SGA News

NOVEMBER 1998 Number 6

The nineties as a decade of change in African and global exploration patterns

Gregor Borg

Institute for Geological Sciences, Martin-Luther-University Halle-Wittenberg, Domstr. 5, 06108 Halle, Germany

The last decade and particularly the last five to six years have seen dramatic changes in mineral exploration in Africa in respect of both total activity and areas under exploration. The following article outlines the significant changes that have taken place in the global economic framework of mineral exploration during the last decade with a special emphasis on Africa. These changes might also stimulate the geoscientific community to cooperate even more closely than in the past. Ore deposit research is particularly suited as 'industrial geoscience' or 'near industry research' when it is - at least partly - aimed to improve existing exploration models and thus can assist the international exploration community. Or as the Mining Journal has recently phrased it: *'The skill of geologists in identifying prospective areas for exploration, and then undertaking the detailed search, remains a valuable commodity. It is a skill which must be learnt from study, experience and communication.'* (Mining Journal, Exploration Supplement, 1997, p.1). This summary is based on data published by periodicals such as the *MINING JOURNAL, MINING ANNUAL REVIEW, THE METALS ECONOMICS GROUP, AFRICAN MINING* and various industry sources.

(cont. to page 6)

Contents

◆GEODE: The new European Research Programme on Ore Deposits

page 2

◆SPECIAL: Extensive information on the Joint 5th Biennial SGA Meeting & 10th Quadriennial IAGOD Symposium London, England, 22-25 August 1999 (scientific programme, excursions, etc.)

pages 19-24

From the Steering Committee Chairman of the GEODE Programme

Derek J. Blundell

Department of Geology , Royal Holloway, University of London
Egham, Surrey, TW20 0EX, UK

The new European Research Programme on Ore Deposits - GEODE

On 1 April 1998, the European Science Foundation (ESF) launched its new scientific programme on Geodynamics and Ore Deposit Evolution, GEODE, for a five year term. GEODE aims to build a quantitative understanding of the geological processes on all scales that lead to the formation of world class ore deposits, particularly in their timing and location. The research programme is built around projects centred on five metallogenic provinces, all of which contain world class ore deposits. These are the Alpine–Carpathian Chain, the Iberian Pyrite Belt (plus Massif Central), basin hosted deposits (Irish base metal and Polish Kupferschiefer), the Urals and the Fennoscandian Shield Precambrian (including Greenland and Ukraine) mineral provinces. They may be supported by projects in South America and the SW Pacific region specifically aimed at providing insights that can be applied to give a better understanding of ore deposit types in Europe. The programme divides into studies of metallogenic provinces in orogenic systems active at the present day and studies of metallogenic provinces from the geological past. Only with modern systems is it reasonable to relate the mineralising processes to the present day large-scale structure and properties of the lithosphere which are determined from the geophysical information, although the lithospheric structure of the Urals orogen does appear to have been preserved since the time it was active. GEODE is particularly timely because it can take advantage of the major new findings about geodynamic processes in the Alps and Carpathian Chain, the Urals, SW Iberia and the Fennoscandian Shield coming from the EUROPROBE programme.

GEODE is building closer collaboration amongst scientists across a wide range of disciplines from research institutions, geological surveys and the mining industry in order to focus their attention upon the nature and genesis of world class ore deposits. The five projects involve:–

- *The Alpine–Carpathian Chain*

Working Group Convenor: Prof. Franz Neubauer (Franz.Neubauer@sbg.ac.at), University of Salzburg, Department of Geology, Resindenzplatz 1, 5020 Salzburg, Austria.

The Alpine–Carpathian Chain provides a number of specific tectonic environments, chiefly convergence, collapse and rifting, reflecting the underlying known geodynamic behaviour of the subduction zone. The prime mineralising system is the Carpatho-Balkans region of convergence and collapse, characterised by porphyry and epithermal styles of mineralisation and where it is known that, during the late stages of continental collision and orogenic collapse, asthenospheric melts generated by slab break-off may have played a prominent role in generating an additional heat source and essential chemical components. Also of importance in the Alpine–Carpathian Chain is the effect of spreading rates within the Tethyian Spreading Centre and their temporal and spatial variations with respect to the ophiolite hosted mineralisation, for example Albania (chromite) and Cyprus (sulphides/chromite). This province provides a natural laboratory to study the world's major style of copper mineralisation (porphyry), and the second or third most important style of gold mineralisation (epithermal).

Through the work of Europrobe, this chain has a comprehensive database related to deep structures and thermal anomalies through extensive tomographic and seismic studies. In addition, through tectonophysical modelling, the evolution of these structures and anomalies is particularly well characterised. Linking on to Europrobe, the GEODE project will take full advantage of the huge amount of new knowledge that is accruing about the thermo-tectonic and structural evolution of the region and use this to concentrate on the mineralisation processes of specific deposits.

- *The Iberian Pyrite Belt*

Working Group Convenor: Prof. Fernando Barriga (Fernando.Barriga@fc.ul.pt), Dep.Geologia, Fac. Ciencias, Universidade de Lisboa, Edificio C2, Piso 5, Campo Grande, 1700 Lisboa, Portugal.

This province contains some of the world's largest concentrations of volcanic-hosted base metal deposits, such as Neves Corvo in Portugal, Aznalcollar-Los Frailes and the newly discovered Las Cruces deposit in Spain.

SGA News

N.° 6 November 1998

Editor
M. Chiaradia

Département de Minéralogie, Université de Genève, Rue des Maraîchers 13, CH-1211 Genève 4 SWITZERLAND

Collaborators
L. Fontboté, D. Rickard, V. Walters, J. Berthoud, L. Linares, Y. Haeberlin, J. Metzger

SGA News is a publication of SGA (Society of Geology Applied to Mineral Deposits) and appears twice a year. Articles of SGA News can be read also in the SGA homepage on Internet: http://www.immr.tu-clausthal.de/sga.html maintained by Bernd Lehmann and Jan Heinhorst, Institut für Mineralogie, TU Clausthal, Adolph-Roemer str. 2a, D-38678 Clausthal-Zellerfeld; Fax: +49 5323 72 2321; e-mail: heinhorst@immr.tu-clausthal.de

Printed by:
UNIVERSITY OF GENEVA

Information for contributors
Items for publication may be sent to: SGA News (see address below)
Manuscripts should be sent in computer diskette in Macintosh or DOS formats using Microsoft Word or WordPerfect. Please always send a paper copy and indicate the format you are using.

Deadline for SGA News Nr. 7:
31 MARCH 1999

SGA News - Mailbox:
Département de Minéralogie, Université de Genève
Rue des Maraîchers 13
CH-1211 Genève 4
Switzerland
e-mail: SGANEWS@sc2a.unige.ch
Fax: +41 22 320 57 32

It is a current focus for international exploration and is already the subject of a Europrobe project. This is investigating transpressional orogeny in this part of the Variscide orogen specifically in order to place the massive sulphide ore deposits within their tectonic setting. Through collaboration with the Europrobe project team, GEODE can bring greater impact to the research by using its coordinated approach to analysing mineralisation processes. This research will extend to studies of the mineralisation of the Massif Central and NW Iberia, especially in the fields of geochronology, fluid chemistry and the modelling of the palaeo-hydrology of subaqueous hydrothermal systems that form giant VHMS deposits.

- *Basin-hosted deposits*

Working Group Convenor: Prof. Willy Viaene (willy.viaene@geo.kuleuven.ac.be), KU Leuven, Afdelung Fysico-chemische Geologie, Celestijnenlaan 200C, 3001 Leuven, Belgium.

World class sediment-hosted base metal deposits include the classic carbonate hosted lead-zinc Navan ore deposit in Ireland and the major Kupferschiefer copper deposits of Poland. The Irish Pb-Zn-Ag and the Kupferschiefer Cu deposits formed in basins that developed in the foreland of or postdated the Variscan Orogeny. The absence of later deformation makes them ideally suited to metallogenetic research, in contrast to their giant equivalents in the Precambrian of Canada, central Africa and Australia, which are mostly disturbed by later deformation. The Kupferschiefer is the best example of the world's second most significant style of copper mineralisation and can provide important insights which could be applied elsewhere in the world (e.g. Zaire and Zambian copperbelt; Udokan in Eastern Russia, etc.). It is also of value to search for the source of gold and platinum group elements in the Kupferschiefer. Irish Carboniferous lead-zinc deposits represent a class of mineralisation for which a range of models of either Sedex or replacement origin exist. Their excellent mineralogy and grade make them a world-class target and thus there is a need for a much more clearly defined model. Success in exploration for new deposits of both types depends on sophisticated exploration concepts because they are generally buried under shallow cover.

- *The Urals Mineral Province*

Working Group Convenor: Prof. Krister Sundblad (Krister.Sundblad@geo.ntnu.no), Dept. of Geology and Mineral Resources Engineering, NTNU, N-7034 Trondheim, Norway.

This region remains a frontier area for mineral exploration, containing major volcanic-hosted VHMS deposits such as Degtiarskoe, Uchalinskoe, Sibay and Gai, the Magnitogorskoe skarn-hosted magnetite deposits and the ophiolite-hosted chrome deposit at Kempirsai. These deposits are at least an order of magnitude larger than average deposits in the same geological settings elsewhere in the world. Deeper mantle processes may hold the clue to the striking productivity of this collision belt. A well advanced Europrobe project has produced superb structural and tectonic information about the orogen, which has retained its crustal and lithospheric roots. Recent studies from Europrobe show that the southern Urals is currently marked by an anomalously low geothermal gradient which has resulted in excellent preservation of original deposit features, where even hydrothermal vent fauna associated with VHMS deposits are recorded. This indicates that the region is an ideal area to study ore-forming processes because the ore deposits have suffered less overprint by post-formation events. GEODE will build on Europrobe by focusing on the mineralisation.

- *The Fennoscandian Shield Precambrian Province*

Working Group Convenor: Dr. Pår Weihed (weihed@algonet.se), Geological Survey of Sweden, Box 670, 751 28 Uppsala, Sweden.

In common with many other early Precambrian provinces, the Fennoscandian Shield is metal rich, and has for a long time been a major source of metals in Europe. Exploration is active and ongoing, and the recent discoveries of a major diamond deposit on the White Sea coast near Archangel and of gold deposits in the Proterozoic and Archean greenstone belts of Eastern Finland have added further interest to the province.

GRANTS FOR VISITS

To give this new programme a strong start, the GEODE Scientific Steering Committee wants to support short visits by active researchers and doctoral students to a research institution (e.g. University, Geological Survey) in another European country for laboratory and/or field work in order to build new research partnerships and facilitate new funding proposals for collaborative, multidisciplinary research. See the GEODE website

http://www.gl.rhbnc.ac.uk/geode/

for details of the Grants for Visits scheme and how to make an application. The deadline for applications is 31 January 1999 for visits to begin from 15 March 1999, although the Steering Committee may set a subsequent deadline for a later set of grants if they feel it is warranted.

The shield has been well studied geologically and geophysically, but many of the major deposits remain enigmatic, at least in part because complex deformation and metamorphism of host sequences have hindered interpretation of tectonic settings. Significant deposits of interest are the iron ore deposits of Kiruna, and the iron-oxide associated base metal deposits at Aitik and Bergslagen, which are now gaining recognition as being part of a suite of deposits that includes world class deposits of copper, gold and uranium in Australia and South America, and are therefore of current international interest. Significant base metal Cu ± Zn ± Ni ± Co deposits include those at Pechenga and Outokumpu, and are variably hosted in mafic-ultramafic suites and associated sedimentary sequences. It is likely that the application of new techniques in geochronology and geochemistry will further our understanding of the ore deposits of this province. The project will include the Precambrian of Greenland and the Ukraine along with Fennoscandia.

GEODE is managed through ESF by a Scientific Steering Committee with membership drawn from those countries that have agreed to provide support (Austria, Belgium, Denmark, Finland, France, Norway, Portugal, Sweden, Switzerland and UK) and from the mining industry. At its first meeting on 3 April, the Steering Committee set up project working groups to define the scientific problems on which to focus in each of the five main projects and to initiate the scientific activites needed to address them.

(Cont. to page 5)

NEWS OF THE SOCIETY

☞ News of the Council

Prof. I. R. Plimer Fighting Fund: new account

A new bank account in favour of the Prof. I. R. Plimer Fighting Fund has been opened in Munich (Germany: see page 10 of this issue for details).

New SGA Flyers

Newly printed SGA flyers are now ready for distribution. Those interested are invited to contact the Executive Secretary of SGA, Dr. J. Pasava via e-mail (pasava@cgu.cz).

Mineralium Deposita

The new cover of *Mineralium Deposita* will be on from the Volume 34:1. From 1999 Mineralium Deposita will appear 8 times a year with 800 pages.

5th Biennial SGA-IAGOD Meeting

The SGA Council appreciated the work of the Organizing Committee. More than 600 pre-inscriptions have been received and the meeting is expected to be very successful.

SGA Constitution

The President has informed the Council that a first review of the SGA constitution will be distributed to all Councillors in the near future. Final constitutional changes will be discussed at the next SGA Council Meeting as the final text has to be ready for distribution to all SGA Members at least 75 days prior to the SGA General Assembly (August 24, 1999).

SGA Short Course Notes

The proposal for editing and printing of SGA Short Course Notes under the editorship of John Gray from the USGS Denver was presented by D. Leach. The Council has approved that John Gray will become Editor of this new SGA publication series. The first book of the series will be „Wallrock Alteration and Primary Dispersion in Lode-Gold Exploration" by Eilu, Mikucki and Groves.

The North American Initiative

The Council has acknowledged efforts of Rich Goldfarb as Editor of *Mineralium Deposita* in the Denver office. Appreciation has also been expressed by the Council to Mrs. Suzanne Leach for her voluntary work for the SGA.

Next SGA promotional Activities

Booths for promotion of the SGA will be set up in the next future in occasion of the following events:

-Prospectors & Developer Association of Canada (March 14-17, 1999 Toronto, Canada).

-11th International Conference of the Geological Society of Africa (June 29-July 2, 1999, University of Cape Town, South Africa) where G. Borg will represent SGA as a keynote speaker.

-SGA-IAGOD Meeting (August 22-25, 1999, London, UK).

Next SGA events

-SGA-IAGOD Meeting (August 22-25, 1999, London, UK).

-31st IGC (August 6-17, 2000, Rio de Janeiro, Brazil) where SGA will run 3 symposia: i) Pre-Atlantic Metallogeny of West Africa and Eastern South America (B. Lehmann); ii) Ore Deposits of the Central Andes (L. Fontboté); iii) Mineral Deposits Associated with Black Shales (J. Pasava).

Best paper in *Mineralium Deposita* award

SGA will award a prize for the best paper published on *Mineralium Deposita* at the SGA-IAGOD joint meeting in London (22-25 August 1999). The prize amounts to 3000 DM and costs to attend the meeting.

Candidature for the 2001 SGA Biennial Meeting

The Council has taken notice of the offer from the University of Mining and Metallurgy (Krakow, Poland) to organize the next SGA Biennial Meeting in 2001. Additional offers may be sent to the SGA Executive Secretary, Dr. J. Pasava (pasava@cgu.cz), as soon as possible. ◆

Your suggestions and ideas for any topic of interest to SGA are welcome! They can be addressed to any Council member or to

Dr. Jan Pasava
SGA Executive Secretary

Czech Geological Survey
Klárov
CZ-11800 Prague 1
CZECH REPUBLIC

Tel.: +420 2 58 17 390
Fax: +420 2 58 18 748
e-mail: pasava@cgu.cz

✂.....

CHANGE OF ADDRESS FORM

If you have changed or will change in the next future your address please fill in this form and send it to:

Peter M. Herzig, SGA Treasurer - Institut für Mineralogie, TU Bergakademie Freiberg, Brennhausgasse 14 - D-09596 Freiberg, Germany; phone: +49 3731 39-2662/2626; fax: +49 3731 39-2610; e-mail herzig@mineral.tu-freiberg.de

Name: .....

Old address: .....

Complete new address (including phone, fax and e-mail) .....

.....

SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS (SGA)

SGA COUNCIL 1999

Executive Committee

President	H. Papunen (Finland)
Vice-President	B. Lehmann (Germany)
Past President	E.F. Stumpfl (Austria)
Executive Secretary	J. Pasava (Czech Republic)
Treasurer	P. Herzig (Germany)
MINERALIUM DEPOSITA Editors	D. Rickard (U.K.)
	R. Goldfarb (U.S.A.)

Regional Vice-Presidents

N. America	D. Leach (U.S.A.)
S. America	M. Brodtkorb (Argentina)
Asia	M. Shimizu (Japan)
Australia	R. Hill (Australia)
South Africa	H. Frimmel (South Africa)

Councillors: term ending on December 31, 1999

C. Ayora (Spain)
A. Björlykke (Norway)
C. Gasparini (USA)
P. Lattanzi (Italy)
C. Marignac (France)
S. Scott (Canada)

Councillors: term ending on December 31, 2001

F. Barriga (Portugal)
G. Borg (Germany)
Ch. Heinrich (Switzerland)
H. Kucha (Poland)
J. P. Milesi (France)
W. Paar (Austria)
Ch. Stanley (U.K.)

Ex officio Members, SEG

President	P. Bethke (U.S.A.)
Executive Secretary	J. A. Thoms (U.S.A.)

Ex officio Members, IAGOD

Secretary General	J. Aichler (Czech Republic)
Membership Secretary	R. Seltmann (Germany)

SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS

Report of the Executive Secretary about membership

21 Regular Members, 1 Junior Member, 6 Student Members, 1 Senior Member and 2 Corporate Members applied for membership from May 98 to October 98 and were approved by SGA Council.

