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The northern Fennoscandia IOCG-province

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Introduction

Iron oxide-copper-gold "IOCG" deposits have gained a world wide exploration interest since the discovery of the world class Olympic Dam deposit in Australia in the mid 1970's. As defined by Hitzman et al. (1992), the IOCG constitute a new, poorly understood, controversial deposit category that also includes large to very large deposits such as Ernest Henry and Olympic Dam in Australia and Candelaria and Salobo in South America. The IOCG deposits are very diverse in age, tectonic setting, local geological environment, P-T conditions of formation, and character of the associated alteration (Barton and Johnson, 2000; Hitzman, 2000; Pollard, 2000). The ores commonly display a regional time-space association with igneous rocks but, generally, lack the intimate relationship to intrusions that distinguish porphyry and skarn deposits.

In several genetic schemes for the IOCG family of deposits, Kiruna-type apatite-iron ores have been suggested as an Fe oxide dominated end-member (e.g. Hitzman et al., 1992; Hitzman, 2000), and during the last few years exploration for IOCG type of Cu-Au deposits has intensified in the northern part of the Fennoscandian shield (Eilu, 2004). Many models also encompass Fe oxide-poor Cu-Au deposits, including the Swedish occurrences Aitik and Pahtoha-

vare, as a sulphide dominated end-member. Also deposits in northern Finland, in the Misi, Kolari and Kuusamo regions have been suggested to be included in the IOCG category (Vanhanen, 2001; Eilu et al., 2003; Niiranen and Eilu, 2003). Occurrences in northern Fennoscandia related to the discussion in this paper are shown in Figure 1.

In northern Fennoscandia, published and unpublished data together indicate that Palaeoproterozoic hydrothermal mineralization is multiphase and has occurred during a time span for over 160 m.y. (Mänttari, 1995; Billström and Martinsson, 2000; Niiranen et al., submitted; Niiranen et al., in prep.; Wanhainen et al., in prep.). This further implies that mineralization took place in different tectonic settings and with different magmatic associations. An important unresolved problem relates to the mechanism of the formation of the apatite-iron ores. Some (e.g. Nyström and Henríquez, 1994; Naslund et al. 2002) have argued that many of them are strictly orthomagmatic (melt consolidation products reflecting the existence of oxide-silicate melt immiscibility in magmatic systems), while others suggest that they are products of magmatic hydrothermal replacement (e.g. Hitzman et al., 1992; Pollard, 2000) or a product of a combination of orthomagmatic and magmatic hydrothermal processes (Broman

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From the President of SGA

David Leach, SGA President

I want to thank the many dedicated SGA members who volunteer their time and leadership by representing our Society in various regional and international activities. These highly valuable contributions are important for our growth in stature and recognition as a society committed to scientific excellence. In this issue of SGA News you will read the good news concerning Mineralium Deposita. Not only does MD continue to be the top-ranking journal in its class but also an all-time high citation index was recently reported for the journal. Well-deserved congratulations are due to our past editors, Rich Goldfarb and David Rickard, and to our current editors Bernd Lehmann and Larry Meinert for their outstanding stewardship of MD. And of course, everyone appreciates Massimo Chiaradia's dedication and hard work on the wonderful new format for the SGA News.

SGA was well represented in the UNESCO-SEG Metallogeny Course in Mendoza, Argentina (August 17-28, 2004) by lectures presented by Fernando Tornos, Francisco Velasco, and Chris Heinrich. We thank Fernando Tornos and Lluís Fontbote for organizing this opportunity in Mendoza. We appreciate Holly Stein's leadership in organizing the SGA exhibit at IAVCEI Meeting (November 14-19, 2004 Santiago, Chile). I want to recognize the Regional Vice Presidents who are actively serving our membership and promoting SGA in their regions. I especially want to thank Georges Beaudoin and Frank Bierlein for promoting SGA at important regional and international conferences. Georges also initiated an effort to enlarge and redesign the SGA website. Mohammed Yazdi will represent SGA at the World Mining Congress in Tehran and Mei-Fu Zhou is providing input and participating in the Beijing organization. You will read Frank Bierlein's report on the highly visible SGA Day in the Perth SEG Conference. Noreen Vielreicher provided outstanding leadership for the SGA Day in the Perth SEG Conference and is due much credit for our successful participation.

The most visible activity for SGA in 2005 will be our 2005 Biennial Meeting in Beijing led by Jingwen Mao and his organiza-



tional committee. Beijing marks a major milestone for SGA, as it will be our first Biennial Meeting outside of Europe. The Beijing venue reflects SGA's commitment to our growing international membership and to the global community of ore deposit geologists. The conference brings together academic and government researchers from around the world with industry geologists to integrate results from mineral resource exploration and ore deposit research. Beijing is an ideal venue to focus on the global challenges to find new mineral resources. Beijing provides an excellent departure point for stimulating field trips to important ore deposits in the region. The conference benefits from several IAGOD and SEG-organized technical sessions and field trips. An exciting social and guest program will provide additional highlights to the conference. SGA and the Beijing Organizing Committee are working to obtain funds that will make the conference more accessible to students and economically disadvantaged professionals. We thank the Beijing Student Advisory Committee led by Jorge Relvas, Zhang Xinliang, Chai Fengmei and our new Student Representative on Council, Anna Vynazalova for their efforts to assist students attending the Beijing meeting. An important measure of the success of the Beijing meeting will be the extent of student participation. Doug Kirwin of Ivanhoe Mines is providing crucial leadership for organizing corporate sponsorships for students.

I look forward to seeing you in Beijing in 2005 for this exceptional conference.

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Other requests will be not considered.

Your suggestions and ideas for any topic of interest to SGA are welcome!

They can be addressed to any Council member or to

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>>> page 1 *The northern Fennoscandia IOCG-province*

et al, 1999; Perring et al. 2000). In some genetic models, the IOCG deposits are suggested to be formed from fluids with largely evaporitic sources that underwent little or no interaction with magmas (Barton and Johnson, 1996; Rhodes and Oreskes, 1999).

Palaeoproterozoic geology of northern Fennoscandia

Unlike most other shield areas, the Fennoscandian shield is more mineralized in the Palaeoproterozoic compared to the Archaean. During the earliest Palaeoproterozoic, 2.5-2.0 Ga, clastic sediments, intercalated with volcanic rocks, below referred to as greenstones, were deposited on the deformed and metamorphosed Archaean basement during extensional events. These form host to a number of epigenetic (orogenic) Au±Cu, stratiform base metal and BIF occurrences. Layered intrusions represent a major magmatic input related to early extension in the region at 2.45–2.39 Ga.

Svecofennian, subduction-generated

calc-alkaline volcanic rocks and related volcanoclastic sedimentary units were deposited around 1.9 Ga in the northern Fennoscandia in a subaerial to shallow-water environment. In the Kiruna area, the 1.89 Ga Kiirunavaara Group rocks is chemically different from the underlying andesites and is geographically restricted to this area. The Svecofennian volcanic rocks form hosts to apatite-iron ores and various styles of epigenetic Cu-Au occurrences including porphyry Cu-style deposits.

The 10 km thick pile of Palaeoproterozoic volcanic and sedimentary rocks was deformed and metamorphosed during the Svecofennian Orogeny (1.95–1.77 Ga), contemporaneous with the emplacement of several generations of mafic to felsic intrusions. Large-scale migration of saline fluids during the many stages of igneous activity, metamorphism and deformation is expressed by regional scapolitization, albitization and albite-carbonate alteration in the region. Scapolitization has been suggested to be related to felsic intrusions (Ödman, 1957), or to be an expression of mobilized evaporites from the base of the greenstone successions during metamorphism (Tuisku, 1985; Frietsch et al., 1997).

Ore deposits

Northernmost Finland, Norway and Sweden are characterised by Fe oxide, Cu±Au and Au ores. Based on the style of Fe and Au-Cu mineralization and the extensive albite and scapolite alteration, the region has been regarded as a typical Fe oxide Cu-Au (IOCG) province (e.g. Martinsson, 2001; Williams et al., 2003). These deposits are quite variable in their character and include three major styles of economic mineralization: Stratabound sulphide deposits, Kiruna-type and skarn-like Fe oxide deposits, epigenetic style Cu±Au and Au deposits (Table 1). On a strict genetic ground, only some of these occurrences may be classified as typical Fe oxide-Cu-Au deposits whereas others only share some features with the rather loosely defined IOCG category. The region also contains Cr, Ni±Cu±PGE and Fe-Ti-V deposits in layered intrusions, banded iron formation (BIF) and stratiform Cu±Zn deposits with economic potential.

Fe-oxide ores*Skarn iron ores*

Lens- and irregular-shaped iron occur-

Table 1. Examples of deposits potentially belonging into the IOCG category in northern Finland and Sweden.

Ore type	Occurrence	Character	Main ore minerals	Alteration	Hosting sequence	Approx dep. age (Ga)
Fe oxide Cu±Au	Laurinoja, Kuervitikko, Cu-Rautuvaara	Massive lenses, Disseminated	Mt, Py, Po, Cp	Di, Bi, Kf, Ab, Sc, Am	SG	1.86-1.76
Fe oxide±Co-Cu-Au	Vähäjoki	Breccia	Mt, Py, Cp, Co	Am, Bi	TF	1.9-1.8 ?
Fe oxide	Mertainen	Breccia	Mt, (Ht)	Ab, Am, Sc	KiG	1.88
Fe oxide-apatite ±REE	Kiirunavaara, Rektorn	Massive lenses	Mt, Ht	Am, Ab, Bi, Kf	KiG	1.88
Fe oxide-apatite-Cu±Au	Tjärrojäkka, Nautanen	Disseminated, Veins	Mt, Cp, Py, Bo	Kf, Sc, Bi, To	PoG	1.77?
Fe oxide- Cu ± Co ± Au	Kiskamavaara	Disseminated, breccia	Mt, (Ht), Py, Cp	Kf, Bi, Sc	PoG	1.86?
Cu±Au±Fe oxide	Aitik, Pikkujärvi, Pahtohavare	Disseminated, Veins	Cp, Py, Po, Bo, Cc, Mt	Ab, Sc, Bi, Kf, To	PoG, KiG, KGG	1.89, 1.88, 1.88-1.86?
Cu-Au	Lieteksavo Ferrum	Vein, Disseminated	Bo, Cp	Sc, To, Bi	KiG	1.76

Abbreviations: Ab = albite, Am = amphibole, Bi = biotite, Bo = bornite, Cc = chalcocite, Co = cobaltite, Cp = chalcopyrite, Di = diopside, Ht = hematite, KGG = Kiruna Greenstone Group, Kf = K feldspar, KiG = Kiirunavaara Group, Mt = magnetite, Po = pyrrhotite, PoG = Porphyry Group, Py = pyrite, Sc = scapolite, SG = Savukoski Group, TF = Tikanmaa Formation, To = tourmaline

rences consisting of magnetite, and Mg and Ca-Mg silicates are common within the greenstones in Sweden and the north-western Finland (Table 1). Some of the deposits are spatially associated with oxide- and silicate-facies BIF. Individual deposits are from <0.1 to 82 Mt in size and have an iron content of 35–50%. Disseminated pyrite-pyrrhotite and some chalcopyrite are commonly present, with sulphur contents at <5%. The occurrences have been suggested to be metamorphic expressions of originally syngenetic exhalative deposits (cf. Bergman et al., 2001) or intrusion-related skarn deposits (Hiltunen, 1982).

Skarn iron ores have been mined in the Kolari area in northwestern Finland, with original reserves at about 85 Mt, and in the Misi region in southern Finnish Lapland (Nuutilainen, 1968; Hiltunen, 1982; Niira-

nen et al., 2003). Significant amounts of Cu and Au have been recovered from the magnetite rock of the Laurinoja ore body at Kolari (Fig. 1; Hiltunen, 1982). Ore-grade Au and Cu is also reported from the Cu-Rautuvaara and Kuervitikko deposits at Kolari and significant Au, Co and Cu from the dolomite- and tuffite-hosted Vähäjoki Fe deposit in the Peräpohja area.

Apatite-iron ores

Kiruna is the type area for apatite-iron ores with the Kiirunavaara deposit as the largest and most well known example (Table 1). Totally about 40 apatite-iron deposits are known from northern Sweden. This type of deposits is mainly spatially restricted to the Kiirunavaara Group rocks and very few occurrences exist outside the Kiruna-Gällivare area. Individual deposits

have an average content of Fe and P between 30–70% and 0.05–5%, respectively. Besides magnetite and hematite, most deposits contain significant amounts of apatite and they generally are strongly enriched in LREE.

The apatite-iron ores exhibit a considerable variation in host rock composition, relationship to host rocks, alteration, P-content, and associated minor components. It is possible to distinguish two rather distinct groups of deposits: breccia type and stratiform-stratabound type. A third and less distinct group has features between these two end member types (Bergman et al., 2001).

Breccia-type apatite-iron ores mainly occupy a stratigraphically low position of the Kiirunavaara Group or are hosted by the underlying Porphyry Group rocks. Amphibole is always present as a minor com-

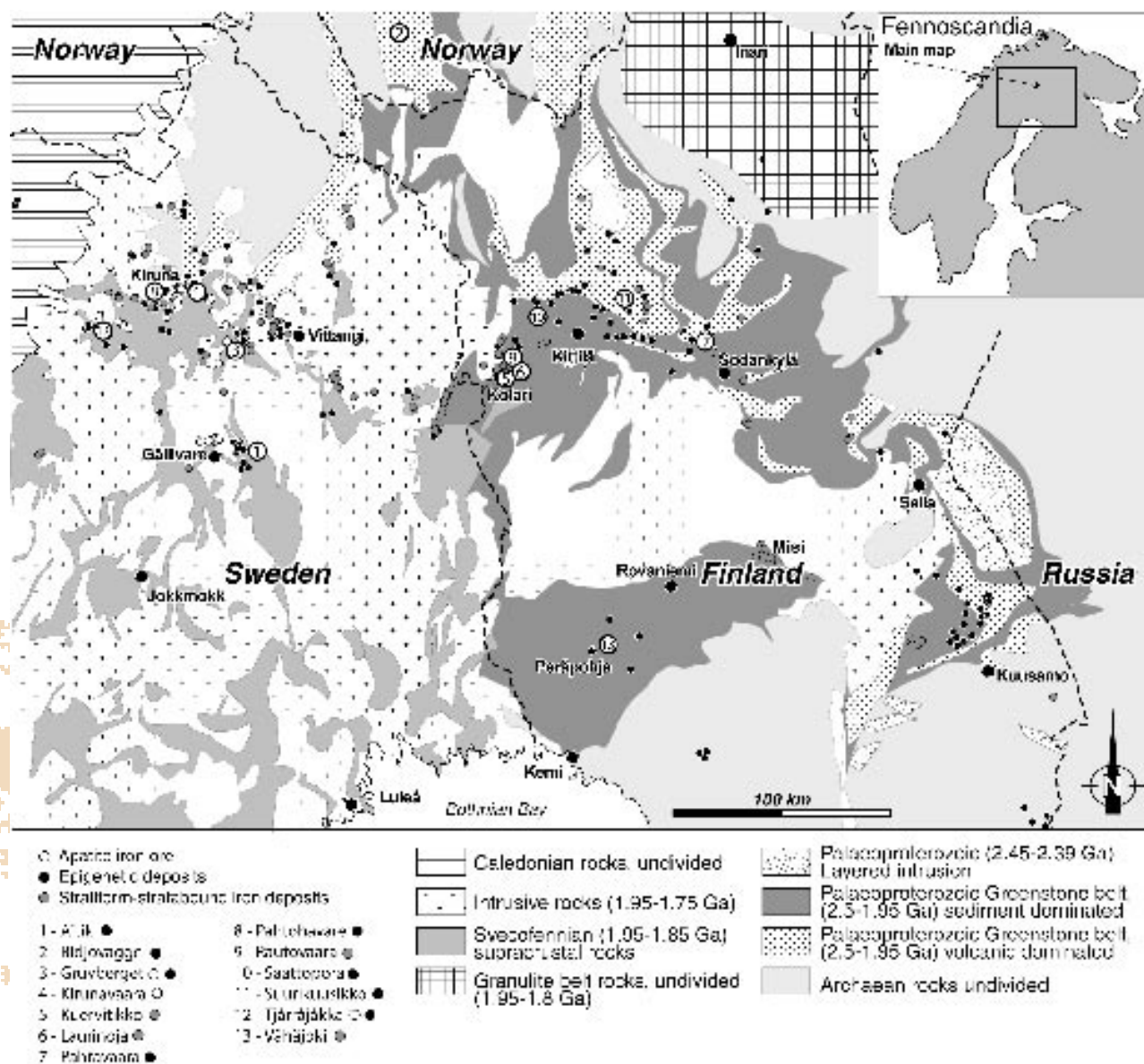


Figure 1: Simplified geological map of northern Fennoscandia with IOCG-related deposits and epigenetic (orogenic) gold deposits. Deposits discussed in text are also indicated by numbers. The map is simplified from Koistinen et al. (2001).

ponent and accessory amounts of pyrite, chalcopyrite and titanite may occur. Albite and scapolite alteration is common, with minor sericite, epidote and tourmaline. A low P-content (<0.3%) and average 30% Fe are characteristic. With a few exceptions, magnetite is the only iron oxide present.

