### THE VICTORIAN GEOLOGIST



September 2013

THE GEOLOGICAL SOCIETY OF AUSTRALIA
Victoria Division

### Selwyn Lecture

Thursday 26th September at 6:15 p.m.

Why should we be interested in Intra-plate Continental Basaltic Volcanic Provinces? Reassessing what we know about the Newer Volcanics Province, SE Australia.

### **Emeritus Professor Ray Cas, School of Geosciences, Monash University**

Fritz Loewe Theatre, School of Earth Sciences, University of Melbourne Talks will be preceded by drinks from 5:30pm in the 4th floor tearoom, cost \$2.

The Selwyn Dinner will take place following the seminar at Cafe Italia. Please RSVP to Adele Seymon (aseymon@gmail.com OR 0403 269 462 by September 24th.

Intra-plate Continental Basaltic Volcanic Provinces (ICBVPs) are a long ignored species of volcanic system. They have never been viewed as being sexy as large volcanoes such as large conical stratovolcanoes and explosive calderas or supervolcanoes have been. However, as the world's population increases, and settlements encroach more onto volcanoes, the hazards to society from even the small volcanoes of ICBVPs are becoming more apparent, and there is just a renewed research interest internationally in wanting to find out what makes these volcanic systems tick.

ICBVPs can be considered to be "leaky" volcanic systems, fed by repeated small but intriguingly variable magma batches that produce multiple small volcanoes distributed over a large region, rather than a single central vent edifice. What factors cause them to form and what controls where, when and how they erupt?

Continued on page 2...

### **A**BSTRACT

The Newer Volcanics Province (NVP) of western Victoria and southeastern South Australia is one of the largest ICBVPs in the world, covering an area of >23,000 km2, and known to have ~400 volcanoes. It ranges in age from 4.6 Ma to Recent. Its morphological expression is extensive plains forming lava flows and point source volcanoes. Although the volcanoes of ICBVPs are commonly considered to be monogenetic and monomagmatic. Intriguingly, volcanism began and has continued at a time when southeastern Australia was/is in a state of compression. Was the volcanism the result of Australia drifting over a mantle hot-spot or decompressional mantle melting consequent upon continental Gondwana rifting, lithospheric edge-driven melting or trans-tension related decompressional melting?

Recent research on the NVP at Monash has identified

- Subtle variations in erupted magma compositions from single volcanoes (e.g. Mt Gambier, Purrumbete, Mt Rouse)
- Improved understanding of the subsurface structure of maar volcanoes using geophysics and modeling
- Factors which have influenced changing eruption styles in monogenetic volcanoes
- The value of remote sensing in producing maps and relative stratigraphies in ICBVPs
- Eruption magnitudes, potential hazards similar to the 2010 Eyjafallajökull eruption, Iceland.

However, patterns of eruption age migration, provincialism in compositions of erupted products, and understanding of where future eruptions will occur remain obscure due to inadequate data that has a sound regional scale chrono-stratigraphic framework. Understanding of the dynamics of ICBVPs requires new generation maps combined with new strategic geochronology and geochemistry to be able to assess what patterns exist regionally.

### MEMBER SURVEY

Due to the ongoing poor attendace at the monthly GSAV meetings, the GSAV committee is seeking feedback from members on what they desire at these meetings. The 7 question long survey is fully anonymous and will be vital in assessing the future direction of GSAV monthly meetings.

The survey can be completed online at http://www.surveymonkey.com/s/M7JYTWR and should take no more than 10-15 minutes of your time. For those receiving a hard copy of TVG, responses can be completed online or on the included flyer and returned to GPO Box 2355, Melbourne, 3001.

### **2013 SELWYN MEDALLIST**

The 2013 Selwyn Medallist is Ross Cayley. A short bio, accompanied by the nomination form, are provided over the following pages

Ross Cayley graduated from the Melbourne University in 1988. He joined the Geological Survey of Victoria (GSV) in 1990 to begin work as a mapping geologist (with a structural bent) producing regional-scale geological maps, reports and wild-ideas. Ross has helped GSV teams develop geological maps and datasets and interpretations of geophysical dataset across Victoria.

Ross' first few projects were in western Victoria, most notably in partnership with David Taylor. Western Victoria turned out to be a structural geologist's paradise, and GSV work culture the perfect environment to get results. Key results were recognition of the Moyston Fault as a major craton-directed thrust and the terrane-scale boundary between the Delamerian and Lachlan Orogens. Tectonic melange was recognised within the high-grade Moornambool Metamorphic Complex, and a structural model developed that linked movement on the fault to the formation and exhumation of this broad, complex hangingwall region. Another highlight was remapping of the Grampians Ranges, revealing them as an extensionally-segmented thrust-and-fold belt.

