The Tasmanian Geologist

May 2019

Join us for the upcoming meetings.

27th of June Annual General Meeting and prize night. Talk by Professor Jocelyn McPhie. "Beyond the Mt Read Volcanics"

14th of July Inaugral Joint Meeting with the Royal Society of Tasmania, Northern Chapter QVMAG Inveresk."Flood and Flood modelling" by Dr Claire Kain

22nd August Dinner Details TBA

September TBA

October Field Trip to the Tasman Peninsula

November Bruce Houghton

5th December Tasmanian Geoscience Forum, St Helens

NEXT MEETING:

Thursday 23rd May 6:00 PM

Speaker

Andrew Gleadow

Explorations in Time - The Kimberley Rock Art Dating Project

Stanley Burbury Lecture Theatre,
University of Tasmania
Join us for drinks and nibbles from 5:30 onwards

NEXT MEETING:

Explorations in Time - The Kimberley Rock Art Dating Project

The Kimberley contains one of the greatest concentrations of indigenous rock art in the world with innumerable sites showing figurative and engraved art of extraordinary richness and beauty. These sites are of great cultural importance to the Traditional Owners, and also of enormous scientific interest, the significance of which to a broader narrative has been constrained by a lack of quantitative dates. The Kimberley Rock Art Dating Project is a major research collaboration involving scientists from five different institutions supported by the ARC and the Kimberley Foundation Australia in partnership with Balanggarra Aboriginal Corporation. The project is uniquely focussed on developing a deep time framework in which to better understand the art and the people who have lived in this vast region from the Pleistocene to the present day.

Dating rock art in the Paleoproterozoic sandstones of the Kimberley Basin is extremely challenging as most pigments used are devoid of datable constituents and there are no carbonates present. However, bracketing ages can be obtained by dating natural materials that have formed in association with the different rock art styles, and four independent dating methods have now been successfully adapted to this purpose. These include cosmogenic radionuclide dating of rock falls and other landscape evolution processes, radiocarbon dating of organic constituents within mud wasp nests and oxalate mineral layers, optically stimulated luminescence dating of large mud wasp nests, and uranium-series dating of phosphate layers within surface mineral accretions. In addition to dating, the project is also providing insights into surface processes operating on rock faces that degrade the rock art over long periods of time. In this way the project will also help inform future strategies aimed at conservation and preservation of this important part of our national indigenous heritage.

Professor Andrew Gleadow (AO) Professor Gleadow has been extending of knowledge of the age of Earth materials and relating that understanding to continent cycles, mountain building, forming depositional basins and developing landscapes for over 40 years. He has pioneered many innovative dating techniques, that are now used routinely by researchers all over the world. These tools have provided the keys to unlock the secrets of Earth processes over a range of timescales. He completed both undergraduate and postgraduate degrees at the University of Melbourne, graduating with a PhD in Geology in 1974. Subsequently, he held positions at the University of London, the University of Melbourne, and the University of Bern. He has been Head of the Schools of Earth Sciences at both Melbourne and La Trobe Universities, and a Program Coordinator in both the Australian Geodynamics, and Predictive Mineral Discovery CRCs, amongst many other roles. His work has been recognised by numerous awards, including the Research Medal of the Royal Society of Victoria; the Stillwell and Selwyn Medals of the Geological Society of Australia, the Gold Medal of the Australian Institute of Nuclear Science and Engineering, the Centenary Medal of the Australian Government, the Jaeger Medal of the Australian Academy of Science and the Laslett Prize for Fission Track Thermochronology. He is a Fellow of the Australian Academy of Science, the Geological Society of Australia and the American Geophysical Union, and Geochemical Fellow of the Geochemical Society and European

Association of Geochemistry. He is currently a Director of the Kimberley Foundation Australia and has previously served as President of the Geological Society of Australia and Councillor for the Australian Academy of Science. In 2017, he was made an Officer in the Order of Australia for distinguished service to the earth sciences and education. (*from the Melbourne University Website*)

