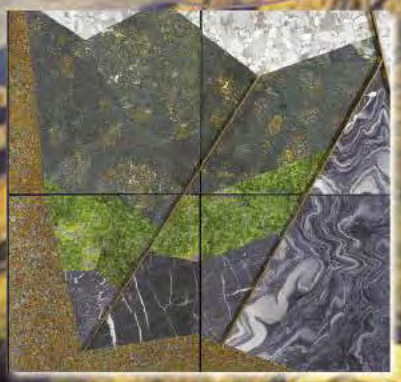
The Geological Society of Australia Inc

Newsletter Number 167
June 2013

tag



Rock wall detail
see p27

AESC 2014
Field trips see p33

AESC 2014
Newcastle see p35

Tasmanian Museum's Rock wall

ANU in partnership with the National Rock Garden

Newcastle will host AESC 2014

The Australian Geologist

Newsletter 167, June 2013

Registered by Australia Post
Publication No. PP243459/00091
ISSN 0312 4711

Managing Editor **Sue Fletcher**
Technical Editor **Bill Birch**
Production Editor **Kate Hawkins, Twofoot Group PL**
Send contributions to tag@gsa.org.au

Central Business Office
Executive Director Sue Fletcher
Suite 61, 104 Bathurst Street,
Sydney NSW 2000
Telephone (02) 9290 2194
Fax (02) 9290 2198
Email info@gsa.org.au
GSA website www.gsa.org.au

Design Alan Taylor, The Visible Graphic Words
Typesetting Joan Taylor, The Visible Graphic Words
Printed by Ligare Pty Ltd
Distributed by Trade Mailing & Fulfilment Pty Ltd

tag

FRONT COVER

A wide-angle aerial photograph of the Gosses Bluff impact structure, Northern Territory (diameter approximately 24 km, age end Jurassic — 142.4 ± 0.8 Ma), taken by Reg Morrison. Initial observations by Keith Crook and Peter Cook in 1967 were followed by systematic mapping by Dan Milton (USGS) and Andrew Glikson, with seismic, gravity and airborne magnetic studies by the Bureau of Mineral Resources (now Geoscience Australia). The crater-like structure results from erosion of soft sandstone and shale in the core of the central uplift dome. This image is from the book The asteroid impact connection of planetary evolution *by Andrew Glikson, which is advertised for review in this issue of* TAG. *Image courtesy Reg Morrison.*

From the President

This is an exciting time to be part of the Geological Society of Australia. New governance structures are rare opportunities to guide the direction of the Society for years to come. While new management structures can be daunting, and many cannot see the need for such radical change, we must also recognise the opportunities to steer the Society in new directions. Structures that applied over 60 years ago may not be as relevant today as they were at the birth of our Society. Back then, members saw serving the GSA as a privilege, and many sought to become involved. T oday, many Divisions struggle to attract members to serve on committees and the same faces keep cropping up year after year . Clearly there needs to be a renewal of the structures.

We are finalising a new governance document to go before the membership in the coming months. The document has been checked by various people in order to comply with Rules for societies such as ours, and to address some serious shortcomings of the previous Rules in the light of current legislation. In a world where litigation is rife, committees such as ours need the protection that the *Associations Incorporation Act 1991* provides, but only if our Rules and procedures are in accordance with the legislation. While none of us foresees legal issues arising, it is best to be assured that you are covered in case something goes wrong.

As well as formulating Rules to comply with legislation, the current changes provide us all with an opportunity to shape the future of the GSA. We in the Federal and Divisional committees have been involved in the process of rewriting the Rules. You — the members — have also had the chance to review what is in the new documents. In order for the new governance to be implemented during the life of the current Committee, the Rules need to be ratified and will be implemented — if approved — at the next Annual General Meeting in the middle of the year. Following this approval, the Committee will then implement the new procedures so that the next Committee is elected in 2014 using the new Rules.

One of the major changes relates to how the Federal Executive is to be run. A Governing Council is to be elected for either two or four years, and will undergo renewal every two years. Many members of the Governing Council will be elected directly by the State membership, giving the membership a greater say in how the Executive is to be run. The other States will get their turn in two years time. The incoming Chair and Treasurer will come from the Governing Council. This model will give membership a more direct say in the Executive, and is good for our members.

I encourage you all to become involved and vote on the new Rules when the opportunity comes around. It is important for all of us to be comfortable with the new Rules and the direction they are going to take the Society . Your involvement will ensure the Society can move forward into the 21st Century.

LAURIE HUTTON
President

Society Update

Business Report

Divisions have held their Annual General Meetings, with the inevitable committee changes taking place. The GSA audit has been completed and while they seem like 'smallish things', in the main scheme of things the changes require time and effort on the part of a small group of members – especially the Treasurer of each group. This is the second year of the consolidated financial reports and I'd like to take this opportunity to thank the Treasurers and Committee members for collating the information and working with the Executive Office to ensure we meet our reporting requirements. The Divisional and Branch work is usually done by a small core of members located in a State, Territory or region. Their activities vary from organising monthly talks, producing newsletters and other publications and evaluating Honours students, to holding mini-symposia or working with other societies on larger scale events, as with the ever-popular annual SA Explorers Conference and Ekka in Brisbane.

Here is a snapshot of some of the interesting talks we hope you managed to catch (apologies if I have not included all talks). GSA members have a lot of talent – why not go to these talks as an opportunity to connect with others in the geoscience community or learn something new.

- Groundwater evolution in the Lower Murrumbidgee catchment, by Bear McPhail
- Coastal geology – mapping and applications, by Verity Rollason
- The 2012 AK Denmead Lecture: Re-awakening the Mt Carbine tungsten mine, by Andrew White
- Tropical megafauna – new discoveries in the north, by Scott Hocknull
- The 2013 AK Denmead Lecture: The Eastern Australian bauxite province, by Ian Levy
- Bacteria–metal (–mineral) interactions with a focus on the biogeochemistry of gold, by Gordon Southam
- The importance of geology in mineral discoveries, by Kevin Wills
- Dating Snowball Earth on King Island, by Clive Calver
- The Petermann Orogeny: syntectonic sediment pulse across the Centralian Superbasin and beyond traced by detrital zircon ages and Lu–Hf isotopes, by Peter Haines
- Victoria: last frontier in the quest for whale origins, by Erich Fitzgerald
- An Early Pleistocene hyper-diverse fossil sclerophyll flora: implications for the distribution of plant species diversity, by Kale Sniderman
- Highstand sand transport to deep water by longshore transport, tidal and gravity processes, by Ron Boyd, Kevin Ruming, Marianne Sandstrom and Claudia Schroder-Adams
- PACE: redefining geoscience partnerships, by Miles Davies
- 100 years of Antarctic science: Scott's tragic race for the South Pole, T Griffith Taylor and the 1912 Canberra connection, by Gavin Young
- Peak global resource production: is there a problem? by David Denham
- Shaping the nation: a geology of Australia, by Richard Blewett.

As well as talks, Divisions and Specialist Groups organised excursions, symposia and field trips, including:

- Trip to Glovers Bluff and Weld River area, Tasmania
- SA Explorer's Symposium
- The Brisbane Ekka
- Tours under Parliament House in Canberra
- Coastal excursions from Batemans Bay to Ulladulla, to the Shoalhaven, to Lake George and to important geological features in Canberra
- Yorke Peninsula Field Trip.

TAG The Australian Geologist

SCHEDULE & DEADLINES

ISSUE	COPY	FINISHED ART	INSERTS
SEPTEMBER 2013	29 Jul	9 Aug	23 Aug
DECEMBER 2013	25 Oct	1 Nov	8 Nov
MARCH 2014	31 Jan	7 Feb	28 Feb
JUNE 2014	28 Apr	2 May	23 May

CONTACT US: tag@gsa.org.au

We write our columns nearly two months before you receive your copy of *TAG* and that means sometimes we are writing about future events as if they have happened — with fingers crossed that they actually happen when scheduled. Sometimes the timing is a little out, though, and in the December and March *TAG*s I flagged changes to the *AJES* online access to take place in March. Circumstances were not that kind to us — we were behind by a month and when we uploaded some of the data we encountered a few hurdles. My thanks go to the patient members who waited for us to resolve the issue, and while the solution is not optimal it is easier to navigate than the voucher system. Retired members and members working outside government departments or tertiary institutions were most affected. Again, thank you for your patience.

The 2014 Australian Earth Sciences Convention (AESC 2014) is in the planning stages and the first circular was distributed in April. We welcome you to join us in Newcastle on 7–1 0 July 2014. For more details, please refer to pages 33-35. The website is now live **www.aesc2014.gsa.org.au**.

During March, April and May we had a bit of fun with Facebook, stimulating a geological conversation among members, non-members, students, academics, travelling geoscientists and an interested general public. A Committee member floated the idea for me to call for images and articles on the theme of 'my favourite outcrop', which would be published in *TAG*. I thought Facebook might be a more immediate medium so we started uploading the odd outcrop photo, hoping for comments — and slowly they started trickling in. On page 24 you can see some of the images we used recently with comments from all over the globe: people posted comments on a geological feature while waiting for a flight connection or when they logged on to check upcoming talks. While Facebook is typically used for 'social' media, it has proven to be a great place to share information and chat about rocks and geological features. So if you have the opportunity log on, why not join the dialogue (I don't want to say 'conversation'). Or better still, send me a couple of your geological images of interest. There is always someone with a few spare moments who wants to see photos of rocks and think about the geological forces that created those rocks and landscapes.

Finally, congratulations to the W estern Australia Division for their 500th issue of their bi-monthly newsletter *The WA Geologist (WAG)*. If you missed it go to the W A Division web page at **http://www.gsa.org.au/divisions/wa.html**.

SUE FLETCHER
Executive Director

Society Update

Governance changes

After extensive consultation with the Divisions, Branches and Specialist Groups, we have been progressing through the GSA Constitution (Society Rules) changes. Before the Annual General Meeting all financial members of the GSA will receive ballot papers for the Constitution changes. We urge all members to carefully review the documentation and vote on the future of the Society. The changes to the GSA Constitution are designed to bring the GSA in line with modern Constitutions and include:

- clearly defined Definitions and Interpretations
- Objects of the Society
- improved equity into the area of Discipline timing and standards
- provisions to use technology opportunities and transparency in relation to meetings, notifications, electronically transmitted signatures and the opportunity to approve resolutions circulated to the members of the Committee
- clarification of membership criteria and categories
- improved member rights
- clarification of the delegation of powers to committees including Divisions, Branches and Specialist Groups
- transparent voting process to ensure Divisions are represented on the Governing Council
- inclusion of postnominals
- standardised terminology so the GSA Rules comply with all legal requirements in Australia, including new legislation passed in December 2012 governing the not-for-profit sector
- indemnity clause for the Governing Councillors
- transition from the current model to the Governing Council
- provision for streamlining the current process for consolidating the accounts.

The constitutional changes have been approved by the GSA Executive Committee and are supported by the Divisions, Branches and Specialist Groups. The proposed new Constitution will be made available to all members in July. Members can vote directly by attending the AGM, or alternatively by nominating a proxy who can be the Chair , (to ensure voting), or another member who is likely to attend the meeting. The law does not have provision for a postal ballot for a special resolution. Approval of the new Constitution will require 75% approval from those members casting a vote.

JIM ROSS on behalf of the Governance Committee— Ian Graham, Laurie Hutton, Jim Ross, Chris Yeats and Sue Fletcher

Finance and risk report — Consolidation of the 2012 accounts

Overview

The status of GSA as a singular legal entity requires submission of audited, consolidated accounts to the Office of Regulatory Services, which administers the *Associations Incorporation Act 1991*. The 2012 year is the second year of consolidated national reporting and now that we have confidence in the process it is timely to communicate the resulting financial information to members. It provides a revealing snapshot of the Society.

Preparation of these accounts requires collation of the financial information for the calendar year from eight Divisions, two Branches and thirteen Specialist Groups. It is a substantial task for the Central Business Office because these entities differ widely in size, scope, activities and capacity . Those differences are reflected in the accounts. The Divisions and Branches provide bank statements, quarterly bank reconciliations and income/expenditure documents for auditing and review by the GSA accountant, and incorporation into the national accounts on a quarterly basis. Specialist Groups provide equivalent information on a six-monthly basis.

The considerable variation in the GSA income and expenditure during the calendar year means that it is the annual consolidated accounts that provide the most reliable measure of the GSA fiscal performance. The Central Business Office provides the Executive Committee with monthly financial accounts for the Central organisation of the Society and these reports are cumulatively compared with its annual budgeted operating expenditure and income of >$0.5 million. That annual cash budgeting process is aimed at achieving a small surplus.

Consolidated Profit and Loss

For the 20 12 audited financial year , the GSA reported the following:

Income: $1 038 024

Expenses: $717 936

Net profit: $312 275, including a one-off dividend of $251 000 from the International Geological Conference (IGC).

The Divisions and Branches collectively recorded a profit of $74 048. The Specialist Groups recorded a loss of $12 745, in contrast to a profit in 2011. Central operations recorded a small operating profit of about $19 328 which was then dwarfed by the IGC dividend.

Consolidated Balance Sheet

The consolidated balance sheet for GSA assets gives combined total equity (member equity) of $2 793 828. These assets are held in a mixture of cash (in bank accounts, cheque accounts, investment portfolios and fixed term deposits), investments and unsold publications held as inventory. This total can be broken down into the GSA operating units as follows: the Central organisation has net assets of $834 347, the eight Divisions total $803 593 (ranging from $4 453 to $406 361), the two Branches total $4 750, and the 13 Specialist Groups total $1 148 457 (ranging from $2 527 to $489 592). The difference between the consolidated total equity ($2 793 828) and the individually listed equity above is $2 682. The difference is a result of eliminating values that sit on both the Central office and the accounts for the Divisions, Branches and Specialist Groups and is removed to ensure there is no double-counting.

Investments held in the GSA Central investment platform totalled $830 771 at year end and although dominantly consisted of Central funds (about 80%) it also includes investments managed on behalf of three Divisions (Queensland, South Australian and Tasmania) and four Specialist Groups (ASG, SGEG, SGTSG and AAP). It remains open to include additional funds to be managed on behalf of any operating unit of the Society.

Comments on the consolidation process

When the consolidation process was introduced in 2010 to enable legal compliance, the Divisions and Specialist Groups were initially asked to consolidate their finances into a single bank account managed by the Central Business Office. Most Divisions and Specialist Groups insisted on maintaining their separate bank accounts, which they could control, and that wish has been respected. However, it has resulted in some complexity that relies on the timely participation and assistance of each T reasurer. Unsurprisingly, the financial information provided by the Divisions and Specialist Groups varies widely in quality, completeness and timing. This variation and the resulting delays have led to a significantly increased workload for the Central Business Office staff and consultants.

The contributions of the Treasurers of Divisions, Branches and Specialist Groups to consolidation of the accounts are appreciated and the outcomes will enable more effective strategic decision-making to support modernisation and growth of the Society. However, current arrangements need to be streamlined to reduce the workload at both ends, minimise delays and avoid the extra work that results from incomplete and tardy responses from some Treasurers. The voluntary nature of this work is acknowledged, and one logical development is to enable the Executive Officer of the Society to have 'view only' authority to access all Society bank accounts, but no authority to actually operate these accounts. This access should simplify a significant component of the consolidation process to the benefit of individual Treasurers and the Central Business Office. Furthermore, transferring all bank accounts to the bank the Central office banks with (National Australia Bank) would further streamline financial reporting and reduce costs to the Society , while retaining autonomy for the Divisions, Branches and Specialist Groups.

Making GSA assets work

The value of the consolidated assets of the Society indicates significant success by Divisions, Specialist Groups and the Central organisation in accumulating funds over time. This capacity is in stark contrast with the absence of any current Society-wide spending initiative to strategically strengthen our membership and our profession.

If our funds are viewed as a means to an end, then good administration is not necessarily linked to an increasing balance of funds. To her credit, the GSA's Executive Director, Sue Fletcher, has recently proposed some worthy initiatives for investing some of the IGC dividend in the future of the Society and these are under consideration by the Executive.

Then there is the curious case of the opportunity provided by the new Australian Curriculum for which the Foundation to Year 10 (F–10) subjects are currently being rolled out around the country. The science component of the new F–1 0 curriculum must now reflect the inclusion of Earth and Environmental Science as the fourth senior science subject for Years 11 and 12, and it is due for introduction in about 201 5. These developments provide us with a unique opportunity to support both primary and secondary school teachers and students who are unlikely to have access to adequate resources without some form of external support. Experience in WA indicates that there will be a strong need for this support. In 2010, Council approved the Executive's recommendation that Divisions be subsidised by Central funds on a dollar-for-dollar basis to provide supporting initiatives for the new curriculum within their State or T erritory. However, to date there has been only one call, to match W A Divisional expenditure of $2 500.

Given the prominence of geoscience and resource issues over most of the last decade it is surprising that GSA membership has shown little growth. Ours is an aging Society in a time-poor era, one that is crying out for reinvigoration of our offerings and profile. The Society's current strong asset base, further enhanced by the windfall from the 34th IGC, provides us with an opportunity to initiate significant change to modernise the organisation and make it more relevant, engaging and attractive to Australia's large population of practising geoscientists. However, the required change cannot be driven solely by the National Executive – we require ideas, enthusiasm and initiative across all levels of the GSA. The resources are available – what remains to be seen is if you, the members of the GSA, rise to the challenge to proceed.

JIM ROSS on behalf of the Finance and Risk Committee

Congratulations Bill!

Bill Birch was elected President of the Royal Society of Victoria on 28 March 2013.

Society Update

New members

The GSA welcomes the following new members to the Society. May you all have a long and beneficial association with the GSA. If you want to know more about membership of the GSA please contact info@gsa.org.au or ring 02 9290 2194.

ACT

STUDENT
Tim Hobern

NSW

MEMBER
Paul Freeman
Chloe French

ASSOCIATE
Greg Arandt

STUDENT
Timothy Crawley
Mitchell Dillon

NT

MEMBER
Stefan Kraus
Kristian Masterman

QLD

MEMBER
Tanya Jude-Eton
Christine Murray

STUDENT
Jacob Harvey
Nikki Limpin
Casey Maskill
Scott Muller
Maija Raudsepp

SA

MEMBER
Gunther Longueville

STUDENT
Donnelly Archibald
Jacqueline Beersworth
Michael Barnes
Kamini Bhowany
Matthew Bosch
Jason Boxall
Jessica Browne
Natasha Bysterveld
Brianna Clark
Peta Clarke
Kiana Day
Philippe Dupavillon
Nick Eckert
Ryan Fanning
Matthias Grocke
Darragh Hoban
Lise Jense
Paige Liebich
Stacey Lock
Thomas Mehrtens
Michael Stepan
Stephanie Sun
Laura Wong

VIC

STUDENT
Sarah Dyer
Mathias Egglseder
Janenie Mohgan
Sarah Moser
Ngoc Nguyen
Dharam Pal
Phillip Robertson
Benoit Saumur

WA

MEMBER
James Bartle
Ramli Osman

GRADUATE
Amy Yates

STUDENT
Marlene Woligroski

Lost members

Mail for the following members has been returned to the GSA. If you know these members and have their contact details, please email **info@gsa.org.au** or call 02 9290 2194. Thanks in advance for your assistance.

Jenna Doherty
Stuart Ellar
Rufus Henry
Jeremy Hill
Toshiyuki Iijima
Stephen Parkes
Rachael Roberts
Max Rohrman
Liam Shearer
Gerhard Pauwels
Glen Phillips
Helen Williams

Letters to the Editor

Hydrogeologic climate management

A Climate Management Statement by GSA is needed to identify past and future contributions that otherwise could be neglected. Geologists such as RL Jack defined the Great Artesian Basin just in time to provide water during the prolonged 'King Drought' compounded by extreme temperatures. Landscapes and wildlife as well as stock and communities were able to hang on around supply bores and their lengthy drains. Explorer L Leichhardt (a geo-ecologist) was perhaps first to advocate in print the use and landscaping of Australian riverine aquifers for drought management by pastoralists.

