

ore solutions

Newsletter of the Centre for Ore Deposit Research, an ARC Special Research Centre at the University of Tasmania



Giant Ore Deposits Workshop to Discuss Exploration Strategies in the Current Economic Climate

Ore deposit discoveries will need to be substantial in terms of grades and tonnages to have an impact on the share price of the recently-merged mining houses.

A major international Giant Ore Deposits Workshop including a post-workshop visit to some world-class western Tasmanian deposits will be held 17–19 June 2002 to help facilitate exploration during the current economic

climate. The workshop Convenor is David Cooke (Leader of CODES Program 5 – Hydrology and Chemistry of Hydrothermal Systems).

Six classes of hydrothermal mineral deposits will be discussed at the workshop: porphyry Cu-Au-Mo; Fe-oxide Cu-Au; sediment-hosted Zn-Pb-Ag; nickel-PGE; Carlin-type Au and Witwatersrand Au.

Speakers will discuss each deposit type, the characteristics of giant deposits and how they compare to the smaller deposits in their class. Case histories of discoveries of giant deposits will also be covered. Each sessions will conclude with an open forum about the exploration for future giant deposits.

Industry and academic experts will give presentations and lead exploration forums. They include:

- Tony Belperio (Minotaur Gold)
- Francisco Camus (CODELCO)
- Richard Moore (Falconbridge)
- Greg Hall (Placer Dome)
- Scott Jennings (Teckcominco)
- David Groves (Centre for Global Metallogeny)
- Douglas Haynes (consultant)
- Tony Naldrett (consultant)
- Tommy Thompson (Mackay School of Mines, Nevada, USA)
- Keith Bettles (Barrick Goldstrike)
- Lawrie Minter (University of Cape Town, South Africa)
- John Thompson (Teckcominco)
- Nick Fox (Anglogold)
- Garry Davidson (CODES)
- Ross Large (CODES)



HYC No.2 Orebody at the McArthur River Zn-Pb mine. Photo courtesy of McArthur River Mining.



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The workshop and field trip constitute the first week of a CODES Masters short course (17–28 June). The second week of the short course will include sessions on other major deposits including Broken Hill type, MVT, VHMS, epithermal and hybrid.

For further information see page 11 of this Newsletter.

Boston 2001: A Geo-Odyssey

CODES had a strong presence at the November Geo-Odyssey 2001 Geological Society of America Conference, Boston, where the Special Research Centre was promoted at an international forum attracting over 5,000 delegates.

Research Fellow Garry Davidson presented a paper in the Society of Economic Geologists special session "Deposit studies of iron-oxide copper-

gold systems to a global context", and also reported on a hydrothermal sulfur anomaly at Macquarie Island in a technical session on "Ophiolites and the evolution of Geological Thinking".

Bruce Gemmill, joined forces with Helen Mango, of Castleton State University, Vermont, USA, to chair a special session in honour of the late Half Zantop, who was their PhD supervisor. The session

honored the scientific accomplishments and teaching excellence of Half Zantop, who was an economic geologist and Professor at Dartmouth College in Hanover, New Hampshire. Bruce presented a paper on Half's contribution to the geology and mineral deposits of the Fresnillo district in Mexico.

Peter McGoldrick and Jianwen Yang, were involved in the technical session "Sediment-hosted lead-zinc deposits: roles of basin evolution, tectonics and geochemistry in ore genesis". Peter gave talks about the HYC and Lady Loretta deposits, of northern Australia, whilst Jianwen presented new ideas about the control of salinity ore fluid migration models in SEDEX ore systems.

CODES was the only Australian research centre to attend the Geo-Odyssey as an exhibitor with Research Fellow, Robina Sharpe, and Skippy the inflatable kangaroo "personing" the stand. The display was a great success with numerous enquiries about CODES' publications and post-graduate opportunities.



Peter McGoldrick, Joel Brugger (University of Adelaide), David Giles (Monash University), Bruce Gemmill, Mike Simms (Johns Hopkins University), Garry Davidson and friends at the CODES booth — Geo-Odyssey 2001.

CODES Staff Changes

CODES has a new Research Fellow, **Andrew Rae**, who submitted his PhD thesis on the Palinpinon geothermal field, Philippines, in September 2001. Andrew's position at CODES involves investigating the trace element composition of sulfide minerals from a variety of hydrothermal ore deposits and evaluating the use as a tool for mineral exploration.

Yu Zongshu is going west to work for Murdoch University's faculty of engineering. Zongshu came to CODES from China in 1997 to study for his PhD. After completing his PhD,

Zongshu worked as a technical officer and operated CODES ICPMS.