List of NEW SGA MEMBERS
(April 1998 - October 1998)

Regular Members

Giovanni FUNAIOLI, Castiglioncello (LI), ITALY
Mark BURRIDGE, London, UNITED KINGDOM
Miles WIDNALL, Malmesbury, UNITED KINGDOM
T. SERAFIMOVSKI, Faculty of Mining and Geology, Stip, MACEDONIA
L. P. JAMES, James GeoAssociates P. C., Lakewood, U.S.A.
J. THOMPSON, Teck Corporation, Vancouver, B.C., CANADA
A. F. KAMONA, University of Zambia, ZAMBIA
M. Markku LAPPALAINEN, North (Mining) Exploration Sweden AB, SWEDEN
Mike SANDIDGE, Scottsdale, Arizona, U.S.A.
Kreshimir MALITCH, VNII Okeanologia, St. Petersburg, RUSSIA
Sushil Kumar JAIN, Delhi, INDIA
D. BLUNDELL, Royal Holloway University of London, UNITED KINGDOM
B. NISBET, Equinox Resources, West Perth, AUSTRALIA
I. J. MORRISON, Townsville, QLD, AUSTRALIA
Warren DAY, USGS, Denver, U.S.A.
I. KAVALIERIS. Jakarta, INDONESIA
N. POP, Copaipo, CHILE
D. PATRICK, Bristol, UNITED KINGDOM
G. AREHART, University of Nevada, Reno, U.S.A.
M. T. COATES, San Jose, COSTA RICA
Bruce MOUNTAIN, ETH Zürich, SWITZERLAND

Junior Members

J. Christian ANDERSEN, University of Exeter, Redruth, UNITED KINGDOM

Student Members

J. KANTÉ, University of Arizona, Tucson, U.S.A.
Jan PFEIFER, Freiberg, GERMANY
Sangwong CHEONG, Reno, U.S.A.
Patrick HERB, Göttingen, GERMANY
P. MOHR, Clausthal, GERMANY
O. SIKAZWE, University of Vienna, Vienna, AUSTRIA

Senior Members

Jaroslav RUZA, North Vancouver, B. C., CANADA

Corporate Members

ISCOR MINING, Pretoria, SOUTH AFRICA
FUNDACAO DA FCUL, CITECMAT, Univer. de Lisboa, Lisboa, PORTUGAL

SGA NEWS MAILBOX

Département de Minéralogie, Rue des Maraîchers 13
CH-1211 Genève 4, SWITZERLAND

fax: +41 22 320 57 32
e-mail: SGANEWS@sc2a.unige.ch

We expect your letters with comments, news, criticisms, ...

from 3: *THE NEW EUROPEAN RESEARCH PROGRAMME GEODE*

These are reporting to a workshop and Scientific Steering committee meeting being held in Lisbon in November 1998 which is setting up the implementation of the GEODE research programme. GEODE wants to take a fresh approach and develop its own research ethos. The Workshop is therefore determining the major scientific approach to the research, linking geodynamics, thermo-mechanical modelling and the processes of ore genesis. Close collaboration with EUROPROBE and its relevant projects is central to the GEODE programme.

Underpinning the scientific research of GEODE is the establishment of a database of the major ore deposits of Europe. The Minerals Industry Research Organisation, MIRO, was asked for help in setting up this database. Following two productive meetings a strategy has been formulated and MIRO has every hope of funding the project for GEODE and setting up and managing the database scheme early in 1999. Care is being taken to ensure that it will be fully compatible with other database schemes, in particular the GIEXS scheme of EuroGeoSurveys. GEODE is also making efforts to publicise its activities through the establishment of a website (http://www.gl.rhbnc.ac.uk/geode/) which includes an open invitation to all interested scientists to become involved, and would be delighted to hear from SGA members. Symposia are being organised during the European Union of Geosciences Assembly in Strasbourg, 28 March-1 April 1999 and the SGA-IAGOD meeting to be held in London 22-25 August 1999, which will include a GEODE session on "Geodynamics and ore deposit provinces". Further workshops relating to specific GEODE projects are also planned for 1999 in order to involve the broader scientific community, particularly younger researchers.

If you are interested in GEODE please contact the Steering Committee chairman Professor Derek Blundell (d.blundell@gl.rhbnc.ac.uk), or any of the Working Group convenors. ◆

from 1: THE NINETIES AS A DECADE OF CHANGE IN AFRICAN AND GLOBAL EXPLORATION PATTERNS

Prior to 1990, Africa attracted relatively little attention from the international exploration community with the southern African Countries, such as South Africa, Zimbabwe, Namibia and Botswana being the main focus of exploration at the time. This exploration was carried out predominantly by a few South African mining houses. Limited mining and exploration activity outside these countries was generally restricted to Zambia, Zaire, Ghana and Morocco (Fig. 1).

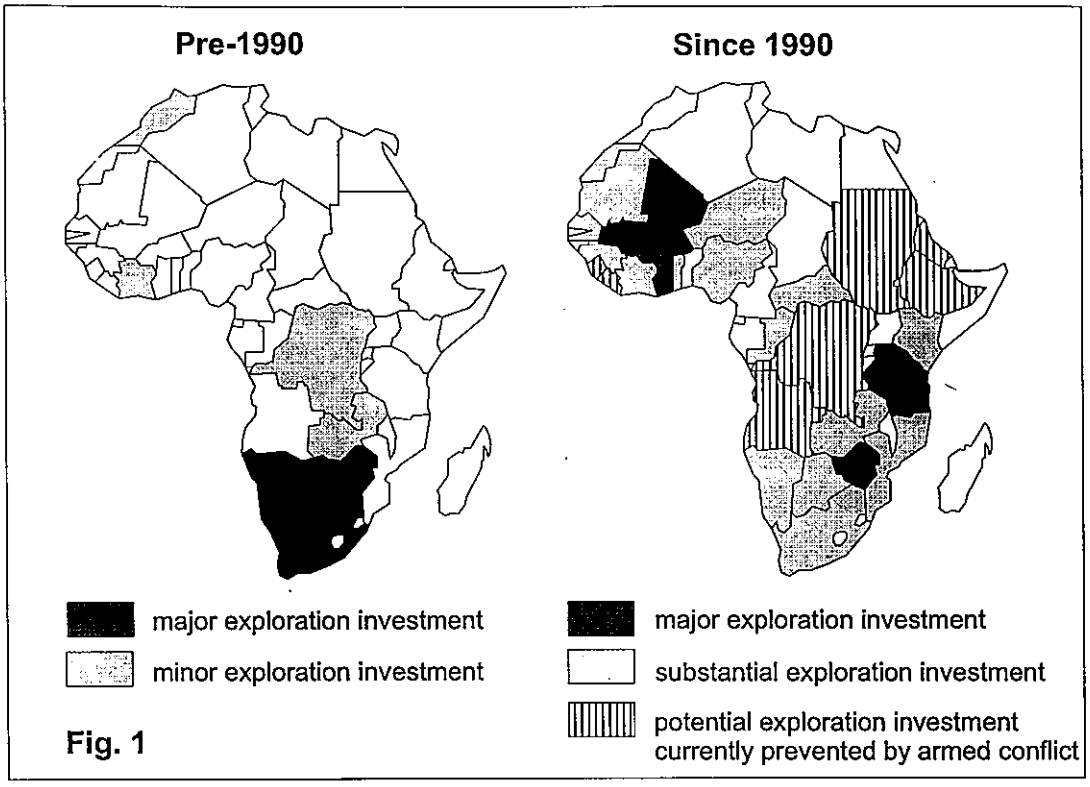

Fig. 1

Figure 1: Maps of the geographic distribution of exploration investments in African states pre-1990 (left) and post-1990 (right).

Changing patterns in global exploration expenditure

During the last few years, global spending on mineral exploration has tripled from 1,53 billion US $ in 1991 to 4,6 billion US $ in 1997. The African continent attracted not more than 4,7 % of the world's total exploration expenditure at the beginning of this period (Fig. 2). However, since then, Africa's share of the 4,6 billion US $ has risen to 16,5 % or 759 million US $ (Figs. 2 and 3). This change is most dramatically illustrated when comparing the relative increase of exploration expenditure in different regions (Fig. 4). Of all regions, Africa shows by far the most impressive increase of more than 900 % of its 1991 exploration expenditure! This last decade, however, has seen a more complex reshuffling of exploration activities on almost all continents. In 1991 the ranking of exploration expenditure in different regions (Fig. 5) followed a rather stable distribution pattern established several years ago. This patterns saw Canada with 25,8 % followed by Australia (22,3 %), the U.S.A. (20,2 %), Latin America (14,3 %), SW-Pacific region (7,2 %), the European Union (EU) together with the Community of Independent States or former Soviet Union (CIS) plus the rest of Asia (5,5 %), and finally Africa (4,7 %).

Canada had been ranking first in its share of global exploration expenditure for ten years between 1981 to 1991. After that it has lost this position to Australia in 1994 and subsequently to Latin America in 1997.

In 1997 Latin America attracted almost every third dollar (29 %) spent world - wide on exploration (Fig. 6) and it is now followed by Australia (16,7 %), Africa (16,5 %), the SW-Pacific region (10,9 %), Canada (10,8 %), U.S.A. (9,1 %), and the EU, CIS and Asia (7 %) now at the end of this list.

This means that expenditure in Latin America has moved to pole position from fourth rank while Africa has left behind its seventh place and moved up to third position. Canada, the U.S.A., the EU, CIS, and Asia languish toward the rear. These modifications have affected virtually all regions although the least changes appear to have occurred within the EU, CIS and Asia. Another statistical diagram can be developed from the data of Figure 2 and might better serve to stress the systematic differences in global exploration patterns. Figure 7 presents the relative change in the percentage of global exploration expenditure within each area between 1991 and 1997. Such an illustration helps to distinguish those countries whose relative share in global expenditure has risen during this period from the ones whose share decreased. 'Losers' in this respect are Canada (- 58 %), the U.S.A (- 55 %), and Australia (- 25 %) where exploration expenditure has decreased relative to world-wide spending increases (+ 301 %). The 'winners' in this competition for funds are Africa (+ 251 %), Latin America (+ 103 %), the SW-Pacific region (+ 51 %) and even the EU, CIS and Asia (+ 27,3 %), areas or continents which have successfully increased their portion of the 'global exploration budget'.

Reasons for global change

The shift of exploration efforts and funds away from regions such as the U.S.A. or central Europe can be mainly attributed to two factors. First of all, these regions are considered 'over-

explored' by many exploration companies, with new discoveries requiring disproportionally large financial, technical and scientific efforts.

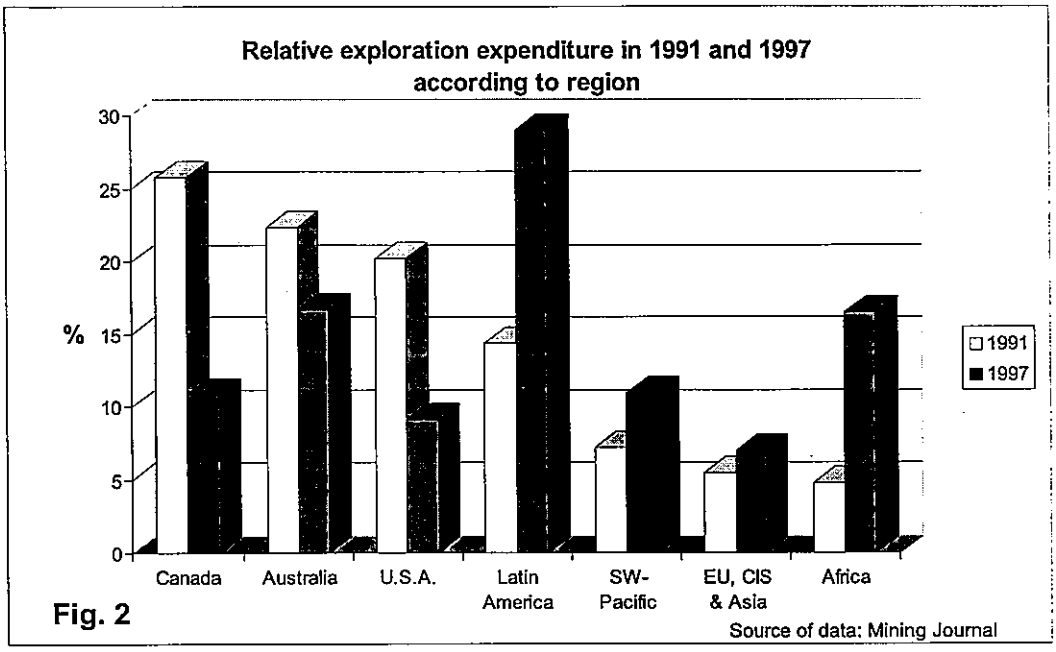

Fig. 2

Figure 2: Relative exploration expense in 1991 and 1997 according to region.

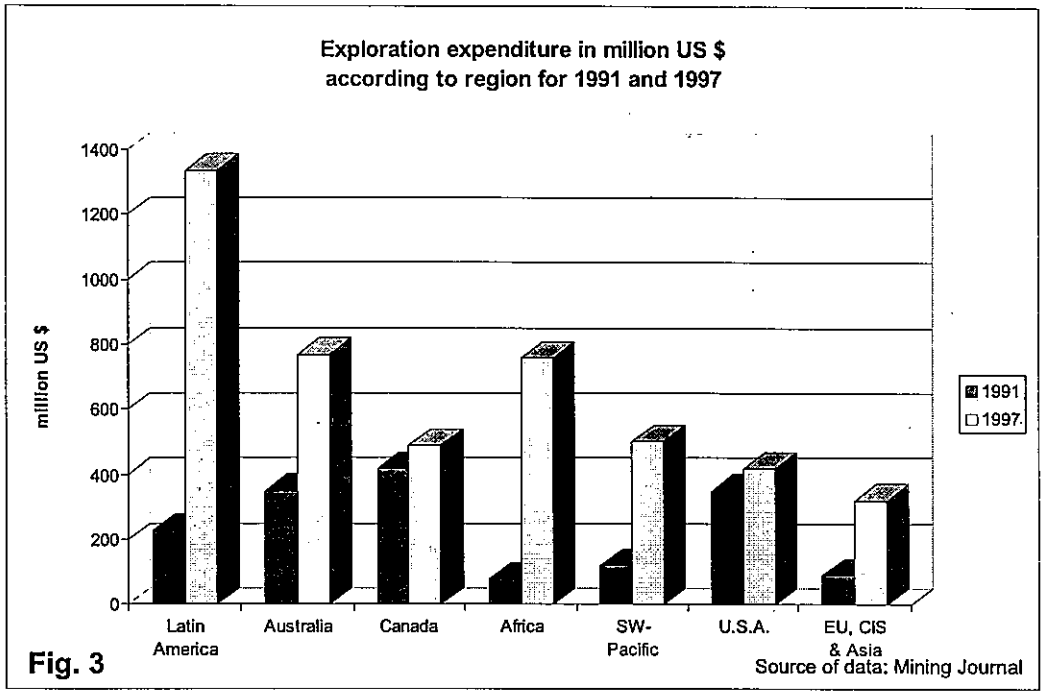

Fig. 3

Figure 3: Exploration expenditure in million US$ according to region for 1991 and 1997.

Secondly, mineral exploration in 'highly developed' countries is increasingly obstructed by unfavourable public opinion resulting at least partly from an increased environmental awareness. There is a marked tendency in these highly developed countries to regard mining activity and hence exploration as a threat to high (environmental) living standards. The commonly expressed public opinion, that mining is highly undesirable, generally remains unquestioned by the increasing demand for processed natural mineral resources.

One could state that the hunter-gatherers have finally given way to (environmentally correct) traders and consumers. At the same time it becomes obvious that the global demand for mineral resources will continue to grow despite all first and second world attempts to reduce consumption and to optimise recycling techniques. Even the most optimistic scenario will have to include a constant or more probably a rising demand for mineral resources. The world's increasing population with its justified demands alone requires the discovery and development of new mineral deposits to replace exhausted ones and thus poses a serious challenge to future minerals supply.

Africa's new popularity

Of Africa's 47 mainland countries some 32 qualify as 'least developed nations' according to UN definitions. The continent holds 20 % of the earth's landmass with 670 million inhabitants. It is the world's largest gold producer and currently hosts some 45 % of the world's known gold reserves. Africa is geologically well endowed with Archean and Proterozoic terrains including an abundance of greenstone belts with their exceptionally high potential for gold deposits.

However, despite the recent significant increase it still attracts only 16,5 % of the world-wide exploration expenditure. Between 1985 and 1990, global political change with respect to the 'superpowers' and the abandoning of apartheid in South Africa resulted in a re-orientation of numerous African countries towards foreign investment and mineral exploration by international exploration companies.

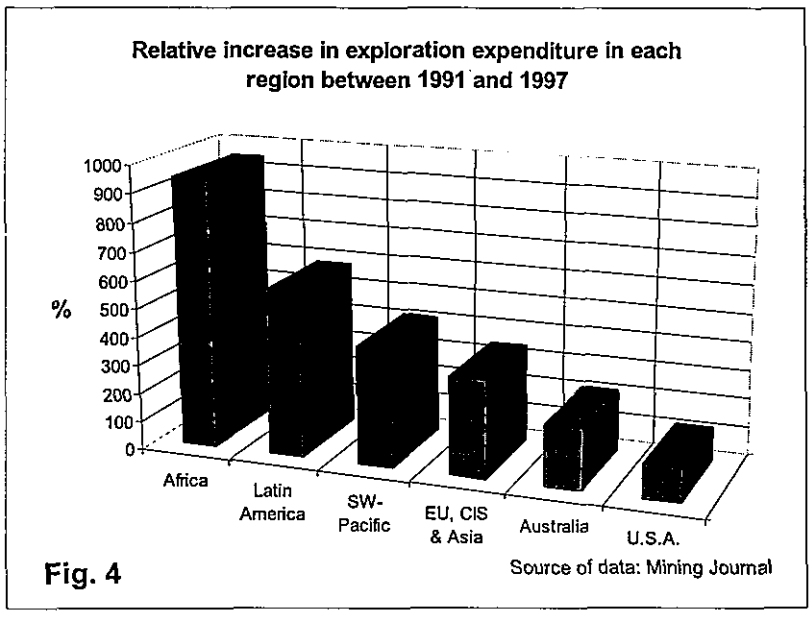

Figure 4: Relative increase in exploration expenditure in each region betweeen 1991-97.

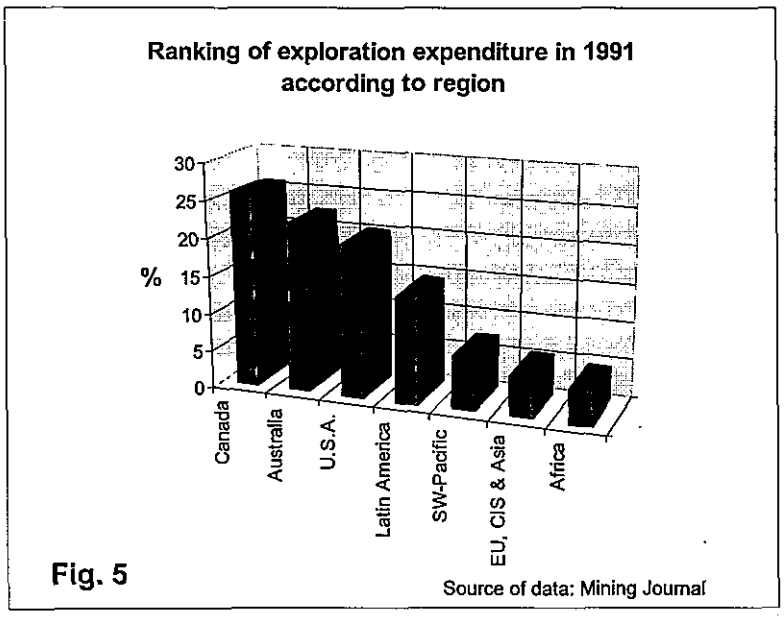

Figure 5: Ranking of exploration expenditure in 1991 according to region.

