

ORE SOLUTIONS

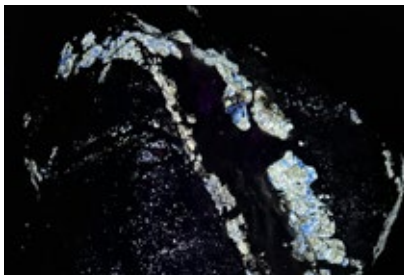
NEWSLETTER OF **CODES** CENTRE FOR ORE DEPOSIT AND EARTH SCIENCES

> AUTUMN 2024 **No.48**

CRITICAL AND STRATEGIC METALS SYMPOSIUM: CODES TO HOST IMPORTANT RESEARCH GATHERING

Critical and strategic metals are essential for the development of clean energy technologies, but they face supply risks and environmental challenges. To discuss these issues, CODES is organising a 'Critical and Strategic Metals Symposium', which will be held between 10 and 12 July 2024 at the University of Tasmania (Sandy Bay Campus), Hobart.

This symposium is part of the 'Ore Deposit Models and Exploration Strategies' unit (KEA712) of the Master of Economic Geology. The symposium will bring together experts from academia, industry and government to discuss the latest research, opportunities and challenges in the critical and strategic metals sector. There will be six technical sessions, covering different topics, including the global and Australian context; as well as lithium, tin, tungsten, rare earth elements, cobalt, copper, nickel and platinum



Light fantastic: Scheelite under UV light. Dolphin W deposit, King Island, Tasmania (Photo: Angela Costa).



Research findings: Dr Mohammad Fathi, CODES Research Fellow in Geometallurgy and Engineering Geology, with CODES PhD students Musa Emmanuel Dogara and Alfredina Appiah; they are all working within the RRC Critical Metals project.

group element deposits. A range of talks and posters will be presented, as well as discussion panels. We plan to hold this symposium largely in person to enable networking and foster discussion among participants, although remote participants will be provided with a dial-in option.

This initiative is being organised by the research team working on CODES' Regional Research Collaboration (RRC) project titled 'Building capacity in Regional Australia to enhance Australia's Economy through research, training, and environmentally sustainable production of critical metals'.

If you are interested in attending the symposium, please contact CODES (CODES.Info@utas.edu.au) for more

information and registration details. Keep an eye on our website (<https://bit.ly/CODES-CSMS>) and social media where we will share the symposium's upcoming program. Don't miss this chance to learn more about the future of critical and strategic metals – and network with leading professionals in the field.

See you in Hobart!

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FROM THE DIRECTOR

Professor David Cooke thanks staff members Dr Michael Roach (who has retired) and Dr Paul Olin (who has moved to the University of Adelaide) and forecasts a busy year ahead for the research and teaching teams at CODES.

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"A HUGE HONOUR"

The Society of Economic Geologists announced in late January that CODES Director, Professor David Cooke, has been appointed as the new Editor of *Economic Geology*.

Since the journal's inception in 1905 there have been only six editors prior to his appointment. David commented that: "It is a huge honour to be considered worthy of this role by the Society of Economic Geologists. I consider this to be an inspiring and rare opportunity to take on a vital role that makes a difference for the Society. It provides an opportunity to work closely with the SEG Executive and Editorial Board members on something that I care passionately and deeply about – helping the Society to sustain and grow the reputation and impact of its flagship journal.

"*Economic Geology* has already achieved pre-eminence in our research field due to the exemplary standards of scientific excellence fostered by its Editorial Board. I am looking forward to embracing the challenges of leading the Editorial Board and working with the SEG Executive to ensure that the journal enhances its globally renowned status and maintains long-term

sustainability within the increasingly challenging landscape of competition from commercial publishers and the looming impacts of artificial intelligence on scientific writing".

David commenced editorial duties in late February 2024, and is currently sharing these with outgoing Editor Larry Meinert. During this period of transition, David will handle all new submissions, while Larry completes editorial handling of all manuscripts submitted to the journal prior to David's appointment. It is anticipated that this transitional period will continue throughout 2024.

Regarding the outgoing Editor, David added: "I'd like to thank Larry for everything he has done for the SEG and the broader economic geology community as the Editor of *Economic Geology*. Larry has been simply amazing in his role as the journal's Editor since 2008. Under his leadership, the journal's impact factor has grown significantly, the content has diversified markedly, the global outreach has expanded, and the journal has maintained and grown its pre-eminence as the leading journal in its field. Larry has been a superb Editor in all regards, and he leaves very big shoes to fill".



David Cooke at Bluestone Bay on Tasmania's east coast: he is looking forward to embracing the challenges of his new role as Editor of *Economic Geology*.

AMONG THE TOP ECONOMIC GEOLOGY MASTERS COURSES IN THE WORLD



Participants of the 2024 Advanced Field Skills in Economic Geology unit pictured en route to Tasmania's West Coast.

Masters Co-ordinator DR ROBERT SCOTT gives an update on the state of play with our world-renowned Master of Economic Geology program.

The Master of Economic Geology (MEconGeol) program is off to a flying start for 2024, with two of the six units on offer this year already completed. The first of these, Advanced Field Skills in Economic Geology was taught at field sites in the west, north and east of Tasmania in February. This unit provides training in graphic and structural core logging, geological mapping, cross-section construction, the Anaconda mapping technique and structural analysis of multiply deformed rocks.

Our second unit for 2024, Volcanology and Mineralisation in Volcanic Terrains, is also field-based. See page 10 of this issue for some spectacular photos from this trip. While Advanced Field Skills is offered annually, Volcanology and our third field-based unit, Ores in Magmatic Arcs, are offered in alternate years. In the current degree structure, MEconGeol students must complete at least one of these three field-based units as well as two other compulsory units, both of which will be delivered this year. Fundamentals of Economic

Geology, is offered annually in April–May (online delivery) and the biennial Ore Deposit Models and Exploration Strategies unit is in June–July (blended mode). A highlight of this year's Ore Deposit Models short course will be a three-day symposium on critical metals. The two remaining MEconGeol units for 2024 are GeoData Analytics (July–Sept, online) and Exploration in Brownfield Terrains (Oct–Nov, online).

Ores in Magmatic Arcs is next offered in March 2025. To help keep attendance costs down, this unit is now regularly delivered in Indonesia. However, if there is sufficient interest, a second offering of the unit in South America is sometimes possible, as was the case in 2023. Since 2017, students interested in this unit had to choose between the Indonesian and South American deliveries, as the unit could only be done once for academic credit. However, the creation of an additional research option in the new Masters course structure enabled three lucky students to attend both field trips for credit. Part-time students wanting a research component to their degree now have the option of either completing a two-unit research thesis (units KEA724 and KEA725) or a single-unit research project (i.e., enrolling in KEA724 as a stand-alone unit).

Last year, three students who had previously completed Ores in Magmatic Arcs (Indonesia) used KEA724 as a basis for attending the field trip to South America. The KEA724 students were required to develop a research proposal that addressed a significant geological, geochemical, geophysical and/or geometallurgical problem relating to a site or sites visited during the field trip. In addition to participating in the usual group activities during the field trip, the KEA724 students collected data relevant to the objectives of their individual research projects. Further research, analysis and interpretation of the data collected was completed after the field trip, and these students ultimately presented their findings in a 15,000-word research report addressing their project aims. Field trip leader Professor David Cooke was extremely impressed by the quality of the research reports produced, and it is pleasing to see the redesigned course structure being used to the students' advantage. It is also very pleasing to see the steady stream of new graduates from the MEconGeol program continue into 2024. Some of our most recent graduates share their thoughts about the program below.