Hydrogeologic filter landscapes benefit productivity as well as climate management by retaining nutrients, colloids and soil-forming minerals. Filter landscapes facilitate recharge of subsoil moisture and unconfined aquifers, so reducing destructive runoff. Moisture and water are recycled during dry seasons. Productive browse groves can then benefit climatic conditions by reflection of infra-red radiation and reduction of dust haze which can retard cloud formation and can cause adverse atmospheric thermal layering.

Geological design and placement of filter groves is not a simple matter. Geologists need to work with other Earth Scientists, including those in agriculture, forestry, engineering and environmental ecology. As hydrogeologic climate management can be productive, there is less need for long-term financial input by the community and governments. However they will need to come on-side. A Climate Management Statement by the GSA could go further, also developing guidelines from the geological record and geology generally.

ERIC HEIDECKE
Brisbane

GSA Climate Change Statement

I was interested to read the four Letters to the Editor of *TAG* in the last issue (*TAG* 166, March 2013), commenting on the Geological Society of Australia's draft Statement on Climate Change, prepared on behalf of the Executive Committee by Brad Pillans. All four respondents disapproved of that statement.

In my opinion the statement presents a balanced view of both sides of the argument on the hypothesis of anthropogenic global warming (AGW). The Executive is to be congratulated on their courage, knowing that the revised statement would be condemned by AGW believers who will only be satisfied by a statement that is fully supportive of the AGW hypothesis, without presenting any contrary views. The previous GSA statement on climate change ignored the opinions of many members of the Society (probably a majority) who are sceptical about AGW. A previous executive committee had dealt with this issue by conducting a poll of members asking whether or not the Society should have a position statement on climate change, but failing to ask the key question of whether members agreed with the existing statement. The result was that a clear majority of respondents (75.6%) agreed that the Society should have a position statement on climate change.

The then-President of the Society, Brad Pillans, toured Australia to present his own views on AGW, while inviting comment from audiences regarding their opinions on the issue. I don't know about the reaction in other States, but many members at the Western Australian meeting made it clear that they are sceptical about AGW. An independent poll of members of the Society (conducted in 2010) showed that a majority (53% of 626 members who responded) did not agree with the Society's position statement. The Executive then agreed to withdraw that statement from the Society's website, but by then it had been picked up by other websites and continues to be freely available.

Surely no rational person could disagree that any statement by the Society on such a contentious issue needs to reflect the various views of its members. Indeed the statement by Brad Pillans does just that.

For the interest of readers, my own views as a 'sceptic' (known to some AGW believers as a 'denier') can be summarised as follows:

- Modern global warming is a fact; it has continued, with stops and starts, since about 1850, the end of the Little Ice Age.
- Geological evidence shows that the Earth's climate has always been changing, due to natural causes, for billions of years.
- Climate changes were much greater at many times in the geological past than those being experienced today, and AGW could not have been a factor in those past changes.
- Historical evidence shows that there have been large changes in climate during the past two millennia, entirely due to natural causes – including the Medieval Warm Period (AD 950 to 1250, when wine grapes were grown as far north as Yorkshire and the Norsemen colonised Greenland) and the Little Ice Age (AD 1550 to 1850, when the Thames periodically froze over, sea ice extended into the Zuyder Zee, and the Norsemen had to leave Greenland).
- The presence of CO_2 in the atmosphere is vitally important to life on Earth, and increasing levels stimulate plant growth.
- CO_2 is a known greenhouse gas and its content in the atmosphere is rising steadily due to the burning of fossil fuels – but there is no accepted scientific method to separate natural causes of climate change from any that are due to the rising levels of CO_2.
- There was no global warming during the period from the 1940s to the early 1970s, and again from 1999 to the present, despite ever-increasing levels of CO_2 in the atmosphere.

- During the 1970s serious concern was expressed by some that the Earth was about to descend into a new ice age, which contrasts with the views of AGW believers today that the Earth is about to experience catastrophically hot conditions and rising sea levels.
- Others now contend that Solar factors are more important than has generally been recognised, and the pattern of recent sunspot cycles is similar to that experienced prior to the Maunder and Dalton Solar Minima, so that some solar physicists predict that cooling of 1–2°C will occur during the next few decades.

I doubt that these issues can be resolved conclusively in the near future. Although the President of the [Intergovernmental Panel on Climate Change] IPCC, Rajendra Pachauri, has conceded that the rise in global temperatures has stalled for the past 14 years, he contends that this trend will need to continue for at least another 30 or 40 years for it to invalidate the AGW hypothesis. Some invoke the 'precautionary principle' in seeking to take action to reduce CO_2 levels in the atmosphere, and Australia is in the forefront in that regard. However, in any case, Australia produces only about 1.5% of global CO_2 emissions, and if it could entirely eliminate its generation of CO_2 that would have no significant effect on the world's climate.

PHILLIP PLAYFORD

Early days of Australian geoheritage

Geological heritage work by the GSA began in Australia in the 1960s but was not a part of the International Geological Congress held in Sydney in August 1976.

At least, not officially!

Reading through some material from the 1976 IGC meeting, I came across my annotated program and found that two informal but now historical meetings were held at the Sydney IGC.

By 1975 there were individual sub committees in most GSA Divisions, with much work going on in NSW, South Australia, Victoria and Queensland.

In July 1974, two years before the Sydney IGC, Colin Branch had been invited by the GSA Council to accept appointment as National Convener of a new Federal Committee for the Preservation of Geological Monuments. He was to take on the responsibility of maintaining liaison with the locally formed subcommittees.

And at the Sydney IGC, two informal lunchtime meetings were held, and I found I had written them into my copy of the official printed program:

Wednesday, 18 August
Geol. Monuments Room A11 1.30pm

Thursday, 19 August
1.00pm Geol. Monument A.11

And in my 1994 report on the history of the Geological Heritage Committee (published by the GSA) I briefly recorded (p.32) that "Colin Branch arranged a series of informal lunchtime meetings of Divisional subcommittee conveners ... with discussion of Queensland and South Australian work".

Perhaps someone else has notes from those discussions, or has a better memory than I have?

As a result of those 1976 Sydney discussions I organised a symposium on *Geological Conservation in Australia* at the Second Australian Geological Convention at Monash University, Melbourne in 1977, and a succession of national meetings on geological heritage with symposia and workshops were to follow. The Federal Committee is now known as the Standing Committee for Geological Heritage, and Margaret Brocx is the current Convener.

So the 2012 Brisbane IGC was in a sense the 36th anniversary of the first time the Convener of the Federal Committee and Divisional Subcommittee members met to discuss geoheritage. Perhaps we can look forward to a 40th anniversary meeting on Geoheritage in Australia in August 2015?

BERNIE JOYCE
Former Convener of the Standing Committee for Geological Heritage, GSA

Snowy Mountains Scheme

The interesting article on the Snowy Mountains Scheme by Robert Goldsmith highlighted some important aspects of the development of engineering geology in Australia, and indeed internationally, with a rock quality scheme, which, I believe, improved that developed earlier by Karl Terzaghi.

Robert Goldsmith rightly deals with the importance of the understanding and importance of rock bolting and related matters, much of which owed its development to the enthusiasm and work of Dan Moye and his perceptive staff. [In] this respect he indicates three fundamental issues: classification of weathering, diamond drilling [and] improvement of the Lugeon test. I suspect that the triple-tube core barrel was adapted from the design by Ken Mosher and Brian Vitnell of the Joint Coal Board, and its implementation in the Hunter Valley a little earlier.

Robert Goldsmith mentions briefly, in passing, 'state of stress', and later the use of two-dimensional photo-elastic models for stress analyses. I believe that the major achievement by the [Snowy Mountains Authority] SMA geological team was in recognising that horizontal stress in the large power stations, and indeed within the rocks of the Snowy region, often greatly exceeded the vertical stress, an opinion that would have been almost heretical just a few years earlier.

This awareness was carried to Sydney, and I seem to remember David Jordan pointing out that similar horizontal stress was distorting the wall of the Kings Cross Railway Station, which we visited during its construction.

Dan Moye possibly had an inkling of this problem when he began his career at Warragamba, where he probably worked with his near-namesake, the engineer Moyes, who studied the phenomenon of 'valley bulging' there, and he probably talked about it with his university teacher, WR Browne, who, although not remembered as an engineering geologist, nevertheless was quite in demand for his expertise, consulting on both the Hume Reservoir and Warragamba. Browne acted at Warragamba for many years, and was probably largely responsible for the decision to move the damsite to its present position.

In his summary of the geology, might I be permitted to differ from the author in suggesting that uplift occurred much earlier than the Cenozoic.

While Robert Goldsmith's article is devoted to the engineering geology aspects of the Snowy Scheme and the period during which this occurred, he mentions the period during which the Scheme was carried out, beginning in 1949.

It should not be forgotten that prior to the passing of the *Snowy Mountains Hydro-Electric Power Act 1949* some relevant geological work had been carried out by the Geological Survey of New South Wales. Although it is possibly pushing matters back too far to include the 1937 work on Snowy geology by Charles Mulholland as preparatory, his work on tunnels and damsites at Jindabyne in 1941 was certainly relevant. The extensive regional surveys by members of the NSW Survey from 1950 to 1955 (Len Hall and Dick Relph (still with us) [and] Col Adamson, Jim Lloyd, Cliff McElroy (all deceased) and numerous others) carried out in difficult conditions, was important to the project. Geologists from the then Bureau of Mineral Resources also contributed to the regional mapping program in the same period, and Rick Wilkinson in *Rocks to Riches* (1996) gives a detailed description of the Commonwealth/State story relating to the Snowy Scheme.

In 1950 the SMA wasn't yet in 'full swing', and the Adaminaby Dam work was carried out by the NSW Department of Public Works, with geology done by the NSW Geological Survey. I was one of those assisting Adamson on an alidade survey of the first proposed site for the Adaminaby Dam, which was soon moved to its final site.

The early mapping of the Toolong area, carried out under Len Hall, proved difficult as there was no military map of the region and a base map compiled by the NSW Lands Department from Snow Lease maps was the best that could be managed. As it turned out the map did not fit the assigned coordinates, and adjustments had to be made. However air photos were invaluable.

Charles E Marshall, Ken Glasson, possibly Denis Bell (UNSW), Jim Standard and I were among numerous geologists who consulted for various companies contracted to undertake the construction of specific projects during the 1950s–1960s.

Recent visits to some of the damsites and the Murray 1 Power station revived memories of much interesting and demanding work. Although my own involvement with the Snowy Scheme was slight, I still have a sense of satisfaction in viewing particular damsites and knowing that I had some involvement.

Joe Whiting (NSW Survey) used to quote the words of a former Survey Director, 'The Count' (LF Harper), when standing on the bank of the Burrinjuck Dam, on which he had advised, "it's nice to see your work complete".

DAVID BRANAGAN
(now in the 'glowing' period of 'if I remember correctly!')

Snowy Mountains Scheme
Editor's comment

The Editor has received a letter from Ken Sharp in response to the article in *TAG* 166 by Robert Goldsmith on the Snowy Mountains Hydroelectric Scheme. Ken was the second geologist to join the Snowy Mountains Authority (SMA), then he became Chief Geologist on the SMA and later on the Snowy Mountains Engineering Corporation (SMEC); he retired in 1990.

Ken has drawn the Editor's attention to a number of errors in this article that he considers to quite serious and cannot be ignored. For example, the photo titled Tumut 2 power station is actually Tumut 1 power station; the main Civil Engineering contracts were Schedule of Rates contracts, not lump sum; and the first flat jack, *in situ* stress measurements were done in the exploratory tunnel at T1 Power Station before, not after, construction of the main underground chamber.

Ken does acknowledge that an enormous amount of the Snowy Story involving engineering geology has not been adequately documented, but says it cannot be summarised in a three-page article. He suggests the following references:

Packham GH (Ed) 1969. The geology of New South Wales. *The Journal of the Geological Society of Australia* vol 16 pt 1. This volume includes a number of sections on the Snowy Mountains by Moye, Sharp and Stapledon. Facing page 92 is figure 3.6, a geological map of the Snowy Mountains area. Most major features of the Snowy Scheme are shown on this figure but it was compiled in 1963, before the scheme was completed. Some of the four 1:250 000 geological sheets covering the region were also published before the scheme was completed. (These are the Wagga, Tallangatta, Canberra and Bega–Mallacoota sheets.)

Wyborn D, Owen M and Wyborn L 1990. Geology of the Kosciusko National Park (1:250 000 scale map). *Bureau of Mineral Resources, Canberra*. This article shows Snowy tunnels and dams.

A website on Daniel Moye, who was Chief Geologist on the SMA until he resigned in 1967, at **http://www.daniel-moye.org/dan_moye_ remembered/index.php?include=obituary**.

Another informative article entitled 'Engineering geologists honoured' was published in *The AusIMM Bulletin* No 4, August 1993, p 25–26. (The article was also published in *TAG* but an omission had to be corrected in the following *TAG*).

Editor's note: Should he so wish, Robert Goldsmith will have the opportunity to respond to Ken's comments in a future issue of TAG.

Geology by consensus

It was only in 1963 that US geologist Gene Shoemaker noted the surficial similarities between underground nuclear detonation sites at Yucca Flats, Nevada and the Barringer Crater in neighbouring Arizona. From there, the plausibility of extraterrestrial impacts was established and a concept once overwhelmingly rejected by geologists became accepted as fact. The arrival at this consensus was not smooth: starting with Galileo Galilei it followed almost four centuries of long and tortuous argument characterised by a distinctly unscientific rancour fuelled by religious zeal.

But if ever there was a 'closer' to this argument, it came in the form of the asteroidal impact over Chelyabinsk, Russia, on 15 February 2013. Tellingly, this fascinating event was not captured on myriad cameras choreographed by prescient prize-winning scientists, august professors or Nobel laureates. Alas, even the boffins let the side down. No, the evidence was inadvertently collected by a bunch of amateurs armed with dash-cams, doing something else, viz., going about their daily lives. The cognoscenti and paid help didn't even see it coming because they were singularly focused on asteroid 2012 DA14.

Perhaps the brouhaha that doubles as discourse in your Letters section regarding the GSA Statement on 'Climate Change' should be viewed with the above history in mind. This statement is in keeping with the spirit of Albert Einstein's remark that "... the important thing is not to stop questioning"

BOHDAN (BOB) BURBAN
Los Angeles, 2013

Climate Change Statement

(*TAG* December 2012)

I ask the four correspondents (Andrew Glickson, Martin J Van Kranedonk, Malcom Walter and John Veevers *TAG* 166) who wrote in opposition to the draft GSA Climate Change Statement (*TAG* 165), which of the geological facts enunciated in the Statement they would take issue with? Perhaps they would prefer to see them swept under the carpet as they may be seen to contradict their own positions on the anthropogenic contribution to climate change. Pejorative terms such as "deniers" and "contrarians" are used. Nobody is denying climate change, only the significance of fossil fuel emissions as a major causal factor. Galileo, among other great scientists of the past, was a contrarian.

No doubt your correspondents would have applauded the original Position Statement published in *TAG* 152, September 2009 which endorsed strong action to reduce human fossil fuel emissions. This statement was concocted by the Executive Committee of the time who consulted with themselves and very few other members. When it was published purporting to represent the views of the GSA, expressions of outrage and threats of resignation were received from a number of members. Two members undertook to conduct an informal poll of the membership and contacted over 2000 members inviting them to respond to two questions: 1) Did they agree with the Position Statement? 2) Were they approached to express an opinion?. 27% of those contacted gave a meaningful response to Question 1 of which 53% opposed the Statement and 47% supported it. On Question 2 only 2% of respondents stated that they were consulted on the Statement. This survey showed two things: opinion within the GSA membership is deeply divided and consultation of the membership by the then Executive was virtually nil. Full results of this survey are outlined in "Letters to the Editor" in *TAG* 156, September 2010. In the same issue the then Executive confirmed that they would be conducting a poll of the membership on the issue, an undertaking they subsequently reneged on.

With the election of Brad Pillans as President the new Executive withdrew the original Position Statement and initiated a new poll. Perhaps bearing in mind the divisiveness created by the original Statement the questions put to the membership did not directly ask for opinions regarding human induced climate change although separate submissions on this subject were encouraged. The questions were more along the lines of whether the GSA should have any position on the issue. The report on this survey is summarised in *TAG* 158, March 2011. 75.6% of the respondents agreed that the GSA should have a position on climate change although I strongly believe that the vast majority of this 75.6% would only support a GSA position that was in accordance with their own personal views, as witness the letters of the four critics that I am responding to.

John Veevers suggests that because such organisations as the Geological Society of America, Geological Society of London and American Geophysical Union have statements on climate change we should automatically jump on board and follow them. I disagree. I have not read these statements but I would lay odds that they were produced in the same way as our own original statement, by a small group of committee members and not necessarily reflective of the opinion of the majority of the general membership.

I also can criticise the new Draft Position Statement. Perhaps there should have been more detail on past climate changes and their causes but this would have been at the expense of conciseness. There were lines of evidence I would have like to have seen included that were omitted. However there was no attempt to go beyond our field of expertise and piggyback on the opinions of organisations of other disciplines and there were no predictions as to which direction climate change may take. This is to be applauded. I accept that no organisation should adopt a public position on which up to 50% or more of its members may be in vehement disagreement with. The Draft Position Statement as presented outlines a number of geological facts that few in our profession could seriously disagree with, facts which the general public may be totally unaware of and which are of material significance to the climate change debate. The reader is left to take these into consideration when formulating his or her own opinion on climate change. To this extent the Draft Statement serves a very useful purpose and I support it.

JOHN GEARY

REFERENCES IN LETTERS:

In the interests of space, Letters to the Editor will no longer include reference lists. *TAG* asks correspondents to use short weblinks or author's names and dates as sources for technical information in the body of the letter.

DISCLAIMER:

The Geological Society of Australia encourages letters from members. The letters do not necessarily represent the opinion of the Society.

From the *AJES* Editor's desk

Tender for publication of *AJES*

In 2012 the GSA Executive Committee decided that we should approach the market to determine the best publisher for five years with possible extension for another five years beginning in 2014. *AJES* has been published for GSA by Taylor & Francis since 2005, and from 1984 to 2004 by Blackwells (now Wiley). Prior to 1984 GSA published *AJES* as a stand-alone journal. Over that time *AJES* has expanded from four issues per year in 1984, five in 1991, six in 1993 to eight in 2007. Using commercial publishers has allowed *AJES* greater penetration into the science market, particularly through online access outside Australia.

During 2012 we undertook a strategic planning meeting with Taylor & Francis and several members of the Editorial Board (4 April in Canberra) and canvassed some of the options at the Editorial Board meeting that was open to all members held during the IGC (7 August in Brisbane). At the Brisbane meeting we decided to immediately offer authors the option of gold open-access and to include in the tender document an offer of both online and hard copies of *AJES*, to explore full-colour options for print and to investigate improved online access for members. The journal would retain its current format, with eight issues and about 1120 pages per volume. The publisher's financial model would be a profit-sharing arrangement with the GSA.

The tender documents were distributed on 2 November 2012 with a closing date of 30 January 2013. Five publishers representing small to large publishers submitted tender proposals. A committee made up of Chris Fergusson, Chris Yeats, Sue Fletcher and I assessed the tenders and short-listed two publishers for interview.

Interviews were conducted in Sydney on 20 February 2013 with some issues later clarified by email. Recommendations to the Executive Committee of GSA were submitted for consideration at their meeting on 30 April 2013. There was a considerable delay between the interviews and the decision because I was on holiday for most of March but both companies were advised of our timeframes at interview.

The GSA Executive Committee accepted the recommendation of the tender evaluation committee to accept the Taylor & Francis offer, which includes printing in full colour at no cost to authors. The Executive Committee also accepted the recommendation to print in Singapore, creating savings for the GSA.

The Taylor & Francis offer also involves the creation, at no cost to the GSA, of a Society portal for improved member access to the journal through the GSA web page. As this portal would be on the GSA web page the GSA would retain ownership of the portal. This portal would reduce some of the issues that members, particularly retired members, have when they access GSA outside a government department or university (which have one account enabling all employees access to *AJES*).

Upcoming in *AJES*

AJES Volume 60/3

PF Rey: Opalisation of the Great Artesian Basin (central Australia): An Australian story with a Martian twist.