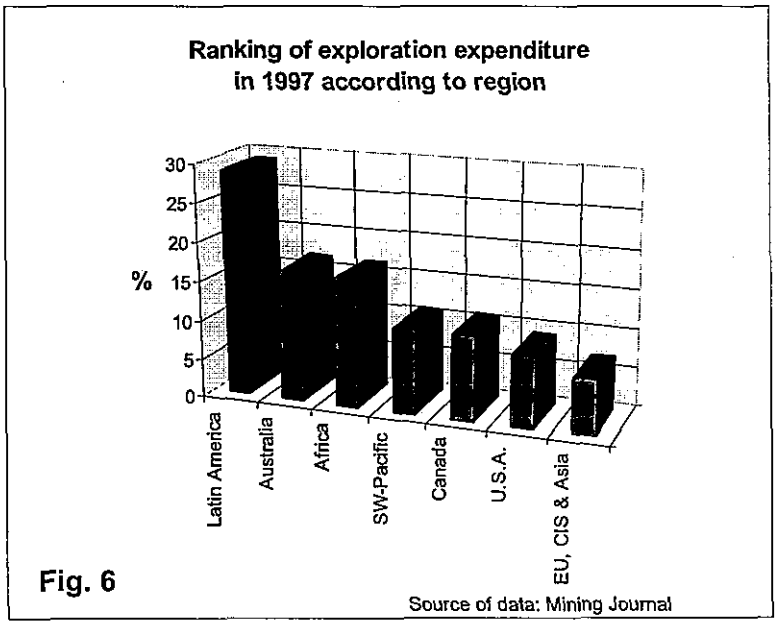

Figure 6: Ranking of exploration expenditure in 1997 according to region.

The opening process was not without difficulties due to a lack of experience with licensing and permitting procedures and in many cases the lack of fully established legal and fiscal rules in the minerals commodity sector. However, entrepreneurs, juniors and a large number of major exploration companies soon took the opportunity to claim ground in areas which in many cases had not been explored for more than 30 years, but with an impressive mining record from colonial times. More than 200 companies were conducting mineral exploration in sub-saharan Africa alone by 1996. Bilateral governmental aid projects helped to raise the information level of large prospective areas and to promote mineral exploration. Claiming known mineral occurrences faster than competitors was the most immediate and effective method of 'exploration' during the early years of this renewed exploration boom. However, the application of conceptual studies and modern multimethod mineral exploration projects followed shortly after.

The combination of high resolution aerogeophysics, remote sensing techniques and regional soil sampling programmes, processed by new GIS-systems has become almost a standard exploration procedure and has resulted in the identification of large numbers of highly prospective target areas.

Gold appears to be by far the most attractive commodity explored for in Africa with some 50 to 60 % of the expenditure being spent on gold exploration alone. Diamonds, platinum, zinc, copper, nickel, cobalt, bauxite, iron and manganese ores, and heavy mineral sands are amongst the other commodities that have attracted significant attention.

Low political risk, favourable investment conditions such as tax repatriation of dividends, corporate tax, free-carried interests, low royalty rates, and above all good geological indications are the main criteria to stimulate exploration in individual countries.

This has led to a tremendous exploration boom in Ghana and Tanzania, a considerable increase in exploration in Zimbabwe, Zambia, Burkina Faso, Ivory Coast, Guinea, Mali, and increased levels of interest in Eritrea, Ethiopia, Senegal, Nigeria, Mauritania, the Central African Republic and Mozambique (Fig. 1).

To name an example, close to 100 million US $ have been spent during the last year on exploration in Tanzania alone. In the last few years this has resulted in the discovery of over 30 million new ounces of gold (measured and indicated).

Even traditional mining and exploration countries such as South Africa, Namibia, Botswana, and Zimbabwe have attracted a lot of renewed attention although these countries had been regarded for some time as relatively 'over-explored'. Yet, new exploration models and especially new ground mapping and remote sensing mapping techniques to identify and document regolith patterns have been developed in similarly arid terrains of Western Australia covered by sand or hard grounds.

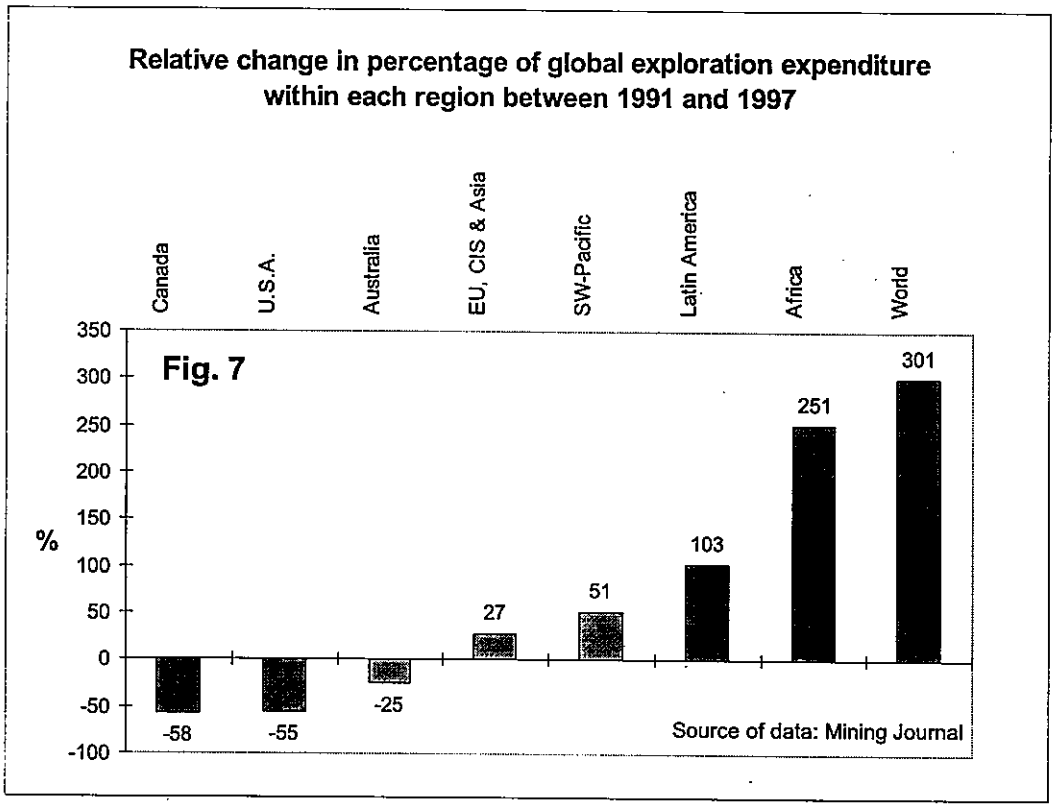

Figure 7: Relative change in perecentage of global exploration expenditure within each region between 1991 and 1997.

These techniques are being successfully applied to African countries, turning some of them into viable exploration targets for foreign companies and thus attracting new exploration capital.

However, currently there is no similarly increased mining activity in Africa. This must be largely attributed to the fact that the exploration boom has started only some eight to ten years ago and the first newly discovered deposits are about to come into production shortly. African annual new production of gold, from outside of South Africa, stands at 560.000 oz per year between 1990 and 1996. Some 1.2 million oz/year of new production is expected for the year 2000.

Africa's new exploration geography and obstacles to the recent exploration boom

There remain severe obstacles to the exploration future of African countries since other areas of the world compete for the same global exploration capital. The lack of highly attractive fiscal regimes (when compared with Latin America), poor infrastructure, locally restrictive mineral policies and slow and corrupt government licensing agencies are severe threats to the newly emerging mining and exploration 'culture'. Currently, Latin America's top exploration countries are Chile and Peru where nearly all fiscal parameters are more attractive than in most African countries and have thus earned Latin America its current leading role in exploration terms.

The dramatic changes of mineral exploration in Africa described above have resulted in a new 'exploration geography' of the dark continent (Fig. 1). The African continent is now much more widely explored for its mineral wealth compared to any period prior to 1990.

Exploration funds from South African mining houses have been re-directed away from Southern Africa and towards West and East Africa. Virtually all international exploration companies have started to invest in the same regions and partly on Southern African terrain abandoned by South African mining companies. Two thirds of African countries are considered to be geologically highly prospective. However, continued civil war in Sudan and Angola and recent armed political conflict in the Democratic Republic of Congo (DRC), Eritrea, Ethiopia, Sierra Leone, and Liberia inhibit exploration in some of these countries. It is uncertain how soon these regions might rejoin the group of countries that attract foreign investment for mineral exploration. Considering the strong interest that exists for future exploration in these war tormented countries almost two thirds of the African countries are currently explored or considered highly prospective. Ironically it appears that peace and political stability are considered prerequisites for mineral exploration and successful mining while the positive side-effects of mining, such as improved infrastructure, employment in the minerals sector, forex earnings, and an overall increase in GNP are amongst the best measures to prevent violent political conflict.

The role of ore deposit research and economic geology for mineral exploration

It goes without saying that the current increase in world-wide mineral exploration has also increased the number of known ore deposits as well as subeconomic but geologically significant mineral occurrences. This has resulted in a wealth of new geological information with respect to types and styles of mineralisation, alteration, and regional distribution patterns.

New geophysical and geochemical methods as well as new exploration concepts have resulted, in many cases, from good communication and often from close co-operation between ore deposit research and the mineral exploration industry.

There is a high and growing demand for further practical ore deposit research which can be applied to day-to-day exploration. Thus it is important for the relevant scientific community to lend itself to this type of study and keep in mind the applicability of its research. It is surely not only to the benefit of the exploration companies to cooperate closely. The acquisition of new data and industrial funding of practical research will lead to a better understanding of the formation of ore deposits. This is especially relevant in the large and vastly underexplored regions of Africa. More opportunities than ever exist for the earth scientist to study recently discovered ore bodies to the benfit of science, industry, and African nations alike. ◆

The Professor Ian Plimer Fighting Fund (see SGA News N. 4, November 1997)

Prof. I. Plimer, Head of the School of Earth Sciences in the University of Melbourne (Australia) and former SGA President, has been engaged in a dispute with the Creationist movement since 1988. Creationism is a fundamentalist movement which claims that the Bible is the only correct source of information regarding the evolution of our planet. Accordingly the Earth was created 6,000 years ago and partly devastated by the great flood 2,000 years later. Creationists' efforts are mainly directed at the school system. Being committed to education, Prof. I. Plimer felt that he had "to take a public stand against Creationism". Litigation continued up to the Federal Court of Australia and judgement was handed down in summer 1997. Prof. I. Plimer found he had lost a major part of the case and was likely to face a cost order of $A 400,000. However, he has decided to appeal. In support to the legal battle of Prof. I. Plimer "The Prof. I. R. Plimer Fighting Fund" has been instituted in Broken Hill (Australia) under the administration of the Mayor of Broken Hill, Mr. Peter Black, and the Reverend Brian Nicholls of the United Church of Australia.

In addition to the account at the Broken Hill Credit Union, Broken Hill, NSW (Australia) (see SGA News N. 4, November 1997), donations can now be payed to

Bayerische Vereinsbank München,
BLZ 700 202 70
account N. 419 19 612

to facilitate payments from European countries.
Please continue to support the Fund: your help is urgently required.

E. F. Stumpfl
SGA President


Prof. I. R. Plimer

FIELDCOURSE - IBERIAN PYRITE BELT MINERALISED SILL-SEDIMENT COMPLEXES

March 21st-27th 1999

The Iberian Pyrite Belt is the world's leading mineralised sill-sediment complex. Though superficially similar to an effusive/pyroclastic volcanic pile, sill-sediment complexes behave very differently and require a totally different approach. This fieldcourse will establish methodologies for recognising and analysing these environments.

Further information from Clive Boulter, School of Ocean and Earth Science, University of Southampton, Southampton Oceanography Centre, Southampton, SO14 3ZH, U.K. (cab2@soc.soton.ac.uk); tel.: +44 (0)1703 592670 fax: + 44 (0)1703 593052.

Registration required by Monday January 25th 1999.

IGCP 429 „Organics in Major Environmental Issues" successfully launched in Prague

Jan Pasava

Czech Geological Survey, Klárov, CZ-11800 Prague 1, Czech Republic

The Inaugural Meeting of the IGCP 429 was held in Prague, Czech Republic on September 10-13, 1998. The two day meeting was followed by a one day field trip. Forty one participants from 20 countries took part in this event with the aim to present and discuss the proposed Project management structure, work plan, schedule of annual international meetings, creation of working groups as well as publication policy. At the very beginning, the following basic information about IGCP and its rules were presented by Jan Pasava.

Following the official opening of the IGCP 429 Inaugural Meeting, the proposal for the IGCP 429 Management Structure and IGCP 429 - MAB (Man and Biosphere UNESCO Programme) initiative were presented, discussed and approved by the participants.

IGCP 429 MANAGEMENT STRUCTURE

Co-Leaders: Jan PASAVA (IGCP) (CZECH REPUBLIC) <pasava@cgu.cz> and Jan JENÍK (MAB) (CZECH REPUBLIC) <jenik@prfdec.natur.cuni.cz>

Scientific Secretary: Andrew Paul GIZE (UNITED KINGDOM) <andy_gize@email.msn.com>

Regional Vice-Leaders: Kagumbu WALEMBA (AFRICA) <065KABUN@cosmos.wits.ac.za>; Delian FAN (ASIA) <fandl@public.intercom.com.cn>; Bernd LOTTERMOSER (AUSTRALIA) <blotterm@metz.une.edu.au>; Kirsti LOUKOLA-RUSKEENIEMI (EUROPE) <kirsti.loukola-ruskeeniemi@gsf.fi>; Tom GIORDANO (NORTH AMERICA) <tgiordan@NMSU.Edu>; Laecio CUNHA DE SOUZA (SOUTH AMERICA) <laecio@geologia.ufrn.br>

IGCP 429 MAJOR GOALS

This project is intended as a means of bridging gaps especially between IGCP and MAB activities involving geoscientists, biologists and health specialists, to encourage cross-fertilisation of skills and ideas, and to co-ordinate research efforts in order to be of great value to society as possible.

This project: i) should help society through studies of organic-metal interactions and the weathering process of fossil organic matter and associated sulphides in developing more sophisticated and effective remediation policies, and treating acid mine drainage from active and former mining areas, thus contributing to the prediction, minimization, and treatment of the negative environmental impacts of mining activities on our planet; ii) should provide society with very useful analogues to assess the performance of radionuclide containment at man-made radioactive waste repository sites, thus making repository processes more safe; iii) should help society, through compilation of environmental models, to develop safer exploitation of industrial, widely occurring, black shale hosted mineral deposits; iv) should help society to identify organic atmospheric factors ranging from environmental to health deterioration, thus to help to become aware of, and minimize, negative impacts of human living; v) should help society to distinguish various sources of traceable organic pollutants in aquifers, thus to contribute to the evaluation of water pollution risk.

The IGCP 429 is the first IGCP Project to be internationally co-ordinated by a geoscientist (Dr. Jan Pasava - experienced leader of several IGCP Projects from the Czech Geological Survey in Prague) and a biologist (Dr. Jan Jeník - MAB chairperson from the Department of Botany, Faculty of Science, Charles University in Prague). The primary objective of this collaborative venture is to integrate varied groups of geoscientists and biologists in order to bridge a gap between two major UNESCO Programmes - IGCP and MAB- and thus serve our society more effectively.

After introduction of Man and Biosphere Programme, Prof. Jenik has strongly encouraged all the participants to get in touch with local MAB representatives in order to inform them about IGCP 429 activities with the aim to initiate joint studies. After acceptance of the IGCP 429 structure and introduction to the IGCP 429 main goals, six keynote lectures (20 min. each) addressed major topics within the IGCP 429. Twenty three talks were presented by scientists from 20 countries during the two full day sessions, which were well attended by 41 participants. The concluding discussions resulted in the constitution of the following eight thematic working groups:

TOPICAL WORKING GROUPS

WG1: Organic matter - metals interaction: *A.P. Gize, UK - e-mail: <andy_gize@email.msn.com>*

WG 2: Microbial leaching in environmental clean up: *K. Bosecker, Germany - e-mail: <k.bosecker@bgr.de>*

WG 3: Weathering of organic matter: *B. Køibek, Czech Republic- e-mail: <kribek@cgu.cz>*

WG 4: Acid mine drainage: *E. Puura, Estonia - e-mail: <epuura@math.ut.ee> or <erx@ket.kth.se>*

WG 5: Environmental models of black shale hosted mineral deposits: *W. Mayer, Poland - e-mail: <wmayer@geol.agh.edu.pl>*

WG 6: Organic atmospheric particulates: *K. Hall, U.K.- e-mail: <Keith_Hall_GC2@compuserve.com>*

WG 7: Organic matter in nuclear waste issues: *D. Mossman, Canada - e-mail: <dmossman@mailserv.mta.ca>*

WG 8: Organics in aquifers and water systems: *L. de Souza - <laecio@geologia.ufrn.br>and R. Melo, Brazil, J. Spangenberg, Switzerland - <Jorge.Spangenberg@imp.unil.ch>*

ANNUAL INTERNATIONAL MEETINGS

Finally, a schedule of annual major international meetings was arranged for the duration of the IGCP 429:

1999-Annual International Meeting (session 2 „Organics in the formation and remediation of mineral deposits", London, U.K (August 25-28; within the 5th SGA-IAGOD Meeting) - confirmed. More info at http:// www.immr.tu-clausthal.de/sga.html

2000-Annual International Meeting (within the 31st IGC), Rio de Janeiro, Brazil (August 6-17) - under negotiation with the organizers

2001-Annual International Meeting (within the 6th SGA Meeting)

2002-Final Meeting in a country with the most advanced research (most likely at the GAC/MAC Meeting in Canada or GSA Meeting in USA)

The meeting was followed by a one day field trip to the North Bohemian Coal Basin, co-organized by the North Bohemian Coal Mining Joint Stock Company. It has been documented in several case studies that lignite mining and waste heap remediation have to address problems such as the generation of acid mine drainage, and various agrochemical properties resulting from newly formed organic substrates. Such issues will be evaluated during the IGCP 429.