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THREE STUDENTS WHO HAVE RECENTLY COMPLETED THE MASTER OF ECONOMIC GEOLOGY DEGREE AT CODES TELL OF THEIR EXPERIENCES:



JESSICA ASKEW

Exploration Manager at Plutonic Ltd

'It is a well-known fact that the more rocks you see, the better geologist you'll be.'

What if I was to tell you that, not only does the CODES Economic Geology Masters provide this platform, but also an opportunity to upskill and build lifelong friends and an even stronger network? Pending my marks in my final assessment, I will have completed this Masters program travelling to all parts of the globe, from New Zealand, Indonesia, Chile, Peru and of course all over Tassie. An opportunity to see some of the largest economic deposits in the world, how can you possibly say no!



Jessica Askew with friends at Blue Mountain in Peru; this photo was taken during a side trip while in South America for the CODES Masters course. She summed up the Masters course as a 'remarkable adventure' and encourages other industry geologists to do the course.



Joel Blake in Chile at the Mantoverde-Santo Domingo mining district operated by Capstone Copper. He said the MEconGeol course was 'an exceptional education experience combining theoretical knowledge with practical application for use in mineral exploration'.

For instance, during our Chilean field trip in 2023, we visited the Rio Blanco-Los Bronces district, the highest producing area of copper in the world.

Finishing this program has opened many doors for me, some of which I never thought possible, and has significantly accelerated my career in geoscience exploration. As a side note, I hear it is also now possible to complete the Indonesia field trip as well as the South America trip.

If you've been umming and ahing about signing up for a unit as an industry participant or enrolling for the Masters as a student, just do it and thank yourself later!

I extend my heartfelt appreciation to all who contributed to the richness of my Masters journey. Your collective guidance, encouragement and camaraderie have been invaluable, fostering an environment where personal and academic growth flourished. Together, we've cultivated enduring memories and connections, and I am deeply grateful for the shared experiences. My sincere thanks to each of you for being part of this remarkable adventure.



JOEL BLAKE

**Principal Geologist
at Rio Tinto Exploration**

In 2020, after many years in industry and while being confined during the pandemic, I decided to re-invest in myself and commence the Masters

program at CODES. This prestigious program is meticulously designed to offer an exceptional education experience combining theoretical knowledge with practical application for use in mineral exploration. I prioritised every field learning opportunity I could, attending all the key field trips including New Zealand and Western Tasmania ('Volcanology and Mineralisation in Volcanic Terrains'), Indonesia ('Ores in Magmatic Arcs') and a cross-institutional enrolment to visit South Africa. It's one thing to read about geological terrains, but there is no better way to learn than looking at a rock within its landscape of formation and preservation today.

Working in porphyry terrains, the visits to key deposits in Indonesia including Batu Hijau, Tuhuh Buhkit and Onto, Hu'u, were so valuable, and so I took advantage of KEA724 (Thesis Project A) and attended the 'Ores in Magmatic Arcs' field trip again, this time visiting several deposits in Chile and Peru on the South American tour. The long list of ore deposits I have now visited and studied during the program would have taken me decades to complete in industry. Instead, the Master of Economic Geology program has accelerated my learnings, giving a critical understanding of key characteristics across terrains, questions that remain to be understood and exciting opportunities to make future discoveries.

I've been extremely lucky to travel the world with the program and have forged strong bonds with a community of like-minded individuals, now friends, united by the passion for geology. Whether it was collaborating on projects, embarking on field trips, or simply engaging in lively discussion over cups of coffee on a bus journey, the program has grown a strong network for me in industry and research alike.

I'd like to sincerely thank all the teaching staff and the entire team at CODES for making the program and my time there such a success!



Steve Rennick pictured during fieldwork in the Atacama region of Chile during the 2019 'Ores in Magmatic Arcs' Masters field trip. Steve has recently completed his MEconGeol degree and described it as an 'overall fantastic experience'.



STEVE RENNICK
**Principal Generative Geologist
at BHP Exploration**

The Masters program at CODES has been a rewarding, challenging and overall fantastic experience. I have been fortunate enough over the past five and half years to complete the eight coursework units whilst working fulltime at IGO and BHP. The short coursework duration, variety of courses on offer, and mixed delivery format of the CODES Masters program is perfectly suited to an industry geologist looking to

advance their knowledge of economic geology and provides an unparalleled development opportunity.

The opportunity to visit world-class deposits in the Andes, the Bushveld, the Yilgarn and Tassie's very own Mount Read Volcanics with leading researchers in the field of economic geology coupled with detailed courses in Geochemistry and Geodata Analytics has significantly impacted my development as an explorer and broadened my understanding of what world-class ore deposits look like and how to find them.

One of the best parts of the Masters program has been the great group of like-minded industry and research geoscientists with a similar passion for economic geology that I have met along the way.

Big thanks to the CODES staff for running such a well-organised and engaging Masters program.

WORK IN PROGRESS ... AND TIME TO RELAX

The Amira P1249 Sponsors' Review Meeting 4 was held across two days on 6–7 December and brought together researchers, industry representatives and CODES PhD students to discuss progress so far on this large and complex project. The CODES Christmas BBQ was held in conjunction with the Amira gathering on the second day of the meeting. The research team presented updates from study sites located in Australia, Africa, North and South America, as well as a technology transfer workshop for sponsors on the functionality and application of software developed for exploration vectoring using mineral chemistry data. Following the end-of-year break, field activities for the project have already recommenced, with site visits to southern Arizona and Nevada completed in February. Field activities are also planned for sites in NSW, South Africa and Spain through April and May.



Industry representatives, researchers and PhD students working on the Amira P1249 project gather on the lawn in the CODES Rock Garden on 6 December. Bright Foli, the recently appointed Amira Project Manager, is at far right in the front row, while CODES director, Professor David Cooke, is centre, middle row (in brown jacket).



Amira P1249 research team member Stephen Cooke ran a workshop instructing users on LocatOre, his Unity-driven visualisation tool for vectoring towards the causative intrusions of orebodies. Users were guided through step-by-step instructions for analysing sample datasets and were then given free rein to explore an unknown dataset independently. The workshop saw about 15–20 Amira P1249 researchers and sponsors attend. Stephen did an excellent job showcasing new developments to LocatOre, such as improved model optimisation, analysis of the spatial distribution of samples and spatial declustering.



Amira meeting participants enjoy lunch at the UTAS staff club where informal discussions and networking play an important role in the collaboration process.



Alan Kobussen from Rio Tinto talks with CODES PhD student Isaac Evinemi at a morning tea gathering on the second day of the Amira meeting.



Dr Lejun Zhang collecting white mica samples in Yerington, Nevada, in late January 2024, as part of CODES' research activities under the Amira P1249 project.