Tanzi Lewis has been appointed Public Relations Officer with CODES. Tanzi's background is in journalism and public relations.

The linguistic skills of CODES new administrative assistant, **Loreto Lazcano-Frikken**, have been welcomed with many staff and students enrolling in her Spanish classes. Loreto, a former Chilean journalist, is married to CODES PhD student, Peter Frikken, who is doing

research in South America. CODES has several research projects in South America and Loreto's Spanish classes are proving beneficial for CODES staff bound for Chile, Peru and Argentina.

Marc Norman has resigned from his position as Senior Research Fellow and Manager of the CODES ICPMS Laboratory. Marc's work at CODES was critical in the development of zircon dating and sulfide geochemistry LA-ICPMS applications. Marc is now a Fellow in the Research School of Earth Sciences at ANU in Canberra.

CODES Contributes a Special Issue of *Economic Geology*

Researchers at the CODES have produced another Special Issue of the premier international journal, *Economic Geology*.

The Director of CODES, Ross Large, said the opportunity to compile and edit a Special Issue of *Economic Geology* was a major coup. "It is a significant achievement and demonstrates the strength and depth of our research projects," he said.

The new Special Issue of *Economic Geology* (v. 96, no. 5), co-edited by CODES Program 3 Leader, Bruce Gemmell, and Research Fellow, Walter Herrmann, is devoted to "alteration associated with volcanic-hosted massive sulfide deposits and its exploration significance". Most of the content of this Special Issue is based on a three-year (1995–98) collaborative research project (P439) between CODES and the Australian Mineral Industry Research Association. Fifteen of the 18 papers are based on CODES staff and student research on volcanic-hosted massive sulfide (VHMS) deposits and districts in Australia, with some contributions from external parties who were invited to contribute.

Research was undertaken at both regional and deposit scales. Three productive submarine, VHMS-bearing, volcanic belts in Australia were investigated: the Mt Read Volcanics in western Tasmania, the Mt Windsor Volcanics in northern Queensland, and the Archean Murchison volcanic province in Western Australia. Deposit case studies included research at Mt Lyell, Hellyer, Rosebery and Henty in the Mt Read Volcanics, Thalanga and Highway Reward in the Mt Windsor Volcanics, and Gossan Hill in the Murchison Volcanics.

The following companies and organisations supported this research: AMIRA, Aberfoyle Resources Limited, Copper Mines of Tasmania, Denehurst Limited, Mineral Resources Tasmania,



Ross Large, Wally Herrmann, Bruce Gemmell and Mike Solomon displaying the new geological map of the Mount Lyell area published in the Special Issue of *Economic Geology*.

Normandy Exploration, Pasmenco Exploration, Queensland Metals Corporation Ltd, RGC Exploration, and Rio Tinto Exploration.

CODES and the Geology Department/School of Earth Sciences at the University of Tasmania have produced three Special Issues of *Economic Geology* in the past three decades. "This is very significant as no other Australian or overseas department or research group can match this accomplishment. Each Special Issue produced has had different authors and spread of subject matter which shows the strength of economic geology at the University of Tasmania", Bruce Gemmell said.

The first Special Issue of *Economic Geology* (v. 76, no. 2) covered the geology and mineral deposits in Tasmania and was published in 1981. This issue was edited by Mike Solomon, with help from John Walshe and Chris Eastoe of the Geology Department.

In 1992, a second Special Issue of *Economic Geology* (v. 87, no. 3) was devoted to Australian VHMS deposits and

their volcanic environment. This issue was edited by Ross Large of the then CODES Key Centre.

This third Special Issue represents yet another milestone in the University of Tasmania's economic geology achievements.



New PhD students

CODES has welcomed three new PhD students who bring strong international industry experience.

Mineral exploration geologist, **Kate Bull**, has moved from one end of the Earth to the other to study for her PhD. Memories of a 1988 trip to Tasmania and the opportunity to study with Jocelyn McPhie lured Kate to Tasmania. "I wanted to study with Jocelyn and I liked Tasmania. So CODES was an attractive option," Kate said.

Kate, who worked in mineral exploration in Alaska, Canada, Greenland and Argentina, will study the volcanic facies architecture of the Palaeozoic Urals in New South Wales. Kate studied for her Master of Science at the University of Alaska, Fairbanks.

