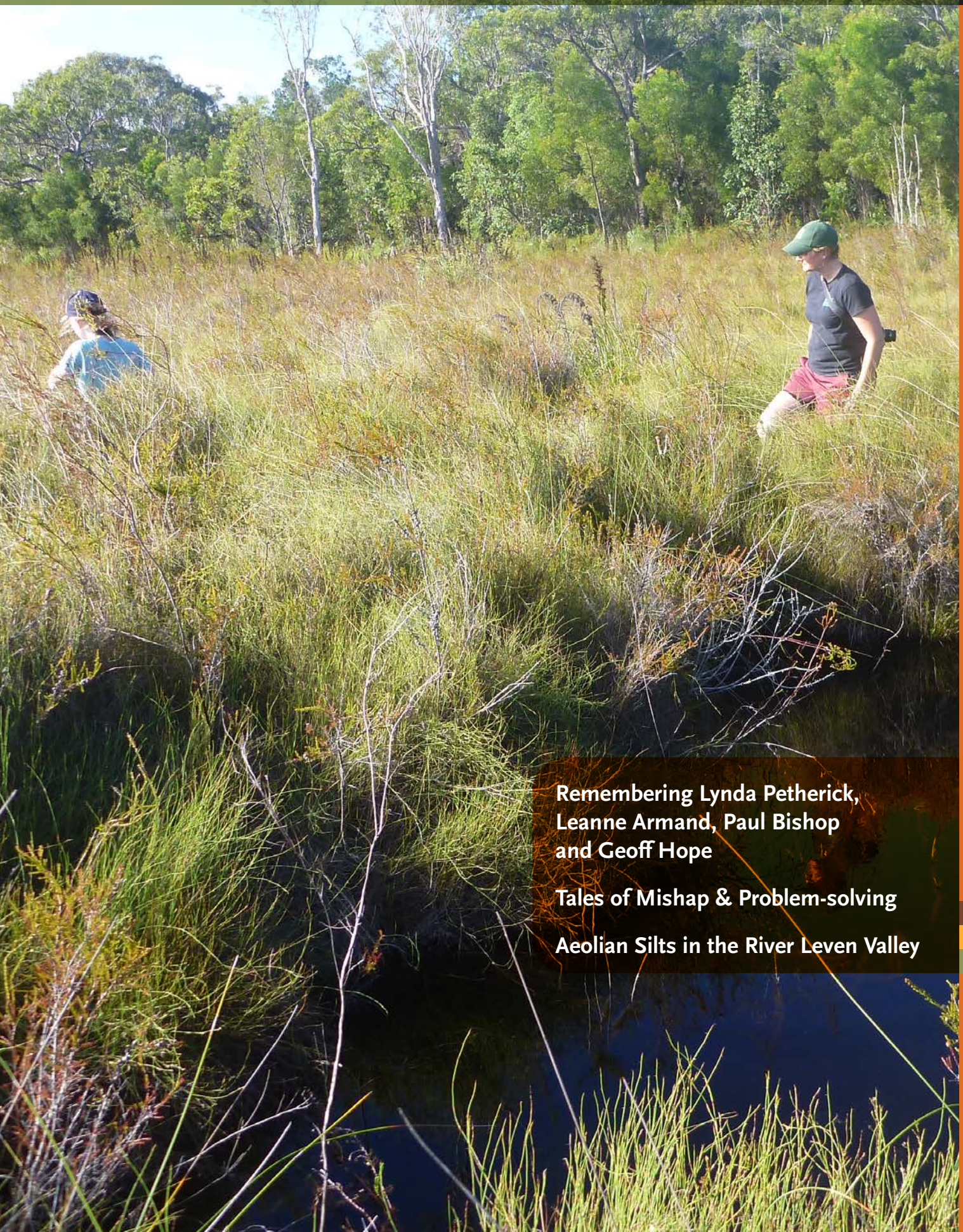
VOLUME 39 | NUMBER 1 | JULY 2022

Quaternary AUSTRALASIA



Remembering Lynda Petherick, Leanne Armand, Paul Bishop and Geoff Hope

Tales of Mishap & Problem-solving

Aeolian Silts in the River Leven Valley

AQUA LIFE MEMBERS

Current life members are Jim Bowler, Eric Colhoun, John Chappell (dec), Peter Kershaw, John Magee, Matt McGlone. and Geoff Hope (dec).

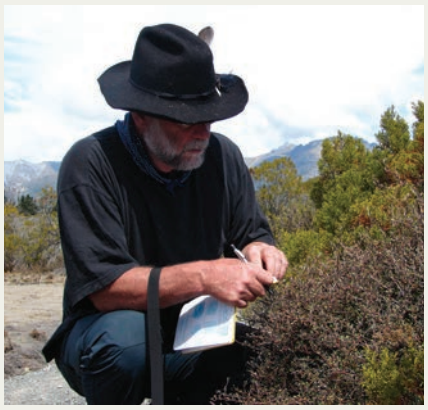
Jim Bowler
(Photo credit: socialpolicyconnections.com.au)

Eric Colhoun
(Photo credit: Tim Barrows)

John Chappell (dec)
(Photo credit: Helen Chappell)

Peter Kershaw
(Photo credit: ANU)

John Magee
(Photo credit: Giff Miller)



Matt McGlone
(Photo credit: Manaaki Whenua Landcare Research)

Geoff Hope (dec)
(Photo credit: https://iceds.anu.edu.au/people/academics/professor-geoffrey-hope)

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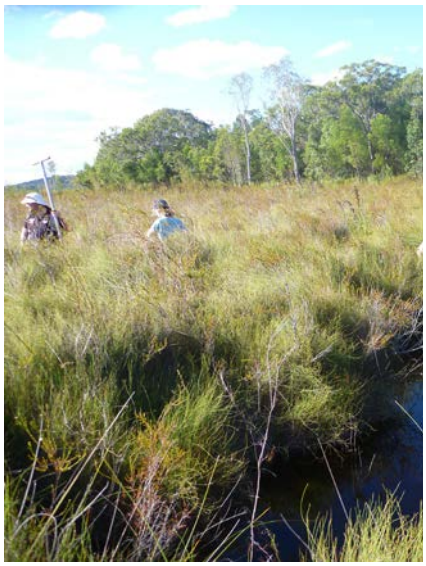


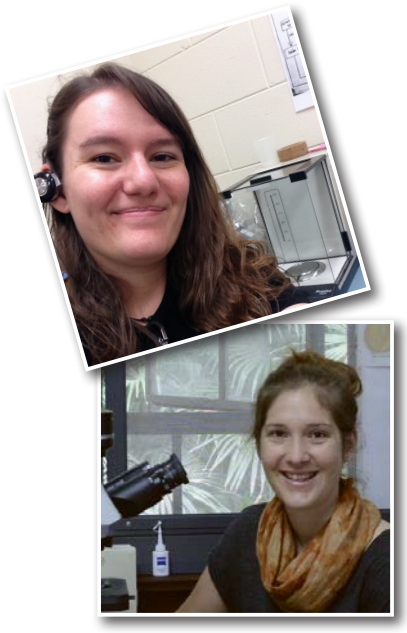
Front cover photo:

Lynda Petherick with Craig Sloss on Fraser Island (Photo credit: Patrick Moss)

Below:

Resourceful coring in Mexico. See 'Reports'. (Photo credit: Richard Gillespie)

EDITORIAL



Dear Quaternarists,

It has been a difficult 12 months for the AQUA community. We were devastated by the news of the sudden passing of AQUA's former President, Lynda Petherick. Lynda was a dear friend, mentor, and collaborator to many of us in the Quaternary community and she will be deeply missed. This issue honours Lynda as well as other valued community members who have recently passed: Leanne Armand, Paul Bishop, and Geoff Hope. An announcement of a new travel award in Leanne's name appears in this issue along with more details about the upcoming AQUA conference, which will be held face-to-face for the first time since the pandemic began.

