

## 2014 AusIMM NZ Branch – Visiting Lecturer Programme – June 2014

The second of two 2014 AusIMM New Zealand Branch Visiting Lecturers is Professor David Cooke from University of Tasmania, Hobart, Tasmania, Australia ([www.utas.edu.au/codes/people/academic/david-cook](http://www.utas.edu.au/codes/people/academic/david-cook)). David will present a short course and lectures at several centres during June-July.

### David Cooke Biography

Professor David Cooke is a geochemist and economic geologist specialising in the characteristics and origins of:

1. Porphyry Cu-Au and Cu-Mo deposits
2. Epithermal precious metal systems
3. Sediment-hosted Pb-Zn deposits of northern Australia

He also specialises in chemical modelling of mineralising processes from a variety of hydrothermal environments. The principal techniques that he employs include mineralogical, fluid inclusion, chemical modelling, and isotopic studies, built on a framework on detailed geological and structural field data collection. Since 1985, David, his students and his postdoctoral research fellows have investigated porphyry and epithermal deposits in the Philippines, Indonesia, Papua New Guinea, Australia, New Zealand, the Dominican Republic, Mexico, Peru, Canada and Chile. David has been a leader of five team-based industry-funded research projects since 1998. Each of these three- or four-year projects has involved a team of academic staff, postdoctoral research fellows, and postgraduate students (PhD, Masters, Honours) working in close collaboration with industry partners. David is an associate editor of *Economic Geology* and was the recipient of the SEG Thayer Lindsay Award in 2005. In 2012 David, together with Bruce Gemmill and the AMIRA P765/765A/1060 research team, won the inaugural AMIRA International Award for Geoscience Research Excellence.

### Programme

The following programme for June-July 2014 is tentative and may change. For specific dates, times and venues for events, please refer to notices that will be circulated locally or contact the relevant person listed in the Contacts and further information section at the end of this notice.

Date	Time	Presentations	Location	
Monday 23 June	09:00-16:30	Short course (day 1)	Auckland	University of Auckland
Monday 23 June	17:30-19:00	Lecture 1	Auckland	AECOM House, 8 Mahuhu Cres, Downtown Auckland
Tuesday 24 June	09:00-13:00	Short course (day 2 – half day)	Auckland	University of Auckland
Wednesday 25 June	12:00-13:00	Lecture 2	Waihi	Newmont Waihi Gold
Thursday 26 June	09:00-16:30	Short course (1-day)	Lower Hutt	GNS Science
Thursday 26 June	17:30-19:00	Lecture 1	Wellington	Venue to be notified
Friday 27 June	9:00-14:30	Short course (day 2 – half day)	Lower Hutt	Lower Hutt
Friday 27 June	17:30-19:00	Lecture 1	Nelson	Golders, Level 3, 295 Trafalgar Street
Monday 30 June	12:00-13:00	Lecture 2	Reefton	Globe mine
Tuesday 1 July	09:00-16:00	Short course (1-day)	Christchurch	Venue to be notified
Wednesday 2 July	09:00-17:00	Short course (1-day)	Dunedin	GNS Science
Thursday 3 July	12:00-13:00	Lecture 1	Macraes	Macraes mine

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## **Short course: Breccias in porphyry and epithermal environments – working from description to interpretation**

This short course will review the major classes of hydrothermal breccias that occur in porphyry copper and epithermal gold environments. The workshop will involve both lectures and practical sessions, and will provide the participant with skills required to work in hydrothermal breccia systems, including complicated situations where hydrothermal and volcanic breccias overlap. Emphasis will be placed on describing and identifying key features and textures, understanding breccia facies associations, interpreting breccia genesis and understanding the significance of different breccia types in exploration. This course involves many practical exercises that illustrate important textures, processes, and relationships, and uses rock suites collected from hydrothermal systems from around the world.

**Short course attendance is by registration. Click [HERE](#).**

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### **Lecture 1: Mining and exploration around the Pacific Rim – diverse environments, common problems, future challenges**

The Pacific Rim is richly endowed with a diverse array of gold, copper and molybdenum deposits. Exploration for, and mining of, these and other resources faces a variety of challenges, some of which relate to physiography (e.g., climate, topography, vegetation, etc.), and others to anthropogenic matters (e.g., population density, local land use, plus an array of local community and environmental issues). Historical legacies of old-style mining practices continue to shape the public perception of mining, and today's miners and explorers face on-going challenges to build and maintain community trust so that they can establish and maintain a social licence to operate. Mine planning in the modern world must take into consideration the increasing desire to minimise disturbance to local environments. Success stories where mine sites are returned to conditions of higher value land use after mine closure, or where natural ecosystems are re-established, provide indications of the likely paths that mining companies will follow in the 21<sup>st</sup> Century as they continue to deliver the resource base essential to modern society.

