

THE GEOLOGICAL SOCIETY OF AUSTRALIA  
Victoria Division

## Next General Meeting

Thursday 29th September at 6:15 p.m.

### Selwyn Lecture

**A backwards-in time stroll through a billion years of Antarctica's tectonic evolution.**

**Dr. Steve Boger**

**School of Earth Sciences, University of Melbourne**

**Fritz-Loewe Theatre, School of Earth Sciences, The University of Melbourne**

Preceded at 5:30 p.m. by drinks and nibbles in the tea room, 4th floor. Cost \$2

### Selwyn Dinner

The Selwyn dinner will be held at Cafe Italia following the seminar, approximately 7:30pm. Please RSVP no later than Monday, 26th September to Adele Seymon at [aseymon@gmail.com](mailto:aseymon@gmail.com) or on 0403 269 462. No RSVP is required for the Selwyn Lecture

Although events are typically viewed chronologically from oldest to youngest, geology in many respects can be better understood working in the opposite direction—from the youngest, where constraints are best, to oldest, where constraints are poorer and the geologic evidence more fragmentary. When considering the tectonic evolution of the southern continent, one can easily place Antarctica in the core of Gondwana by closing the modern oceans. One can similarly quite easily visualise the formation of West Gondwana via the vast accretionary Gondwanide and Terra Australis orogenies that flanked the palaeo-Pacific Ocean and linked South America and Australia via Antarctica. Reaching further back in time one needs to consider the events that formed Gondwana. The positions of the orogenic belts (late Ediacaran to early Cambrian) along which this occurred are less well constrained, however a growing body of data suggest some of these belts lie in East Antarctica and sutured rocks of African and Indian affinity into their modern Antarctic positions. Indeed, it can be argued that most of the rocks found along the East Antarctic coast between longitudes 30°W and 100°E owe their origins to the formation of Gondwana. The remaining 2/3 of Antarctica can be split approximately evenly between rocks of clear Australian affinity and those that have no affinity with rocks found in Antarctica's nearest neighbours. Given the geologic differences between these two regions it is tempting to speculate that they represent separate terranes that were sutured sometime before the formation of Gondwana. The belt along which this occurred has not been directly observed in Antarctica, but one can begin to infer its existence from a number of geologic and geophysical datasets. These data date this belt to the late Mesoproterozoic. If this orogenic belt is proved to exist, it provides a link between late Mesoproterozoic orogenic belts observed in Western Australia and south-eastern Laurentia, and may represent one of the major collisional belts along which Rodinia, the precursor supercontinent to Gondwana, formed.

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**NOMINATION FOR THE  
2011 SELWYN MEDAL**

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Prof. Mike Sandiford and A. Prof. Tim Rawlings have nominated Dr. Gary Gibson for the 2011 Selwyn medal for his substantial contributions to earthquake seismology in Australia and our region.

The below is their Citation Support Statement.

Gary Gibson was born in Terang and was brought up in the volcanic region of Western Victoria. He was educated at the University of Melbourne, and after graduating in 1968, remained for six years giving laboratory classes and field excursions in geophysics. In 1973 he developed EQLOCL, a computer program used to determine earthquake locations and magnitudes, and later versions of this program are still being used.

He joined the Phillip Institute of Technology, later amalgamated into RMIT University, lecturing in physics and geology. In 1976 he established the Seismology Research Centre (SRC) at RMIT, working on the application of earthquake seismology to geological and engineering problems.

From its inception, the seismograph network operated by the SRC was optimised to record local and regional earthquakes rather than large distant earthquakes. This requires high sample rates and precise timing, allowing more precise location of earthquakes than is possible with a network oriented towards global seismology. A relatively high density of seismographs allows estimation of earthquake depths, and delineation of active faults. Over the past 25 years, the network operated by the SRC has been the largest seismograph network in Australia, with about 100 permanent seismographs.

From 1976 to 2000, Gary supervised the specification, design and development of four generations of digital seismograph, and has been an interested observer of the development of three further generations since 2000.

Since 2000 he has mainly been concerned with earthquake hazard and earthquake risk mitigation. This has seen the development of earthquake recurrence models developed with extensive use of geological and geophysical data to support earthquake seismicity data (with Amy Brown, MSc, RMIT), and ground motion models to characterise Australian earthquake motion (with Trevor Allen, PhD, Monash University).