As some of us return to fieldwork, it's an ideal time to read some good advice and good humour provided by Rachel Rudd and contributors who have shared their stories of fieldwork that didn't always go to plan. We appreciate that these mistakes are not only relatable but also the reminder that it tends to all work out alright in the end. It's great to normalise challenges and learning from setbacks as part of science, and of life.

In this issue you will find a book review by Philip Hughes of Martin Williams' When the Sahara was Green, a book that is likely to be on many of our reading lists. There is also a research article by Slee et al. on aeolian silts in the River Leven Valley, and a report on the first Indian Quaternary Congress by Bob Wasson. Happy reading!

Stay safe, and we look forward to seeing many of you in Adelaide at the conference in December.

Yours Quaternarily,

Emma Rehn
Editor

Lydia Mackenzie
Shadow Editor

PRESIDENT'S PEN

Dear AQUA colleagues,

I'd like to start by saying thank you for allowing me to be the AQUA President. It's lovely to be thinking about representing a community of people who I like and respect enormously.

It's been the most emotionally challenging of years for AQUA with the passing of our former President Lynda Petherick. I was fortunate enough to work alongside Lynda both in an academic capacity and as a member of the AQUA committee. Lynda had an extraordinary drive and verve and an amazing ability to "bring people along" with her generous spirit. In the weeks that followed receiving the sad news, there was a wonderful outpouring of emotion highlighting just how much Lynda meant to so many people in the community. The Executive Committee are thinking of appropriate ways to commemorate Lynda. I believe that there have already been proposals put to both the INQUA Rome Congress and the AQUA Adelaide meeting to have sessions in Lynda's honour.

We've also lost a number of other members of the community and a piece about Professor Paul Bishop appears in this edition of QA. Prof Leanne Armand, a Quaternary micro palaeontologist with speciality in diatom research, passed away earlier this year and a piece about her also appears in this issue. A fund is being set up in her name, administered by AQUA, to provide support to students and ECRs in her field to visit experts particularly to work on issues of taxonomy. The announcement of the fund including how to apply appears in this issue; if you would like to donate to the fund, please contact me.

AQUA has recently launched a mentoring scheme. I think this is a wonderful initiative and thank Lynda Petherick, Micha Campbell, and Caroline Mather for their work in bringing this to fruition.

Preparations are underway for the AQUA meeting in Adelaide and a number of great ideas have already emerged. Encapsulating the spirit of the AQUA community, many people have volunteered to take on various roles. If there's anything you'd like to see at the conference or if you'd like to volunteer to arrange something specific please get in contact with me in the first instance. At present we have plans for a joint session with the Australian Archaeological Association and the session in honour of Lynda Petherick. Field trips to The Coorong and to Kangaroo Island are being planned/scoped.

Of course, if there are other things that you would like to see the committee undertake, particularly in the lead up to the INQUA meeting next year, then please get in touch with me or one of the other members.

Cheers,

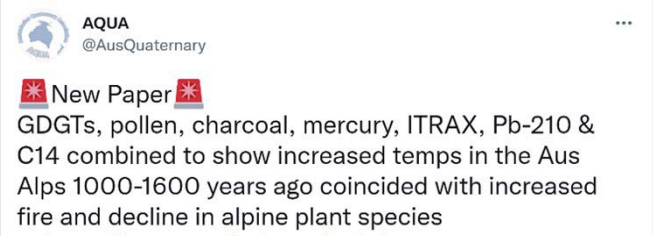
John Tibby
AQUA President

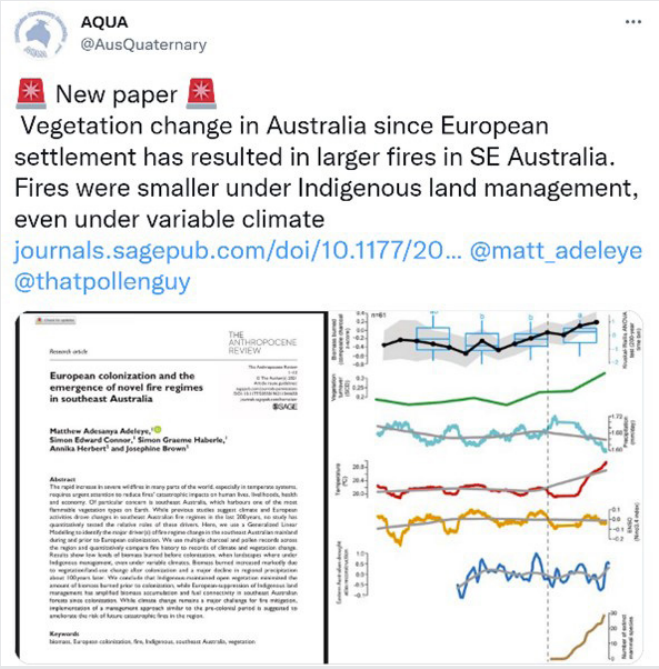
NEWS

Do you have a paper coming out?

WANT TO ADVERTISE A NEW JOB OR SCHOLARSHIP OPPORTUNITY?

Reach a wider audience with the help of the @AusQuaternary Twitter account! If you would like @AusQuaternary to promote your work either send a Twitter message or email us at communications@aqua.org.au. With over 500 followers all over the world (and more joining every week), we can help your work reach a broad audience, even if you are not on Twitter!





Conference announcement

AQUA CONFERENCE 6 - 8 DECEMBER 2022

UNIVERSITY OF ADELAIDE, ADELAIDE, SOUTH AUSTRALIA

A three-day conference for all aspects of Quaternary science! We plan to meet in-person with some (reduced) options for online participation. The conference will include oral and poster presentations, with the option to pair the latter with a small introductory talk.

Field trips to The Coorong (Friday 9th) and Kangaroo Island (Monday 5th) are being arranged for before and after the conference. A "hackathon" introduction to Python and its application is planned for Monday 5 December (details below)

There will be a small number of travel prizes awarded to students, including those demonstrating financial need. Keep an eye out on the AQUAlist for details.