Numerical modeller **Lyudmyla Koziy**, from the Ukraine, has embarked on her PhD studies with the aim of developing a multi-dimensional numerical package for simulating ore-forming hydrothermal fluid migration in complex earth



Kate Bull



Lyudmyla Koziy

structures, particularly the sedimentary basins in northern Australia.

Lyudmyla is a graduate of the Kiev State University and worked for the Mathematical Machines and Systems Problems Institute at the Ukrainian



Lee Evans

Academy of Sciences from 1992–2001. Her work dealt with the application of mathematical modelling for ecological problems such as radionuclide transport in the marine environment, oil slicks and sea ice cover. Jianwen Yang and Ross Large will supervise her PhD.

Lee Evans, from Victoria, has come to CODES to research environmental geology for his PhD. Lee's project title is "Groundwaters in wet, temperate, sulfide mining districts: delineation of modern fluid flow, and predictive modelling to improve management after mine closure (Rosebery, Tasmania).

Lee graduated with a Bachelor of Applied Science from RMIT University, in Melbourne, and did Honours in environmental geology at the University of Ballarat. Lee has worked in exploration and mining in Western Australia, Victoria and Queensland.

Garry Davidson, Jianwen Yang and David Cooke will supervise his PhD.



Graduation

Four CODES/Earth Sciences students graduated in December 2001. Pictured are from left (back row) David Cooke, Bruce Gemmell, Ross Large and Tony Crawford; (front row) Kirstie Simpson (PhD), Rick Squire (PhD), Jocelyn McPhie and Alison Raos (PhD). Steven Hunns (PhD) graduated *in absentia*.

PROMOTION



*Bruce Gemmell, Leader of
CODES Program 3 – Ores in
Volcanic Arcs*

Bruce Gemmell, has been promoted to the position of Associate Professor, effective 1 March 2002.

The promotion recognises Bruce's excellence in teaching and leadership of research into volcanic-hosted and epithermal ore deposits at CODES.

Bruce has a long association with CODES, starting as a Lecturer in Economic Geology in 1990. In 1995, he was promoted to Senior Lecturer in Economic Geology and became tenured in 1996.

Originally from Canada, Bruce studied for his Bachelor of Science, majoring in geology, at the University of British Columbia, and completed his Masters and PhD at Dartmouth College in the USA. In addition, Bruce has six years of mineral exploration experience in Canada.

PhD Thesis Caps off Hard Work



Sarah Jones ready for action at the entrance to the Lynx Mine Adit, Myra Falls.

Time was of the essence when New Zealander Sarah Jones, decided to leave her job as an exploration geologist in Western Australia to embark on her PhD studies at CODES. Now, three years and three months later, Sarah has submitted her PhD thesis that involved eight months field work at the Myra Falls Cu-Zn-Pb deposit, Vancouver Island, British Columbia, Canada.

The thesis examined the geology and geochemistry of the "cap rocks" above VHMS deposits at Myra Falls where polymetallic orebodies are hosted by the Devonian Sicker Group, a volcano-sedimentary package which includes two mineralised horizons. The "cap rocks" are cherts that immediately overlie the orebodies.

Sarah's study concentrated on the lower ore horizon, which includes the Battle and HW deposits, located on or near the contact with the footwall andesite.

CODES Program 3 Leader, Dr Bruce Gemmell, said Sarah had produced an excellent thesis that satisfied all its aims, in near record time.

Prior to studying at CODES, Sarah completed a Masters degree at Otago University (NZ) and then worked as an exploration geologist with Plutonic Resources and Homestake Gold of Australia Limited.

Sarah is leaving Tasmania to work for the West Australian Geological Survey in Kalgoorlie as a field geologist.

Visit the CODES
Bookshop at
www.codes.utas.edu.au

The Geology and Origin of Australia's Mineral Deposits

by M. Solomon and D.I. Groves

Additional material outlining recent progress in understanding the processes involved in the genesis of Australia's major mineral deposits has been added to the highly successful 1994 edition of this book. Particular attention has been paid to sediment-hosted, stratiform Pb-Zn and volcanic-hosted massive sulphide deposits, but the review also includes discussions of Archaean ocean composition, orogenic lode gold deposits, Proterozoic Broken Hill-type and Cu and Au ores, and banded iron formations and their related iron ores. 1002 pages, hardbound. Price: AUD\$165.00.

"This is an excellent book of high publishing quality. Geologists of many callings will find this book valuable for its discussion of deposits in the context of geological history and crustal genesis, for its discussion of ideas concerning the origin of many well-known ore styles that occur in the Australian settings, for its wealth of ideas, and for its use as a reference." From a review of the 1994 edition by Spencer R. Titley, in Economic Geology, v. 91, p. 224, 1996.