FROM GRENVILLE OROGENY TO TERTIARY MAGMATISM – the southwest USA's spectacular porphyry Cu provinces

Postdoctoral Research Fellow in Economic Geology Paula Montoya recounts a recent successful Amira P1249 fieldwork trip to one of the world's most well-endowed copper porphyry belts in Arizona, and to porphyry systems in Nevada.

Earlier this year, four CODES researchers (Lejun Zhang, David Cooke, PhD student Axel Cima and myself) conducted fieldwork in two of the world's premier porphyry copper provinces in Arizona and Nevada, USA. During this field campaign, the team reviewed the spectacular diversity of host rocks, including the basement Paleoproterozoic schists, Mesoproterozoic clastic sedimentary and volcanic units, and the voluminous dolerite sills that intruded them during the Grenville Orogeny, and overlying carbonate units.

The team's primary focus was the Cretaceous intrusions that produced giant porphyry Cu-Mo and related high and intermediate sulfidation state epithermal Cu-Ag deposits in the Superior, Globe-Miama and Christmas regions. Spectacular landforms defined by the widespread Tertiary volcanic units that unconformably overlie the mineralised rocks provided a stunning backdrop to the field campaign. These Oligocene tuffs and volcanoclastic sequences formed during a major magmatic flare-up during three major extensional events (i.e., Basin and Range, California Gulf Coast and Rio



PhD student Axel Cima examining Laramide Cretaceous magmatism close to the Globe-Miami porphyry district in Arizona during the CODES January fieldwork trip to the USA.

Grande rift). A secondary objective was field sampling at the Jurassic Cu-Au-Mo porphyry system at Yerington, Nevada.

During our time in Arizona, the team had the opportunity to review fertile mineralising plutons, stocks and dykes, and the potassic, phyllic and propylitic alteration assemblages associated with those intrusions at several porphyry systems. Key textural features including sheeted and stockwork veins, USTs, resorbed phenocrysts, and mafic enclaves were a particular highlight.



BHP geologists and some of the CODES team in the field at the BHP Ocelot project (Globe-Miami). This Amira P1249 fieldwork trip was a great opportunity to share experiences with local staff.

Overall, this two-week field campaign provided outstanding opportunities for the research team to learn more about Arizona's amazing porphyry Cu province, and we thank Amira P1249 sponsor BHP and their Arizona exploration team for their kindness and generosity in hosting us, and for sharing their knowledge and wisdom with us. An unexpected bonus of this excursion was the opportunity for some of the team to visit Tucson's famous Annual Gem and Mineral Show at the Gem and Mineral Park LLC.

MAKING THE CHINA CONNECTION:

CUGB undergraduates visit CODES and Earth Sciences

A group of eight undergraduate students from the China University of Geosciences – Beijing (CUGB) visited CODES and Earth Sciences in February and spent two weeks taking part in classroom lectures, field trips to the west and east coasts of Tasmania and other activities. Six of the students were from the CUGB School of Earth Sciences and Resources and two from the School of Engineering and Technology.

Blown away: The CUGB students with their group leader, Professor Zhang Jing (second from left), pictured on top of kunanyi/Mount Wellington in Hobart, where they were able to take in the expansive 360-degree views.



Hands-on learning: Dr Lejun Zhang (in red vest) teaching the students from CUGB to identify, describe and interpret magmatic-hydrothermal transition textures in granite at Bluestone Bay, Tasmania. This location is the regular field site for the Advanced Field Skills Mapping Camp Masters short course. This day trip was organised as part of a two-week teaching program for the CUGB visiting students. They really enjoyed the amazing rocks at Bluestone Bay and the scenery of the east coast of Tasmania.



The final goodbye: The CUGB visitors gathered outside the CODES offices at the University of Tasmania at the conclusion of their study visit. Their tour leader, Professor Zhang Jing, Vice Dean, School of Earth Sciences and Resources at CUGB, is second from right in pink.

A FORMATION OF GEOLOGISTS...

In December a number of CODES PhD, Masters and Honours students graduated with – in some cases – years of work behind them. Two supervisors – Professor David Cooke and Associate Professor Rebecca Carey – were there to support them. Here they are pictured after the graduation ceremony at the Hotel Grand Chancellor on the Hobart waterfront. Congratulations to all these recent CODES graduates!



CODES en masse (L–R): David Eddy (Master of Economic Geology); Associate Professor Rebecca Carey; Matthew Ferguson (PhD); Naomi Potter (PhD); Professor David Cooke; Thomas Ostersen (PhD); Harrison Keeble (Honours); Millie Young (Honours); Madison Mulder (Honours); Joe Knight (PhD) and Sibebe Nascimento (PhD).



Congratulatory catch-up: Madison Mulder (left) chats with her Honours supervisor Associate Professor Rebecca Carey following the graduation. Madison carried out research into the Louisiade Ophiolite in the Coral Sea.



What an honour: three Honours graduates, Millie Young, Harrison Keeble and Madison Mulder, are happy to have their studies behind them and look forward to their next challenge.



Trust us, we're doctors: three of the CODES December 2023 PhD graduates after having their degrees conferred. Joe Knight, Naomi Potter and Matthew Ferguson have all gone on to work in the geology and geophysics space.

NEW ZEALAND VOLCANOLOGY MASTERS UNSURPASSED

The biennial Master of Economic Geology 'Volcanology and Mineralisation in Volcanic Terrains' field trip to New Zealand saw a total of 13 students and staff tackling some tough conditions and long treks. But they were rewarded with some superb volcanic scenery, and a new appreciation of the volcanic architecture of the country, and the spectacular active and ancient hydrothermal system associated with New Zealand's volcanic environments.



The CODES Volcanology Masters course participants and course leaders pictured in front of an acid sulfate-chloride lake occupying a collapse crater at the Waiotapu geothermal field.



Fog makes viewing difficult atop Mt Tarawera during the field trip.



Joint course leader Rebecca Carey teaches the course participants about Tongariro volcano at 1,900 m asl. David Cooke provides support as a mobile white board (Photo: Esther Little).



The stunning acid sulfate lakes atop Tongariro volcano. These lakes are produced by condensation of volcanic gases into shallow groundwater, and have pH values of 2–3.



A spectacular view of Mt Ngauruhoe (aka Mount Doom) on the Tongariro Traverse (Photo: Esther Little).



Siliceous sinter terraces downstream from Champagne Pool, Waiotapu geothermal system (Photo: Louise Neill).

KALGOORLIE REUNION BRINGS TOGETHER ALUMNI FROM ACROSS THE YEARS

Dr Alicia Verbeeten from the Geological Survey of Western Australia, and a past CODES PhD graduate, organised a get-together for CODES alumni in Kalgoorlie in the Western Australian Goldfields.

She writes: "Professor Ross Large's visit to Kalgoorlie on 20 March, to talk about a big data approach to exploration at the Raglan Drilling Geology Lecture Series, presented a great opportunity to organise a UTAS-CODES alumni reunion, commemorating the significant milestone of 35 years since CODES was established. Professor Tony Crawford happened to be in the great state of WA at the same time, so it was a great opportunity to join Ross as part of the celebration and to catch up with past UTAS-CODES graduates".



The reunion was held at the Hannans Club in Kalgoorlie and pictured are (L-R): Back row: Tony Crawford, Ross Large, David Rawlings, Sam Maloney, Alicia Verbeeten, Carol Campbell (née McCarthy). Front row: Steve Bodon and Vanessa Lickfold.

