

ore solutions



UNIVERSITY OF TASMANIA

**Newsletter of the Centre for Ore Deposit Research
at the University of Tasmania**

This issue's research profile:

August - December 1999

**Numerical Simulations
Hawaiian Fire Fountains**

issn 1440-4109

Funding results: new ARC & AMIRA projects get go ahead

In early September this year, a team of CODES researchers backed by an industry consortium began a major new AMIRA research project into epithermal gold and silver deposits throughout Australia and the Pacific.

'AMIRA P588: Epithermal gold-silver deposits - geological, geochemical and isotopic vectors to target major deposits' was given Australian Research Council funding in this year's round, announced last month. The grant of \$291,000 over three years will combine with AMIRA funding of \$365,000 over three years.

The project is a collaborative venture between CODES and the Geothermal Institute at the University of Auckland (New Zealand). Led by Bruce Gemmell (CODES) and Stuart Simmons (UAuckland), research will combine data on geology, structure, volcanic facies and alteration mineralogy and geochemistry to understand the processes of alteration halo formation related to epithermal gold-silver systems.

The project will extend the successful methodology developed during AMIRA project P439 ('Alteration halos surrounding volcanic-hosted massive sulfide deposits') to selected low sulfidation epithermal deposits in Australia (Twin Hills), Indonesia (Gosowong, Mt Muro), Papua New Guinea (Lihir) and Argentina (Cerro Vanguardia).

The research team will develop exploration criteria to help geologists target high-grade areas within particular epithermal systems, and to differentiate these from the weakly mineralised or even barren areas - one of the priority research areas recently identified by the minerals exploration industry.

Research Team

Bruce Gemmell, Stuart Simmons, Robina Sharpe, Wally Herrmann, Jocelyn McPhie, Rob Scott, Jianwen Yang, Michael Blake, Andrew Wurst (MSc) and Dan Olberg (MEcon Geol).

Industry Partners

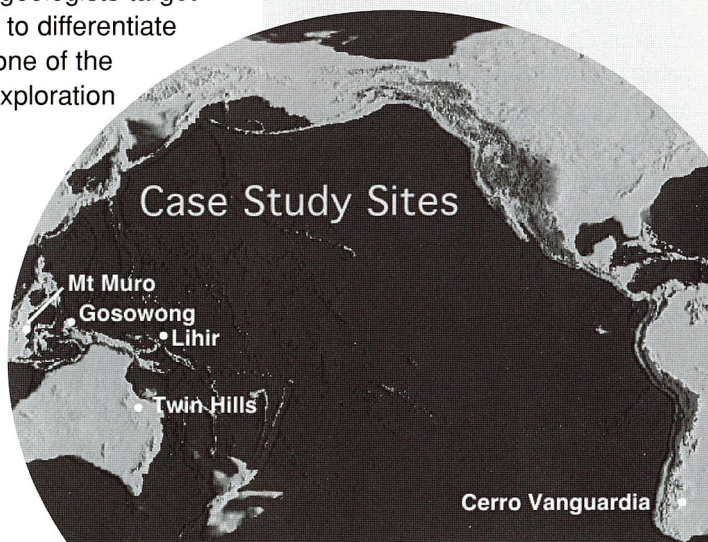
AngloGold, Aurora Gold, Delta Gold, Homestake Gold of Australia, Lihir Management Company, Newcrest Mining and Normandy Exploration.

continued on page 3

'AMIRA P603 - Geologic, tectonic and metallogenic relations of South China' - has been given the go ahead to begin later this year, led by Khin Zaw.

CODES will develop a metallogenic and tectonic interpretation of southern China based on a GIS mineral deposit and geoscience database. The work will build on the previous successful P390 and P390A projects in SE Asia.

continued on page 2



From the Editor

At the time this edition of **OreSolutions** went to press, the finishing touches were being applied to Stage 1 of our web site overhaul (see ad on page 5).

The site features a whole new structure, with comprehensive information about our research program, our people and our publications. It also features a new layout which will, in time, become more interactive.

We have added 'pdf' versions of the Annual Report, the Research Compendium and **OreSolutions**, as well as repeats of all our media coverage and copies of submissions or presentations of interest.

In the future, the site will be expanded to include on-line registration forms for our short courses, on-line publication ordering and a host of other electronic services. Of particular note will be a searchable database of our entire research program, which will provide visitors with answers to even the most simple questions about the extent of our research effort.

This edition introduces a new column on our education program, featuring student project profiles, to help raise the profile of our excellent students. Education Program coordinator Tony Crawford provides a roundup of our existing PhD program and sets out what makes a good PhD student.