For more details see
https://www.kimberleyfoundation.org.au/

PREVIOUS MEETINGS

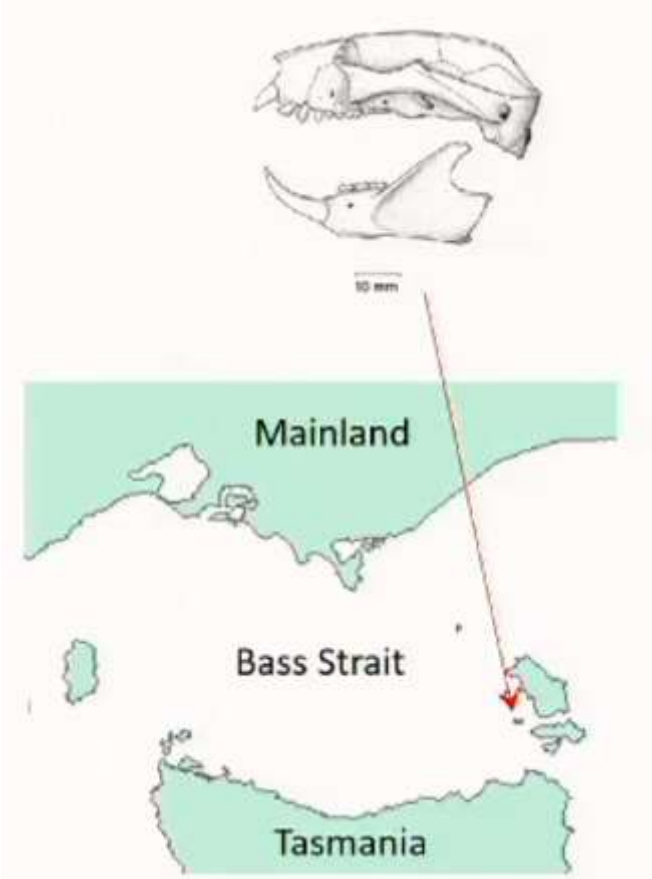
GSA- meeting April 21st Matthew MacDowell Fossil mammal responses to climate change and isolation in Tasmania, a land-bridge island

It has been a while since the Geological Society Tasmania Division had a paleontology talk. Maybe someone can send a letter to the editor and tell us when that was. The drought was broken by Dr Matthew MacDowell from the University of Tasmania who introduced himself and his passion for fossil hunting.

He spoke about his experiences examining the Pleistocene-Recent fossil record on Kangaroo Island and in the Nullabor Caves. His interest in the small mammal record and island biogeography has led him to Tasmania. He has been down holes and through bush scouring Tasmanian and Eastern Victorian localities to find recent fossils. His digging, caving and tramping have been rewarded with a cache of fossils that he hopes will shed light on why some animals crossed the most recent land bridge between Tasmania and the mainland and other common animals did not. He is not focusing on high-profile megafauna, but is hunting for small beasties, such as rodents and sugar gliders. Relying heavily on the owl pellets, which are like owl "fur balls" deposited at roosting sites. The remains of small mammals the owls have concentrated will help him to unravel the ecology of Tasmania and Eastern Victoria over the last 130,000 years and examine the perplexing questions about species migration.

Treasure trove of small mammal bones concentrated by owls can help to discover the nature of the Pleistocene-Holocene land bridge between Tasmania and the mainland (photo Matthew MacDowell)

During the Pleistocene-Holocene parts of Bass Strait, were land. Despite the long open land bridge many species common to the mainland, such as *Rattus fuscipus*, did not enter Tasmania. The land bridge may have been inhospitable, and inhibited animal migration, There is more work to do and Matthew is keen to investigate known sites in the Bass Strait Islands to confirm previous findings and expand on these with new excavations. .



Sugar gliders made it to Badger Island (but are thought to have been introduced to Tasmania during the early 1800s)

Matthew MacDowell's talk was recorded so if you want to catch up on this presentation, please contact Karin Orth.

Congratulations to student member Lexi K'Ng

Her Excellency Professor The Honourable Kate Warner AM, Governor of Tasmania presented student GSA Tas Div member Lexi Kng and Johanna van Balen with the Governors Environment Scholarships at a ceremony at Government House on the 3rd April. This ceremony was attended by University of Tasmania Chancellor Hon. Michael Field AC and current donors including Bell Bay Aluminium, Hydro Tasmania, TasNetworks, Nyrstar Hobart and Norske Skog.

Lexi K'Ng (right) and Johanna van Balen (left) with their scholarship certificates at the entrance of Government House, Hobart. (Photo Lexi K'Ng)

A little piece of Antarctica is visiting Hobart on it's way to the Canberra Rock Garden.

Two blocks of Mawson Charnockite are resting in the yard of the MRT Core Storage Facility, in Hobart, on their way to the Canberra Rock Garden. Contributions from Jacqui Halpin, Barbara Frankel and Ralph Bottrill highlight their interesting geology and their journey from Mawson Base in Antarctica to Tasmania.