The stratiform-stratabound type comprises lenses at stratigraphically high positions within the Kiirunavaara Group. They are hematite-dominated and have a high P-content, at 1–4.5%. Amphibole is absent, and the main gangue minerals are apatite, quartz and carbonate. Sericite, biotite, tourmaline and carbonate occur in the alteration assemblages. Sulphides are rare and mainly found in the altered footwall or as crosscutting late veinlets. Ore breccia is absent or restricted to the footwall.

The intermediate types of apatite-iron ore are dominantly stratabound in character, but also have ore breccia developed along the wallrock contacts (e.g. Kiirunavaara and Tjärrojäkka). Magnetite is the dominant, or only iron oxide. Amphibole is a characteristic minor component and titanite may be present in accessory amounts. Iron content is high (55–67%), and the average P content generally low, although it may vary considerably (0.01–5%). Alteration assemblages include albite, amphibole, biotite, sericite and, locally, scapolite or tourmaline (Bergman et al., 2001).

A high V content (300–3000 ppm) in the iron oxides and a relatively low Ti content (100–600 ppm) are typical. Co and Ni are mostly in the range of 20–200 ppm and 50–300 ppm, respectively. The Cr content is generally less than 100 ppm. The REE's mostly are strongly enriched and mainly occur in apatite, monazite and orthite. Another typical feature is a strong negative Eu-anomaly. Thorium contents up to 110 ppm are common, whereas U rarely exceeds 10 ppm (Martinsson 2003). The content of Cu and Au is mostly very low (Cu <100 ppm and Au <10 ppb) except where there locally are chalcopyrite or pyrite veins and for apatite-magnetite-actinolite veins at Tjärrojäkka.

Age determinations are only published from the Kiirunavaara area. Titanite in coarse-grained magnetite veins within biotite-chlorite altered trachyandesite are dated at 1888 ± 6 Ma (Romer et al., 1994), and granophyric to granitic dykes crosscutting the Kiirunavaara ore have an U-Pb zircon age of 1880 ± 3 Ma (Cliff et al., 1990). This suggests that the Kiruna-type magnetite-apatite ores were formed between 1.89 and 1.88 Ga. This means that regardless of the preferred mode of origin for these deposits,

there is a strong both spatial and temporal relationship with the Kiirunavaara Group rocks and a temporal relationship with intrusions with a monzonitic differentiation trend, co-magmatic with the Kiirunavaara Group rocks.

On a broad scale, most of the Kiruna-type Fe deposits appear to be located in areas where both strong Na-Cl alteration and monzonitic magmatism occur. Evaporitic units are suggested to have been present in the Kiruna Greenstone Group (Martinsson, 1997), Peräpohja, Central Lapland and Kuusamo (Tuisku, 1985; Vanhanen, 2001; Eilu et al., in press). Hence, formation of the apatite-iron ores and the extensive scapolitization may both be genetically linked to fluids derived from evaporitic units in the underlying greenstones.

Sulphides are mostly rare in the apatite-iron ores. Significant Cu mineralization is only found in a few apatite ores (e.g. Tjärrojäkka and Gruvberget). A genetic relationship between Cu and iron oxide mineralization has not been proved but is probable at Tjärrojäkka. At Gruvberget, the relationship might be only spatial since Cu mineralization there represents a later event with the iron ore obviously only acting as a chemical-structural trap (Lindskog, 2001). The U-Pb titanite ages indicate that the Cu mineralization at Tjärrojäkka and Gruvberget is c. 1.80 Ga in age (Billström and Martinsson, 2000), significantly younger than the suggested 1.89 Ga emplacement age for apatite-iron ores in the central Kiruna area.

Epigenetic Cu-Au ores

Epigenetic sulphide deposits form a heterogeneous group with extensive variation in the style of mineralization, metal association and host rock. Most deposits are hosted by tuffitic units of the greenstones and by Svecofennian mafic to intermediate volcanic rocks. Some of the deposits display a close genetic and/or spatial relation to intrusive rocks varying in composition from monzodiorite to granite. Magnetite is a common component in some, but is lacking in others. A close spatial relationship with regional shear zones is typical. Redox reactions involving an originally high graphite or iron content of the host rock to trigger sulphide precipitation is important in many deposits. Besides Au, several occurrences also contain Cu±Co in economic to subeconomic amounts. Other elements that locally are significantly enriched include Fe, LREE, Ba, U and Mo (Vanhanen, 2001;

Eilu et al. in press).

Highly saline fluid inclusions with 30 to 45 eq. wt % NaCl and depositional temperatures of 300 to 500 °C are reported for the Cu-Au deposits (Ettner et al. 1993; Lindblom et al. 1996, Broman and Martinsson 2000; Wanhainen et al. 2003; Edfelt et al. 2004). However, a prominent E-W Au-Cu zoning may reflect some regional differences in fluid composition. Furthermore, more frequent scapolite alteration in the west (Sweden) and more frequent carbonate alteration in the east (Finland) suggests fundamental differences in fluid characteristics on a regional scale.

Age data from Au and Cu-Au deposits and related hydrothermal alteration in the northern Fennoscandia suggests three major events of ore formation at c. 1.87 Ga, 1.84–1.81 Ga and 1.77 Ga (Bjørlykke et al., 1990; Mänttari, 1995; Billström and Martinsson 2000). These events are temporally related to magmatic and metamorphic episodes of regional importance.

Greenstone-hosted deposits

Three deposits in the region have been mined in a larger scale producing both Cu and Au (Bidjovagge, Pahtohavare and Saattopora). These deposits and several other subeconomic occurrences are characterised by the metal association Cu±Au±Co±U and the lithological association of mafic to intermediate tuffite, black schist, carbonate rocks, chert and dolerite. The occurrences share many features with both IOCG and orogenic gold styles of mineralization, but lack significant amounts of Fe oxides.

At Pahtohavare (Martinsson et al., 1997b), strong premineralization albitization of the host rocks is typical. Biotite-scapolite alteration typically envelopes the albite-rich zone that contains chalcopyrite and pyrite together with carbonate, quartz, albite and, locally, scapolite. Albitization and carbonatization are common and extensive in greenstones in greenstones in northern Finland (Eilu, 1994; Vanhanen, 2001). Several orogenic Au occurrences have been discovered, and many of them show similarities to the Bidjovagge-Pahtohavare type as they occur in albite- and carbonate-altered komatiites and basaltic rocks. Gold typically occurs together with pyrite, arsenopyrite, pyrrhotite and chalcopyrite in quartz veins (e.g., Pahtavaara, Suurikuusikko).

Cu-Au deposits in Svecofennian rocks

Since 1980, several porphyry Cu-style occurrences have been described from the Fennoscandian shield (cf. Weihed, 2001

and references therein). Some of these have been attributed to alternative genetic models, for example Aitik, and some have been suggested to be related to the IOCG family of deposits.

The deposits vary in character from the large disseminated ore body at Aitik to small high-grade vein occurrences. They are characterised by alteration producing K-feldspar, scapolite, biotite, minor tourmaline and, in places, sericite. Extensive albization is only locally developed and then mainly in association with intermediate to felsic intrusions. The main ore minerals are pyrite and chalcopyrite with magnetite as a minor to major constituent in most occurrences. Several deposits also contain bornite and minor amounts of molybdenite. The ore minerals occur as disseminated, in quartz-tourmaline veins, veinlets and breccias. Generally, the occurrences are structurally controlled and mainly occur within areas dominated by K-feldspar alteration, whereas scapolite-biotite alteration may be more important outside the mineralized area.

Magmatic, non-magmatic or mixed fluid and metal sources in the northern Fennoscandian context

The debate over the role of magmas in the formation of IOCG deposits extends to the distinctly hydrothermal copper-gold deposits and to their possible relationships with apatite-iron ores. Broadly coeval magmatism and mineralization can be demonstrated in many districts worldwide including northern Fennoscandia. Pollard (2000) strongly advocated a magmatic fluid and metal source for Fe oxide Cu-Au mineralization. The salient features which indicate and distinguish the magmatic fluids associated with Fe oxide Cu-Au mineralization involve evidence of hypersaline, CO₂-rich fluid inclusions. According to Pollard (2000), these fluids evolved by unmixing of magmatic-derived H₂O-CO₂-salt fluids contrary to fluids related to porphyry Cu-Au systems where hypersaline brines evolved by boiling of magmatic H₂O-salt fluids. Williams et al. (2003) suggested that the mineralizing process in Norrbotten and Cloncurry may have involved the evolution of a copper-rich and sulphur-poor fluid phase from CO₂-bearing magmas at >6 km depth, and the fluid could have been channelized by brittle-ductile shear zones and evolved by mineral precipitation, wall-rock

reactions and mixing with nonmagmatic deep-seated fluids. The precipitation of metals occurred by specific wall-rock reactions involving ironstones or carbonaceous sulphide-bearing metasedimentary rocks, fluid mixing, and possibly CO₂-phase separation (Williams et al. 2003).

A different origin for many Fe oxide Cu-Au related fluids has been postulated by Barton and Johnson (1996, 2000), Hitzman (2000), Mathur et al. (2002), and Dow and Hitzman (2002). They advocate the strong influence of non-magmatic fluids, especially evaporitic brines. In the external brine model, circulation of convecting brines creates both distal and proximal alkali alteration. Voluminous metal-depleted sodic-calcic ± shallow K-feldspar-hematite alteration forms in inflow zones. The fluids are focused near the magmatic heat source and on rising and cooling they produce intense sodic (in mafic rocks) and/or potassic (typical in felsic rocks) as well as overprinting sericitic or chloritic alteration (Barton and Johnson, 2000). Evaporitic units are suggested to have been present in northern Fennoscandia (Frietsch et al., 1997) and thus this model may have some relevance for the formation of IOCG deposits in northern Fennoscandia.

In contrast to the high-salinity fluids in most of the porphyry Cu-Au deposits, the Cu-Au related saline fluids in the northern part of the Fennoscandian shield and in many other IOCG districts are characterized by a high Ca content (Wanhainen et al. 2003; Williams et al. 2003). This may be a consequence of extensive fluid-rock exchange related to regional albization or the expression of added components from evaporitic sediments within the local greenstones that contributed to the salinity of the mineralizing fluids (Wanhainen et al. 2003). Recent studies of the halogen chemistry of individual fluid inclusions from the Cloncurry and northern Norrbotten districts suggest multiple sources of salinity including magmatic, halite-derived and bitter brines (Williams et al. in prep). Thus, IOCG deposits can form from brines of both magmatic and evaporitic origin or from a mixture of these sources. This would, at least partly, explain the diversity in character exhibited by deposits of the IOCG family in northern Fennoscandia and elsewhere and also makes a simple genetic model for the deposits class dubious.

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Report on 'SEG 2004: Predictive Mineral Discovery Under Cover' Meeting in Perth (co-sponsored by SGA)

Frank P. Bierlein

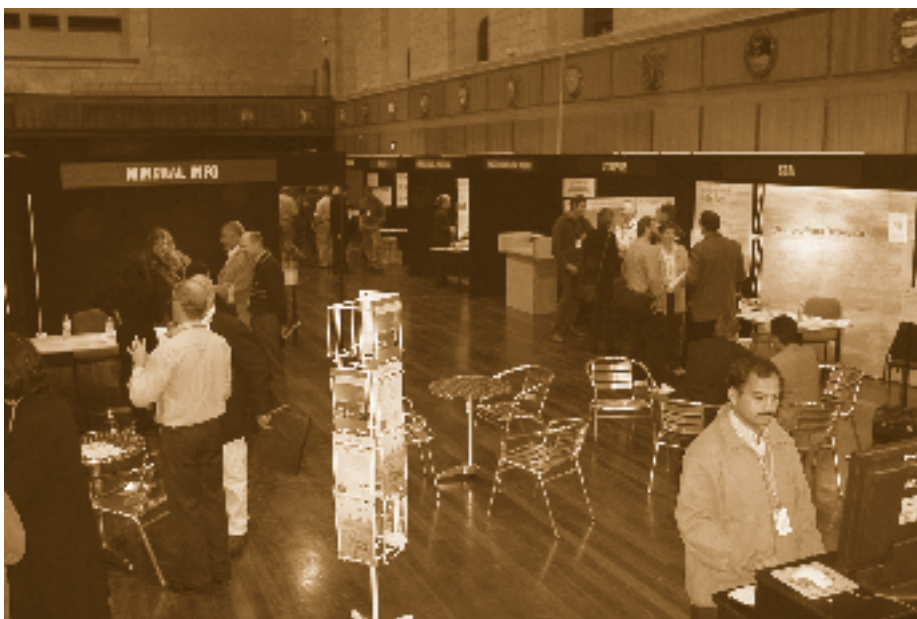
Regional Vice-President, Australia/Oceania

This meeting, which was held in picturesque Perth from September 27th to October 1st, 2004, brought together over 600 delegates from industry, academia, government organizations. The first three days of the meeting featured 37 keynote addresses and invited presentations that focused on the business of exploration, ore deposit modeling and targeting, mineral systems footprints, and the recognition of mineral systems under cover. The diverse and topical nature of the high-quality presentations provided plenty for everyone, and ensured that there was a continuous abundance of in-depth discussion among delegates during the nightly, industry-sponsored and well-lubricated sundowner sessions in the exhibition hall. Additional five-star food for thought was offered by the over 50 poster presentations that were on display at the exhibition venue during the conference. In accordance with the overall theme of the meeting, the focus of the SGA-coordinated Day Four was on 'cutting-edge developments in economic geology'. Following a stimulating keynote address by Jeff Hedenquist, 43 excellent oral presentations were presented in three concurrent sessions throughout an action-packed day (well done, Noreen!). The consistently high quality of presentations

meant that the SEG-SGA award for best oral presentation by a student had to be split four ways – congratulations to Charlie Seabrook, Barry Stoffell, Louis Gauthier and Chris Wijns!