As usual, on page 8 the calendar of events lists the next three short courses alongside our regular contacts list and fax-back contact update form.



from page 1

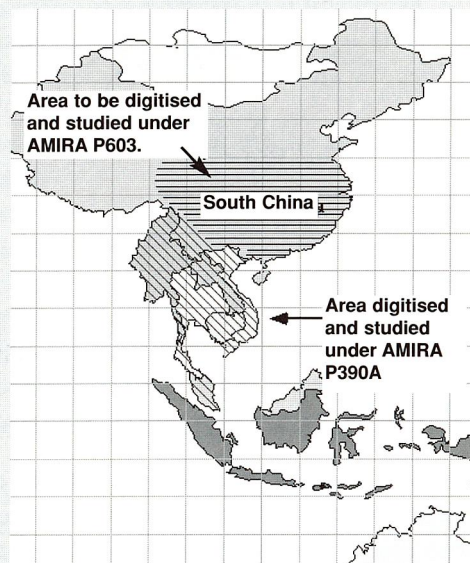
AMIRA P603 cont'd

The database will be used as a framework for geotectonic and metallogenic studies of mineralised belts in the region.

According to Khin Zaw, the country is a relatively untapped sources of minerals.

The ultimate aim is to provide sponsor companies with a tectonic and metallogenic synthesis and ore deposit models that can be used for predicting and locating world-class ore deposits in the area.

Funding: \$300,600 over three years.



Industry partners: AngloGold, Cominco, Pasminco, Biliton China, North and Sino Mining International,

MCA geoscience education consortium full steam ahead

The University of Tasmania's School of Earth Sciences and Centre for Ore Deposit Research are involved in developing a university consortium under the Mineral Council of Australia's new plan for minerals tertiary education, released in September.

Under the plan, eight Universities will join with the MCA to deliver world-class undergraduate and post-graduate education for geoscience students entering the minerals industry.

Industry funding is expected to exceed \$2.5 million over five years. The consortium in collaboration with the MCA is applying for matching funding through the new Department of Education, Training & Youth Affairs (DETYA) Science Lectureship Scheme.

According to CODES director Ross Large, the initiative is an opportunity for Australia and Australian-based mining companies to build a world-class tertiary education system that will enhance our international competitiveness.

"This is an exciting development that brings together the research expertise in the Centres Program and the teaching expertise across a range of universities, so that our geoscience graduates will be exposed to the best lecturers and courses that Australia has to offer" he said.

The move is the result of an industry-wide consultation by the MCA to identify threats to the supply of suitably educated professionals for the industry. The findings were released in a paper called 'Back from the Brink: re-shaping minerals tertiary education'.

from page 1

Funding results cont'd

Other projects funded by the Australian Research Council include:

'Isotopic response of fluid flow in submarine volcanic-hosted hydrothermal systems and implications for prospectivity: Mt Read Volcanics case study'.

Research partners: Pasminco, Goldfields and Mineral Resources Tasmania.

Funding: \$60,000 over two years.

'Microanalysis of fluids involved in genesis of magmas and ore deposits: a state-of-the-art facility'.

Collaborators: Monash University

Funding: \$120,000.



The Hon. Paul Lennon (centre) with Tasmanian Government Mining Scholarship holders (from left): Oliver Holm (PhD), Nick Williams (Hons), Cathryn Gifkins (PhD), Bronwyn Stacey (Hons), Matthew Zengerer (Hons).

The Tasmanian minister for Infrastructure, Energy & Resources, the Hon. Paul Lennon, visited CODES during Earth Science Week to find out more about CODES and its research.

PhD and Honours students gave presentations on current Tasmanian research at CODES and director Ross Large gave a presentation on the imperative for increased research funding for Tasmanian minerals exploration.

Part of a successful Tasmanian exploration strategy, he said, was appreciating the different styles of deposits in Tasmania and setting exploration strategies depending on the differing characteristics.

"Understanding these deposit styles and how they differ is a key aspect of deciding where to start and which techniques to use.

"For example, the Mt Read Volcanics are host to a range of deposit types that each need a different exploration approach. The gold-rich Henty deposit is more akin to a submarine epithermal, rather than a VHMS, while the Mt Lyell system includes hybrid deposits somewhere between a porphyry copper-gold and VHMS ores".

From the Director

CODES has recently signed ten companies to the second three-year term of our industry Corporate Sponsor program. Our sponsors are now:

- BHP
- Goldfields Exploration
- Homestake Gold
- MIM Exploration
- Minorco-Anglo
- Newcrest Mining
- North
- Pasminco Exploration
- Western Metals
- WMC

While listening recently to our honours students giving their end of year research and field project presentations, I was struck by two thoughts.

Firstly, what an impact PowerPoint software has had in improving the quality of presentations. All the talks were of a high standard and good enough to be presented at international conferences.

Secondly, what a strong group of Honours students we have finishing this year. However, it is the first time in 15 years that fewer than one-third of the graduating class have been offered jobs so far this year.

Our student quality is way up this year, but job opportunities are way down. Hopefully with the improvement in the gold and metal prices, the industry is turning the corner and job prospects will be on the climb for 2000.

All the best for the new millenium and may the discoveries come thick and fast.