Since the 1990s Ross has worked in larger GSV project teams on out-of-sequence thrusts along the eastern margin of the Melbourne Zone (the Mount Useful Fault Zone), in the Glenelg River Metamorphic Complex of far western Victoria, the Omeo Metamorphic Complex, the rugged terrain of the Tabbeabbera Zone, and the goldfields rocks of central Victoria, including project-managing the Walhalla-Woods Point-Tallangallook project. A career highlight was the landmark GSV publication 'The Tasman Fold Belt System in Victoria'. Ross also contributed to several chapters of the 3<sup>rd</sup> edition of the Geology of Victoria, published by the GSA (Victorian Division) in 2003.

Ross is currently a Senior Geologist for GSV, these days specialising more in structural geology and regional-scale tectonics, and implications for prospectivity. The concept of the 'Selwyn Block' of Precambrian continental crust buried beneath central Victoria explained the long-debated link between Tasmania and the Australian mainland and introduced a controversial new tectonic model for the entire western Lachlan Orogen. This work led to the opportunity to help design, acquire and interpret regional-scale deep seismic transects across parts of the state in collaboration with Geoscience Australia, the pmd\*CRC, private industry and AUSCOPE. The emerging results, combined with over 20 years of field research, underpin a statewide 3D geological model of Victoria developed by GSV. Work currently in progress is collaborative research to further resolve the geometry f the Delamerian-Lachlan transition in western Victoria, and to further develop a mega-fold model with implications for the evolution of the whole of the Lachlan Fold Belt. Ross lives in Melbourne with long-suffering partner Jane.



### **Department of Primary Industries**

13 August 2012

Selwyn Award Committee GSA Victorian Branch

Dear Ingrid,

1 Spring Street GPO Box 4440 Melbourne Victoria 3001 Australia Telephone: (03) 9658 4000 Facsimile: (03) 9658 4400 ABN 42 579 412 233 DX 210404

We, the undersigned, would like to nominate Ross Cayley for the 2012 Selwyn Medal. Ross has, over the last two decades, made an outstanding contribution towards an understanding of the Palaeozoic tectonic structure and development of Victoria.

During the period 1990 to 2005 Ross has been a leading light in providing structural geology input to many regional geological mapping programs conducted by the Geological Survey of Victoria. As both the sole or lead author on a number of landmark papers over the last decade, as well as a major contributor to both the 2001 GSV Tasman Fold Belt System in Victoria volume and the 2003 GSA Geology of Victoria volume, Ross has been instrumental in pulling together a coherent model for the 4D development of Victoria during the Palaeozoic.

Ross was a leading contributor to several important geological advances such as the Selwyn Block model and the evolution of the region surrounding the Moyston Fault. These are groundbreaking concepts that have changed the way we view Victorian geology.

Ross's drive and enthusiasm were major factors in the successful organisation and execution of the 2006 and 2009 onshore seismic transects. He subsequently made a major scientific contribution towards the interpretation of the survey results.

While Ross would be the first to admit that much of this work has been facilitated by the environment of teamwork and commitment of geoscientists at the GSV, his colleagues would agree that Ross's 'Eureka moments' have been pivotal in advancing our understanding of what was where and when during the development of the Lachlan Orogen in southeastern Australia.

We believe that Ross is a worthy recipient of the Selwyn Medal.

Yours sincerely

Peter O'Shea

Clive Willman

Vince Morand



### **STUDENT CONTRIBUTION**

Caitlin Gionfriddo
PhD Candidate
School of Earth Sciences, University of Melbourne
GSAV Student Scholarship Recipient

For the past three years I have been involved in research projects at the University of Melbourne that investigate the biogeochemical transformations of mercury in the environment. My work has focused on the biotic production of the neurotoxin methylmercury in a range of environments: contaminated land, geothermal systems, and now polar environments. With the support of a GSAV Student Scholarship I was able to attend the International Conference on Mercury as a Global Pollutant (ICMGP) in Edinburgh, Scotland. The conference is the leading forum for mercury research, attracting top scientists, industry leaders, and political advisors to debate advances in environmental mercury research and policy. This year's conference was particularly important as it preceded the launch of the United Nations Environment Program's (UNEP) Legally Binding Instrument on Mercury, also known as the Minamata Convention. As a mercury researcher who is interested in how science informs policy and impacts industries, this was an extremely valuable conference for me to attend.