The SGA booth was well frequented throughout the meeting, with pens, scales and copies of the SGA Newsletter disappearing like hot cakes; our active

membership drive saw over 25 new members joining up to take advantage of the Society's many benefits. The meeting was rounded off by several social functions, practical workshops and highly successful pre- and post-conference excursions (which included invaluable outback driving experiences, and lessons on how to rough it on a five-day field trip without any



View of the Exhibition Hall, with SGA booth on right

personal luggage). Full credit must go to the organizing committee, under the leadership of David Groves, whose tremendous efforts

ensured the raging success of the meeting – which can also be considered an excellent reflection of the internationalisation of both

the SEG and the SGA, and the continuing close collaboration between the two ‘sister’ societies. Next stop Beijing!



SGA President David Leach, Regional Vice-President Frank Bierlein (proudly holding up completed new membership applications) and Meeting Organising Committee Member Noreen Vielreicher at the SGA booth



SGA Regional Vice-President for North America Georges Beaudoin impressing Jon Hronsky with fluid flow models



SEG President Ross Large and SGA President David Leach with two of the four SEG-SGA Award winners (for best oral student presentation at the SEG 2004 Meeting), Barry Stoffell and Charlie Seabrook



SGA Regional Vice-President Frank Bierlein congratulating Chris Wijns and Louis Gauthier for sharing the SEG-SGA Award for best oral student presentation

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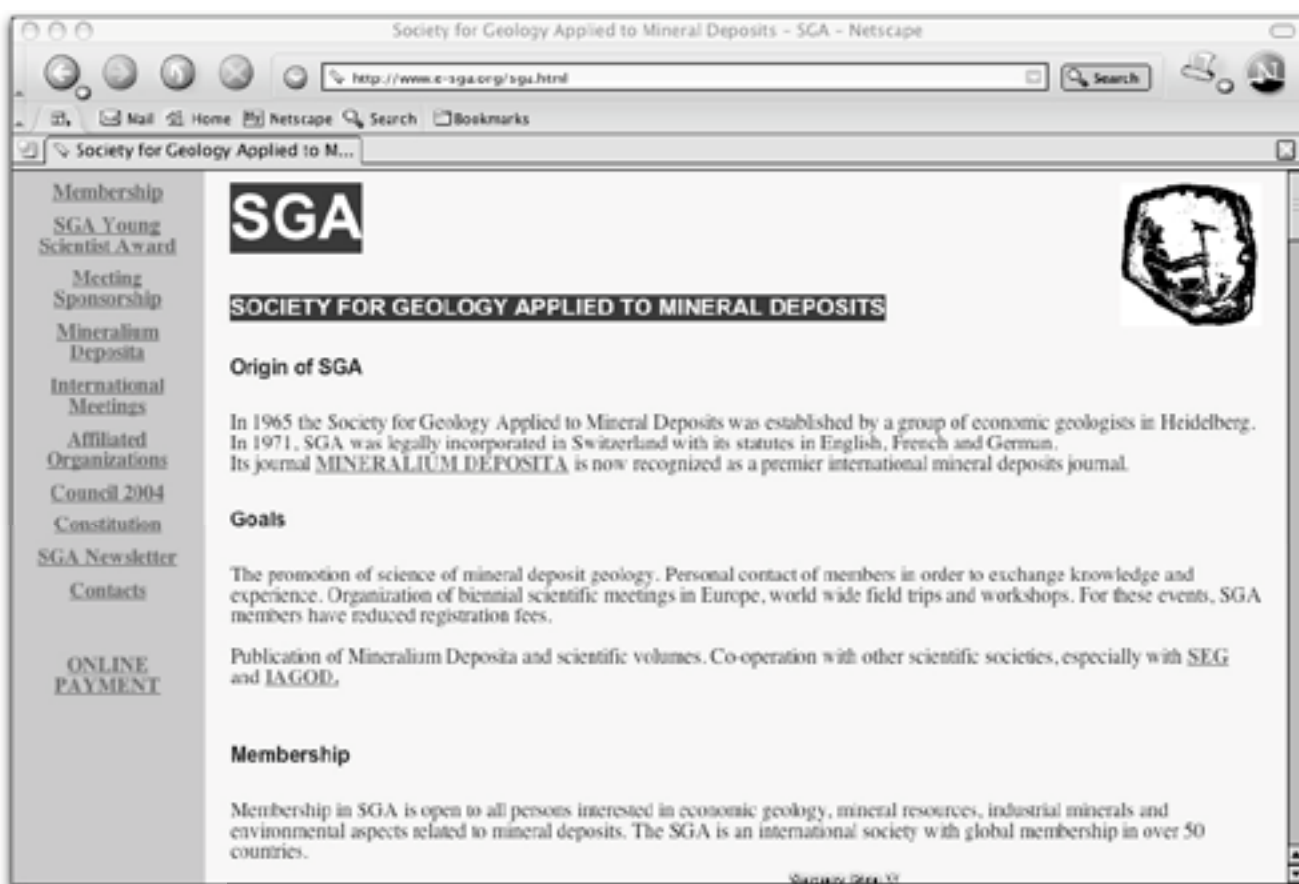
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Report on MORE-SGEG Conference in Orange, NSW, July 6 – 8, 2004

Frank P. Bierlein

Regional Vice-President, Australia/Oceania

This 3-day meeting was organised by the Monash Ore Deposits Research Group (MORE) and the Geological Society of Australia's Specialist Group in Economic Geology (SGEG), and centred around the theme of "Tectonics to Mineral Discovery - Deconstructing the Lachlan Orogen".

The last decade has seen major advancements in our understanding of the geodynamic and tectonic evolution of the Lachlan Orogen in southeastern Australia, as well as its geochronology, ore deposit studies, and geophysical interpretations. Yet, the genesis of many of the precious and base metal deposits, mechanisms of ore emplacement and, importantly, linkages between the geodynamic, tectonic and metallogenic evolution of the Lachlan Orogen remain the subject of considerable debate. With this in mind, the MORE-SGEG Conference organising committee (Frank Bierlein, Stuart Smith, Megan Hough, Andy Wilde) conceived a three-day meeting to bring together participants from industry, government departments, and universities, with the aim to further the development of ideas about the driving mechanisms responsible not only for hydrothermal systems at the deposit- to camp-scale, but also crustal-scale tectonic processes and their implications for the generation of one of the world's major metallogenic provinces. Orange was chosen as the venue of the conference as it is the major city in the 'Explorer Country' central west of New South Wales with a long and rich history. Orange is also a nationally significant metallurgical mining centre with the development of the nearby Cadia and Ridgeway gold and copper mining projects, and several other recent discoveries being developed throughout the region.

The principal purpose of the meeting - to foster and encourage collaboration aimed at whole-system understanding - was fittingly reflected by the breadth of the 15 oral and 9 poster presentations on Day One of the conference. The multi-disciplinary studies, which were grouped into three thematic sessions (namely 'Tectonics', 'Metallogenesis', and 'Ore Deposit Studies') provided a balanced mix of active work in progress,

showcased new and exciting developments, and presented reviews of acquired understanding and expanding knowledge. Significantly, these presentations highlighted the importance of increased linkages between computational geosciences, micro-analytical research, empiric exploration technologies and the understanding of broad tectonic patterns that ultimately are most likely to result in new discoveries in the Lachlan Orogen.

Overview presentations by David Gray (University of Melbourne), Dick Glen (Geological Survey of New South Wales) and Clive Willman (Geological Survey of Victoria) provided some stimulating discussion and also illustrated the in part contrasting nature of tectonic models currently proposed for the Lachlan Orogen. Russell Korsch (Geoscience Australia) presented results of recent deep seismic surveys and how these can provide valuable insights into the three-dimensional crustal architecture of the orogen. Bill Collins (University of Newcastle) argued in his contribution that understanding the causes of mineralisation in the Lachlan Orogen requires investigating the interplay between magmatism, deformation and plate tectonics. In addressing the question of why major gold and copper-gold deposits in the Lachlan are associated with certain parts of the orogen, John Walshe (CSIRO Exploration & Mining) presented some thought-provoking questions that underlie the task of predicting prospective localities of mineral provinces. David Cooke (University of Tasmania) and Stuart Smith (Oxiana Resources) reviewed the nature and genesis of alkalic porphyry gold-copper deposits of the Ordovician-Silurian Macquarie Arc in NSW, and discussed critical exploration features for the discovery of porphyry systems in this economically important mineral province. In his presentation, Martin Hughes (CSIRO Exploration & Mining) focussed on Late Devonian gold-stibnite associations in the Victorian gold province and northeastern Tasmania, and argued that these occurrences remain an important exploration target. In the final session, five presenters provided excel-

lent up-to-date-reviews of the discovery and exploration progress of lode-style gold deposits in the Wyoming Prospect (Ian Chalmers; Alkane Exploration), development of the E42 mesothermal gold deposit at Lake Cowal (Andrew Bywater; Barrick Australia - Cowal Gold Project), the age and setting of gold-base metal mineralisation at Mineral Hill (Gregg Morrison, for Triako Resources), recent developments and exploration in the Stawell Corridor in western Victoria (Adam Elliston, MPI), and the renewed exploration potential of the Ballarat goldfield (Steve Olsen; Ballarat Goldfields).

Breaks and poster sessions provided ample time for informal discussions and chit-chat, which were facilitated and lubricated by finger food and beverages from the open bar. The first day of the meeting was rounded off by an enjoyable and flavour-some conference dinner, and a stimulating presentation by John Holliday (Newcrest Mining) on the past, present and future of exploration in the NSW Lachlan Orogen. John made an excellent case for deep drilling as the key to exploration success, given that many of the mineralised systems lack a surface expression and occur away from outcropping terrain.

Days two and three of the conference comprised a field trip to several operating Cu-Au mines in the region as well as sites of recent discoveries, with an overnight stay in Parkes (home of Australia's premier radio-telescope affectionately known as the 'Dish'). The large size of the group (over 100 delegates took part in the field trip) provided some interesting logistical challenges but thanks to the tremendous efforts and collaboration of the participating companies and their staff (Newcrest Mining's Cadia Valley Operations; Alkane Exploration; Triako Resources; Barrick Australia's Cowal Gold Project), the 2-day trip went smoothly and offered plenty to take in and look at. Highlights included a comprehensive core display, several excellent presentations and an overview of the impressive Cadia open pit, drill core from Wyoming and Peak Hill as well as the exhausted open

cut at Peak Hill, an impressive range of drill core, specimens and illustrating material laid out at the Mineral Hill site, and a site tour of the E42 deposit at Lake Cowal with spectacular drill core on display at the Cowal Gold Project.

The recent upswing in minerals exploration interest, specifically in the Lachlan Orogen, was aptly demonstrated by strong industry participation and broad, national support of the conference. Judging from the high turn-out (180 registrations on Day One), the high calibre of presentations and balanced mix of topics covered, and the positive feedback from numerous participants, the conference can be considered an outstanding success. The theme and contents of the conference also generated a high level of interest from the media, with

television, newspaper and radio coverage across the region.

Sponsorship support for the conference was provided by the Society of Geology Applied to Mineral Deposits, the Geological Survey of New South Wales, Boart-Longyear, ALS Chemex Laboratory Group, Amdel/The Gribbles Group, Seismic Supply International, Southern Cross Technical and Field Services, and the predictive mineral discovery Cooperative Research Centre.

All oral and poster presentations, together with a field guide, have been published as

Bierlein, F.P., Hough, M.A. (editors), *Tectonics to Mineral Discovery - Deconstructing the Lachlan Orogen. Proceedings Volume and Field Guide, MORE-*

SGEG Conference, Orange, NSW, July 6 - 8, 2004. Geological Society of Australia Abstracts No 74, 188 pp.

Copies of this publication may be obtained for \$60 (\$65 overseas) from the Geological Society of Australia Incorporated, 301 George Street, Sydney, NSW 2000, Australia, or the GSA Specialist Group in Economic Geology, School of Geosciences, PO Box 28E, Monash University, VIC 3800, Australia.

Several presenters have indicated their interest to contribute a submission to a thematic issue of *Mineralium Deposita* based on the MORE-SGEG Conference. A preliminary deadline for submissions has been set for October 2004.



View of the audience attentively listening to Dick Glen's presentation at the Ex-Services Club in Orange



Field trip participants at Mineral Hill listening to presentations by Paul Dunham and Craig Miller from Triako Resources

Iron oxide-copper-gold excursion and workshop: Northern Finland and Sweden May 31–June 4 2004

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The Geological Survey of Finland and Luleå University of Technology (Sweden) organised, from May 31 to June 4 2004, an international excursion and field workshop on iron oxide-copper-gold (IOCG) deposits

in the northern part of the Fennoscandian Shield. The event was attended by 46 participants from 21 organisations (universities, mining and exploration companies and geological surveys) of 13 countries. The

aim was to present and visit all significant deposits in northern Finland and Sweden potentially belonging to the IOCG category, discuss their characteristics, the temporal and spatial relationship between different

styles of deposits and with the regional geology and, especially, concentrate on the question as whether the deposits fit into the IOCG or some other genetic categories of mineralisation.

The IOCG deposits constitute a poorly understood, controversial deposit category that includes a set of large to very large deposits across the globe. In several genetic schemes of the IOCG family, Kiruna-type apatite-iron ores have been suggested as an Fe oxide-dominated end-member. During the last five years, exploration for IOCG-style Au and Cu-Au deposits has intensified in the northern part of the Fennoscandian Shield. Many models also encompass Fe oxide-poor Cu-Au deposits as a sulphide dominated end-member of the class. Many Fe and Fe-Cu-Au deposits in northern Finland have also been suggested to belong to the IOCG category.

The field trip was organised so that the deposits to be visited were presented in a workshop session in the previous night. Also regional geology and its relationship to Fe, Au-Cu and Fe-Cu-Au mineralisation in the region were presented during the workshop sessions. The deposit presenta-

tions were given by PhD students from the universities of Luleå (LTU) and Helsinki (HU). Overviews on the deposit types and geology of the region were given by Dr. Olof Martinsson from the LTU.