Volcanic Environments and Massive Sulfide Deposits

International conference and field meeting • 17-19 November 2000 •

Centre for Ore Deposit Research,
University of Tasmania.



Open for expressions of interest for papers, posters and registration.



Sponsored by CODES SRC
and the Society of Economic
Geologists



Co-convened by Bruce Gemmell and Jocelyn McPhie, this conference will focus on current issues in research into massive sulfide deposits and the physical volcanology of their host successions. Emphasis will be on parallels between modern, active seafloor hydrothermal systems and their ancient analogs.

Sessions

- Global VHMS belts
- Deposit descriptions, new discoveries
- Sub-seafloor vs exhalative genesis
- VHMS-epithermal transition
- Subaqueous pyroclastic flows
- Submarine volcanic architecture
- Shallow water settings and VHMS deposition
- Tectonic setting of VHMS deposits
- Modern seafloor mineralisation

Field Trips

Identical pre-conference (Nov 10-16) or post-conference (Nov 20-26) trips will introduce volcanic lithologies and VHMS deposits of the Mount Read Volcanics, Tasmania. Mine visits will include Mt Lyell, Rosebery, Hercules, Henty and Hellyer. Optional visit to the Renison Sn mine.

Registration and abstracts due by June 30, 2000

For more information, contact secretary@codes.utas.edu.au or visit the web site: www.geol.utas.edu.au

News

PIMA update

CODES recently acquired a new PIMA-SP spectrometer of the type that is increasingly being used for alteration mapping in mineral exploration and mining.

It is a portable, short-wave infra red spectrometer that can measure reflectance in the 1.3 to 2.5 micron wavelength range, enabling spectral identification of hydrous silicates, sulfates and carbonates, as well as the estimation of some variations in composition and crystallinity. These minerals are common constituents of hydrothermal alteration assemblages and are frequently difficult to discriminate by megascopic and optical means.

PIMA analysis coupled with the latest spectral recognition software, provides a rapid (and therefore inexpensive) in-field mineralogical analysis method that is applicable to any dry geological sample materials.

The technology has great potential for mapping many types of hydrothermal alteration zones and identifying exploration vectors to ore.

The instrument has already been useful to several of our postgraduate researchers studying epithermal gold, porphyry copper-gold and base metal massive sulfide type systems. It has further potential in identifying clay mineralogy of sediments and measuring illite-muscovite crystallinity in weakly metamorphosed sedimentary rocks.

New projects at Rosebery, Cadia

CODES recently advertised for PhD students for new projects at the Rosebery massive sulfide deposit in Tasmania and the Cadia porphyry district in New South Wales.

The Tasmanian project will look at the geology and genesis of a newly-defined series of ore lenses at Pasminco's Cu-Zn-Pb-Ag-Au Rosebery mine.

Student Neil Martin will investigate the volcanic facies, structure and geochemistry of the deposit, which will lead to improved exploration strategies.

The New South Wales project will look at the geological and geochemical characteristics of porphyry Au-Cu mineralisation at Cadia in a collaborative project with Newcrest Exploration. It will lead to an improved understanding of the mineralising system, which will assist exploration companies in targeting similar systems elsewhere in eastern Australia.

International fellowships

CODES recently introduced a new International Visiting Fellowship scheme to bring eminent earth scientists to the University of Tasmania for research collaboration.

The scheme allocates \$10,000 for six months or \$20,000 for 12 months to cover airfares, research costs and accommodation.

Applications are being sought for proposals in the areas of: magmatic-hydrothermal fluids and related ores; volcanic processes and products; ores in volcanic arcs and continental rifts; hydrothermal chemistry, isotope geochemistry and hydrogeology.

Tasmanian industry audits

The Tasmanian Government has released its response to the Mining and Mineral Processing Industry Audit process it underwent earlier this year:

<www.dsd.tas.gov.au>

Appointments

Jocelyn McPhie has been appointed to the International Association of Volcanology & Chemistry of the Earth's Interior (IAVCEI) Executive Committee.

Earth Science Week

A national celebration of earth sciences in Earth Science Week (10-16 October) was coordinated by the Australian Geological Survey Organisation (AGSO), with a program of events in every state.

The Tasmanian component, with the theme 'Earth Science is All Around Us', was coordinated by CODES and the School of Earth Sciences, and featured some excellent media coverage of career paths, student opportunities and interesting stories about earth science research. CODES research featured, as did the School's excellent and well-

regarded track record in student enrolments and graduations.

The program will be repeated again next year at the same time, to coincide with the USA's celebrations on the same topic.

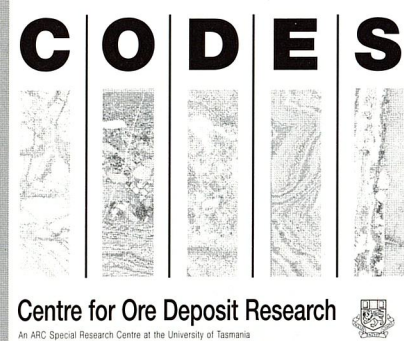
Australian Student Mineral Venture

This year's ASMV is facing tough times, with an overall reduction in industry sponsorship. To allow the program to continue at its established high quality, student numbers have been reduced. This year 25 top students from Tasmania, Victoria and South Australia will tour Tasmania, visiting mine sites and geological locations.

