for *taxonomy* of concepts of these objects (Smyth, 2003; also see below). In terms of psychology, data can be paralleled with short-term memory, in contrast to episodic and semantic memory (Loudon, 2003 – see below). Also, we can understand data as an “external description” of an object, a more or less “blind” record of its features and behavior.

The formalisms for knowledge include, first, well-known essentially *deductive* approaches of mathematical, physical, chemical and other deterministic conceptual quantitative modeling and second, an array of tools for qualitative concepts: knowledge representation, management and engineering, classical logic and information technologies based on these (Loudon, 2003; Pshenichny, 2003 a; Smyth, 2003). Also, the approaches of semiotics (Baker, 1989 – see reference in Pshenichny, 2003 a) and cognitive psychology (Curtis and Wood, oral presentation) apply to concepts in geoscience. This wide range of approaches may correspond, as hypothesized by Loudon (2003), to our episodic memory (supposedly, responsible for interpretation of individual entities and instances) and semantic memory (likely the holding general knowledge). Such formalisms must be most applicable to majority of fields of geoscience, which represent largely qualitative descriptive knowledge but,

continued on p. 19

IUGS-CGI:

A Re-awakened Opportunity to Enable the Global Exchange of Knowledge of Geoscience Information and Systems

An understanding of geology is crucial in protecting human life, health and assets, and sustaining our environment and resources. Information technology and knowledge management are having a considerable impact on the way geoscience data and information are being captured, processed and disseminated. These developments can be regarded as *the* key tools for the future exploitation of geoscience information for the benefit of society and they are thus the reason that the former IUGS Commission dealing with information technology and systems, COGEOINFO (Commission on the Management and Application of Geoscience Information), was re-activated by the IUGS Executive in 2002. The newly formed IUGS Commission has been re-branded "CGI" and aims to represent IUGS on all geo-information matters. CGI's overall objectives are to:

1. Provide the means for exchanging knowledge on geoscience information and systems,
2. Support dissemination of best practice in geoscience information applications,
3. Encourage the development of geoscience standards,
4. Be the eyes and ears of the IUGS on geoscience information matters,
5. Help to bring together individuals and organisations with an interest in the management and application of geoscience information.

Specific future plans are:

- encourage and support the development of geoscience standards
- develop a new multilingual thesaurus for geosciences (MTG), to be available at no charge,
- offer a "home" and network to those geoscientists with an interest in geo-information,
- Make the CGI web site a reference point for geoscience standards and information exchange,
- organise Outreach Workshops to exchange knowledge and to transfer skills and technology,
- extend CGI membership worldwide.

Only recently, on 27. and 28. October in Burgdorf, close to Hannover, the first CGI working group: the Multi-lingual Thesaurus Working group, met for their kick-off meeting. The group is going to develop a new, free-of-charge multi-lingual thesaurus for the geosciences (MTG).

At the International Geological Congress (IGC) in Florence, 2004, the first full CGI meeting will take place. At the congress, CGI, in joint cooperation with IAMG and ICOGS, is closely involved in organising three symposia on the Management and Application of Geoscience Information (T22.01, T22.02, T22.03).

More details about CGI, its objectives, membership and work plan can be obtained from the website http://www.bgs.ac.uk/cgi_web. To contact CGI and/or become a member of the Commission, please mail cgiwebmaster@bgs.ac.uk.

*Kristine Asch, CGI Chair
BGR, Stilleweg 2, 30655 Hannover, Germany
e-mail k.asch@bgr.de*

At the next International Geological Congress in Florence, Italy, August 2004, one of the many session will focus on Geoscience Information. The session is sponsored by IAMG and other organisations. The title of a group of three symposia will be Management and Application of Geoscience Information (T22). This is a call for papers for the third of the symposia (T22.3) entitled: "Dictionaries, Standards, and Technologies for Geoscience Data Management and Delivery" If you would like to present a paper at this session please submit an abstract at <http://www.32igc.org> and provide a copy of the abstract to Kristine Asch (K.Asch@bgr.de) or Jeremy Giles (jrag@bgs.ac.uk) by 30th November 2003.