The IOCG excursion and workshop started at Rovaniemi on the 31st May with a workshop session. This session contained presentations on Fe and Fe-Cu-Au deposits in northern Sweden and Finland and their relationship with the regional geology, and on the deposits to be visited in the following day. During the subsequent two days, the skarn-like Fe and Fe-Cu-Au deposits in southern and western Finnish Lapland, in the Misi and Kolari areas, respectively, were visited under the guidance of Tero Niiranen (HU). The Misi region contains a set of about ten magnetite deposits, four of which have been mined, containing in total >10 Mt @ 40-55 % Fe. Several magnetite deposits are also known from the Kolari region where the largest is Hannukainen with about 66 Mt @ 40-50 % Fe, 0.1-2 % Cu and 0.2-2 g/t Au.

In the third day, the famous apatite-iron deposits of Kiruna were visited, under the guidance of the LKAB geologists and Dr.

Olof Martinsson (LTU). Pre-mining resource in the mines visited is: Kiirunavaara 2000 Mt @ 60-68 % Fe (magnetite ore), Rektorn 23 Mt @ 33 % Fe and 3.5 % P (haematite ore).

During the last day in the field, the large Aitik Cu-Au (guide Riikka Aaltonen, Boliden AB) and the small Nautanen Cu deposits (guide O. Martinsson), both near Gällivare town, were visited. At Aitik, the current reserves are 244 Mt, and there is an additional mineral resource of 970 Mt; the grades in the mined ore at Aitik are 0.38 % Cu and 0.22 g/t Au. The calculated resource at Nautanen is 0.63 Mt @ 2.36 % Cu, 1.3 g/t Au and g/t Ag.

The guide book of the IOCG excursion, also including the workshop presentations, is available from the Geological Survey of Finland; please, contact: pasi.eilu@gtk.fi or arkisto@gtk.fi: Eilu, P. (ed.) 2004. Iron oxide-copper-gold excursion and workshop, Northern Finland and Sweden 31.5.-4.6.2004. Geological Survey of Finland, Report M 10.3/2004/1/10. 93 p.



The excursion group at the Hannukainen mine, Kolari, NW Finland. Photo Olavi Kontoniemi.

In Memoriam of Professor Eugen F. Stumpfl

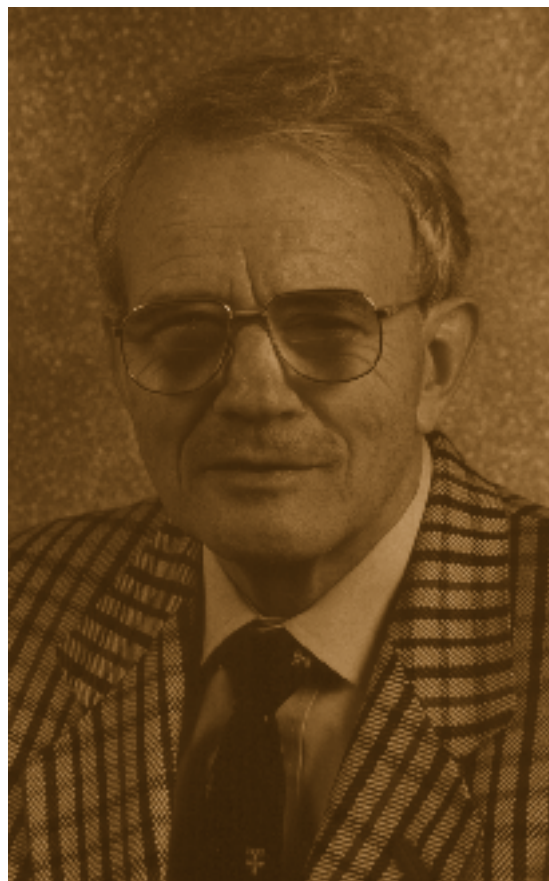
On July 12, 2004, the scientific community had to accept that one of its most prominent members, former president of SGA (1997-1999), Professor Eugen F. Stumpfl, passed away. Eugen F. Stumpfl was born in Igls (Tyrol, Austria) in 1931. After having received his high school certificate in 1949, Eugen F. Stumpfl studied geology, mineralogy and chemistry at the Universities of Innsbruck (under Bruno Sander) and Heidelberg, and started his distinguished career in 1956 when he received his Ph.D. "magna cum laude" under the guidance of Paul Ramdohr. He then spent two years as a research assistant to Paul Ramdohr at the University of Heidelberg. From 1958 to 1970 Eugen F. Stumpfl occupied positions as Lecturer in Economic Geology and Ore Microscopy at the University College, London (1958-1965), as Visiting Professor in the Geology Department, University of Toronto, and as Lecturer in Economic Geology and Member of the Lunar Investigation Team, University of Manchester (1967-1970). In 1967 Eugen F. Stumpfl received the "venia legendi" for Mineralogy and Petrology from the University of Heidelberg, and in 1970 he joined the University of Hamburg as a Professor of Economic Geology. During this time Eugen F. Stumpfl was particularly focusing on introducing advanced courses in quantitative ore microscopy, leading to the development of the compact miniphotometer (together with M. Tarkian and H. Matthies), on planning and supervising electron microprobe facilities, and on establishing research groups. His main interest was the application of ore microscopy, microprobe analysis and geochemistry to the study of ore deposits world-wide (e.g. Canada, South and West Africa, Malaysia, Norway, Australia, Austria), following and expanding the "footpath" of his former professor Paul Ramdohr. In the same year (1970) Eugen F. Stumpfl married Valerie Allwood, who was the pole of fundamental support and understanding for all Eugen's activities in the coming 34 years. The 70ies were the time when Eugen F. Stumpfl directed his research interests more and more to the formation, occurrence and classification of platinum group element (PGE) deposits, and particularly to the geochemistry of PGE

in various geological environments. Eugen F. Stumpfl was one of the first to recognize the importance and significance of aqueous processes in the transport and distribution of PGE, and his research studies/results certainly made a remarkable imprint on the scientific community for the following 30 years. Although Eugen F. Stumpfl mainly held positions at universities, he also worked with industry as a consultant (e.g., South Africa) and was involved in numerous cooperative research programs with industry in Canada, South Africa, Australia and Austria.

In 1976 Eugen Stumpfl was appointed as Professor of Mineralogy and Petrology and Head of the Department of Mineralogy and Petrology at the University of Leoben, Austria. He remained in that position until his retirement in 1997, and also was Chairman of the Institute of Geological Sciences (now Department of Applied Geosciences and Geophysics) during 1988 and 1993. Eugen F. Stumpfl was by then an internationally very well recognized scientist with a remarkable widespread expertise in ore geology, most likely Eugen F. Stumpfl was at the peak of his academic career. His scientific know-how, experience, international reputation, his brilliance and charisma in representing his department and himself in front of the scientific community, led to the development of the Department of Mineralogy and Petrology, University of Leoben, to an internationally recognized centre in ore geology research with particular emphasis on precious metals. I am proud of having had the chance to be part of that development, of having been able to make some contributions to it, and presently to do my best to continue and expand what Eugen F. Stumpfl has built up in the last 25 years. Eugen F. Stumpfl's scientific achievements have been summarised in 124 international publications, numerous abstracts, reviews, and unpublished research

reports. When he retired in 1997, he was even more active as ever before, becoming more and more interested in other research topics including the mineralogy and geochemistry of soils and filter residues.

Eugen F. Stumpfl always attracted students from all around the world. The time from 1976-1986 at Leoben University was characterised by a significant number of his previous Hamburg students to follow him to Leoben and carry out a Ph.D. under his supervision (e.g. J. Schütze, C. Reimann, C. Ballhaus, J. Vogt, M. Cornelius and others), just to emphasise one example. Eugen F. Stumpfl also brought and established a new style and atmosphere in the department and in the very traditional University of Leoben, characterised by "being open for everything". I remember him appearing at a meeting of the University "Kollegium" (i.e., the highest committee of the university) in a "Hawaiian shirt" without wearing a tie, or when he was lying in a hammock in



Eugen F. Stumpfl

his office at one late afternoon in 1985 after a busy day, chairing a staff meeting in his department.

Eugen F. Stumpfl's scientific career was also characterised by numerous additional activities such as acting as an external examiner in the universities of Alberta, Cairo, London, Mainz, Oulu, Finland, Malaya, Newcastle, N.S.W., Tasmania and Western Australia, and having been a member of the Appointments Board for the Chairs of Economic Geology, University of Lulea, Sweden, and Turku, Finland. Furthermore, he was a member of numerous national and international scientific councils and boards such as Secretary and, from 1982, Chairman of the Commission on Ore Mineralogy of the International Mineralogical Association (IMA/COM, 1978-1986), Regional Vice President, Europe, Society of Economic Geologists, USA (1987-1994), Representative of the Mining University on the Council of the Austrian Research Foundation (FWF), Vienna, in charge of ge-

oscience projects (1988-1995), IMM Official Correspondent for Austria (1990-2004), President, Society for Geology Applied to Mineral Deposits (SGA, 1997-1999), Steering Committee Member, European Science Foundation GEODE (Geodynamics and Ore Deposit Evolution, 1998-2003), just to name the most important ones. Eugen F. Stumpfl was a member of the editorial board of international journals, and since 1978 he was the Managing Editor of "Mineralogy and Petrology", published by Springer-Verlag.

Eugen F. Stumpfl received the following honours and awards, the way how the scientific community recognized Eugen F. Stumpfl's expertise and outstanding career: Correspondent of the Geological Survey of Austria (1985), The Consolidated Gold Fields Silver Medal (Institution of Mining and Metallurgy, London, 1985), Corresponding Member of the Austrian Academy of Science (1987), Member of the European Academy of Sciences and Arts (1992),

Honorary Fellow, Institution of Mining and Metallurgy, London (1993), Schnerdhöhn-Price (1997), Honorary Fellow, Austrian Mineralogical Society (2001), and finally Honorary Doctorate (Dr.phil.h.c.), University of Oulu, Finland (2002).

We all miss Eugen F. Stumpfl as an outstanding scientist, open minded gentleman, colleague and friend. I have lost my former "Professor", who provided the base for my scientific career, and who was a friend during the last ten years. However, we are all called to appreciate and benefit from Eugen's scientific and personal input into the community, and, most importantly, to continue, expand and improve the direction Eugen F. Stumpfl has shown us!

Oskar A. R. Thalhammer
Chair Mineralogy and Petrology
Department of Applied Geosciences and Geophysics
University of Leoben, Austria

The UNESCO-SEG Latin America Metallogeny Course, 2004 edition (CLAM'2004)

Fernando Tornos
IGME, Salamanca, Spain

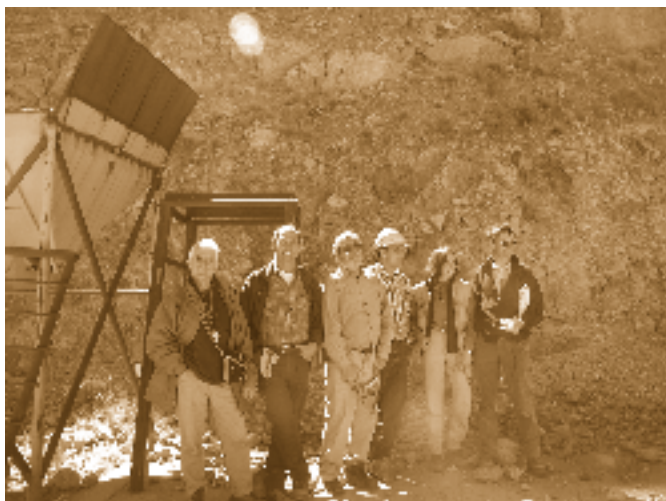
The 2004 Latinamerican Course on Metallogeny was held in Mendoza (Argentina) between the 17th and 28th August. Sixty geologists belonging to universities, mining companies and research institutions from different countries of Latinamerica (Argentina, Bolivia, Chile, México and Perú) joined in the CRICYT-IANIGLA institute in the suburbs of Mendoza to assist to six intensive days of theoretical classes and a later one week field trip. This edition of the course is the first one outside Ecuador, that has organized it successfully for 22 years. In 2003, the Organizing Committee decided to make the course itinerant so more institutions can get involved into its organization, field trips to different areas can be organized and more people can attend to it. This year it has been managed by M.Florencia Márquez-Zavallá and Nivaldo Rojas as local organizers and Fernando Tornos as international coordinator. The course has been organized in three modules including general geochemistry of ore deposits, the geology and geochemistry

of porphyry systems and the ore deposits in Argentina, being the speakers Antonio Arribas (Placer Dome), Milka de Bordtkorb (U. Buenos Aires), Chris Heinrich (ETH Zürich), M.Florencia Márquez-Zavallá (CONICET), Nivaldo Rojas (Consultant), José Perelló (Antofagasta Minerals), Jeremy P. Richards (U. Alberta), Fernando Tornos (IGME), Francisco Velasco (U. Bilbao) and Eduardo Zappettini (SEGEMAR). The presentations were complemented with practical seminars on geochemistry of ore deposits and presentations of the students.

An excellent and exhausting field trip took us to the major epithermal and porphyry copper deposits of northwestern Argentina, including Bajo de la Alumbrera, Farallón Negro, Agua Rica, Paramillos, Casposo, and Mexicana (Famatina), giving a rather complete overview of the relationships between subvolcanic intrusions, porphyry-like mineralisation and and epithermal systems.

The course has been organized by the UNESCO and SEG and has been spon-

sored by different academic and scientific institutions, local organizations and mining companies. Between them, the SGA has partially supported the attendance of F.Tornos as SGA speaker and has donated, along with Springer, two one year free subscriptions to Mineralium Deposita to the students that made the best presentations. These were awarded to Verónica Herrero (Universidad de Concepción, Chile) and Marcos Rubio (Universidad Nacional Autónoma de México). Our aim is that in the future, SGA joins UNESCO and SEG as co-organizer of the course. The Latinamerican Course of Metallogeny is probably becoming the more important course on ore deposits held in Spanish and a reference for researchers and experts in ore deposits in Latinamerica. Thus, the full participation of SGA in its organization will be a major way of making our society well known in that area.



The instructors (from left: Antonio Velasco, Fernando Tornos, Florencia Marquez-Zavalía, Chris Heinrich)



Closing ceremony: participants and instructors



Closing ceremony (from left: Fernando Tornos, Florencia Marquez-Zavalía, Milka de Bordtkorb, Antonio Velasco, Chris Heinrich)



Mejicana Mine (from left: Francisco Velasco, Antonio Arribas, Florencia Marquez-Zavalía)



Mate drinking in the excursion bus



Participants and instructors at the entrance of Mejicana mine

>>> FORTHCOMING EVENTS <<<

* marks a new entry

2005

*April 11-21

MODULAR COURSE IN EXPLORATION FOR HYDROTHERMAL ORE DEPOSITS, Sudbury, Ontario, Canada – Contact address: Harold Gibson, Mineral Exploration Research Centre, Department of Earth Sciences, Laurentian University, Ramsey Lake Road, Sudbury, ON, Canada, P3E 2C6; phone: +1.705.675.1151 x2364; fax: +1.705 675 4898; email: hgibson@laurentian.ca, website: <http://earthsciences.laurentian.ca>.