Guest appearances

Dr Peter Hollings (pictured at right) from the University of Saskatchewan (Canada) has won a post-doctoral award from the Natural Sciences & Engineering Research Council of Canada, to study at an overseas university. He has chosen CODES as his host institution and in a two-year collaboration, he will work with us on igneous petrology and geochemistry related to mineralisation, on a number of projects in Australia and the South West Pacific.

Dr Peter Hollings will work with CODES for two years on igneous petrology and geochemistry.



NEW CODES WEB SITE

stage 1 upgrade complete

- full research project listing by program
- alphabetical staff listings, including specialisation
- downloadable course registration forms for all short courses
- downloadable publications order form
- 'pdf' versions of Annual Report, Compendium and OreSolutions.

<www.geol.utas.edu.au/codes>



Research Profile

Numerical simulation in hydrogeology

from Jianwen Yang, lecturer in hydrogeology

Fluid migration is a crucial factor controlling the genesis of hydrothermal ore deposits.

Hydrogeological simulation of subsurface flow, heat and mass transport provides an efficient way of testing geological hypotheses and in most cases, numerical modelling may be the only available tool to investigate the temporal evolution of ore systems, because their formation occurs too slowly in time and too widely in space to be directly observed.

Numerical simulations of ore fluid migration involve solving time-dependent multi-dimensional partial differential equations

governing groundwater flow, heat transport, aqueous-phase mass transport, and geochemical reactions between different phases. These equations are coupled with each other very closely, which leads to their solutions being nontrivial.

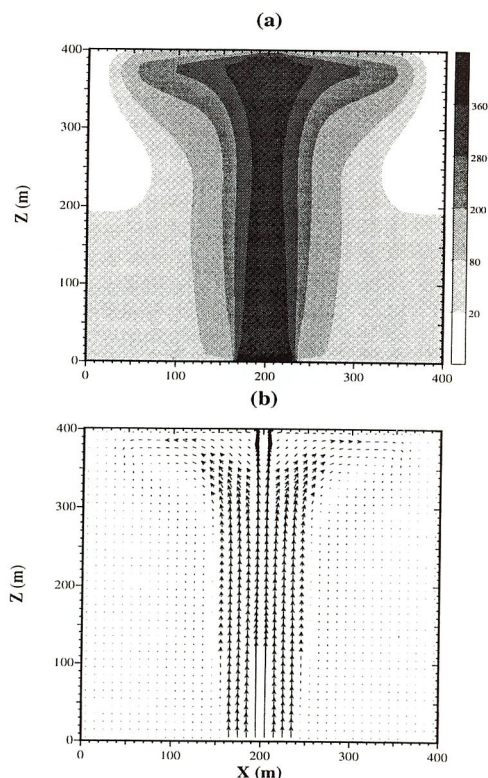
We have developed several finite-element software packages to simulate time-dependent, 3D groundwater flow, heat and mass transport in complex structures. Our computer code has fully incorporated the hydrodynamic coupling between discrete fractures and the surrounding porous medium, hence is capable of dealing with discretely fractured anisotropic porous media. Studies have indicated that discrete fractures are an important factor controlling the pattern of hydrothermal fluid migration, and they can initiate and maintain fluid circulation, even if the Rayleigh number is less than its critical value.

Our codes have been extensively used to investigate hydrothermal fluid circulation within modern oceanic crust in mid-ocean ridge settings and in active seafloor massive sulfide mounds (see below). Their applicability to sedimentary basins has also been confirmed.

We also have access to Professor Grant Garven's software (JUH2D) from Johns Hopkins University. This package is currently being used to study ore fluid flow in the Mt Isa and McArthur Basins (AMIRA P552). Another code, MINTRAN, originally developed at the Waterloo Centre for Groundwater Research (Canada), is also available for modelling multi-component reactive transport in groundwater systems.

Some of our on-going hydrogeological studies include: simulation of subseafloor fluid and heat transport associated with the genesis of the Gossan Hill VHMS deposit; numerical investigation of competing genetic theories for the HYC deposit; numerical investigation of hydrothermal fluid circulation in volcanic facies hosting VHMS deposits; hydrogeological modelling of subsurface fluid flow in the Tasmania Basin; and numerical studies on fracture closure associated with thermal expansion and periodicity of hydrothermal fluid migration.

International collaborations include: studies on a paradox in seafloor heat-flow measurement nearby the DSDP/ODP borehole 504B (with University of Marseille, France), and modelling convective flow of fluids in deep fractured basins.



Numerical simulation results of temperature distribution (a) and fluid velocity field (b) within the TAG active massive sulfide mound in the Mid-Atlantic Ridge.