Antonella - continued from p. 4

She took the degree in geology with summa cum laude in 1988, and was offered the chance to continue doing research at the *Dipartimento di Scienze della Terra della Università degli Studi di Firenze* working in applications of mathematics and statistics to geology. But she had to get herself the necessary financial support for doing it, and she managed to get one grant after the other from the National Research Council of Italy as well as from the University. She received her PhD degree in Geochemistry in 1994 after three years studying the volatile content, F and Cl, in basaltic rocks collected in different geodynamical contexts. Her investigation of active volcanoes, and in particular of the composition of fluids and their behaviour in time, started during this period thanks to her direct experience in Italy (Aeolian islands and Phlegrean fields), Mexico (Nevado de Colima, Ceboruco, El Chicon), and Canary islands (Teide), and continue up to now. Some of her research activities were developed under the auspices of a European project.

It was her curiosity for mathematical and statistical methods that could be applied to geochemical problems that brought her first to the Geological Survey of Ottawa, Canada, to work with Dr. Chang-Jo Chung in 1994, and later to Barcelona during the academic year 1998/99 to work with me at the Department of Applied Mathematics III of the Technical University of Catalonia. She has pursued other cooperative work in this field, especially with Dr. Hugh Rollinson, from Cheltenham University in the UK.

On November 1st, 2001, Antonella received the deserved recognition for her hard work: she became *ricercatrice*, a permanent research position at the same section for geochemistry and volcanology of the *Dipartimento di Scienze della Terra della Università degli Studi di Firenze*.

Antonella is a member of the International Association for Mathematical Geology (IAMG) since 1994 and she is an active one. She belonged to the IAMG Membership Committee (1998-2000) and also to the Editorial Advisory Board of *Computers & Geosciences*. She is well known in the Mathematical Geology community for the excellent organization of IAMG'98 in Ischia, a memorable meeting. In 2000 she was elected to the IAMG Council and was named delegate for the International Geological Congress, which will take place in August 2004 in her hometown Firenze.

Dottoressa Buccianti has published numerous articles, both in national and international scientific journals, as well as presenting communications to national and international meetings. Nowadays she is well known in Italy for her knowledge and interpretative capability in the field of mathematical and statistical methods in the geosciences. For this reason she has been invited to give seminars, short courses and conferences in many universities. She has even put on paper her knowledge and co-authored with mathematicians of her university a 3-volume textbook on mathematical and statistical methods in the Earth Sciences. But this is not her only activity related to teaching. She is also responsible for several undergraduate and graduate courses at the *Università degli Studi di Firenze*. In particular, she teaches descriptive and statistical inference techniques for a better understanding of geological data, with special emphasis in compositional data, directional data, and time series.

Since 1988 the scientific activity of Antonella Buccianti has been focused on the study of the statistical analysis and interpretation of compositional data in geochemistry (composition of water, gas and rocks) and in Environmental Sciences, as well as on the application and interpretation of univariate and multivariate statistical methods to sequential geochemical data and for geochemical cartography. Her objective has been and still is to obtain tools for the description of the complexity of natural systems and to characterize their variability. In my opinion, the success of her research is nevertheless not as important as the promise of future results. Her main research project deals with the chemical composition of water in different natural environments, related or not to volcanic activity, by comparing classical statistical methods used to visualise and interpret relationships among variables and new statistical methods based on the theory of compositional data analysis, to improve the capture of parameters to monitor the dynamics of such natural processes. The revisiting of many approximations to reality under a new mathematical perspective is under way, and new advances in knowledge and understanding of natural systems appear on the horizon. I wish Antonella whole-heartedly success in this enterprise and congratulate IAMG for giving her the chance to show that she is capable of doing so.