Why study mercury? Mercury is known for its severe toxicological affects, and is most toxic in its organic form as methylmercury. In the environment, anthropogenic mercury is converted to methylmercury by bacteria, and can then biomagnify up the foodweb. Our primary exposure to mercury comes from consumption of freshwater and saltwater fish. My research focuses on how mercury is transformed by bacteria prior to human exposure, and the mitigation of the environmental production of methylmercury. As a PhD candidate, I am investigating the transformation of mercury in the sea ice zone of East Antarctica. Recent studies have demonstrated that Antarctica is affected by anthropogenic emissions of mercury, and a significant amount of mercury is deposited (mainly in snowfall) both on the continent and across the sea ice every spring. Every year ~15 million km<sup>2</sup> of first year sea ice surrounds the Antarctic continent. The sea ice plays a critical role in defining marine food webs and provides a unique ecological niche that may host microorganisms capable of methylating mercury. Despite this, very little is known about the contribution of methylmercury from the sea ice environment to resident aquatic organisms in the Southern Ocean. At the ICMGP, I gave an oral presentation of my results thus far, which are some of the first reported values of total mercury and methylmercury for first year sea ice in Antarctica. I was presenting in a session focused on mercury in polar regions, and many talks addressed how a changing climate, particularly a decrease in ice cover, might affect the biogeochemical cycling of mercury at both the poles. Since my project is quite unique in its scope, and provides new insight into methylmercury concentrations in sea ice, I had attracted a fair amount of interest in my work following the presentation.

In addition to a talk, I presented a poster on my Masters research, which I also conducted at the University of Melbourne. This work focused on mercury transformations in a contaminated mine site and natural geothermal system. Mercury research tends to be dominated by North American and European groups, therefore attending the ICMGP and presenting twice allowed me to draw attention to my work in Melbourne, and lay down contacts for future opportunities. Out of all the sessions I attended during the week, I found the talks focused on a genetic basis for mercury methylation (identifying the genes responsible for microbial methylation of mercury), and mercury isotope studies (identifying isotope signatures for mercury sources and transformations) to be the most valuable and interesting for my future research. By the last day of the conference my voice was hoarse from talking with colleagues. Overall I felt the conference was a success, and the contacts I made will be invaluable to my career. I am extremely grateful to the GSAV for their financial support.



### The Royal Society of Victoria has been an active and vital part of Melbourne's scientific heritage

since 1854. Membership is open to anyone interested in the community. Members enjoy the benefits of access to science and the promotion of science for the benefit of support a range of activities promoting science such as symposia, a public lecture series, science prizes and the Society's historic hall in the heart of the city and student awards and a publication program.



### Victoria's Energy Future:

## Prospects and Challenges

### FREE Public Forum

Wednesday 23rd October, 6:30pm - 8:00pm Museum Victoria Theatre

Carlton Gardens, 11 Nicholson Street, Carlton

Booking essential www.trybooking.com/51895

### Symposium

Friday 25th October, 9:00am - 5:00pm and Saturday 26th October, 9:30am - 1:00pm

8 La Trobe Street, Melbourne The Royal Society

Booking essential www.trybooking.com/53416



### Victoria's Energy Future: Prospects and challenges Wednesday 23rd October

**Public Forum** 

### MUSEUMVIC For registrations on or after 21st September .\$170

.\$150

Early Bird - Non-member. Early Bird - Member..... Full time student ....

For registrations up to 20th September Symposium Registration

solarcorp
S
E NO TO S NOT

solarcorp
E JANIOS KORS

Closing remarks

8:00pm

Costs include lunch and all refreshments

Full time student. Non-member.

	6:35pm - 6:55pm 6:45pm - 7:15pm	6:30pm Opening Remarks President of RSV, Dr Bill Birch and Ch Mr Rob Gell 6:35pm - 6:55pm Overview of Global / National picture of energy resour Mr Tony Wood, Grafton Institute, Melbourne 6:45pm - 7:15pm Sandiford, Melbourne Energy resources Professor Mike
TORIA	7:15pm - 7:35pm 7:35pm - 8:00pm	A Local view, Hepburn wind community Vir Simon Harnes-a-court, Director of Embark Project Panel discussion Chair: Vir Rob Gell, Executive Director bhine Group Ptv. Hd

## Symposium Day 1 Friday 25th October

Welcome/Introductory Remarks President of RSV, Dr Bill Birch 8:50am - 9:00am

Principal consultant - Carbon & Energy Team, Pitt & Sherry Energy Requirements for Victoria Mr Phil Harrington Brown coal: Unlocking Victoria's potential Dr Len Humphreys, CEO, Ignite Energy Panel discussion **Present Energy Resources** 10:00am - 10:30am 9:30am - 10:00am 9:00am - 9:30am