Joint SGA-IGOD Meeting, London

August was a busy month for the CODES team, who appeared at the joint **SGA-IGOD International Meeting (London, 22-25 August 1999)**.

Presenters included:

- **Cooke** (chair): 'Sediment-hosted mineral deposits' session.
- **Large & Gemmell** (joint chairs): 'Volcanism and mineralisation: terrestrial and submarine' session.
- **Large (Invited Plenary Lecture)**: 'Evidence for pulsed brine exhalation in the formation of giant Proterozoic stratiform sediment-hosted zinc-lead-silver deposits of northern Australia'.
- **Cooke, Large, Bull & McGoldrick**: 'Brine chemistry and the spectrum of stratiform sediment-hosted lead-zinc deposits'.
- **McGoldrick**: 'Northern Australian 'SEDEX' lead-zinc deposits: microbial oases in Proterozoic seas'.
- **Khin Zaw**: 'Geology and genesis of Bawdwin deposits, northern Shan State, Myanmar (Burma): an gold-rich, volcanic-hosted, polymetallic massive sulfide deposit'.

CODES also ran two very successful **short courses**:

- 'Volcanic-hosted massive sulfide deposits' (Large, McPhie, Gemmell).
- 'Proterozoic sediment-hosted ('SEDEX') zinc-lead-silver deposits' (McGoldrick, Bull, Cooke, Large together with Neudert (Queensland University of Technology).

Funds raised by these short courses were used to cover expenses of field trips to the Urals, Ireland and the Iberian

Pyrite Belt. Ross Large and Bruce Gemmell attended the 'Massive sulfide deposits of the **southern Urals** (Russia)' field trip while Stuart Bull and Peter McGoldrick attended the 'zinc-lead-silver deposits of **Ireland**' field trip.

The entire contingent took a field trip following the meeting to study giant massive sulfide deposits of the **Iberian Pyrite Belt** as guests of Fernando Tornos from Instituto Tecnológico Geominero de Espana.

In a separate tour prior to the SGA-IGOD meeting, Sharon Allen led a field workshop on Quaternary island arc volcanism, on the island of **Kos** (Greece, 1-5 August) as part of the **IUGG 99** meeting (Birmingham).

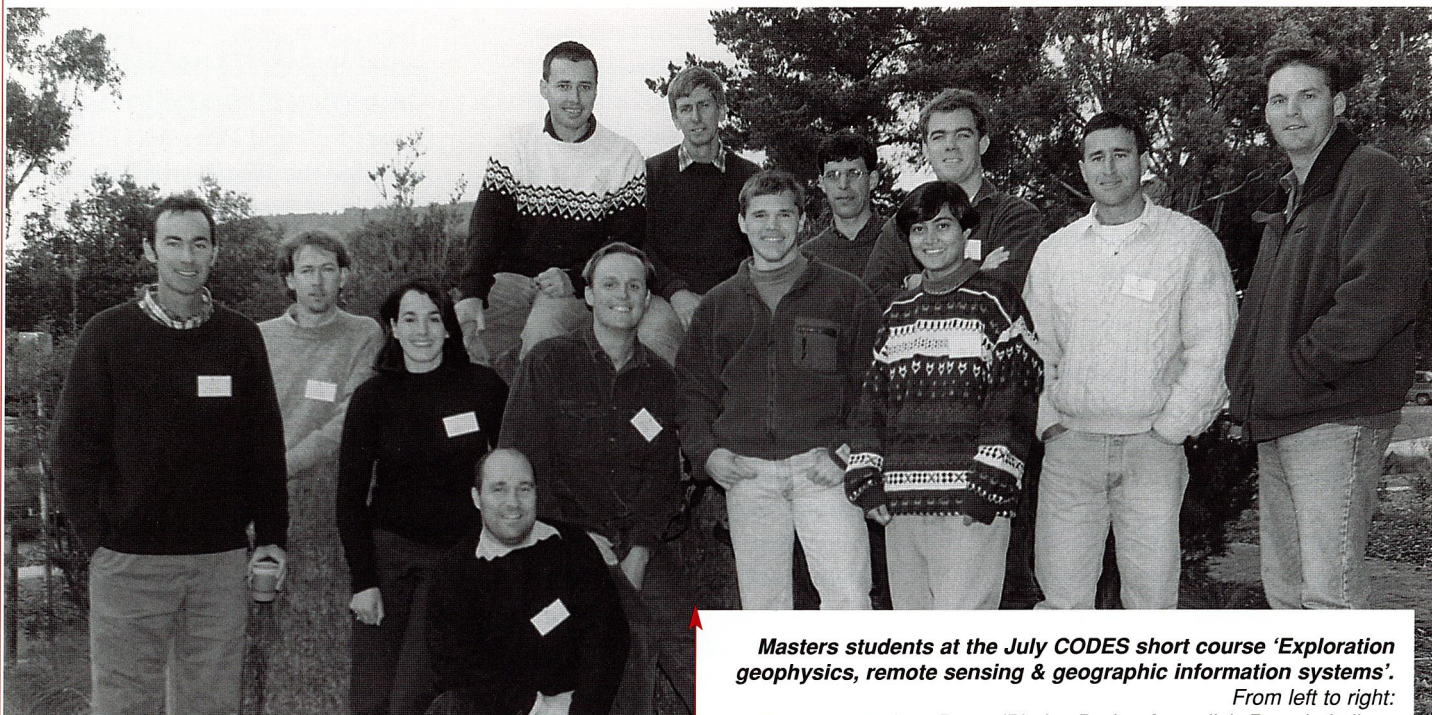
Sharon also ran a workshop for the **IAVCEI Commission on Explosive Volcanism** (31 July-5 August). See page 10 for more details.