April 24-27

MINING ROCKS, Toronto, Canada – Contact address: Jean-Marc Demers, Director, Commercial Operations; phone: +1 514 939 2710, ext 1314; e-mail: jmdemers@cim.org or Chantal Murphy, Meetings Coordinator; phone: +1 514 939 2710, ext 1309; e-mail: cmurphy@cim.org; website: <http://www.cim.org/mce/toronto2005/>

May 15-18

THE ANNUAL MAC-GAC-CSPG MEETING, Halifax 2005: Building Bridges - across Science, through Time, around the World, Halifax, Canada – Contact address: e-mail: rob.raeside@acadiu.ca; website: www.halifax2005.ca

May 20-24 - SGA-Cosponsored

GOLDSCHMIDT CONFERENCE 2005, University of Idaho, Moscow, Idaho, USA – Contact address: gold2005@uidaho.edu; web-site: www.gold2005.uidaho.edu

June 27-July 1

INTERNATIONAL CONFERENCE ON MINING AND THE ENVIRONMENT AND METALS AND ENERGY RECOVERY: SECURING THE FUTURE, Skellefteå, Sweden – Contact address: Expolaris Kongresscenter, Skellefteå, SE-931 78 Skellefteå, Sweden; phone: +46-919-736000; fax +46-910-736010; e-mail: kongresscenter@skelleftea.se, tomas.from@metallgruppen.se, manfred.lindvall@boliden.se or helena.ornberg@kongresscenter.skelleftea.se

*July 31- August 5

GORDON CONFERENCE "Inorganic Geochemistry, metals in ore-forming systems: sources, transport, deposition", Proctor Academy, Andover, New Hampshire, USA – Contact address: e-mail: Steve.Garwin@geoinformex.com or christoph.heinrich@erdw.ethz.ch or cline@ccmail.nevada.edu; website: <http://www.segweb.org/GordonConf.pdf>

August 7-11

10TH INTERNATIONAL PLATINUM SYMPOSIUM: "Platinum-Group Element - from Genesis to Beneficiation and Environmental Im-

pact, Oulu, Finland – Contact address: Congress Oulu, P.O. Box 56, Fin-90015 Oulun kaupunki, Finland; e-mail: congressoulu@ouka.fi; web-site: www.congressoulu.fi and <http://platinum-symposium.oulu.fi/>

August 18-21 - SGA-Cosponsored

8TH BIENNIAL SGA MEETING "MINERAL DEPOSIT RESEARCH: MEETING THE GLOBAL CHALLENGE". Beijing, China – Contact address: 8th SGA Biennial Meeting, Secretary: Dr. Jingwen Mao, Institute of Mineral Resources Chinese Academy of Geological Sciences, 26 Baiwanzhuang Road, Beijing, 100037 China; fax: +86-10 68 33 63 58; e-mail: mail@sga2005.com; website: <http://www.sga2005.com>

August 29 - September 2

STOMP - STRUCTURE, TECTONICS AND ORE MINERALIZATION PROCESSES, Townsville, Australia. Organised by the Economic Geology Research Unit at James Cook University – Contact address: e-mail: Timothy.Baker@jcu.edu.au or Thomas.Blenkinsop@jcu.edu.au; website: www.es.jcu.edu.au/STOMP/

*August 30 - September 13

MODULAR COURSE IN STRUCTURE, TECTONICS, AND MINERAL EXPLORATION, Sudbury, Ontario, Canada – Contact address: Bruno Lafrance, Mineral Exploration Research Centre, Department of Earth Sciences, Laurentian University, Ramsey Lake Road, Sudbury, ON, Canada, P3E 2C6; phone: +1.705.675.1151 x2364; fax: +1.705.675.4898; email: blafance@laurentian.ca; website: <http://earthsciences.laurentian.ca>.

*September 11-16

URANIUM MINING AND HYDROGEOLOGY, Freiberg, Germany – Contact address: fax: +49 3731 392720; e-mail: UMH@geo.tu-freiberg.de; website: www.geo.tu-freiberg.de/umh

*September 19-23

GEOCHEMICAL EXPLORATION AND 1ST INTERNATIONAL APPLIED GEOCHEMISTRY SYMPOSIUM, Perth, Australia – Contact address: Promaco Conventions Pty Ltd, ABN 68 008 784 585, PO Box 890, Canning Bridge, Western Australia 6153; phone: +61 8 9332 2900; fax: +61 8 9332 2911; e-mail: promaco@promaco.com.au; website: www.promaco.com.au/conference/2005/iges

*September 20-23

MINERAL DEPOSITS OF SOUTH AMERICA: NEW VISIONS, XVI Congreso Geológico Argentino, La Plata, Argentina – Contact address: website: www.congresogeologico.org.ar

October 16-19

GEOLOGICAL SOCIETY OF AMERICA: AN-

NUAL MEETING, Salt Lake City, Utah, USA – Contact address: GSA Meetings Department, P.O. Box 9140, Boulder, CO 80301-9140, USA; phone: +1 303 447 2020; fax: +1 303 447 0648; e-mail: meetings@geosociety.org; web-site: <http://www.geosociety.org/meetings/index.htm>

November 7-11

20TH WORLD MINING CONGRESS & EXPO 2005, Teheran, Iran – Contact address: Mr. A. Almasi, Chief of Executive Committee, No. 25, Ostad Nejatollahi Avenue, Teheran 1599913717, Iran; e-mail: info@wmce2005.com; website: www.20wmce2005.com

November 30-December 2

5TH FENNOSCANDIAN EXPLORATION AND MINING, Rovaniemi, Finland – Contact address: Regional Council of Lapland, Ms. Riitta Muhojoki, Project Secretary, P.O. Box 8056, Fin-96101 Rovaniemi, Finland; phone: +358-16-3301230; fax: +358-16-318705; website: www.lapinliitto.fi/fem2005

*December 8-17

MODULAR COURSE IN EXPLORATION GEOPHYSICS, Sudbury, Ontario, Canada – Contact address: Michael Leshner, Mineral Exploration Research Centre, Department of Earth Sciences, Laurentian University, 933 Ramsey Lake Road, Sudbury, ON, Canada, P3E 6B5; phone: +1.705.675.1151 x2364; fax: +1.705.675.4898; e-mail: lesher@laurentian.ca; website: <http://earthsciences.laurentian.ca>

2006

*April 5-16

MODULAR COURSE IN EXPLORATION FOR MAGMATIC ORE DEPOSITS, Sudbury, Ontario, Canada. Information: contact Michael Leshner, Mineral Exploration Research Centre, Department of Earth Sciences, Laurentian University, 933 Ramsey Lake Road, Sudbury, ON, Canada, P3E 6B5; Ph. +1.705.675.1151 x2364; fax: +1.705.675.4898; e-mail: mlesher@laurentian.ca; website: <http://earthsciences.laurentian.ca>.

May 14-16

SOCIETY OF ECONOMIC GEOLOGISTS (2006 Conference), Keystone, Colorado, USA.

July 16-23

ZEOLITE '06, Socorro, New Mexico, USA – Contact address: Dr. Bowman; e-mail: b Bowman@nmt.edu

July 23-28

19TH GENERAL MEETING OF THE INTERNATIONAL MINERALOGICAL ASSOCIATION, Kobe, Japan – Contact address: websites: <http://www.congre.co.jp/ima2006>, <http://homepages.udayton.edu/~koziol/meetings.html>

GEOCHIM – CGS/UNESCO/SGA TRAINING COURSE SUCCESSFULLY FINISHED IN CZECH REPUBLIC

Jan Pasava

Czech Geological Survey, Prague, Czech Republic

INTRODUCTION

It has been tradition to organize very successful UNESCO Postgraduate Courses on Geochemical Prospecting Methods in the former Czechoslovakia from mid 70's. The first certificated course - GEOCHIM PRAHA UNESCO 1975 was launched on September 5, 1975 and lasted till October 25, 1975. Since that time this course has been organized biannually by the Czech Geological Survey in Prague together with the Dionyz Stúr Geological Survey in Bratislava and sponsored by the Division of Earth Sciences (UNESCO/Paris) and the International Association of Geochemistry and Cosmochemistry (IAGS). The course was specialized on both theoretical and practical training in classical geochemical prospecting methods.

The major political and economic changes initiated in 1989 and which led to a split up of the former Czechoslovakia into two independent countries - the Czech and Slovak Republic have had a significant impact on the evolution of earth sciences and related mining activities. Following decades of extensive exploration programmes and also underground and surface exploitation, new policies have been formed which will result in a more responsible approach to the environment.

A very old and famous prospecting and mining tradition, coupled with a strong emphasis on environmental issues, are reflected in the character of a newly recovered certificated GEOCHIM Postgraduate Training Course. Our new group intends to offer more complete view, showing how these classical geochemical prospecting methods can be successfully used in the solution of various environmental problems.

Five GEOCHIM courses were organized in Prague and Dolní Rozínka (Czech Republic) between 1999 and 2003 and around 70 participants from more than 25 countries were trained both theoretically and practically in geochemical exploration methods and their environmental applications.

GEOCHIM 2004

This, already sixth, course was held in Prague and Dolní Rozínka (Czech Republic) from September 6-20, 2004 and fifteen participants (of whom 5 were female) from Bulgaria, Burkina Faso, Cameroon, China, Democratic Republic of Congo, Egypt, Macedonia, Mongolia, Namibia, Republic of South Africa, Romania, Russia, Zambia and Zimbabwe were trained both theoretically and practically in the geochemical exploration methods and their environmental applications similarly as during previous years. The course was organized by the Czech Geological Survey and Society for Geology Applied to Mineral Deposits (SGA) under the auspices of the Ministry of the Environment, Czech Republic, Czech Commission for UNESCO and the Czech IGCP National Committee and financially sponsored by the Czech Government (through the Program of Technical Assistance of the Czech Republic to developing countries), Czech Geological Survey in Prague, Division of Earth Sciences - UNESCO/Paris (through the contract no.45000 18625), Czech Commission for UNESCO (through participation program), and the Society for Geology Applied to Mineral Deposits.

It should be noted that the course was officially launched on September 7th, 2004 in the headquarters of the Czech Geological Survey in Prague by opening speeches delivered by Mr. M. Pastvinsky (Director, Department of Global Relations, Ministry of the Environment, Czech Republic), Mr. Z. Venera (Director of the Czech Geological Survey), Mr. Z. Kukal (the former director of the Czech Geological Survey) and Mr. J. Pasava (Chairman of the Czech IGCP National Committee, SGA Executive Secretary and Director of the GEOCHIM Courses).

Lectures, seminars and practical field training started on September 8th, 2004 in Dolní Rozínka and included the following subjects: (1.) Introduction to the geochemical prospecting methods, (2.) Principles of environmental geochemistry, (3.) Principles of analytical methods, (4.) Heavy

minerals prospecting and evaluation of HM concentrates with environmental applications, (5.) Stream sediment prospecting with environmental applications, (6.) Soil prospecting with environmental applications, (7.) Biogeochemical prospecting with environmental applications, (8.) Lithogeochemical prospecting, (9.) Hydrogeochemical prospecting with environmental applications, (10.) Geophysical prospecting methods with environmental application and radon risk, and (11.) Computer modeling of prospecting and environmental data.

Individual lectures covering various geochemical methods, which were presented during morning sessions, were followed by afternoon practical field and computer training. The underground visit to the uranium mine as well as processing plant and remediated sites at Dolní Rozínka (Moravia) and also full day field trip observing surface lignite mining operations and examples of various types of remediation in the North Bohemian Coal Basin (North Bohemia) were a part of this course. The aim of these visits was to demonstrate possible ways of effective usage of geochemical methods in both prospecting and environmental fields.

Presentation of Jan Pasava on SGA major goals and activities resulted in decision of five out of fifteen GEOCHIM participants to join SGA.

The following special textbooks were prepared for the purpose of the GEOCHIM Postgraduate Training Course on the Geochemical Prospecting Methods and Their Environmental Applications:

Pasava, J. and Kríbek, B., (eds.), 2003, Geochemical prospecting methods and their environmental applications. Special Publication, 144 p., Czech Geological Survey, Prague, ISBN 80-7075-602-0.

Pasava, J., Godány, J. and Masek, D. (eds.), 2004, Geochim 2004 Postgraduate Training Course - Field trip guide to the North Bohemia (2004). Czech Geological Survey, 12 pages.

CONCLUSIONS AND FUTURE

PLANS

It is apparent that renewed GEOCHIM courses have become very popular among geoscientists from especially developing countries. Many participants highly appreciated both organization and scientific level of the course through their personal letters mailed either to organizers or to Mr. W. Eder from the Division of Earth Sciences, UNESCO, Paris. Moreover, the organizers have already started seeking funds for GEOCHIM 2005, which should be organized from September 5 to September 19, 2005, if sufficient funding available.

ACKNOWLEDGEMENTS

On behalf of the Organizing Committee, I wish to extend best thanks to the following

sponsors for their financial and/or moral support: Government of the Czech Republic, Czech Geological Survey in Prague, Society for Geology Applied to Mineral Deposits (SGA), Czech Commission for UNESCO, Division of Earth Sciences, UNESCO (Paris) and Czech IGCP National Committee.

It would not have been possible to organize this course without efforts of members of the Organizing Committee (D. Masek, R. Cadská, V. Bláha and J. Tesar from the Czech Geological Survey in Prague) as well as considerable understanding of the management of the DIAMO/GEAM State Enterprise in Dolní Rozinka. The leadership of the North Bohemian Mines j.s.c (Severočeské doly a.s., Chomutov). also

supported our activities. Mr. W. Eder and Mrs. D. Piuze from the Department of Earth Sciences/UNESCO helped to get the course funded through the UNESCO administration. Last, but not least I wish to thank all authors who contributed to the updated textbook and to all lecturers.

More information on the GEOCHIM 2005 Postgraduate Course is available at <http://www.geology.cz>

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News from joint Prague-Freiberg Student Chapter

Our chapter has organized a short course dedicated to Geochemistry, mineralogy and metallogeny of Platinum-group element deposits. This course was held at the Faculty of Science, Charles University, Prague on 12-14th October 2004. Fifteen participants (10 from Czech Republic, 2 from Germany, 2 from Slovakia and 1 from Iran) took part in it. We invited Dr. Zdenek Johan (BRGM, France) as a lecturer, because he is one of the most experienced geoscientist in this field and has studied many PGE deposits (e.g. Bushveld, Sudbury, Great Dyke, Jin Chuan). The course covered the most interesting topics of platinum-group element deposits.

On the first day we talked and discussed the economy and mineralogy of PGE deposits. It is absolutely clear that South Africa controls the Pt market (68.94% of the world total production) and Russia controls the Pd market (60.64% of the world total production). These two countries produce nearly 90% of the world PGE. However, large deposits in Finland (e.g. Penikat, Suhanko, Naukas) with total resources of 13816 tons (13 % of the total world reserves) have not been mined yet. Concerning the mineralogical part we focused on the platinum-group alloys (Pt-Rh, Ir-Os, Pt-Ir, Ir-Pt3Fe and Pt-Pd-Cu) and their effects on the oxygen and sulfur fugacities. Also partitioning coefficients of PGE between sulfide/silicate liquid and monosulphide solution/sulfide liquid were discussed.