RA Glen: Refining accretionary orogen models for the Tasmanides of eastern Australia.

RA Glen, RJ Korsch, R Hegarty, A Saeed, Y Poudjom Djomani, RD Costelloe & E Belousova: Geodynamic significance of the boundary between the Thomson Orogen and the Lachlan Orogen, northwestern New South Wales and implications for Tasmanide tectonics.

FR Fontaine, H Tkalcic & BLN Kennett: Crustal complexity in the Lachlan Orogen revealed from teleseismic receiver functions.

AJES Volume 60/4

K Mills, P Gell, P Hesse, R Jones, P Kershaw, R Drysdale & J McDonald: Paleoclimate studies and natural resource management in the Murray–Darling Basin I: past, present and future climates.

K Mills, P Gell, J Gergis, P Baker, M Finlayson, PL Hesse, R Jones, P Kershaw, S Pearson, P Treble, C Barr, M Brookhouse, R Drysdale, J McDonald, S Haberle, M Reid, M Thoms & J Tibby: Paleoclimate studies and natural resource management in the Murray–Darling Basin II: unravelling human impacts and climate variability.

LF Dean & P De Deckker: Recent benthic foraminifera from Twofold Bay, Eden NSW: community structure, biotopes and distribution controls.

GE Williams, VA Gostin & JR Prescott: Stratigraphy and optical dating of Pleistocene coastal deposits in the Port Campbell australite strewn field, SW Victoria.

MJ Rickard & IS Williams: No zircon U–Pb evidence for a Precambrian component in the Late Eocene Yavuna trondhjemite, Fiji.

Also on the way

L Bagas, R Boucher, B Li, J Miller, P Hill, G Depauw, J Pascoe & B Eggers: Paleoproterozoic stratigraphy and gold mineralisation in the Granites–Tanami Orogen, North Australian Craton.

WK Witt, SG Hagemann & C Villanes: Geochemistry and geology of spatially and temporally associated calc-alkaline (I-type) and K-rich (A-type) magmatism in a Carboniferous continental arc setting, Pataz gold mining district, northern Peru.

WK Witt, SG Hagemann, J Ojala, C Laukamp, T Vennemann, C Villanes & V Nykanen: Multiple methods for regional-to mine-scale targeting, Pataz gold field, northern Peru.

Vale Keith Scott

Keith Scott died suddenly on 23 April 20 13. He was 64. A University of Adelaide graduate, K eith had an exemplary research history with CSIRO that began in 1969. He worked principally in regolith mineralogy and geochemistry throughout Australia, particularly in Mount Isa, the Yilgarn, the Drummond Basin and the Lachlan Foldbelt. In 20 11 Keith published a paper in *AJES* on the geochemistry of rutile from the Kalgoorlie Goldfields.

Keith was a valued member of CRC LEME, with close contacts in many of the affiliated organisations, and was greatly respected by the exploration industry with which he collaborated throughout his career. After retiring from CSIRO, Keith was a CSIRO Honorary Fellow and a Visiting Fellow at The Australian National University (ANU) where he continued to actively pursue his scientific interests. He worked on research projects from exploration in regolith terrains to the origin of dust with Richard Greene in the ANU Fenner School of Environment and Society. He co-supervised Honours and Masters students, and was a major contributor to the annual Minerals Technology Education Council (MTEC) Honours short course at the ANU. With Colin P ain, Keith edited the 2009 book *Regolith Science* and was a member of the Editorial Board of the 20 12 Geoscience Australia publication *Shaping a Nation: a geology of Australia*.

Keith was a good friend for more than 30 years and provided advice and encouragement to me as Editor of *AJES*. We had almost daily contact over many years when we would discuss editorial issues and other world problems.

He will be sadly missed.

ANITA ANDREW
Editor-in-Chief *AJES*
AJES.Editor@gsa.org.au

Scan for the latest GSA news.

Education&Outreach

More than 12 months ago the Gonski Report was handed to Government with a recommendation that $5 billion extra was needed to ensure schooling outcomes in Australia improve. Now as I write, the Federal and State Governments are negotiating funding packages that may see the Gonski Report become something of a reality. Unfortunately there are two issues bearing down on this important reform. First, the Federal Government has partly funded its proposal by reallocating scarce resources from university funds, which will alienate many in the tertiary education sector who would otherwise champion this much-needed boost to school education. Second, with a federal election due this year and State and Federal relationships rarely bipartisan, it is inevitable that this proposal and many other education-related promises will become politicised. Consequently, it is unclear just what this reform will ultimately mean for education generally and science education specifically. I suspect it will remain unclear until the dust has settled on the federal election and the new government, whatever its political bias, stamps its authority on this initiative.

No matter what the outcome of the election and the subsequent way the proposed reform may ultimately be dealt with, it is incumbent on us as members of the science community, the education community and the general public to ensure our political leaders understand the cost of doing nothing to improve Australian education as well as the cost of robbing tertiary Peter to pay pre-tertiary Paul. It is now easier than ever to let your opinions be known through social media and direct contact with candidates for elected office. To quietly sit on the sidelines is no longer an option we can afford to adopt.

In the previous issue (*TAG* 166, March 2013) I wrote that the new Earth and Environmental Science (EES) course is set to become the fourth senior subject, equivalent in weight and degree of difficulty to the other three: Biology , Chemistry and Physics. I am still reviewing how tertiary entrance scores are calculated across Australia but scores are not the whole story; many university science faculties also set prerequisites additional to minimum scores. Simply put, they require a senior student to have completed one of Biology, Chemistry or Physics with other subjects including English in this list. The exact nature of the list varies among institutions and some have no prerequisites as far as I can tell.

We know that students interested in studying science at university will study science subjects at school and usually choose those subjects that they are interested in. These students can expect to pass (and in so doing achieve a good university entrance score) and they need to pass in order to meet prerequisites set by their universities of choice. The question I have is, "Will those universities that do set (one of) Biology , Chemistry or Physics as prerequisites also now set senior EES as an acceptable prerequisite, and if not, why not?"

University entrance requirements have dominated students' choice of senior subjects at school for many years and I don't think that will end anytime soon. However , should EES not be adopted as an acceptable prerequisite along with other senior science subjects by universities that set them, EES will not be an attractive option for schools to teach or for students to enrol in. This may become the ultimate barrier to the successful roll-out of EES nationwide. I am interested to hear from anybody in a science faculty where prerequisites are set and what, if anything, their faculty is planning to do as EES rolls out nationally. I am also keen to hear from any science faculty that already has EES in its 'one of' list.

GREG McNAMARA
Geoscience Education and Outreach Services
Send all comments to Greg McNamara at
outreach@gsa.org.au

Stratigraphic Column

International connections

Do you know where the Australian Stratigraphy Commission (ASC) fits into the international scene? The ASC is a voting member of the International Subcommission on Stratigraphic Classification (ISSC), which is one of a number of subcommissions of the International Commission on Stratigraphy (ICS). This in turn is part of the International Union of Geological Sciences. While most of the international communication is by email these days, there were meetings of the ICS and the ISSC at the 34th IGC in Brisbane last August, and there will be a face-to-face gathering of stratigraphers at the 1st International Congress on Stratigraphy in Lisbon in early July 2013. I look forward to hearing from any Australians able to attend.

The ASC focuses on lithostratigraphy , but we do keep a watching brief on other kinds of stratigraphic classification too, such as biostratigraphy, chronostratigraphy, sequence stratigraphy and magnetostratigraphy. As part of the ISSC, we receive newsletters from time-to-time. These often include details of recent papers of relevance.

The most recent newsletter included three papers published by the Geological Society of America:

Zalasiewicz J 2013. Chronostratigraphy and geochronology: a proposed realignment. *GSA Today* vol 23(3), p 4–8.

Walker JD, Geissman JW, Bowring SA, Babcock L 2013. The Geological Society of America Geologic Time Scale. *Geological Society of America Bulletin* vol 125 (3–4), p 259–272.

Raymond LA, Webb Jr F, Love AB 2012. Mappability, stratigraphic variation, and diagenetic problems in sedimentary map unit definition and field mapping. *Geological Society of America Bulletin* vol 124 (11–12), p 1762–1772.

The first paper discusses the difference between geochronological units (spans of time) and chronostratigraphic units (bodies of rock that show relative time relations through physical evidence). This distinction has generally not been a major issue for Australian geologists, but it is always helpful to have discussion papers like this.

The second paper provides some interesting history on the development of both North American and international time scales, as well as discussion on recent advances and remaining stratigraphic challenges. While it may seem a little surprising that the Geological Society of America still sees a need to publish their own formatted time scale, and it does follow the subdivisions and boundary ages used in the International Chronostratigraphic Chart, the time scale does help to clarify the appropriate terms to use for time, showing early middle and late epochs, as opposed to the lower, middle and upper series shown on the International Chronostratigraphic Chart.

The third paper discusses some of the practical issues a field mapper must face in defining or redefining units. Although reference is made to the North American Stratigraphic Code and North American examples are used, generally at about 1:25 000 scale, I think most, if not all, of the issues discussed are relevant to Australian situations too. The authors discuss scale and mappability and consider the use of detailed studies in regional mapping. They discuss the use of diagenetic features in defining unit boundaries such as between dolostones and limestones, and issues with poorly exposed terrains, facies changes, variations in thickness (is the unit generally thick enough to be called a Formation?), variable contact types (gradational, interfingering, sharp) and variable diagenesis.

The authors conclude that while the problems of field mapping are not new, units must be mappable in the field, at the map scale, not just in exceptional exposures or from detailed studies. They conclude that formations should reflect the general nature and stratigraphic position of the type section but not necessarily the exact stratigraphy , that poor exposure and variability may result in the need for hybrid 'lumped' units (although I would like to think that Australian stratigraphers are generally better at using Groups for this) and that the variability of diagenetic features means that these features should be used with caution in defining units.

I encourage you to read these papers in full, and to consider writing about Australian examples of stratigraphic issues (the Loxton–Parilla Sands perhaps, or the Mount Bruce Supergroup?) and potential solutions.

CATHY BROWN
National Convener, Australian Stratigraphy Commission
c/- Geoscience Australia
GPO Box 378, Canberra ACT 2601
cathy.brown@ga.gov.au or **cathyeb@netspeed.com.au**

Other Stratigraphy Commission contacts are available at:
http://www.gsa.org.au/management/standing_committee.html
and online access to the database through
http://www.ga.gov.au/products-services/data-applications/reference-databases/stratigraphic-units.html or
http://tinyurl.com/8wfjqzv

Heritage Matters

The International Union for Conservation of Nature (IUCN) World Parks Congress is being hosted by Australia in Sydney 12–19 November 2014. The congress presents itself as an exceptional opportunity for the GSA to make a major and lasting contribution towards establishing recognition, by the IUCN, that geology is a component of nature in managing biodiversity in conservation areas. The 2014 IUCN World Parks Congress (IUCN WPC) has been marketed as "the world's most influential gathering of people involved in parks and protected area management".

The International Standing Committee for the IUCN WPC has extended an invitation to the GSA, ProGEO (European Association for the Conservation of Geoheritage at **http://www.progeo.se**) and the International Association for the Promotion of Geoethics (IAPG at **http://www.iapg.geoethics.org/**) to participate in Stream 1 – 'Reaching Conservation Goals' and other potential Steams where applicable. Stream 1 is the only science-based stream in the congress.

GSA, ProGEO and IAPG will be making the case that biotic systems, especially vegetation, are strongly linked to habitats, variable landforms, soils and hydrologic processes because:

> *Geology is a part of Nature and therefore should be recognised as part of IUCN's objective in conserving biodiversity such that geology then becomes a core part of Parks management.*

Our objective in participating in the WPC is to engage the global 'Parks' community in adopting an 'ecosystem approach' in the broadest sense of its meaning, involving geology , geodiversity and biology — and taking geological features, landforms and soils as an integral part of the whole nature conservation asset.

In Australia, the GSA Geological Heritage Subcommittee (NSW Division), in collaboration with Parks NSW and in consultation with the Blue Mountains World Heritage Team, proposes to develop a program that will lead to the inclusion of geology in the Global Parks Biodiversity Strategy. Since the WPC will be held in Sydney, we plan to use the Blue Mountains World Heritage Area as a case study. This case study would include an excursion to the Blue Mountains from the Lapstone Monocline, visiting some key sites a moderate distance into the plateau, to demonstrate:

- geology underpinning landscape development
- hydrological processes that need to be understood for ecosystem management
- geodiversity underpinning biodiversity
- geoheritage as a component of Parks management.

In addition, it is proposed to:

- develop an audiovisual presentation that encapsulates the above principles with global examples added
- develop a map-sized pamphlet that encapsulates the above principles with global examples (to be provided to all WPC attendees)
- engage a prominent, inspirational speaker to present these principles. Possible speakers might include, for example, Iain Stewart or Sir David Attenborough.

If we are successful in making the case that there is a need to include geology in the IUCN WPC Biodiversity Strategy — that is, that it is beneficial to conserving biodiversity (as is already occurring in a number of other countries) — the benefits to the IUCN Parks initiative will result in increased funding and opportunities for:

- Earth Science research
- environmental forecasting
- education and training
- sustainable tourism based on the geoparks concept
- management of sites of geoheritage significance
- integrated multidisciplinary environmental planning and management, and landscape management.

Other contributions at the WPC may include the valuing of geology, geodiversity and geoheritage as components of Parks management.

The IUCN World Parks Congress is timely in that it builds on the successful sessions on Geoheritage held at the 34th IGC held last year. If our proposal is adopted by IUCN, it will help raise awareness among biologists and ecologists, change the way Parks are managed and change the face of environmental, ecological and landscape management.

Draft Geoheritage policy

On another matter, a revised Draft Geoheritage policy , which includes comments from members and the Geological Heritage Subcommittees from each State, has been finalised by the Standing Committee. It is available on the GSA website at the Heritage link.

MARGARET BROCX
Convenor
Standing Committee for Geological Heritage
geoheritage@iinet.net.au

ACT
Earth Science education

Through the hard work of a small group of interested members including Doug Finlayson, Éva Papp, Leah Moore, Mike Rickard, Gavin Young and Wolf Mayer, the ACT Division has continued to offer a wide range of Earth Science activities and field trips for the general public and, especially, school children. Primary school activities have included the Division's fossil painting event for National Science Week and Éva's term-long 'Prehistoric Canberra' program where children learnt about rocks and fossils as well as general geological principles. The children went on to produce two large paintings now displayed in the CSIRO Discovery Centre.

The Division has collaborated with a number of local and national organisations to provide excursions and talks. Popular events have been geological walks in central Canberra organised by Acton Walkways, tours under Parliament House to see the Camp Hill Sandstone/Black Mountain unconformity, and the Conservation Council's geological treasure hunt on Gossan Hill. The Division has provided excursions in and around Canberra for the Australian Naturalists Conference, the CSIRO Discovery patrons and the Spectra 2012 Symposium participants.

Mike Rickard and Leah Moore led the field trips. Another member, Caroline Prévot, used the local knowledge she had gained on these field trips when she took 20 of her Narrabundah College students on excursions along the coast from Batemans Bay to Ulladulla, to the Shoalhaven, to Lake George and to important geological features in Canberra. The excursions allowed the students to study igneous, sedimentary and metamorphic rocks. Students saw ancient marine environments in Ulladulla, the effects of erosion along the Shoalhaven River and evidence of tectonic events such as folding and faulting at Myrtle Beach, Lake George and State Circle. The field trips, plus maps and time scales, help the students build an understanding of the local geological history, especially that of the Lachlan Orogen and the Sydney Basin. Students prepared reports and posters for an exhibition at school. They will investigate the role of water in the weathering and erosion of reliefs by working on the granulometry of sands in Shoalhaven and Myrtle Beach in the laboratory.

Regrettably, Mike Rickard has decided he can no longer clamber over rocks as he once could, so has discontinued his very popular University of the Third Age geology courses, which always included a visit to the major features of Canberra's nearest sea-coast.

We hope someone else will soon feel inspired to carry on where Mike left off.

JOHN ROGERS
Chair, ACT Division

Narrabundah Year 11 and 12 science students formulating their hypotheses about the relative ages of the dykes at Bingie Bingie Point. Image courtesy Caroline Prévot.

SA
GeoNight

'GeoNight at the Pub' is a chance for graduates, students and industry professionals to get together and socialise in an informal session. This monthly get-together aims to bring together people from across all Earth Science disciplines at a social evening at the Griffin's Head in the Adelaide CBD. The night has been going for over 6 months and is proving to be popular, with 30 to 40 people attending regularly. Geo-talk is encouraged; however industry experience is not necessary as we encourage people from all sectors of industry, government and study to participate.

This event is proudly supported by the GSA SA Division and is held on the first Thursday of every month.

[L–R] AusIMM Chair Mark McGeough, Daniel Tanti (BHP Billiton), Matt Grooby (Oz Minerals), Amy Suto (Golder Associates) and GSA SA Division Chair Kevin Wills.

GSA SA Division–AusIMM joint student BBQ

The annual joint GSA–AusIMM student BBQ, held on 21 March, was well attended as usual. This popular event is always a great chance to get together with other associations and to meet undergraduate students. The quality of the presentations by recent graduates was excellent. GSA SA Division Chair, Kevin Wills, welcomed the students and gave background information on the GSA. Kevin also revealed the new SA Division banner, which will be used at GSA SA Division events. The AusIMM Chair, Mark McGeough, introduced the graduate speakers from the University of Adelaide:

- Matt Grooby, Graduate Metallurgist, Oz Minerals
- Amy Suto, Graduate Environmental Scientist, Golder Associates
- Daniel Tanti, Graduate Geologist, BHP Billiton.

The speakers took the crowd on a virtual tour from Prominent Hill to the Pilbara via the beaches of South Australia. The AusIMM Auxiliary hosted the BBQ following the graduate presentations, while GSA SA Division provided the drinks.

More than 100 students attended. These students (and many promising young geologists among them) showed a lot of interest in both organisations, based on the number of laminated stratigraphic record reference cards given away on the night.

A big thankyou must be given to the Adelaide University Geological Society and AusIMM Student Chapter who assisted with the set-up and packup.

ANNA PETTS

Amy Suto and Kevin Wills with the GSA SA Division banner.

Enjoying the student BBQ, Kevin Wills chats with some of the GSA's newest student members from the University of Adelaide — [L–R] Matt Bosch, Georgia Mathews, Alicia Caruso and Jesse Clark. Images courtesy Anna Petts.

News from the Specialist Groups

Specialist Group in Tectonics and Structural Geology (SGTSG)

Call for award nominations in tectonics and structural geology

The Executive Committee of the SGTSG is seeking nominations for three awards in the field. The Carey Medal is issued by the Society and will be presented at the next Australian Earth Sciences Convention in Newcastle, NSW (7–10 July 2014). The Hobbs and Powell medals are awarded by the Specialist Group at the next SGTSG meeting in Thredbo, NSW (2–8 February 2014). Nominations are due by 31 August 2013. The choice of recipient is at the sole discretion of the SGTSG Executive Committee, which also reserves the right to not to make an award.

SW Carey Medal

A medal awarded at the Australian Earth Sciences Convention to a person distinguished in the field of tectonics (*sensu lato*). Nominations and further information are available at: **http://gsa.org.au/recognition/swcarey.html**.

Bruce Hobbs Medal for Structural Geology

This medal may be awarded at each regular field conference of the SGTSG for excellent contribution to structural geology. For further information, visit **http://www.gsa.org.au/recognition/specialist.html.**

Chris Powell Medal for Postgraduate Research in Tectonics and Structural Geology

This medal may be awarded at each regular field conference of the SGTSG for an outstanding research paper arising from postgraduate research on some aspect of structural geology or tectonics. For further information, visit **http://www.gsa.org.au/recognition/specialist.html.**

GORDON LISTER
Chair SGTSG
gordon.lister@anu.edu.au

NEWS

In the news this issue

ANU digs deep for National Rock Garden

It's official — The Australian National University (ANU) is to be an Education Partner of the National Rock Garden (NRG) in Canberra. On Tuesday 23 April, ANU Vice-Chancellor, Professor Ian Young, signed a Memorandum of Understanding with the NRG and also announced $100 000 funding towards the project.