The earthquake data used for hazard studies requires a detailed and comprehensive earthquake catalogue, with consistent magnitudes and information about non-random content (earthquake clustering in time and space). Gary initially developed such a catalogue for Victoria, later extended it to all of Australia, then to the Australian Plate and its boundaries. It now also includes larger earthquakes from all other areas, with a total of 1.3 million earthquake locations. He has also produced a version of the International Seismological Centre catalogue in the same format, not yet fully processed, with a total of 5.4 million earthquake locations.

The study of non-random activity as used to decluster the catalogue for earthquake recurrence estimates has led to an interest in clustering, and its possible use for anticipating for earthquakes

through alerts and forecasts, although he is quite sure that the earth is too complex to allow a well-defined prediction of the location, time and magnitude of any future earthquake by using seismicity data.

The SRC is now part of Environmental Systems and Services Pty Ltd, and operates about 100 seismographs in eastern Australia, from North Queensland to Southern Tasmania. It continues to develop seismographs and analysis software for its own use and for sale in Australia and overseas, still mainly optimised for local and regional seismograph networks. Gary still works at the SRC part-time, undertaking earthquake hazard consulting for major projects.

Gary has produced or supervised over 300 earthquake hazard studies in Australia, most southeast Asian and southwest Pacific countries, and other countries including China, Mongolia, Nepal, Iran, Morocco, South Africa, Lesotho and Chile. He has specialised in all aspects of earthquakes and dams, particularly triggered earthquakes associated with large water reservoirs. He has studied triggered earthquakes associated with mining, and currently with geothermal activities.

Highlights of his career include the following:-

- He has been a member of the Executive Committee of the International Seismological Centre (ISC) for the past ten years, and has just completed a four-year term as Chairman. His main contribution has been to encourage the development of earthquake catalogues optimised for the study of earthquake hazard by provision of appropriate magnitude scales, and the facility to consider earthquake clustering and declustering. He has been on the Governing Council of the ISC for 14 years.

- He has supervised students working in earthquake related topics from RMIT University, Latrobe University and Monash University, including 2 PhD and five Masters students. Topics include modelling of the Victorian crust, earthquake hazard in Fiji, earthquake source and attenuation parameters in Victoria, earthquake alarm systems, earthquake recurrence models, ground motion models in SE Australia, and earthquake hazard in Papua New Guinea.

- He was on the foundation committee of the Asian Seismological Commission (ASC), within the International Association of Seismology and Physics of the Earth's Interior (IASPEI). He undertook a period as Vice-President, and remains on the steering committee of the ASC.

- He is co-chair of the ASC and IASPEI Commission on Earthquake Hazard, Risk and Strong Ground Motion Joint Working Group on Seismic Hazard and Risk Assessment.

- He is a member of the IASPEI Commission on Education and Outreach. The main product of this Commission is a large two-volume summary of observational seismology called the New Manual of Seismological Observatory Practice. He is currently writing an extended chapter for the manual entitled Seismological Contributions to Earthquake Risk Mitigation, covering basic risk mitigation (hazard, vulnerability and risk; hazard estimates, alerts, warnings, alarms, etc), with emphasis on the relationships between seismology, geology and earthquake engineering.

-He has been a member of the Standards Australia committee that has produced the past two revisions of the Australian Loading Code (AS1170.4) for design of buildings. He was a member of the Australian National Committee on Large Dams (ANCOLD) working group that developed the first edition of the Guidelines for Design of Dams for Earthquakes, and is a member of the group producing the next revision.

-He is the Victorian representative on the Australian Earthquake Engineering Society

-He is the Australian representative to the International Association for Earthquake Engineering

-He is a member of the Editorial Board of Earthquake Science (was Acta Seismologica Sinica), the journal of the Seismological Society of China.

-He has been an active participant in post-earthquake monitoring following most recent significant Australian earthquakes, including Meckering, WA, 1968, mag 6.8; Preston, Vic, 1976, mag 1.4; Balliang, Vic, 1977, mag 4.7; Lorne, Vic, 1981, mag 5.3; Wonnangatta, Vic, 1982, mag 5.4; Yanac (Nhill), Vic, 1986, mag 4.9; Maryatt Creek, SA, 1986, mag 5.7; Tennant Creek, NT, 1988, mag 6.7; Mt Olga, NT, 1989, mag 5.4; Newcastle, NSW, 1989, mag 5.7; Ellalong, NSW, 1994, mag 5.1; Eugowra, NSW, 1984, mag 4.1; The Range, NSW, 1996, mag 5.1.