ORDER NOW at www.codes.utas.edu.au/publications

Chile

Beneath the rich cultural and historical surface ... there's ore



by Andrew Tunks

Cultural and historical were among the first impressions CODES Masters students developed about Santiago, Chile. However, those on the “South American Ore Deposits” tour (part of the CODES Masters program) soon found that Chile had great hidden wealth and depths.

Recovering from jetlag was the first priority for the group who came from far and wide — Australia, Sweden, Greenland, Peru and Chile — to embark on awesome discoveries. Some respite was offered at Santiago's Providencia restaurant and bar bistrick by night. “Early birds” like Graham Gribben, a Masters of Economic Geology student from the University of Western Australia, even emerged at 6 am to go sightseeing.

While Santiago provided our first sight of Chile, the first deep discovery was a trip to the world's largest underground mine, El Teniente, owned by Codelco, about 100 km southwest of Santiago in the Western Cordillera.

A Greyhound bus is not the usual method of transport into an underground mine, but that was how we were transported into the Esmerelda section of the orebody. From there, the group completed a geological traverse from the post-mineral Braden Breccia pipe through a 1.5 km section of copper mineralisation, showing the zonation from bornite to chalcopyrite, fantastic breccia textures, sensational vein relationships and giving some insight into the scale of these giant porphyry Cu systems.

Lunch at the underground cafeteria was novel. The cafeteria, with self-service, trays and cashier, is capable of seating 100, a bit different to any “crib room” I have ever visited. After lunch, the group visited an underground vug within the breccia pipe, complete with gypsum crystals up to 6 m long. Finally, a visit to the core shed to view some recently drilled high-grade holes underneath the zone currently being mined.

The visit was memorable thanks to the work of Patricia Zuniga, Ricardo Floody and the team including Jose, Arturo and Fernando.

Wednesday commenced with a drive to the north and then a visit to the Codelco-owned Andina operation. This is another giant porphyry Cu deposit in the Cordillera very close to Santiago. This visit enabled students to complete a breccia logging exercise looking at three diamond holes drilled through the Sur Sur mineralisation. These holes showed a variety of different breccia textures and gave a good overview of the mineralisation and some of the paragenetic relationships developed at Andina.

Australian geologists are accustomed to working in the dry, hot and flat interior but a visit to the La Union open-pit on Thursday morning provided the Antipodeans with a bit of a

culture shock. La Union is at 4200 m and during the visit it started to snow. Only Mike Buchanan, a Canadian, and our Nordic visitors were happy in these conditions. Thanks to Louis Serrano, Ricardo Vargas and Celso Aguilar for making our time at Andina so memorable.

After the Central Chile section of the trip we flew north to Calama via Antofagasta. Missing luggage is always a worry, but missing persons can be worse when on a group expedition. One team member was almost lost during the stopover when he decided to disembark without his hand luggage at the wrong destination. Fortunately, he was found wandering aimlessly on the tarmac, apparently, he claims, looking for his leatherman that had been confiscated by security.

The site for Friday's visit was the world-famous Chuquicamata in the heart of the Atacama desert. Chuquicamata is another Codelco operation and the world's largest open pit. During a brief presentation on the operation, Geology Superintendent, Alejandro Faunes, challenged the Masters students on several fronts including strategic thinking,



Volcan San Pedro (6154 m) towering above the Atacama Desert, an andesitic stratavolcano with a parasitic basaltic scoria cone on its western flank.

exploration success and the use of copper oxide mineralogy as a guide to life.

The scale of the open pit at Chuquicamata had to be seen to be believed. Due to a recent LTI the group was not allowed into the pit and had to be content with an overview from the “Mirador” into the main pit and also the exotic Cu oxide deposit known as Mina Sur. This was followed by a visit to the core farm. We would like to thank Jose Roca who hosted the visit, with a special vote of thanks to Alejandro who selflessly donated his hammer when Alan Wilson carelessly left his on the Codelco bus.

Saturday saw a change of focus to exploration and regional geology with a day trip in the Western Cordillera. This gave the group a chance to look at the Domeyeko Fault system to the north of Chuquicamata and the stratigraphy that hosts much of the Eocene copper mineralisation.

The traverse was held in an area of spectacular scenery including recent volcanoes such as San Pablo. The group reached a maximum altitude of about 4400 m above sea level. Fortunately, not much walking was involved thanks to excellent logistical support from Rio Tinto's Antofagasta operation that loaned us four fully-equipped vehicles complete with field guides, the excellent Daniel, Emilio, Herberto and Patricio.