Dean of the ANU College of Physical and Mathematical Sciences, Professor Andrew Roberts, said, "In Australia, we owe much of our national prosperity to our geological resources. The NRG is a great way to communicate to the general public about Australia's geological heritage. As one of the world's great Earth Science research establishments, it makes sense for ANU to partner with the Geological Society of Australia in the NRG."

2013 is shaping up as a busy year for the NRG, culminating in an NRG inauguration event on Sunday 13 October, during Earth Science Week, as part of the Centenary of Canberra celebrations. Not to be confused with an opening ceremony, which is still some years away, the inauguration will mark the arrival of the first big rocks on-site — eight to be exact, if things go according to plan.

It is proposed that an important element of the NRG will be these eight large rocks, one from each State and Territory, to commemorate Federation. The 'Federation Rocks', as they have become known, will be displayed permanently and prominently near the NRG entrance and form a centenary link to the six-sided Canberra Foundation Stone, laid in March 1913. The NRG has asked for ACT Government assistance in funding the Federation Rocks.

Recently, the NRG appointed well-known landscape architects, Taylor Cullity Lethlean (TCL), to produce the NRG master plan that will be publicly released at the NRG inauguration in October. TCL has been responsible for creating outstanding landscape designs for major national projects, including the National Arboretum in Canberra and the Australian Garden in Melbourne. The recently completed Stage 2 of the Australian Garden is of a similar size to NRG — about 6 hectares — and comprises 11 precincts, each with a different theme. The precinct approach, analogous to rooms in a museum or gallery, is being explored for the NRG. TCL has used rocks to stunning effect in

Australia Garden, Cranbourne, Royal Botanic Gardens Victoria. Image courtesy Sue Fletcher.

Dean of the ANU College of Physical and Mathematical Sciences, Professor Andrew Roberts, and Professor Brad Pillans after signing the Memorandum of Understanding between The Australia National University and the National Rock Garden. Image courtesy The Australian National University.

Searching the Deep Earth: A vision for exploration geoscience in Australia *was launched by Minister Martin Ferguson AM MP at the 34th International Geological Congress. Image credit Dietmar Müller. Publication copyright Australian Academy of Science.*

parts of the Australian Garden, so we are confident that they will develop an NRG master plan with a 'wow' factor . Sue Fletcher, GSA Executive Director, who visited the Australian Garden earlier this year, says, "TCL's work at the Australian Garden is impressive. TCL is more than capable of working with us to develop a master plan worthy of the NRG."

Meanwhile, the NRG Steering Committee continues to seek out suitable rock specimens for inclusion in the garden and your suggestions are always welcome. However , while it is our commitment to display very large rocks — up to 20 tonnes — we recognise that not all rocks will be obtainable in that size. For that reason, the NRG master plan will include provision for display of smaller rock specimens that nevertheless have great stories to tell. Size matters, but not always!

Finally, we are asking all GSA members to consider writing a contribution for 'Rock of the Month.' Do you have a favourite rock with an interesting story that can be published in *TAG* and also featured on the NRG website? Tell us in 200–400 words, include a photo and email your contribution to **rockgarden@gsa.org.au**.

BRAD PILLANS

Update on UNCOVER — May 2013

UNCOVER grew out of an initiative of the Australian Academy of Science (2010), which recognised that much of Australia's wealth is derived from mining orebodies that were discovered in the near surface many decades ago. As those deposits are mined out, Australia faces a serious decline in its mineral sector, and therefore its economy, if new deposits are not found. Y et much of Australia remains under-explored because around 7 0% of it is covered by regolith and sediments. UNCOVER sets out a new vision for Australia's Earth Scientists to cooperate in an innovative strategic venture in order to bring competitive advantage to Australian mineral exploration (Australian Academy of Science, 2012). The UNCOVER document was launched in August 2012 by the former Federal Minister of Resources and Energy The Hon. Martin Ferguson AM MP at the International Geological Congress in Brisbane (Ferguson, 2012).

Four science themes

UNCOVER has identified four science themes that will help to focus the effort to stimulate new greenfield exploration in areas under cover. These themes will be bound together by an active network involving the exploration industry , service providers, researchers and government geoscience agencies at Federal, State and Territory levels.

The four science themes are:

- Characterising Australia's cover — new knowledge to confidently explore beneath the cover
- Investigating Australia's lithospheric architecture — a whole-of-lithosphere architectural framework for mineral systems exploration
- Resolving the 4D geodynamic and metallogenic evolution of Australia — understanding ore deposit origins for better prediction
- Characterising and detecting the distal footprints of ore deposits — towards a toolkit for minerals exploration.

Establishing a research network

Until now, UNCOVER has been working in a development mode, with people from all sectors participating in a working group. They have now set up the process to shift UNCOVER to a more operational mode. In May, the first step was taken, with the Academy agreeing to a new management structure led by an Executive Committee. The Executive Committee will comprise representatives from the major stakeholders:

- the exploration industry
- universities
- CSIRO
- the Geological Surveys
- the geoscience societies
- the Academy as the initiator of UNCOVER.

The Academy will announce the names of the people appointed to the UNCOVER Executive Committee on the UNCOVER website (Australian Academy of Science, 2012) when appointments are complete.

Filling in details of the themes

The four science themes provide a skeleton of what has to be done to improve the success rate of mineral discovery. One of the next steps is to fill in the details of these themes. The strategy will be in two stages.

First, although the UNCOVER themes were defined by working groups of people from all sectors, a larger stakeholder group will be consulted. This will take two forms: a formal survey by a consultant engaged for the purpose, and a questionnaire at the UNCOVER website that members of the sector can fill in and so take part.

Second, the results of the survey will be used to tease out the nature of discussions of the four themes at the UNCOVER Conference, which is planned for mid-October 2013. Details will be advertised on the UNCOVER website. In summary, the UNCOVER Conference will be a 'by-invitation workshop' where interested people submit a case to receive an invitation. Themes will be examined first by presentations to get attendees' thoughts focused. These will be followed by structured and unstructured break-out and discussion sessions. Rapporteurs will be appointed to summarise the results of the conference, and the conference results will form the basis for a strategic approach to the first years of UNCOVER's operational life.

For more information, or to obtain a hard copy of the UNCOVER document, please contact Fiona Leves on **uncover@science.org.au**.

RICHARD BLEWITT

REFERENCES

Australian Academy of Science, 2010, at **http://www.science.org.au/events/think-tank/thinktank2010/index.html**

Australian Academy of Science, 2012, UNCOVER website at **http://www.science.org.au/policy/uncover.html**

The Hon M Ferguson AM MP, 2012, 8 August, at **http://minister2.ret.gov.au/MediaCentre/Speeches/Pages/ResourcingTomorrow.aspx**

International Geological Correlation Program (IGCP)

Report on IGCP Project 559 supported by a grant from the Australian IGCP Committee

IGCP Project 559 'Crustal Architecture and Images – Structural controls on landscapes, resources and hazards' aims to bridge the gap between scientific effort and the public interest and give a real insight into the nature of the major geological processes in the outer 50–70 km of the Earth that directly affect our lives.

In September 2012, with financial support from the Australian IGCP Committee, I participated in the SEISMIX 2012 International Seismic Symposium, and visited the Sinoprobe office in Beijing, China. SEISMIX meetings are biennial events that provide opportunities for seismologists and related specialists from all continents to meet to discuss advances in seismic profiling acquisition, processing, interpretation and data integration. The previous SEISMIX 2010 meeting took place in Cairns, Australia.

During SEISMIX 2012, I presented a paper on Geoscience Australia's recent seismic work related to the Carbon Capture and Storage (CCS) Program and chaired a symposium session. As a result, I received a very useful update on the latest developments in the CCS-related seismic investigations, particularly in Spain, and in deep crustal seismic research globally. During the post-symposium field trip I gained an excellent overview of the geology, geomorphology, nature and culture of the Yangtze Three Gorges area and the eastern margin of Tibetan Plateau from the 2nd to the 3rd topography platform in China.

After the symposium and field trip I returned to Beijing to visit the Sinoprobe office, and to discuss results from several projects of this program relevant to Geoscience Australia's work. The Sinoprobe Program is the Chinese government-funded Earth Science program with the overall aim of exploring the composition, structure and evolution of the continental lithosphere beneath China and to explore the processes causing earthquakes, geo-hazards and natural resources. Learning about the experience of this program and gaining access to its data is important for Australia. Although Australia acquires high-quality deep seismic reflection and magneto-telluric data to understand the structure and evolution of the Australian Continent, we do not currently have a comparable program. Geoscience Australia's presentations at the Sinoprobe office were well attended by Sinoprobe staff, who also made presentations and participated in the discussion. As a result of this visit, Professor Shuwen Dong proposed signing a Memorandum of Understanding (MOU) between Geoscience Australia and Sinoprobe. Preparation of this document is currently underway at Geoscience Australia.

The same IGCP grant also allowed me to travel to Perth in October 2012 to present a workshop for industry and academia to maximise benefits for IGCP Project 559 from the new Australian National Pool of Ocean-Bottom Seismographs (OBSs), which Australia will obtain for the first time in 2013. These OBSs are suitable for multi-scale experiments at sea and for onshore–offshore combined observations in a style similar to that of one of the Sinoprobe projects. Twenty broadband OBS instruments will be

purchased for short and long-term deployment to a maximum water depth of 6 km. The instruments will be made available to Australian researchers through the ANSIR Earth-imaging national research facility, with only the costs of mobilisation and deployment to be met. It is anticipated that the OBS facility will greatly improve the research capabilities of Australian scientists in the area of Earth imaging, offshore exploration and natural hazard assessment.

ALEXEY GONCHAROV
Geoscience Australia

GSA Facebook rocks

During March and April we invited friends of GSA Facebook to upload photos of their favourite outcrops for discussion. Here are two images that attracted comments and conversation.

Wasp Head Formation

Gary Lewis posted a picture of a dyke that cuts through the Permian Wasp Head Formation at South Durras in Murramarang National Park, NSW. The dyke is about 75 cm thick, and shows beautiful chilled margins (rusty looking sides). In the centre are 2–3-mm-sized crystals of plagioclase. The dyke is well eroded on the northern side of Wasp Head and can only be seen as a 'trench' in the rocks. Here on the southern side where it is more protected, the original igneous rock remains. Further to the south it has eroded away, forming a canyon that cuts a headland before it joins a larger feeder dyke that runs perpendicular and trends east–west. The extent of the dyke is around 500 m. The base of the Sydney Basin lies just less than a kilometre away.

Here is a link to the Earthcache site:
http://www.geocaching.com/seek/cache_details.aspx?wp=GCHFT2

China Wall, WA

Matthew Kindervater posted this image of an outcrop at the China Wall location, 6 km along the Duncan Highway from Falls Creek, WA. Because quartz is more resistant to erosional and weathering processes than the surrounding rock, this rock has broken down over time, leaving the quartz outcrop behind.

LEFT: Dyke intruding the Permian Wasp Head Formation at South Durras in Murramarang National Park, NSW. Image courtesy Gary Lewis, Geological Society of America.

RIGHT: China Wall near Halls Creek, WA. Image courtesy Matthew Kindervater.

Australian Tertiary Educators meet again

The second meeting of Australian tertiary geoscience educators, held in Townsville in January this year, continued the enthusiasm of the 2012 inaugural meeting, exposing a new cohort of Australian university lecturers to this emerging, dynamic group. Importantly , the group agreed on a name. We are now officially the Australasian University Geoscience Educators Network (AUGEN) – an appropriately geological acronym. With the simple goals of providing a mechanism of connection between academics teaching in geoscience in Australia, the meeting proved again to be a vehicle of collegial exchange, recognition of the common challenges and opportunities we share despite our different locations, sharing of teaching and learning ideas, and enthusiastic discussion.

Hosted at James Cook University' s Earth and Environmental Sciences School, about 30 participants experienced the tropical summer before Semester 1 commenced. A balmy evening overlooking the water from The Strand with a few cool drinks was a wonderful start to the two-day meeting. The meeting addressed four main themes: Flexible Learning, Innovative T eaching, Discipline Expertise and Industry Needs, and Fieldwork Challenges. Speakers in the first two themes showed examples of how they tackled problems of teaching remote and disparate groups of students, engaged contemporary student cohorts in more 'lectorial' style learning environments compared with the traditional lecture model, and embraced the IT realm in course delivery by integrating web-based software and resources into the curriculum. There was much discussion on how new innovations of mass delivery of curriculum via the internet in programs such as massive open online courses (MOOCs) may impact the current university teaching model. As with most discussions involving geoscience teaching, there is always consensus that providing adequate field experience (and exposure to rocks in general in a lab, a box set or in the field) is essential and difficult to replace in an online setting.

The theme of discipline expertise in teaching, or lack thereof, particularly in relation to the dearth of geophysics expertise in Australian universities, highlighted the need for better alignment between Australian economic and social trends, most commonly reflected in industry workforce demands, and undergraduate offerings and teaching capabilities in Australian universities. Presentations from academics and industry participants identified the disjunction between the fast rates of industry change and the slower response in human resourcing, and consequently student output and expertise, within academic institutions. The topic of professional accreditation in geosciences in Australia and the role academics should be playing in consideration (and ultimately implementation) was also discussed. This is an area Australian academics have not been engaged in to a large extent in the past but probably should be considering more seriously at school and faculty levels.

This second meeting was generously sponsored by a range of Australian professional geoscience bodies including the Australian Geoscience Council, AusIMM, Australian Institute of Geoscientists, Geological Society of Australia Qld Division, Australian Society of Exploration Geophysicists, Australian Geoscience Information Association, Minerals Council of Australia, James Cook University Economic Geology Research Unit (EGRU) and Queensland University of Technology (QUT). One significant outcome of this meeting was the recognition that Australia's geoscience professional bodies are deeply interested in geoscience teaching in our universities and how we as educators will impact the future of geoscience in this country The network participants were greatly appreciative of the financial support of these groups to facilitate a meeting such as this, as well as their active contribution to discussions throughout the meeting.

The positive feedback and enthusiastic mood with which participants left the meeting heading into the start of Semester 1 for 2013 bodes well for the continuation and development of this network. Future activities for this year include development of a web presence for the network and preparation for the next meeting in 2014, to be hosted by QUT in Brisbane. If you would like more information on the network or to be added to the mailing list, contact us: **maree.corkeron@qut.edu.au, linda.nothdurft@qut.edu.au** or **jessica.trofimovs@qut.edu.au**.

MAREE CORKERON

Recognition

Congratulations Daniel Wood

PDAC Thayer Lindsley Award

Daniel Wood [L] was presented with the Thayer Lindsley Award from the Prospectors and Developers Association of Canada at PDAC on 4 March 2013 in Toronto, Canada. The award was presented by Peter Legein [R], PDAC 2013 Convention Planning Committee Chair. Image courtesy Prospectors and Developers Association of Canada.

SEG Conference keynote speaker

Daniel Wood [L], Distinguished Lecturer and Fellow of the Society of Economic Geologists, was a keynote speaker at the Society of Economic Geologists (SEG) Conference in Lima, Peru in September 2012. The incoming 2013 SEG President Antonio Arribas [R] applauds after the keynote address. Image courtesy Society of Economic Geologists.

SME Dreyer Award

Daniel Wood [R] was presented with the Dreyer Award from the Society for Mining, Metallurgy & Exploration (SME) at the annual conference on 27 February 2013 in Denver, Colorado. The SME President for 2012, Drew Meyer [L], presented the award. Image courtesy Society for Mining, Metallurgy & Exploration.

Feature

Tasmanian Museum – Rock walls and roller coasters

Understanding the Rock wall recently installed in the Tasmanian Museum and Art Gallery (TMAG) requires a little background.

Museums are in a tight spot

Most museums worldwide are in some difficulty with declining funding, staff and visitors. In our youth they were a place to visit regularly (for some of us at least) to spend time looking at cases with large, systematic, unchanging collections and learn from them how the world works (pre-internet). Nowadays the displays are relatively minimalist with relatively small, 'arty', thematic short-term displays, with more interpretation and hands-on exhibits but less diversity. Also, many museums are amalgamated with art galleries and are generally their poor cousins, struggling to get a fair share of funding, while even in the museum sections, the natural sciences are usually distinctly subordinate to anthropology and history. Earth Sciences can be greatly dominated by the biological sciences.

Museums like TMAG in smaller regional centres suffer particularly from the lack of staff and funds to mount significant displays, even though these museums are often custodians of wonderful material. The geological curator of TMAG retired in 2005 and was not replaced. However, two part-time Honorary Associate positions — Don Squires (fossils) and Ralph Bottrill (minerals) — were offered to help keep an eye on the almost priceless geological collections dating back to the late 1800s.

TMAG redevelopment

In 2008 the Tasmanian Government promised $200 million to redevelop the museum, something greeted enthusiastically by most people, though there was some sadness to see the place stripped and so many great specimens buried back in the compactuses. However, after about $10 million had been spent on plans and designs, the funding was cut to $30 million following an economic decline in the State. Naturally this meant that the building and archaeological studies, which had already commenced, had to be cut short and money for new exhibits and staff became almost non-existent.

Discussions about the new displays started in 2011 and mostly revolved around finding 100 iconic objects representing Tasmania, some Wunderkammer-style (ie, non-thematic) window displays of random items from the collections, and some initially vague themes of Tasmanian history and nature. Planning seemed mostly controlled by design and financial constraints rather than scientific ideas. However, the scientific staff persisted in getting some scientific input, particularly at the urging of Mineral Resources Tasmania (MRT) scientist David Green. Staff agreed some geological input was needed to complement the biological material, including a selection of minerals and fossils, particularly to accompany Gondwanan concepts.

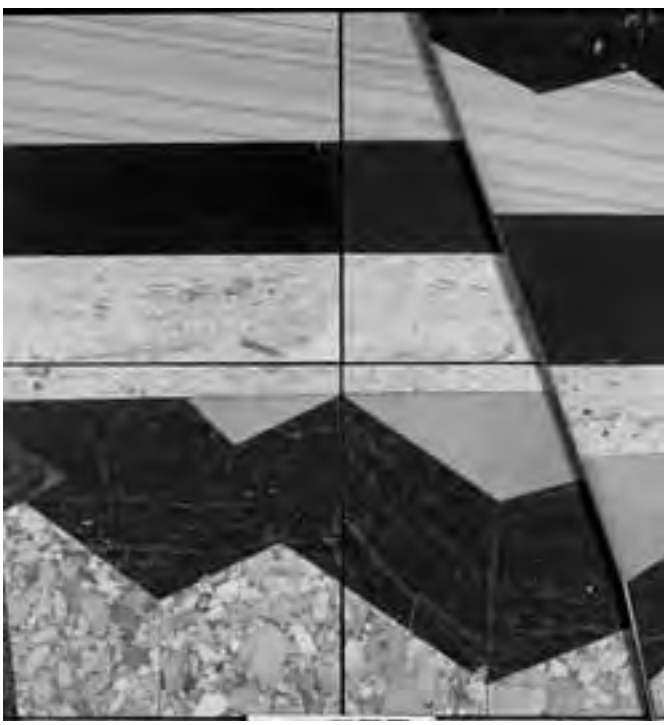
To this end we sought ideas far and wide. The University of Tasmania and the Geological Survey (now MRT) responded with good ideas; the management of these organisations kindly supported some of their staff members joining a committee for coordinating display ideas. This committee was interesting as it was made up of biologists, geologists, designers, managers and facilitators. One of our first actions was to argue strongly that the main science gallery should include geology and so the 'Earth & Life Gallery' was born.

The committee began in earnest in April 2012. Some great ideas were considered — plate tectonic models, interactive geological displays, a recreated mine adit, a black-smoker model, a time line walk or drive leading to the museum, and a mural of polished stones. Many were too expensive, difficult or large, but the mural theme struck a chord.

The Rock wall idea evolves

The mural idea spawned possibilities like a mosaic map of Tasmania, a drystone wall, a time line or a stone floor. Then Garry Davidson came up with the idea of a geological cross-section made of Tasmanian rocks covering a wall. Although we thought this was an exciting concept, there was some feeling that it was too expensive and would take too long. The museum also raised some pertinent concerns whether the wall and floor could hold this object. The design people also had peculiar

Rock wall detail showing rock types and suggesting faulting. Image courtesy TMAG.