Adding a „training component" and encouraging the involvement of more people especially from developing countries will be another very important aspect of IGCP 429 activities. For this reason, IGCP 429 co-organizes GEOCHIM, a postgraduate training course in exploration and environmental geochemistry (see page 15 for details). ◆

BOOK ADVERTISMENTS

SGA Special Publications Special Sale

Springer-Verlag has dramatically reduced the prices of these two **SGA Special Publications:**

Nr. 8 Stratabound ore deposits in the Andes. Fontboté, L., Amstutz, G.C., Cardozo, M., Cedillo, E. & Frutos, J. (eds.), Springer, Berlin, 815 p. (1990) ISBN 52181-X
Old **298 DM**, new **DM 165**. SGA members: **132 DM (ca. 88 US$)**

Nr. 9 Bitumens in ore deposits, by Parnell, J., Kucha, H., & Landais, P. Special Publication No. 6 of the Society for Geology Applied to Mineral Deposits, Springer, Berlin, 520 p. (1992). ISBN 55621-4
Old **274 DM**, new **DM 150**. SGA members: **120 DM (ca. 80 US$)**

Proceedings of the Biennial SGA Meetings

Pagel, M. & Leroy, J.L. (eds.) (1991) **Source, transport and deposition of metals.** Proceedings of the 25 years SGA anniversary meeting, Nancy, 30 August - 3 September 1991, Balkema, Rotterdam. 841 p. (ISBN 90-5410 0206). Orders to: Balkema, P.O. Box 1675, NL 3000 BR Rotterdam, The Netherlands; fax +31 10 4135947

Fenoll Hach-Ali, P., Torres-Ruiz, J. & Gervilla, F. (eds.) (1993) **Current research in geology applied to ore deposits.** Proceedings of the second biennial SGA meeting, Granada, 9-11 September 1993, University of Granada, 785 p. (ISBN 84-338-1772-8). Orders to: Prof. Puri Fenoll Hach Alí Dep. Mineralogía y Petrología Fac. Ciencias Av. Severo Ochoa E 18071 GRANADA, Spain; fax +34 58 243368, (7.000 pts, ~US$ 70)

Pasava, J., Kríbek, B., & Zák, K., eds. (1995) **Mineral Deposits: From their origins to their environmental impact.** Proceedings of the third biennial SGA Meeting, Prague, Czech Republic, 28-31 August 1995, Balkema, Rotterdam, 1018 p. (ISBN 90 5410550 X). Orders to: Balkema, P.O. Box 1675, NL 3000 BR Rotterdam, The Netherlands; Fax +31 10 4135947, (US$ 105)

Papunen, H. (1997) **Research and Exploration: where do they meet?** Proceedings of the fourth Biennial SGA Meeting, Turku, Finland, 11-13 August 1997, Balkema, Rotterdam, 980 p. (ISBN 90 5410 889 4). Orders to: Balkema, P.O. Box 1675, NL 3000 BR Rotterdam, The Netherlands; Fax +31 10 4135947, (US$ 115)

Published Thesis Works

Metallogenetic investigations in the Punta del Cobre belt, northern Chile by R. Marschik (1996) Terre & Environnement, Geneva, v. 5, 200 p. ISBN 2-940153-04-3. Orders to: Département de Minéralogie, Rue des Maraîchers 13, CH-1211 Genève 4, Switzerland: 30 Swiss Francs (ca. 25 US$).

The Pb-Zn-As-Tl-Ba-deposit at Lengenbach, Binn Valley, Switzerland - Petrogenesis based on combined geochemical and isotopical (U,Pb,Rb,Sr,S,O,C) investigations by M.D. Knill. Beitraege zur Geologie der Schweiz, geotechnische Serie, Lief. 90, 1996. 87 p. (includes numerous color figures). Orders: Schweizerische Geotechnische Kommission, ETH-Zentrum, 8092-Zuerich, Switzerland: 35 SFR, (about 28 US$).

Geochemical (elemental and isotopic) constraints on the genesis of the Mississippi Valley-type zinc-lead deposit of San Vicente, central Peru, by J. Spangenberg (1995). Terre & Environnement, Geneva, v. 1, 123 p. ISBN 2-940153-00-0. Orders to: Département de Minéralogie, Rue des Maraîchers 13, CH-1211 Genève 4, Switzerland: 30 Swiss Francs (ca. 25 US$).

Lithogeochemistry of Lower Cretaceous sediments from the Bilbao Anticline, Basque-Cantabrian basin by I. Yusta. (1994, in Spanish). Orders to: Dpto. Mineralogia y Petrologia, Universidad del Pais Vasco, Apdo. 644, E-48080 Bilbao, Spain: 2500 pesetas (about 25 US$).

Skarn and ore parageneses in the Cu(-Fe) Tintaya deposit, southern Peru, by Saez, J. (1996). Vol. 86: Heidelberger Geowissenschaftliche Abhandlungen, III+205 S., 17 Abb., 39 Tab., 15 Taf., ISBN 3-931161-12-9; 30.- DM

Syngenese und Epigenese in metamorphen und nicht-metamorphen Pb-Zn-Erzlagerstätten, aufgezeigt and den Beispielen Blazna-Tal (Ostkarpaten, Rumänien) und Ramsbeck (Westfalen, BRD), by Udubasa, G. (1972/1996). Vol. 87: Heidelberger Geowissenschaftliche Abhandlungen, 158 S, 106 Abb., ISBN 3-931161-13-7, ISSN 1430-8665; 30.- DM

The Precambrian supracrustal rocks of the "Isla Cristalina de Rivera" in northern Uruguay and their ore deposits - Definition of a new lithostratigraphic unit ("Vichadero Formation") and a contribution to the genesis of banded iron-formation and manganese-formation, by Ellis De Luca, J. H. (1998). Vol. 90: Heidelberger Geowissenschaftliche Abhandlungen, 196S., 50 Abb., 57 Tab., ISBN 3-931161-16-1, ISSN 1430-8665; 30.- DM

Mineralogie, Petrographie und Genese der schichtgebundenen Kupfererzlagerstätte Chapi (Moquegua-Peru), by Chirif, L. H. (1988). Vol. 91: Heidelberger Geowissenschaftliche Abhandlungen, 226 p.,ISBN 3-931161-17-X, 30 DM

For Vols. 86, 87, 90, 91 ORDERS to: Vereinigung zur Fördeg der Mineralogie in Heidelberg e.V., c/o Prof. Amstutz, Postfach 104040, D-69030 Heidelberg, Germany.

Information on Ph.D. Theses on Economic Geology published by non-profit organizations should be sent to SGA News

Proceedings of the Ninth Quadrennial IAGOD Symposium

Proceedings of the Ninth Quadrennial IAGOD Symposium held in Beijing, China, August 12-18, 1994, edited by Richard D. Hagni, University of Missouri-Rolla, Rolla, Missouri, USA

The 9th IAGOD volume contains papers on 13 topics concerning ore deposits:
1) ore-forming theory for superlage ore deposits, 2) structure of ore fields and ore deposits, 3) paragenesis and paragenetic sequence, 4) experimental modeling of metallogeny, 5) kinetics and thermodynamics in ore-forming hydrothermal systems, 6) isotopic and trace element geochemistry of mineral deposits, 7) gold, silver, and uranium deposits, 8) stratiform and strata-bound deposits, 9) skarn deposits, 10) tin and tungsten deposits, 11) ore deposits in mafic and ultramafic rocks, 12) fluorite and barite deposits, and 13) manganese deposits.

620 pages with 300 figures and 108 tables, 17 x 24 cm, 1998. Cloth DM 240,-/US$ 136 (for Individual IAGOD members and attending members of the IGC-Congress in Beijing only 102 US$). ISBN 3-510-65180-4.

Available from:
Gebrueder Borntraeger, Berlin - Stuttgart (distributor E. Schweizerbart´sche Verlagsbuchhandlung, Johannesstraße 3 A, D-70176 Stuttgart)
Fax (0711) 625005, e-mail: order@schweizerbart.de
in USA from Balogh Scientific Books, 1911 North Duncan Road, Champaign, Illinois 61821, Fax: +12173559413, e-mail: balogh@balogh.com

(Cont. to page 17)

⇨⇨⇨FORTHCOMING EVENTS⇨⇨⇨

★ marks a new entry

1999

★February 4-8

COURSE ON MINERAL DEPOSITS IN THE VOLVANIC ENVIRONMENT, Lima, Peru - Contact address: Sociedad Geologica del Peru, Arnaldo Marquez 2277, Jesus Maria, Apartado 2559, Lima 100, Peru; phone: +511 463 3947; fax: +511 261 2362; e-mail: SGP@INICTEL.GOB.PE

★February 22-26

GEOLOGISCHE VEREINIGUNG E.V. 89TH ANNUAL MEETING: Old Crust - New Problems, Freiberg, Germany - Contact address: Prof. Dr. B. Merkel, Institute for Geology, TU BergakademieFreiberg, Zeunerstrasse 12, D-09596 Freiberg, Germany; phone: +49 3731 392792; fax: +49 3731 392720; e-mail: merkel@geo.tu-freiberg.de

★March 1-3

SEG ANNUAL MEETING WITH THE SOCIETY FOR MINING, METALLURGY AND EXPLORATION (SME), Denver, CO, USA - Contact address: Donald Taylor, BHP Minerals, 1597 Cole Blvd., Ste. 250, Golden, CO 80401; phone: +1 303 235 4414; fax: +1 303 235 4435; e-mail: taylor.don.dr@bhp.com.au

★March 21-27

FIELDCOURSE - IBERIAN PYRITE BELT MINERALISED SILL-SEDIMENT COMPLEXES - Contact address: Dr. Clive Boulter, School of Ocean and Earth Science, University of Southampton, Southampton Oceanography Centre, Southampton, SO14 3ZH, U.K.; phone: +44 1703 59 26 70; fax: +44 1703 59 30 52; e-mail: cab2@soc.soton.ac.uk (see p. 10)

★March 28-April 1

EUG 10, EUROPEAN UNION OF GEOSCIENCES, Strasbourg, France - Contact address: EUG Office, 5 René Descartes, 67084 Strasbourg Cedex, France; phone: +33 3 8845 0191/8841 6393; fax: +33 3 8860 3887; e-mail: eug@eost.u-strasbg.fr; website: http://eost.u-strasbg.fr/EUG

★May 4-6

NORDIC MINERAL RESOURCES SYMPOSIUM - GOLD '99 TRONDHEIM "PRECAMBRIAN GOLD IN THE FENNOSCANDIAN AND UKRAINIAN SHIELDS AND RELATED AREAS", Trondheim, Norway - Contact address: Krister Sundblad, Dept. of Geology and Mineral Resources Engineering, NTNU, N-7034 Trondheim, Norway; phone: +47 73 59 48 09; fax: +47 73 59 48 14; e-mail: Krister.Sundblad@geo.ntnu.no (see p. 14)

May 26-28

GEOLOGICAL ASSOCIATION OF CANADA - MINERALOGICAL ASSOCIATION OF CANADA, JOINT ANNUAL MEETING, Sudbury, Ontario, Canada - Contact address: Dr. P. Copper, Department of Earth Sciences, Laurentian University, Sudbury, Ontario, Canada P3E 2C6; phone: +1 705 675 1151 (ext 2267); fax: +1 705 675 4898; e-mail: gacmac99@nickel.laurentian.ca (see p. 14)

★June 13-24

XVIII CURSO DE POSTGRADO EN METALLOGENIA, Quito, Ecuador - Contact address: Dr. Jaime Jarrin, Universidad Central del Ecuador, Faculdad de Ingenieria en Geologia, Minas y Petroleos, Instituto Superior de Postgrado, Casilla 17-21-1405, Quito, Ecuador; phone: +593 2 557 814; fax: +593 2 566 738/500 306; e-mail: iinvest@uio.telconet.net (see p. 15)

★June 29-July 2

11TH INTERNATIONAL CONFERENCE OF THE GEOLOGICAL SOCIETY OF AFRICA, "Earth Resources for Africa", University of Cape Town, South Africa - Contact address: Congress Secretariat; phone/fax: +27 (0)11-4622384; e-mail: geoconf@gsa11.co.za

August 22-25 *SGA-SPONSORED*

5TH, BIENNIAL SGA MEETING AND 10TH IAGOD QUADRIENNIAL SYMPOSIUM, London, U.K. - Contact address: Dr. C. J. Stanley, Dept. of Mineralogy, The Natural History Museum, Cromwell Rd., London, SW7 5BD, U.K.; fax: +44 171 938 9268; e-mail: cjs@nhm.ac.uk (see pp. 19-24)

August 27-September 3

IGCP-373 FIELD CONFERENCE ON GEODYNAMICS AND MINERAL DEPOSITS IN UZBEKISTAN MURUNTAU, Kochbulak, Almalyk - Contact address: A. Kremenetsky, krem@sovam.com and R. Seltmann, seltm@gfz-potsdam-de (see p. 22)

★August 28-September 1

MIN WIEN 1999, Annual Meeting of the German Mineralogical Society (DMG) together with the Hungarian Geological Society (MFT) and the Austrian Mineralogical Society (OEMG), Wien, Austria - Contact address: MinWien 1999, Institute of Petrology, University of Vienna, Geozentrum, Althanstrasse 14, A-1090 Wien, Austria; phone: Secretary of the OC +43-1-31336-9174 e-mail: Mineralogie@univie.ac.at; website: http://www.univie.ac.at/ Mineralogie/Oemg.htm

★September 4-13

SEG-SPONSORED FIELDTRIP: EPITHERMAL MINERALIZATION IN THE TERTIARY VOLCANIC BELT OF THE WESTERN CARPATHIANS, Ungary and Slovakia - Contact address: Dr. Jeffery W. Hedenquist c/o SEG, 5808 South Rapp St., Suite 209, Littleton, CO 80120, USA; fax: +1 303 797 0417; e-mail: SEGhungary@aol.com (see p. 15)

★September 7-20

GEOCHIM: TRAINING COURSE IN EXPLORATION AND ENVIRONMENTAL GECHEMISTRY, Prague/Dolni Roiinka, Czech Republic - Contact address: GEOCHIM, Czech Geological Survey, Geologická 6, 150 00 Prague 5 - Barrandov, Czech Republic; phone: +420 2 581 7390; fax: +420 2 581 8748; e-mail: pasava@cgu.cz (see p. 15)

September 12-16

SUDBURY '99, MINING AND THE ENVIRONMENT II - Contact address: Sudbury 99, Centre in Mining and Mineral Exploration Research CIMMER), Laurentian University, Sudbury, Ontario P3E 2C6 Canada; phone: +1 705 673 6572; fax: +1 705 673 6508; e-mail: cmosher@nickel.laurentian.ca *or* bevans@nickel.laurentian.ca

★September 22-25

ENVIRONMENT 2000, Geosciences for Society, Halle (Saale), Germany - Contact address: Environment 2000, c/o Universitätszentrum für Umweltwissenschaften, Martin-Luther-Universität Halle, Moritzburgring 10, D-06 108 Halle (Saale), Germany; web site: http://www.gug.org

★November 3-5

INTERNATIONAL SYMPOSIUM ON GEOCHEMICAL AND MINERALOGICAL TRACERS, Santiago, Chile - Contact address: International Symposium on Geochemical and Mineralogical Tracers in Mining Exploration, ORSTOM. Casilla 53390, Correo Central, Santiago 1, Chile; phone: +56 2 2363 464; fax: +56 2 2363 463; e-mail: orstom@netline.cl (see p. 16)

2000

August 6-17

31ST INTERNATIONAL GEOLOGICAL CONGRESS, Rio de Janeiro, Brazil - Contact address: Secretaria Executive do 31° Congresso Geologico Internacional, Av. Pasteur, 404 - Anexo 31 IGC - Urca - Rio de Janeiro - RJ - CEP 22.290-240; phone: +55 21 295 5847; fax: +55 21 295 8094; e-mail: 31igc@31igc.org world wide web site: http://www.31igc.org

★May 21-24

5TH INTERNATIONAL CONFERENCE ON ACID ROCK DRAINAGE: Denver, CO, USA - Contact address: ICARD SME, PO Box 625002, Littleton, CO 80162-5002; phone: 800 763 3132 and +1 303 973 9550; fax: +1 303 979 3461

★September

GEOLOGY AND EXPLOITATON OF TIN DEPOSITS IN EUROPE FOR THE THIRD MILLENNIUM, Sokolov, Czech Republic - Contact address: Pavel Beran, Okresni muzeum a knihovna Sokolov, Zamecka ul. 1, 356 00 Sokolov, Czech Republic; fax: +420-16822217; e-mail: okmsokolov@mbox.vol.cz

2002

August

11TH IAGOD SYMPOSIUM, South Africa - Contact address: Dr. Hammerbeck, Council for Geoscience, P.B. X112, Pretoria 0001, South Africa; phone: +27 12 841 1130; fax: +27 12 841 1140; e-mail: ehammerb@geoscience.org.za

WISH TO ADVERTISE FORTHCOMING EVENTS? Send your announcements to SGA News

ANNOUNCEMENTS

MEETINGS, CONFERENCES, FIELD TRIPS AND SHORT-COURSES

COURSE ON MINERAL DEPOSITS IN THE VOLCANIC ENVIRONMENT

Lima, Peru

February 4-8 1999

Organized by the Geological Society of Peru, the course will consist of two day lectures given by Donald C. Noble followed by a fieldtrip to the mining district of Julcani, Huancavelica.
The main topics of the course will include: -Volcanic rocks, structures and systems; -Ore deposits in the volcanic environment; -Mineralogy and hydrothermal alteration; -Geochemical methods to evaluate ore prospects; -The ore district of Julcani: geology, ore deposits and potential

Registration fee: 1500 US$
Number of participants: 20-35
The course is addressed to geologists and exploration geologists
Owing to the location of the Julcani district (3800-4300 m a.s.l.) good physical condition and a rapid adaptation to altitude are advised.

Contact address: Sociedad Geologica del Peru, Comité de Actividades Cientificas, Arnaldo Marquez 2277, Jesus Maria, Apartado 2559, Lima 100, Peru; Tel.: +511 483 3947/261 4232; Fax: +511 261 2362; e-mail: sgp@inictel.gob.pe

EUG 10 - EUROPEAN UNION OF GEOSCIENCES

Strasbourg, France

March 28 - April 1 1999

In the frame of EUG 10, Theme H will deal with "Mineral Deposits - geology and genesis". This Theme includes the following Symposia:
H1. Geodynamic control of ore deposit formation in the Alpine-Carpathian-Dinaric-Balkan Region. Covenors: Franz Neubauer (Salzburg), franz.neubauer@sbg.ac.at, E. F. Stumpfl (Leoben), C. Tomek (Salzburg)
H2. Metallogeny of the Variscan Belt. Convenors: Jean-Pierre Milesi (Orléans), jp.milesi@brgm.fr, R. Moritz (Geneva)
H3. Genesis of platinum-group element (PGE) sulphide deposits. Convenors: Maryse Ohnenstetter (Nancy), mohnen@crpg.cnrs-nancy.fr, G. Kolonin (Novosibirsk)
H4. Industrial minerals - geology, mineralogy and exploration. Convenors: Tor Arne Karlsen (Trondheim), tor.karlsen@ngu.no, D. Highley (Keyworth)
H5. Ore deposit evolution in Europe. Convenors: Derek J. Blundell (Egham), blundell@gl.rhbnc.ac.uk, P. Weihed (Lulea)

NORDIC MINERAL RESOURCES SYMPOSIUM GOLD '99 TRONDHEIM "PRECAMBRIAN GOLD IN THE FENNOSCANDIAN AND UKRAINIAN SHIELDS AND RELATED AREAS"

Trondheim, Norway

May 4- 6 1999

Organised by The Norwegian University of Science and Technology (NTNU) and the Geological Survey of Norway (NGU) at the Geological Survey of Norway

You are invited to attend the Nordic Mineral Resources Symposium at the Geological Survey of Norway. The symposium will focus on the gold metallogeny of the Fennoscandian and Ukrainian Shields and related areas.