Saturday evening saw another trip highlight when Åso and Christinna (two PhD students from Luleå in Sweden) introduced the team to the traditional Nordic methods of drinking vodka. This involved singing in Swedish, followed by "Skol", which I thought meant "cheers" but now believe translates into "you're going to be sorry tomorrow".

There was to be no rest for the wicked. BHP-Billiton geologist, Louis Moreno, who is based at Antofagasta organised a special presentation of the recently-discovered Spence porphyry Cu deposit. This provided an opportunity to look at the core, visit to the exploration decline and view the large ore stockpiles collected for metallurgical testwork.

It was an exciting time to be at Spence as BHP-Billiton announced the decision to go to the next phase of the feasibility study while we were on site. However, although great news, it meant Louis suddenly had extra work and could not come on the rest of the trip.

The Atacama desert is a dry, unrelenting environment. It was a relief to end the week by the sea at Antofagasta.

The first week of the trip had seen us visit three of the world's largest copper deposits, one of Chile's newest mineral discoveries and a host of spectacular geology, mountains and scenery. All in all, it was time to sit back with a Pisco Sour and look forward to the second week of the trip which would



Mick (Buchanan) and Mick (Priestley) dressed for the occasion at La Union pit, Andina.



Ore Deposits of South America trip participants at 4000 m in the La Union pit, Andina.

encompass visits to several iron-oxide Cu-Au deposits and also an epithermal Au deposit. Week two of the trip will be detailed in the next *Ore Solutions*.

Prestigious International Editorships



Sharon Allen



David Cooke

CODES Research Fellow, Sharon Allen, has been invited to join the editorial board of the *Journal of Volcanology and Geothermal Research*.

David Cooke, CODES Program 5 Leader, has been appointed to the Editorial Board of *Economic Geology* for a five-year term (2002–2007).

University Medal Winner

Tim Ireland (pictured right) received the University Medal 2001, the highest honour for an undergraduate student at the University of Tasmania, for his combined BSc and Honours year results. Tim received 14 High Distinctions and one Credit for his undergraduate degree followed by First Class Honours. His Honours project, which was supported by McArthur River Mining, was a study of "Lateral variability of sedimentology, mineralogy and geochemistry in the HYC Zn-Pb-Ag deposit, Northern Territory: implications for ore genesis". Tim is



currently writing up his work for publication.

THE FUTURE FOR THE MINERALS INDUSTRY IN TASMANIA

Ross Large (Director of CODES) presented this speech at the Annual Dinner of the Tasmanian Minerals Council, at Bridport, Tasmania, on 30 November 2001.

“The minerals industry is suffering right now due to record low metal prices. However, Tasmania still has some major strengths and opportunities for future growth. But, there is a hard road ahead.

When facing the future, it is important to identify strengths, challenges and solutions.

Strengths of Tasmania's mineral industry

I would like to emphasise the significant strengths of Tasmania's mineral industry.

Geological diversity, world-class mines and processing, excellent potential for new discoveries, an international ore deposit research centre and good collaborative networks characterise Tasmania's mineral industry. Tasmania is one of the few places in the world with such geological diversity in a small area of the West Coast and Northeast Coast

World-class mines such Rosebery (Zn-Pb-Ag-Au), Renison (Sn), Mt Lyell (Cu-Au) — to name but a few — operate in Tasmania. Rosebery ranks at number 10 in the world in the top 500 massive sulfide deposits in terms of metal content.

Tasmania also has world-class mineral processing. Pasminco had record production in 2001 and Comalco, Temco and Goliath continue to be very productive.

Excellent potential exists for new discoveries. The recent Ni and platinum group discoveries at Avery and Cuni indicate new possibilities. The potential for more Cu, Zn and Au discoveries in the Mt Read volcanic belt is exceptional on the global scene. The potential for more tin deposits (like Renison) related to

our Devonian granites is also very good.

The new geoscience data sets released late in 2001 by the Regional Minerals Program are very exciting, especially the radiometrics, which will certainly lead to renewed exploration interest in Tasmania. These new data sets, financed by the State and Federal Governments, will form the foundation for revitalised exploration programs.

Tasmania also has the advantage of having an international mining equipment manufacturer that has grown up with our industry, Elphinstone, based at Burnie. Elphinstone is now selling equipment worldwide and has just released a new 55-tonne underground truck that's breaking sales records.