Garry Davidson [L] and Ralph Bottrill [R] choosing rocks for the Rock wall. Image courtesy Ruth Mollison.

The ute's full. Image courtesy Ralph Bottrill.

Preparing the rocks for cutting. Image courtesy Ralph Bottrill.

concerns about having 'dirty rocks' in a museum making crumbly messes on the floor and damaging children's heads! Luckily the Museum Director, Bill Bleathman, jumped at the idea and promised the money if we could prove the practicality, and have it done by the opening in mid-February 2013.

Garry started work to put together, at UTAS, a small square of different polished slabs mounted on a board. This took a few months to create. There was a lot of argument about whether it should be a polished or rough-faced wall; eventually the polished model won. Calculations on the weight (about 9 kg/panel) indicated that the wall had to be scaled down to about 1.6-m square, with 16 panels (40 cm × 40 cm) mounted in a metal frame on a wall. A design was drafted and refined into an arrangement that appeared aesthetically pleasing as well as relatively geologically accurate (at least vaguely — trying to recreate recognisable folds, faults and unconformities in rocks was not simple with our budget!). The panel showed a good representation of Tasmanian stratigraphy, fairly flat-lying at the top, and quite deformed at the base, with various intrusions and some mineralisation. The Precambrian and Cambrian rocks are dealt with fairly simply, unfortunately, lest it looked totally chaotic. A quote from Brad Rizzollo of Heritage Stone for the cutting and polishing was accepted in about October 2012; something he may have regretted at times later during the construction!

Rock road-trips

The museum's designers hoped we could buy the stone off-the-shelf from Heritage Stone or other stone masons, but commercial stock comprises mostly imported materials and the rocks we wanted were going to take considerable time visiting quarries or the bush around Tasmania to find. Rock trips, yeah! Luckily our workplaces were very supportive. Heritage Stone had some nice Coles Bay granite and local sandstone. Our team had access to UTAS and MRT collections for suitable rocks — and we did find some great ones there! We needed large samples — at least 0.5–1 m — to enable cutting suitably sized slabs to show satisfactory continuity in the final panels.

Our first road trip was in November 2012 to the HBMI Quarry at Leslie Vale to source large blocks of dolerite, a principal rock constituting Tasmania, and some beautiful hornfelsed fossiliferous mudstones with glacial dropstones. The quarry management, especially John Sherburd, were incredibly helpful with extracting and loading nearly a tonne of samples, as shown in a photograph of the tail-heavy ute, which had to then negotiate the winding road back to the depot.

The next trip was to the Boral Bridgewater Quarry, where the manager, Mike Pilcher, helped us obtain and load some great Tertiary basalt with agate-like, calcite-filled amygdales.

In December, Garry and I fitted in a geology conference in Strahan with more collecting, taking two vehicles. With help from Dehne McLaughlin, Mike and Eleanor Phelan (who donated some beautiful stichtite in serpentine) and Richard Wolfe we collected some good carloads of useful rocks: Ordovician conglomerate, Cambrian volcanics, serpentinite and ore samples. We had thought about a truck and crane but were concerned about the cost and logistics. It's amazing what you can lift with a bit of grunting and groaning, and what you can carry keeping a straight back, tightening those core muscles. Amazingly our backs and knees are still intact! We had some long days, but luckily people waited with a forklift to help us unload back in Hobart (and wondered how we managed to load it all!).

Installing the frame on the completed Rock wall. Image courtesy Ruth Mollison.

We were told the opening would be delayed a month, to mid-March 2013, giving us some breathing space. After Christmas, however , the museum considered cancelling the project if we didn't get all the rocks collected. Heritage Stone did not want to start the cutting and polishing until all stones were together, and the deadline for completion was mid-February. Several more field trips around the State took in Bicheno, Rossarden and Maydena — mostly on our weekends. Some trips took in quarries, others looked at roadside cuttings and coastal outcrops. W e mostly found loose material — no geological heritage sites were damaged!

The Rock wall emerges

Finally we appeared to have enough rock (several tonnes) to commence construction, and with fingers crossed we left them to Brad to cut into 15-mm slabs. Many had structural problems — it broke our hearts to see some wonderful rocks disintegrate under the saw , despite Brad's best efforts. We had to take an extra trip for some spare material; however Brad's skill showed through and all the stone was slabbed and polished satisfactorily (the sandstone was left unpolished). The slabs were then trimmed to shape, a tricky manual job . Then we fitted these pieces as a mosaic to match the plan. Some pieces went in with the wrong geological orientation, with some recutting needed, but eventually all pieces fitted together very well. (And we refuse to listen to any geologists tell us of any geological inconsistencies ...)

Brad fitted the pieces in the metal frame and delivered it to the museum on deadline day. Hanging it in the old Hunter Gallery was a challenge, as the wall was not quite flat. Fault lines were another challenge — we had considered leaving gaps or thin black strips of rock but eventually settled on copper strips, which worked satisfactorily , and these were added after hanging. I think we all breathed a big sigh of relief and had a quiet drink after it was finally hung.

Scaffolds were bundled out for the official opening. Visitors offered positive comments. Because some people thought it was merely a decorative mosaic, we wrote an information panel and index a few weeks later. It has been described as a 'rock quilt' by some — not a bad analogy! But we do hope the panel helps teach visitors about the structure of the Earth and how Tasmania was formed.

Where to from here?

Some more integration with concepts of Gondwana and plate tectonics, as well as life sciences, would be useful at some stage. Better displays are desperately needed, with themes and interpretation, showing how geology and minerals affect our landscapes, land uses, homes and technology; ultimately geology and minerals affect all parts of our lives. While architecture and design are all very well, many people still come to museums to learn and see interesting and beautiful objects from our natural world.

One thing we need to get better at is realising that the Earth is part of our natural heritage, and while mining is very vital to our economy , modern technologies and way of life, very little from the mines finds its way to museums nowadays. Most of the good minerals and geological specimens in the TMAG were found over a hundred years ago. Most modern mines open and close, producing millions of tonnes of ore, but a specimen is rarely preserved for posterity. Spectacular specimens worth thousands of dollars are crushed for a few cents worth of ore; preservation of any specimen is usually considered robbery from the mine rather than the national heritage it should be. Hopefully we can work together better in future.

The National Rock Garden in Canberra is working on a similar theme, collecting iconic rocks from around Australia to educate people about how the land we live on was formed and used, and how it affects us all.

We thank everyone who assisted in this endeavour , including the staff of the museum, especially Ruth and Cathy; Nicky who really made it happen; staff at MRT , UTAS and Norske Skog; as well as our long-suffering families!

RALPH BOTTRILL and GARRY DAVIDSON

Special Report 1

The appearance and disappearance of a small geology school

Fate of a small geology school — Applied Geology at SAIT/UniSA, 1969–2005

Geology in the broad sense has been taught at the University of South Australia (UniSA) and its predecessor institutions, the South Australian School of Mines and Industries and the South Australian Institute of Technology (SAIT), from the foundation of the School of Mines and Industries in 1889. Initially, it was taught largely as a service subject to the Mining Engineering Diploma program. What we are concerned with here is the Applied Geology degree course that commenced in 1969 and closed with the final third-year geology classes taking place in 2005, although a few students needed to complete odd subjects in subsequent years.

Applied Geology commences

The Applied Geology program commenced in the late 1960s partly as a response to the nickel boom of the time. Numbers of undergraduate geology students increased dramatically in all Australian tertiary institutions that taught geology and related subjects. In the 1960s geology was taught at SAIT as a service subject by people such as Wally Fander. The Applied Geology course commenced in 1969 with the newly appointed Peter Hancock (engineering geology) as the sole lecturer, supported by Errol Stock as tutor.

David Carver arrived in 1969 as technical officer and remained at SAIT/UniSA until 2011. Peter had a huge workload because apart from the first-year Applied Geology students, he had to prepare new lectures and teach separate subjects for mining engineers, metallurgists and town planners. In mid-1970 Peter left to join Layton Associates in New Zealand, but retained links with SAIT, as in the summer of 1970–1971 he arranged industry experience for several SAIT students, supervised by Stan Joyce, in the Fiordland area of New Zealand.

In 1970 Stan Joyce (geochemist/petrologist) and Bernie Farrow (geophysicist) joined the staff, with the new Head of Applied Geology, Colin Branch, arriving in August 1970. David Jones (economic geologist) and Jim Jago (stratigraphy/paleontology) arrived in 1971. Our first secretary, Ann Boos, was also appointed in early 1971; all staff were then in their twenties and early thirties.

These appointments were really just in time because 1971 was the first year in which all three years of the Applied Geology course were taught, with the first students graduating at the end of 1971 being John Keeling (joined the SA Mines Department), Grant Ellis (petroleum geology) and Dick Ralston (secondary teaching). In addition there was a need to teach the various service courses for students of mining and civil engineering, metallurgy, surveying and town planning; 1971 was an extremely busy year because everyone was preparing lectures and laboratory exercises for the first time. In addition, new field excursions and field camps had to be organised. Colin Branch spent much of the year preparing an accreditation document in order to convert the then Diploma in Technology in Applied Geology into a Bachelor of Applied Science in Applied Geology. This document was approved by an accreditation panel in 1972 with accreditation of the course dating from 1973.

The first year of the initial Applied Geology course comprised mainly geology, physics, maths and chemistry; that is, a traditional science course. The second year included geophysics, maths, surveying and mining engineering as well as geology subjects. The third year was largely geology and geophysics with all students having to do a field-based mapping project of about 15 days in their own time. Over the years these mapping projects covered much of the Adelaide Hills and were used by the Geological Survey of South Australia in their regional mapping program.

Higher degrees and industry liaison

The applied nature of the Applied Geology degree was emphasised through a compulsory work experience component, staff consulting, mine visits and a third-year mapping camp in an area of a volcanogenic massive sulfide (VMS) deposit and active exploration that included core logging. A feature of all of the science and engineering programs at SAIT was the presence of strong industry liaison committees that fitted in with the industry-linked ethos of SAIT. These committees provided valuable advice as to the direction that the various degree programs should take, particularly at the time of course reaccreditations that occurred every five years. Applied Geology's Industry Liaison Committee was made up of industry and government geologists as well as academic staff. At this time SAIT was part of the College of Advanced Education sector of the tertiary education system.

In 1973 a geology Honours program was accredited and commenced, although due to pressure from the traditional universities, it was termed a Graduate Diploma in Applied Geology rather than a Bachelor of Applied Science (Honours) in Applied Geology; this terminology did not come into effect until 1991. A Masters degree was introduced in 1978, although PhDs were not awarded until SAIT became part of UniSA in 1991.

Changes in location and academic staff

The Department of Applied Geology commenced operations in the Bonython Jubilee Building of the City Campus of SAIT at the corner of Frome Road and North Terrace. At the end of 1971 it shifted to a larger area on the ground floor of the Playford Building. At this time Applied Geology was the last Science or Engineering School left on the City Campus, with all other such schools located at a new campus at The Levels (now Mawson Lakes) about 11 km north of the Adelaide CBD.

Applied Geology staff in early 1976. Standing [L–R], Colin Branch, David Carver, Greg Drew, Stan Joyce, Bob Wiltshire, Ann Boos, Jim Jago. In front, Bernie Farrow. On top, David Jones. Images courtesy Jim Jago.

David Stapledon with a visitor in the mid-1980s.

At the start of 1972 Bob Wiltshire was appointed as Lecturer in Metamorphic Petrology/Structural Geology; a couple of years later Greg Drew (mineragrapher) was appointed as a tutor. This meant that Applied Geology now had seven academic staff, which turned out to be the maximum number ever attained. For the first two or three years student numbers were quite good, but as the exploration boom declined so did student numbers, although almost all of the Applied Geology graduates then and subsequently were successful in gaining employment. In the early 1970s both Colin Branch and Jim Jago were awarded ARC grants, some of the first to be awarded to SAIT staff.

A major change took place in May 1976 when Colin Branch and Stan Joyce moved to other positions, Colin as Deputy Director of the South Australian Mines Department and Stan as Head of Applied Geology at QUT. The well-known engineering geologist David Stapledon commenced as Head of Applied Geology in early 1977.

A second major change was the shift of Applied Geology to The Levels Campus during Week 3 of Term 3, 1978. Although this occurred in the middle of teaching, very few classes were missed. Applied Geology was shoehorned into the Metallurgy Building with the transition quite smooth largely due to the tact of David Stapledon and Ian K etteridge, Head of Metallurgy. However, an initial setback occurred when the new first-year geology laboratory was flooded to a depth of several centimetres during the first week at The Levels.

An advantage of moving to The Levels was that Applied Geology was now with all other science and engineering disciplines at SAIT, although a downside was that we were no longer close to the then-excellent Barr Smith Library of Adelaide University. Another advantage of moving to The Levels was that all the buildings were less than ten years old and in much better condition than those of the City Campus.

In 1979 David Jones returned to industry (Newmont) and was replaced by Max Frater. At about the same time Greg Drew left to join the SA Mines Department and was replaced by David Hilyard (igneous geology) who remained until early 1985 when he took a position with the Geological Survey of PNG. David was replaced by Steve Fermio, who remained for about 18 months before moving to industry and being replaced by P eter Boult (petroleum geology) in 1988. By the late 197 0s, student numbers had dropped considerably, but increased again in the early 1980s as a result of the gold boom.

The Gartrell School

Although there had been various administrative changes within SAIT , Applied Geology was largely unaffected until 1987 when Applied Geology combined with Mining Engineering and Metallurgy to form the Gartrell School. The school was named after Professor HW 'Spog' Gartrell, who held joint appointments in Mining and Metallurgy at Adelaide University (Lecturer 19 15–1938, Professor 1939–1945) and The South Australian School of Mines and Industries (Director of the Bonython Laboratories 1934–1945). At the same time, David Stapledon went to a half-time appointment and Jim Jago became Head of Applied Geology. The formation of the Gartrell School was supported by the building of a Mining Engineering wing (completed in 1990) to the Metallurgy Building; this meant that for the first time all mining-industry related disciplines were housed in one building. At this time the Gartrell School owned the Kanmantoo Mine about 60 km east of Adelaide.

In 1985 the National Centre for Petroleum Geology and Geophysics (NCPGG; now the Australian School of P etroleum) was formed with Honours, Masters and PhD students first enrolling in 1986. The NCPGG was a joint venture between Adelaide University, Flinders University and SAIT, although eventually Flinders University and then SAIT/UniSA discontinued their involvement. However , while the association continued a number of SAIT/UniSA PhD, Masters and Honours students graduated in petroleum geology through the NCPGG. On the retirement of Professor JB Evans, a mining engineer and initial Head of the Gartrell School, Bruce Webb, the Director of the Australian Mineral Foundation, was appointed as a part-time Chair of School in 1991.

UniSA is formed

A major reorganisation of tertiary institutions in South Australia in January 1991 resulted in the formation of UniSA, which comprised SAIT and the Magill, Salisbury and Underdale campuses of the South Australian College of Advanced Education (SACAE). The Salisbury Campus of SACAE taught geology for students planning to be secondary school teachers and as a service course for students intending to work as park rangers and in similar jobs in environmental management. For some years after 1991 the teaching of geology at the two campuses was combined with Bob Wiltshire becoming Course Coordinator for Applied Geology. Eventually the Salisbury Campus was closed and John Cann (modern sedimentology/paleontology) and Mark Bishop (geomorphology) joined Applied Geology at The Levels. The Professor of Metallurgy, Ken Strafford, became Head of the Gartrell School in 1994 on the retirement of Bruce Webb.

Further administrative changes in 1996 saw the Gartrell School become part of a School of Engineering that comprised Applied Geology and Mining, Metallurgical, Mechanical, Electrical, Electronic, Civil and Computer Systems Engineering. After about three years this large and unwieldy school was split up and Applied Geology became part of the School of Geosciences, Mining, Metallurgical and Civil Engineering, a much more sensible arrangement. Throughout all of these changes, student numbers in Applied Geology, Mining Engineering and Metallurgy remained relatively low, which resulted in increasing pressure on retaining or replacing staff. Despite the addition of the Salisbury staff, the Applied Geology staffing situation continued to deteriorate with the retirement of David Stapledon in 1994, Bernie Farrow in 1997 and the departure of Peter Boult to join Origin Energy. John Cann took a retirement package in 1997 but continued doing some teaching in an adjunct capacity. It should be noted that throughout the running of the Applied Geology course considerable assistance was obtained from outside specialist lecturers such as Bernie Milton, Ken Wrigglesworth, Bridget Youngs, Neville Alley, Clint Foster and Sun Xiaowen.

Prior to the late 1990s, The Levels campus was physically isolated, with the Parafield Airport to the north, a marginally successful technology park with lots of open space to the south, a very busy Main North Road to the east and sheep paddocks to the west; very few people outside The Levels knew its exact location. However, in 1998 the real estate development company Delfin released the first land of the upmarket Mawson Lakes housing project accompanied by abundant advertising that often mentioned the presence of a university campus. This was essentially free advertising for the campus, which changed its name to the Mawson Lakes campus of UniSA.

Administrative reviews

Although the staffing situation was becoming serious, a positive development was the commencement in 1996 of a five-year double degree in Mining Engineering and Applied Geology. Initially this was quite successful with good student numbers in the double degree with minimal effect on the Applied Geology or Mining Engineering single degree numbers. A second five-year double degree in Civil Engineering and Applied Geology commenced in 2001, but attracted few students. However, with the decline of the mining industry in the late 1990s and the first years of the 21st century, student numbers in Applied Geology, Mining Engineering and Metallurgy also declined. Throughout the time before and after the formation of UniSA there had been what appeared to be continual reviews of the various science and engineering schools. This usually resulted in some form of time-consuming administrative reconstruction and the appointment of an increasing number of administrators to the detriment of teaching and research, although in fairness to the university administration some of this was due to ever-increasing government demands for information.

In 2000, one of these reviews stated that another member of the Applied Geology staff needed to leave and in early 2001 Jim Jago took early retirement, but stayed on in an adjunct capacity; meanwhile, during 1999–2001 John Cann was a visiting academic at Johns Hopkins University, Baltimore, USA. Bob Wiltshire continued as Program Director for the Applied Geology single degree, the Applied Geology–Mining Engineering double degree as well as the Mining Engineering degree. Also in early 2001 Max Frater left to join the Northern Territory Geological Survey and later that year was replaced by Solomon Buckman.

Applied Geology degree closes

In early 2003 as a result of yet another review, a decision was taken to stop the teaching of Applied Geology, Mining Engineering and Metallurgy. The last intake of Applied Geology degree students occurred in 2003 and the last graduating class was in 2005. In February 2007 Bob Wiltshire took a retirement package and joined Jabiru Metals, but remained in an adjunct capacity. Ironically the decision to close the mining-industry related programs coincided with the start of the present exploration boom, which has continued to this day after a slight hiccup during the 2008–2009 Global Financial Crisis. Mining Engineering is now thriving at Adelaide University.

Although the Applied Geology degree course was closed down, it still remains possible to do Honours, Masters or PhDs in geology at UniSA. Geology continues to be taught at UniSA as a service subject. Ironically there are now more students doing the six available Earth Science/Geology service subjects than were ever doing geology at the time of the various Applied Geology degree programs. Since 2003 Applied Geology has been part of the School of Natural and Built Environments, which also comprises Civil Engineering, Building, Planning, Environmental Science, Surveying and Geoinformatics. The only full-time geology staff members are now Ian Clark (originally with SACAE) who is heavily involved in administration and Tom Raimondo (appointed July 2011) with support from adjunct staff John Cann, Jim Jago, Barry Cooper (formerly of PIRSA) and until recently Haggis Shackleton (originally with SACAE).

In essence the fortunes of the Applied Geology program were controlled by Federal Government policies. In the early days of the School there was encouragement for growth and expansion. However, over time there was what appeared to be a change in emphasis with universities changing from academic institutions to business enterprises. Despite demands for increased class sizes and a reduction in teaching hours (especially for 'expensive' activities such as practical classes and field trips) staff had to show that quality had actually improved. Although the Applied Geology program attracted only a relatively small number of students throughout its life, it fulfilled a niche within South Australia to provide an excellent program for students who were interested in careers as geologists, particularly as exploration and engineering geologists.