All enquiries concerning the meeting should be sent to:
Krister Sundblad, Dept. of Geology and Mineral Resources Engineering, NTNU, N-7034 Trondheim, Norway
Tel.: +47 73 59 48 09; Fax: +47 73 59 48 14;
e-mail: Krister.Sundblad@geo.ntnu.no

Oral and poster presentations on aspects of gold in the Fennoscandian and Ukrainian Shields and related areas are invited. Oral presentations will be 15 minutes plus 5 minutes for discussion. Abstracts should be submitted in English, both on paper and on diskette. Submissions via e-mail are welcomed. The length of abstracts should not be longer than 2 A4 pages of single spaced type and may include tables and diagrams. Abstracts should be mailed or sent by e-mail as soon as possible to the address given above. Authors are also encouraged to present their contributions as full-length papers for a special volume of Economic Geology 'Precambrian gold deposits in the Fennoscandian and Ukrainian Shields and related areas'.

Meeting programme:

Saturday 1st and **Sunday 2nd May**: Pre-meeting field trip to Precambrian gold deposits in central Sweden, including visit to the abandoned Enåsen mine (trip starts in Sundsvall, Sweden, May 1st and ends in Trondheim, 2nd May).
Monday 3rd May: Pre-meeting field trip to Løkken drillcore store. On display will be material from gold and gold-copper targets in Norway and Sweden on display
Tuesday 4th - Thursday 6th May: Scientific sessions.
Friday 7th and **Saturday 8th May**: Post-meeting field trip to gold deposits in the Precambrian of southern Scandinavia at Eidsvoll, Norway and Harnäs, Sweden (starts in Trondheim evening of Thursday 6th May, ends in Oslo in the evening of Saturday 8th May).

JOINT ANNUAL MEETING GEOLOGICAL ASSOCIATION OF CANADA -MINERALOGICAL ASSOCIATION OF CANADA

Laurentian University, Sudbury, Canada

May 26-28 1999

The 1999 Joint annual meeting of the GAC and MAC will be held in Sudbury, which is situated at the juncture of the Superior, Southern and Grenville provinces of the Precambrian Shield, close to the numerous mining camps of northeastern Ontario. Debate continues over the relationships between the 1.8 billion year extra-terrestrial impact, the Sudbury Igneous Complex and the rich nickel-copper ores. Planned keynote addresses will focus on such topics as the impacts of mining and geoscience research on our understanding of the Earth and its resources.

Abstracts
Authors will be able to submit their abstracts for both oral and poster presentations, from November 1, 1998 to January 15, 1999, via web site, e-mail or paper copy to the GAC-MAC Sudbury 1999 Registration Office. Abstracts may be submitted in English or French.

Symposia
1. Homogeneous and heterogeneous equilibria in magmas; 2. Precambrian terrane boundaries; 3. Advances in genetic models and exploration strategies for magmatic sulphide deposits, 4. Sudbury Ni-Cu-PGE ores and their emplacement environments: where we stand after 100 years; 5. Impact events and mass extinctions

Special sessions
1. Geophysical signatures of ore deposits; 2. Geochronology and stable isotope tools applied to large scale mineralization: problems approaches and solutions; 3. Large sills and melt sheets: dynamics of cooling and crystallization, 4. Actualistic and nonactualistic Precambrian sedimentary styles; 5. Tectonics of impact basin formation, with special reference to Sudbury; 6. Geological remote sensing and Radarsat; 7. Genesis of gem deposits; 8. World class Archean gold camps of the Canadian Shield; 9. Geochemistry of surficial materials: advances and applications to mineral exploration; 10. Earth science education and public awareness; 11. Environmental reclamation in mining camps; 12. Toward a new tectonic paradigm for the western Superior Province ; 13. Alteration facies of volcanogenic massive sulphide deposits; 14. 3D computing for the geosciences; 15. The Southern Province at 1 million years B.I. (Before Impact); 16. The physical environment of urban areas

General Sessions
-Stratigraphy and sedimentology; -Paleontology; -Economic geology; -Structural geology and tectonics; -Volcanology and igneous petrology; -Quaternary geology and geomorphology, -Mineralogy and crystallography; -Geophysics; -Hydrogeology and environmental earth sciences; -Remote sensing ; -Geographic information system
GAC Short Courses and MAC Short Courses have been also organized as well as 8 pre- and 11 post-meeting fieldtrips.

Contact address
GAC-MAC Sudbury 1999, Department of Earth Sciences, Laurentian University, Sudbury, Ontario Canada P3E 2C6
Tel.: +1 705 673-6572; Fax: +1 705 673-6508
e-mail: gacmac99@nickel.laurentian.ca
web site: http://www.laurentian.ca/www/geology/gacmac99.htm

XVIII CURSO DE POST-GRADO EN METALLOGENIA sponsored by UNESCO and SEG

Quito, Ecuador

June 13-24 1999

The XVIII "Curso de Post-grado en metallogenia" will be held, like the past editions, in Quito (Ecuador) under the sponsorship of UNESCO and, for the first time in the history of the course, also SEG.
The course is open to post-graduate students and professionals who have interests in metallogeny, mineral exploration and associated environmental problems. A limited number of candidates (5-10) from Latin America (including Central American and Caribbean countries) will be granted a fellowship by UNESCO for travel and lodgment expenses. Succesful candidates will be chosen by selection criteria based on their CV and involvement in topics related with the subject of the course.
Main language of the course: Spanish.
Instructors: Prof. L. Fontboté (Geneva, International coordinator of the course), Dr. F. Tornos (IGTE, Spain), Dr. M. Chiaradia (Geneva) and Dr. A. Paladines (Quito).
Preliminary dates:

13-19 June: Course in Quito
20 -24 June: Visit of selected ore deposits of Ecuador

The definitive program and dates of the course will appear in the beginning of 1999 at the following internet address:
http://www.unige.ch/sciences/terre/mineral/min_ore.html

Information on participation conditions and how to apply for an UNESCO-granted fellowship can be obtained under the above-mentioned web-site.

Applications must be sent to:
Dr. Jaime Jarrin J., Director de l'ISP
Universidad Central del Ecuador, Faculdad de Ingenieria en Geologia, Minas y Petroleos, Instituto Superior de Postgrado, CASILLA:17-21-1405, Quito, ECUADOR
Tel.: +593 2 557 814
FAX: +593 2 566 738 or 593 2 500 306
e-mail: iinvest@uio.telconet.net

SOCIETY OF ECONOMIC GEOLOGISTS-SPONSORED FIELD TRIP: EPITHERMAL MINERALIZATION IN THE TERTIARY VOLCANIC BELT OF THE WESTERN CARPATHIANS

Hungary and Slovakia

September 4-13 1999

Organized by the Department of Mineralogy, Eötvös L. University, Hungary, and Geological Survey of Slovakia.

The Au-Ag-base metal deposits of the Tertiary volcanic arc of the Carpathians were among the most important European sources of precious metals during the Medieval Ages. This field trip will examine three major areas of the arc in Hungary and Slovakia, with typical low- and high-sulfidation epithermal environments from the paleosurface down to subvolcanic levels. The 1400-km long journey will also provide an introduction to the Tertiary metallogeny of the Western Carpathians, and an opportunity for interaction between geologists of Central and Eastern Europe and other regions.
Field observations at outcrops and in quarries and mines will be preceded by review lectures from specialists working in each area. The program also includes underground visits to Medieval mines at Telkibánya, Tokaj Mts., at Hodrusa in the Banská Stiavnica region, and to the working Rozalia gold mine in the Stiavnica Stratovolcano central zone .

Programme:
5 September: Epithermal systems: Our present understanding (Eötvös L. University, Budapest): An introductory one-day lecture course presented by: Jeffrey W. Hedenquist (Geological Survey of Japan) & Antonio Arribas Jr. (Placer Dome Exploration)
6-8 September: Shallow levels of low-sulfidation epithermal systems of the Tokaj Mts., NE-Hungary
9 September: High- and low-sulfidation epithermal systems of the Mátra Mts., N-Hungary
10-13 September: Epithermal deposits of the Central Slovakian volcanic field

Coordinators: Ferenc Molnár (Eötvös L. University), Jaroslav Lexa (Geological Survey of Slovakia) and Jeffrey W. Hedenquist (Geological Survey of Japan).

Registration fee: US$ 1500. SEG-members, $1200; SEG and SGA student members, $800. Registration fee includes accommodation, meals, transportation in field from Budapest and return to Budapest, SEG guidebook, maps and social events. Limited funding is available to help support the participation of several students from regions with economic difficulties. The number of participants is limited to 25, on a first-come, first-served basis.

For details of the complete program and registration, plus application for student support, please send your Name, Affiliation, Address for Correspondence (including Fax and Email), and Status (SEG member, SEG or SGA student member) to:

Jeffrey W. Hedenquist, <SEGhungary@aol.com>, or by post, c/o SEG, 5808 South Rapp St., Suite 209, Littleton, CO, 80120, USA, fax 1(303)797-0417.

The deadline for registration is April 30 1999.

GEOCHIM: TRAINING COURSE IN EXPLORATION AND ENVIRONMENTAL GEOCHEMISTRY

Prague and Dolní Roínka, Czech Republic

September 7-20 1999

Organized by Czech Geological Survey, Prague and IGCP 429, with the support of UNESCO

Aims of the course
Certified postgraduate course aims at providing knowledge of important geochemical methods widely used in the prospecting for ore deposits and at showing their applications in the solution of environmental problems. Individual lectures covering various geochemical methods will be accompanied by practical field and also computer training. The course will be followed by a 3 day field trip visiting ongoing open and underground mining operations and processing plants as well as abandoned mining sites with the aim to demonstrate possible ways of effective usage of geochemical methods in both exploration and environmental issues.

✂.....

APPLICATION FORM FOR GEOCHIM

Name: .....
Surname: .....
Obtained degree: .....
Present position: .....
Institution: .....
Address: .....
.....
.....

Phone: .....
Fax: .....
E-Mail: .....
Male/Female (please tick): Male ❑ Female ❑
Date: .....Signature: .....

Return by March 15, 1999 to:
GEOCHIM, Czech Geological Survey, Geologická 6, 150 00 Prague 5 - Barrandov, Czech Republic

Contents of the course
Principles of exploration and environmental geochemistry, exploration and environmental applications of soil geochemistry, stream sediments, heavy minerals, biogeochemical, lithogeochemical, hydrogeochemical, geophysical and radiometric studies with practical field and computer training.

Official language of the course
English.

Other information considered relevant to the course
For technical reasons, the number of participants has to be restricted to 15 persons. Tuition fees including the cost of printed handouts is USD 100 for university postgraduate students, USD 200 for personnel from state agencies such as geological surveys and USD 400 for staff members of private companies. Accommodation, traveling and meals during the course will be covered by the organizer. International traveling to Prague is not included.
A diploma is awarded to each successful participant.

Place
Prague (2 days), Hotel Duo, Dolní Roínka (40 km North of Brno), double rooms.

Duration
7 - 20 September 1999

Application procedure
Applicants must have a good knowledge of English and the fundamentals of geochemistry. A BSc degree or equivalent is the minimum requirement. The application form together with short CV should be sent to organizers not latter than March 15, 1999. Letter of acceptance with detailed programme, travel and payment instructions will be sent to applicants in the second half of June, 1999.

Deadline for application
March 15, 1999

Contact address
GEOCHIM
Czech Geological Survey
Geologická 6, 150 00 Prague 5 - Barrandov
Czech Republic
Tel.: +420-2-5817390
Fax:+420-2-5818748
e-mail: pasava@cgu.cz
kribek@cgu.cz

INTERNATIONAL SYMPOSIUM ON GEOCHEMICAL AND MINERALOGICAL TRACERS

Santiago, Chile

November 3-5 1999

This International Symposium on Geochemical and Mineralogical tracers in the mountainous supergene environment applied to mining exploration is organized by the "Institut français de Recherche Scientifique pour le Développement en Coopération" - ORSTOM (France) and the Departamento de Geologia de la Facultad de Ciencias Fisicas y Matematicas de la Universidad de Chile.

OBJECTIVES: The symposium aims to present the most recent advancements and developments in the field of soil geochemistry and mineralogical tracers in stream sediments applied to mineral exploration.

ABSTRACTS: All abstracts must be in English. The deadline for submission of abstracts will be June 1st, 1999. Oral and poster presentations are planned.

LANGUAGES: English and Spanish.

REGISTRATION FEES: $US 250 until June 1st 1999, $US 280 after this date. Student participation $US 65.

FIELDTRIPS: Various field excursions to different areas of central and northern Chile are planned. Clear examples of differences among supergene environments and their impact on metal transport and dispersion will be presented.

CONTACT ADDRESS
International Symposium on Geochemical and Mineralogical Tracers in Mining Exploration, ORSTOM. Casilla 53390, Correo Central, Santiago 1 - CHILE
Fax: (562) 2363463 - Tel: (562) 2363464
e-mail: orstom@netline.cl

31ST INTERNATIONAL GEOLOGICAL CONGRESS

Rio de Janeiro, Brazil

SGA-COSPONSORED

August 6-17 2000

The 31st Session of the International Geological Congress - 31st IGC - will be held in Rio de Janeiro, Brazil, from August 6 to 17 of the year 2000, in cooperation with and under the scientific sponsorship of the International Union of Geological Sciences - IUGS. The 31st IGC is co-hosted by the Brazilian Geological Society, the Brazilian Ministry of Mines and Energy, Brazilian Ministry of Science and Technology, the Geological Survey of Brazil, Petrobras, the National Department of Mineral Production and important Brazilian government agencies, universities and scientific institutions. Industrial organizations and other South American countries will also be involved in the organization of the Congress.
The Conference shall take place at Riocentro, Rio de Janeiro, during the celebration of the 500th anniversary of the Portuguese venue to Brazil. The meeting is designed to create a forum for a broad debate of the most significant advances in the geological sciences and to promote a discussion of the theme "Geology and Sustainable Development: Challenges for the Third Millenium".

Registration Fees

Participating members	Accompanying members	Students in 2000
US$ 350	US$ 150	US$ 100

The fees include the right to attend scientific events associated with the Congress, to receive Congress publications and to take part in some of the social events specially organized for the Congress.

Scientific Program
The Scientific Program of the 31st IGC consists of Colloquia, Special Symposia, General Symposia, Short Courses, Workshops, and Field Trips.

Colloquia
Colloquia on "Geology and Sustainable Development: Challenges for the Third Millenium". Nine key addresses (titles are not final) will be given by technical-scientific authorities on general subjects as:
1) New perspectives for Mineral Exploration in the next century; 2) The energy problem and the search for renewable energetic resources; 3) Oil and gas exploration: new challenges for the future; 4) Geological challenges for soil conservation and management; 5) Myths and facts on global climatic changes; 6) Geological records of past climatic changes; 7) New trends in prevention of geological hazards; 8) Hydrological resources for the next century; 9) The role of geology for a sustainable society

Special Symposia
Each Special Symposia will consist of about eight invited papers on:
a) Origin and evolution of the Earth; b) Geosciences and human survival, environment, and natural hazards; c) Global changes and future environment; d) Structure of the litosphere and deep processes; e) Lithospheric motion; f) Global tectonic zones; g) Metallogenesis; h) Basin analysis; i) Energy and mineral resources for the 21st century; j) New technology for geosciences; k) Progress of international geoscience projects

General Symposia
General Symposia are designed to cover approximately the entire spectrum of the present geological activities and each of them is subdivided into 5 to 10 specific topics within the main theme. Each General Symposium will consist of a Poster Session accomodating all accepted contributions (afternoon) followed by an oral session (following day) with: i) Convener's address; ii) about 5 keynote speakers; iii) open discussion. General Symposia will address the following thematics:
1) Stratigraphy; 2) Paleontology and historical geology; 3) Sedimentology; 4) Marine geology and paleoceanography; 5) Structural geology and geomechanics; 6) Igneous petrology; 7) Experimental petrology; 8) Mineralogy; 9) Precambrian geology; 10) Metamorphic petrology; 11) Geology of mineral deposits; 12) Geology of fossil fuels; 13) Mineral economics; 14) Geochemistry; 15) Remote sensing; 16) Exploration geophysics; 17) Geotectonics, plate motions and regional geophysics; 18) Geochronology and isotope geology; 19) Seismogeology; 20) Quaternary geology; 21) Hydrogeology; 22) Engineering geology; 23) Environmental geology; 24) Mathematical geology; 25) Comparative planetology; 26) Geological education; 27) History of geosciences

Short Courses
Pre-Congress
i) The paleoichnological approach in geology; ii) Brazilian geology Part 1: Geology of Paleozoic cratonic basins and Mesozoic interior rifts of Brazil; iii) Geostatistics for geologists; iv) Coal and organic petrology - Principles, methods, and applications; v) Hydrogeology applications in developing countries; vi) INTERNET as a tool for geoscientists in developing countries; vii) Sustainable development of mineral resources

Post-Congress
Brazilian geology part 2: Geology of Brazilian Atlantic basins

Workshops
Pre-Congress
i) Granitic magmatism and associated mineralization; ii) Regional seismological assembly in South America; iii) Andean Symposium on neotectonic and paleoseismology; iv) Andean structural styles, v) Andean

magmatism and tectonics; vi) Andean metallogeny; vii) Andean basement and geophysics; viii) Deposit modeling and its role in sustainable development

Post-Congress

i) Andean volcanism and hazards - Manizales, Colombia; ii) IUGS Geosites: Geoconservation in support of Geoscience - A way to assist the conservation of world heritage

Presentation of communications

All papers must be presented in English.

Two types of contributions will be presented orally:

-those chosen by the conveners and invited to be included in the Special Symposia;

-those submitted independently and selected by the conveners to be presented orally, prior to the open discussion of the General Symposia.

Colloquia

The main subject of the colloquia will focus on the Congress Theme. The key presentations (50 minutes) will be delivered by invited geoscientists.

Special Symposia

The papers to be presented at the Special Symposia (20 minutes) will be delivered by invited speakers, but some of the contributions offered may be selected by the conveners for presentation within a Special Symposium.

General Symposia

All papers offered spontaneously and accepted by teh Scientific Program Committee will be presented as posters. Each General Symposium will consist of one (afternoon) poster session, followed by one session the following day, at which up to five specially invited oral presentation (30 minutes) will be given.

