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UNIVERSITY OF TASMANIA

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

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Tasmania

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Giant Steps Forward

Program 5 (Hydrology and chemistry of hydrothermal systems) has recently been expanded to take in our new work on giant ore deposits, focusing on the large porphyry copper deposits of Chile. With David Cooke now appointed Leader of the program and hydrogeology lecturer Jianwen Yang on the team (see page 6), plus three new PhD students recently associated with the research (see page 6), Program 5 is now in a strong position. Here we round up the major projects under the Program 5 banner.

Program 5: Hydrology and chemistry of hydrothermal systems

Leader: David Cooke.

Team: Stuart Bull, Bruce Gemmell, Ross Large, Michael Solomon, Darren Turner, Jianwen Yang, Grant Garven.

Students: A Rae, J Cannell, P Frikken, G Masterman.

Projects

Project 5.1: Nature, timing and significance of fluid flow in Proterozoic sedimentary basins, and relationship to stratiform Zn-Pb-Ag ore formation.

Project 5.2: Fluid flow in the Mt Isa Basin. (AMIRA P552).

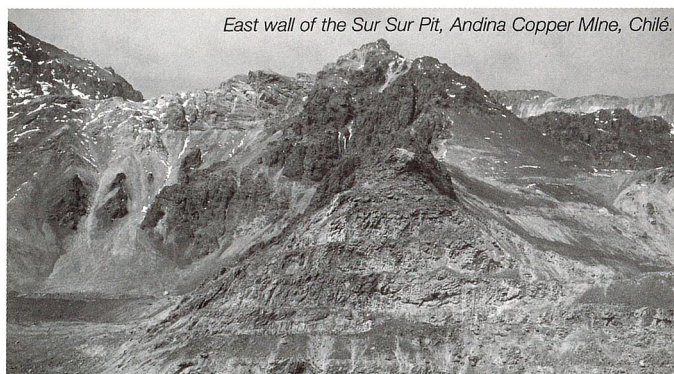
Project 5.3: Thermodynamic software development.

Project 5.4: Thermodynamic modelling of fluid/rock interaction, hydrothermal alteration and numerical simulations of fracture-controlled fluid flow related to VHMS deposits.

Project 5.5: Numerical modelling of precious metal transport and deposition in low sulfidation epithermal & subaerial geothermal systems.

Project 5.6: Numerical simulations of two-phase fluid flow, Palinpinon geothermal system.

Project 5.7: Giant porphyry Cu deposits. (AMIRA P511).



East wall of the Sur Sur Pit, Andina Copper Mine, Chile.

AMIRA P511: Giant porphyry Cu Deposits.

Team: D Cooke and J Walshe, P Gow (CSIRO).

Students: J Cannell, P Frikken, G Masterman.

Sponsors: Anglo Gold, BHP, Codelco, Falconbridge, Goldfields, Gold Fields of South Africa, Great Central Mines, Homestake, Minorco, Newcrest, Normandy, Placer Pacific, Cyprus, WMC.

Although Australia contains several economic porphyry deposits, we are yet to discover any giant systems (eg, Grasberg, Indonesia). There must be a conjunction of key geological phenomena to provide an environment favourable for giant porphyry development. By studying geochemical and alteration characteristics of regions known to contain giant deposits, we hope to identify magmatic, lithological and hydrothermal controls on metal deposition and to test hypotheses on the diversity of fluids (eg, orthomagmatic, paramagmatic, etc) and depositional processes within porphyry systems. ➔ page 2

From the Editor

This edition coincides with a major Tasmanian conference on investment and exploration, convened by the 'Australian Journal of Mining' at the Hotel Grand Chancellor in Hobart (24-25 May). It gives us the opportunity to showcase our relationship with the Tasmanian minerals industry and some of our major achievements in mineral exploration research for the state over the years. The special insert focuses on the current crop of Tasmanian research projects and students, and provides an outline of a new project in the west of the state.

The conference also gives us an opportunity to release our new corporate brochure, a high-quality promotional tool that we will send to all our colleagues around the world, as well as to prospective students and collaborators.