Acknowledgements

Colin Branch, John Cann, Bernie Farrow, Peter Hancock, John Keeling and Carol Dadswell are thanked for their assistance in compiling this information.

JB JAGO and RG WILTSHIRE
School of Natural and Built Environments
University of South Australia, Mawson Lakes, SA 5095

Special Report 2

Australian Earth Sciences Convention – AESC 2014

The Geological Society of Australia invites you to participate in the Australian Earth Sciences Convention 2014 in Newcastle.

AESC 2014 will be held in Newcastle, a vibrant port city that is characterised by its working harbour, beautiful surf beaches and proximity to many of Australia's most prestigious wineries. It is the gateway to the Hunter Valley – heart of the Sydney Basin coalfields, centre of power generation for New South Wales and home of the NSW Institute for Frontier Geoscience, a joint initiative of the University of Newcastle and the NSW Department of Trade and Investment. Combined with the city's focus on energy efficiency via the Federal Government's 'Smart Grid, Smart City' initiative and the CSIRO Energy Centre, Newcastle is an ideal site for our convention – *Sustainable Australia.*

The convention will focus on energy, basin geology, geodynamics, resources and the environment. Dedicated symposia include the 39th Symposium on the Advances in the Study of the Sydney Basin and Comparisons & Contrasts in Circum-Pacific Orogens.

AESC 2014 offers all geoscientists a unique opportunity for professional development and a chance to hear firsthand the latest developments in geosciences.

Earth Scientists recognise that the key to sustaining Australian society, the economy and environment into the future lies in an understanding of the make-up, structure and deep-time history of the continent.

We welcome you to participate in the AESC 2014 convention in Newcastle and look forward to seeing you next year.

Themes

AESC 2014 will feature the following themes.

Energy

Increases in the global demand for energy have been driving advances in the efficiency of coal and conventional hydrocarbon extraction, while also spurring the rapid growth of interest in unconventional hydrocarbons. Future energy supplies are likely to include all fossil fuels, nuclear sources, and significant increases in the use of renewable energy and cleaner alternatives. Building on the public debate that will be stimulated by the 'Energy 2050' public forum to be held with AESC 2014, the Energy theme will encompass Earth Science perspectives on energy sources, exploration and extraction methods, and environmental consequences and solutions.

Resources

In an era of increasing demand for mineral resources from the developing Asian economies, and declining rates of discovery of new deposits, new mineral exploration strategies are vital. In response to these trends, a national collaboration network (UNCOVER), focused on exploration geoscience research, has been established under the auspices of the Australian Academy of Science. The four major research initiatives of this collaboration are characterising Australia's cover, investigating Australia's lithospheric architecture, resolving the 4D geodynamic and metallogenic evolution of Australia, and characterising and detecting distal footprints. Any other aspect of exploration geoscience will be included, such as new technologies and new methods of data interpretation. Presentations are invited from academic, government agency and industry sectors.

Bald Rock Monolith, Warwick. Image courtesy © Copyright The State of New South Wales through Industry & Investment NSW.

Environment

Earth's environment is a dynamic and responsive system with a long geological record of change and an immediate and future impact on society, particularly in an Australian context. High-resolution records of past climates (including outcomes of the International Ocean Drilling Program), assessments of the state and future of our groundwater and surface-water resources, predictions of the response of the Australian environment to climate change, and studies specific to the Australian arid and semi-arid zones will be major elements of the Environment theme.

Service and Community

The Earth Sciences have an ongoing role of service by informing, influencing and supporting Australian society, as well as a proud history of education and research. The Service and Community theme will address the geoscience response to distributed grid computing and cloud storage, the dissemination of geoscience information in a high-bandwidth environment, the continuing and evolving role of geoscience outreach and education, geohazard studies and their role in protecting the community , the contributions of geotourism and geoheritage, and the historical record and influence of Earth Scientists.

Dynamic Planet

Today's Earth is the sum of 4.5 billion years of geological processes. The Dynamic Planet theme will address the geodynamic evolution of Australia and other continents from the Hadean to the present; the evolution of the Earth–Moon system and the meteoritic impact record; the expression of the circulation driven by the Earth' s heat engine in lithospheric plate tectonics, mantle dynamics and differentiation, and core evolution; the processes that govern deposition and deformation in intracratonic settings; processes of crustal growth and recycling at convergent margins and in other settings; geophysical and geochemical evidence of the structure and composition of the deep subsurface; and the influence of all of these elements on the formation and distribution of mineral and energy resources.

Living Earth

Life has fundamentally influenced the development of the Earth, making it unique with respect to its planetary neighbours. The Living Earth theme will investigate the evolution of life as witnessed in the fossil record; consider novel methods to supplement traditional paleontological approaches; investigate the major events in the evolution of life, the hydrosphere and atmosphere; and draw contrasts and comparisons with other planets.

Symposia

39th Symposium on the Advances in the Study of the Sydney Basin

Initiated by the University of Newcastle in 1967, the long-running series of symposia on Advances in the Study of the Sydney Basin has become a well-established focal point for the discussion of research findings and other studies of academic, industrial and community interest for one of the most significant geological provinces in Australia.

The 2014 symposium aims to continue this role, with broad coverage of fundamental geology; coal, coal seam gas, mineral, energy and groundwater resources; developments in geological technology; and geological aspects of the natural and urban environments.

Comparisons and Contrasts in Circum-Pacific Orogens

Fundamentally different tectonic evolution models have been applied to circum-Pacific orogenic belts, depending on location in either the eastern or western Pacific realms. For example, for the last three decades, North American Cordilleran models have focused on accretion of suspect oceanic terranes to grow the orogen, whereas more recent models for the southwest Pacific have focused on growth by protracted slab rollback and intermittent contraction (tectonic mode switching). These have been applied to the P aleozoic Gondwanan orogens now exposed in Australia, Antarctica and New Zealand.

What is the geological evidence for these competing models? Can each model be applied to either side of the Pacific? If not, why not? What insights can be gleaned from Andean tectonic evolution, which seems to be dominated by subduction–erosion processes? Are there fundamentally different geodynamic drivers that permit this supposed contrasting tectonic evolution across the Pacific?

This special session of AESC will explore these questions and related issues on circum-Pacific tectonic evolution.

Public forum — Energy 2050: the future of energy in Australia

As part of AESC 2014, a public forum 'Energy 2050: the future of energy in Australia' will be held on Monday 7 July at 7.30pm at the Civic Theatre, Newcastle.

Why the forum?

An abundance of relatively cheap energy has been the critical support component of the quality lifestyle we enjoy in Australia — it powers the cars we drive, the appliances we use in our homes and the industry we rely on for creature comforts and wealth creation. Most of this energy comes from fossil fuels. For example, coal accounts for over one-half of Australia's domestic energy production:

Devonian Mega Folds, Tamworth.

Boxwork Iron Pattern, Newcastle.

Coalminers with Pit Horses Lymington Colliery, Newcastle.

about 90% of NSW electricity comes from coal. But fossil fuel resources (oil, gas and coal) come at a cost to the local environment and probably to the global climate. Moreover , we live on a finite planet, so the shift from the industrial era to the sustainability era must come if we are to maintain our lifestyles through the 2 1st Century and beyond. Alternative renewable sources of energy are available, but many of these have their own limitations in terms of capacity, environmental effects and high production costs. At present they represent less than 5% of our energy production. Moreover, the impacts of energy production, particularly coal mining, are strongly felt by local communities when mines encroach on urban areas and valuable agricultural land. Thus, the key themes are the future of energy resources in Australia, and the social impact of our transition to a secure renewable energy future. These are key national issues and will increasingly become global issues.

So, what does the future hold for Australia? What are the best resources or alternatives to secure a reliable energy future and what are their environmental effects? Are alternatives really viable and what are the implications of transitioning society into the 'sustainable era'?

Speakers at 'Energy 2050' have intimate knowledge of their respective industries, or have a vision of where we need to be in 2050. Presentations will be followed by a public question and answer period, and then possibly by the ABC' s *Q&A* television program on the same topic. The evening will commence at 7.30pm at Newcastle's famous Civic Theatre, run for two hours, and end at 10.30pm at the close of *Q&A*.

Why Newcastle?

The Hunter region, with its capital Newcastle, has been coined the 'Energy Hub of Australia', reflecting its high rates of energy production and ongoing potential underpinned by vast reserves of coal and coal seam gas (CSG). But it is also where coal mining intensification and CSG exploration impinges on an ever-expanding urban zone and critical agricultural clusters, including the equine and viticulture industries.

Conflicting land use issues are probably more strongly focused here than any other region of Australia. The competing land use issues have created a high level of community uncertainty and concern about environmental and water resource impacts. In response, the Federal and NSW Governments have introduced tough new regulations, which will change the way coal mining and CSG exploration take place in NSW for the next 20 years. Partly in response to these regional imperatives, the University of Newcastle has launched a long-term whole-university research project focused on achieving the balanced social, environmental and economic transitions required in the Hunter region during the next two decades. These are the key issues to be discussed at the 2050 forum.

AESC 2014 venue — Newcastle

The convention will be held at the historic Newcastle City Hall, in the heart of Newcastle. The City Hall is situated close to transport and is within walking distance of the CBD.

Opened in 1929, Newcastle City Hall is one of Newcastle's most prestigious buildings. Its architecture includes sandstone walls and columns, marble staircases, a clocktower, a sweeping staircase and a ballroom. The AESC will be using the entire Hall for the four-day duration.

Located nearby are numerous points of interest: Newcastle Museum, Art Gallery, Civic Theatre, Nobbys Headland, Fort Scratchly, walking and cycling pathways, parks and beaches.

The City of Newcastle has a rich history and following European settlement, has re-invented itself many times, from penal station to coal town, steel city, live music city, working port and more recently a centre for energy innovation.

Newcastle is the gateway to the resource-rich Hunter Valley and is adjacent to the southern part of the New England Foldbelt. Hunter Valley wines are highly acclaimed.

Registration and expressions of interest

Abstracts deadline: March 2014
Presentations: oral and poster
Registration: late 2013/early 2014
Workshops and field trips: The convention invites proposals for short courses, workshops and field trips.
Exhibition: The convention will host an exhibition and welcomes companies and businesses to participate so they can promote the emerging opportunities in their organisation, State or Territory.
Supporters: The organising committee invites companies, institutions and technology providers to support this meeting.
Expressions of interest: **aesc2014@gsa.org.au**
Convention location: Newcastle City Hall
www.aesc2014.gsa.org.au

Special Report 3

Geoscientific Data Warehouse – accessing and delivering NSW geoscience data

In September 2012, the Minerals Resources unit of NSW Department of Trade and Investment released its new Gescientific Data Warehouse (GDW) on the internet. The GDW is the culmination of the COGENT II project (2008–2012) to identify, validate, consolidate and store geoscientific datasets of the highest data integrity secured in perpetuity This represented the first step in fulfilling the vision of "providing on demand access to all validated (non-confidential) corporate geological data stored by Mineral Resources from a single spatial-based interface". The GDW provides access to geoscientific information to attract investment for mineral and petroleum exploration and development and help inform land use decision-making, a major role of the Mineral Resources unit.

The COGENT I project (1995–1999), funded by the NSW Government's 'Discovery 2000' initiative, started the transfer of data to a central, secure environment. COGENT II is a major project of the continuing initiative now called 'New Frontiers', which continues the government program of pre-competitive geophysical surveys, data compilation and delivery, frontier mapping and interpretation.

The GDW is the delivery vehicle for data captured and stored in the geoscientific database application system. Now that this system is in place, users of the GDW will see a steady stream of new and updated datasets from nightly replication.

How it works

The GDW uses Google Earth technology to enrich the functionality and experience of discovering geoscientific data in NSW. Integrating the 3D and layer transparency features of Google Earth with geo-referenced field photos and microphotographs provides a 'virtual field' experience for the user. This experience is shown in the figure that displays data in Google Earth along with simple queries within web pages.

The geoscientific data held in the new database is primarily point data such as field observations, structural readings, geochronology and non-confidential data from exploration reporting. However, the GDW spatial interface also has layers for geological and metallogenic maps and geophysical imagery (geolocated at all zoom levels), current mineral, coal and petroleum titles as well as title applications for minerals, coal and petroleum. The GDW also contains a link to the new Geoscience Product Catalogue and to the DIGS database (of exploration and geoscience reports and maps).

For those who wish to bypass the spatial interface, comprehensive text-based search facilities are available, including geoscientific database data and reports as well as data and images stored in the DIGS database. These are all complemented by a download facility that supports download in multiple formats including shape files, TAB files and CSV.

Maps for mobile devices

A new feature in November 2012 was the addition of a facility to download free statewide geological maps and geophysical imagery to smartphones and tablets. This is a one-off file download over an internet connection. However, the feature does not require an internet connection to display, therefore making these maps available in areas without internet reception. GPS technology embedded in smartphones allows the user to instantly view maps or imagery at their location. Maps used are NSW 1:1 500 000 surface geology, total magnetic image and ternary radioelement image. This facility has proven to be very popular and more maps will be made available for download on an ongoing basis.

Access

The public GDW can be accessed at **http://dwh.minerals.nsw.gov.au/CI/warehouse.**

The entry page has links to demonstration videos and feedback forms.

For maps for mobile devices go to **http://dwh.minerals.nsw.gov.au/CI/warehouse/view/mobileapps.**

Data

Data migration was prioritised with respect to value and risk. For example, radiogenic isotopes were considered the highest priority because of the cost of re-collecting and reanalysing samples, along with storage of records in multiple versions of spreadsheets on the computer network and on individual computers. Resources were allocated to compile, model and migrate data based on their priority. All data have been secured and there is a work plan for implementing the data into the GDW. As a result of finite resources, not all data have been implemented in the GDW at this stage, as shown by the two tables accompanying this article.

Data implemented as of 28 February 2013

Dataset	Description	Records
Radiogenic isotopes	Sample and analytical data for U–Pb, K–Ar, Ar–Ar, Re–Os and Sm–Nd isotopic studies	2 169 samples
Petrological collection	Catalogue and description of thin sections of rock samples	93 126 thin sections
Drillholes — minerals	Minerals drilling (mostly industry exploration data plus department stratigraphic) including collar, survey and lithology data	44 117 collars
Drillholes — petroleum	Petroleum wells — department and industry (coalseam gas, oil, gas) including collar, survey, lithology, other downhole data	864 collars
Drillholes — coal	Coal drillholes (department and industry) including collar, survey, lithology, other downhole data	56 303 collars
Exploration geochemistry — downhole assay	Analytical data for down-drillhole assays reported by exploration companies	2 668 997 samples (represent data from 96 717 drillhole collars compiled from industry exploration reporting)
Exploration geochemistry – surface samples (stream (stream sediments, soils, rock chips and Niton)	Sample and analytical data for geochemical surveys reported by exploration companies	773 817 samples
Photographs — field photos	Embedded location and metadata for image bank	2 500 photos
Field observations	Geological observations, measurements and sample data by department geologists	114 140 locations

Data planned for implementation

Dataset	Description	Records
Seismic	Shot points, line coverage, SEG Y file format and imagery from onshore and offshore seismic surveys (approximately 2500 surveys for about 45 000 line km)	Approx. 45 000 line km (2500 surveys)
3D geology	Vector data representing geological (geophysical) features below the Earth's surface in 3D space	
Petrophysics	Petrophysical properties of rocks (magnetic susceptibility, density and radioelements)	Approx. 5 000 records
Whole-rock geochemistry	Sample and analytical data for whole-rock geochemical samples	Approx. 25 000 records
Paleontology	Sample and descriptive data for fossil samples in NSW to aid stratigraphic and age discriminations	Approx. 65 000 records
Stable isotopes	Sample and analytical data for S, O and other stable isotopic systems	Approx. 3 500 records
Polished blocks	Sample and descriptive data for polished blocks of mineral samples	Approx. 1 775 records
Economic rocks	Sample and descriptive data for economic mineral samples in NSW	Approx. 30 000 records
Radiogenic isotopes (Pb–Pb)	Sample and analytical data for Pb–Pb isotopic studies	Approx. 2 000 records

Case study–drillhole data

The GDW provides access to non-confidential stratigraphic, coal, mineral and petroleum drillhole information from across NSW . Currently all drillhole data, with assay analysis from drilling, are stored using Micromine's Geobank geological data management software. All data are stored in tables in Geobank so data can be migrated from both historical sources and the current data template. Non-confidential data are replicated nightly from Geobank to the GDW.

The first priority of COGENT II is to store location information for drillholes. Data captured include coordinates, title, company, date, purpose, end-depth and Geological Survey (GS) report number for further information via DIGS. The next priority is to capture downhole information such as assay , lithology, geophysical and survey data. The focus to date for capture of these data for minerals drilling has been the Cobar P eneplain Bioregion, to assist mineral explorers and land use planning.

A wealth of drillhole data for NSW is available via the GDW. Image courtesy Ian Percival.

In the GDW, drillhole locations may be viewed by type (coal, mineral or petroleum), whether they are stored in department core facilities (WB Clarke Geoscience Centre at Londonderry and EC Andrews Core Facility at Broken Hill), and whether they have been hyper-spectrally scanned or have associated lithology data. As with other GDW datasets, the data can be queried, viewed in Google Earth, and downloaded into geographic information systems (GIS) or database software.

The availability of drillhole data will allow exploration companies to easily access existing drillhole and associated assay and lithology information for their area of interest, and similarly allow department staff access to subsurface geological information across NSW.

Drilling by the department

Holes drilled by the department include coal resource evaluation drilling, petroleum wells and regional stratigraphic programs. For example:

- A regional drilling program was conducted by the department under the 'Discovery 2000' initiative to assess petroleum potential of the Darling Basin
- 138 shallow air core holes were drilled east of Cobar in the late-1990s as part of the 'Exploration NSW' initiative to improve geological understanding of the area.

Exploration drilling

Reporting of exploration drilling on coal, mineral and petroleum titles to the department is mandatory . Since the late 1990s, minerals drilling activity has been reported by digital submission in data templates in line with the Australian Requirements for the Submission of Digital Exploration Data. Data are now uploaded to Geobank routinely, with all minerals exploration drilling now stored in Geobank. Before digital submission, exploration drilling was submitted in hard-copy reports, scanned into raster format and archived in DIGS. Under the 'New Frontiers' initiative, contractors have been extracting drilling information from DIGS and populating Geobank.

Ongoing work

The GDW simplifies the discovery and accessibility of free geoscientific information to aid mineral and energy exploration, inform land use decision-making and enhance ongoing geoscientific research in NSW. To enable future enhancements, a key feature of the GDW is a feedback form for users to provide comments and suggestions for improving the site and data available.

Contact details

For more information contact
trisha.moriarty@industry.nsw.gov.au
Team Leader, Knowledge Management
Geological Survey of New South Wales

D COLLINS, P GILMORE, J GREENFIELD, T BARLIN and S MEAKIN
Geological Survey of New South Wales
NSW Trade & Investment
516 High Street, Maitland, NSW 2320

OBITUARY

Alec Francis Trendall
1928–2013

Alec Trendall '...cheesemaker extraordinaire'. Image courtesy PE Playford.

Alec Trendall died peacefully at home in Springhaven, near Denmark, WA, after a short illness. The announcement placed in the *West Australian* newspaper by his family aptly describes him: "He was a gentle man with an amazing intellect, who was a respected geologist, cheesemaker extraordinaire and an eternal explorer and seeker of knowledge."

Alec Trendall was born in Enfield, Middlesex, UK, on 8 December 1928, the youngest of a family of four: two girls and two boys. Alec's father worked at the Royal Arsenal at Enfield Lock and moved to the Rifle Factory at Ishapore, Calcutta, India, to work when the post-World War I depression hit the UK. In 1925 the family resettled in Enfield, but 10 years later his parents and the two boys returned to Ishapore and the two girls remained in the UK to continue their education under grandparental guidance. In India, Alec and his brother attended St Joseph's College, North Point, a boarding school in Darjeeling. The scenic Himalayan environment there stimulated a life-long empathy with mountains, wild and remote environments, and most importantly, rocks and geology.