-He has participated in post-earthquake visits to the sites of major earthquakes including Wenchuan, China, 12 May 2008, magnitude 7.9, IAEE; Chile, 27 February 2010, magnitude 8.8, NZSEE/AEES; Christchurch, New Zealand, 3 September 2010 and 22 February 2011, Magnitudes 7.1 and 6.1, AEES.

His main interests continue to concern the relationship between earthquakes and geological structure and processes, including high-resolution seismograph networks to delineate active faults, and non-random seismicity (earthquake clustering in time and space) to understand more about the character of earthquakes. He is currently planning the developments needed for the next generation earthquake recurrence model for Victoria.

We hope you will look favourably upon this nomination to award Gary Gibson the 2011 Selwyn Medal, for which we believe he would be a very worthy candidate.

#### **PAPER REDUCTION EFFORT**

#### **Attention All Members!!!**

Are you still receiving a hard copy of TVG each and every month? Each month a significant number of hard-copy TVG's are printed but wouldn't it be great if we could reduce that number, lessening costs and our impact on the environment? Well the good news is you can by switching to receiving an electronic copy of TVG via email.

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**SCIENCE NEWS***It's the big bling theory as astronomers discover a girl's best friend in the universe*

*www.theage.com.au, 26th August, 2011*

As bling goes, it doesn't get bigger. Australian astronomers have discovered a planet they think is made of diamond. The galactic gem could be as large as 60,000 kilometres across – five times the diameter of Earth. It is orbiting a tiny, dead, spinning star, called a pulsar, about 4000 light years away in the Milky Way. CSIRO astronomer Michael Keith said the diamond planet was likely to be very hot and glowing white.

"It would probably look very pretty," he said.

An international team, led by Matthew Bailes of Swinburne University of Technology in Melbourne, found the exotic object using telescopes including the radio telescope at Parkes. They were searching for pulsars – the lighthouses of the universe – which emit beams of radio waves as they spin rapidly.

They discovered a pulsar which is only about 20 kilometres across and rotating extremely fast – 175 times every second. Slight variations in its pulse alerted the astronomers to the presence of the companion planet, which orbits the pulsar every two hours and 10 minutes. Dr Keith said the planet appeared to have been a massive star that lost more than 99 per cent of its mass. Its density made it likely it's comprised mostly of carbon atoms, crushed together in a crystalline structure "very similar to diamond."

He joked that it would be priceless: "I recently got engaged so I know how much diamonds cost."

Team member Willem van Straten said they hoped the planet was glowing white, because that would make it easier to see light from it using a telescope. The team was searching for millisecond pulsars because they were like accurate "clocks" whose regularity could be used to detect the presence of gravitational waves – theoretical ripples in space time thought to be generated by cosmic events such as two black holes colliding. The "holy grail" would be to find a pulsar orbiting a black hole, to see if Einstein's general theory of relativity still holds in an extremely strong gravity field, he said. "You could study space and time in the vicinity of the black hole with a lot of precision."

Somewhat unromantically the pulsar, with its diamond companion, is named PSR J1719-1438.





## CONFERENCE REPORT

Ashleigh v.S. Hood, Geology PhD  
Candidate, University of Melbourne

Email: ashleigh.vs.hood@gmail.com

### GSAV Student Scholarship Recipient

Several international conferences focusing on sedimentary geology were held in Europe in July, 2011. With the financial support of the GSAV, I was able to attend and present my research at the 28th IAS Meeting of Sedimentologists in Zaragoza, Spain, and the 14th Bathurst Meeting of Carbonate Geologists in Bristol, UK. The conferences were a great opportunity to meet other researchers and industry contacts, and gave me many new ideas for further study.

I presented a summary of my PhD research in a short talk at each conference. My project is focused on carbonate geology, in particular, on the formation of sedimentary dolomite. The discovery of a dolomitic Cryogenian reef complex in the northern Flinders Ranges, South Australia has significant implications for the understanding of dolomite precipitation.