If you're interested in proposing a topic for a session at the conference, or have other suggestions, please get in contact with AQUA President John Tibby (john.tibby@adelaide.edu.au)

Workshop announcement: Palaeo science "hackathon" – Monday 5 Dec (before the AQUA conference)

Darren Ray, University of Adelaide, has offered to host a hackathon before the AQUA conference on Monday 5 December focused on palaeo-science data analysis. It would be based on the emerging Python-based palaeo analysis framework, through Jupyter Notebooks. It will be aimed at those who might have some coding experience in R or Python, and will introduce installing and setting up Python environments, basic data analysis in the framework such as importing, analysing, and visualising .csv based data (including producing maps), introduce GitHub repositories such as LinkedEarth, how netcdf and LiPD files work and how to access them, and introduce using Pyleoclim for analysis such as PCA, wavelets, and power spectrum analysis.

Darren is the Principal Climate Change Analyst, Dept of Environment and Water South Australia and PhD candidate in Earth Sciences at the University of Adelaide. To express early interest in the hackathon, contact Darren (darren.ray@adelaide.edu.au)

There may be a modest fee to cover costs for salaried and grant-funded participants, but please don't let this be a barrier to participation.

The Leanne Armand Travel Award

This award was set up in honour of the Late Professor Leanne Armand (Feb 1968 – Jan 2022). Leanne was Director of the Australian and New Zealand Consortium [ANZIC] and was also Professor of Micropalaeontology at The Australian National University [ANU]. Leanne was a world leader on marine diatoms which she successfully used to reconstruct the waxing and waning of sea ice in the Southern Ocean. She was passionate about training the next generation of scientists and was an advocate for diversity and inclusion. Funds were donated towards this award by family members, colleagues, and friends of Leanne to help train up the next generation of microfossil experts. An obituary for Leanne is available on https://doi.org/10.1016/j.marmicro.2022.102095

The award is for postgraduate and Early to Mid-Career Researchers based in Australia and is to be administered by the Australasian Quaternary Association [AQUA]. The award consists of a travel stipend to the maximum of A$3000 and is offered at most once a year to a single candidate. Preference will be given to travel where the applicant is seeking to learn microfossil identification or advanced characterization techniques from an expert(s).

Applicants for the award must provide a document up to three pages containing: (1) a brief research biography including details of their current research project; (2) the benefits of the travel grant for their research; (3) details of the opportunity (e.g., workshop or specialist conference) or expert(s) willing to host the applicant; and (4) a budget listing anticipated expenses. In addition, a letter of support is required from the applicant's supervisor. Application for this award is on condition of travel insurance being provided by the applicant's institution. A successful awardee must provide a letter of acceptance by the expert offering assistance and the proposed timing and duration of the visit. Upon completion of the award, the applicant is to submit a report to be published in Quaternary Australasia.

Up to three official members of the AQUA committee, as well as two members of the Research School of Earth Sciences [RSES] at the ANU to be designated by its Director, are to oversee the applications once a year set by a date advertised on the AQUA website as well as the RSES website. This travel award will continue to be offered annually until funds have expired.

Applications for this year close on 1 September 2022 and are to be sent directly to AQUA's President.

Leanne Armand. Photo credit: https://doi.org/10.1016/j.marmicro.2022.102095

OBITUARY FOR PROFESSOR LEANNE ARMAND (1968 – 2022)

Helen Bostock

Leanne was an international expert in marine diatoms. She specialised in reconstructing past temperature and sea-ice extent of the Southern Ocean and coastal Antarctica. During her career she spent many months at sea participating and leading multidisciplinary voyages south. Leanne was a strong advocate for women in science and a mentor to several paleoceanographers in Australia/New Zealand and internationally. She was also deeply invested in training up the next generation of marine researchers.

Leanne started her career doing an undergraduate degree in biology at Flinders University, taking a specific interest in paleontology and participating in digs at Naracoorte Caves in South Australia and Alcoota Station in the Northern Territory with Rod Wells and Peter Murray. She continued this interest into her Honours at ANU with Prof. David Ride, working on Quaternary vertebrate fossils from Teapot Creek in the Monaro region of New South Wales. She stayed at ANU for her PhD and shifted to micropaleontology, working with Patrick De Deckker and Dr Jean-Jacques Pichon at the University of Bordeaux. Her PhD focused on using fossilised diatom species assemblages to determine past changes in sea-surface temperature and sea-ice extent in the Southern Ocean – the topic she then devoted the rest of her career to contributing significantly to our understanding of the paleoceanography of the Southern Ocean.

On completing her PhD, Leanne was offered a postdoctoral position at the Antarctic Climate and Ecosystem Cooperative Research Centre (ACE CRC) at the University of Tasmania in Hobart. Following this in 2007 she was the first Australian to receive a Marie Curie Postdoctoral Fellowship and moved to France to work at the Université d'Aix-Marseille. During this time, she participated in some large multidisciplinary research voyages to the Kerguelen Plateau. Leanne returned to Australia in 2009 to a position at Macquarie University in the School of Biology building a phytoplankton research group and teaching first year marine sciences. During this time, Leanne set up and was Director of the Collaborative Australian Postgraduate Sea Training Alliance Network (CAPSTAN), a Master-level training program with the Marine National Facility on board the RV Investigator (2013-2017). She also helped to set up the international Polar Diatom Training school which has since trained up many marine diatom experts.

In 2018, Leanne took up the role as the Australian/New Zealand International Ocean Discovery Program Committee (ANZIC) Program Scientist and later Director at ANU. She reinvented and reinvigorated this role, bringing together the community and raising the reputation of ANZIC within the international ocean drilling community. She continued to supervise students and undertake research at ANU and in 2020 was promoted to professor.

Leanne published over 100 publications during her career and was awarded the Australian Academy of Sciences prestigious Dorothy Hill Medal in 2007. She also received the U.S. Antarctic Service medal in 2014 for her voyage to the Sabrina Coast, East Antarctica on the ice breaker RV Palmer. She was also the first Chief Scientist to lead the Australian new RV Investigator in 2017 and was due to go back to Antarctica on the RV Investigator in 2022 as a mentor on a female-led voyage to Cape Darnley. She died on the 4 January 2022 after a year-long battle with a rare cancer.

Leanne was an inspiring and enthusiastic researcher with a love of life and making science fun. Leanne was my mentor for many years and was always there to build me up (or keep me grounded). She encouraged me to get out of the warmth of the subtropics and work on the cold Southern Ocean and despite my misgivings I am glad she did as it is a fascinating place. I was never lucky enough to sail with her, but there are many funny anecdotes (and photos) from voyages. Here is a short selection below from close friends and colleagues of Leanne.

"Leanne was known at fancy dress parties for her fantastic dress-up clothes that she sought at second-hand shops or whipped up on her sewing machine. She was often the life of the party in a jazzy wig or crazy outfit, and would also bring fancy dress on voyages, including an Elvis costume with a blow-up guitar! Her taste in music was broad and you could find her listening to Midnight Oil or Mozart's operas." Prof. Penny King, ANU – part of her speech at Leanne's funeral.

"The thing I want to highlight is her creativity in making surveys fun. Marine surveys can be totally business-like and successful, but just hard slog with no distractions, or they can be just as successful but with extra, slightly mad activities to lighten the mood. It depends a lot on the Chief Scientist. Our 2017 survey started with Leanne's Chief Scientist's instructions that loud shirts, crazy glasses, and mad hats should be brought for survey milestones, then her huge supply of chocolates used as "bribes" or prizes. Once at sea, mysterious postcards started appearing in the corridors. After a few weeks, multiple activities, invented by multiple people, were running that even involved the crew, which is not that common. It may not sound that important, but these things help the ship's company get on together and stay friends, even after 7 weeks at sea. As Chief Scientist, she made everyone work hard so nicely and encouraged activities/stunts that made the whole thing memorable and fun. It can make the difference between everyone getting off the ship wanting to work together in the future or hope not to see each other again.