The second day was dedicated to PGE distribution in ophiolitic complexes and Alaskan-type intrusions. This part was based mainly on the personal experience of Zdenek Johan from many localities around the world (e.g., ophiolites - New Caledonia, Cyprus, Albania; alaskan-type complexes - Australia, Papua-New Guinea, Canada and Italy). We discussed the petrology, mineralogy and genesis of chromite mineralization associated with PGE within this kind of rocks. Zdenek Johan presented his very interesting opinion that the main reason for chromite mineralization in some ophiolites is probably the presence of reducing fluids.

Finally, we discussed the geochemistry of platinum-group elements and PGE occurrences of the Bushveld complex on the third day. In this part we talked about all features of this layered intrusion and its relationships with PGE mineralization. We concentrated on PGE-bearing horizons (Merensky reef, UG-2 reef, Platereef) and petrogenesis of platiniferous pipes (Driekop, Onverwacht, Mooihoek)

and on the differences among them. The main interesting feature for us was the presence of reducing fluids within these reefs and their strong CH₄/CO₂ variation indicating an important role of oxygen fugacity changes. This feature is probably very closely connected with chromite and PGE mineralization. At the end we discussed the geochemistry of PGE and base metals (Ni, Cu, Cr) in (ultra)mafic rocks from many environments in the crust and mantle.

Lukás Ackerman

Organizer, Charles University, Prague



Group photo at Krupka Mine



Training Course in Exploration and Environmental Geochemistry

Geochim
postgraduate course

Organized by the
Czech Geological Survey, Prague
and



Prague and Dolní Rozínka
Czech Republic
September 5-19, 2005

Aims of the course

Certificated 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.

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.



Language of the course
English.

Other information

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. The organizers will cover accommodation, travelling and meals during the course so that no per diems are provided. International travelling to Prague is not included. A diploma will be awarded to each successful participant.

Insurance

No travel insurance will be organized for any of the course participants. All participants are reminded that they should organize their own personal insurance for all aspects of the course and field excursions. The organizers shall accept no responsibility whatsoever for any damage, loss, personal injury or death suffered by any participant during the course and associated field excursions.

Place

Prague (2 days), Dolní Rozínka - Hotel Duo (40 km North of Brno).

Duration 5 - 19. September 2005

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 a short CV should be sent to organizers not later than March 15, 2005. Letter of acceptance with detailed programme, travel and payment instructions will be sent to selected applicants during May 2005.

Deadline for application: March 15, 2005

Contact address:

GEOCHIM 2005

Dr. Jan Pasava

Czech Geological Survey

Geologická 6

152 00 Prague 5 - Barrandov

phone: +420-2-51085506

fax: +420-2-51818748

e-mail: pasava@cgu.cz or masek@cgu.cz

GEOCHIM 2005 Training Course in Geochemical Exploration Methods and their Environmental Applications

Prague and Dolní Rozínka, Czech
Republic
September 5-19, 2005

APPLICATION FORM

Name

Surname

Date of birth

Passport N.

Obtained Degree(s)

Present position

Institution

Contact address

Phone

Fax

E-mail

Home address

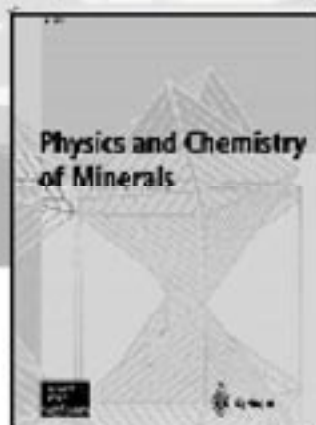
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Female ☐

Date

Signature

Return by 15 March 2005



Physics and Chemistry of Minerals

In cooperation with the
International Mineralogical
Association (IMA)

Editors:

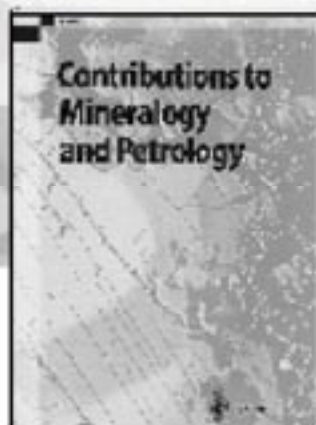
M. Akaogi, A. Putnis,
M. Rieder, J.A. Tyburczy

Physics and Chemistry of Minerals presents physical and chemical studies on minerals or solids related to minerals. Its aim is to support interdisciplinary work in mineralogy and physics or chemistry. Particular emphasis is placed on applications of modern techniques or new theories and models to interpret atomic structures and physical or chemical properties of minerals.

Subscription information 2004:

Volume 31, (10 issues)
€ 1650 suggested list price, plus
carriage charges Germany € 20, 10, other
countries € 30, 00

ISSN 0342-1791 (print edition)
ISSN 1432-2021 (electronic edition)
Title No. 269



Contributions to Mineralogy and Petrology

Executive Editors:

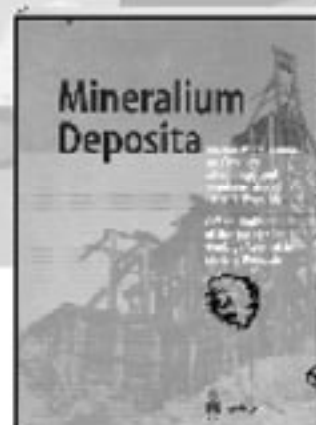
T.J. Grove, J. Hoefs

The journal was founded in 1947 by O. H. Edmundo-Sorlier with the collaboration of C. W. Correns and H. Steinmetz as "Heidelberger Beiträge zur Mineralogie und Petrographie". It rapidly gained an important position among geological journals, and has for years ranked among the leaders in the Science Citation Index mineralogy listing.

Subscription information 2004:

Volumes 147 + 148, (6 issues each)
€ 3100 suggested list price, plus
carriage charges Germany € 31, 00,
other countries € 53, 10

ISSN 0010-7999 (print edition)
ISSN 1432-0967 (electronic edition)
Title No. 410



Mineralium Deposita

International Journal of Geology,
Mineralogy and Geochemistry of
Mineral Deposits

Official Bulletin of the Society for
Geology Applied to Mineral Deposits

Editors:

B. Lehmann, L. D. Meinert

This journal introduces new observations, principles, and interpretations from the field of economic geology, including nonmetallic mineral deposits, experimental and applied geochemistry, with emphasis on mineral deposits. It contains short and comprehensive articles, review papers, brief original papers, scientific discussions and news, as well as reports on meetings of importance to mineral research.

Subscription information 2004:

Volume 39, (8 issues)
€ 1220 suggested list price, plus
carriage charges Germany € 20, 80,
other countries € 35, 50

ISSN 0026-4598 (print edition)
ISSN 1432-1866 (electronic edition)
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Canada Research Chair Tier 2 Geochemistry



The Department of Geological Sciences and Geological Engineering, Queen's University, one of Canada's oldest and best-known earth-science departments, seeks exceptional researchers to apply for a Tier 2 Canada Research Chair in the field of Earth System Science, with a focus on the geochemical processes that take place on or within the Earth. Areas of specific interest are: rock-forming processes in the lithosphere, the origin of mineral deposits, biogeochemistry, sedimentary geochemistry, and the origin/diagenesis of bio-chemical sediments. The successful candidate must be within 10 years of receipt of their Ph.D. and have an outstanding research record in order to fulfil the criteria for Tier 2 Canada Research Chairs (see www.chairs.gc.ca/web/program/nominate_e.asp). It is expected that the Chair holder will supervise graduate students at the M.Sc. and Ph.D. levels, contribute actively to undergraduate and graduate teaching, undertake vigorous externally funded research, and collaborate with departmental colleagues. The department has faculty with a wide range of expertise and emphasizes the linkage between field and laboratory-based research and teaching. Its labs include state-of-the-art geochemical facilities. For more information about the Department, visit www.geol.queensu.ca.

The University invites applications from all qualified individuals. Queen's is committed to employment equity and diversity in the workplace and welcomes applications from women, visible minorities, aboriginal people, persons with disabilities, and persons of any sexual orientation or gender identity. All qualified

candidates are encouraged to apply; however, Canadian citizens and Permanent Residents will be given priority. The academic staff at Queen's University is governed by a collective agreement, the details of which are posted at <http://www.queensu.ca/qufa>. In accordance with the Queen's guidelines for the assignment of Canada Research Chairs, applications from qualified women are particularly encouraged for this position.

Applicants should send a current curriculum vitae, a statement of research interests and future plans, a statement of teaching experience and interests, and samples of research writing to the following address. Individuals who intend to apply should provide to the undersigned, as soon as possible, the names and addresses of five persons of international standing who have agreed to provide letters of reference. Doctoral and/or post-doctoral supervisor(s) may be included. Review of complete applications will begin on January 24, 2005.

Robert W. Dalrymple, Head,
Department of Geological Sciences and Geological Engineering,
Queen's University,
Kingston, ON K7L 3N6, Canada
Telephone: 613-533-2598
Fax: 613-533-6592
E-mail: zarichny@geol.queensu.ca



CHANGE OF ADDRESS FORM

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

Peter M. Herzig, SGA Treasurer - Leibniz-Institut für Meereswissenschaften · IFM-GEOMAR
Gebäude Ostufer · Wischhofstr. 1-3 · D-24148 Kiel, Germany
phone: ++49-431-600-2800 · fax: ++49-431-600-2805 · e-mail: pherzig@ifm-geomarg.de

Name

Old address

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



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

- | | |
|----------------------------------|--|
| <input type="checkbox"/> 65 EUR | Regular |
| <input type="checkbox"/> 10 EUR | Student (up to Ph. D., max. 4 years)* |
| <input type="checkbox"/> 45 EUR | Senior (after retirement)* |
| <input type="checkbox"/> 200 EUR | Corporate (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

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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 geologists. 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. Subsidies 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: Bernd Lehmann (Clausthal, Germany)
and Larry Meinert (Pullman, WA, 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 aspects of 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.

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MINERALIUM DEPOSITA & SGA NEWS!!!

Additional information in the SGA homepage
on Internet:

<http://www.e-sga.org>

Society for Geology Applied to Mineral Deposits

8th Biennial SGA Meeting August 18-21, 2005 Beijing, China

第八屆國際礦床地質會議
北京

礦

主題
礦床研究——應對全球挑戰

Mineral Deposit Research: Meeting the Global Challenge



Co-organizers

- China University of Geosciences (Beijing)
- Institute of Mineral Resources, Chinese Academy of Geological Sciences
- National Natural Science Foundation of China
- China Society of Geology

- Society of Economic Geologists
- International Association on the Genesis of Ore Deposits
- Institute of Geology and Geophysics, CAS
- Institute of Geochemistry, CAS
- State Key Lab for Mineral Deposit Research (Nanjing University)

Contact: Dr. Jingwen Mao, Institute of Mineral Resources, CAGS, 26 Baiwanzhuang Rd., Beijing 100037, China, E-mail: mail@sga2005.com, Website: <http://www.sga2005.com>



8th Biennial SGA Meeting Beijing 18-21 August 2005 SECOND CIRCULAR



Invitation to the 8th SGA Biennial Meeting on "Mineral Deposit Research: Meeting the Global Challenge"

Message from the President (Yuchuan Chen) and Secretary General (Jingwen Mao)

Dear Colleagues, the Chinese economy is rapidly growing which is reflected in the expanding Chinese and global markets for minerals. The future mineral resource need of the global community depends on the discovery of new and unconventional resources that must be linked to ore deposit research. This meeting provides an exceptional opportunity to participate in technical presentations, workshops, and field trips organized by university, industry, and government geologists dedicated to the study of ore deposits.

Beijing provides an exciting venue for the conference. Modern tourist facilities, interesting cultural attractions, and unique historical sites provide a background for the conference. Considering the tremendous progress in research and exploration of Chinese mineral deposits along with the remarkable economic growth during the last twenty years, the 8th SGA Biennial Meeting in Beijing provides opportunities for exchanging new ideas on research, exploration and mine development. Numerous field trips will be offered to some of the world's largest ore deposits. We warmly invite you to make plans to participate in the 8th BIENNIAL SGA MEETING in Beijing.

Message from the SGA President (Dave Leach)

The 2005 BIENNIAL SGA MEETING in Beijing marks a major milestone for SGA as it will be our first Biennial Meeting outside of Europe. The Beijing venue reflects SGA's commitment to our growing international membership and to the global community of ore deposit geologists. The conference brings together academic and government researchers with industry geologists from around the world to integrate results from mineral resource exploration and ore deposit research.

Beijing is an ideal venue to focus on the global challenges to find new mineral resources. China's impressive economic growth is accelerating the need for new mineral resources and highlights the need for new insights into why and where ore deposits form in the Earth's crust. Beijing provides an excellent departure point for stimulating field trips to important ore deposits in the region. The conference benefits from several IAGOD and SEG-organized technical sessions and field trips. An exciting social and guest program will provide additional highlights to the conference.

SGA and the Beijing Organizing Committee are working to make the conference accessible to students and economically disadvantaged professionals. We have a committee that is focused on student needs for the conference. We thank Doug Kirwin of Ivanhoe Mines for organizing corporate sponsorships for students and professionals in need of travel assistance.

On behalf of SGA, I encourage you to join us in Beijing in 2005 for this exceptional conference.

Message from the CUGB President (Ganguo Wu)

I am very pleased that China University of Geosciences (CUG) is honored to be the venue of the 8th BIENNIAL SGA MEETING. On behalf of CUG, I sincerely welcome all participants from all over the world to our

university. CUG is a comprehensive university offering educational opportunities in many areas with geology, resources, environment, and geological engineering technology as the main educational and research activities which are coordinated with various science disciplines, engineering, liberal arts, management, economics and law. During the past fifty years, more than 80,000 scientific graduates were educated by CUG, including many academic masters and political figures. This meeting will also provide a great opportunity for the scientists of CUG to exchange their latest research results on geosciences with the colleagues over the world.

I promise to provide everything possible for the meeting and trust that the 8th SGA Biennial meeting will be a successful and fruitful.

Place, date, theme and meeting language

The 8th Biennial SGA Meeting will be held in Beijing, August 18-21, 2005 in the Academic Exchange Center of the China University of Geosciences, 29 Xueyuan Road, 100083. The Meeting language will be English.

Deadlines

January 31, 2005 - submission of extended abstracts, early registration for field trips and application for student grants

February 28, 2005 - notification of abstracts acceptance.

March 15, 2005 - final submission of abstracts and notification of student grants

April 30, 2005 - payment of early registration, short courses and field trips fees

Insurance

The Organizing Committee will not be liable for any personal accidents or illness of the meeting participants. Attendees are responsible for personal insurance coverage.