*Vera Pawlowsky-Glahn
Department of Informatics and Applied Mathematics
University of Girona
Girona, Spain*



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Upcoming Meetings

American Geophysical Union (Fall Meeting), San Francisco, California, USA, **08-12 December 2003**. AGU Meetings Department, 2000 Florida Avenue, NW, Washington, DC 20009 USA; Phone: +1 202 462 6900; Fax: +1 202 328 0566; E-mail: meetinginfo@agu.org; Website: <http://www.agu.org/meetings>

Annual Conference. California WEED SCIENCE Society. Sacramento, CA, USA, **11-15 Jan 2004**. Lars Anderson, President. <http://www.cwss.org/conf.htm>

"GEOPHYSICS AND GLOBAL CHANGE" - Symposium on the Application of Geophysics to Environmental and Engineering Problems (SAGEEP 2004), Colorado Springs, CO, USA, Environmental and Engineering Geophysics Society, **22-26 Feb 2004**. Kathie Barstnar, 1720 S. Bellaire Street, ste 110 Denver, CO 80222, Phone: 303 531 7517, FAX: 303 820 3844, EMail: kbarstnar@eegs.org, Web: <http://www.sageep.info>

Hedberg Conference on Carbonate Reservoir Characterization and Simulation: From FACIES TO FLOW UNITS, El Paso, Texas USA, **15 - 18 March 2004**. <http://www.aapg.org/education/hedberg/el Paso/index.cfm>

17th Annual GEOGRAPHIC INFORMATION SCIENCES Conference (TUGIS 2004). Center for Geographic Information Sciences at Towson University and Towson University's Department of Geography and Environmental Planning. Baltimore, MD, USA, **22-23 March 2004**.

MODELLING PERMEABLE ROCKS IV, Southampton University, Southampton, UK, by the Institute of Mathematics and Its Applications, **29 Mar -1 Apr 2004**. Lucy Nye, Catherine Richards House, 16 Nelson Street, Southend-on-Sea, Essex, Phone: +44 (0) 1702 354020, FAX: +44 (0) 1702 354111, EMail: lucy.nye@ima.org.uk, Web: <http://www.ima.org.uk/mathematics/confmodelling.htm>

American Association of Petroleum Geologists and Society for Sedimentary Geology (SEPM) (Joint Annual Meeting and Exhibition), Dallas, Texas, USA, **18-21 April 2004**. AAPG Conventions Dept., P.O. Box 979, Tulsa, OK 74119, USA; Phone: +1-918 560 2679; Fax: 1-918 560 2684; E-mail: convene@aapg.org Website: www.aapg.org

66th EAGE Conference & Exhibition, Paris, France, **07-10 June 2004**. EMail: eage@eage.nl, Web: <http://www.eage.nl>. Europe's largest Geoscience event!

GeoMod 2004 - From Mountains to Sedimentary Basins: Modelling and Testing Geological Process, Emmetten - Lake Lucerne, Switzerland, **09-11 June 2004**. University of Bern, Universiteit Amsterdam, Dalhousie University Halifax, ENI&P Division, Milan, EAGE-SEG Italian Section. Angela Marchetto, Istituto Naz. di Oceanografia e di Geofisica Sperimentale - GOS/ Borgo grotta Gigante, 42c - 34010 SGONICO TS, EMail: amarchetto@ogs.trieste.it, Web: <http://www.ogs.trieste.it/GeoMod>

11th International Symposium on WATER-ROCK INTERACTION, Saratoga Springs, New York, USA, **27 June - 2 July 2004**. Dr. Susan Brantley, Secretary General, Dept. of Geosciences, The Pennsylvania State University, 239 Deike Building, University Park PA USA 16802, Phone: 814-863-1739, FAX: 814-863-8724, Web: <http://www.outreach.psu.edu/C&I/WRI/>

SIAM Annual Meeting 2004 (AN04), Portland, Oregon, **12-16 July 2004**. <http://www.siam.org/meetings/an04/>

10th Int'l Congress on MATHEMATICAL EDUCATION, Tech. University of Denmark, Copenhagen, **4-11 July 2004**. Congress Consultants, Martensens Alle 8, DK-1828 Frederiksberg C, Denmark, Tel: +45 70 20 03 05, Fax: +45 70 20 03 15, E-mail: icme@congress-consult.com, www.ICME-10.dk

American Statistical Association Joint Statistical Meetings, Toronto, **8-12 August 2004**. Sponsored by ASA, ENAR, WNAR, IMS and SSC. Linda Minor, 1429 Duke St., Alexandria, Virginia 22314-3415. Tel.: +703-684-1221, E-mail: meetings@amstat.org, Web: www.amstat.org/meetings