The CODES Special Research Centre at the University of Tasmania has grown to become a top international group with strong support from the local industry and international mining companies. CODES now has 23 research scientists on staff working in all the major mining districts in Australia and around the globe in places like Chile, Zambia, Sweden, Spain, Canada, Argentina and Peru.

Tasmania is a small State where it's important to work together. Good collaboration exists between the industry, research, exploration, mining, smelting and servicing.

The challenges

Given these strengths, why is the Tasmanian industry experiencing problems? There is a perception that mining and processing is on the way out in Tasmania and that it's an industry of the past, whereas tourism, aquaculture, fine food and wines are the future.

The reality is, our industry supplies over 40% of export earnings to Tasmania and is significant to employment in western and northern Tasmania. Without the minerals

industry, the Tasmanian economy would be in severe trouble. Tasmania needs, and can have, both the clean, green industries and a modern, clean mining industry.

The decline in mineral exploration is the other challenge facing Tasmania

Greenfields exploration has declined dramatically since the early 1980s. When I was exploring in Tasmania for Geopeko in the late 1970s, exploration expenditure was about \$15 million per year, or \$45 million in today's terms. In 2001, Greenfields expenditure was less than \$4 million — that's less than 10% of the 1980s expenditure. Without increased exploration we cannot find the deposits that will form the mines of the future in Tasmania.

Long-term survival

The trend away from exploration must be reversed if the industry is to discover new mineral deposits and survive long-term.

More research on how, and where, to find deposits and more exploration to do the surveys and drilling to locate and assess them are needed.

Is there a solution?

The industry as a whole needs to develop a 10-year strategic plan on how to grow and survive into the future. The plan should be developed by wide consultation amongst all stakeholders and presented to both State and Federal Government.

This industry has the runs on the board. We have significant natural and developed strengths and there is a strong future for minerals in Tasmania, but it requires collaboration at all levels, a significant increase in minerals research and exploration, and, in particular, long-term planning.”

VISIT CODES new
website

@

www.codes.utas.edu.au

June Pongratz, Manager of CODES

**Publications and Media Resource Centre,
and erstwhile seismic interpreter, recently
passed the milestone of 40 years service
with the University of Tasmania within the
School of Earth Sciences and CODES.**

**“It must be pointed out that I was very,
very young when I started work”, she said.**

**A telegram from the Queen was not
received.**



SEG Student Chapter



The 2002 SEG committee members — Back row (L to R): James Cannell, Russell Fulton (Vice President), Mawson Croaker (President). Middle row: Wallace Mackay, Michael Agnew, Kate Bull, Andrew Wurst. Front row: Glen Masterman (Treasurer) and Nikki Pollington (Secretary).

The CODES SEG Student Chapter completed a busy and productive year with a twilight cruise on the Derwent River in the 1912 built ferry *Cartella*. The Annual General Meeting was held prior to the cruise and a brief rundown of the successful year's events was given by out-going president Andrew Wurst.

The SEG began the year by assisting with the very successful CODES conference *Volcanic Environments and Massive Sulfide Deposits* at the Wrest Point Casino.

The main event of the year was the internationally lauded overseas field trip to Bulgaria, Greece and Turkey organized by Professor Kamen Bogdanov and Andrew Wurst. The "Thracian Odyssey" field trip visited a range of different ore deposits in 13 days in the ancient region of Thrace. Ore deposits visited were represented by a diversity of mineralisation styles and metal commodities from Au-Cu porphyries to metasomatic vein fluorite deposits, high sulfidation multi-element deposits, low sulphidation Au-Ag vein and sediment-hosted deposits, Sedex style Ag-Fe deposits, and replacement and skarn Pb-Zn deposits. A constant feature of the trip was the historical longevity of mining in the area, with mining activity of most mines visited dating back to ancient Greek times around 2500 years ago.

The trip would not have been successful if it were not for help from the hosting companies such as Normandy, TVX, Thracian Gold, Navan and the Bulgarian Universities of Sofia University and the Institute of Mining and Geology. Financial support was also received from the Society of Economic Geologists, CODES and Analabs.

A feature of the trip was the collaboration between the Bulgarian SEG student Chapter and the CODES SEG student chapter, and the many friendships made.

The trip was also greatly supported by the whole CODES SEG chapter and everyone who attended helped to get the idea off the ground.

A number of social functions were held during the year including touch football and cricket matches.

SEG President (2001) Andrew Wurst thanked the executive committee and members: Andrew Stewart (Vice President), Sarah Jones (Secretary) and James Cannell (Treasurer) for their support during 2001. Outgoing Treasurer James Cannell provided a detailed report on the financial activities of the group.