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### **Lecture 2: Magmatic-hydrothermal sutures and clusters of giant porphyry Cu-(Au-Mo) deposits**

Porphyry deposits are the world's major sources of Cu, Mo and Re, and important sources of Au and Ag. They typically form in compressional orogens, either during or after subduction. The transition from extensional tectonism and widespread calc-alkaline volcanism, to a compressional tectonic regime causes inversion of the extensional structural architecture, crustal thickening and shutdown of volcanism, promoting the growth of mid-to upper-crustal intermediate-to felsic magma chambers at major structural intersections. Fractional crystallisation within the magma chamber, possibly coupled with mafic magma underplating, thermal destabilisation and volatile addition, leads to eruptions of hydrous melts and mineralising fluids from the roof of the pluton, producing elongate 'spires' of porphyry that intrude to paleodepths are surrounded and overprinted by of 1-3 km and magmatic-hydrothermal alteration and mineralisation.

Both geochemical and structural processes are fundamental to the formation of clusters of giant porphyry deposits. Several of the world's largest deposit clusters, in terms of contained metal, were localised on major suture zones that developed due to the interaction of arc-parallel and arc-oblique fault systems in the overriding plate. The Eocene—Oligocene Chuquicamata cluster of deposits in northern Chile (Chuquicamata, Radomiro Tomic, Mina Sur, Ministro Hales, Opache and the Toki cluster) was localised along a 25 km corridor controlled by the NNE-trending Mesabi fault and equivalent structures, at its intersection with the Calama-Olacapato-El Toro NW lineament. The district contains over 93 Mt of fine Cu. In the case of the world's largest porphyry Cu-Mo district, Rio Blanco-Los Bronces (> 200 Mt of fine Cu), at least seven porphyry deposits formed during the late Miocene-early Pliocene along a 12 km long, NNW-trending suture zone, with mineralised centres localised at the intersections between the major NNW-trending structures and cross-cutting NE-trending fault systems. The Paleozoic Oyu Tolgoi district in Mongolia contains at least 1749 t Au and 45.5 Mt Cu in a cluster of eight porphyry Cu-Au deposits aligned along a NNE-trending, 26 km long structural corridor. In each of these examples, conditions that promote repeated magmatic-hydrothermal activity in major upper-crustal sutures were essential for the formation of giant porphyry deposit clusters.

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Attendance at the lectures is free of charge, but please email your intention to attend to the relevant contact person listed below for planning of refreshments.

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## Contacts for further information

**Auckland short course** (Monday 23 and Tuesday 24 June): University of Auckland, contact Julie Rowland, [j.rowland@auckland.ac.nz](mailto:j.rowland@auckland.ac.nz), phone: 09 3737599 ext 87412, or 021 747709

**Auckland lecture** (Monday 23 May); AECOM House, 8 Mahuhu Cres, Downtown Auckland (near old Railway Station), contact Roger Gregg, [roger.gregg@ihug.co.nz](mailto:roger.gregg@ihug.co.nz), phone 09 634-8066 , or 021 181-4843

**Lower Hutt short course** (Thursday 26 and Friday 27 June); GNS Science, contact Tony Christie at GNS Science, [t.christie@gns.cri.nz](mailto:t.christie@gns.cri.nz), phone (04) 570-4682

**Wellington lecture** (Thursday 26 June): venue to be advised, contact Tony Christie at GNS Science, [t.christie@gns.cri.nz](mailto:t.christie@gns.cri.nz), phone 04 570-4682

**Nelson lecture** (Friday 27 June): Nelson Discussion Group, Nelson offices of Golder Associates, Level 3, 295 Trafalgar Street (above Café Affair), contact Peter Hancock, [peter.hancock@anu.edu.au](mailto:peter.hancock@anu.edu.au), Phone: 03 541 0458

**Christchurch short course** (Tuesday 1 July): venue to be advised, contact Dean Fergusson, Resource and Reserve Ltd, [dean@rarl.co.nz](mailto:dean@rarl.co.nz), phone 0274 454928

**Dunedin short course** (Wednesday 2 July): GNS Science, contact Adam Martin at GNS Science, [a.martin@gns.cri.nz](mailto:a.martin@gns.cri.nz), phone (03) 479-9683