INDUSTRY LINKS

FORGING TIES WITH INDUSTRY IS CRUCIAL TO CODES' SUCCESS

Guest pass: Professor David Cooke and the Freeport McMoRan exploration team outside Freeport's outstanding Exploration Center for Excellence facility in Tucson, Arizona. David was fortunate to be able to tour the facility as a guest of Freeport McMoRan in late January, and had the opportunity to meet with members of the exploration team, briefly review core from several mine and exploration sites in Arizona and learn about Freeport's impressive workflow for orebody characterisation. (Photo: courtesy of Freeport McMoRan)



RIGHT: Explore MetFest 2024: During this year's MetFest conference in Burnie, Tasmania, CODES staff and students had the opportunity to take a guided tour of the Iron Ore Pelletizing Plant at Port Latta, operated by Grange Resources.

In the realm of critical minerals processing, forging connections between university staff, students, and industrial processing companies is imperative. This collaboration facilitates the exchange of knowledge, fosters cooperative research endeavours, and drives the innovation of sustainable processing methods. Moreover, these partnerships offer valuable opportunities for practical skill development, thereby enhancing competitiveness and industry relevance.



CODES INDUSTRY PARTNERS 2024

Industry partnerships are now open for 2024 – please join us by contacting Professor David Cooke (d.cooke@utas.edu.au) or Helen Scott (helen.scott@utas.edu.au). By becoming a CODES Industry Partner your company will be contributing to important ongoing minerals research and will have access to significant research benefits.

GOLD



SILVER



CONFERENCES

CODES GOES GLOBAL – AGAIN

The all-important conference circuit continued right up to Christmas; and CODES staff and students again took to the podium with enthusiasm at the start of the new year. Our research is constantly being disseminated throughout the geoscience community in this way, and the exchange of ideas during networking sessions is equally important for promoting discussion and further research streams.

45TH ANNUAL SEMINAR OF THE JOINT MINERALOGICAL SOCIETIES OF AUSTRALASIA

5–10 October 2023, Grindelwald, Northern Tasmania

Honorary Professor Khin Zaw and Dr Wei Hong attended the 45th Annual Seminar of the Joint Mineralogical Societies of Australasia entitled 'Granite Minerals', which was held in Grindelwald, Northern Tasmania from 5–10 November 2023. Dr Hong was invited to give a keynote presentation entitled 'Tasmanian granite and associated critical minerals: with a focus on control on Sn, W and Li mineralisation'. Professor Khin Zaw gave an oral presentation entitled 'Genesis and geographic typing of ruby and sapphire from Mogok, Myanmar'. Both talks received praise for being entertaining, engaging and informative.

XVI CHILEAN GEOLOGICAL CONFERENCE

26 November–1 December 2023, Santiago, Chile

This conference covered aspects of Chilean and Andean geology, with presentations from academia, industry and government participants, from both national and international institutions. CODES PhD student Jaime Osorio and Research Fellow in Critical Minerals Characterisation Dr Yamila Cajal attended. Jaime presented his research on the porphyry–high sulfidation Valeriano Cu–Au system of northern Chile and Yamila presented her work on magma fertility related to porphyry Cu deposits of central Chile.



CODES Honorary Professor Khin Zaw (left) and Dr Wei Hong both spoke at the 45th Annual Seminar of the Joint Mineralogical Societies of Australasia in northern Tasmania during November 2023.



CODES PhD student Jaime Osorio presenting at the XVI Chilean Geological Conference, held in Santiago at the end of November 2023.



Dr Julie Hunt, Leader of 'Element 2: Pathways to Production' within the Regional Research Collaboration Critical Metals project, presenting at the AusIMM 13th Annual Geoscience Forum at Tullah in northwest Tasmania during November 2023.

CODES alumni José Piquer (Associate Professor at Universidad Austral de Chile) also presented and moderated a session on mineral resources. All their talks were very well-received.

This was a great opportunity for networking with South American colleagues and industry partners, and to hear about the latest and most exciting research being undertaken in Chile and the Andes, a lot of which has still not been published.

AUSIMM 13TH ANNUAL GEOSCIENCE FORUM

30 November 2023, Tullah, Western Tasmania

The Regional Research Collaboration (RRC) Critical Metals team headed out to the West Coast in late November for their one-year RRC Sponsors' Meeting and the AusIMM Annual Geoscience Forum, which were held at the same venue. Fifty people turned

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out for the Sponsors' Meeting, with a range of talks setting the scene for why Tasmania has such potential for critical metals production, then diving into student and staff research across the west and northwest of the state. Professor Sharon Fraser and School of Education PhD student Jane Hall-Dadson ran a workshop on formative science experiences which was enjoyed by the participants.

The next day, a full house crammed into the Tullah Lakeside Lodge conference venue for talks by industry, academic and government speakers following a bumper year of drilling across Tasmania, with Dr Sheree Armistead one of the organisers of the speakers list for the day. On the Friday, some of the team returned home via Zeehan, visiting the West Coast Heritage Centre and the Stellar Resources core shed, examining one of the latest drill cores.

AME ROUNDUP

22–25 January, Vancouver, Canada

The AME Roundup Conference was held at the Vancouver Convention Centre from 22–25 January. Over 6,000 participants attended this year's meeting, including a healthy contingent of CODES alumni, many of whom got together for an informal gathering over dinner at the end of the conference. CODES Director David Cooke was the keynote speaker in the Precious Metals session on Wednesday 24 January, and also presented a one-day sold-out short course on gold-rich porphyry deposits on the final day of the conference.

At least three of the session chairs were from CODES (either PhDs or former staff) – among them Patrick Sack, Shaun Barker and Ayesha Ahmed.

AUSTRALIAN MINE WASTE SYMPOSIUM

6–7 February, Brisbane, Queensland

Over 150 delegates attended the inaugural Australian Mine Waste Symposium held at the University of Queensland's St Lucia campus. Dr Owen Missen presented a poster and short talk on his geoenvironmental research as part of the Regional Research Collaboration entitled



CODES MEconGeol program graduate Albert Chong is pictured introducing Professor Cooke as he was about to present the sold-out short course on gold-rich porphyry deposits on the final day of the Roundup 2024 conference in Vancouver.



Dr Owen Missen (left) with third-year Earth Sciences student Anthony Tai attending the inaugural Australian Mine Waste Symposium in Brisbane during February 2024.



The CODES contingent at the 2024 AusIMM MetFest event in Burnie (L–R): PhD students Musa Emmanuel Dogara and Alfredtina Appiah; Postdoctoral Research Fellow in Geometallurgy/Economic Geology Dr Julie Hunt; and Research Fellow in Geometallurgy/Engineering Geology Dr Mohammad Fathi.

'Unlocking critical metals in mine wastes: Potential for bismuth, indium, cobalt and more in Tasmania'. Third-year undergraduate Anthony Tai was successful in gaining a student bursary to attend the symposium, receiving a first-hand look at the state of mine waste research, policy, opportunities and challenges in Australia today. The event was co-chaired by former CODES environmental geologist Associate Professor Anita Parbhakar-Fox.