Scientists, as a group, don't always do "people stuff" that well, but Leanne did, and was an excellent leader as well as an excellent scientist." Phil O'Brien, ex-Geoscience Australia, Emeritus Sydney University

"In this flurry of activities, she never missed an opportunity to share the love of her research with the general public, colleagues, the next generation of scientists, and school children as well. She was a role model especially to young researchers, and a mentor to women in science of all ages. Beyond her leadership in the scientific community, Leanne was a dedicated and warm friend to many. We are all grateful that Leanne was part of our lives, bringing laughter, deep conversation, and dreams of our shared science. In every way, Leanne was an inspiration and a true friend. Truly, Leanne was one of a kind, with her huge smile and her big, open heart – she will be missed thoroughly and remembered fondly." Amy Leventer, Colgate University, USA. Excerpt from obituary published at https://doi.org/10.1016/j.marmicro.2022.102095.

Information from Obituary – Professor Leanne Armand, ANZIC Director (1968-2022) | ANU Research School of Earth Sciences

Leanne Armand's obituary https://doi.org/10.1016/j.marmicro.2022.102095.

Leanne Armand – Wikipedia

OBITUARY FOR DR LYNDA PETHERICK

Patrick Moss

Lynda Petherick passed away suddenly on 26 February 2022, and this has left a massive hole within Australasian Quaternary Science. It was a great shock to hear the news and I think I speak on behalf of the whole Australasian Quaternary community that we will greatly miss her as a shining light in the field. I have known Lynda since July 2004, when I commenced as a new lecturer and her associate advisor (with Hamish McGowan as her principal supervisor) at the University of Queensland, and she was a newish Master of Philosophy student. She arrived from New Zealand after completing an Honours degree at the University of Canterbury and a Bachelor of Science degree at Lincoln University. She completed her MPhil in 2006 and then moved onto her PhD in 2007, graduating in 2012.

In both degrees she focussed on reconstructing the past environments of Minjerribah (North Stradbroke Island) through geochemical analysis of long-travelled dust and pollen/charcoal analysis of wetlands. This provided significant insight into environmental change across Australia during the Last Glacial Maximum and generated a number of key publications and conference presentations. Lynda demonstrated significant initiative and dedication to her studies, particularly through excelling in balancing her extra-curricular activities (also involving extensive sporting commitments, including representing Queensland in cricket) with her studies, as well as completing her MPhil while working to support herself, which demonstrated excellent planning abilities through juggling her studies with her work commitments.

During her time at the School of Geography, Planning and Environmental Management she made important contributions to the School, both in terms of teaching, in which she developed an excellent rapport with students and staff to deliver high quality classes, as well as the School's cultural life in which she was an integral member of the Geography and Environmental Management Society (GEMS), as well as supporting her fellow students through being a strong mentor and role model. In particular, she was closely involved in field trips with fellow staff and students, including being an integral member of research undertaken in Tasmania and K'Gari (Fraser Island), which provided important support to two Honours students (including Lydia Mackenzie) and staff research. She was also very active within the Quaternary Science community during her time at UQ, in particular taking a key role in the OZ-INTIMATE project, which involved wrangling a number of senior researchers to produce a lead author publication on late Quaternary environmental change for temperate Australia and helping to produce the seminal Quaternary Science Review OZ-INTIMATE special edition with Jess Reeves.

After completing her studies at UQ, she moved down the river to undertake a postdoc at the Queensland University of Technology with Craig Sloss. I continued to collaborate with her and Sloss working in the South Wellesley Archipelago in the Gulf of Carpentaria, where she demonstrated her outstanding field skills and making important contributions to archaeological, palaeoecological and sea level research as part of this ARC funded project (led by Sean Ulm).

She then moved to China in 2013, becoming a lecturer at Xi'an Jiaotong-Liverpool University near Shanghai and then returning home to New Zealand in 2016, securing a lecturing position in environmental science at Victoria University of Wellington. At Vic, Lynda continued to make important strides with her research and teaching, particularly through her involvement on a range of grants and developing environmental science curricula in both of her lecturing positions.

Furthermore, she made important and ongoing contributions to AQUA through a variety of committee positions, particularly as AQUA President, in which she played a key role in promoting women in science, developing the AQUA mentoring program and the AQUA Code of Conduct. I think a number of her colleagues have a favourite Lynda story and I am looking forward to catching up with colleagues at the next AQUA conference in Adelaide, raising a glass in her memory and embellishing our favourite stories, as it was a privilege to work with her as a colleague and a friend, and she will be sadly missed.

Lynda at Freycinet in 2009

OBITUARY FOR EMERITUS PROFESSOR PAUL MICHAEL BISHOP FRSE (17 NOVEMBER 1949 – 25 JANUARY 2022)

Martin Williams

"Why is it all so flat?" This was the rather plaintive question put to Bob Wasson by Paul Bishop during the long drive back to Sydney through the arid plains of west-central New South Wales. At that time, Bob was a tutor in the School of Earth Sciences, Macquarie University, and Paul was in his third year as an undergraduate. For a lad like Paul, brought up among the spectacular rocky sea cliffs of New South Wales, it was a fair question, and it became one he was to ponder for many years.

Paul Bishop was born on the scenic Central Coast of New South Wales and lived at Terrigal until he moved to school in Sydney as a teenager. After teaching for a while, he began his university career in the School of Earth Sciences at Macquarie University, graduating with an Honours Degree (First Class) in Physical Geography in 1976, supervised by the ebullient and iconoclastic geologist-pedologist Ron Paton. Paul later completed a Diploma in Education, perhaps superfluous for someone who was already an innately gifted and imaginative teacher. After teaching at high school and at Kuringai College of Advanced Education, he became a tutor in the Department of Geography at Sydney University. During that time Paul continued his field and laboratory research at Macquarie University and was awarded his PhD degree in 1983 for a brilliant study of Cenozoic drainage evolution in eastern New South Wales. This work proved a precursor to his subsequent sustained research on long-term landscape evolution, which later took him to many other parts of the world including Thailand, Vietnam, Cambodia, and Namibia as well as closer to his adopted home in Scotland.

Between 1989 and 1997, Paul lectured in the School of Geography and Environmental Science at Monash University, where he proved himself a stimulating lecturer and a steadfast colleague, before becoming Professor of Physical Geography at the University of Glasgow. At Glasgow, Paul proved to be an effective and enthusiastic teacher (this I know from meeting some of his former students in far-flung parts of the world), a caring, generous, and successful supervisor, and a visionary academic leader. This latter quality shone forth to good effect in the mid-2000s when the decision to merge two departments into what became the School of Geographical and Earth Sciences was being mooted. Here Paul could draw upon his experience in the large and well-equipped School of Earth Sciences at Macquarie University and the merger of the Graduate School of Environmental Sciences with the Department of Geography at Monash University at the time Paul moved to Monash.