Venue and Climate

The Meeting will be held in the China University of Geosciences (Beijing), 29 Xueyuan Road, Haidian District, Beijing 100083, PR China. The weather during the conference should be pleasant with temperature around 30°C.

Registration fee

By 2005-4-30: Members of SGA/SEG/IAGOD/G.S.G 300US\$; non-members 350 US\$; Student members 100 US\$; Student non-members 200 US\$; accompanying guests 50 US\$

After 2005-4-30: Members of SGA/SEG/IAGOD/G.S.G 400US\$; non-members 450 US\$; Student members 150 US\$; student non-members 250 US\$; accompanying guests 100 US\$

Icebreaker Party

All registered participants are invited to attend the Icebreaker Party, held in the Canteen close to the Academic Exchange Center, beginning at 6 PM, Aug. 17.

Short Courses and Workshops

Short courses and workshops will be offered before the meeting. All per-

Scientific Programme

1. Tectonics, lithospheric, and deep mantle controls on global metallogenic provinces and giant ore deposits
2. Basin evolution: base and precious metal mineralization in sediments
3. Uranium deposits: metallogeny and exploration
4. Magmas and base-metal ore deposits
5. Epigenetic gold systems
6. Submarine ore systems and ancient analogues: Global comparisons of VMS (IGCP 502)
7. Understanding ore systems through precise geochronology, isotope tracing and microgeochemistry
8. Geology and economics of non-metallic resources
9. General economic geology
10. Mesozoic to recent geodynamics and metallogeny of eastern Asia
11. Metallogeny of the Tethys-Himalayan Orogen
12. Geodynamics and metallogeny of the Altaid Orogen (IAGOD +IGCP-473)
13. Metallogeny of Au-Ag-Se-Te mineralized systems (sponsored by IAGOD and IGCP-486)
14. Conceptual targeting of mineral deposits
15. Exploration, Discovery, and Mine Developments in China (SEG Sponsored Session)

sons wishing to attend a short course or workshop must be pre-registered for the course even if the course is free of charge. Please complete the form in the Supplement Information. On-site registration may be possible for some short courses providing that space is available.

SHC-1

Geology, metallogeny, and numerical modelling of supergene oxidised zinc deposits

Date: August 16-17, 2004; Place: Academic Exchange Centre, China university of Geosciences

Speakers: Gregor Borg (gregor.borg@geo.uni-halle.de) Jörg Reichert and Farahnaz Daliran

Martin-Luther-University Halle-Wittenberg, Halle, Germany

Lately, supergene non-sulphide zinc deposits have attracted much attention as alternative zinc exploration targets, due to their technical, economic, and ecological advantages.

The 1.5 day course will present a number of different examples from this class of deposits and will cover various continents, host rock lithotypes, and geological settings. This includes the presentation and discussion of past and current metallogenetic concepts and classifications as well as strategies in and obstacles to exploration of these deposits. A module on geochemical numerical modelling - using PHREEQC software - will present firm thermodynamic constraints on some of the most important mineral reactions and this will also include a hands-on exercise with this programme. (Maximum: 30 participants)

Enrolment: 170.00 \$ for professionals, and 20.00 \$ for students

SHC-2

Geochemical Mapping — Regional, National and Global

Speakers: Xie Xuejing (xuejing@public.bta.net.cn) and Wang Xueqiu

Dates: August 16-17 (one and half days), 2005; Place: Academic Exchange Centre, China university of Geosciences

The 1.5 day course will include one day's lectures on historical development of geochemical mapping concepts and methodology, China's regional and national geochemical mapping projects. Now strategy for mineral exploration based on the development of geochemical mapping. The application of geochemical mapping to solving agricultural and environmental problems. Recent proposal of global geochemical mapping along world major rivers. Geochemical mapping will provide important basic information for mineral resources exploration and environmental assessment, metallogenic and ore genesis study. In the other half day a visit will be organized to IGGE's analytical laboratory and world famous standard reference sample bank in Langfang (70 km from Beijing). (maximum: 50 participants)

Enrolment: 50.00 US\$ for per person (cover the travel to Langfang and the second day lunch).

Workshop-1

Gold deposits: New Development and Exploration (SEG workshop)

Speakers: Richard Goldfarb, Noel White, John Muntean, and Craig Hart (craig.hart@gov.yk.ca)

Dates: Date: August 16-17, 2005; Place: Academic Exchange Centre, China university of Geosciences

The Society of Economic Geologists is offering its very successful Gold Deposit Workshop, as previously held in Beijing and Moscow. Speakers will include Richard Goldfarb (USGS) - Orogenic gold Deposits, Noel White (consultant, Brisbane) - Epithermal Gold Deposits, John Muntean (Placer Dome) - Carlin-type Gold Deposits, and Craig Hart (Yukon Geological Survey) - Intrusion-related Gold Deposits. Materials presented will be rich in geological descriptions of some of the world's best examples of these deposit-types, as well as sections on exploration methods. This workshop would be of interest to all geologists, particularly those involved in gold exploration. Professionals: \$100 US Students: \$20

Workshop-2

Metallogeny of Intrusion-related gold deposits in China and adjacent countries

Speakers: Shunso Ishihara (Geological Survey of Japan), Timothy Baker (School of Earth Sciences, James Cook University, Queensland, Australia), Feng-Jun Nie (Institute of Mineral Resources, Chinese Academy of Geological Sciences, Beijing, China, nfjj@mx.cei.gov.cn)

Date: August 17, 2005; Place: Academic Exchange Centre, China university of Geosciences

The intrusion-related gold deposits and their associated plutonic provinces are globally widespread. Investigation and exploration of this type gold deposit have attracted much attention as an important exploration target. Geological, geophysical and geochemical data are emerging and expanding at an extremely rapid pace. We will examine the status of our knowledge on intrusion-related gold deposits. The one-day workshop invites experienced geologists from industry and academic circles to give lectures on the intrusion-related gold deposits. These may include discussions of defining criteria, essential features, tectono-magmatic setting, igneous environment, structural controls and hydrothermal fluid evolution of this class of deposits. Both genetic and exploration models of this type gold deposits will be discussed. Meanwhile, the relationship of intrusion-related gold deposits to other types of magmatic hydrothermal system will be examined. Moreover, geological maps and rock/ore samples selected from two or three typical intrusion-related gold deposits occurring within the north China craton will present for audiences hands-on examination. (maximum: 50 participants)

No charge for the workshop. abstracts

Abstracts and Proceedings

The Organizing Committee invites the participants to prepare oral presentations and/or posters. Extended abstracts will be reviewed by the Scientific Committee and those accepted for publication will be printed in the Proceedings volume (including a CD-Rom), distributed at the Meeting. The price of the Proceedings Volume is included in the registration fee. The abstract language is English. Abstracts submitted by non-English speaking authors should be edited by native English speakers. The official Publisher of the

Proceedings Volume will be the Springer Verlag.

The maximum length of abstract manuscripts is four pages including figures, gray-tone photographs and references. Colored photographs and drawings will not be accepted. For details see the Springer instructions below. Deadline for abstracts submission is January 31, 2005. Abstracts will be accepted before February 28, 2005 and should be returned to the Organizing Committee in the camera-ready form before March 15, 2005 at the address:

Dr. Mao Jingwen
Institute of Mineral Resources
Chinese Academy of Geological Sciences
26 Baiwanzhuang Rd., Beijing 100037, China
Tel: +86 10 68327333 Fax: +86 10 68336358
E-mail: mail@sga2005.com

Abstracts will be printed only if the registration fee is paid together with the submission of camera-ready manuscript and/or before April 30, 2005. For late payments (after April 30, 2005) publication of abstracts cannot be guaranteed.

Posters

Poster session will be held from August 18 to 21, simultaneously with the thematic sessions. The available space for a poster is: vertical length 195 cm and horizontal length 95 cm. Poster authors will be required to be present with the poster at a specified time to be determined.

Field trips

Pre-meeting Field Trips

1. Mineral deposits of western Inner Mongolia--Bayan Obo supergiant Nb-REE-Fe deposit and Wulashan lode gold deposit, Inner Mongolian Autonomous Region, China

Located 130 km north of Baotou City, the second largest city in Inner Mongolian, Bayan Obo is the largest Nb-REE-Fe deposit in the world, and contains 75% of the total REE reserve of the world. The deposit occurs within Middle Proterozoic volcano-sedimentary sequences and shows an intimate spatial relationship with Paleozoic alkaline igneous rocks. The unique geological and geochemical features of the deposit have attracted great attention from the international economic geological community, and debate concerning ore genesis of the unique deposit is ongoing. In addition, Paleozoic alkalic-magmatic gold occurrences are well developed in the Baotou-Bayan Obo region. Among these gold deposits, the 50 t Au Wulashan deposit is the largest. The deposit, located 25 km NW of Baotou City, consists of a series of gold-bearing quartz-K feldspar veins cutting Archean metamorphic rocks near Paleozoic igneous rocks. Participants on the field trip will tour the Bayan Obo and Wulashan deposits and examine the local geology, sample host rocks and ores, and discuss ideas of ore genesis.

Leaders: Feng-Jun Nie (Institute of Mineral Resources, CAGS), and Zhang Hong (Inner Mongolian Geological Survey)

Dates: 11-16 Aug.

Max./Min. number of participants: 36/20

Cost (US\$): 500

2. Giant orogenic gold deposits and related granitoids in the eastern Shandong Province, China

Shandong Province is China's most significant gold province with at least 30 Moz of past production and defined reserves, and great remaining resource potential. It is the world's most important granitoid-hosted lode gold province. The Yanshanian (ca. 125-120 Ma) veins and disseminated ores are predominantly hosted by the margins of massive Mesozoic granitoids, which intrude Late Archean country rocks. Our visit will be to four of the most important deposits in the province--Linglong, Jiaojia, Sanshandao and Cangshang, each with at least 2-3 Moz Au and with Cangshang being

the largest open pit gold mine in China. The metamorphic country rocks, ore-hosting granitoids, and major tectonic features of the region will also be visited.

Leader: Yi-Tian Wang (Institute of Mineral Resources, CAGS)

Time: 11-15 Aug.

Max./Min. number of participants: 25/15

Full cost (US\$): 575

3. Cenozoic metallogeny of Tibet, China: the Gangdese Cu-Mo and Au metallogenic belt

The Gangdese copper belt occurs in the Gangdese magmatic arc along the northern side of the Yaluzangbo suture. Five large copper deposits (Cu reserves ≥ 0.5 million tons) and several medium to smaller copper deposits have been discovered in this newly defined belt during the last few years. The ore-bearing porphyries have an adakite affinity and intrusion ages range from 18 Ma to 14 Ma. The copper-dominant polymetallic mineralization occurred during the final stages of this magmatic episode. The trip will visit three important deposits: Jiama Cu porphyry-polymetallic skarn deposit, Tinggong porphyry Cu-Mo deposit, and Xiongcu Cu-Au deposit.

Leader: Xiaoming Qu (Institute of Mineral Resources, CAGS)

Time: 12-16 Aug.

Max./Min. number of participants: 15/10

Full cost (US\$): 1300

4. Copper and Gold Deposits of Mongolia (SEG-IAGOD field trip)

The giant mid Palaeozoic Oyu Tolgoi (Turquoise Hill) porphyry gold and copper system is located in the south Gobi region of Mongolia. Mineralisation outcrops at Central and South Oyu whereas the gold-rich copper zone at Southwest Oyu and the high grade copper-gold being explored at the Hugo zone in the north are blind discoveries. The newly discovered deeply buried porphyry system at Hugo North is one of four cogenetic copper and gold porphyries delineated along a six kilometer northeast trending structural corridor. The Erdenetiin Ovoo (Erdenet mine) is the largest porphyry copper-molybdenum deposit in Mongolia (1.78 Gt @ 0.62% Cu, 0.025% Mo). Multiple intrusions of diorite to granite porphyries control multi-stage mineralization. The oxide zone overlies a 30 to 300 m thick supergene enrichment blanket where secondary chalcocite replaces hypogene chalcopyrite and bornite-covellite assemblages in stockworks and sheeted veins. The Boroo gold deposit, 10.3 Mt of ore averaging 3.52 g/t gold, is largely granite hosted with lesser portions hosted by sheeted quartz veins in a deformed meta-turbidite sequence, and is classified as a low silica Au+As sulfide system, probably intrusion-related. Trip will start and end in Ulaanbaatar

Aug 14th: 8am charter flight to Oyu Tolgoi and technical presentation, lunch;

visit to key outcrops and drill core; 5pm return to Ulaanbaatar and dinner

Aug 15th: 7am departure by bus to Erdenet with packed lunch. 2pm technical presentation and visit to open pit. Overnight at hotel at Erdenet.

Aug 16th: 8am drive to Boroo and technical presentation followed by lunch. Afternoon visit to open pit and return to Ulaanbaatar.

Leaders: Doug Kirwin (Ivanhoe Mines), Reimar Seltmann (NHM CER-CAMS), Ochir Gerel (Mongolian University of Science and Technology, Ulaanbaatar)

Time: 13/14-16 Aug. (to arrive Ulaanbaatar by 13th Aug.; departure 17th Aug.)

Max./Min. number of participants: 18/10

Full cost (US\$): 900

(including reference guidebook publication and air & vehicle charters from/to Ulaanbaatar. Note this does not include hotel in Ulaanbaatar or airfares from and to Beijing. Assistance with visas and hotel bookings will be provided).

5. Active and extinct hydrothermal systems of the North Island, New Zealand (4 days)

Visits will be made to geothermal systems in the Taupo Volcanic Zone and several low sulphidation epithermal gold-silver deposits in the Coromandel region to illustrate the hydrology, fluid chemistry, alteration and mineralisation of subaerial epithermal systems. Highlights include Champagne Pool at Waiotapu where gold-silver precipitates are actively forming, the Waihi gold mine, and spectacular scenery of lakes and recently active volcanoes. Trip will start and end in Auckland.

Leader: Tony Christie (Institute of Geological and Nuclear Sciences, NZ)

Time: 11-16 Aug.

Max/Min number of participants: 24/14

Full cost (US\$): 1000

Post-meeting Field Trips

6. Porphyry-skarn-stratabound Cu-Au-Mo deposits of the Middle and Lower Yangtze River region, China: Xinqiao, Dongguashan, Shizishan, Anqing, Chenmenshan, and Wushan deposits

The Middle-Lower Yangtze River metallogenic belt runs through the provinces of Hubei, Jiangxi, Anhui and Jiangsu in eastern China, and consists of more than 200 economic metal deposits. These include the copper deposits of Tieshan, Chengchao, Tonglushan, and Tongshankou in the Daye area; Chengmenshan, Wushan, and Yangjishan in the Jiurui area; Tongguanshan, Shizishan (Dongguashan), Fenghuangqiao, and Xinqiao in the Tongling area; and the iron deposits in the Ningwu-Luzong area. The mineralization is intimately related to the Yanshanian magmatism, with many large and Cu-Au porphyry and skarn deposits, as well as less significant stratabound ores. This metallogenic belt is the most important porphyry-skarn province in China, and has been the focus of numerous studies by economic geologists from both China and overseas. A tour of the beautiful Lushan Mountain scenery will also be included during the trip.