Alec Francis Trendall
BSc (Hons) (London) ARCS
PhD (Liverpool), DSc (London),
DSc (hc) (Curtin)
8 December 1928—4 April 2013

Returning to the UK in 1937 he completed secondary education at Luton Grammar School, where his enthusiasm for geology was reinforced and encouraged by his geography master. In 1946 Alec won a Royal Scholarship to the Imperial College of Science and Technology in London, where he graduated BSc (Hons), ARCS in 1949.

Imperial College was a stimulating place to be. HH Read (the respected international figurehead of the 'granitisation' movement) was head of the department; John Sutton and Janet Watson were working on their PhDs on the Lewisian rocks of Scotland, and the structural geologist W ally Pitcher was a demonstrator. But the person who was to have the greatest influence on Alec's career was Robert Shackleton, who arrived fresh from mapping in Fiji in 1948 to teach a unit in petrology – although the essential message of this course was that the best way to understand the Earth was to get out into the field, make good maps, study the rocks in as much detail as possible, and interpret the evidence on its own merits rather than rely on received opinion. Shackleton supervised Alec's Honours thesis, which involved the complete remapping of Achill Island, off the west coast of County Mayo.

In 1949 Robert Shackleton was appointed Professor of Geology at the University of Liverpool, and invited Alec to join him as a PhD student. Alec jumped at the chance. His research topic was 'The origin of albite gneisses' in a belt of low-grade Dalradian metasedimentary rocks in the Scottish Highlands and Achill Island.

In early 1951 Duncan Carse wrote to Robert Shackleton – a distant cousin of the Antarctic explorer Sir Ernest Shackleton – asking whether he knew of any young geologist, such as a PhD student, who might volunteer to join a six-man expedition to South Georgia that he was organising to survey this major sub-Antarctic island. Shackleton discussed Carse's letter with Alec, who was instantly attracted by the opportunity: Carse and Alec met in London, appropriately on-board Scott's ship *Discovery*! So began Alec's association with South Georgia geology.

Carse led three South Georgia Surveys – 1951–1952, 1953–1954 and 1955–1956 – which are documented in detail in Alec's book *Putting South Georgia on the Map*, published in 2011. Alec was a member of the first two expeditions. On the 195 1–1952 expedition, "Alec ... disappeared down a hole in the snow!" – actually a bergschrund – and sustained a severely dislocated left knee which necessitated his being sent back to England for specialist treatment. In Alec's own words, written 61 years after the event: "The unknown time between falling into the hole and finally emerging at the top marked a dividing point in Alec's life. He had escaped death on the first day of January 1952 by a chance of probably one in billions (how can it be calculated?). He had gone down overconfident, naïve, and too quick to ignore the advice of others. Although he didn't know it, his experiences during the rest of 1952 were to leave him a different person."

During Alec's recuperation Carse asked whether he was interested in going to South Georgia for the 1952–1953 season. Alec declined because: (1) his surgeons advised against strenuous use of his left leg for a year; (2) he needed to write up not only his PhD thesis but also the results of the 1951–1952 fieldwork; (3) he had been offered a lectureship at K eele University; and (4) in hospital he had met Kathleen Waldon, a nurse who had played a major part in his rehabilitation, and whom he planned to marry However, South Georgia continued to call him and Alec accepted Carse' s invitation to join the 1953–1954 expedition while at Keele and sailed south just two months after his marriage.

Alec's geological work was published in two Falkland Island Dependencies Survey (FIDS) Scientific Reports, *The geology of South Georgia I and II.* The British Antarctic Survey (the successor to FIDS) subsequently published a detailed map of the island in 1987, the work involving 1 1 geologists over eight years. The accompanying text stated: "The memoir is dedicated to Alec T rendall, who showed us all the way", a testament to the detailed observations he had made on the two expeditions he took part in.

On his return from South Georgia, and after writing up his geological results, Alec joined the Geological Survey of Uganda (at that time one of the Colonial Geological Surveys) in 1954 as a field geologist. Most of his geological work was in the Karamoja District in northeast Uganda, a sparsely inhabited plateau of

arid savannah about 1 000 m above sea-level, part of the Mozambique Belt, with scattered Cenozoic volcanic mountains rising to 3 000 m. Alec and his family lived in bush camps, first in tents and later with the luxury of a caravan. All three children, Jasper, Justin and Lucy, were born in Uganda. His fieldwork in Uganda was published in a number of Geological Survey of Uganda Records and Reports as well as a much-cited paper on laterite entitled 'The formation of apparent peneplains by a process of combined lateritisation and surface wash' published in *Zeitschrift für Geomorphologie* in 1962.

With Ugandan independence looming, Alec sought new pastures and accepted a position with the Geological Survey of Western Australia (GSWA) as petrologist, moving to Perth with the family in May 1962. He had little idea that the banded iron-formations (BIFs) of the Hamersley Group were to become a consuming interest for the rest of his geological career. This interest grew out of an investigation into the blue asbestos (crocidolite) occurrence in the BIFs of the group in which he was the lead researcher from 1964. It rapidly became apparent that a study of the origin of the BIFs was an important part of this investigation, particularly as these rocks are the primary source of the iron ore deposits that were being actively explored and developed at that time. This work culminated in GSWA Bulletin 119 *The iron formations of the Precambrian Hamersley Group, Western Australia, with special reference to the associated crocidolite*, co-authored with John Blockley.

In pursuing his investigations into BIFs, Alec made many trips abroad to study similar deposits in South Africa, North America, Europe, India and Brazil. His 1968 paper 'Three great basins of Precambrian banded iron formation deposition: a systematic comparison' (published in the *Geological Society of America Bulletin*) was a summary of the first study tour. Alec considered that the microbanding in the BIFs were chemical evaporitic varves and in 1969 he applied for and received a Churchill Fellowship that enabled him to further develop a global context for the geology of the BIFs. One of the results from the trip was his 1971 Presidential Address to the Geological Society of Australia entitled 'Revolution in earth history', where 'revolution' referred to the annual journey of the Earth around the Sun – a typical 'Trendallism'!

Alec received worldwide recognition for his work on BIFs and was invited to participate in one of the Dahlem Conferences organised by the Freie Universität in Berlin. The proceedings of this 1983 conference were subsequently published with a joint editorship of HD Holland and AF Trendall under the title *Patterns of Change in Earth Evolution*. He contributed to and jointly edited (with RC Morris) a book in Elsevier's Developments in Precambrian Geology series *Iron Formation: Facts and Problems*.

Alec recognised that work on the Precambrian rocks of Western Australia depended on accurate geochronological data. He had long been of the opinion that a numerical nomenclature for the Precambrian would enable Precambrian stratigraphy to 'start anew', rather than follow the approach used in the Phanerozoic. He articulated this in his 1966 paper 'Towards rationalism in Precambrian stratigraphy' (published in the *Journal of the Geological Society of Australia*). In 1968 he and John De Laeter (Head of Applied Physics at the Western Australian Institute of Technology (WAIT), now Curtin University) established a joint program whereby GSWA supplied the samples and WAIT did the analyses using, initially, the Rb–Sr technique. Well-defined problems were selected and the resulting papers were published mainly in the GSWA Annual Reports. Over the years other techniques were added. One interesting outcome of this work was the dating of the 'oldest rocks' in the Mt Narryer and Jack Hills regions – summarised in De Laeter and Trendall's 2002 paper 'The oldest rocks: the Western Australian connection', published in the *Journal of the Royal Society of Western Australia*.

Alec was appointed Deputy Director of GSWA in 1970 and was Director from 1980 to 1986. In 1986 he took the unusual decision to step down as Director to become a Principal Geologist and concentrate on geological research.

Alec Trendall in the field – note the safety gear. Image courtesy Alec Trendall.

This resulted in GSWA Report 42 *The Woongarra Rhyolite – a giant lavalike felsic sheet in the Hamersley Basin of Western Australia* published in 1995 and GSWA Bulletin 144 *Geology of the Fortescue Group, Pilbara Craton, Western Australia*, co-authored with Alan Thorne and published in 2001.

One initiative during his term as Director was to produce an updated account of the geology and mineral resources of the State. This was a large task and was uncompleted when Alec retired. However, his successor as Director, Phil Playford, gave Alec the task of overseeing the completion of what became Memoir 3 *Geology and mineral resources of Western Australia*, which was published in 1990 along with a new State geological map.

Alec was active in a number of scientific societies: Secretary of the Western Australian Division of the Geological Society of Australia from 1963 to 1965 and President from 1969 to 1971, Editor of the *Journal of the Royal Society of Western Australia* from 1965 to 1969 and President from 1973 to 1974, Chair of the Perth Branch of the Australasian Institute of Mining and Metallurgy in 1980 and Chair of the Organising Committee of the Perth Conference in 1979. He was also a Fellow of the Geological Society of London and the Geological Society of America.

After retirement in 1990 Alec continued his geological work, particularly in geochronology, and was an Adjunct Professor in the Applied Physics Department at Curtin University, continuing his collaboration with John De Laeter. This culminated in the multi-authored 'SHRIMP zircon ages constraining the depositional chronology of the Hamersley Group, Western Australia' published in the *Australian Journal of Earth Sciences* in 2004. He crystallised his ideas on

the origin of the continents in a 1996 paper A tale of two cratons: speculations on the origin of continents' published in the Royal Society of Western Australia's De Laeter Symposium volume.

He was eventually able to return to the place and time that stimulated his interest in geology when he was offered the chance to write an account of Duncan Carse's expeditions to South Georgia. In 2007 he was fortunate to be able to travel to South Georgia to commemorate Duncan Carse's achievements. The changes between his first visit in 1951 and his last in 2007 are implicit in the title of an SBS documentary of the trip: *Antarctica – the Great Meltdown*. His book was privately published in 2011 under the title *Putting South Georgia on the map*.

Alec received many honours in recognition of his contributions to geology. He was awarded a DSc for his work on BIFs by the University of London, the Clarke Medal of the Royal Society of New South Wales in 1977 and the Gibb Maitland Medal by the Western Australian Division of the Geological Society of Australia in 1987. Trendall Crag in South Georgia is named after him.

Alec always maintained an interest in languages, including Mandarin Chinese and Russian. He was sufficiently fluent in Russian to be able to deliver a geological paper in that language at an International Symposium in Kiev. An accomplished keyboard player he carried a clavichord (the smallest keyboard he could find, but still not really portable) into the field in Uganda and subsequently built a spinet, a harpsichord (his son Justin painted the sound board) and a forte piano from kit sets. I was privileged to hear him play the harpsichord; the beautiful sound from it a tribute to his skill, not only as a player but also as a builder

In 1995 Alec and Kath moved to Springhaven, a property near Denmark on the south coast of WA, where they planted fruit trees, oak trees and banksias and ran a small herd of goats. Here he added cheesemaking to his many interests and I believe perfected a local version of the traditional ash-coated pyramid. Sadly I never tasted his goat cheese.

Truly a man of many talents. We shall not see his like again.

This account of Alec's life was compiled by Tony Cockbain and is based on an auto-obituary started in Albany Hospital on 19 January 2013, supplemented by details from Alec's book *Putting South Georgia on the map*, with assistance from Kathleen and Jasper Trendall, and John Blockley.

Books for review

Please contact the Geological Society of Australia Business Office (info@gsa.org.au) if you would like to review any of the following publications.

New

The Asteroid Impact Connection of Planetary Evolution with Special Reference to Large Precambrian and Australian Impacts
G Glikson
www.springer.com

Re-advertised

Gemstones of Western Australia
JM Fetherston, SM Stocklmayer and VC Stocklmayer

Destiny or Chance Revisited
SR Taylor

From Geomechanics to Geoid Tectonics: the analysis of major geological processes
PM James

Geomechanics Applied to the Petroleum Industry
Jean-Francis Nauroy
www.editionstechnip.com

Essays in Honour of Frederico Waldemar Lange, Pioneer of Brazilian Micropaleontology Continent
EP Bosetti, Y Grahn, JHG Melo
www.editorainterciencia.com.br

Minerals, Metals and Sustainability: meeting future material needs
WJ Rankin
www.publish.csiro.au

Clean Energy, Climate and Carbon
Peter J Cook
www.publish.csiro.au

From the Geological Society of London

The publishing details for the following titles are all published by the Geological Society of London **www.geolsoc.org.uk/bookshop** or **enquiries@geolsoc.org.uk**.

SP293 Metasomatism in Oceanic and Continental Lithospheric Mantle
M Coltorti and M Gregoire

SP337 Petrological Evolution of the European Lithospheric Mantle
M Coltori, H Downes, M Gregorie & SY O'Reilly

SP343 Dinosaurs and Other Extinct Saurians: an historical perspective
RTJ Moody, E Buffetaut, D Naish & DM Martill

SP358 Comparing the Geological and Fossil Records
AJ McGowan & AB Smith

SP362 Military Aspects of Hydrogeology
EPF Rose & JD Mather

Book Reviews

A Short Introduction to Climate Change

T Eggleton
Cambridge University Press, Cambridge, 2013, 240 pages
ISBN 978-1-107-61876-3 (Paperback)

This timely (or perhaps overdue?) book promises a clear, balanced and well-documented explanation of the science of climate change. It not only lives up to this promise but also provides inspiration and context for scientists contributing to our society. It achieves this by providing easy-to-read and well-constructed scientific foundations so readers can contribute thoughtful substance to their own internal debate as well as society's debate and discussion on the topic.

The book commences with the scenario that motived the book's author. Many geoscientists would empathise with this: a simple, informal question about the reality of human-induced climate change. What is inspiring here is that it encapsulates one of the roles for scientists in our society – as the sage custodians of enquiry. It also highlights the challenge of a simple question seldom being met with a simple answer. From here the author takes the reader on a journey through some of the scientific observations of historical changes in the Earth's response to changing climate. Some of these are remarkable cases of earlier annual flowering, earlier grape harvests, acceleration of caterpillar life cycles and reduction in the freezing of water canals in Europe. The book then provides several chapters about the main processes and controls on climate and its variations. These chapters are a credit to the author and his balanced scientific distillation and communication skills. Complicated processes, such as Milanković cycles, sunspot cycles, *El Nino* and *La Nina*, greenhouse gases, sea-level change and paleoclimates are well explained and presented. There are well-researched and representative, peer-reviewed references that substantiate the content as well as offering pathways for further reading and investigation.

This approach of balanced voice of reason among controversy has been a feature of Tony's previous books, such as how he dealt with definitions of terms, such as 'laterite', in his editorial leadership of the *Regolith Glossary*. Tony is not a meteorologist or climatologist; he is a geologist (and one of the world's leading mineralogists and regolith geologists at that!) but he uses his fundamental scientific grounding to offer clear and balanced explanations in a very readable and thought-provoking format. In reading the book I felt that I was receiving a humble gift of clarity and understanding from the author. As an Australian, I found further connection from the many examples coming from our own country, which reinforces that we are all part of a global system.

A further highlight of the book is the way that the author addresses the published arguments and claims that do not support (or 'deny') human-induced global warming (in particular Ian Plimer and Bob Carter). These are addressed thoughtfully and frankly. It will be interesting to see the next phase of discussion on this topic, particularly from Australian authors on both sides of the debate. I suspect the discussion is not over by a long shot (nor should it be), but hopefully this book is successful in raising the bar of justified scientific reasoning on the topic.

It's important to know that this book is out there. I hope that it is widely read and used as an introductory foundation to enquiry, knowledge and discussion on climate change. A scientist's legacy is not always measured by formal citations and equivalent 'factors', but sometimes instead by his or her engagement with and contribution to our lifestyle and society. This book meets a level of excellence that translates into popular discussion, our future existence and well-being. Thank you Tony for taking the time to write this book ahead of the many other journal manuscripts you could have written. I strongly recommend this book to all members of the Geological Society of Australia, as well as to many of my friends and family who want to understand how things work and 'what is going on with all this' climate change science and debate.

STEVEN HILL
University of Adelaide

Faulting, Fracturing and Igneous Intrusion in the Earth's Crust

A volume in honour of EM Anderson
D Healy, RWH Butler, ZK Shipton & RH Sibson
Geological Society of London, Special Publication 367, London 2012, 253 pages.
ISBN 978-1-86239-9, ISSN 0305-8719

The book contains 16 papers/chapters dealing with aspects of faulting and seismic activity, tectonic situations and fluid pressure changes and relationships using examples from very diverse locations. Indeed, the papers offer a most varied collection of cases and case histories — which is the true value of this volume — on which one can add personal experience and thoughts.

Although the book includes 'igneous intrusion' in the title, this aspect is very thinly covered. Read it for fracture mechanisms and stress concepts.

The book was conceived as an appreciation of EM Anderson and several papers deal extensively with the implications of his work. While interesting, these are perhaps a little dated and often lack the balance of more recent thinking. Most contributions, however, extend Anderson's ideas or even avoid or ignore them altogether and offer very modern theory and observations. The introduction by the editors provides a solid summation.

Several papers point out the major flaw in Anderson's argument, in particular his failure to fully appreciate the role of gravitational forces. These are crucial in 'tensional' environments and examples are provided here. The paper by Tingay *et al* describing faulting in evaporates in the Nile Delta points out many shortcomings in classical theory.

Other papers examine various issues, including discussion of stress deflection about salt diapirs (King *et al*), pore-pressure factors and other stress changes during orogeny (eg, Van Noten *et al*) or stress deflections during folding (eg, Healy *et al*); these are extremely valuable and are worth the price of the book. They give the reader modern insights to integrate with classical views. I suspect that some of these papers will become 'classics' in their own right.

In all, this book contains a rounded view of deformation theory. Although the papers are drawn from a wide geographic distribution, Australian interest may be focused on the paper about the recent Christchurch seismicity, and the three Australian papers discussing the (southern) Australian continental margin (Macdonald *et al*, Tassone *et al* and Tuitt *et al*).

The volume concludes with a reproduction of Anderson's classic 1905 paper. This is a very worthwhile addition. The book will be of interest to most structural geologists.

DE LEAMAN
Leaman Geophysics, Hobart

Natural Hazards in the Asia–Pacific Region: recent advances and emerging concepts

JP Terry & J Goff (Eds)
Geological Society of London, Special Publication 361, London 2012, 225 pages.
ISBN 978-1-86239-339-4

This Geological Society Special Publication is a well-presented hard-copy book with 17 independent chapters, thankfully an index and a liberal mix of colour and grey-scale figures.

The first two papers, by the editors, serve as the introduction. Their very first paragraph, second sentence, reads, "In the past few years we have not only experienced the 2004 Indian Ocean tsunami, but also the 2006 Java, 2007 Solomon Islands, 2009 New Zealand, 2010 Chilean and 2011 Tohoku earthquakes and tsunamis".

One might have expected then that the book would include papers about earthquakes but, sadly for me, not so. The editors have compiled an interesting set of papers on tsunamis, cyclones, landslides, volcanoes and monsoonal floods, reflecting their research interests. There is one paper about earthquake catastrophe insurance: all about insurance, not earthquakes.

The book was published in 2012 but there is neither mention of the 2009 Samoan earthquake and tsunami, nor of the 2010–2011 New Zealand earthquake sequence in Christchurch (except for a one-liner in the catastrophe modelling paper). The country with one of the longest coastlines bordering the Pacific, Australia, doesn't rate a mention in the index. Neither do so many other countries of the region such as Papua New Guinea, which are so vulnerable to natural hazards.

The title is rather misleading, which the publishers should have noticed; perhaps it should have been 'Selective samples of natural hazards in ...'.

Having got that off my chest, the papers are most interesting, covering non-seismic hazards in Taiwan, Thailand, India, Philippines, Indonesia, French Polynesia and the broad North Pacific and South Pacific with a strong emphasis on tsunamis and cyclones/typhoons. The two papers on volcanoes in Indonesia and the Philippines were particularly interesting, the latter focusing on the risk to a nuclear power station less than 5 km from an active volcano and near an (active?) fault, a rather alarming scenario with Manila only 60 km away.

The point is strongly made that in estimating natural hazards we should be focusing on the possible big events rather than just the largest event known from the historical record. Paleotsunami and paleoseismology studies are essential tools in forecasting hazards or feeding catastrophe insurance models, work that imitates what volcanologists have been doing for decades dating the organic history of volcanoes.