IGC - Int'l Geological Congress, Florence, Italy, **15-28 Aug. 2004**. Scient. Sec. Chiara Manetti, Dip'to di Scienze della Terra, Univ. di Firenze, Italy, ph.+39 055 2382146, E-mail: casaitalia@geo.unifi.it, <http://www.32igc.org>; 703-648-6112, EMail: jbriskey@usgs.gov, Web: <http://www.32igc.org/home.htm>

SEG 2004: Predictive Mineral Discovery Under Cover, University of Western Australia, Perth, WA, Australia, **27 Sep-01 Oct 2004**. Society of Economic Geologists (SEG), Geoconferences WA, and Society for Geology Applied to Mineral Deposits (SGA). Susan Ho, P.O. Box 80, Bullcreek WA 6149, Australia, Phone: (61 8) 9332 7350, FAX: (61 8) 9310 6694, EMail: susanho@geol.uwa.edu.au, Web: <http://www.cgm.uwa.edu.au/geoconferences/index.asp>

GSA Annual Meeting: Geoscience in a Changing World, Colorado Convention Center, Denver, CO, USA, **07-10 Nov 2004**. Geological Society of America. GSA Meetings, Phone: (303) 357-1000, FAX: 303-357-1072, EMail: meetings@geosociety.org, Web: <http://www.geosociety.org/meetings/2004/>

INTERNATIONAL STATISTICAL INSTITUTE, 55th Biennial Session (includes meetings of the Bernoulli Society, the International Association for Statistical Computing, the International Association of Survey Statisticians, the International Association for Official Statistics and the International Association for Statistical Education), Sydney, Australia, **5-12 April 2005**. ISI Permanent Office, Prinses Beatrixlaan 428, P.O. Box 950, 2270 AZ Voorburg, The Netherlands, Phone: +31-70-3375737, Fax: +31-70-3860025, E-mail: isi@cbs.nl

IAMG 2005 Toronto, Canada, **Sept. 2005**. www.iamg.org



The international conference **The Application of Mathematical Methods and Computers in Science and Technology** within the framework of the 8th international symposium **The Application of Mathematical Methods and Computers in Mining, Geology and Metallurgy** will be finally held in **Cracow (Poland), June 16 - 19, 2004**. Previous conferences of this series took place in Prague (1997) and Sofia (1998). Contacts: The Organizing Committee, AGH - The University of Science and Technology, The faculty of Mining and Geoengineering, 30-059 Cracow, Al. Mickiewicza 30, Poland. - E-mail (to the Secretary Mr. J. Chmura): chmura@agh.edu.pl



The **32nd International Geological Congress (IGC)** will be held in Florence (Italy), August 20-28, 2004.

The congress is being organised in co-operation with, and under the sponsorship of the International Union of Geological Sciences (IUGS), and various members countries of the Mediterranean Consortium. The main object of the congress is related to a global geological renaissance and the main title is: "From the Mediterranean Area Toward a Global Geological Renaissance (Geology, Natural Hazard, and Cultural Heritage)".

The Scientific program of the 32nd IGC consists of Plenary Lectures, Special Symposia, Topical Symposia, General Symposia, Workshops, Short Courses and Field trips. The structure and the list of sessions are present available on the internet: <http://www.32igc.org>

IAMG sponsors several sessions and here is a summary of them.

IAMG sponsors a topical symposium, T22, together with other associations (CGI, ICOGS), focus on specific themes that include both invited and volunteered presentations: "Management and Application of Geoscience Information", with three sections (T22-01 National/international geological map databases, T22-02 Examples of innovative geoscience information delivery, T22-03 Dictionaries, standards and technologies for geoscience).

IAMG sponsors a general symposium focused on Mathematical Geology (G13), with six sessions: G13-01, Compositional data analysis: from theory to practice, G13-02, A renaissance for the geoscience model, G13-03, New application of mathematical statistics in Earth Sciences, G13-04, Geographic information system for exploratory spatial data analysis, G13-05, Understanding geology through geomathematical analysis of remote sensing data, G13-06, Mathematical Geology for resource exploration.