Our latest Research Compendium will also be available, and gives a comprehensive overview of all our research in progress. It is a new format this year, with an expanded index for a clearer guide to all our research grants, locations, and collaborators. This information will be soon presented on-line in our new web site, so that even casual browsers can quickly appreciate the quality and breadth of our research.

A new addition to **OreSolutions** is a contact details form on the back page. Feel free to photocopy this for as many contacts as applicable in your workplace, or correct any details that may be incorrect on your mailing label. In the near future, we will be mailing to all currently-listed contacts in a separate mailout to ensure that we mail information to the right people at the right time.

OS

from page 1

AMIRA P552: Fluid Flow in the Mt Isa and McArthur Basins.



Team: J Yang (CODES),
P Southgate, (AGSO),
CSIRO, QueensU,
UQueensland.

Sponsors: Cameco, Cominco, Rio
Tinto, North, MIM,
Pasminco.

CODES has joined with AGSO,
CSIRO, University of Queensland
and Queens University (Toronto),
to investigate brine evolution in the

Lawn Hill Platform, Queensland.
Our contribution will be numerical
simulations of fluid flow based on
the geological findings of the P552
research team.

Our new lecturer in hydrogeology
(Jianwen Yang) will undertake this
work, which is complementary to
the existing fluid flow research in
the McArthur Basin.

OS

News

Appointments

Bruce Gemmell has been appointed as Councillor to the Society for Geology Applied to Mineral Deposits for the term 2000-2004. To top this off, he has also been appointed to the Admissions Committee for the SEG.

Ross Large has been appointed to the editorial board of 'Mineralium Deposita', as Associate Editor.

Tony Crawford has been appointed to the editorial board of 'The Island Arc'.

June Pongratz was recently awarded the inaugural Vice Chancellor's Award for

Exceptional Performance by General Staff. Her contribution to the School and to CODES over the years has indeed been exceptional and we thank June for her outstanding contribution to the University's reputation for excellence in earth sciences.

Accreditation

The School of Earth Sciences recently received AusIMM accreditation for three streams of the Honours degree course – Economic Geology, Geochemistry and Geophysics – confirming the University's standing as Australia's leading provider of education in the earth sciences.

News

From the Director

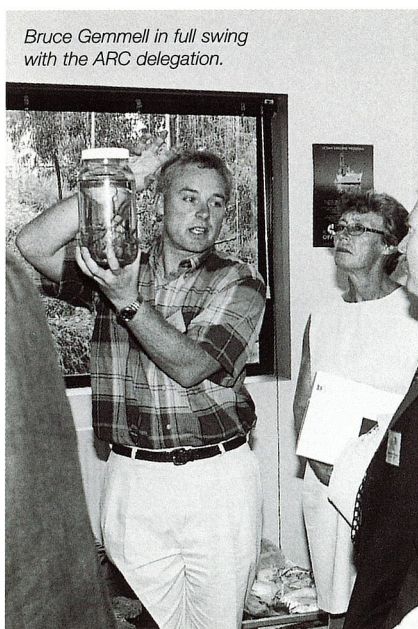


Bruce Gemmell and PhD student Andrew Davies gave a three-day short course on epithermal mineralisation at the Kelian mine (East Kalimantan, Indonesia) in December 1998, for PT Kelian Equatorial Mining and PT Rio Tinto Indonesia geologists.

ARC visit

Australian Research Council Chair Professor Vicki Sara and a team of high-level ARC/DETYA representatives visited the University in February as part of their commitment to regular contact with organisations that receive ARC funds.

Professor Sara praised our track record in leading research and its ability to attract high-quality researchers and students.



Bruce Gemmell in full swing with the ARC delegation.

Education, Training & Youth Affairs. We found the review process to be a very worthwhile exercise, not only to demonstrate our successful growth and research output to the ARC, but also to provide a forum to evaluate our strengths and weaknesses and to discuss the plans for future research, industry collaboration and forward budgeting.

It also provided the opportunity for senior management in the University to get together with us to discuss the important place CODES holds in the overall research framework of the University of Tasmania. We received some very positive feedback from the review panel about our performance to date, and although the formal report is yet to be released, there is every indication that we will receive core funding from the ARC for the next triennium.