Field Trips

29 field trips before the Congress, 11 during and 46 after have been planned to various localities of geological interest of South America. The field trips will focus on the following themes:

I Alkaline complexes; II Coastal geology; III Continental correlation; IV Environmental and engineering geology; V Gemmology and mineralogy; VI Geohazards; VII Geomorphology; karst and caves; VIII Geotectonic and structural geology; IX Glaciology and ancient glacial deposits; X Granitoids; XI Hydrogeology and Hydrology; XII History of Geological Sciences; XIII Mafic and ultramafic complexes; XIV Medium- to high-grade metamorphism; XV Metavolcano-sedimentary sequences; XVI Mineral resources and ore deposits; XVII Paleontology and biostratigraphy; XVIII Petroleum and coal; XIX Regional geology; XX Sedimentary basins and sedimentology; XXI Seismology and geophysics; XXII Volcanology

Contact address

Secretariat Bureau - Casa Brazil 2000
31st INTERNATIONAL GEOLOGICAL CONGRESS
Av. Pasteur, 404 - Urca - Rio de Janeiro - RJ - Brazil
Cep 22.290-240 - Phone: +55 21 295 5847 - Fax: +55 21 295 8094
e-mail: 31igc@31igc.org - web site: http://www.31igc.org

Society of Economic Geologists Foundation Student Research Grants Available in 1999

Students of mineral resources throughout the world may apply for thesis research grants available in 1999 from the Society of Economic Geologists Foundation and the Society of Economic Geologists. Purpose of this research grant program is to provide partial support of master's and doctoral thesis research for graduate students. Grants from Hugh E. McKinstry Fund are awarded to support research with a substantial field component. The Hickok-Redford Fund awards grants for field projects in arctic, sub-arctic, or other challemging field areas. A third group of student research grants is in part funded by gifts from BHP Minerals. These provide funds for research in economic geology that focuses on new descriptive data on ore deposits, mining districts, and on topical subjects.

The 1999 awards total $30,000. Individual grants range from US$500 to US$3,000 and are intended to fund specific thesis research expenses.

Application forms may be obtained from the:

Chair, SEG Student Research Grants, 5808 South Rapp Street, Suite 209, Littleton, Colorado80120 USA.

Phone: +1 303 797 0332

Fax: +1 303 797 0417

e-mail: socecongeol@csn.net

Form also available on the web: http://www.segweb.org

Applications must be postmarked by 15 February 1999, and awards will be announced by 15 April 1999.

from 12: BOOK ANNOUNCEMENTS

Ore-Bearing Granites of Russia and Adjacent Countries

A.A. Kremenetsky, B. Lehmann, R. Seltmann (Editors)

Published by Institute of Mineralogy, Geochemistry and Crystal Chemistry of Rare Elements (IMGRE RAS), Moscow, 1998. With approx. 300 p., 170 Figures, 60 Tables, and 2 Appendices.
Price USD 60.- USD (incl. packaging and shipping); ISBN 58198-0002-8.

Pre-publication orders should be sent to: Dr. A. Kremenetsky <krem@imgre.iitp.ru>, IMGRE, 15 Veresaeva ul., Moscow 121357, Russia. Fax +7 095 443 9043

Summary

In this book some of the major granite provinces of Russia are covered, e.g., Kola-Karelia, Urals, Northern Caucasus, Transbaikalia, Kuznetsk Alatau, Tuva, Sakha-Yakutia, Yana-Kolyma, as well as those of adjoining regions, such as the Pamirs of Tajikistan, the Tien Shan of Kyrghyzstan, for Kazakhstan the Kokchetav massif and Central Kazakhstan, and Mongolia. The paleo-geodynamic setting of the granite series is outlined for each province. Geological, geophysical, petrological, geochemical, and isotopic features of ore-bearing granitoids and associated mineralizations (W, Mo, Sn, Cu, Au; Ta, Nb, Li, Rb, Cs, Be, REEs, Bi, Zr) are given.

The classification principles of genetic and economic features of the granite-related ore deposits are discussed. The location and distribution controls of these deposits are illustrated by an original schematic map. A brief description for more than one hundred major granite-related ore deposits of the former Soviet Union is given, including economic data on ore resources, mining production, uses, and applications. A larger part of the papers deals with various aspects of the evolution of granite-related ore-producing magmatic systems, as well as the anatomy and magmatic-hydrothermal mechanisms of ore deposition.

A technique for 3-d modeling of ore-bearing granitoid bodies down to a depth of 10 to 15 km is presented. Current data on geochemistry and isotopes (Sm-Nd, Rb-Sr) are given which help to clarify the role of crustal and mantle components in the formation of rare metal ore deposits, along with new experimental information on K, F, Cl, and other chemical parameters controlling the ore potential of silicic melt systems. New experimental data are presented on permeability of granitic rocks and on physico-chemical controls in the development of major types of metasomatic alteration.

This volume provides a first and hitherto unavailable overview of the geology and metallogeny of granite-related rare-metal deposits of Russia and adjacent countries. It is of interest to the mining community and all geoscientists, especially economic geologists, petrologists, and mineralogists. ◆

SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS

SGA Membership Application Form

I would like to become a member of the **Society for Geology Applied to Mineral Deposits (SGA)** and to receive my personal copy of *Mineralium Deposita*.

Surname/Corporation .....
First name .....
Title .....
Mailing address .....
.....
.....
Phone ..... Fax .....
E-mail .....
Date of birth..... Nationality.....
Degrees obtained from Universities or Colleges .....
.....
Present position .....
.....
Membership in other scientific societies .....
.....
Are you a member of the Society of Economic Geologists? (If yes, no sponsors are necessary) ❑ Yes ❑ No

❑ DM 98,- (~65US$)	Regular Member
❑ DM 68,-	Junior Member (up to 4 y after Ms. Sc., Ph.D.)*
❑ DM 38,-	Student Member (up to Ph. D., max. 4 years)*
❑ DM 68,-	Senior Member (after retirement)*
❑ DM 294,-	Corporate Member (includes 3 copies of *Mineralium Deposita*)

*Certificate required

If the application is approved by the SGA Council, I authorize the "Society for Geology Applied to Mineral Deposits" to charge the above amount (please tick)

to my ❑ Visa ❑ Mastercard/Eurocard ❑ American Express

Card No. ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry date ☐☐ ☐☐

Signature .....
Place and date .....
(If you do not intend to pay by credit card, an invoice will be issued after acceptance of your application)

Two SGA Sponsors (If you have difficulty in finding sponsors, please send this form to the Executive Secretary who will recommend sponsors)

Name, place, date, signature

SPONSOR 1 _____

_____

SPONSOR 2 _____

_____

Send the Membership Application Form to:

Dr. Jan Pasava
SGA Executive Secretary
Czech Geological Survey
Klárov
CZ-11800 Prague 1
CZECH REPUBLIC

Tel.: +420 2 58 17 390
Fax: +420 2 58 18 748
e-mail: pasava@cgu.cz

Join the SGA now...

The Society of Geology Applied to Mineral Deposits was established in 1965 by an international group of economic geologsts. Its Journal *Mineralium Deposita* is now recognized as a premier international mineral deposits journal.

GOALS

-The promotion of science of mineral deposit geology
-Personal contact of its members in order to exchange knowledge and experience
-Organization of scientific meetings, field trips, workshops. For these events, SGA members have reduced registration fees and in certain cases may apply for travel grants
-Cooperation with other scientific societies, especially with SEG and IAGOD
-Publication of *Mineralium Deposita* and scientific volumes

MEMBERSHIP

Membership in SGA is open to all persons interested in economic geology, mineral resources, industrial minerals and environmental aspects related to mineral deposits. SGA is an international society with global membership in over 50 countries. Members have reduced registration fees in SGA-sponsored events and in certain cases are eligible for travel grants. Subsides for publication of color plates in *Mineralium Deposita* also may be applied. Current membership fees are listed on the left-side column of this page.

MINERALIUM DEPOSITA

Editors: David Rickard (Cardiff, UK) and Richard Goldfarb (Denver, CO, USA).
Mineralium Deposita publishes papers on all aspects of the geology of mineral deposits. It includes new observations on metallic and non metallic minerals and mineral deposits, mineral deposit descriptions, experimental and applied inorganic, organic and isotope geochemistry as well as genetic and environmental aspectsof mineral deposits. *Mineralium Deposita* is published bimonthly. Fast publication: *Mineralium Deposita* publishes *Mineral Deposita Letters* within 3 months and regular papers normally within 4 months after manuscript acceptance and usually 6-9 months after manuscript submission.

..and receive

***MINERALIUM DEPOSITA* & *SGA* NEWS!!!**

Additional information in the SGA homepage on Internet:
http://www.immr.tu-clausthal.de/sga.html

SGA - IAGOD

International Meeting

MINERAL DEPOSITS: PROCESSES TO PROCESSING

Science and technology applied to mineral formation and breakdown, mineral processing and environmental problems

SGA
SOCIETY FOR GEOLOGY APPLIED TO MINERAL DEPOSITS
5th Biennial Meeting

IAGOD
INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS
10th Quadrennial Symposium

LONDON
22nd to 25th August 1999
Natural History Museum & Imperial College

ORGANIZING COMMITTEE

C. Stanley (NHM), A. Criddle (NHM), R. Herrington (NHM), B. Williamson (NHM), C. Stockley (NHM), F. Wall (NHM), T. Williams (NHM), J. Wilkinson (Imperial College), C. Halls (Imperial College), S. Mulshaw (Imperial College), J. Pasava (Prague, SGA) J. Aichler (Prague, IAGOD), R. Seltmann (Potsdam), D. Alderton (Royal Holloway), H. Colley (Oxford Brookes), A. Rankin (Kingston), I. McDonald (Greenwich), J. Naden (BGS), J. Richards (Edmonton), P. Scott (Camborne), R. Ixer (Birmingham), H. Prichard (Cardiff), E. Valsami-Jones (NHM), E. Stumpfl (Leoben), P. Herzig (Freiberg)

HONORARY ADVISORY COMMITTEE

H. Papunen (Turku), R. Grauch (USGS Denver), M. Stemprok (Prague), Z. Johan (BRGM), B. Lehmann (TU Clausthal), D. Rickard (Cardiff), M. Worthington (Imperial College), D. Buchanan (Imperial College), P. Henderson (NHM), A. Fleet (NHM), J. Plant (BGS), C. Rice (Aberdeen), D. Vaughan (Manchester), M. Pagel (Orsay), R. Foster (Southampton), N. White (BHP Minerals International), R. Sillitoe (London), M. Harris (Rio Tinto PLC), P. Gower (Billiton PLC), O. Bavinton (Minorco PLC), B. Yardley (Leeds), D. Blundell (Royal Holloway).

PATRONS

MINORCO, LONDON METAL EXCHANGE, BHP, RIO TINTO, BILLITON, GEOLOGICAL SOCIETY, MINERALOGICAL SOCIETY, SOCIETY OF ECONOMIC GEOLOGISTS.

SPONSORS

Natural History Museum, Imperial College, British Geological Survey, University of Birmingham, Oxford Brookes University, University of Kingston, University of Wales, Camborne School of Mines, Royal Holloway College, University of Greenwich, Applied Mineralogy Group.

INVITATION FROM THE ORGANIZING COMMITTEE

We invite all academic and professional economic geologists, geochemists, mineralogists and environmental scientists to come to this historic joint meeting of the SGA and IAGOD in London to discuss current research under the general theme: "Mineral Deposits: Processes to Processing".
The venue for the meeting is the main site of the Imperial College of Science, Technology and Medicine, home to the Royal School of Mines situated just to the south of Hyde Park in South Kensington, the cultural centre of London. 300 beds have been reserved in the recently upgraded student accommodation on campus and hotel accommodation is also available nearby. The nearby Natural History Museum with its recently redesigned Earth Galleries will be the location for a reception in the Rio Tinto atrium.

GENERAL INFORMATION

Travel to London

By air: London has five airports, Heathrow, Gatwick, City, Stansted and Luton. Busiest is Heathrow with excellent transport links by London Underground Piccadilly line to South Kensington (about £3-4) or by Airbus No 1 (£5 - ask for South Kensington). A taxi is about £35. Gatwick is further away and requires a train journey to Victoria Station (about £10) and a short ride on the District Line underground to South Kensington. Stansted and Luton are not so conveniently situated, while City airport caters mostly for business people.

By train: Direct rail links to London Waterloo through the Channel Tunnel from Paris and Brussels now exist. Waterloo to South Kensington is a short journey on the underground involving one change of line, or a £10 taxi ride. Other mainline stations serve trains picking up passengers from the ferries, notably Liverpool Street for trains from Harwich.

By bus: Scheduled coach services exist from Eastern and Central Europe and some Western European cities. The main terminus in London is Victoria Coach Station. This is only a few minutes from the underground and South Kensington is just two stops on the District Line.

By car: Although London is less congested with traffic at this time of year, parking is expensive. No car parking space has been booked at Imperial College.

Visas

Participants should check with the British Consulate or Embassy in their country as to whether they need a visa to enter the United Kingdom. If you need a letter of invitation from the Organizing Committee, please ask for this as soon as possible.

Weather

London in late summer can be warm and dry with the risk of the occasional thunderstorm, but remember that we have a maritime climate which is rather less predictable than continental climates. Bring a raincoat and umbrella, just in case!

SCIENTIFIC PROGRAMME

Sessions

There will be three days of oral and poster presentations with parallel sessions. The opening half day will be devoted to three or four plenary lectures.

1. Fluid inclusions and ore formation processes (COFFI) (R.Bodnar, J.Naden, J.Wilkinson, A.Rankin)
   - 1A. Applying thermodynamic models to understanding ore deposits (B.Yardley)
   - 1B. Ore mineralogy and paragenesis (Commission on Ore Mineralogy; Paragenesis Commission) (A.Criddle & R.Hagni)
2. Organics in the formation of mineral deposits and remediation of mining sites (IGCP 429) (A. Gize, J.Pasava & A.Fleet)
3. Ore-bearing granitic systems: anatomy and magmatic-hydrothermal evolution (IGCP 373 and WGTT) (R.Seltmann, C.Halls, & M.Stemprok)
4. Volcanism and mineralization: terrestrial and submarine (R.Herrington & R.Hill)
5. Ore-forming processes associated with mafic, ultramafic and alkaline rocks, carbonatites, and kimberlites (IGCP 427, CODMUR) (H.Prichard, F.Wall, C.T.Williams, & I.McDonald)
6. Sediment-hosted mineral deposits (J.Wilkinson & D.Cooke)
7. Metamorphism and ore formation
   - 7A. Processes and scales of remobilisation in metamorphosed ore deposits (N.Cook, B.Marshall & P.Spry - Working Group on Ores and Metamorphism)
   - 7B. Metamorphogenesis and other fluid-related syn-metamorphic mineralising processes (N.Cook, B.Marshall & P.Spry - Working Group on Ores and Metamorphism)
   - 7C. Skarn deposits - worldwide contrasts and similarities (L.Meinert, K.Sundblad & Khin Zaw- Working Group on Skarns)

8. Processes of formation and geology of industrial mineral deposits (COFAB) (P.Scott, S.H.B.Clark, & S.Akande)
9. Technological advances in mineral processing (R.Pascoe & R.Ixer)
10. Environmental aspects of mineral deposits (E.Valsami-Jones)
11. Timing of ore-forming processes, palaeoenvironmental change and geochronology (Commission on Manganese)
-Time-preferential ore deposits and palaeoenvironmental changes (N.Beukes)
-Timing and duration of ore processes - contributions through radiometric dating (H.Stein & J.Hannah)
-Sequence stratigraphy of ore deposits (C.Amstutz)
12. Geodynamics and ore deposit provinces (GEODE) (F.Neubauer & D.Blundell)
13. Open session

Workshops and Short Courses
Co-ordinator: Dr D.H.M.Alderton E-mail: D.Alderton@rhbnc.ac.uk
For pre-meeting and post meeting short courses and workshops please pre-register your interest with the co-ordinator above.

Pre-meeting

S1. Mineralogy of Russian Diamond Deposits
Course leader: Dr T.V. Possukhova, Moscow State University, Russia
1. Geological structure and petrological and mineralogical peculiarities of the Yakutian kimberlites (Mir and Udachnaya pipes) including characteristics of the diamonds, coexisting minerals, and xenoliths of mantle rocks; 2. Geological position, petrological characteristics and mineralogy of the Arkhangelsk kimberlite province (M.V.Lomonosov deposit) including morphology and quality of diamonds, chemistry of minerals associated with diamonds and minerals from kimberlite groundmass; 3. Geological position and mineralogical characteristics of placer deposits (Timan, Ural, North Yakutia) including morphology and quality of diamonds, chemistry and morphology of coexisting minerals, hypotheses of origins.
August 22nd. Minimum 12 participants. Cost £75.

S2. Unconventional Platinum Group Minerals
Workshop Leader: Prof J.J.Jedwab, Université Libre de Bruxelles, Belgium [also involving A.Criddle, J.Spratt, & C.T.Williams, Natural History Museum]
1. Introductory lecture on unconventional PGMs and PGE-containing minerals, undefined compounds and associations. Including special detection techniques, types of compound and tentative classification, localities, typical deposits, origins, etc.; 2. Demonstration of Platinum Group compounds under the reflected light microscope; 3. Demonstration of Platinum Group elements with back scattered SEM or electron microprobe.
August 22nd. Minimum 10, maximum 30 participants. Cost £100.

S3. Quantitative Analysis of Hydrothermal Alteration: Applications in Mineral Exploration
Course leader: Dr Hans E Madeisky, HEMAC Exploration, Canada
Lithogeochemical exploration, like every other geochemical method, depends on recognizing element concentrations and distribution patterns which are significantly different from local background in order to identify prospective exploration targets. In order to separate the background variations in the geochemistry of unaltered rocks from the variations superimposed by later hydrothermal alteration, a new method of analyzing whole-rock geochemical data has been developed. It is an adaptation of a petrologic modelling technique originally designed to study mass transfer processes in igneous systems. The fractionation models used by that technique have been adapted for use in lithogeochemical exploration. By quantifying hydrothermal alteration, this method can identify lithogeochemical vectors which point to the core of a hydrothermal system and, if it exists, to mineralization. The method has been applied to deposits hosted in a variety of terranes, with metamorphic grades ranging from greenschist to upper amphibolite. Deposit types include volcanic- and sediment-hosted massive sulphide, volcanic-hosted epithermal gold, mesothermal vein, carbonate-hosted (Carlin type) gold, porphyry Cu-Au and Archaean shear zone hosted gold deposits.
August 22nd. Minimum 10 participants. Cost £150.

S4. Genetic Mineralogy of Gold from Hydrothermal Deposits and Deposits in the Weathering Profile.
Workshop Leader: Prof E.M.Spiridonov, Moscow State University, Russia
First lecture. Main types of gold deposits: plutonogene (mesothermal), volcanogene, volcano-plutonogene, epithermal (telethermal) and crust of weathering. (1-1.5 hours).
Second lecture includes the following items (2-3 hours): 1. Mineralogy of the Au-Ag-Hg system (Stepnyak, Dzhelambet, North Aksu, Kwartzitovye Gorki in North Kazakhstan; Kyuchus in Yakutia; Baley in Transbaikalia; Berezovsk at the Urals; Muruntau in Uzbekistan and other Au deposits in Eroupe and Asia and others); 2. Mineralogy of the Au-Cu system (Zolotaya Gora, Zhelannoe at the Urals and others); 3. Mineralogy of the Au-Bi and Au-Sb systems (Bestyube in North Kazakhstan; Golgotay in Transbaikalia; Zarmitan in Uzbekistan; Sarylakh and Sentachan in Yakutia and others).
Third lecture includes the following items (2-3 hours): 1. Mineralogy of the Au-Ag(Cu)-Te system (Zhana-Tyube, South Aksu, Karaagach in Kazakhstan; Kochbulak in Uzbekistan; Kochkar at the Urals; Zod in Armenia and others); 2. Mineralogy of the Au-Ag-Se,S system (Maykain in Kazakhstan; Zavodinskoe at Altay; Przhedborzhitze in Czech Republic and others); 3. Au-Ag-Bi-Pb-Tl-As-Sb complex sulfides; 4. Au(Ag)-Cu(Fe)-Te(Pb,Bi,Sb) minerals (Aginskoe, Ozernovskoe and other deposits of Kamchatka; Pioneerskoe in Sayans; Kalgoorlie and others).
Lectures are accompanied by demonstration of numerous slides, samples and polished sections.
August 22nd. Minimum 5, maximum 30 participants. Cost £100.