Paul's research into long-term landscape evolution involved meticulous fieldwork, state-of-the-art dating techniques, and imaginative computer modelling. Some of this work is summarised in the chapter he wrote, with his former PhD student Geoff Goldrick, in *Australasian Landscapes* (2010), the Geological Society Special Publication he co-edited with Professor Brad Pillans (ANU).

Paul was elected a Fellow of the Royal Society of Edinburgh in 2004 for his outstanding work in the earth sciences. On his retirement in 2016, Paul was given the rare honour of being awarded an Honorary Research Fellowship by the university, as well as becoming an Emeritus Professor.

At a chance meeting at the European Geophysical Union conference in Vienna in 2014, Paul informed me of his intention to retire totally from academic work and focus on local history. Paul and his wife, Dr Geraldine Perriam, continued to live and work in Scotland after retirement, which enabled him to embrace his love of local history by carrying out research close to home. He chaired the Scottish Local History Forum. With fellow resident, Professor Niall Logan, Paul set up the Local History group for the parish in which he lived. Although active with charities and various societies, Paul continued to carry out research. He and other colleagues were awarded a grant of ca. £500,000 from the Leverhulme Research Foundation for further research into the history of Scotland's mills – one of Paul's great loves – and the change from waterpower to steam power during the Industrial Revolution.

Fieldwork with Paul was invariably invigorating and always fun. Working among the fierce Karriyu pastoralists in the Ethiopian Rift Valley in 1975 with eminent archaeologist Professor John Desmond Clark, Paul rapidly won their trust through his great good humour and his genuine concern for their well-being. Like Paul, the Karriyu men were tall and slim, and they soon became quite protective towards him, especially when

he accidently fell into the soil trench that he and I had spent that morning digging. Paul was shaken but happily unscathed. One of the Karriyu men mimed the event brilliantly, to Paul's great amusement.

In Paul we have lost a great earth scientist, an excellent colleague and a superlative teacher. Paul is survived by his widow, Dr Geraldine Perriam, whom I thank most warmly for the photos and for information about Paul. Vale, old friend!

Paul and Yindi. (Photo credit: Dr Geraldine Perriam)

OBITUARY FOR EMERITUS PROF GEOFF HOPE

Prof Simon Haberle

Director of the School of Culture, History and Language, Australian National University

The news that our friend, colleague, and Australasian Quaternary Association Life Member Emeritus Professor Geoff Hope passed away over the Christmas break after a long battle with cancer has been met with great sadness. Geoff was a close friend and mentor to many of us and contributed enormously to the disciplines of palynology, botany, palaeoecology, and biogeography.

Geoff began his career in Quaternary research and palaeoecology at the Botany Department, University of Melbourne, where he investigated the modern pollen-vegetation relationships and Holocene vegetation history of Wilson's Promontory, for which he was awarded a B.Sc (Honours) and M.Sc in 1966 and 1968, respectively. In 1969 he moved to Canberra at the invitation of Prof Donald Walker, who was then the Head of the Department of Biogeography and Geomorphology, Research School of Pacific and Asian Studies (RSPAS), Australian National University, to begin a PhD on the vegetation history of Mt Wilhelm, Papua New Guinea. Geoff completed his PhD in 1973 after pioneering a remarkable study on the influence of climate and human interaction with the alpine zone and montane forests in the highlands of Papua New Guinea. Thus began a life-long devotion to research, always conducted in consultation with local communities, on the human history and landscape evolution of New Guinea.

In 1974 Geoff was awarded a prestigious Queen Elizabeth II Fellowship at the ANU by the Australian Research Council to continue his work on the palaeoenvironments of New Guinea. He was able to complete a range of remarkable surveys of the botany, palaeoecology, glaciology, palaeontology, and archaeology of the highland landscapes of both West Papua (then Irian Jaya) and Papua New Guinea, as well as extend this work across southeast Australia (e.g., Hunter Island in Bass Strait, Tasmania), northern Australia and the Pacific (e.g., Fiji and Vanuatu). His early surveys of the botany and glacier/tree-line elevation in the Mt Jaya region of West Papua remain crucial benchmarks and glimpses into an environment that is rapidly transforming, and in some cases disappearing, under global warming and ever greater human exploitation. His multi-faceted interests represented a truly ground-breaking conceptualisation of research – an approach that we now recognise as transdisciplinary scholarship.

In 1978 Geoff was appointed as a lecturer in the Geography Department at the ANU, where he enthralled many undergraduate and graduate students (including myself) with his distinctive and often laconic lecturing style, and where he is responsible for training generations of Quaternary researchers and igniting the curiosity of many in the field of natural history. His sense of adventure combined with a jovial and calm demeanour inspired many as they accompanied him into the field – often bringing his partner Bren and son Julian along for the ride. He led many undergraduate fieldtrips to iconic locations such as Lake Mungo, Mt Kosciuszko and the highlands of NSW and Victoria, where he demonstrated the importance and effectiveness of doing field-based research with a minimum of technology and an abundance of enthusiasm.

He became Head of the Geography Department between 1987-1989, before moving back to the Department of Biogeography and Geomorphology (later to become the Department of Archaeology and Natural History in the School of Culture, History and Language), where he was also Head from 1999-2003. Over his academic career Geoff published around 200 journal articles, reports, and book chapters and supervised 32 PhD students, conducting fieldwork in countries as diverse as Indonesia, Myanmar, New Guinea, and a number of Pacific islands. In 2000 he was awarded a D.Sc for his research on "Environmental and anthropogenic change in the late Quaternary of the Southwest Pacific region" (University of Melbourne). Geoff also played an active role over many years in the Australasian Quaternary Association. He served as its President from 1991-1994, organising the Nerriga meeting in 1994 and was a regular attendee at the other meetings. His recent award of Life Membership in the Australasian Quaternary Association is but a small reflection of the enormous contribution that Geoff made over the years to the Quaternary research in our region.

After more than 40 years of academic life at the ANU, Geoff retired in 2009, but he continued to contribute to the ANU as Emeritus Professor through generously teaching, researching, and mentoring staff and students. He devoted much of his time over the last decade to the conservation of peatlands in montane ACT, NSW and Victoria, where he wrote a number of significant reports on the state of peatlands in southeast Australia and continued to monitor peatland recovery after recent

bushfire events across the region. A Festschrift published in Geoff's honour in 2010 details the legacy of Geoff's enduring contribution as an inspirational research leader, collaborator, and mentor (https://press.anu.edu.au/publications/series/terra-australis/altered-ecologies).