The 2002 SEG committee is Mawson Croaker (President), Russell Fulton (Vice President), Nikki Pollington (Secretary) and Glen Masterman (Treasurer).

The new committee and members who attended the AGM expressed enthusiasm for organising another overseas geological field trip and also put forward ideas for activities in the coming year.



National Economic Geology Masters Explores the Spectrum

CODES and a number of Australian universities have combined forces to offer the most comprehensive Masters courses in mineral exploration and mining geology in the world.

CODES Masters coordinator, Andrew Tunks, said the National Masters of Economic Geology had been designed for geoscientists wanting a thorough update on advances across the spectrum of economic geology applied to mineral exploration and mining geology.

The National Masters provides access to 17 highly specialised courses in five different institutions across the country. It's a very flexible program that is specifically structured around the needs of busy industry geoscientists who wish to improve their technical skills in time for the next industry boom cycle.

Participating universities are CODES (University of Tasmania), University of Western Australia, James Cook University, CRC LEME (University of Canberra) and VIEPS (a collaboration between Monash, Melbourne and Latrobe Universities).

The course forms part of the National Geoscience Teaching Network, supported by the Minerals Council of Australia and the Commonwealth Department of Training and Youth Affairs (DETYA).

Each participating university offers up to five courses in rotation over a two-year period. Each course is of two weeks' duration.

Courses offered at CODES are:

- Volcanology and mineralisation in volcanic terrains
- Ore deposit models and exploration strategies
- Ore deposit geochemistry, hydrology and geochronology
- Ore deposits of South America (Chile)
- Brownfields Exploration.

Courses offered by participating universities:

University of Western Australia:

- Ore deposit models
- Computer applied exploration techniques
- Applied structural geology and field mapping
- Ore deposit field trip to South Africa

James Cook University

- Advances in ore genesis
- Resource definition: theory and practice
- Business and financial management
- Advanced field training
- Exploration techniques in ore search

University of Canberra and Australian National University

- Landscape evolution and exploration geochemistry

VIEPS

- Geophysical exploration methods

The entry qualifications are a Bachelor of Science with Honours or a Bachelor of Science with at least two years' industry experience.

The Federal Government has recently introduced an interest free loans scheme to assist students undertaking postgraduate coursework degrees. Information on this scheme can be found at <www.hecs.gov.au/pels>

Further information can be obtained from Andrew Tunks (phone: 03 6226 2374 or email: Andrew.Tunks@utas.edu.au)

Vanuatu Australian Vents Expedition

CODES Research Fellow Dr Robina Sharpe was a participant on the recent VAVE (Vanuatu and Australian Vents Expedition) Cruise in September 2001. The cruise, led by chief scientist Tim McConaghy, of the CSIRO, was a highly successful expedition that investigated seafloor hydrothermal ore-forming activity in arc and backarc settings along the Vanuatu island chain.

The scientific team brought together researchers from the CSIRO, Vanuatu's Department of Geology, Mines and Water Resources, the Australian National University in Canberra, CODES SRC, University of Tasmania, and the University of Lisbon, Portugal.

The success of the of the VAVE cruise was highlighted by the discovery of a new and potentially large hydrothermal field along Nifonea Ridge – a basalt ridge in the Vate Basin southeast of Port Vila. Photographic evidence of possible chimney structures in the Nifonea hydrothermal vent field were obtained – the first discovered in Vanuatu waters. Evidence of hydrothermal activity was also identified at a number of sites including the active submarine volcano Oscostar, Ciaon volcano near Epi Island, Kuwae caldera and Temakons Seamount (formerly 94SO-1).

Giant Ore Deposits Workshop

17–19 June 2002

Centre for Ore Deposit Research
Hobart Australia

PROGRAM

DAY 1 – MONDAY, 17 JUNE

Porphyry Deposits

Characteristics of the Andean giant porphyry systems (Francisco Camus: Codelco)

The geology and corporate discovery history of the Collahuasi District porphyry copper deposits (Richard Moore: Falconbridge)

Fe-Oxide Cu-Au Deposits

Characteristics and formation of Fe-oxide copper(-gold) systems (Garry Davidson: CODES)

Giant iron oxide copper(-gold) deposits - are they in distinctive geological settings? (Douglas Haynes: Douglas Haynes Discovery Pty Ltd)

Mt Woods - Exploration strategies leading to a new iron-oxide copper-gold discovery at Prominent Hill (Tony Belperio: Minatour Resources)