S5. Introduction to Organic Processes Related to Ore Deposits
Course Leaders: J.Leventhal (USGS, Denver), A.Gize (University of Manchester)
The short course is divided into two 1/2 day sections.
The first section will be an introduction to organic processes in the Earth's crust, which will assume no prior knowledge of organic geochemistry. The processes covered will include transformations between the biosphere and the geosphere, and the different types of organic-metal interactions which occur. Special emphasis will be placed on soil organic matter (e.g. humic materials) and their metal interactions. The second section will be an advanced introduction to applications of organic geochemistry and petrology to ore deposit studies. Topics to be covered will include Mississippi Valley-type Pb-Zn, SEDEX-type, Carlin type Au, Kupferschiefer, and uranium deposits. Emphasis will be placed on their genesis, analytical methods, and their interpretation (chromatography, mass spectrometry, microscopy) and carbon-sulphur-iron relationships.
August 22nd. Minimum 25. Cost: section 1, £40; section2, £50.

S6. Volcanic Hosted Massive Sulfide Deposits (VHMS)
Course Leaders: Prof Ross Large, Associate Prof Tony Crawford, Drs Jocelyn McPhie & Bruce Gemmell, Centre for Ore Deposit Research, University of Tasmania
1. Styles of Australian VHMS deposits, including Cu-rich types, Zn-Pb rich types and gold-rich types; 2. Examples discussed include Rosebery, Hellyer, Que River, Henty, Mt Lyell (Tasmania); Thalanga, Mt Chalmers , Mt Morgan (Queensland); Scuddles, Gossan Hill (Western Australia). Comparisons are made with other global VMS districts; 3. Tectonic environments and volcanic geochemistry; 4. Volcanic facies architecture of VHMS districts; 5. Alteration styles and geochemistry; 6. Genetic models and comparisons to current seafloor hydrothermal systems; 7. Mineral exploration case histories and key criteria.
2 day course 21-22 August. Minimum 10, maximum 40. Cost: £300.

S7. Fe-Oxide Cu-Au Deposits - (The Candelaria - Ernest Henry - Olympic Dam Family)
Course Leaders: Patrick J. Williams and Peter J. Pollard (Economic Geology Research Unit, James Cook University, Queensland, Australia)
Are you interested in the magmatic versus amagmatic debate for Fe oxide-Cu-Au deposits (e.g. Candelaria, Olympic Dam and Ernest Henry) and are you labouring under the misconception that the Cloncurry Cu-Au deposits such as Ernest Henry are hosted in banded iron formations? Are you unaware of evidence that Broken Hill-type deposits may have been transported to their current locations by the same sorts of hot high salinity fluids that formed these distinctive Cu-Au deposits? This short course is for you if you are intrigued by any of these questions or would simply like to know more about the essential geology of the newly recognized class of Fe-rich Cu-Au deposits that is particularly well represented in Australian Proterozoic rocks. The course presenters have recent hands on research experience in several of Australia's very largest ore systems (e.g. Broken Hill, Cannington, Ernest Henry, Olympic Dam) and are also studying Fe-rich Cu-Au systems in younger rocks (e.g Ertzberg-Grasberg complex, Irian Jaya). They will outline some major advances in understanding of Fe oxide-Cu-Au deposits that have occurred in the last few years including unpublished results of large industry-funded research projects in the Mount Isa - Cloncurry province that will be available for the first time in an international public forum.
August 22nd. Minimum 10, maximum 30. Cost £150.

During meeting

The role of deep lithospheric structure in the origin of large and superlarge ore deposits
Workshop leaders: J.Kutina, Pei Rongfu, D.V.Rundqvist and P.Laznicka
This will incorporate CTOD/IGCP-354 together with CTOD WG5 "Remote sensing methods for Tectonics and Ore Prospecting".
25th August (provisionally) All welcome. No charge to registrants for meeting.

Post meeting

S8. Proterozoic Sediment-Hosted ('SEDEX') Zinc-Lead-Silver Deposits
Course Leaders: Drs Peter McGoldrick, Stuart Bull, David Cooke, Prof Ross Large (Centre for Ore Deposit Research, University of Tasmania) and Dr Martin K. Neudert (School of Natural Resource Sciences, Queensland University of Technology)
26th August: 1. Introduction (McGoldrick); 2. Geology and zinc-lead-silver deposits of the Carpentaria Zinc Belt of northern Australia (Bull, Neudert & McGoldrick); 3. Detailed 3D sub-basin reconstruction of the area around HYC (Neudert); 4. Mount Isa Group sedimentology, setting, depositional /diagenetic/ alteration processes (Neudert).
27th August: 5. Geochemistry of metal transport in SEDEX deposits (Cooke); 6. Lithogeochemical and isotopic halos to northern Australian SEDEX' deposits (Large & McGoldrick); 7. SEDEX genetic models for HYC and Lady Loretta

(Large and McGoldrick); 8. Diagenetic models for HYC and Mount Isa mineralisation (Neudert); 9. Geochemistry of metal transport in SEDEX deposits (Cooke); 10. Differences between Broken Hill type and SEDEX Zn-Pb deposits (Large and Cooke).
2 days 26 -27 August. Minimum 15, maximum 40. Cost: £300 or single day at £180.

FIELD EXCURSIONS
Please pre-register an interest in taking part in any of the field excursions with the named organiser (underlined) by e-mail or fax. All excursions are offered on a first come, first served basis.

Pre-meeting
A1. Massive sulphide deposits of the Southern Urals
10 - 19th August, 1999.
Start and end: Miass, Chelyabinsk district, Russia.
Leaders: Prof Viktor Zaykov, Institute of Mineralogy, Urals Branch, Russian Academy of Sciences, Miass, Chelyabinsk district, 456301 Russia [fax: +7 35135 50286; e-mail: zaykov@imin.urc.ac.ru] or Dr Richard Herrington, Department of Mineralogy, Natural History Museum, Cromwell Road, London SW7 5BD [fax: +44 171 938 9268; e-mail: R.Herrington@nhm.ac.uk].
Cost: £700 per person not including transport from London to Ekaterinburg and back [current Apex fare London-Ekaterinberg-London with Lufthansa is about £500 - cheaper flights can be booked with Aeroflot or Transaero].
Excursion will visit classic Cu-Zn 'Uralian-type' massive sulphides (several deposits more than 100 million tonnes at 3-5% Cu+Zn) and Cu-Zn-Ba-Au 'Kuroko-type' deposits (largest 20 million tonnes at 8-10% Cu+Zn, 3-5g/T Au and 15-30g/T Ag). Three days will be spent in the northern part of the south Urals at Uchaly, Molodyezhnoe open pit Cu-Zn deposits, Uzelga underground Cu-Zn deposit and Urazovskoe Mn deposit. The remainder of the visits will be further south at Sibay and Yubilenoye Cu-Zn open pits, Tash Tau, Alexandrinka Cu-Zn-Ba-Au open pit deposits. Further visits may include the Fayzullino, Kyzyl-Tash Mn open pits. Drill core displays are planned from new deposits.

A2. Gold and massive sulfide deposits in the Middle Urals
15 - 19th August
Leaders: Vladimir N. Sazonov and Nikolai S. Bortnikov [Bortnikov@igem.msk.su].
Maximum and minimum numbers of participants: 20. Cost per person: £700.
Start at: Ekaterinburg, August 15; End at: Ekaterinburg, August 19.
[NB. Travel expenses between Ekaterinburg and London are not included, current Apex fare London-Ekaterinburg-London with Lufthansa is about £500 - cheaper flights can be booked with Aeroflot or Transaero].
The Berezovsk deposit, the largest gold-quartz deposit in the Urals has been mined for 250 years. The deposit, which has an annual output of up to 2t Au, is situated within Berezovsk town which is on the east side of Ekaterinburg. The numerous ore veins of the deposit have been fully worked to 100-250 m below the surface. The Berezovsk deposit is considered to be a typical intrusive-related mesothermal vein gold deposit located within the Urals Paleozoic fold belt which is composed of greenstones and granites. The area of ore field consists of both volcanogenic and sedimentary rock. The Saf'anovka copper massive sulfide deposit is located 100 km NE from Ekaterinburg-city. It was discovered in 1985. Explored reserves of ores are 27.5 mt at the average Cu content of 3 %. It is within the East Uralian depression accreted between continental gneiss-schist blocks. The deposit is hosted by the volcaniclastic unit of Devonian age which consists of fluidal clastic lavas, dome breccias, tuffs of tholeiitic dacites, rhyolite-dacite tuffs and siliceous pelites. Intrusive rocks and dykes are rare and are represented by K-diabases, lamprophyres and granodiorites. Massive sulfide ores form a lenticular chain of lens-like bodies from 0,3 to tens of metres thick in wall-rock of metasomatically altered tephroites. The main ores are: copper stringer ore, copper-zinc and copper massive sulfide ores, copper-zinc disseminated ores and ore columns. Massive, banded, breccia-like and colloform fabrics are typical. Ores consist of pyrite, chalcopyrite, sphalerite, tennantite (+tetrahedrite), enargite, pyrrhotite, galena, tellurides, arsenopyrite, native gold.
August 15-17th: Underground tour of Berezovsk giant gold deposits and examination of surface outcrops at the associated Pyshminsko-Kluchevsk copper-cobalt and Shulginsk gold-quartz deposits.
August 18th: Travel by bus to the Saf'anovka mine and examination of geological traverses of ore-hosting volcanogenous units along highway.
August 19th: Field trip to visit the Saf'anovka massive sulfide deposit (open pit and outcrops). Drive back to Ekaterinburg.
August 20th: Departure from Ekaterinburg.

A3. Mineralisation in Wales
Leaders: Howard Colley [hcolley@brookes.ac.uk] & Simon Dominy.
Start: Oxford rail station, Tuesday August 16, 1999 at 10am.
End: Oxford rail station, Saturday August 21, 1999 at 5pm.
Cost: £290
The excursion costs cover transportation, hotel accommodation, breakfast and dinner but lunch is not included. The tour will be by minibus, starting and finishing in Oxford. Oxford is easily reached by rail and bus from London and by bus from Heathrow and Gatwick airports. Visits will be made to a number of sites of mineralisation in Wales and will look at geological features and historical aspects of the mining. Most of the sites are no longer actively mined but we do hope to have underground visits at the Gwynfynydd and Ogofau gold mines. Stout footwear and waterproof clothing is essential. The excursion will visit as many as possible of the following localities in the time available: Parys Mountain Cu-Pb-Zn-Ag mine (Anglesey); the Llanrwst Pb-Zn mining field; the Dolegellau gold belt (Coed-y-Brenin porphyry Cu prospect and Gwynfynydd and Clogau Au mines); the Harlech Dome bedded manganese slate; the mid-Wales Pb-Zn mining field; and the Ogofau gold mine.

A4. Zn-Pb-Ag deposits of Ireland
August 18th-20th 1999
Leader: Dr Jamie Wilkinson [j.wilkinson@ic.ac.uk] and Dr Garth Earls
Duration: 3 days. Limit: 16 people. Cost: £180 (excluding any London to Dublin flights, including 3 nights accommodation).
Trip starts and returns to Dublin. The evening of 17th needs to be spent in Dublin as it will be an early start on 18th.
Provisional Itinerary:
18th - Navan: geological talk, underground visit and core examination
19th - Galmoy Deposit: geological talk, underground visit - Lisheen Deposit: geological talk, core examination
20th - Silvermines, outcrop and core examination - Kildare district mineralization.

A5. Metallic and industrial mineral deposits of the northern Fennoscandian/Baltic Shield
August 13th - 19th 1999.
Leaders: Peter Sorjonen-Ward [Peter.Sorjonen-Ward@gsf.fi] (Geological Survey of Finland) and Par Weihed (Geological Survey of Sweden).
Duration: 7 days. Cost: £600 (excluding flights to and from start and end points)
Starting point: Kuopio, Finland morning of 13th, or Kemi, Finland morning of 15th. End point: Kemi or Rovaniemi, Finland, afternoon of 19th.
A trip commencing from Kuopio on August 13th would emphasize industrial minerals including the late Archaean Siilinjarvi carbonatite, Proterozoic talc, kyanite and soapstone operations, recent reappraisals of the Outokumpu Cu-Zn-Co deposits, a recently delineated kimberlite province and several greenstone-hosted mesothermal gold and nickel deposits, before arriving in Kemi on August 15th. From Kemi, the excursion would continue through Finnish and Swedish Lapland to examine a range of early Proterozoic mafic intrusive complexes, including the Kemi chromite mine, early Proterozoic greenstone-hosted Au and Au-Cu deposits and the Kiruna district, returning to Kemi on August 19th to connect with flights via Helsinki to London.

Post-meeting
B1. Metalliferous and industrial minerals in Cornwall, England
Leaders: P.Scott, [pscott@csm.ex.ac.uk], R.Shail and C.Halls.
Depart London Thursday 26th August (am) travel to Redruth.
Introductory lecture and reception (?) in CSM Museum late pm and evening.
Fieldwork Friday 27 and Saturday 28th August. Fieldwork Sunday 29th August (am). Depart for London (pm) from Redruth.
Cost: £220 each (including Standard Class train fare from London, bed and breakfast for three nights and minibus transport in Cornwall). Lunches and dinner are not included. Minimum 12, maximum 25.
The main features of the Variscan orogeny (metasediments, granites, ophiolite complex) and associated mineralisation (Sn, W, Cu, and others) will be examined, along with the associated china clay (kaolin) deposits.

B2. Geology and mineralisation of the Shetland ophiolite
Leader: H. M. Prichard [sglhmp@cardiff.ac.uk].
Duration 4 days. Participants: maximum 27, minimum 18.
Cost:-£255 per person includes travel on Shetland and Hotel accommodation with breakfast and evening meal but does not include travel from London to Shetland or lunches.
Starting point, Lerwick, Shetland at 8am on Friday 27th August.
Travel to Shetland is possible by air on Thursday 26th August or by train to Aberdeen and ferry to Lerwick arriving at 8am on the 27th. End point, Lerwick, Shetland, 3pm on Tuesday 31st August.
The excursion will take place on the most northerly of the Shetland islands on Unst and Fetlar. The itinerary will include the igneous geology of the Shetland ophiolite from mantle through layered dunite, pyroxenite and gabbro, to the dykes in the top of the gabbro. Podiform chromitites in the mantle and overlying crustal sequence will be visited. Sites with platinum-group element (PGE) mineralisation will be examined including the Cliff locality which hosts anomalous total PGE concentrations of 10s of ppm. The underlying melange, and emplacement contact of the ophiolite with the basement, will be seen at several localities revealing the varying development of the contact aureole at different grades up to pyroxene-garnet grade on the Island of Fetlar. The order of visits will depend on tides and weather.

B3. Scottish mineral deposits
Leaders: Clive Rice [gmi118@abdn.ac.uk] (Aberdeen Univ.), Graham Smith (BGS).
Duration: 4 days. Cost/person: Estimate £320. Maximum/Minimum number: 18-12.
Start: 7.30am, 26th August, Imperial College, Exhibition Road, SW7.
End: Mid-evening, 29th August, Imperial College, Exhibition Road, SW7.
Thursday 26 August: Leave London 7.30am. Arrive for dinner Millcroft Hotel, Gairloch, N.W. Scotland. Friday 27 August: Loch Maree Group at Gairloch.

Saturday 28 August: Leave Gairloch for Aberfeldy, Perthshire. Foss Baryte Mine. Sunday 29 August: AM. Cononish gold development near Tyndrum (if open); PM. Return to London.
The Proterozoic (c. 2by) Loch Maree Group at Gairloch is a varied group of metagreywackes and metabasalts which overlie Archaean gneiss and are, in turn, overlain by Torridonian sandstones (c. 1by). The group contains a subeconomic volcanogenic massive sulphide (Cu-Zn-Au) deposit, BIFs and Mn-rich sediments. The day will consist of a traverse across the Group examining the diverse rock types (Jones et al., 1987). The Foss baryte mine is the largest baryte producer in the UK and is a major supplier to the N. Sea Oil Industry. The mineralisation is of the SEDEX type and consists of a strongly deformed, high grade, baryte bed about 4m thick, hosted by the Neoproterozoic Ben Eagach Schist Formation. The baryte bed is associated with barium-enriched muscovite schist, quartz-celsian rock and also carries some sulphides. The open pit and underground operation will be visited (Coats et al., 1980). The Cononish gold-silver deposit is the most important precious metal deposit so far discovered in Scotland (Earls et al., 1992). The mineralisation (c. 500,000t @ 10g/t) occurs in the Eas Anie quartz vein and may be of Lower Devonian age. The vein is hosted by Neoproterozoic psammites and pelites. The precious metal phases comprise tellurides, electrum, native gold and silver and these correlate with sulphides which are mainly pyrite, chalcopyrite, sphalerite and galena. This visit depends on the underground workings being open.

B4. Geology of the main ore deposits of SW Iberia
Leaders: Fernando Tornos, [ftaitge@iponet.es], Juan Locutura (ITGE, Spain) and Luis Martins (IGM, Portugal). Visits are organized in conjunction with the mining companies and research geologists.
Duration: 5 days. Cost per person: £300 (NB. Does not include flights to Madrid or Seville).
Maximum and minimum numbers of participants: 20-8.
Start: Seville, 27 August, 08.00. End: Seville, 31 August, 20.00. The trip will finish in time for trains and flights to Madrid.
This classic field trip includes visits to several representative deposits of the Iberian Pyrite Belt as well as some mineralized sites in the nearby Ossa Morena Zone. The Iberian Pyrite Belt is one of the major ore districts in the world with more than 1700 Mt of volcanic-related massive sulphides, currently worked for pyrite, base metals, tin and gold. However, the geologic setting is rather different from that of the Kuroko, Canadian or Australian metallogenic provinces. The visit will include most of the mines currently operating in the Iberian Pyrite Belt in both Spain and Portugal including the mines of Rio Tinto, Tharsis, Aljustrel, Neves Corvo and Aguas Tenidas as well as some selected outcrops. The Ossa Morena Zone is very different from the Pyrite Belt; only one deposit, the Cala mine, will be visited but outcrops and drill cores of other recently discovered mineralizations will probably be shown.
This preliminary schedule as well as the total cost may be modified depending on how mining operations develop, and the total number of people interested. The cost includes hotels (5 nights, from 26/8 to 30/8), field lunches (5) guidebook and local transport. It does not include travel from London to Seville. There are direct flights between London and Seville or Madrid and a high speed train from Madrid to Seville.
Further information: Fernando Tornos (ftaitge@iponet.es) or fax +34-23-265066.