Linked to the ARC funding is our CODES Corporate Sponsors Program that has now been running for three years, and is currently under review. I have visited the head offices of all our major sponsors and collaborating companies – 18 in total – around Australia to discuss CODES projects and future directions. Over the next three years, we are hoping to raise \$150,000pa through the sponsors program and a further \$500,000 from AMIRA and other industry-focused research. Both these figures are down on the previous three years, but in the current tough financial climate, I think it is realistic to expect a drop of around 30% in industry funding.

To reach our targets, we need to bring at least five new companies into the Sponsors program, and commence a further two or three AMIRA projects to replace the four projects which finished last year. At this stage, we are on track to reach these targets.

Our most exciting news this month has been the very positive response from industry to our AMIRA proposal for a new research project on epithermal Au-Ag deposits, to be lead by Drs Bruce Gemmell and Stuart Simmons. With five sponsors contributing already, we are confident that this research project has hit the right spot with industry.

Research Profile

Ore solutions solution

The new laser ablation ICP-MS facility at CODES will underpin many current and new projects across the Centre's research programs. Deputy Director Tony Crawford reports on the analytical techniques being developed and applied at CODES.

In 1968, Mike Solomon and graduate student Geoff Loftus-Hills (later to have a distinguished career with WMC) set about analysing minor element contents of pyrite from various ore deposits. Their aim was to evaluate the possible usefulness as a vector to mineralisation and to contribute to the understanding of ore genesis in the deposits they studied. Their task involved tedious manual/microscopic separation of single pyrite crystals, and was compromised by a number of factors, notably, the difficulty in obtaining pure separates of inclusion-free pyrite.

Today, the notion of using minor element (Co, Ni, Cu, Zn, Se) contents of pyrite to complement other ore genesis/exploration studies is no less interesting or relevant.

The difference is that now we have the technology to analyse for important trace elements on tiny (20-30 micron) spots in single pyrite grains, usually to sub-ppm limits, only a pipe-dream even 10 years ago.

CODES has recently installed a new microanalytical facility built around a Hewlett Packard 4500Plus quadrupole induction-coupled plasma mass spectrometer (ICP-MS). Microsampling of geological materials is achieved using a new generation Merchantek LuV266 ultraviolet laser that ablates a tiny cloud of material eventually passed, via a carrier gas, into the ICP-MS for analysis.

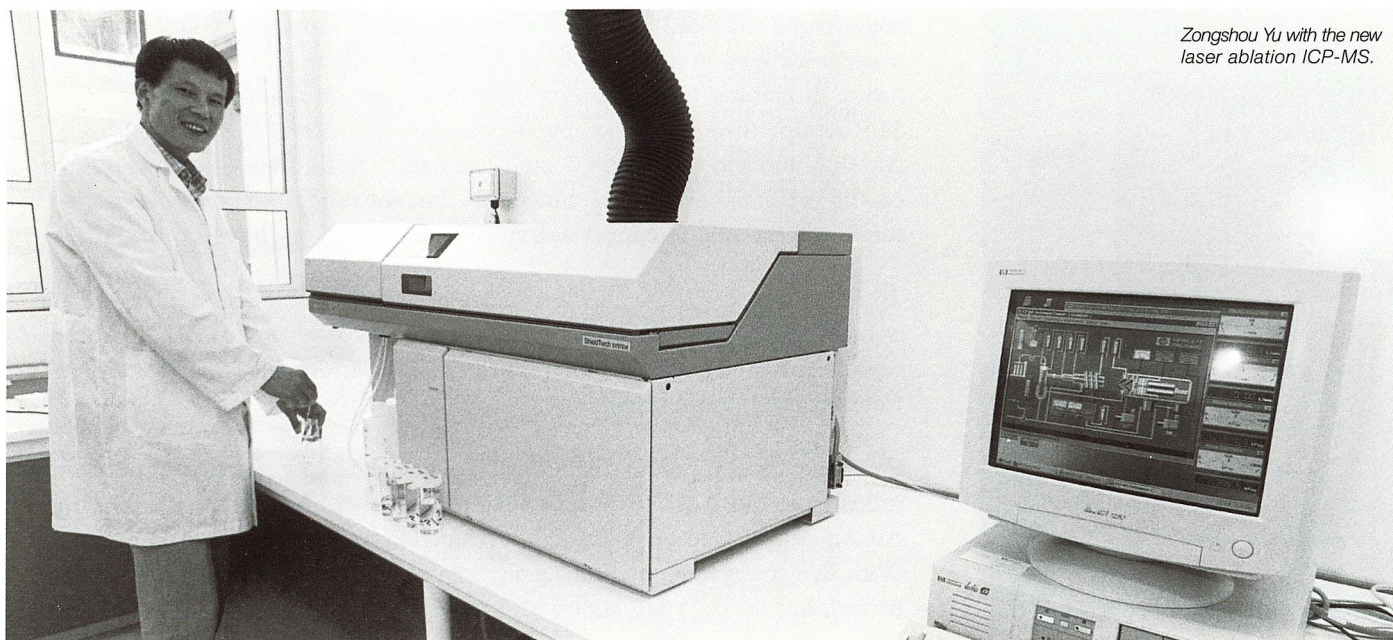
Dr Marc Norman, Senior Research Fellow at CODES, aims to bring the laser ablation ICP-MS facility into routine operation.