OS



Lecturers and course participants at the SEDEX short course, London.

Education News



Masters students at the July CODES short course 'Exploration geophysics, remote sensing & geographic information systems'.

From left to right:

Front row: Andrew Rowe (Phelps Dodge Australia), Pamela Italiano (Mining Project Investor), Ian Laurent (Viking Gold), Mitchell Bland (Newcrest Exploration), Dan Olberg (Newcrest Mining Indonesia), Nalin Shah (BHP World Minerals), Philip Tornatora (Acacia Resources), Allan Kneeshaw (Acacia Resources).

Back row: Julian Bartlett (Mt Wellington Gold), Spencer Summers (Indochina Goldfields), Steve Richardson (consultant), Paul Cromie (BHP Minerals Exploration), Adrian Byass (Anaconda Nickel).

Passionate PhD people: project possibilities

A roundup of the PhD program by Education Program Coordinator Tony Crawford. In this first installment of a regular column on education, Tony talks about the attributes of a successful PhD candidate.

CODES and the School of Earth Sciences currently have 35 PhD students, 17 of whom have worked in industry.

Our experience shows that ex-industry people taking a PhD are very focussed, effective and successful students, with excellent management and presentation skills, particularly when it comes to time management. This means that it is very much in the candidate's interest to complete a PhD in the minimum time required to do a good job.

But although industry experience clearly enhances the self discipline needed for a successful PhD program, one more ingredient is absolutely necessary for the completion of a PhD – **PASSION** for the science.

Without exception, our ex-industry PhD students have chosen their path because they have wanted to take on a challenge, get 'back into science' to get to the bottom of a geological problem, and become 'expert' at something.

If you have a passion for geology, and are thinking about coming back to university to do a PhD, call us about the process, possibilities and projects or visit our website for information.

New Masters students

Master of Economic Geology

Allan Kneeshaw, Acacia Resources: 'Deformation and structural history of the southeastern margin of the Laverton Basin, northeastern goldfields, Western Australia'.

Andrew Rowe, Phelps Dodge Australia: 'Geology, geophysics and mineralisation of the Idrapuri porphyry copper system, Aceh'.

Philip Tornatora, Acacia Resources: 'Structural architecture and the relationship of structure to mineralisation of the Western Deeps Zone, Cleo Deposit, northeastern goldfields, Western Australia'.

Julian Bartlett, Mt Wellington Gold, 'Alteration within the Barkley River Greenstones, Whisky Knob Window, eastern Victoria'.

Master of Science (Geology)

Andrew Wurst, PT Indo Muro Kencana: 'Mineralisation and alteration of the Kerikil and Serujan lode systems, Mt Muro, Indonesia: implications for ore genesis and exploration'.

PhD Submissions

Robina Sharpe submitted her thesis, along with **Peter Winefield** and **Holger Paulick**, during this year. Holger has returned to Germany and is waiting on a post-doctoral grant to work at Freiberg University and Peter is working with Shell International in the Netherlands. Robina recently received an Australian Research Council Post-doctoral Fellowship for Industry, and will work on the new epithermal gold and silver deposits AMIRA project (see page 1 for details of this research).

New PhD students

John Butler: 'Hydrogeology and geochemistry of acid mine drainage around western Tasmanian minesites'.

Neil Martin: 'Genesis of the Rosebery massive sulfide deposit'.

1999 graduands

PhD

Neil Allen, Xu Li.

Master of Economic Geology
Jason Beckton, Stella Searston.

MSc (Exploration Geoscience)
Stephen Law.

Honours

Tim Chalke, Mark Davidson, Robert Findlay, Nicole Patison, David Dedenczuk, Andrew Ezzy, Adrian Penney, David Stacey.

Hawaiian Fire Fountains

Kirstie Simpson and Jocelyn McPhie recently travelled to Hawaii to study the products of subaerial fire fountains as a basis for comparison with the subaqueous fire fountain deposits that have been identified in the Mount Windsor Volcanics (Queensland).

These units are part of Kirstie's PhD research ('Volcanic facies architecture of the Mt Windsor Volcanics, Queensland') and here she summarises her observations.