B5. Epithermal and porphyry mineralisation in the northern and southern Aegean
Leaders: J.Naden, (British Geological Survey) [j.naden@bgs.ac.uk], Yannis Cheliotis (Institute of Geology and Mineral Exploration, Greece), Stephanos Kilias (University of Athens).
Cost approx.: £850 inclusive of air fares to and from London, accommodation (room only basis) and transport within Greece.
Participants: Minimum 15 , Maximum 20.
Dates: 26th August to 3rd September.
The excursion will be an opportunity to compare epithermal and porphyry mineralisation in the northern Greece with a modern geothermally active analogue -- Milos Island. In northern Greece, planned localities to visit include high-sulphidation epithermal gold, porphyry-Au--PGE and replacement base metal deposits. On Milos Island there will be an opportunity to examine synsedimentary Mn-Ba deposits, low-sulphidation epithermal mineralisation and see the effects of large scale hydrothermal activity.
Flights will be from London to Athens with onward transport (plane or ferry) to Milos (3 days). The excursion will then move to northern Greece (Milos-Athens-Thessaloniki) and visit mineralisation in the Kassandra peninsula (2 days) and Thrace (2 days). Return to London will be via Thessaloniki. Depending on demand, it will be possible to arrange a spare day for people to visit Athens, but this will add an extra day to the trip. For further information and itinerary details contact: Jonathan Naden (j.naden@bgs.ac.uk) Fax: +44 (0)115 936-3163.

B6. Au, Ag and Cu Deposits of Uzbekistan (IGCP 373 - Field Conference)
Start: Tashkent 27 August a.m.; End: Tashkent 3 September a.m.
Maximum number of participants including leaders is 30.
Cost: USD 1000.- including local flight, accommodation and food [not included is the London to Tashkent flight that will be block booked when numbers are known and will be about £450-£550]. The trip is co-sponsored by IGCP, UNESCO, IAGOD and others.
Organizing committee:
T. Sh. Shayakubov, Honorary Chairman (State Committee for Geology and Mineral Resources, Tashkent, Uzbekistan)
R. Grauch (USGS Denver, USA, Co-leader IGCP-373)
R. Seltmann (GFZ Potsdam, Germany, IGCP-373 Leader)
Responsible leaders of the field excursion:
F. Islamov, B. Isakhodjaev, A. Juraev (Tashkent, Uzbekistan)
A. Kremenetsky (IMGRE Moscow, Russia; Co-leader IGCP-373)
Aug. 27: Arrival of the participants individually or by block-booked flight from London and meeting at the Tashkent airport in the morning. Rest day in Tashkent (breakfast, lunch and dinner); departure for Zarafshan / Kyzyl Kum by plane (Yak40, 20:30 local) and accommodation in a hotel in Zarafshan or in a rest house of the Muruntau Co. (for three nights).
Aug. 28: Bus excursion (about 90 km) to the Daughyz open pit (Au-Ag) and, probably, Vysokovol'tnoe, with return to Zarafshan in the evening; night in hotel in Zarafshan. The Daughyztay ore is classified as of Au-sulfide type. This is a mineralized zone about 2.5 km long and 100 through 450 m thick that comprises en echelon-sited series of orebodies (10-30 by 200-500 m). Mineralization is represented by Au-pyrite-arsenopyrite disseminations. Vertical range of the ore zone is approx. 650 m. The average Au content varies from 5 through 10 ppm.
Aug. 29: Excursion to the Muruntau pit (travel by bus, about 50 km): before lunch – visit of mine and open pit; after lunch – visit to the full cycle gold metallurgy plant. Night in hotel in Zarafshan. The Muruntau ore is classified as of Au-quartz type. This is a giant stockwork formed by quartz veins and veinlets combined with quartz-microcline wall rock metasomatites. Ore zones are hosted by meta-terrigenous carbonaceous sequence of O2-S1 age. The stockwork is a complicated pattern of large sub-vertical ore pipes and low-angle thin (linear) zones. Length of the ore zones varies from 800 to 1350 m at width of up to 750 m; maximum traced depth 1100 m. Contents of sulfides in ore is low; average Au/Ag proportion is 4:1. Average Au content varies from 1 through 29 ppm, Ag 0.8 through 7.2 ppm, WO3 0.003 through 0.6 %.
Aug. 30: Early breakfast and trip (about 5 hours) to Samarkand by bus; lunch and sightseeing visit (3 hours) to the historical city of Samarkand; further bus trip to Tashkent; arrival to Tashkent by 8 p.m. for supper, accommodation in a hotel in Tashkent (Aug. 30 - Sept. 3).
Aug. 31: Bus excursion to Almalyk (the Kalmakyr Cu porphyry open pit), geological introduction lecture and visit to mineralogical museum and Cu metallurgy plant.
Sept. 1: Brief visit to the downtown of Tashkent (where the Independence Day as the national holiday in Uzbekistan will be celebrated); later a scientific conference in the Institute of Mineral Resources (IMR) where local specialists will present reports on major mineral deposits of Uzbekistan.
Sept. 2: Bus excursion to Angren and visit to Kochbulak (a volcanites-hosted Au deposit with Au-rich explosive pipes; open pit and mine); a lecture and a lunch in the Karabau Mts.; return to hotel. Sep. 3: Departure from Tashkent.
Contact address for more detailed information: Dr Reimar Seltmann (Leader of IGCP-373), GeoForschungsZentrum Potsdam (GFZ), Telegrafenberg B223, D-14473 Potsdam, Germany.
e-mail: seltm@gfz-potsdam.de; phone: +49 331 288-1433, fax: +49 331 288-1436;
http://www.gfz-potsdam.de/pb4/pg3/igcp/welcome.html (further information about IGCP-373).

THE SGA HOMEPAGE ON INTERNET
http://www.immr.tu-clausthal.de/sga.html

The SGA has a homepage on INTERNET from which you can get information about scientific meetings in Europe, world wide field trips and workshops, membership application form for the SGA and authors and titles of this year contributions to Mineralium Deposita as well as the electronic edition of SGA News.

The frequent updates of the SGA-Homepage and Newsletter provides you with the most recent information regarding SGA-Activities and News. For your convenience, we offer you the possibility to be informed at the moment these changes happen. To join our service just send an e-mail message to

heinhorst@immr.tu-clausthal.de

with subject line "subscribe SGA upgrade information". The textblock may be left empty, but we would appreciate if you include your name, address and profession. Membership of the SGA is not necessary to subscribe.

ABSTRACTS AND THE PROCEEDINGS VOLUME

Intending participants are encouraged to submit extended abstracts for oral or poster presentation. These will be peer reviewed. The Organizing Committee in conjunction with the Session/Topic Organizers will then select those for oral and poster presentations on the basis of scientific quality and originality. Extended abstracts of the papers selected for presentation will be published as a Proceedings Volume which will be distributed to all those registered for the meeting and which is included in the registration fee. The language for the abstracts and throughout the conference is English, non-English speaking authors should have the text checked by a native English speaker before submission.

The maximum length of printed Abstracts will be four pages (A4); black and white diagrams and graytone photographs will be accepted but they must be included in the total length of four pages. Those submitting Abstracts must carefully follow the instructions provided by Balkema and included with this circular.

Abstracts will be accepted in electronic form as a WordPerfect, Microsoft Word or ASCII file. If using Word turn the Fast Save option OFF. The file may be sent on a 3.5 inch diskette, or as an attachment by e-mail. In addition, three copies printed on white paper must be sent by mail in the format requested by Balkema. On the hard copy, indicate the relevant session, the preferred form of presentation oral/poster and the mailing address, telephone, fax, and e-mail of the communicating author.

The address for abstract submission by e-mail is: SGA.IAGOD@nhm.ac.uk

On acceptance of the MS, copyright will be transferred to the Publisher, A.A.Balkema, and offprints can be ordered using a request form which will be mailed to authors.

DEADLINES

January 15th 1999 is the deadline for submission of requests for partial funding to attend the meeting. The SGA, IAGOD and Patron organizations have allocated limited funds to cover registration, travel and accommodation expenses for participants from World Bank designated poorer countries or for students. In your request please make it absolutely clear how much money you are asking for. Requests will only be considered with submission of an Abstract and the completed form on page 24.

February 15th 1999 is the deadline for submission of an extended Abstract to the Organizing Committee with an indication of preferred session and preference for a poster or oral presentation.

By March 15th 1999 authors will be informed whether or not their Abstract has been accepted. Authors will be expected to submit their revised contributions in the Balkema format.

April 15th 1999 is the deadline for the return of final camera-ready Abstracts, payment of registration fees at lower rate and order for reprints. Abstracts will not go to the printer unless a registration fee has been paid. Registration form is on page 24.

Deadline for registration with full payment for Workshops/Short Courses and Field Excursions is also April 15th 1999. Limited registration for those courses and excursions designated viable will be possible after this date. Remember to register your interest with the Short Course co-ordinator and with individual field excursion leaders at the earliest opportunity.

SOCIAL PROGRAMME

Sunday 22nd August 19.00 - 22.00: Ice Breaker Party at Imperial College. Cost included in registration fee for participants and accompanying persons.

Monday 23rd August 19.00 - 22.30: Riverboat excursion with buffet and cash bar. A luxury river boat will leave Westminster pier and travel downstream past St Pauls Cathedral, Tower Bridge, Docklands, Greenwich, the Millennium Dome as far as the Thames Barrier before returning. Cost £25 (pre-paid as we need to know numbers in advance).

Tuesday 24th August 19.00 - 21.00: Reception in the Rio Tinto Atrium of the Earth Galleries of the Natural History Museum. A special opportunity to visit the newly opened exhibits at your leisure. Cost included in registration fee for participants and accompanying persons.

REGISTRATION

Venue: Imperial College of Science, Technology, and Medicine, Exhibition Road, South Kensington, LONDON, SW7 2BP, United Kingdom.

Contact telephone, fax and e-mail: Conference office for messages during the conference: +44 171 594 9494
Organizing Committee: +44 171 938 9353 +44 171 938 9268; cjs@nhm.ac.uk
Accommodation: +44 171 594 9507 +44 171 594 9504

OFFICIAL LANGUAGE

English

REGISTRATION FEES [for payment before April 15th]

SGA/AGOD/SEG/Geological Society of London/Mineralogical Society of Great Britain and Ireland members [as of August 1st 1998] £95.
SGA/AGOD/SEG/Geological Society of London/Mineralogical Society of Great Britain and Ireland student members [as of August 1st 1998] £25.
Non-members £150; Non-member students £50.

Registration fees increase by £30 in each category for payments after April 15th.

The registration fee includes the scientific programme, morning coffee and afternoon tea, abstracts volume, Ice Breaker Party, and Earth Galleries reception. There are separate fees for the Short Courses, Workshops, Field Excursions and the Riverboat excursion.

Meals are not included in the registration fees. There are many places to eat in South Kensington. Boxed or packed lunches can be ordered using the registration form. These cost £4 each day.

The registration fee for accompanying persons is £25 and they will be welcome to attend the Ice Breaker Party and reception in the Earth Galleries of the Natural History Museum.

Payment of fees

Please note: all payments must be made in Sterling (GBP) and be free of bank charges to the Conference Organisers. Please ensure that the participant's name is clearly attached and legible so that the payment is registered correctly. There are three methods of payment:

1. Bank/wire transfer to:

Account name: Natural History Museum
Bank: National Westminster Bank, 186 Brompton Road, London, SW3 1HH
Sort Code: 60-04-04; Account Number: 18129773
Please annotate with SGA-IAGOD and your family name.

2. Bank cheque or draft in sterling made out to 'Natural History Museum'
[Eurocheques not accepted]

3. Credit card payment by Visa, or Mastercard only.
Please fill in the authorization in the registration form

Cancellation

Cancellation must be made in writing to the Organizing Committee. A refund of 80% of the total amount paid will be made on cancellations before July 15th 1999. Unfortunately, it is not possible to offer refunds after this date. If a Short Course/Workshop or Field Excursion fails to run because it is not viable or for any other reason, full refunds will be given of the fees paid.

ACCOMMODATION

Accommodation is being handled separately by the Imperial College Vacation Accommodation Office. They will accept reservations for South Kensington campus Halls of Residence accommodation and also for local hotels.

Single rooms on campus are priced at £29.50 per night and twin rooms at £47 per night, both inclusive of full English breakfast and VAT. All rooms are fitted with hand washbasins and full bathroom facilities are shared with, on average, three other rooms. Imperial College Vacation Accommodation Office are also able to offer a selection of local hotels with a discount of 20-38% on standard rates. Please quote your attendance at SGA-IAGOD 1999 on all correspondence with the vacation accommodation office (see p. 24).

INSURANCE

Important notice. No travel insurance is being arranged for any of the conference or field excursion participants. All participants are reminded that they should organize their own personal insurance for all aspects of the conference and field excursions including travel to and from the venues. The Organizing Committee, short course, workshop, and excursion leaders and anyone else connected with organizing and running the conference and field excursions shall accept no responsibility whatsoever for any damage, loss, personal injury or death suffered by any participant during the conference and field excursions or in travel to and from the conference and field excursions. ◆

You can get complete information on the SGA-IAGOD joint Meeting
at the following internet address:

http://www.nhm.ac.uk/mineralogy/course/sga.htm

or from

Dr C. J. Stanley (SGA-IAGOD), Department of Mineralogy, The Natural History Museum, Cromwell Road, LONDON, SW7 5BD, U.K. - Fax: +44 (0)171 938 9268. E-mail: SGA.IAGOD@nhm.ac.uk

REGISTRATION FORM ◆ SGA-IAGOD MEETING (London 22-25/08/99)

Title ..... First/Last Name .....

Address .....

.....

.....

E-mail .....

Fax ..... Tel. .....

Registration fees
Member SGA/IAGOD/SEG/Geol.Soc./Min.Soc. £95 ❑ (after 15/04 £125 ❑)
Student SGA/IAGOD/SEG/Geol.Soc/Min.Soc. £25 ❑ (after 15/04 £55 ❑)
Non-member £150 ❑ (after 15/04 £180 ❑)
Student non-member £50 ❑ (after 15/04 £80 ❑)
Accompanying person £25 ❑

Lunch (a packed snack lunch at £4 per day not included in registration fee)
23 Aug ❑ 24 Aug ❑ 25 Aug ❑
Excursion on River Thames 23 August £25 ❑

Short courses and workshops [check with co-ordinator for availability]
S1 £75 ❑ S2 £100 ❑ S3 £150 ❑ S4 £100 ❑
S5 section 1 £40 ❑ S5 section 2 £50 ❑ S6 £300 ❑ S7 £150 ❑
S8 £300 ❑ (or single day option £180 ❑)

Field excursions [check with leader that excursion is not overbooked]
A1 - Urals £700 ❑ A2 - Urals £700 ❑ A3 - Wales £290 ❑
A4 - Ireland £180 ❑ A5 - Finland £600 ❑ B1- Cornwall £220 ❑
B2 - Shetland £255 ❑ B3 - Scotland £320 ❑ B4 - SW Iberia £300 ❑
B5 - Greece £850 ❑ B6 - Uzbekistan £650 ❑

Payment: Grand total .....

Cheque (in sterling) ❑ Mastercard ❑ Visa ❑ Bank transfer ❑

Card Number: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Expiry date (year/month): ____ / ____

Name as it appears on card .....

Signature ..... Date .....

Also give billing address if different from above.

Send to: Dr C. J. Stanley, Dept. of Mineralogy, Natural History Museum, Cromwell Road, LONDON SW7 5BD, UK

REQUEST FOR GRANT FORM ◆ SGA-IAGOD MEETING (London 22-25/08/99)

Title ..... First/Last Name .....

Address .....

.....

.....

E-mail .....

Fax ..... Tel. .....

Please fill in either A, B, or C below
A. I am a student and request *£ ..... to enable me to attend the SGA-IAGOD joint meeting. I enclose a letter signed by my Head of Department.

B. I am a student/scientist of a World Bank designated poorer country and request *£ ..... to enable me to attend the SGA-IAGOD joint meeting.

C. I am organiser of a field excursion/workshop/short course/session and from a World Bank designated poorer country and request *£ ..... to enable me to attend the SGA-IAGOD joint meeting.

*the precise amount of funding you require should be stated here (including all registration fees at the appropriate rate)

I enclose an Abstract titled: .....

.....

.....

Signature ..... Date .....

Send with your abstract (by 15/01/99) to: Dr C. J. Stanley, Dept. of Mineralogy, Natural History Museum, Cromwell Road, LONDON SW7 5BD, UK.

ACCOMMODATION BOOKING FORM ◆ SGA-IAGOD MEETING (London 22-25/08/99)

I will be attending the SGA-IAGOD conference to be held at Imperial College August, 1999 and wish to book accommodation as follows:

Arrival date: ..... Departure date: .....

No of nights: ..... Room type: .....

Student Accommodation at Imperial College Single room £29.50 ❑
Twin room £47 ❑

Hotel	Single	Double/ Twin	Includes
Millenium (Gloucester)*	£145	£175	room only
Bailey's*	£125	£135	room only
Stakis London Metropole*	£117	£144	room only
Regency*	£109	£119	English B'fast
Holiday Inn*	£105	£125	room only
Harrington Hall*	£105	L105	room only
Rembrandt*	£104	£124	room only
Forum*	£99	£119	Cont. B'fast
Jury's Kensington*	£98	£98	Cont. B'fast
Swallow International*	£96	£106	Vitality B'fast
Stakis Hyde Park*	£95	£115	room only
Novotel Hammersmith*	£89	£89	room only
Kensington Moat House*	£88	£105	English B'fast
Paragon*	£85	£95	room only
Jarvis Embassy House*	£83	£93	Cont. B'fast
Cranley Gardens*	£72	£95	Cont. B'fast
Imperial College Guest Rooms*	£42	from £68	Cont. B'fast
Imperial College Apartments	prices on request		
Roland House Apartments	prices on request		

*=executive room rates available upon request

1st preference .....
2nd preference .....
3rd preference .....

A 50% deposit or credit card number with expiry date is required to secure a booking. Payment can be made by Switch, Visa, Mastercard, Eurocard and Sterling cheques (made payable to Imperial College). A charge will be made for late cancellations and non-arrivals.

Delegate's details
Name .....

Address .....

.....

.....

E-mail .....

Fax ..... Tel. .....

Card Number: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Expiry date (year/month): ____ / ____

Send to: Vacation Accommodation Office, Imperial College of Science, Technology and Medicine, Watts Way, Prince's Gardens, LONDON SW7 1LU. Tel.: +44 (0)171 594 9507 or +44 (0)171 594 9511; Fax: +44 (0) 171 594 9504; E-mail: vacation.accommodation@ic.ac.uk