METFEST 2024

8–9 February, Burnie, Northern Tasmania

Several CODES staff and students attended and presented at this AusIMM event in Burnie, held during

early February. The fourth session was specifically aimed at presenting the outcomes of CODES research into critical minerals processing. Dr Mohammad Fathi spoke about addressing the issue of slimes generation to maximise recovery efficiency (slimes are very fine particles and colloidal suspensions).

PhD student Alfredtina Appiah responded to the event enthusiastically with the following quote: 'The AusIMM MetFest 2024 conference was amazing and inspiring...[it] created a friendly environment to discuss ideas relating to processing. My appreciation to volunteers and organisers for the tour to ALS and Port Latta'.

A PARENTAL GIFT, A FASCINATION WITH TELLURIUM AND DESERT WALKS AT NIGHT...

...these are the things that led Dr Owen Missen, Lecturer in Environmental Geology, to his interest in mineralogy and the far reaches of the periodic table. Here he shines a light on his past studies and his pathway to CODES.

I was fascinated by chemical elements as a child and was regularly disappointed that my local library had entire books on carbon and oxygen, while three-quarters of the periodic table was relegated to a mere footnote. Why weren't there books on selenium, rhodium or dysprosium? An interest in rocks and minerals soon followed, though with a similar feeling that something was missing – why so much focus on various different kinds of silica?

My parents gifted me a copy of *Nature's Building Blocks* for my 14th birthday, a compendium somewhere between popular science and reference book, and I duly read it cover to cover. Subsequent trips down memory lane have revealed that some of the mineralogy descriptions in this book could have done with some further attention!

I began my university studies at the University of Melbourne in 2013 with Chemistry, Physics and Mathematics as my science subjects. I didn't especially enjoy my first semester elective subject and decided to take up a fourth science subject (Earth Sciences) which rapidly leap-frogged Physics and Maths to be my favourite alongside Chemistry. This set the scene for the rest of my undergraduate studies: Chemistry with a minor in Earth Sciences, especially anything involving mineralogy and chemistry.

An elective subject on inorganic crystallography taught by Associate Professor Brendan Abrahams piqued my interest, and I am greatly indebted to him as he put two and two together and directed me to Museums Victoria and their geosciences curator, expert mineralogist Dr Stuart Mills. A project on secondary tellurium mineralogy was



Study trip: Viewing the University of Alberta's impressive mineralogy collection while visiting Edmonton for a week to extract DNA from soil samples during my PhD. (Photo: Professor Sasha Wilson)

waiting for a student and I had all the ingredients I needed: chemistry, minerals and strange corners of the periodic table!

I enjoyed learning about mineralogical crystallography, discovering the joy of overnight Synchrotron sessions and a 'zoo' of tellurium-oxygen minerals with entrancing names like tlapallite and xocomecatlite. As my Masters drew to a close, I was keen to continue researching but also to move more into environmental geochemistry, which led me to Monash University and the supervision of Joel Brugger, Barbara Etschmann and Rahul Ram with a continued component of my research at Museums Victoria. The next few years – admittedly interrupted by COVID – were a whirl of tellurium, from minerals to biogeochemistry and everything in between. I continued my work on mineralogical crystallography, including a three-month stint visiting the Technische Universität, Vienna, and Natural History Museum, London, while also diving into the interface of minerals and microbes in the field and in the laboratory.

My studying years were full of tutoring and demonstrating jobs, which – while not mandatory for research students – have been excellent for developing my teaching technique. Despite ample preparation, full-time academic work is undoubtedly different from PhD student life (more than one project on the go for one thing!). I am a relatively recent PhD graduate (July 2022), and my transition from student to supervisor was surprisingly rapid! My previous academic appointment prior to coming to CODES was as a Geosciences Researcher at Museums Victoria, researching cobalt environmental geochemistry. Cobalt is one of the critical metals which Australia possesses in abundance but produces very little of. Like many critical metals, scientists have not spent a lot of time researching cobalt's environmental behaviour in Earth's surface environments: Which minerals are soluble? What oxidation state is most stable? Does cobalt pose any risks to the environment?

My researcher role featured a three-week road trip across the Australian

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The night shift: 6 am during an all-night Masters beamtime at MX2 beamline, Australian Synchrotron: those crystals won't measure their own structures! (Photo: Owen Missen)

interior and beamtime at the European Synchrotron Radiation Facility, Grenoble (ESRF), France. The remnants of the pandemic prevented overseas travel, but the ESRF's set-up allowed for remote access to operate the beamline computer from anywhere in the world.

Fieldwork often seems to provide the most interesting stories. My PhD research involved traipsing through the Mexican desert in search of tellurium-rich outcrops, hiking for 10 km one way in the darkness of early morning to escape the worst of the heat, and dodging a myriad of spiders and scorpions on the hike home in the evening – all while carrying 20 kg of collected samples. For fieldwork in my first academic job, I swapped desert walks at night for driving in the day, covering over 10,000 km from Melbourne up to far north Queensland and the eastern edge of the Northern Territory, returning via the Flinders Ranges and Broken Hill to sample four different hosts of cobalt-rich rocks and sediments. Geology certainly takes you places!

I cannot remember how far back I first heard of CODES, though I think it was quite likely reading a paper modelling the hydrothermal behaviour of tellurium by one David Cooke. I also remember Dave's online talk on tin granite systems as the Society of Economic Geologists ran a series of online seminars in 2020, providing me with an introduction to one of the PhD projects I had no idea then I would be co-supervising three years later.

I was looking for a postdoctoral role just as the Regional Research Collaboration (RRC) on Critical Metals was looking for PhD students and staff to join the CODES team. I had already been introduced to a few of the CODES team through mutual connections (Dr Angela Rodrigues at Monash University collaborated with CODES on a previous Amira project, and she introduced me to past CODES PhD student Emily Smyk) and initial positive experiences suggested to me that CODES would be a great place to work. I was pleased to successfully land the Postdoctoral

Fellow in Environmental Geochemistry and Mineralogy role in late 2022, and late last year was grateful to be selected for the role of Environmental Geochemistry Lecturer for 2024.

Opportunities to lead research on critical metals and teaching the next generation of environmental geologists are both key motivators for me. The environmental geology lecturer role is an important one, with several hundred contaminated sites found across the state of Tasmania. The discipline of environmental geology plays a key role in developing innovative solutions to manage mining waste and contaminated run-off issues in Tasmania and beyond. I am looking forward to continuing to supervise the PhD students I am working with, teaching and – hopefully – inspiring undergraduate students, and to developing new partnerships at UTAS and beyond. Environmental geology is a multi-faceted field linking geology, chemistry, physics and biology into one large – and, unfortunately, an often (slightly) contaminated – natural laboratory. I am very excited to continue the work I have already started in the Regional Research Collaboration as well as researching the environmental geochemistry of critical metals more broadly!



Environmental geology: Getting my hands dirty investigating alkaline drainage in Tasmania's northeast. We were east of Royal George in the Merrywood Creek working on a project funded by Mineral Resources Tasmania; the mud is sulfide-rich. (Photo: Professor David Cooke).

CH...CH...CH...CH...CHANGES...