Subaerial fire fountaining occurs at both primary vents and littoral vents, where lava flows into the ocean.

View of active tube-fed pahoehoe lavas entering the ocean.



Proximal deposits typically consist of spatter mounds comprising highly vesicular bombs.

Fire fountaining is not restricted to subaerial environments. Recent exploration of young seamounts, such as those on the East Pacific Rise, has revealed the presence of similar bombs more than 1000m below sea level.

As well, basaltic breccias with distinctive, fluidally-shaped clasts have been found in several ancient submarine volcanic successions that host massive sulfides. These clasts are broadly similar to the bombs observed in the Hawaiian fire fountain deposits, but they differ in their association with hyaloclastite and in other lithofacies characteristics.

These breccias may have formed by weakly explosive fire fountaining in a submarine environment. The subaqueous fire fountain deposits are most likely restricted to locations near the source vents, as are their subaerial equivalents, and can help identify the volcanic centres that may have provided a focus for VHMS-related hydrothermal systems.

OS

In Circulation

Visitors

Associate Professor Mark Barley from the **Centre for Strategic Mineral Deposits** visited during June to discuss collaborative research with Khin Zaw. He also gave a seminar titled 'Emplacement of a large igneous province during deposition of 2.45 Ga Hamersley Banded Iron Formations'.

Gary Maddocks from **GEM Exploration Management Services** visited during June to discuss collaborative research.

Professor Grant Garven from the **Department of Earth and Planetary Sciences, Johns Hopkins University (USA)** visited in June to work on fluid flow modelling with Jianwen Yang.

Associate Professor Manoj Pandit from the **University of Rajasthan (India)** visited during July on a study tour.

Student **Thomas Monecke** from the **Institut für Mineralogie (Germany)** continued his research at CODES on the Mt Windsor Volcanic Belt, between January and August this year.

Allan Nichols, previously with Department of Education, Training & Youth Affairs (DETYA) visited the University in July to provide advice on grant applications. Allan was the Director of the Individual Grants at the Research Branch as well as acting Director of the Research Office at the University of Adelaide. In 1995 he left DETYA to become a consultant for universities around Australia.

Richard Goldfarb from the **USGS Mineral Resources Program** visited during October as part of his national GSA/SEG/SGA Distinguished Lecturer in Economic Geology tour.

Field workshops

International Union of Geodesy and Geophysics (IUGG)

Eighteen geoscientists from ten countries participated in a workshop sponsored by the IUGG and Commission of Explosive Volcanism (CEV).

The workshop was organised and led by CODES Research Fellow, Sharon Allen, assisted by Georges Vougioukalakis (IGME), Joerg Keller (Freiberg), Johan Varekamp (Wesleyan University), and Jocelyn McPhie (CODES).

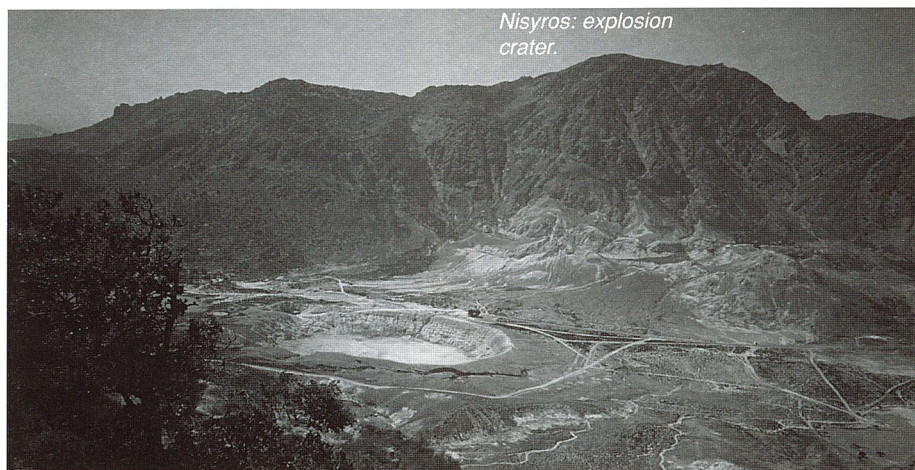
The workshop focussed on the volcanology of a Quaternary arc province as exemplified by Kos, Nisyros and Yali in the eastern Aegean, Greece. Themes included: stratigraphy of deposits from an explosive rhyolitic caldera-forming eruption;

transport and deposition of pyroclastic density currents; interaction of hot pyroclastic density currents with water; significance of partially melted granitoid clasts; origin of thick, coarse submarine pumice breccias; textural facies of rhyolite lava; facies architecture of a composite volcano; and interactions between tectonics and volcanism in an active extensional setting.

Research on Milos (Greece)

Jocelyn McPhie, Sharon Allen and Stuart Bull together with Rodney Allen (Volcanic Resources) and Suzanne Aarburg (University of Koln) examined the volcanology, alteration and mineralisation of Milos, Greece.