Marc, a geochemist-cosmochemist most recently from Macquarie University, brings a wealth of experience in geochemical analysis, and has worked extensively on ICP-MS analytical techniques, including laser ablation development. Here at CODES he is working with Peter McGoldrick, School of Earth Sciences analyst Phil Robinson, the Central Science Laboratory's Dr Ashley Townsend, and CODES PhD student Zongshou Yu on a variety of applications, including some very promising Pb isotopic applications that will be reported in the next Ore Solutions.

One of the first studies underway will be to determine the ablation characteristics of various forms of pyrite, and measure their minor element contents.

With this, and a wealth of other novel applications of the laser ablation ICP-MS, it is hardly surprising that Mike Solomon has abandoned swimming pools for brine pools, and has settled comfortably back at CODES, where he takes an active interest in all things to do with ore deposits.

OS



Zongshou Yu with the new laser ablation ICP-MS.

ASMV summer school

The Australian Student Mineral Venture (Jan 10–21) was again a huge success, with new sponsors and new team leaders bringing a new dimension to the program.

In the South East Region, we face the challenge of communicating about the ASMV across three states, and in managing the logistics of bringing forty students from hundreds of kilometres away to Tasmania. South Australia's initiatives through the Chamber of Mines and Energy have been so successful in bringing people together that we will be looking to repeat these events again this year in SA and to introduce them to Victoria. To this end, the Victorian Chamber of Mines plans to hold a function later this year to bring together all the selected year 2000 students as well as past ASMV participants.

Other new initiatives this year have included a national web site, now hosted on the AusIMM web site at:

<www.ausimm.com.au/education>.

Applications for the year 2000 ASMV opened earlier this year, and close June 18.

OS

Exploration R&D capability in Australia: are we in danger of losing critical mass?

Recent downturns in industry and university budgets have caused a squeeze on smaller minerals Research Centres around Australia. Unless we can find new Government funding or substantial industry support, then the world-class R&D infrastructure established over the last decade is in danger of collapse.

Ross Large explains in part one of a serialised account of his presentation to the AMIRA 3rd Biennial Exploration Managers Conference (Melb, March 1999).

Over the past ten years the Australian Government and mining industry have combined to put in place a world-class Research Centres Program to increase our R&D capability in mineral exploration.

Three Cooperative Research Centres, two ARC Special Research Centres and four ARC Key Centres for Teaching and Research in minerals-related areas have been established in this

Contributions welcome but not guaranteed to run. Send to: Jessica Tyler, Public Relations Officer. See address details on back page.

period, building on the research infrastructure and expertise in the Universities, CSIRO and AGSO.

This major R&D investment, with its focus on a range of Centres and a small team approach, is unmatched on the global scene. Also the close links and collaboration developed between Centre research teams and industry geoscientists is unique in the world, and our Centres are being used as models elsewhere in the world.