Leader: Taofa Zhou (Hefei University of Technology)

Time: 23-28 Aug.

Max./Min. number of participants: 60/15

Full cost (US\$): 650

7. Intrusion-related gold deposits of the northern margin of the North China craton, Hebei Province, China

The Dongping, Hougou, and Huangtuliang gold deposits, located about 250 km NW of Beijing, are important lode gold deposits that have a strong spatial relationship to Paleozoic alkaline intrusive bodies intruded along the northern craton margin. In addition to these deposits, the nearby Xiaoyingpan lode gold deposit will also be visited, which in contrast is hosted by medium to high grade Precambrian metamorphic rocks of the North China craton. These deposits are dominated by continuous and thick quartz veins, and also contain high-grade ores disseminated in strongly K-altered wall rocks. Spectacular views of Yanshan Mountain, the Great Wall of Badaling, and the Xuanhua Ancient Clock Tower, as well as a stop at the hot springs in Chicheng County, will make the trip both informative and enjoyable.

Leader: Sihong Jiang (Institute of Mineral Resources, CAGS)

Time: 22-25 Aug.

Max./Min. number of participants: 30/10

Full cost (US\$): 375 (or \$425 for single room)

8. Giant mineral deposits of central China—the Daijiazhuang Pb-Zn sedex deposit, Jinchuan mafic-ultramafic rock-related Cu-Ni sulfide deposits (Gansu Province), and the Baguamiao and Jianchaling lode gold deposits (Shanxi Province)

We will fly to Xi'an and visit four of China's giant mineral deposits. These

will include: 1) the Changba Pb-Zn deposit occurs in folded marine clastic and carbonate rocks of the western Qinling; 2) the superlarge Jinchuan Cu-Ni magmatic sulfide deposit, mainly hosted by medium- to coarse-grained Neoproterozoic lherzolite, occurring within the rifted southwestern margin of the North China craton; 3) the Mesozoic Baguamiao orogenic gold deposit that is hosted by late Paleozoic marine clastic rocks of the western part of the Qinling tectonic belt; and 4) the Mesozoic Jianchaling gold deposit, of controversial origin (Carlin-like vs orogenic), which occurs along a dolomite-ultramafic contact within the southern edge of the western Qinling belt. Local travel in a modern, air-conditioned bus will allow time for viewing the magnificent mountain scenery, as well as the Terracotta Warriors museum in Xi'an.

Leaders: Wenyuan Li (Institute of Geology and Mineral Resources, China Geological Survey) and Ruiting Wang (Northwest Bureau of Nonferrous Metal Geology)

Time: 23-29 Aug.

Max./Min. number of participants: 30/15

Full cost (US\$): 1300

9. Cambrian black-shale hosted Ni-Mo-PGE, barite and phosphorous deposits, Guizhou Province, China

The southern margin of the Yangtze massif in Guizhou Province is an important region for mineral resources in China, where three deposits will be visited during this trip. These include: 1) the large Lower Cambrian Huangjiawan Ni-Mo-PGE deposit in Zunyi area, 2) the super-large Neoproterozoic Wengfu phosphorous deposit in Weng'an area, and 3) the world-class Lower Cambrian Dahebian barite deposit in Tianzhu area. Stops will also be made to examine the country rocks, fault-controlled basins, and related sedimentary environments in Neoproterozoic strata.

Leaders: Ruizhong Hu, Changyan Wang (Institute of Geochemistry, CAS)

Time: 22-26 Aug.

Max./Min. number of participants: 30/20

Full cost (US\$): 650

10. Investigation of the genesis of salt lake deposits in Tibet, China

Many lakes appear as gems that dot the large mysterious Tibetan Plateau. The lakes in the eastern part of Tibet have evolved from the "Qiangtang East lakes". They are characterized by turquoise blue water, are in an area with magnificent views of the nearby mountains, and there are numerous levels of lakes and high-stand lake sediments. Large magnesite and boron deposits, and smaller potash and mirabilite deposits occur in these lakes. In addition, attendees may wish to visit Potala Palace, Jokhang Temple, etc., in Lhasa, and other famous historic sites. Much will be learned about the history and status quo of Tibetan Buddhism, one will feel the Tibetan ethnic life and culture, and enjoy the beautiful prairie and unique natural scenes.

Leaders: Yuanyi Zhao, Fanjing Kong (Institute of Mineral Resources, CAGS)

Time: 22-28 Aug.

Max./Min. number of participants: 20/10

Full cost (US\$): 1650

11. World-class Toyoha polymetallic deposits, Hokkaido, Japan (5 days)

This trip will visit the polymetallic veins at Toyoha, which is the biggest indium resource in the world, as well as the nearby Koryu epithermal Au-Ag deposit, Minami-Shiraoi (Barite) and Kunitomi Kuroko deposits, the Noboribetsu spa and hydrothermal system, the Kokko Tertiary manganese nodule deposit, and the Otaru-Akaiwa acid sulfate auriferous alteration zone. The trip will also include visits to the active volcanoes of Usu and Showa-Shinzan that have recently erupted. Trip will start and end at Tokyo Narita airport.

Leaders: Hiroharu Matsueda, Shuji Ono (Hokkaido U.)

Time: 22-26 Aug.

Max./Min. number of participants: 15/5
Full cost (US\$): 1200

12. Epithermal gold deposits in southern Kyushu, Japan (4 days)

Visits to the world-class, high-grade Hishikari quartz-adularia type, low-sulfidation epithermal Au-Ag vein deposit, Nansatsu-type high sulfidation Au deposit, surface thermal manifestation of the Yamagawa geothermal field, and the active Sakurajima volcano. Enjoy hot springs and spa during the trip as well. (Trip will start and end in Fukuoka—there are direct daily flights from Beijing)

Leaders: Koichiro Watanabe, Akira Imai (Kyushu U.), Sachihito Taguchi (Fukuoka U.)

Time: 22-26 Aug.

Max./Min. number of participants: 15/5
Full cost (US\$): 600

13. Miocene Kuroko- and vein-type deposits, and active geothermal area, northern Honshu, Japan (4 days)

Visits will be made to Kosaka-Motoyama Kuroko VMS deposits and the Osarizawa Cu-vein deposit to examine the Kuroko geology, bimodal volcanism, alteration, and mineralization. The Kosaka-Motoyama system is the first discovered Kuroko deposit. The debates on seafloor hydrothermal mineralization started from this open-pit. This trip will also visit the active Osorezan Au-Ag epithermal systems and the Hachimantai geothermal plant, with some scenic stops at caldera lakes and active volcanoes in northern Honshu. Trip will start and end at Tokyo Narita airport.

Leaders: Toshio Mizuta, Daizo Ishiyama and Yohei Ishikawa (Akita U.)

Time: 22-26 Aug.

Max./Min. number of participants: 15/5
Full cost (US\$): 1100

14. The Angouran nonsulfide zinc deposit, northwestern Iran, with an overview of the regional geothermal system (5 days)

Leader: Farahnaz Daliran

Time: 23-27 Aug.

Max./Min. number of participants: 12/7
Full cost (US\$): 1250

Youth Program and SGA awards

Awards for the Best Student Oral and Poster Presentations

Experience shows that the technical content of the program and the quality of the presentations in any conference improve with the increase of student participation. The SGA Council is committed to having a large number of students fully integrated into the meeting and well represented in the oral and the poster sessions. One of the most important missions of the Student Advisory Committee is to ensure that an adequate number of students will be giving papers. Students are strongly encouraged to submit extended abstracts. The chair and co-chairpersons of each session will be particularly sensitive to student participation in the meeting. Awards will be given to the best oral and poster presentations senior-authored by students.

The quality of the student abstracts is an important factor in the selection process for best presentations. The chair of each session will suggest the best abstracts and the Conference Committee (consists of Student Advisory Committee, Student Representative on SGA, MD editors and Representative of the Scientific Program Committee) will select the best oral and poster presentations given during the meeting. The criteria of selection will be based on: scientific merit, innovation and international significance, quality and presentation format. The best presentation will be announced and awarded at conference dinner. The award will consist of a certificate and a check for 200 US\$.

Several field trips to some of the world's largest ore deposits will be offered.

Students are invited to attend the field trips and a limited number of free student registrations in selected field trips will be offered.

Student Grants

SGA recognizes that the costs to attend conferences are particularly acute for students who generally have less access to funding than senior researchers. During the Beijing meeting, students will have available low-cost accommodations in one of several student residences at the China University of Geosciences. Limited financial support will be available for students. Applications for financial assistance can be directed to the Student Advisory Committee either in written form or electronically at a conference website. The application should include personal and professional details (see application form in supplement information).

Only applicants whose abstracts were accepted for the meeting will be considered for financial assistance. Financial assistance will be paid directly at the registration desk during the conference. No advance payments are possible. The decision regarding financial assistance will be announced by Organizing Committee by March 15, 2005.

Student participation in field trips and short courses: Several pre-meeting Short Courses, and numerous pre- and post-meeting Field Trips to some of the world's largest ore deposits will be offered, please see the list of field trips. Students are invited to get involved in these activities.

One free participation for a student on each field trip will be offered by the conference. Interested students should apply to Student Advisory Committee by January 31, 2005. The following information should be addressed in a letter of application: Name, advisor, university, degree and year expected, thesis title, and one paragraph (5 sentences) explaining why they want to attend the trip.

The decision regarding the free field trip attendance will be announced by Organizing Committee by March 15, 2005.

SGA Young Scientists Award

The SGA Young Scientist Award is offered biennially to a young scientist who has contributed significantly to the understanding of mineral deposits. The award consists of a citation, prize money (currently EUR 1500), and travel to the Biennial meeting for the presentation, and is open to all persons working in economic geology. The SGA Young Scientist Award is awarded for research in economic geology published before the author's 35th birthday. The candidates must be less than 37 years of age on January 1 of the year in which the award is presented. Any Society member in good standing may nominate candidates for the award.

How to Nominate a Candidate: A brief biographical summary should be submitted by the person making the nomination to the SGA Executive Secretary by January 1, 2005. For more details see <http://www.e-sga.org/sga.html>.

The Best Paper Award

The Mineralium Deposita Best Paper Award is granted for the best paper published in the Journal in the two years preceding the BIENNIAL SGA MEETINGS. For more details see <http://www.e-sga.org/sga.html>.

Hotel accommodation

1. Beijing New Century Hotel, 5 Star

Deluxe Room: US\$ 90

Business Room: US\$ 100

Executive Room: US\$ 130

Deluxe Suite: US\$ 150

Room includes breakfast, 2 bottles of mineral water are provided each day/room free of charge. Guests in Business and Executive Room enjoy free ADSL internet service. Fitness, swimming and Sauna services are free for guests

2. Xiyuan Hotel, 5 star

Standard Room(B): US\$ 60

Standard Room(A): US\$ 65

Deluxe Room: US\$ 75

Breakfast to be paid separately: Western breakfast: US\$ 8; Chinese breakfast: US\$ 5 per person

3. Xijiao Hotel, 3 star

Single Room: US\$ 40

Apartment Room: US\$ 45

Double Room: US\$ 35

Standard Room : US\$ 50

Deluxe Room: US\$ 80

Room bills include Chinese breakfast

Guests enjoy free ADSL internet service

4. Fangxing Hotel

Standard Room (A): US\$ 30

Standard Room (B): US\$ 40

Room bills include breakfast

Guests enjoy free ADSL internet service

5. Student dormitory (for students only)

Single Room: US\$ 10 (1 bed)

Double Room: USD 16 (2 beds)

Payments

All payments should be made in US\$ by bank transfer or internationally accepted credit cards at the Organizing Committee bank account. Chinese participants can pay in RMB by bank transfer at the Organizing Committee bank account given in website www.sga2005.com

Social Program

An exciting Guest Program has been put together for you to experience the best of Beijing's fascinating culture. You must be registered for the conference to attend all guest activities, which include the Icebreaker cocktail party, a marvelous conference banquet, an evening at the celebrated Beijing Opera, and the opportunity to join us on trips to Beijing's highlights.

Travel in air-conditioned coach with an English-speaking guide.

If the minimum number of 10 participants per tour is not achieved your payment will be refunded.

Day #1: BEIJING HIGHLIGHTS

We start at Tiananmen Square, the largest square in the world, stopping to visit Chairman Mao in his repose. Then on to the Forbidden City, home to China's Ming and Qing Emperors since the early 15th century. Be sure to watch "The Last Emperor" before coming. Afterwards we go to the Lama Temple, Beijing's most colorful temple. Full-day tour. Lunch is included. \$35 USD

Day #2: SHOPPING

Who can resist bargaining in one of the best shopping cities in the world? Finish birthday, holiday and Mother's Day shopping for years to come at the "Pearl Market" (pearls and MUCH more!) and at the Ya Xiu market. Floors and floors of fabulous shoes and purses, stunning cloisonné jewelry and trinkets, magnificent handicrafts. Bring an empty suitcase – or two! Half-day tour. Buy your own lunch as we take a break at Ya Xiu's excellent cafeteria. \$16 USD

Day #3: THE GREAT WALL/THE GREAT WALL AND THE MING TOMBS

How many of the Wonders of the World have you seen? You can climb the fabulous Great Wall of China, the symbol of the country, the only manmade object visible from space. Half-day tour. \$30 USD (add Great Wall 10) Full-day tour includes the Ming Tombs, the mausoleums of the 14th century Ming emperors. Lunch is included in the full day tour. \$45 USD

Day #4: HUTONGS AND THE SUMMER PALACE

The hutongs (classic old neighborhoods) of Beijing are rapidly disappearing to make way for the new Beijing. We visit by rickshaw the charming, ancient alleyways. Then elude the summer heat like royalty did on a boat ride to the Summer Palace, where we stroll the ancient walkways. Full-day tour. Lunch is included. \$35 USD

Specially designed tours for children will also be available, to Ocean Park, the Zoo, The Astronomical Observatory and the Science and Technology Museum.

Additional tours will be available to you to visit other parts of China, perhaps while your significant other is away on a field trip. Grab another "Field Widow" and see:

Hong Kong – This spectacular city outshines Las Vegas with its fabled neon lights. Terrific dining, fun market shopping, a cosmopolitan city of the first rank.

Guilin – Site of the beautiful, classic Chinese photos of misty skies, tree-covered limestone cliffs, and a lazy, winding river. Visit stunning terraced rice paddies – and feel like the Empress if you choose to be carried uphill in a sedan chair. Also some of the best shopping in China.

Xi'an – Home of the remarkable 2200-year-old terra cotta soldiers, only discovered in 1974. Some call it the Eighth Wonder of the World!

For information on kids' tours and China travel, write to: susanleach@aol.com

Exhibition

Exhibits from scientific publishing houses, mining companies, scientific equipment providers, university and government organization space will be present. Some local government officials in the provinces and regions will be invited to introduce the local policies for mineral resource development and investment.

Fee: \$500 per standard exhibition space:

Standard exhibition space is 3X3M2

Lighting/electrical connection: \$200

Includes one complimentary registration to conference

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**For registration and booking forms as well as payment details visit the conference web-site:
www.sga2005.com**

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