Mornington Hobart, staging site for the Mawson Charnockite blocks destined for the Canberra Rock Garden

Geology

The Mawson Charnockite (3,000 km2 and possibly even 5,000+ km2) is a famous composite batholith outcropping along the Mawson Coast and directly inland as numerous nunataks and ranges south of Mawson Station. It was originally mapped by Australian geologists in the 1950-60s and is defined as an orthopyroxene-bearing (meta)intrusive, containing older paragneiss and felsic orthogneiss xenoliths (some which are up to kilometres in scale). High temperature melting of dry Paleoproterozoic crust is implicated in the petrogenesis of these granitoids. The Mawson Charnockite forms part of the Proterozoic Rayner Complex which extends from MacRobertson through Kemp and Enderby lands and records protracted c. 1,400–900 Ma accretionary/collisional tectonics correlated with contemporaneous activity in the Eastern Ghats Belt in India (where very similar charnockite is exposed). This orogen is commonly interpreted as reflecting convergence between parts of the Antarctic craton with proto-India, but whether this was part of the assembly of the supercontinent Rodinia is controversial. The most recent age-dating of the Mawson Charnockite defined three pulses of magmatism at c. 1150 Ma, 1050 Ma and c. 960 Ma (Halpin et al., 2012) but these complex zircon data are the focus of current study (Daczko, Halpin, Mulder et al.) where we are investigating whether this zircon record could in fact be inherited, implying a much younger (?500 Ma) age for at least the gabbroic plutons. Stay tuned for future updates!

Jacqui Halpin

Why the Mawson Charnockite?

The Mawson Charnockite was donated to the National Rock Garden by the Australian Antarctic Division (AAD) after requests made by the late Professor Patrick Quilty who knew from first-hand experience, having been Chief Scientist of the AAD for many years, that these rocks are spectacular and would be ideal candidates to represent the Australian Antarctic Territory.

Getting close and personal with the Mawson Charnockite near Mt Henderson. Jacqui Halpin (at the back, Photo Jacqui Halpin)

Jacqui Halpin and Luke Milan scale the Mawson Charnockite peaks near Rumdoodle, Frames Mountains, Antarctica (Photo Jacqui Halpin)

Logistics

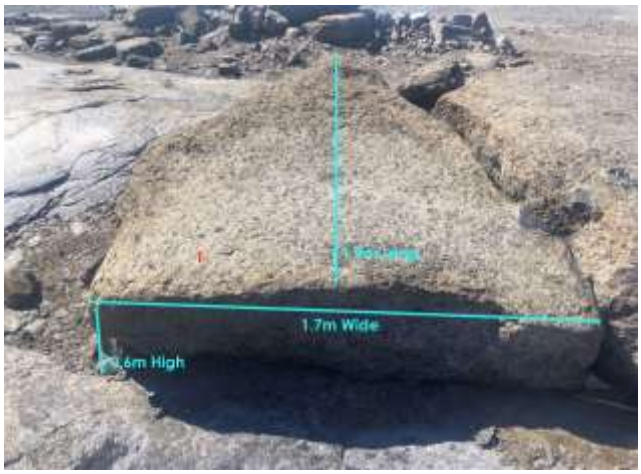
Pat Quilty knew it would be physically possible to move some boulders of the Mawson Charnockite to Hobart, however there were many steps to make this happen. Not only did approvals need to be granted, but the logistics needed to be planned carefully; there are size and weight limitations dictated by accessibility, loading capacity of the lifting equipment, container size, modes of transport, availability of suitably qualified/ticketed personnel, and cargo space on the vessel. The two blocks chosen met these criteria and are 1.3 m x 1.5 m x 1.2 m and weighing 6.7t and 2.9 m x 1.5 m x 0.7 m, weighing 8.5t.

Approvals for the boulder removal were needed from the AAD Director, and from the Antarctic Treaty System (administered through the AAD)

under the *Antarctic Treaty (Environment Protection) Act, 1980*. An environmental impact assessment was therefore undertaken to ensure their removal did not have a detrimental effect on the natural environment (eg disturbing bird nests in crevices). In order to keep the environmental impacts to a minimum, only existing boulders could be removed (ie no force used to create fresh boulders from bedrock). A permit was also required to remove the rocks from Antarctica under the Act.

With these criteria in mind, some suitable boulders showing the best examples of the charnockite mineralogy were selected through teamwork between a project officer and a geologist at the AAD headquarters (Kingston, Tasmania), and Mawson research station staff. The rocks were transported in open 'quarter height' shipping containers to Hobart aboard the icebreaker *RSV Aurora Australis*, arriving on 1st March 2019.

Barbara Frankel



One of the rocks in it's original location near Mawson Base.