Morning tea 10:30am - 11:00am Australia's gas future: How Victoria can stay ahead of the pack Ms Kerrie-Anne Lanigan, ExxonMobil, Director of Gas 11:00am - 11:20am

The Development of Carbon Capture and Geological storage in Victoria Dr Maxwell Watson, CRC for 11:20am - 11:40am

Carbon Capture and Storage: Biological Dr Watter Jehne,

11:40am - 12:00pm

Panel discussion

12:00pm - 12:30pm

### New Resources/Impacts of Energy Generation on Health and the Environment

Lunch

12.30pm - 1.30pm

Wind power in Victoria Mr Tom Keddie, Executive Manager Geothermal energy: Shallow sources Prof. Ian Johnston, cal Director, Hot Dry Rocks Phy Ltd Solder Associates Chair of Geothermal Engineering, Geothermal energy: Deep sources Dr Graeme Jniversity of Melbourne Panel discussion 1:30pm - 1:50pm 1:50pm - 2:10pm 2:10pm - 2:30pm 2:30pm - 3:00pm

Affernoon tea 3:00pm - 3:30pm

or, Australian Academy of Technological Sciences and prospects for Victoria Dr Vaughan Beck, Senior Technica Unconventional Gas: shale and coal seam and some 3.30pm - 4.00pm

Prof. John Thwaites, Chair, Monash Sustainability Institute and Tracking Australia's progress to a low carbon economy

4:00pm - 4:30pm

Panel discussion

4:30pm - 5:00pm

## Symposium Day 2 Saturday 26th October

Solar energy: small and large installations Dr David Ferrari, Wind and Tidal Mr Eoghan Quinn, Project Engineer, Marine Waste to energy Mr John Sanderson, Principal invironmental Engineer Earth systems 10:10am - 10:30am 9:50am - 10:10am 9:30am - 9:50am

Panel discussion 10:30am - 11:00am

11:00am - 11:30am Morning tea

## Impact of Energy Generation on Health

What is the evidence for potential health impacts from wind power? A/Prof. Marion Carey, Monash Sustainability 11:30am - 11:50am

Impact of energy generation on health: Unconventional gas Dr Helen Redmond, Doctors for the Environment 11:50am - 12:10pm

4/Prof. Linda Selvey, Curtin University School of Public Health The impact of coal-fired power generation on health 12:10pm - 12:30pm

Summing up and close Dr Bill Birch, President RSV Panel discussion

12:30pm - 1:00pm









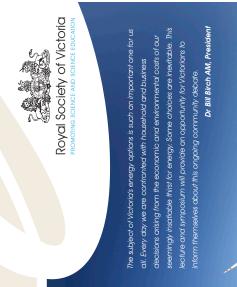
W www.royalsocietyvictoria.org.au 8 La Trobe Street, Melbourne, Victoria 3000 Australia F +61 3 9663 2301 T +61 3 9663 5259 E rsv@sciencevictoria.org.au

# Victoria's Energy Future:

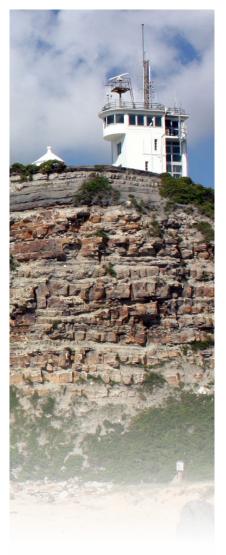
Prospects and Challenges

23rd October, 6:30 - 8:00pm Melbourne Museum **Public Forum** 

26th October, 9.30am - 1:00pm 25th October, 9:00am - 5:00pm Royal Society Hall Symposium











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 be based around the themes of 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.

### Plan your trip to Newcastle

Call for Abstracts:

October 2013

Abstracts Deadline:

March 2014

The website is coming soon, in the interim please contact:

info@gsa.org.au

Presentation: Oral and poster

Registration: early 2014

### Workshops and field trips:

The convention invites proposals for short courses, workshops and field trips.

### **Exhibition:**

The convention will host an exhibition. We welcome 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:**

info@gsa.org.au

### **Convention location:**

Newcastle City Hall

T + 61 2 9290 2194 F + 61 2 9290 2198

Email: info@gsa.org.au

Convention Website: coming soon



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

### **THEMES**

### Energy

Increases in the global demand for energy has been driving advances in the efficiency of coal and conventional hydrocarbon extraction, while also urging 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 to be stimulated by the 'Energy 2050' public forum, 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. Discovery will be stimulated by new technologies, new methods of data interpretation and dissemination, refined and novel understandings of mineral systems and ore environments, and the strength of the pre-competitive geological and geophysical data sector, all addressed under the Resources theme.