Milos comprises Pliocene and Pleistocene calc-alkaline, submarine and subaerial, mainly felsic volcanic rocks including pyroclastic deposits and their resedimented equivalents, lavas and domes, and diverse breccias (hydraulic breccias, autobreccias, phreatic explosion breccias and hyaloclastite). Alteration including



Nisyros: explosion crater.



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University of Tasmania
Student Chapter
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intense argillic alteration and silicification is associated with Au, Ag and base metal mineralisation.

An active geothermal system is also present in the area, with numerous subaerial and submarine hot springs and very young phreatic explosion craters. From the overall review of the geology of Milos, it is clear that the facies architecture bears the imprint of complex interactions between varied volcanic facies and faulting, diagenesis and hydrothermal alteration. The visit allowed possibilities for future research on Milos to be assessed.

GEOMAR Forschungszentrum, Kiel (Germany)

Jocelyn McPhie and Sharon Allen visited the GEOMAR Forschungszentrum in Kiel, the premier centre for volcanology research and teaching in Europe.

Jocelyn McPhie was invited to give a series of lectures on CODES research into submarine pumice breccias and felsic lava-like units, and to interact with the post-graduate students.

Sharon Allen initiated a collaborative research project with GEOMAR Research Scientist, Armin Freundt. Dr Freundt has established a laboratory for experimental volcanology and is investigating the processes accompanying the subaqueous transport of pumiceous density currents. This research is directly relevant to interpreting the submarine pumice breccias that occur in many of the host successions to VHMS deposits. **OS**

Visitor Lecture

Dr John F.H. Thompson, came to CODES SRC in late September as the SEG Thayer Lindsley Visiting Lecturer for 1999-2000.

Dr Thompson is currently Chief Geoscientist of Teck Corporation, based in Vancouver, BC, Canada. Prior to accepting his current position, he worked extensively in Au and base metals exploration in Australasia, north and south America, Europe, and southeast Asia.

Most recently he served as director of MDRU, the Mineral Deposit Research Unit (a joint industry-university research effort) at the University of British Columbia.

There were three topics in his lecture series:

- 'Research and Mineral Exploration';
- 'Cordilleran metallogeny of western Canada';
- 'Intrusion-related Mineral Deposits; Tectonics, Magmas, and Fluids'.

Dr Thompson's visit was timely given the industry background of many research students and one of the current research directions of CODES SRC, with eight PhD students working on porphyry-related deposits, both in Australia and overseas.

Memorial series wine bottling

After the success of the opening pair in the CODES PhD Student Memorial Series, immortalising those who have recently submitted their PhD theses, a second round is soon to be bottled. This series consists of a variety of red blends and a tawny port, from different Australian wine regions. Stay tuned for more details.

CODES and SEG Student Chapter merchandise

The legacy of the Basins, fluids and Zn-Pb ores Special Symposium 1998 convened by CODES and the SEG Student Chapter continues, with the CODES Special Publication No.2, Second Edition now available through CODES.

It features papers presented by an internationally renowned field (G. Garven, W. Goodfellow, J. Hanor and M. Hitzman) as well as Australian and CODES researchers, together with transcripts of the informative discussions that followed.

Baseball-style caps and beer steins/coffee mugs emblazoned with the CODES logo are also available for purchase from CODES and the SEG Student Chapter.

Part of the proceeds will go towards upcoming SEG Student Chapter fieldtrips.

Oliver Holm
President

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Address/Contact Update	Title	First Name	Last Name	Position	Company	Tel	Fax	City	State	Code/Zip	Country	Publications I wish to receive are (tick)	☐ OreSolutions ☐ Short Course flyers ☐ Annual Report

short course dates 2000

volcanology & mineralisation in volcanic terrains

6 - 19 March 2000. Leader: Jocelyn McPhie

Covers current approaches to mapping, facies analysis and mineralisation in ancient and modern volcanic sequences. It provides an introduction to the processes and products of different eruption styles, contrasts in scale and structure of volcanoes, and identifies key volcanic facies associations and interpretations of facies variations. Field trips to New Zealand and western Tasmania.

ore deposit studies & exploration models

19 June - 1 July 2000. Leader: Ross Large

Covers all the major classes of ore deposits: volcanogenic massive sulfides; sediment-hosted Pb-Zn-Cu; carbonate-hosted Pb-Zn; Broken Hill type; Proterozoic Cu-Au; Sn-W; porphyry Cu; epithermal Au-Ag; Archean Au; Ni; and PGE deposits. Features of the deposits relating to their genesis and exploration will be discussed and exploration models will be presented.

tectonics, structure and ore deposits

16 - 28 October 2000. Leader: Ron Berry

Deals with tectonic and structural controls on ore deposits, and includes field trips to northeastern and western Tasmania. Sessions examine structural techniques and the broad tectonic setting and magmatism associated with ore deposits. The course emphasises applications of structural techniques to geological problems in exploration and mining geology, and explores the relationship between modern tectonics, structure and ore deposits.

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