A morning tea was held on 8 February at CODES to farewell Paul Olin and Michael Roach (who retired at the end of 2023 and was away travelling at this time), and to introduce a new member of staff and new PhD students. Dr Valerie Yuleridge (CODES Analytical Laboratories) was welcomed, as were new and recently arrived PhD students Giovana Pimentel, Fuseini Atanga, Pratichee Mondal and Olive Pnyalou.

CHANGES AFOOT AT THE CODES ANALYTICAL LABORATORIES

DR PAUL OLIN

Paul joined CODES Analytical Laboratories as a Senior Analyst back in 2013 and progressed to be the Deputy Leader in August 2019 following the departure of Jay Thompson. He subsequently became Leader of the CODES Analytical Laboratories in November 2022.

The director of CODES, Professor David Cooke, writes:

"Dr Paul Olin has decided to take up a job offer for a new position in South Australia. He will be working as an Isotope Analyst within the Adelaide Microscopy unit at the University of Adelaide. While Paul has enjoyed working in CODES Analytical Laboratories for 11 years, and has a deep regard for the people he works with in CODES, Earth Sciences and CODES Analytical Laboratories, he has decided that it is the right time to move on. I trust that you all join me in wishing Paul every success as he moves forward with his life and his career. I have no doubts that Paul has made the right decision for himself and his family, and it is great to see him smiling with an optimism for what the future will bring."



Speechmaker: Sebastien Meffre and David Cooke listen to Paul Olin's farewell speech in the CODES Rock Garden on a sunny February morning with most CODES staff and students in attendance. Paul gave a heartfelt account of his time at the CODES Analytical Laboratories – he will be sorely missed.



Final chapter: Paul doing what he does best: the master of amusing anecdotes and storytelling (and closet David Bowie fan).

"In addition to his highly valued technical, academic and leadership skills, Paul has made enormous contributions to the social fabric of our group thanks to his compassionate, positive and generous nature, the attributes that made him so very highly regarded by all in our team. His gregarious nature, spontaneity, and optimistic outlook on life made him one of the most popular members of our cohort for the past decade, and he will be deeply missed."

As for Paul himself, he is a little short on words, so has provided the following Irish blessing, which best sums up his sentiments at this time:

*"May the road rise up to meet you.
May the wind always be at your back.
May the sun shine warm upon your face,
And rains fall soft upon your fields.
And until we meet again,
May God hold you in the palm
of His hand."*

He follows this with the comment "Thoughts?" (very Paul).

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DR VALERIE YULERIDGE

Dr Valerie Yuleridge recently joined CODES Analytical Laboratories as a Laboratory Analyst and is an important addition to this highly skilled team. She introduces herself here, explaining her previous roles and what she looks forward to in this role.

"I specialise in U-Pb zircon geochronology and bentonite tephrostratigraphy (characterising and correlating volcanic airfall products in basins). I completed my PhD at James Cook University in North Queensland in collaboration with the Massachusetts Institute of Technology in Boston. My doctoral research investigated temporal relationships between richly fossiliferous Late Cretaceous strata in western North America. Findings demonstrate synchronicity of

a diverse assemblage of large terrestrial biota (dinosaurs) from Alberta to New Mexico, which supports hypothesised latitudinal endemism preceding the K-Pg extinction. Zircon age and geochemical data also yielded insight into synchronicity of recurring tephra deposits related to tectonically triggered volcanic high flux events following termination of Sierra-Nevada magmatism.

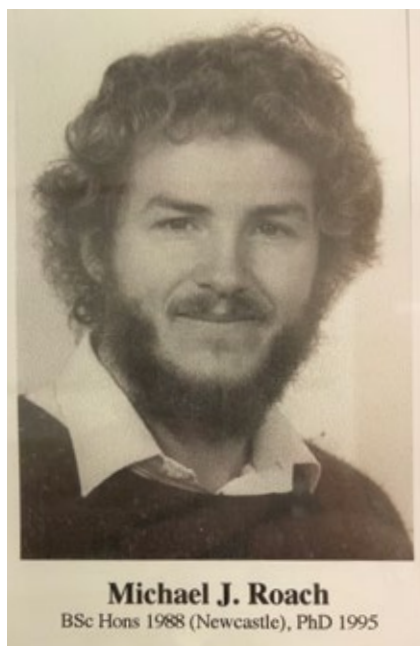
"Since completing my PhD, I have worked at Geoscience Australia in the Geochronology and Stratigraphy team and, most recently, I completed a short-term teaching contract at James Cook University. In that role, I coordinated two subjects totalling 85 students: Sedimentology & Stratigraphy, and Basin Analysis & Energy Resources.



"With my new analyst position here at CODES, I am most looking forward to methods development in U-Pb techniques including other accessory minerals and complex zircon. The laboratory facilities here are outstanding and it's a pleasure to join such a professional and welcoming team."

RETIREMENT OF DR MICHAEL ROACH

Michael Roach provides a retrospective of his 35 years at Earth Sciences and CODES, and says that he hopes to continue his links with UTAS into the future.



Michael J. Roach
BSc Hons 1988 (Newcastle), PhD 1995

Early days: Mike Roach's 1995 PhD graduation photo in the hallway at CODES.

In January 2024 I retired from my full-time teaching role in Earth Sciences and CODES after 35 years at UTAS. I arrived at the UTAS Geology Department to start a PhD in geophysics at the beginning of 1989 having previously worked for nine years for BHP in the NSW coal industry. This was six months before the commencement of the original CODES Key Centre, and I joined Ross Large's Ore Deposit Research Group to undertake a study of the spatial relationships between gold deposits and granitic intrusions in NE Tasmania. In due course I became one of the inaugural CODES PhD students. My PhD work entailed acquisition of petrophysical and gravity data and integration of these with recently acquired aeromagnetic data to generate 2D and 3D crustal forward models.

Shortly after arriving at UTAS, and while still a PhD student, I started teaching both undergraduate and postgraduate units, and this interest in geological and geophysical education set a pattern for my subsequent career as a 'teaching-intensive' academic.



Virtual reality: Mike Roach demonstrating his AusGeol Virtual Library of Australia's Geology at the CODES booth in 2019 during the SEG conference in Santiago, while Bruce Gemmell looks on.

Although my PhD was in geophysics, I really regard myself as a generalist and at various stages in my career at UTAS I have taught components of almost all Earth Science undergraduate units.

I think that a truly unique aspect of the educational offerings at UTAS over the past three decades has been the close integration of geophysical programs with other Earth Science units. This is perhaps best exemplified in the third-year geological mapping unit (KEA310) in which students acquire ground-based geophysical data, to accompany their own geological observations, airborne geophysics, and remote sensing to hopefully generate improved, integrated, geological maps.

From 1998, following the retirement of Roger Lewis, I redeveloped all the undergraduate geophysics offerings at second-year, third-year, and Honours levels and I believe that the students who undertook these units and programs over the following 23 years gained a diverse practical geophysical education that well equipped them for their future roles as explorationists in a diverse range of geological and geophysical careers. For me, the demise of the UTAS geophysical educational programs in 2021 was very sad. This UTAS decision was driven solely by commercial considerations rather than educational outcomes, or demonstrated societal need, and is, in my view, an entirely short-sighted and negative outcome.