Geoff was always keen for fieldwork opportunities and continued to accompany many of his friends and students at ANU and in Canberra into the field when he could, even up until a month before he passed away. His yearning and love for fieldwork as well as for home lasted throughout his life and is beautifully reflected in the acknowledgements section of his 1973 PhD thesis (p.12) where he writes,

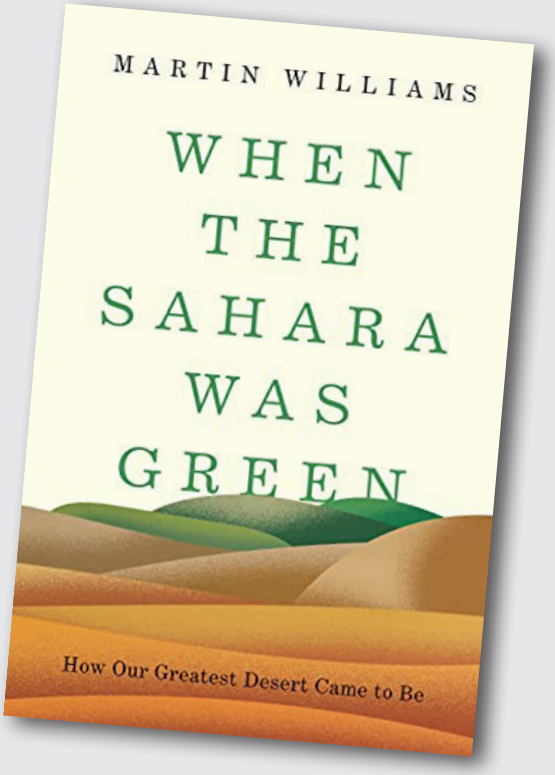
"After a few months in the field in New Guinea one tends to think back to dry, rolling plains with scattered trees and clear blue afternoon skies, with the luxuries of the straight smooth roads, hot water on tap, shops and libraries. One may vow never to walk again along muddy tracks, dreaming of a day without wet feet. But within a short time of returning to the laboratory bench, a reversal of attitudes takes place. One thinks instead of the unbelievable tangle of ridges rising up to mountain peaks, of grasslands and the gleam of ice, with clouds swirling down over sombre still lakes clinging to sheer rock walls and deep green forests. The pleasure of being so fit that a 1500m climb is of no more concern than a walk over level ground is remembered when all the discomforts of any walking in New Guinea are forgotten. Although the contrasting pulls of New Guinea and Canberra will always remain with me, I am very grateful to the people who have introduced me to both worlds."

As are we very grateful to Geoff for generously sharing his knowledge, insights, and friendship throughout his life. His keen wit, wisdom, and gentle encouragement for everyone with a curiosity for the natural world will be sorely missed. Vale Geoff.

Geoff Hope in Namadgi National Park, ACT

BOOK REVIEW

WHEN THE SAHARA WAS GREEN: HOW OUR GREATEST DESERT CAME TO BE



Martin Williams 2022

Princeton University Press, Princeton and Oxford, 222 pp

IBSN 9786912016627, ISBAM (e-book) 9780691228891

Reviewed by Philip Hughes

This book is written for the intelligent layperson as much as for the more academically-minded. As one reviewer (Nicolas Lancaster) wrote for the book's back cover, it is 'part personal reminiscence and reflection, part popular science, and part history'. Another reviewer on the same cover (David Thomas) reassures us however that the science is rigorous! All five reviews condensed onto the back cover were fulsome in their praise for the book.

The book is in three parts. Part One: The Green Sahara sketches how the Sahara came into existence, starting in the Proterozoic and ending at the last time it was significantly wetter than now, between about 15,000 and 5,000 years ago. Over at least the last 30 million years the pattern has been one of oscillating wet and dry. Part Two: A Sea of Sand deals with the progressive desiccation of the Sahara over at least the last 30 million years and with the birth and spread of the great sand seas and dune fields than now cover much of it. Part Three: The Sahara Today examines the causes and consequences of historic droughts, how they have influenced human societies and how these societies have adapted to them. The thorny issue of desertification, including the degree to which it is human-induced or caused by climate change, is also addressed here.

The incredible complexity of the geological, geomorphic, and climatic history through time and space of this huge region, which is roughly 5,000 km east-west and 3,000 km north-south, comes across loudly and clearly. The main focus is on the history of physical environmental change in the Sahara, but the way in which this evolving history affected the flora and fauna (including people), as reflected in the fossil and archaeological records, is also considered. In Chapter 2, in a section entitled 'Roaming Dinosaurs and Petrified Forests', Martin contrasts what conditions were like in the generally wet Mesozoic Sahara with the present waterless and barren desert. The next chapter, 'Hippo Hunters of the Sahara', focuses on a myriad of examples, mainly from the late Quaternary archaeological and fossil records, which illustrate the complex ways human societies coped with and adapted to constantly changing conditions. Chapter 7, 'Wood-Smoke at Twilight', starts with what the sparse archaeological records for our Saharan hominin ancestors tells us life was like for them, beginning as far back at almost 6 million years ago, continuing through to the appearance of our species (*Homo sapiens*) between 200-300,000 years ago, and finishing with more examples from the very much richer late Pleistocene and Holocene archaeological and environmental records.

There is very little comparison with similar phenomena from other deserts, which desert specialists will find frustrating, especially those of us based in Australia, which is Martin's home and about which he has also written extensively.

Since his first expedition to Libya in 1962, Martin has spent his life working and researching across the width and breadth of the Sahara and this has enabled him to bring an intense personal perspective to the writing of this book. Many of the illustrations in the book, for example, are field sketches from Martin's notebooks, and improved drawings by Frances Williams. This is a very personal account of the Sahara written in a style such that at times you can imagine that it is Martin speaking to you about the topic to hand, over a beer in the local pub or while sitting on a dune somewhere far away from civilisation. He talks about the Sahara as if he is talking about a dear friend of very long-standing.

The book is sprinkled with vignettes of Martin's contemporaries, as well as of earlier explorers and naturalists who worked or travelled in the Sahara. The most memorable of these is of Ralph Bagnold (p. 73-76), who travelled extensively through the Sahara in the 1930s and 40s, including during World War II, as a founder of the 'Long Ranger Desert Group', undertaking interdisciplinary research, one outcome of which was his classic book *The Physics of Blown Sand and Desert Dunes*, the handbook for all aeolian researchers.

Throughout the information and explanations are presented at the right level of detail for interested non-specialists, and there are copious endnotes with the published sources of data to which the reader can refer for more details. Much of the information derives from Martins' own scholarly publications, simplified for a different readership. There are separate comprehensive Indices for Subjects, People and Places. The book is well illustrated with maps, photos, and field sketches of landscapes and stratigraphic sections. Many places, often with exotic-sounding names, are mentioned throughout and the reader is advised to photocopy Maps 1-3 at the beginning, which show place names, in order not to have to refer back constantly to them.

Quaternarists, including those working in deserts, will find much that will interest them. School teachers of history, geography, geology, and a range of environmental sciences teaching about environmental change and human-environment interactions should own a copy. It integrates technical information in a way that a Google search cannot.

"... HANG ON, HAS ANYONE SEEN MY FIELD NOTEBOOK?" TALES OF MISHAP AND PROBLEM-SOLVING FROM THE FIELD

Rachel Rudd

School of Earth and Environmental Sciences, The University of Queensland

That's happened to other people too, right? Maybe it wasn't a notebook filled with precious observations, but perhaps you've trekked out to a remote field site and realised you're missing a GPS, an important cable, or even a handy spanner?