### **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 outcome of the International Ocean Drilling Program), assessments of the state and future of our ground- 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, and 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 palaeontological approaches; investigate the major events in the evolution of life, the hydrosphere and atmosphere; and draw contrasts and comparisons with other planets.

### **SYMPOSIA**

39<sup>th</sup> Symposium on the Advances in the Study of the Sydney Basin Comparisons & Contrasts in Circum-Pacific Orogens

T + 61 2 9290 2194 F + 61 2 9290 2198

Email: info@gsa.org.au

Convention Website: coming soon

### **STUDENT FUNDING OPPORTUNITIES**

### Geological Society of Australia (Victoria Division) Student Research Scholarships

The GSAV are pleased to offer up to \$10,000 per year in scholarships available to honours and postgraduate students for assistance with travel costs associated with conferences and field work.



The scholarship is valued at up to \$500 for travel within Australia and \$700 for travel outside of Australia. The number of and value of the scholarships awarded each year is made at the discretion of the GSA(Vic) committee.

Funding will not be granted retrospectively and applicants are asked to submit forms no later than 6 weeks prior to their trip to give the committee time to consider the application.

Students that receive this scholarship are required to submit a report for publication in the newsletter, "The Victorian Geologist", following their trip. A presentation may also be requested by the committee, which will consist of a short, 10-15 minute presentation prior to the monthly seminar.

Applications forms can be scanned and emailed to: secretary@vic.gsa.org.au

or mailed to:

Geology Research Scholarships Victoria Geological Society of Australia (Victoria Division) GPO Box 2355 Melbourne VIC 3001

More information including eligibility criteria can be found on the form and by contacting Barbara Wagstaff (wagstaff@unimelb.edu.au)

### Something interesting to share? Want to see your name in print?

Don't be bashful, contribute to the GSA(V) monthly newsletter!

If there are any events, happenings, news, or views that would be of interest to the membership, please send your details and information to Matt Bliss at mbliss@student.unimelb.edu.au

We'd be glad to hear from you

### FORTHCOMING SEMINARS AND EVENTS

to be presented at GSA (Victoria Division) meetings

Note: unless otherwise indicated, all 2013 talks will be held in the Fritz Loewe Theatre, Earth Sciences Building, University of Melbourne.

October 31st

**TBA** 

November 28th

Liz Rogers

Diving Exploration and Cave Geology

on the Nullabor

Please welcome our newest members

No new members

Visit the GSAV on www.vic.gsa.org.au or the GSA on www.gsa.org.au • Renewing your GSA membership is easy - it can now be done online. •

### **CONSIDER CONTRIBUTING TO TAG!**

It is member contributions which make TAG a member magazine – please keep the contributions coming and assist with informing all of the membership (not just your Division) about your activities.

Please send your news to: tag@gsa.org.au



### GSA (VICTORIA DIVISION) COMMITTEE

Please address all correspondence to the GSA Victoria Division GPO Box 2355, Melbourne, VIC, 3001 Internet address: www.vic.gsa.org.au

OFFICE BEARERS COMMITTEE

Chair:David Cantrill9252 2301 (BH)David Moore0409 977 120Vice-chair:position vacantSusan White9328 4154

Secretary: Adele Seymon 0403 269 462 Matthew Bliss 8344 9980 (BH)
Treasurer: Barbara Wagstaff 8344 6537 (BH) Syed Amir Mahmud 9902 4206 (BH)
Estephany Marillo 8344 9980

SUBCOMMITTEE CONTACTS

Awards: Ingrid Campbell 9486 7160 Bicentennial Gold: Gerhard Krummei 9820 2595 Education: Shannon Burnett 0414 775 939 Susan White Heritage: 9328 4154 Newsletter: Matthew Bliss 8344 9980 Webmaster: Ken McLean 9905 1120

OTHER CONTACTS Newsletter deadline:

Geology of Victoria: Bill Birch 9270 5049 (BH) First Friday of the month except Dec & Jan mbliss@student.unimelb.edu.au

GSA Inc - for membership and subscription enquiries or change of address:
Business Office: Geological Society of Australia, Suite 61, 104 Bathurst Street, Sydney NSW 2000
Email: info@gsa.org.au Tel: (02) 9290 2194 Fax: (02) 9290 2198

Print Post No. PP381827/0025 Registered Publication No. VBH 2135

If undelivered return to: The Geological Society of Australia Inc. GPO Box 2355 Melbourne VIC 3001

PRINT POST APPROVED