During my teaching career one of my major contributions was supervision of BSc Honours projects. Between 1992 and 2022 I supervised over 110 Honours students (~35% of all Earth Science Honours students during this time). These projects were extremely diverse in terms of the scale of investigation, the geophysical methods employed, and the aims and objectives. I enjoyed Honours supervision because I got to see the students transition, over a relatively short period of time, from 'green' third years to young professionals ready to assume useful roles in paid employment.



Teaching matters: Mike Roach with students on King Island during an SEG field trip in 2021.

Some personal highlights of my career at UTAS include geophysical fieldwork in Antarctica and on Macquarie Island, establishing and running the third-year field camp at Broken Hill, and development of the AusGeol Virtual Library of Australia's geology.

I feel privileged to have worked for the majority of my geological career at Earth Sciences and CODES where I have been able to contribute as part of a team of dedicated and inspired researchers and teachers. I arrived before the inception of CODES and have seen it mature and morph over

the years in response to changes in government and industry support and commodity demand cycles.

Although I have now retired from my full-time position at UTAS I hope, as an adjunct staff member, to still retain active close links with Earth Sciences and CODES teaching and research activities. In 2024 and 2025 I will be working on a European Union Erasmus+ project to develop innovative teaching resources relevant to critical minerals and will assist with student supervision and MEconGeol coursework modules.



Mountain high: Mike Roach pictured on Mt Tarawera while on a 2022 field trip to New Zealand.

SPECTACULAR SCENERY, WORLD-CLASS DEPOSITS



The view from the Don Luis open pit lookout at Andina Mine (CODELCO), which is part of the Rio Blanco-Los Bronces deposit in Central Chile, the world's largest porphyry copper deposit.

Dr Yamila Cajal provides more details about the CODES Master of Economic Geology 'Ores in Magmatic Arcs' field-based unit that took place late last year in South America, and thanks the many mines and exploration companies that allowed access to their workplaces.

This unit teaches students about ore deposits, geology and tectonics in arc settings. The South America version of this unit (25 Oct–11 Nov 2023) visited several spectacular locations in the Andes of Chile and Peru. The trip was organised and led by Professor David Cooke, with assistance from Dr Yamila Cajal and PhD students Jaime Osorio and Victor Torres. Associate Professor José Piquer (Universidad Austral de Chile and a CODES graduate) was a guest lecturer during part of the Central Chile section. There were 24 students and industry participants from nine countries including

Australia, Chile, Peru, Brazil, Canada, Colombia, Kazakhstan, the United States and Ecuador, which produced a stimulating learning environment.

Participants visited 17 mine sites and exploration prospects/projects, including world-class porphyry, epithermal, skarn, carbonate-

replacement, IOCG and VHMS deposits, as well as places of regional geology interest. Each day consisted of one or two field visits, with a mix of lectures from the trip leaders and local geologists as well as hands-on learning experiences, such as drill-core inspection, outcrop mapping,



Down under: Visiting the El Teniente underground Mine (CODELCO) in Central Chile, the world's largest underground mine.

and open-pit and underground mine observations. The opportunity of working in teams allowed participants to learn from the course lecturers, and from their peers, enabling a friendly and productive learning environment. Students also had the opportunity to present and discuss their literature review and to receive feedback on their daily and final reports.

The trip leaders are very grateful to everyone who made this trip possible and to all the companies that kindly opened their doors and allowed them to visit these spectacular world-class deposits. They hope that the learnings from this course will benefit the students' understanding of ore deposits and exploration techniques and they will apply them in their careers.



Central Peru: field trip participants examine a map of the area of the discovery outcrop of the Yumpug Ag deposit.



Roll call: Participants of the 2023 Ores in Magmatic Arcs South America field trip visiting the Candelaria IOCG deposit (Lundin Mining) in Northern Chile.

ACKNOWLEDGEMENTS AND THANKS FOR THE CODES 2023 SOUTH AMERICA MASTERS COURSE

Professor David Cooke, Director of CODES, extends his thanks to all those who were involved in the visits to Chile and Peru in December 2023.

Huge thanks to the following mining companies for allowing us to visit their facilities:

CODELCO, Anglo American, Hot Chili, Lundin Mining, Gold Fields, ATEX Resources, Buenaventura, Chakana Copper, Regulus Resources, Nexa Resources and Capstone Copper.

Thanks must also go to the geologists and other mine staff who facilitated site access for our visits to the various mines and other facilities.

And finally, thank you to the following people for their hard work and assistance in organising the trip: José Piquer, David Portocarrero, Victor Torres, Jaime Osorio, Yamila Cajal, Helen Scott and Karen Huizing.

PHDS HEAD WAY OUT WEST

Many of the PhD students researching within the Regional Research Collaboration project have been out in the west and northwest of Tasmania recently gathering data for their ongoing collaborations with Tasmanian mining companies. See what they've been up to here:



Pratichhe Mondal (working with Grange Resources): PhD student Pratichhe undertook her first field trip to Savage River with supervisor Dr Owen Missen, kicking off 2024 with a field campaign in early January. She logged two important ore zones showcasing both economic and gangue materials and collected several samples from the waste rock piles. Pratichhe's project is focused on environmental aspects of critical metal recovery at Savage River, and this trip was primarily designed to help familiarise her with fresh ore samples which are later managed in gangue storage facilities. Here she is pictured examining samples collected from the waste rock piles at the Savage River magnetite iron ore mine facility owned by Grange Resources.



Javier Gill Rodriguez (working with Renison Bell, Bluestone Mines Tasmania): Javier started his PhD fieldwork early this year at Renison Bell on the west coast of Tasmania. Several kilometres of drill core remain to be logged and sampled to achieve the planned objectives for his second year at CODES. Renison Bell is Australia's main tin producer and has the potential for copper as a by-product. Javier's research project is focused on the presence of critical metals that could also be considered as by-products at Renison Bell.



Jose Barillas Diaz (working with Avebury, Mallee Resources): Jose, whose PhD aims to characterise the Avebury nickel deposits at Zeehan, had the opportunity to teach some of the third-year Earth Sciences students and a group of visiting undergraduates from the China University of Geosciences (Beijing) during February. Here he is pictured in Avebury's Zeehan core shed showing the students a geological cross-section and the stratigraphy of the Avebury nickel deposit.



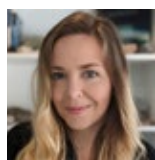
Emrecan Yurdakul (working with Copper Mines of Tasmania): The scope of Emrecan's research project is to understand the formation process of the Western Tharsis Cu-Au Deposit and evaluate the critical mineral potential of the deposit and the Mt Lyell district. Emrecan takes a break from his PhD fieldwork and surveys his study area.

CHANGING FACES

We have more PhD students arriving to work on CODES research projects, and we also farewell Dr Paul Olin and Dr Michael Roach. Paul has worked in the CODES Analytical Laboratories for more than a decade, while Michael (Mike) has been integral to the Earth Sciences and CODES world for 35 years.