One of my favourite things about my work is the varied nature of the tasks I do each day, and the challenges that invariably arise. I don't necessarily love the challenges themselves, but the satisfaction of thinking on my feet and finding a creative solution to a problem is satisfying. Sometimes things just don't go to plan though, so I put the call out to the Australasian Quaternary community to see how you tackle the challenges you come across – surely I wasn't alone?? Everyone advertises their many successes, as they should, but maybe there's also room to celebrate our initiative, mental agility, and those 'learning opportunities'.

Thank you to all those who generously shared their stories with me – seeing the emails pop up and reading your tales made me smile each time. I hope you all enjoy reading them as well.

Helen Bostock shared a story about her early days at sea collecting marine sediment cores – she first shared this in person, and the conversation inspired the idea behind this article (thanks Helen!).

"Choosing a marine coring site is a bit of an art even today with sub-bottom profile data (shallow seismic/chirp) and multibeam data (seafloor bathymetry) to help select a suitable coring site with layers of sediment. Once you've chosen a site, you also need to determine which type of core would work best (Kasten, Gravity, Piston), and it's even more of a fine art for the master or mates to get the ship in the right position. In my early days of going to sea to collect sediment cores from offshore New Zealand, I naively tried to collect cores from pockets of sediment along the volcanic Macquarie Ridge using our pretty old low-resolution chirp system and a multibeam at the end of its useful life as a guide to identify suitable sediment. But with no dynamic positioning system on the RV Tangaroa and strong currents of up to 4 m/s in places, this was rather wishful thinking. I ended up with quite a few "banana" core barrels from these attempts, with cores likely hitting volcanic rocks instead of sediment. Over the space of 2 voyages in 2008 and 2011 to the Macquarie Ridge and Solander Trough, I learnt a few coring tricks from the experienced technicians and ships' crew.

Figure 1: A "banana" core barrel (Photo credit: Helen Bostock)

I targeted much larger areas of sediment in the Solander Trough and I successfully collected ~25 cores ranging in length from 50 cm to 5.5 m (from a 6 m core barrel). Of these, I have spent a lot of time and effort developing chronologies of 15 of the longest cores. After many hours in the lab, logging, measuring magnetic susceptibility, X-raying, sampling, and processing for foraminifera and stable isotopes, only a few of the cores turned out to have coherent isotope records that indicated continuous sedimentation and the potential to hold a useful paleoceanographic/paleoclimate record. I have only published 5 of these cores and 9 coretops (Bostock et al., 2015). So, my ratio for good cores to duds is 1/5, and I have had a lot of disappointing stable isotope and radiocarbon data over the years. However, I should note that I have had 4 MSc students, 3 PhD students, and currently 2 Postdocs working on the good cores from these voyages, and most of these have worked on just one core – TAN1106-28. This core has now had more than 12 different proxies analysed on it, 2 more publications in 2021, and a couple more in prep. I have got better (or luckier) at identifying good coring sites and collecting decent cores over the years (the ratio of good to duds has gone up). I think as an ECR I just chose one of the more difficult places to start my coring career.

I'd like to acknowledge all the support I have had from the NIWA technicians and RV Tangaroa crew that educated and humoured me on the many voyages, and all the scientists and students who have participated in the voyages and worked on these sediment cores over the past 13 years."

Isn't it a great story of perseverance? It also illustrates the importance of a great support team, mentors, and that sometimes you need to collect some duds along the way to finding something special.

Hold tight, the marine stories are coming in waves – David Nobes shared a story from post-doc work with the Pacific Geoscience Centre of the Geological Survey of Canada –

"...we dropped a couple of high-sensitivity ocean bottom magnetometers (OBMs) in Middle Valley on the Juan de Fuca Ridge. We then lowered an electrode at the end of a high-power cable to just above the sea floor with the return electrode near the surface. The idea was to generate electric currents that would induce magnetic fields that could be used to determine the crustal structure. Part way through the experiment, which we ran during the night because we only needed a skeleton crew to run it, we suddenly got a call from the bridge asking us if one of our instruments was due up. I got into my wet weather gear, got up on deck with a transponder, and got the signal that we would have expected from an instrument at the surface. One of the OBMs had popped up early. We could also see the flashing strobe whenever the OBM crested a wave. So, we had to reel in 2.5 km of electrical cable and go chasing after the OBM that was heading for Alaska. We did eventually catch it and retrieve it. What's even crazier is that when we checked the data, the OBM had recorded right up until it released, but only one of the two components (NS and EW) was recorded. The other malfunctioned. Upon closer analysis, we realised that the OBM had been oriented in such a way that the working component was maximally coupled, and the malfunctioning component wouldn't have seen much signal anyway. So the data were still usable! We got a nice paper out of the results. Serendipity is important in science."

A common theme to some of the stories was about missing or forgotten field equipment – in most cases, just part of the equipment was missing, but often (of course) it was a critical piece. Richard Gillespie shared a story of travelling to collect lake sediment cores on a trip run by Alayne Street-Perrott and Alan Perrott in Mexico. The coring equipment was sent from England months before the trip, but they arrived to find the chain hoist and core extensions hadn't arrived...

"So off to a local plumber for some pipe and fittings, got some lengths of pipe threaded for core extensions, and a T-bar on top to push in and lift out the cores. Our coring platform was two rented local wooden boats with a few planks lashed across, not a problem for sampling the mud-water interface of course, or the first few metres of sediment, but it all got stuck about 11.5 metres down.

Somebody had the bright idea to use a car jack to get the core moving, which aroused much interest in the team and with the residents, who did not understand our purpose. With two blokes on the T-bar and the third winding the jack our platform nearly sank, but after 2 or 3 days and the jack sitting on a pile of rocks, we did finally recover the core. And then ... Alan wanted to go down further!"

Figure 2: Resourceful coring in Mexico (Photo credit: Richard Gillespie)

Gresley Wakelin-King shared a story of collecting topographic data in Western New South Wales. On a rainy day, after a hairy drive out to the site where they risked getting bogged, they realised they had left behind the widget that connected the base station's satellite receiver to its tripod –

"There was no going back. Well, we tied the receiver to the tripod with bits of string and spare shoelaces and got on with the work. The surveyors were sceptical (see photo), but it worked OK. This story has a happy ending!"

Sometimes, we don't find what we're expecting in the field. Colin Pain ventured to the Kaugel Valley in the PNG highlands for PhD fieldwork, where he was expecting to study glacial outwash terraces in the valley, and relate them to glacial events on Mount Giluwe –

"This directed my reading before I went into the field. However, once there it became clear that the terraces and other landforms in the valley were not caused by fluvial activity and had nothing to do with the comings and goings of glaciers on Mount Giluwe. Instead, they were a result of a series of lakes that once occupied the valley floor. Thus, all the reading I had done on river terraces and glacial influences turned out to be largely irrelevant and I had to rapidly read up on lacustrine sediments. Never mind, that's how it goes. If the evidence doesn't fit your hypothesis, the only option is to change your ideas."

Colin has embraced telling stories from the field and has compiled a whole book on their PNG fieldwork, which I'm sure you'll agree has a very intriguing title – 'Caution! When in Turbulence do not Pick Nose. Ups and Downs of a Kiwi in Papua New Guinea'.