There are also other sessions sponsored by IAMG, in different general symposia:

G03 Environmental Geology (G03-03 - Coastline changes: interrelation of climate and geological processes

G03-08 - Statistical and mathematical methods in land resource survey;

continued on next page

ironically, exactly these are dramatically lacking or underdeveloped in geoscience. They enable to proceed from a loose unorganized mass of subjectively formulated statements through reasoning by analogy to strict deductive reasoning (Pshenichny, 2003 a). This can be done differently.

Maslov (2003) considers a field of knowledge representing a phenomenon in question as the set of possible combinations ("working models") of a finite number of "elementary processes" (or basic models, or, as accepted in this text, basic concepts). The requirements to the list of elementary processes are the same as to the axioms of formal theory in classical logic – independence, completeness and self-consistence. Maslov introduces the rules of construction of working models from elementary ones and numerical assessment of relative proximity of different working models.

Smyth (2003) takes the entire field of knowledge as a general concept with a minimum of properties (e.g., "ore deposit") and follows traditional Aristotle logic developing a classification (taxonomy) of concepts by adding one property at each step (e.g., "sulfide ore deposit", "massive sulfide ore deposit", "massive sulfide ore deposit hosted by metamorphic rocks", etc.), down to concepts describing individual objects taken for patterns in reasoning. Such approach easily resolves the problem of *ontology*, i.e. ensures that every involved combination (statement) of an object (subject of statement) and property (predicate of statement) makes sense. New instance, if does not fit the classification exactly but is well described, can be taken for pattern, i.e. becomes concept itself and joins the taxonomy. Like in the Maslov's approach, the distance between such instance and any of the existing concepts can be calculated.

Pshenichny (2003 b) recognizes in a field of knowledge primary statements responsible for some elementary (primary) processes, statements describing principal incoming circumstances, secondary statements describing the processes generated by interaction of primary processes under incoming circumstances, and tertiary statements describing the resulting products. Terms are formulated to be minimum in number, as brief as possible (one word – one object/property), and denote simultaneously, whenever possible, a process, an object and a property (i.e. be a verb, a noun and an adjective as permitted by English grammar). The ontology is defined by the accepted interrelation of terms: every term relating to primary process or incoming circumstance implies a limited number of terms relating to all secondary processes directly or indirectly resulting from these and the same for products resulting from a given process (primary or secondary). The author believes that these interrelations can be best recorded in terms of predicate logic and inferred from one another by logical calculi.

Obviously, quoted are far from all possible approaches to formalization of a field of knowledge in geoscience. Each approach has its advantages and shortcomings; their interrelation needs to be explored.

Though the ultimate goal of any knowledge-oriented approach is deductive inference, it also appears to have probabilistic sense like inductive generalization based on data. However, in the considered case the probability is not statistical but subjective, or, to put it more correct, *conceptual* (Pshenichny, 2003 a). Formalisms for knowledge give a description of an object that can be denoted *internal*, pretending to exhibit the object's mechanism (contrary to external description given by data).

Bringing data and knowledge together we obtain, in case of no contradiction, a model *sensu stricto* characterized by complex probability (Pshenichny, 2003 a). There seem to be formalisms that fit this task best of all (fuzzy sets theory, Bayesian approach, possibly, some others).

An important point is that data and knowledge principally can be discerned in every particular case but not in general. Every statement about an object is, in fact, a deductive inference from (i) an inductive general-

ization of singular statements describing hierarchically lower objects and (ii) some other premises stemming from the context determined by pre-existing knowledge and can be taken for singular or general depending on the context (Pshenichny, 2003 a).