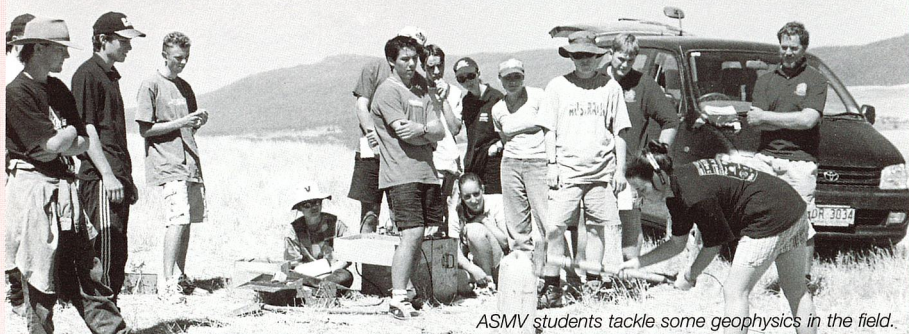
But the short-term nature of the funding contracts from Government makes it difficult to maintain research personnel and to build stable teams.

Because of the cyclical nature of the exploration industry, it is unrealistic to expect Centres to be primarily funded from industry sources. However, Centres may survive, and even prosper, with a strategy of funding from several sources: industry, federal and state governments, AMIRA, and universities.

Some Centres are losing critical mass, and unless they can gain new Government funding, which is difficult, or substantial industry support, then the world-class R&D infrastructure established in the Australian Research Centres Program over the last ten years will be in danger of collapsing.

Solutions to the problem are urgent. Firstly, we must educate the Government about our world-class R&D Centres in geoscience and the importance of maintaining the program. Secondly, we need to work with AMIRA to continue the formula of successful research collaboration between industry and the Research Centres.

OS



ASMV students tackle some geophysics in the field.

In Circulation

New hydrogeologist

Jianwen Yang has joined us as a lecturer in hydrogeology, funded jointly by CODES and the School of Earth Sciences. Jianwen completed his PhD at the University of Toronto in 1996, followed by a two-year post-doc in which he developed and applied 3D finite element software to hydrothermal convection in fractured anisotropic rocks. His experience will be invaluable for hydrothermal fluid flow modelling in volcanic arcs and sedimentary basins, forming the core research for Program 5.



Jianwen Yang.

Front office changes

CODES Secretary **Dianne Steffens** has left the front office to join Christine Higgins in managing the joint CODES/School of Earth Sciences finances. **Moya Kilpatrick**, previously with the School joins us as our new Secretary, and **Lyn Starr** has replaced her as School Secretary.

Junior research fellow position

Applications have opened for a joint appointment with the School of Earth Sciences for a **Junior Research Fellow/Research Fellow (level A/B)** in Geochemistry/Economic Geology. The appointee will work on the genesis of porphyry copper deposits in South America, as well as teaching and supervising. The term is for an 18 month period initially, with the possibility of an extension to three years depending on industry finance for the project.

Visitors

A party from the **Technical University of Clausthal** visited in November to learn more about the geology and mineralisation of western Tasmania and to visit CODES. The group consisted of three professors, two assistant professors, three research engineering and 16 students. Ron Berry provided a detailed geological presentation and the group also toured the new facilities at CODES.

Professor Grant Garven plans to visit CODES in June to work on modelling with Jianwen Yang. Grant spent most of 1998 at CODES and we look forward to seeing him again.

New PhD students

Michael Agnew (BSc, University of Queensland): 'Genesis and setting of the Lewis Ponds VHMS deposit, New South Wales'.

James Cannell (BSc, University of Tasmania): 'Geology, geochemistry and genesis of the El Teniente porphyry Cu deposit, Chile'.

Paul Davidson (BSc, University of Tasmania): 'Melt inclusions in porphyry Cu-Au-hosting magmatic systems'.

Peter Frikken (BSc, University of Wollongong): 'Breccia-hosted porphyry Cu mineralisation at Andina, Chile'.

Glen Masterman (BSc, University of Melbourne): 'Geology, geochemistry and structure of the Collahuasi district porphyry Cu deposit, Chile'.



▶ The University of Clausthal group in the new CODES foyer.



Society of Economic Geologists
University of Tasmania
Student Chapter
 sponsored by CODES SRC

New masters students

Master of Economic Geology

Julian Bartlett, Mount Wellington Gold: topic to be confirmed.