DAY 2 – TUESDAY, 18 JUNE

Sedex and BHT Deposits

Processes that control the formation of giant stratiform sediment-hosted Zn-Pb-Ag deposits (Ross Large: CODES)

Case History of discovery – Red Dog (Scott Jennings: Cominco)

Carlin Au Deposits

Giant Carlin Au systems (Tommy Thompson: Mackay School of Mines)

Overview of geology and exploration at the Goldstrike Property, Carlin Trend, Nevada, USA (Keith Bettles - Barrick)

Discovery of the Pipeline orebody – Greg Hall: Placer Dome

DAY 3 – WEDNESDAY, 19 JUNE

Nickel-PGE Deposits

Giant nickel-PGE systems (Tony Naldrett: U. Toronto)

Nickel laterite deposits - geological overview, resources and discovery case histories. (Mick Elias: Mick Elias Associates)

Discovery of the Cosmos Ni-sulfide deposit (Tony Rovira: Jubilee Mines)

Witwatersrand Au Deposits

An overview of geological processes that controlled primary distribution of gold in the Witwatersrand deposits (Lawrie Minter: University of Capetown)

Exploration within, and for analogues of, the Witwatersrand (Nick Fox: Anglo Gold)

The long-time opposing views on the Witwatersrand: what are the implications for exploration models? (David Groves: University of Western Australia)

•Each session will be followed by a forum on exploration strategies for giant ore deposits.

The post-workshop field trip (19–22 June) will visit several of western Tasmania's mineral deposits, specifically the giant Renison Sn and Rosebery Zn-Pb-Ag-Au deposits, and the important Mt Lyell Cu and Henty Au mines. Trip leaders: Bruce Gemmell and Andrew Tunks.

A poster session will be held on Monday, 17 June.

The workshop and field trip constitute the first five days of CODES two-week Masters shortcourse on *Ore Deposit Models and Exploration Strategies*. We invite you to stay on after the workshop and participate in the rest of the shortcourse, which will conclude on Friday, 28 June. It is followed by the Australian Geological Convention in Adelaide, which runs from 1–5 July.

COST

	Before 28/3/02	After 28/3/02
Full registration	AUD \$800.00	AUD \$1000.00
Student registration	AUD \$400.00	AUD \$500.00
Student registration (with poster)	AUD \$0	AUD \$0
Day registration ⁰	AUD \$320.00	AUD \$400.00
• plus field trip costs		

CODES Gold Sponsor discount (50% of full rate) & Silver Sponsor discount (25%).

For more details and to register contact:

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Seafloor sampling operations also revealed a number of unexpected results with the supposedly old and sediment-filled Coriolis Troughs were floored by very young neovolcanic basaltic lavas – resulting in major revisions of tectonic concepts for the area. Testing for sediment-hosted mineralisation in the Futuna, Erromango and Vate Basins revealed no evidence to support hydrothermal activity. Operations enabled the collection of a large number of water, sediment and rock samples as well as video coverage for subsequent research and analysis.

Robina Sharpe and Brooks Rakau (Department of Geology, Mines and Water Resources, Vanuatu) retrieving samples collected using a Smith MacIntyre Grab, along the Vanuatu island chain.



Upcoming Short Courses

Ore Deposit Models and Exploration Strategies

17–28 June 2002

Leader: David Cooke

See page 11 of this newsletter for details.

Volcanology Short Course

17–30 November 2002

Leader: Jocelyn McPhie

A two-part field course on volcanology and mineralisation in volcanic terrains for geologists interested in a review of current approaches to mapping, facies analysis and mineralisation in ancient and modern volcanic successions. Includes field geology in New Zealand and western Tasmania.

Ore Deposit Geochemistry, Hydrology and Geochronology

April–May 2003

Exploration in Brownfields Areas

August 2003

Ore Deposits of South America

November 2003

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There are many benefits of becoming a corporate sponsor of CODES

- Association with, and first call on, a world-class research team in ore deposit science
- Fee reductions on our regular industry short courses
- Access to scholarships for staff undertaking a Masters in Economic Geology or Masters in Exploration Geoscience
- Membership of the CODES Science Planning Panel

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Ore Solutions banner: a chloritised amygdaloidal basaltic peperite with red mudstone from Redbank Cu mine, Qld/NT border, Australia.

Hydrothermal Fluids Flow



Who said geologists never have fun? CODES Research Fellow, Robina Sharpe, and Sarah Gleeson of Alberta University, Canada, at the Hydrothermal Fluid Society meeting held during GSA, Boston.