However, taking something for data and something for knowledge, we observe specific relations between them in every particular case (Pshenichny, 2003 a). Accumulation of data leads to inductive generalizations, which, if contradict to existing knowledge, contribute to it. Otherwise, any data, as shown by Henley (2003), are incomplete in geoscience. Hence, they should be supported and/or complemented by knowledge. Moreover, deciding what data to extract from a rock (Henley, 2003), the scientist formulates his/her questions about this rock. For this, a *language* is needed. This language is provided by knowledge, and the formalisms to process knowledge discussed above (Loudon, 2003; Maslov, 2003; Pshenichny, 2003 a; Smyth, 2003) lead, *inter alia*, to better formulation of language for further "external descriptions" of objects. Appropriate language uniting data and knowledge, together with the special formalisms discussed above, must be prerequisites for efficient modeling. *Development of both and investigation of relations between them may be considered the main objectives of reasoning research in geoscience.*

This will benefit a wide variety of tasks relevant for geoscience itself (structurization of knowledge, strict proof of statements, assessment of models, governing scientific debate, reconciliation of opinions, optimization of education, new formats of knowledge representation) that can be summarized under the umbrella term of geological prior information (Curtis and Wood, oral presentation) and for applications of geoscience (communication with non-professionals emphasized by Jackson (2003), strict fundamentals for emergency planning, relation of geoscientific results to civil planning, financial, insurance items) defined as *geoplanning and geoprognosis* (Pshenichny, 2003 a). Also, this activity brings geoscience close to the cutting-edge developments in computer technique like OWL (Smyth, 2003), ambient computing (Jeffery, 2003) and others.

References cited (All – in: "Modelling Geohazards" IAMG Proceedings, Cubitt, J., Henley, S., and Whalley, J., Eds., Portsmouth University, UK).

Bardossy, G., and Fodor, J., 2003, Geological Reasoning and the Problem of Uncertainty

Henley, S., 2003, A Rock Is a True Fact – However Inconvenient This Might Be

Jackson, I., 2003, Think Like a Wise Man but Communicate in the Language of the People

Jeffery, K., 2003, GRIDS and Ambient Computing for Geoscience

Loudon, V., 2003, Geological Reasoning: Making Sense of Making Sense

Maslov, L., 2003, Basic Logical Principles for Analysis and Synthesis of Geological Models

Pshenichny, C., 2003 a, A Draft for Complex Formal Approach in Geoscience

Pshenichny, C., 2003 b, Organization of Knowledge for Strict and Non-Intuitive Prediction of Volcanic Hazard

Smyth, C., 2003, Distinguishing Partonomies from Taxonomies in Science Languages: A Prerequisite for Computer-Aided Georeasoning

Cyril Pshenichny

IGC - continued from previous page

application to environmental geochemistry

G17 Paleontology (G17-01) - Computer techniques in the modeling and analysis of biological form, growth and evolution

G21 Sedimentology (G21-12) - Sedimentology of volcanoclastic sediments
Finally, IAMG sponsors two pre-congress short courses:

1) BSC02 - Prediction models for spatial data analysis: application to landslide hazard mapping and mineral exploration (A. G. Fabbri and Chang-Jo F. Chung)

2) BSC04 - The statistical analysis of compositional data (J. Aitchison, J. A. Martin-Fernandez, H. con Eynatten, S. Thio-Henestrosa)

and one short course during congress:

3) DSC04 - GEODAS, specialised GIS technologies for spatial analysis and interpretation of exploratory geo-datasets for mineral exploration (Qiuming Cheng and G. Bonham-Carter)

To register for the Congress it is strongly recommended that you fill in the electronic form available since May 1st, 2003 at <http://www.32igc.org> > <http://www.32igc.org>. On the web page it is possible to find the conditions for membership, general information about accommodations as well as the name of the chairman of each session to whom the abstracts have to be sent. For the first time the IGC is using a new abstract management system with which the submission, review process and final construction of the technical program is handled online. Authors may submit abstracts for oral or poster presentations to the 32nd IGC from May 1, 2003 to January 10, 2004 indicating two sessions in priority order.

Announcements

International Clearinghouse for Geologic Map Databases and Standards

A new Web site has just been developed to help researchers and agencies find, at a single place, basic information about the geologic map database development plans of the world's geological survey agencies. The site, hosted at <http://ncgmp.usgs.gov/intdb/>, also provides information about the scientific and technical standards these agencies are using or developing. Before the Clearinghouse site was developed, discussions were held at technical sessions and with representatives of the IAMG and of the IUGS's Commission for the Management and Application of Geoscience Information. Both organizations have endorsed the Clearinghouse. This site was built because all agencies are grappling with the same set of issues and problems (e.g., limited funding and personnel, rapidly evolving technology, high customer expectations for online map databases), and each can benefit by the exchange of information. You are invited to visit the Clearinghouse and to help make it useful by contributing information!