Mawson rocks in containers on barge ready for loading onto the *Aurora Australis (Photo Katrina Beams)*

Above banding in one portion of the larger block. (Photo Ralph Bottrill)

Large grey inclusion (arrowed) appear to be fragments of dolerite dykes, in part altered along borders and fractures. Interestingly, they include some of the K-spar phenocrysts, (Photo Ralph Bottrill)

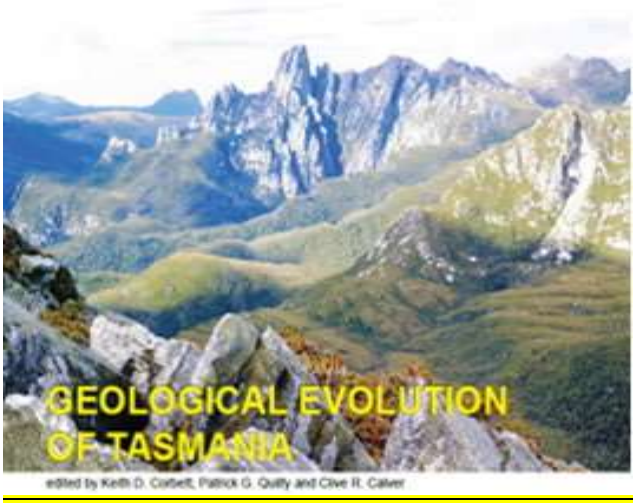
Above Ralph Bottrill and Grace Cumming examine the Mawson Charnockite in Hobart. Below Close up of the large brown K-feldspar crystals displaying simple twinning

The Rock Garden Committee are looking for sponsors to get these rocks, and others from Tasmania, up to Canberra. If you think you can help please contact Ralph Bottrill (Ralph.Bottrill@stategrowth.tas.gov.au).

Tasmanian Geoscience Forum is heading east for 2019.

On the 5th of December this year the Tasmanian Geoscience Forum run jointly with AusIMM and AIG will be held at St Helens.

For more details see https://ausimm.com/news/geoscience-forum-tasmania/



The flagship publication of the Tasmanian Division of the GSA, "The Geological Evolution of Tasmania" (Special Publication 24 of the GSA) is available for ordering. All details are available on a specific part of the Utas CODES web site: http://www.utas.edu.au/__data/assets/pdf_file/0003/55313/Flyer_Order.pdf

Copies of the book can be obtained personally from Deborah Macklin or Caroline Mordant (publications@CODES.utas.edu.au or phone on +61 3 6226 7537 (Thursday morning only)).

Members Price is A$90 + GST + postage where appropriate. Postage can be avoided by buying in person from Deborah Macklin in Earth Sciences (University of Tasmania). The book is also available at Fullers Bookshop and at TMAG in Hobart, and in the Devonport Bookshop, Devonport. Prices at these sites may vary from GSA prices, and the member price is not available at these sites either.

GSA Tasmanian Division Committee

Chairman Dr Andrew McNeill
Vice Chairman: Matthew Ferguson

Secretary: Dr Karin Orth
C/- School of Earth Sciences
University of Tasmania
Private Bag 79
Hobart 7001
Tel 03 62261921
karin.orth@utas.edu.au

Treasurer: Dr Jacqueline Halpin

Committee Members:
Rebecca Carey (Membership)
Grace Cumming (Geotourism)
Peter McGoldrick
Sebastien Meffre
Phil Sansom (Education)
Michael Vicary (Geotourism)
Thomas Schaap (Student Rep)
Sian Tooze (Student Rep)

Geological Society of Australia website:

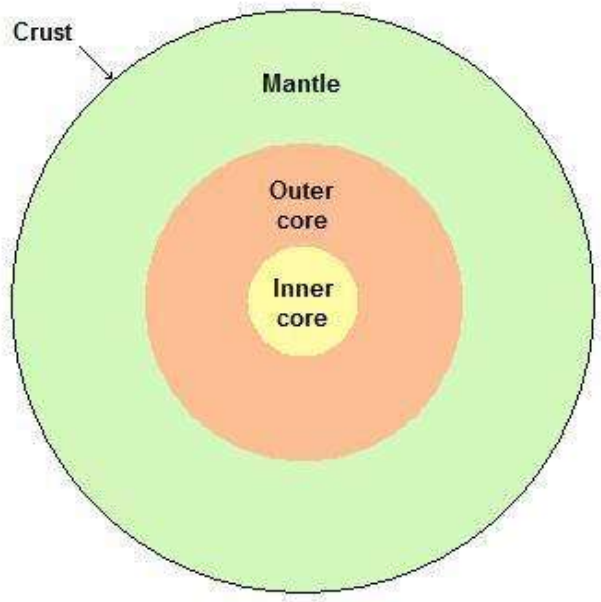
www.gsa.org

Other meetings you may be interested in:

24th of May *Codes conference room at 2.00pm.Dr John Doherty presents the annual Darcy Lecture for the International Association of Hydrogeologists 'Starting from the Problem and Working Backwards'* https://www.groundwater.org/who/news/10-8-18-doherty-named-2019-darcy-lecturer.html

The final word from Noel Kemp:

The geologist took a mantle note that he had to carry on with his research for the crater good.



en.wikibooks.org/wiki/Historical_Geology/Structure_of_the_Earth

Any news, announcements or interesting photographs of Tasmanian Geology you would like to include in the next Newsletter, please send it through via email to karin.orth@utas.edu.au prior to the 19th of June 2019.