Preliminary work has revealed previously undocumented dolomite marine cements, which are abundant in this reef. These cements have optical characteristics and chemical growth zones that suggest that they precipitated directly from seawater, rather than replacing calcium carbonate. This style of marine dolomite formation may help explain the problem of the abundance of dolomite in the Precambrian. Early marine dolomite precipitation of this type implies a radically different seawater chemistry for this time, perhaps associated with extreme glacial events and/or ocean anoxia.

The IAS meeting was a fantastic opportunity to put my research into the broader context of sedimentology. There were three days of oral and poster presentations under twenty-one different sessions, attended by more than 500 scientists. Zaragoza was hot, without a cloud in the sky, and perfect for the many conference excursions and social events. A number of keynote speakers presented new and exciting research from all areas of sedimentary geology, inspiring me to collaborate and to try some new analytical techniques. In particular, several presentations

Folded carbonates on the southern slopes of the Matterhorn, Italy. *Photo Credit: Ashleigh v.S. Hood*



by Spanish research groups that combined carbonate geology and geomicrobiology showed what information can be uncovered by “thinking outside the box”. It was great to see so much collaboration between universities in Europe, an association that we should endeavour to develop between Australian research groups and others worldwide.

Held in the old halls of the University of Bristol, the Bathurst Meeting of Carbonate Geologists was a smaller and more intimate gathering of researchers. Over one hundred of the world’s carbonate geologists attended this three-day conference, ranging from university students to prominent researchers. It was a fantastic to be able to meet and talk with so many people who shared my research interests. My presentation was well accepted, and I was asked many questions- some of which really made me think. The conference was dedicated to the memory of Eric, whose work contributed greatly to the development of carbonate geology. The collaboration between the petroleum industry and European universities allowed many students to attend the conference, which was great in fostering a new generation of scientists. Again, the collaboration between research groups in the UK was inspiring, and I met many geologists who I will stay in contact with for years to come.

After attending these conferences I met up with a colleague in northern Italy to help out for a week of fieldwork in the Alps. It was great be able to get out into the mountains and look at some amazing rocks. Aside from inspiring me with beautiful scenery, this work really helped me expand my geological knowledge. I also learned many new field techniques.

I would like to express my appreciation again to the GSAV for helping me attend these conferences. I would recommend the experience to all PhD students, not only to develop their presentation skills, but to be able to meet so many interesting people and be motivated by new ideas.

**Ashleigh won the Eric Mountjoy Prize for the best student talk at this conference.  
Congratulations Ashleigh!!!**

#### FORTHCOMING EVENTS

##### **University of Melbourne Upcoming Seminars**

All seminars at 4:00pm, Fritz Loewe Theatre, School of Earth Sciences, McCoy Building, University of Melbourne, Parkville

More information at [www.earthsci.unimelb.edu.au/php/seminars\\_upcoming.php](http://www.earthsci.unimelb.edu.au/php/seminars_upcoming.php)

##### **Friday September 30th**

**Dr. Robyn Pickering** *School of Earth Sciences, University of Melbourne*

*“Dating Australopithecus sebida and the implications for our human origins”*

##### **Friday October 7th**

**Dr. Sally Lavender, CSIRO**

TBA

##### **Friday October 14th**

**Dr. Andrew Tomkins, School of Geosciences, Monash University**

*“Magmatic Sulfide Formation by Reduction of Oxidised Arc Basalt”*

##### **Friday October 21st**

**Dr. Roger Dargaville, Energy Institute, University of Melbourne**

TBA

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**STUDENT FUNDING OPPORTUNITIES**

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## **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](mailto: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](mailto:wagstaff@unimelb.edu.au))

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### **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](mailto: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 2011 talks will be held in the  
Fritz Loewe Theatre, Earth Sciences Building, University of Melbourne.

October 27

Sandy Cruden  
*"The emplacement mechanism of granite"*

November 24

Marion Anderson  
*Astrogeology*

**Please join the GSAV in welcoming these new members**



Michael Fox  
Emily Horden  
Trevor Blake

Visit the GSAV on [www.vic.gsa.org.au](http://www.vic.gsa.org.au) or the GSA on [www.gsa.org.au](http://www.gsa.org.au)  
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