PhD STUDENT	START DATE	PROGRAM	PROJECT TITLE
 Olive Lucas Ponyalou	4 December 2023	Supervisors: David Cooke, Owen Missen and Lejun Zhang; working on a stand-alone PNG project within Program 1	Geology, genesis, and exploration significance of Cu-Au veins and altered rocks in the Kainantu Cu-Au district, PNG
 Damian Braize	11 March 2024	Supervisor: Jeff Steadman; working on the IOCG ³ project in Program 3	Geochemistry and geochronology of hematite and chlorite in the Tennant Creek IOCG district

ARRIVAL



Dr Valerie Yuleridge joined the CODES Analytical Laboratories as a Laboratory Analyst in late January and will be working on zircon U-Pb data reduction and reporting but will branch out into other CODES lab roles over time. Previously she was teaching at James Cook University in Townsville (EGRU), where she was coordinating two subjects: 'Sedimentology and Stratigraphy', and 'Basin Analysis and Energy Resources'.

VISITORS



Kobkul Khiaosanan (Neam) is a visiting Masters student from Chulalongkorn University, Thailand. She is spending three months at UTAS between January and April carrying out lab analysis under the supervision of Professor Sebastien Meffre, and specialising in investigating the presence of trace elements within minerals, with a particular concern for those elements that could pose environmental challenges in the context of potential mining activities.



Dr Xuejing Gong (Mia) from the SinoProbe Center–China Deep Exploration Center, Chinese Academy of Geological Sciences (CAGS) visited CODES for two months (January–March). She was here to study melt inclusions in quartz from a deposit in China and did laser analysis under the supervision of Dr Ivan Belousov.

DEPARTURES



Dr Paul Olin left his role as Leader of the CODES Analytical Laboratories in early February. He has moved to a position at the University of Adelaide, where he will take up the role of Isotope Analyst within the Adelaide Microscopy unit.



Dr Michael Roach retired at the end of 2023 after 35 years in Earth Sciences and CODES teaching geophysics, structural geology and tectonics, and more recently virtual education resources for geology students.



Max Hohl, who completed his PhD here at CODES and has been working as a Laboratory Analyst here, has resigned. He will take up a position as a Postdoctoral Research Fellow at MDRU/UBC in Vancouver starting in May.

PhDs MOVING ON UP



Zebedee Zivkovic recently submitted his PhD entitled 'Trace element systematics in whole rock analysis of magmatic-hydrothermal ore deposits'. He has set up his own consultancy business doing exploration geochemistry and has been busy with new clients.

CHANGING ROLE



Dr Jeff Oalman has taken on the role of Acting Manager of the CODES Analytical Laboratories following the departure of Dr Paul Olin.



A MESSAGE FROM THE CODES DIRECTOR, PROFESSOR DAVID COOKE

After 35 years of dedicated service, Mike Roach finally retired at the end of 2023. Mike has been a huge part of CODES and Earth Sciences from when he first arrived as one of the first students recruited into the CODES PhD program right through to the end of his long and profoundly impactful academic career as a lecturer, supervisor and researcher.

Mike carried a huge teaching and supervision load for many years and inspired many students with his passion and dedication to geophysics and geology. He shaped the careers of a significant proportion of our student cohort, who've benefited enormously from his outstanding supervisory skills – Mike always excelled at bringing the best out of his students to help them on their pathway to long and impactful professional careers. Mike was single-handedly responsible for all of the CODES and Earth Sciences teaching staff being able to flip to online teaching in 2020 through his amazing 3D visualisations – this proved to be a huge boon for us throughout the pandemic.

Mike has been an institution for decades at CODES – he is a well-loved and deeply respected member of our team, and we are all better for having had the pleasure of working with him.

While we are all very sad to see Mike resign, we are pleased that he's chosen to stay connected by taking on an adjunct role, and we all hope that he stays actively involved with us for many years to come. Mike's been an inspiration to us all and we wish him the very best for the future.

It was a sad time at CODES in the lead-up to the holiday season when Paul Olin announced that he would be leaving CODES in February 2024 to pursue a new career opportunity (see page 17). Since arriving at CODES 11 years ago, Paul has proved to be one of our most popular team members. In addition to being a fantastic analyst and lab manager, Paul was always quick with a smile and a laugh, and provided many moments of joy for those of us who had the pleasure of working with him. He took on additional duties throughout 2023 as we entered a period of transition in CODES Analytical Laboratories, and his leadership of the lab team during that period was exceptional – I cannot thank Paul enough for what he did for the lab team during his time at CODES, and I wish him the very best for the future.

Other team members who have either moved on over the past few months or are about to depart include former PhD students Max Hohl, Rhiannon Jones, Xin Ni Seow and Alex Farrar – we will miss them all as they contributed richly to our culture and social environment – contributions well beyond simply doing great science. They all have secured exceptional employment opportunities that will significantly enhance their professional careers. But it hasn't all been about departures – PhD candidate Olive

Ponyalou arrived in December 2023 to commence her PhD study of the Kainantu Cu-Au system in Papua New Guinea. Valerie Yuleridge commenced working in CODES Analytical Laboratories in early 2024 – a big thank you to both Olive and Valerie for joining the team!

Our teaching and research staff have been busy running field excursions for all student cohorts in February and March 2024. It was particularly pleasing to see a very healthy and engaged third-year cohort commence this year's studies on the West Coast field excursion. This trip, led by Sebastien Meffre, Sheree Armistead and Lejun Zhang is run every February by the Discipline of Earth Sciences, but this year was particularly special because eight students from China University of Geosciences (Beijing) joined the excursion, as outlined elsewhere in this newsletter. It was great to see new friendships develop between the two student cohorts through shared field learning experiences.

Overall, 2024 is looking likely to be a time of self-reflection and strategic planning for CODES, as our team works with all our stakeholders to decide what new challenges our team members will be embracing in this dynamically evolving research and teaching environment. There will be changes both planned and unexpected; we will continue to strive to achieve excellence in research, teaching and student experience.

UPCOMING SHORT COURSES

ORE DEPOSIT MODELS AND EXPLORATION STRATEGIES (KEA712)

3–8 JUNE AND 8–12 JULY 2024

Ore Deposit Models and Exploration Strategies is an up-to-date synopsis of key ore deposit types including porphyry, epithermal and skarn deposits, IOCG deposits, magmatic sulfide deposits, orogenic and Carlin-type gold deposits, volcanic-hosted massive sulfide and sea-floor hydrothermal deposits, sediment-hosted-Cu, Zn-Pb and Broken Hill-type deposits. The course concludes with a three-day Critical and Strategic Metals Symposium on 10–12 July.

Unit leaders: Professor David Cooke, Dr Robert Scott

Delivery mode/location: Blended delivery (face-to-face Tasmania; with an online option)

GEODATA ANALYTICS (KEA713)

PART 1: 5 AUG– 13 SEP 2024;
PART 2 (INTENSIVE): 16–20 SEP 2024;
PART 3: 23 SEP–27 OCT 2024

This unit will provide industry-based geoscientists with an understanding of the fundamental concepts of database handling and manipulation, statistical analyses, pattern recognition and machine learning for the processing, analysis and modelling of large volumes

of multivariate geoscience data. This unit is divided into three parts delivered online and in succession.

Unit leader: Dr Matt Cracknell

Delivery mode/location: Online, delivered via a combination of pre-recorded content, 'live' lectures and discussion 'forums'

For more details of all these courses:

See the course flyers at:

<https://www.utas.edu.au/codes/masters-short-courses>

Alternately, please email: **CODES.Info@utas.edu.au** OR Master of Economic Geology Program Co-ordinator, Dr Robert Scott: **Robert.Scott@utas.edu.au**