DISTRIBUTION MODELS ON THE SIMPLEX

On October 10, 2003, Gloria Mateu-Figueras, from the University of Girona, received her PhD degree with a thesis on **DISTRIBUTION MODELS ON THE SIMPLEX**. The thesis was judged by a committee chaired by Prof. J.J. Egozcue (Universitat Politècnica de Catalunya, Spain), Prof. J.A. Martín-Fernández (Universitat de Girona, Spain), Prof. J. Aitchison (University of Glasgow, UK), Prof. A. Pewsey (Universidad de Cáceres, Spain), and Prof. P. Puig (Universitat Autònoma de Barcelona, Spain). The thesis received unanimously the qualification of cum laude, the maximum possible within the Spanish system.

The thesis deals with compositional data, *i.e.* vectors whose components represent proportions of some whole. This is the reason why they are subject to the constant-sum constraint of the components. Therefore, a suitable sample space for compositional data is the simplex S^D . In the eighties, Aitchison developed a methodology to work with compositional data which we call MOVE methodology. It is based on the transformation, or *moving*, of compositional data from S^D to real space and the transformed data is modelled by a multivariate normal distribution. The additive logratio transformation gives rise to the additive logistic normal model which exhibits rich properties. Unfortunately, sometimes a multivariate normal model cannot properly fit the transformed data set, especially when it presents some skewness. Also the additive logistic normal family is not closed under amalgamation of components.

In 1996 Azzalini and Dalla Valle introduced the skew normal distribution: a family of distributions on real space, including the multivariate normal distribution, but with an extra parameter which allows the density to have some skewness. Emulating Aitchison, Gloria combined the logistic normal approach with the skew-normal distribution to define a new class of distributions on the simplex: the additive logistic skew-normal class. She suggests using it to model compositional data sets when the transformed data presents some skewness. She proved that this class of distributions has good algebraic properties. She also studied the adequacy of the logistic skew-normal distribution to model amalgamations of additive logistic normal vectors. Simulation studies showed that in some cases the distribution can provide a reasonable fit.

Useful tools in the study of models for random vectors are goodness-of-fit tests. As no tests of goodness-of-fit for the skew-normal distribution were available, Gloria developed these kinds of tests and completed the work with a power study. To do so, she followed the methodology of R.B. D'Agostino and M.A. Stephens, which consists in computing the difference between the empirical distribution function (computed from the sample) and the theoretical distribution function (skew-normal).

Parallel studies have recently developed the metric space structure of S^D . This has suggested a new methodology to work with compositional data sets that we have called STAY approach because it is not based on transformations, but on different representations within the same space. That way, geometrically, sample points *stay* at their place and the metric and associated measure of the space are preserved. The theory of algebra tells us that any D dimensional real vector space with an inner product has an orthonormal basis with respect to which the coefficients behave like usual elements in R^D . Our suggestion is to apply to these coefficients all the standard methods and results available for real random vectors. Following this strategy, Gloria defined on the coefficients with respect to an orthonormal basis of S^D both the normal model and the skew-normal model in S^D . She compared them with the additive logistic normal and the additive logistic skew-normal models, respectively. When computing probabilities of events, the laws on S^D defined using the STAY methodology are identical to the laws defined using the MOVE methodology. But the STAY methodology has provided some important changes. For example, it allows expressing directly in the simplex some basic concepts like *e.g.* the expected value, and leads to the closed geometric mean as an unbiased, minimum variance estimate of it. As we have not found in the literature previous work in this direction, Gloria started this study with a simple, but illustrative example. She defined over the coefficients with respect to a unitary basis the normal model on the positive real line and she compared it with the lognormal model, defined with the logarithmic transformation. Surprisingly, the *normal on the positive real line* is conceptually closer to the ideas of Galton and McAlister, who introduced in 1879 the lognormal distribution.