I am not sure who will buy this book other than non-seismologist natural hazard researchers. The papers present only a limited coverage of the very wide Asian and Pacific regions.

KEVIN McCUE
Adjunct Professor,
Central Queensland University

The Mystery of the Giant Crystals

A DVD film by Javier Trueba
Written and Presented by
Juan Manuel Garcia Ruiz.
Madrid Scientific Films, 2010.
Duration approximately 50 minutes
JP Terry & J Goff (Eds)

The soundtrack to this DVD is supplied in four languages, so initially a choice has to be made from English, Spanish, French and Italian; subtitles are also available in German and Japanese.

Most viewers will be expecting images of the famous selenite crystals in the lead, zinc and silver Naica mine operated by Industrias Peñoles in Chihuahua, Mexico. But that is not the sole topic as the DVD commences with crystals in Spanish mines at Segobriga and Almeria, and also in the Chilean El Teniente mine.

Segobriga, Central Spain

The opening segment is a ten-minute video of a Roman mine in Central Spain from which one-centimetre-thick cleaved slabs of transparent gypsum were extracted for window closures. Crystals suitable for these artefacts were found to be up to 2.1 m (7 ft) long, claimed to be the largest such crystals ever found anywhere. Within this part there are re-enactments of the Roman extraction methods complete with actors in period dress! Towards the end of the segment there are explanations of some elementary crystallographic properties.

Almería, Southern Spain

Part 2 is a seven-minute segment concerning a 19–20th Century mine in which, 50 years after it was closed, mineral collectors discovered a huge geode — 7.6 m (25 ft) 2.1 m (7 ft) 1.5 m (5 ft) — large enough to be climbed into. It is lined with the most beautiful transparent gypsum crystals — and the images of these justify the viewing of a segment that requires patience to wait through the display of school children undertaking experiments.

Naica mine, Northern Mexico

Part 3 is a four-minute introduction to the Naica Mine in Mexico, during which there are images of the renowned Cave of Swords cavity that was discovered in 1910. But rather distractingly the discussion of Naica is interrupted to deviate to a mine in Chile.

El Teniente mine, Chile

So Part 4 is a segment on this copper mine, claimed to have the longest galleries in the world, amounting to 2 575 km (1 600 miles) in length. Some interesting historical images are followed by those taken in the Cave of Crystals — a cavity lined with pyrite and barite crystals and crossed by gigantic crystals of gypsum up to 7.6 m (25 ft) in length. Interesting as this locality is, it presents an unfortunate distraction from the main subject of this DVD.

Naica mine, Northern Mexico

The final 20-minute Part 5 returns to, and is devoted to, the Naica mine and particularly to the Giant Crystal cave, which was discovered in 2000 by miners excavating a new tunnel at a depth of 290 m. In 1975 this level was drained of the hot water in which the crystals grew. To maintain that situation water has to be pumped out at a rate of 87 m^3 (23 000 gallons) per minute.

Within the cavern are gypsum crystals up to 12 m (39 ft) in length, 4 m (13 ft) in diameter and 55 tonnes in weight. These crystals are not being mined but are available for scientific research so there is access through a steel door (later replaced by a plexi-glass wall), which has been built across the opening into the cave.

In the early part of this segment the researchers claimed to be restricted to eight-minute visits as air temperatures reach up to 58°C (136°F) with 90 to 99% humidity. Scientists are seen clambering among the huge crystals without protective clothing and experiencing 'Turkish bath' conditions that fog spectacles. Well-presented animated graphics are used to explain the geology but few examples and results of scientific researches are discussed. The studies mentioned are those being undertaken by geologists in Barcelona to examine the isotopic compositions of anhydrite and gypsum, and by scientists in Granada to measure the rate of growth of crystals placed in the mine waters.

Conclusion

The content of this DVD is unlikely to satisfy professional geologists and might appeal to high school students. But the images are sharp so if you would like to learn about occurrences of very large gypsum crystals in three places other than Naica then this DVD may be well worth watching.

However the information on the main topic, Naica, is out-of-date and has been superseded by the content of five 10-minute video clips that are available online for no cost at:

http://www.youtube.com/watch?v=KSbld57pzm4
http://www.youtube.com/watch?v=co3jDaWzxUc
http://www.youtube.com/watch?v=my0pDEzyjBc
http://www.youtube.com/watch?v=ZcuMek9Dcu0
http://www.youtube.com/watch?v=Kf6ChGLC8Es

The soundtracks are informative but a bit over-hyped; the images are staggering.

PETER C RICKWOOD
University of New South Wales

Hot Deserts: engineering, geology and geomorphology

MJ Walker (Ed.)
Engineering Group Working Party Report, Engineering Geology Special Publications 25, Geological Society of London, London, 2012,
424 pages
ISBN 978-1-86239-342-4

Despite the seeming lack of water within hot deserts over lengthy periods, these regions are remarkably dynamic, and particularly so during and following brief intervals of rainfall. Given the diversity of desert landscapes, however, this volume concentrates on 'hot' mid-latitude arid and hyper-arid deserts where rainfall is uncommon and typically less than 250 and 25 mm per annum, respectively. This beautifully produced and well-illustrated volume provides a general overview of the geomorphological characteristics of hot deserts in terms of their global distribution, the geomorphological processes occurring in desert environments and the suite of landforms, sediments, soils and regolith common to these regions. The central focus is on understanding the general characteristics and processes in these environments so that engineering strategies such as construction activities can be sensitively undertaken in a manner that reconciles the dynamism of these landscapes. The broad scope of the work means that it will appeal to geomorphologists, geologists and engineers.

The work reveals the considerable range of landforms resulting from eolian, fluvial and pedogenic processes, as well as the role of subsurface water and the precipitation of salts. These overviews are very comprehensive and presented to highlight the implications for engineering structures. As Charman points out in the introduction, early western-designed buildings in the Middle East experienced rapid deterioration due to a lack of awareness to the nuances of geomorphological processes in hot desert environments, as well as not considering the use of traditional building materials. In particular, the damaging effects of salt crystallisation associated with capillary rise through soils had been under-appreciated and is very well illustrated within the volume in terms of the damage sustained to buried pipes within only a few years of burial. Similarly, other challenges relate to the stability of concrete, due to the effects of salt heave and the obvious issues relating to actively migrating desert sand.

Chapter 1 sets out the scope and terms of reference of the Engineering Group Working Party in the study of hot deserts, which culminated in the production of this volume. A fold-out map accompanies the chapter, illustrating the global distribution of hot deserts. The defining features of desert regions, causes of aridity and the factors responsible for the diversity of desert regions are explored in chapter 2 as well as a brief consideration of the record of long-term climate change recorded in desert environments. The final section in chapter 2 explores the challenges that face human settlements in desert environments, particularly in the context of population growth. Chapter 3 provides a very comprehensive treatment of geomorphological processes and resultant landforms in deserts. Topics covered include weathering processes and resultant forms, eolian processes and landforms, desert hydrology and fluvial landforms, the influence of subsurface water and the subtleties of sabkha, playa and salina environments.

Hazards and the desert ground model are explored in chapter 4. Hazards are considered in terms of both a suite of natural events and also human-induced events relating to technological developments. An elegant aspect of this chapter is a photographic catalogue of representative desert landforms at a range of spatial scales and of contrasting origin (eg, due to structural, weathering, erosional and depositional processes). Potential hazards associated with these landforms are briefly outlined. Chapter 5 concentrates on the description of soils and rocks within desert landscapes and provides a brief overview of regolith and duricrusts, primarily within an applied, engineering context. The application of remote sensing and geographic information systems (GIS) in the study of hot deserts is examined in chapter 6. This chapter explores the general strategies in formulating a research project within a hot desert environment from the early 'desk-based' survey design stage, followed by field reconnaissance through to the effective application of GIS technologies. Ground investigation, testing and interpretation of results are explored in chapter 7. A range of analytical approaches for subsurface sediment analysis from simple trial pits to drilling and geophysical methods are described. Several case studies are presented and a general summary is provided for a range of analytical techniques and the common sources of error in their application.

The engineering behaviour of desert soils is covered in chapter 8, which examines the mechanical characteristics of soils under contrasting moisture conditions. The role of expansive clays, salts and the mechanics of cemented soils are also considered. The final two chapters examine materials for construction in deserts and engineering design and construction. This is followed by appendix A, a fold-out block diagram model of the essential geomorphological features of desert environments and a comprehensive glossary of geological, geomorphological and engineering terms. Overall, this is an excellent work providing a very comprehensive and authoritative overview of hot desert landscapes that will appeal to a wide audience. It will be of immediate appeal to civil engineers working in these environments and can be applied in a range of teaching contexts in applied geology, geomorphology and engineering.

COLIN V MURRAY-WALLACE
University of Wollongong

Shaping a Nation: a geology of Australia

In *TAG* 166 (March 2013), a book review on *Shaping a Nation* incorrectly stated the book weighed 8 kg. In fact, the book only weighs 4.4 kg — not such a weighty tome.

The book includes a major resource in the accompanying DVD.

Also not included in the review was that *Shaping a Nation* is available for free at ANU EPress. [—*Eds*]

Editor's correction

In *TAG* 166 (March 2013), Special Report 2 *Earth Science Western Australia* stated the authorship was Jim Ross and Jo Whelan. The authorship should have been published as Jo Whelan and Jim Ross.

Calendar

2013

14–19 July

Specialist Group in Geochemistry, Mineralogy & Petrology (SGGMP) — Rocks, Reef and Rainforest

Mission Beach, Qld

http://sggmp2013.webs.com/

15–19 July

Practical Aspects of Reservoir Engineering

UNSW

http://www.petrol.unsw.edu.au

22–26 July

Fundamentals of the Oil & Gas Industry

UNSW

http://unsw.edu.au

11–14 August

ASEG–PESA 2013 — 23rd International Geophysical Conference and Exhibition

Melbourne, Australia

http://www.aseg-pesa2013.com.au

11–14 September

Mines & Wines 2013

Orange Ex-Services Club, NSW

http://www.aig.org.au

25–27 September

International Symposium on Slope Stability in Open Pit Mining and Civil Engineering

Sofitel Brisbane, Central Hotel, Queensland

http://www.slopestability2013.com

GSA members can attend this GNS conference at member rates — ask how!

24–27 November

Geosciences 2013

University of Canterbury, Christchurch, New Zealand

http://www.geosciences2013.org.nz

2014

2–8 February

Meeting of the Specialist Group in Tectonics and Structural Geology

Thredbo, NSW
Welcome BBQ and cricket match Sunday 2 February

Email Gordon Lister
gordon.lister@anu.edu.au

7–11 July

Australian Earth Sciences Convention — AESC 2014

Geological Society of Australia biennial conference
Newcastle, NSW

Geological Society of Australia Inc. Office Bearers 2012–2014

MEMBERS OF COUNCIL AND EXECUTIVE

President
Laurie Hutton
Department of Natural Resources and Mines (DNRM)

Vice President
Ian Graham
University of New South Wales

Secretary
Victoria Gallagher

Treasurer
David Trezise

Past President
Brad Pillans
Australian National University

Hon Editor
Australian Journal of Earth Sciences
Anita Andrew

COUNCILLORS OF THE EXECUTIVE DIVISION

Michelle Cooper
Geoscience Australia

Katy Evans
Curtin University

John Rogers
Australian National University

Christine Edgoose
NTGS – Dept. Primary Industries, Fisheries & Mines

John Greenfield
Dept. of Industry and Investment - Primary Industries & Energy

STANDING COMMITTEES

Geological Heritage
National Convenor
Margaret Brocx

Australian Stratigraphy Commission
National Convenor
Cathy Brown

STATE CONVENORS

ACT, External Territories
Albert Brakel

New South Wales
Lawrence Sherwin
Geological Survey of New South Wales

Northern Territory
Tim Munson
Northern Territory Geological Survey

Queensland
Ian Withnall
Geological Survey of Queensland

South Australia
Wayne Cowley
Primary Industries & Resources South Australia

Tasmania
Stephen Forsyth

Victoria
Fons VandenBerg

Western Australia
Roger Hocking
Geological Survey of Western Australia

DIVISIONS AND BRANCHES

Australian Capital Territory
Chair: John Rogers
Australian National University
Secretary: Tim Hobern
Geoscience Australia

New South Wales
www.nsw.gsa.org.au
Chair: Ian Graham
University of New South Wales
Secretary: Dioni Cendon
ANSTO

Northern Territory
Chair: Christine Edgoose
Northern Territory Geological Survey
Secretary: Jo Whelan
Northern Territory Geological Survey

Queensland
www.qld.gsa.org.au
Chair: Ian Withnall
Geological Survey of Queensland
Secretary: Aldo van Heeswijck
Salva Resources

South Australia
www.sa.gsa.org.au
Chair: Kevin Wills
Secretary: Anna Petts
Flinders Mines

Tasmania
Chair: Garry Davidson
CODES
Secretary: Mark Duffett
Mineral Resources Tasmania

Victoria
www.vic.gsa.org.au
Chair: David Cantrill
Royal Botanic Gardens
Secretary: Adele Seymon
GeoScience Victoria

Western Australia
www.wa.gsa.org.au
Chair: Trevor Beardsmore
Geological Survey of Western Australia

Broken Hill Branch
Chair: Barney Stevens
Geological Survey of New South Wales
Secretary: Kingsley Mills

Hunter Valley Branch
Chair: John Greenfield
Geological Survey of New South Wales
Secretary: Phil Gilmore
Geological Survey of New South Wales

SPECIALIST GROUPS

Applied Geochemistry Specialist Group (SGAG)
www.sgag.gsa.org.au
Chair: Louisa Lawrance
Secretary: Craig Rugless

Association of Australasian Palaeontologists (AAP)
www.es.mq.edu.au/mucep/aap/index
President: Gregory E. Webb
University of Queensland
Vice-President: Jim Jago
University of South Australia
Secretary Gilbert Price
University of Queensland

Australasian Sedimentologists Group (ASG)
Chair: Bradley Opdyke
Australian National University
Secretary: Sarah Tynan
Australian National University

Coal Geology (CGG)
www.cgg.gsa.org.au
Chair: James Beeston
Secretary: Joan Esterle

Earth Sciences History Group (ESHG)
www.vic.gsa.org.au/eshg.htm
Chair: Peter Dunn
Secretary: John Blockley

Economic Geology Specialist Group
sgeg.gsa.org.au
Chair:Chris Yeats
CSIRO
Secretary: Rob Hough
CSIRO

Environmental Engineering & Hydrogeology Specialist Group (EEHSG)
Chair: Ken Lawrie
Geoscience Australia
Secretary: Steven Lewis
Geoscience Australia

Geochemistry, Mineralogy & Petrology Specialist Group (SGGMP)
www.gsa.org.au/specialgroups/sggmp.html
Chair: Hugh O'Neill
Australian National University
Secretary: Kurt Knesel
University of Queensland

Geological Education (SGE)
Chair: Greg McNamara
Geoscience Education & Outreach Services

Planetary Geoscience Specialist Group (SGPG)
Chair: Graziella Caprarelli
University of Technology

Solid Earth Geophysics Specialist Group (SGSEG)
www.gsa.org.au/specialgroups/sgseg.html
Chair: Nick Rawlinson
Geoscience Australia
Secretary: Richard Chopping
Geoscience Australia

Tectonics & Structural Geology Specialist Group (SGTSG)
www.sgtsg.gsa.org.au
Chair: Gordon Lister
Australian National University
Secretary: Richard Blewett
Geoscience Australia

Volcanology (LAVA)
www.es.mq.edu.au/geology/volcan/hmpg.html
Chair: Rick Squire
Monash University
Secretary: Karin Orth
University of Tasmania

The Australian Geologist

Background information

The Australian Geologist (TAG) is a quarterly member magazine which includes society news, conference details, special reports, feature articles, book reviews and other items of interest to Earth Scientists. Each issue has a long shelf-life and is read by more than 3000 geologists, geophysicists, palaeontologists, hydrologists, geochemists, cartographers and geoscience educators from Australia and around the world.

Schedule and deadlines for 2013–2014

Issue	Copy	Finished Art	Inserts
September 2013	29 July	9 August	23 August
December 2013	25 October	1 November	8 November
March 2014	31 January	7 February	28 February
June 2014	28 April	2 May	23 May

Artwork

Material can be supplied electronically via Email or mail CD (MAC or PC). The advertisements or photographs can be sent as jpeg, eps or tiff. W ord files are not accepted as finished art (please convert to pdf). Do not embed logos, images/pictures in W ord documents. If artwork cannot be supplied in any of the preferred formats listed above, an additional production/typesetting fee will be charged. Material must be minimum of 300 dpi for JPEG, EPS or TIFF formats. Logotypes or line symbols 800dpi or larger, eps or tiff. If advertisements are two colour, black plus one spot colour, please supply as black and magenta. If finished art is to be provided for the advertising material supply by the copy deadline (see above). CDs will be returned upon request only. Please contact the Geological Society of Australia for more information or to discuss other options.

Advertising rates and sizes

Full colour advertising is available for inside-front and inside-back covers as well as the middle spread. Advance bookings are essential for colour advertising. Spot colour for other pages is available on request. Basic rates quoted are for finished art supplied in one of the file formats specified above. Discount rates apply where the same material is run in two issues within a calendar year. Where typesetting is required, only one typesetting fee is charged for multiple advertisements. Please note that an additional 10% GST applies to all advertising.

Details		1 issue	2 issues	Typesetting
Full Page	*250mm deep x 180mm wide (Type area)* *Full page Trim 275mm x 210mm plus 5mm Bleed*			
	Colour	$1350	$1280	$tba
	Spot colour	Price on request		
	Black and White	$750	$703	$tba
1/4 Page	*125mm deep x 88mm wide*			
	Black and White	$200	$180	$tba
1/2 Page Horizontal	*125mm deep x 180mm wide*			
	Black and White	$375	$350	$tba
1/3 Page Horizontal	*80mm deep x 180mm wide*			
	Black and White	$290	$270	$tba
2 Column Horizontal	*125mm deep x 119mm wide*			
(3 Column Page)	Black and White	$410	$390	$tba
1 Column Vertical	*250mm deep x 57mm wide*			
(3 Column Page)	Black and White	$410	$390	$tba
INSERTS *(as supplied)*		per issue	per issue	
A4 size		$1285	$1180	

Colour Advertorials or Feature Articles
Three to four page colour advertorials are accepted at a negotiable cost.
It is requested however that these articles have a geological theme.

Black and White Advertorials Cost negotiable.

Contact Sue Fletcher, Executive Director Geological Society of Australia Inc
Suite 61, 104 Bathurst St, Sydney NSW 2000
Tel: 02 9290 2194 Fax: (02) 9290 2198 Email: info@gsa.org.au

Publishing Details

GENERAL NOTE

The Australian Geologist (TAG) is published by the Geological Society of Australia Inc four times a year, March, June, September and December.

COPYRIGHT

BUSINESS CORRESPONDENCE

Advertising/Membership: All business enquiries and correspondence relating to advertising space, inserts and/or subscription matters, should be addressed to the Business Manager of the Society.

EDITORIAL MATTERS

Contributions: All editorial enquiries or contributions should be sent to tag@gsa.org.au or mailed to the GSA business office.

Contributions are preferred as email. MS W ord documents for PC (or compatible) are the preferred file attachment. Photos, maps, etc, should be submitted as separate files and saved as either a .tif .pdf or .jpg at a resolution greater than 300 dpi. If contributors produce a file greater than 3MB it would be appreciated if they could be copied to CD and forwarded to the Hon Editor . Short clearly typed contributions (up to ~1000 words) are accepted, should a member be unable to send an email. The editor reserves the right to reject, revise and change text editorially.

Photographs: Cover photograph submissions should preferably be digital taken at a resolution greater than 300dpi. W eb resolution images and colour prints (unless exceptional) are not of sufficient quality for full colour printing.

Colour transparencies are also acceptable. Photographs for articles may be prints, slides or digital images; they may be black and white and colour.

Back issues are available for sale at $5 plus postage and handling. To order email publications@gsa.org.au