Adrian Byass, Anaconda Nickel: 'Mineralisation style of the Murrin Murrin East nickel-cobalt deposit, Western Australia'.

Daniel Olberg, Newcrest Mining Indonesia: 'Construction of a geological model/vein paragenesis of the Woyla epithermal field, northern Sumatra, Indonesia'.

Michael Priestly, Peak Gold Mine, Rio Tinto: 'Perseverance gold prospect, Cobar, New South Wales'.

Steven Richardson, Contract Geologist: topic to be confirmed.

Nalin Shah, BHP World Minerals, India: topic to be confirmed.

Spencer Summers, Indochina Goldfields Ltd: 'Jakarta, Sekatak project, northeast Kalimantan, Indonesia'.

Master of Science (Exploration Geoscience)

Ben Bartlett, Henty Gold Mine: topic to be confirmed.

Albert Chong, Boliden - Westmin, Myra Falls Operation: 'Geology, mineralisation, metal distribution, and genesis of the polymetallic Ridge and Marshall Zones, Battle Lake Camp, Vancouver Island, Canada'.

ARC review

Students representing the SEG Student Chapter, accompanied by other postgraduate CODES students recently participated in the ARC review of CODES, providing fruitful discussion. The review was followed by a BBQ coordinated by the SEG Student Chapter.

Tas conference

The upcoming 'Australian Journal of Mining' conference in Hobart in May, focusing on Tasmanian Mineral Exploration and Investment and endorsed by CODES will see several presentations by SEG Student Chapter members. Various aspects of mineral exploration in Tasmania will be discussed, including techniques applicable to certain terranes and potential new areas of focus. This will prove to be timely in light of the predicted turn around in the state of the minerals industry.

Shopfront

The SEG 'shopfront' has started well, with undergraduate students eagerly purchasing Mineral Identification Kits, enabling them to 'hit the ground running' in applying hands-on skills that are invaluable in the industry.

First aid

A 'Basic Casualty Care Level 1' St Johns First Aid Course organised by Briony Sinclair of the Student Chapter was undertaken

Terry Hoschke, North Ltd: 'Geophysical signatures of gold copper porphyry systems'.

in February by a group of CODES students and staff.

The course was conducted on site at CODES and was tailored to the needs of the participants. Not only will the course enable them to carry out their fieldwork better prepared, it will also ensure safer undergraduate fieldtrips, as postgraduate students play an integral role in supervising these excursions.

Day excursion

An informative day excursion, led by Associate Professor Clive Burrett, Head of Earth Sciences at the University of Tasmania, is planned for August/September. The focus of the excursion is the little known petroleum seeps in southern Tasmania, and the petroleum potential of the onshore Tasmania Basin. Associated drilling will be examined. A luncheon aimed at sampling some of the local produce, at a nearby venison farm is also planned.

Wine bottling

The SEG wine bottling proved a huge success with the oncoming of the festive season, with all stocks of both shiraz and cabernet sauvignon selling promptly. Due to its success, another bottling event is being considered.

Craig Stegman, Peak Gold Mine, Rio Tinto: 'Review of controls on gold-base metal mineralisation in the Cobar gold field, New South Wales'.

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Mail to GPO Box 252-79
Hobart Tas 7001

short course dates 1999-2000

exploration geophysics, remote sensing & geographic information systems

28 June – 9 July 1999. Leader: Mike Roach

Focuses on the theory and application of potential field and electrical geophysical techniques in exploration geology. The uses, problems and pitfalls of each method will be covered. Both prospect evaluation and regional geophysical studies will be discussed, as well as structural interpretation of airborne geophysical data, remote sensing, data integration and the application of GIS systems to exploration geology.

economic, management & environmental aspects of exploration and mining

1 – 12 November 1999. Leaders: Bruce Gemmell and Ross Large

Includes a one-day session on economic modelling at the feasibility stage, and a session on financing and floating companies. Exploration philosophy, exploration management styles and the factors contributing to exploration success will be debated with a panel of exploration managers. Geological and hydrologic aspects of acid mine drainage will also be considered in a three-day session including a field trip to western Tasmania.

volcanology & mineralisation in volcanic terrains

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.

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Δ Annual Report