Vera Pawlowsky-Glahn and Carles Barceló-Vidal
Co directors of the thesis
Girona, November 2003

Mathematical Methods and Models in the Geosciences
Extension Study in Berlin

In March 2004 the Free University of Berlin will organize a 3-week introductory course on the following topics

- Statistical Analysis of Geodata
- Multivariate Statistics
- Geoinformation Systems and Remote Sensing.



The course is part of an extension study "Mathematical Methods and Models in the Geosciences" which is subject to fee. The course language will be German. For more details please refer to <http://userpage.fu-berlin.de/~agnschum/wbs>.

News from Freiberg

Diplomas for ...

Steffen Bartl (steffenbartl@web.de), 2003, on the completion of his diploma thesis "XML-Schemas für geologische Daten und dreidimensionale gOcad Modelldaten" - XML schemes for geological data and 3d gOcad model data [in German] supervised by Helmut Schaeben and Uwe Kroner.

A database structure using XML schemes has been developed to store and retrieve both geological data referring to the geometry, topology and properties of geological objects as well as gOcad model data. Such an external data base is required to extend gOcad to a 3d geoscientific information system. Simple requests can be resolved by Xquery, a 3d XML Application Server will take care of more complex requests.

Tobias Frank (mail@tobipascal.de), May 2003, on the completion of his diploma thesis "Implementation of a 3d XML Application Server" [in English] supervised by Helmut Schaeben and Konrad Froitzheim, Computer Science Department.

The design of the 3d-XAppS concentrates on multi processor scaling and easy to use programming interfaces for 3d applications and database drivers. The communication protocol between gOcad and the 3d-XAppS is based on HTTP (Hypertext Transfer Protocol) and an optimized example database driver was implemented for the Tamino XML Server V.3.1.2.1. An example application was developed, which can answer geometrical and topological queries to the database. The data conversion between the XML representation of the gOcad data model and according C++ objects is done by an on the fly converter.

Christopher Kopal (chrkop@web.de), May 2003, on the completion of his diploma thesis "3D modelling of the Waterloo volcanic-hosted massive sulphide deposit, Northern Queensland" supervised by Peter Herzig and Helmut Schaeben.

The Waterloo volcanic hosted massive sulphide (VHMS) deposit is a small but high-grade Zn-Cu deposit situated in the Trooper Creek Formation of the Seventy Mile Range Group. This Cambro-Ordovician Group is located in the Charter Towers Region in northern Queensland, Australia. The deposit is documented by 40 wells which were studied by Thomas Monecke in terms of lithology, mineralogy, and geochemistry in the course of his PhD. The obtained data are the basis for the 3D model created with the 3D software program gOcad.

Marlies Engelmann (marlies_engelmann@web.de), 2003, on the completion of her diploma thesis "Darstellung und Analyse globaler Plattenbewegungen mittels GIS" - Representation and analysis of global plate motions with GIS [in German] supervised by Helmut Schaeben and Uwe Kroner.

A generally accepted way to describe the kinematics of tectonic plates is the calculation of their Euler poles. These poles give the coordinates of a point on Earth where the rotation axis of a spherical plate intersects the Earth's surface. Calculations of Euler poles and corresponding angular velocities are based on the geodetic observation data ITRF2000 published by the International Earth Rotation Service (IERS). These datasets contain results of combined GPS, SLR, DORIS and VLBI techniques. The database permits to consider the following tectonic plates separately: Africa (AFRC), Antarctica (ANTA), Arabia (ARAB), Australia (AUST), Eurasia (EUR), Caribic (CARB), Pazific (PCFC), Nazca (NAZC), North America (NOAM) and South America (SOAM). Comparison with existing kinematic models of plate tectonics like the well known "NNR NUVEL 1A" model and the "Actual Plate Kinematic Model" (APKIM) shows a better agreement with APKIM which is also based on geodetic data. However, it should be noted that the results largely depend on the station data actually included in the analysis.

Position for ...

... mathematician **Ralf Hielscher**, who joined the geoscience mathematics and informatics group to work halftime on his dissertation focusing on the DFG funded research project "High resolution texture analysis" which is essentially an application of spherical wavelets to the numerical inversion of the spherical R1 - Radon transform (x-ray transform) in case of very "peaky" functions.

Helmut Schaeben
TU Bergakademie Freiberg (Germany)