I love this next story from Martin Ankor, but it does make me wince a little –

"Many years ago, I did a large field trip, from Adelaide up to Coober Pedy, then Roxby Downs, then across to Broken hill, then back to Adelaide. The main instrument I was using stored data on a compact flash card. Either I'd forgotten the card reader or had decided not to download the data while I was on the trip.

The trip went well. However, at the time I was using a cheap and cheerful card reader, which generally worked well, but occasionally had a little hiccup. When I plugged the card in to download the data it had another little hiccup, except in this case it wiped the card.

Shortly after that I did another field trip to Coober Pedy, Roxby, etc, etc...

I learnt that if you have a bit of gear that's giving you a bit of grief, particularly with regards to reliability, then it may be worth replacing it before it ends up being a problem."

I thought I would wrap this up with a story from Michael Shepherd; it brings together some fears many of us might share, and had me sweating until the end –

"I carried out geomorphological PhD research in the Myall Lakes district, NSW, during the 1960s. Part of this involved levelling profiles for many kilometres across sand dunes and swamps, and through thick scrub in places. That activity sorely tested my originally willing assistants at times. At the end of one day's work, I loaded up the station wagon but left my notebook, containing several month's fieldwork records, on the roof of the vehicle.

Unaware, I drove off along the dirt road to the nearest town.

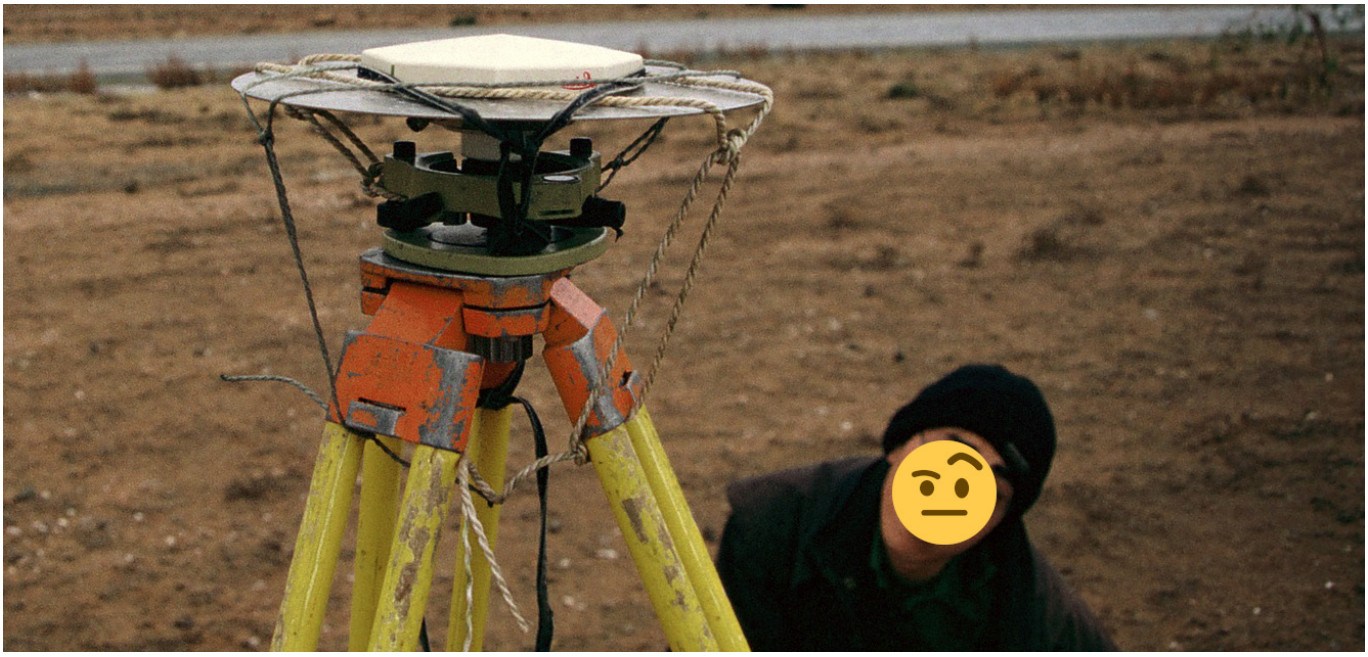


Figure 3: Spectating surveyor sceptical of shoelace system (Photo credit: Gresley Wakelin-King)

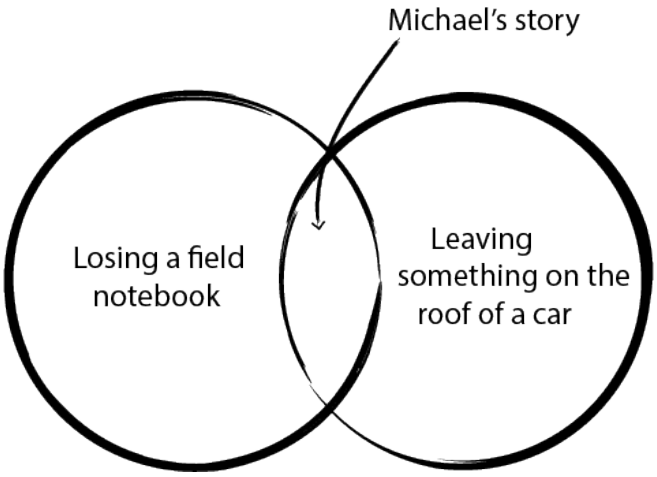


Figure 4: My field anxiety Venn diagram

You can imagine how I felt next morning when I realised what I had done and faced the prospect of having to repeat several months of hard work. I could also imagine the look on the face of my supervisor when I returned to Sydney University. Fortunately, when I retraced my route next morning, I saw the notebook in the middle of the road. It was battered and muddy because several trucks containing heavy mineral concentrates had driven over it, but the writing was still legible.

Needless to say, I have been extra-careful to look after my notebooks after that experience, and 55 years later I still shudder to think how differently it could have turned out."

This story sits in the overlapping section of the Venn diagram of two of my biggest fears: lost field notebooks and leaving things on the roofs of cars. On a coring trip to the Kimberley last year (which you can read about in the previous edition of QA!) we spent a long time searching for the handle from the winch on our coring tripod, including digging back through a pile of clay rich soil we had just dug up while trying to retrieve a stuck coring pipe. Eventually we gave up, but as we drove away, the people in the car behind us spotted the handle fall off the roof of our car – we were lucky we drove away first, and that they were paying attention!

Thanks again to those who shared their time and stories with me, I hope you've enjoyed reading them, and have found some threads within them with which you can relate – I certainly have! And just before I go, don't forget to check your gear lists twice (emulate Santa), back up your memory cards, and check the roof of your car before you drive away – but if you don't, I hope it leads to a good story.

1ST INDIAN QUATERNARY CONGRESS

Bob Wasson

The Australian National University, James Cook University

I had the good fortune to attend the 1st Indian Quaternary Congress on 19-21 January 2022, held virtually on behalf of the Association of Quaternary Researchers.

It was expertly organized by Dr. Binita Phartiyal of the Birbal Sahni Institute of Palaeosciences and Dr. Pradeep Srivastava of the Indian Institute of Technology-Roorkee. The theme of the Congress was Integrative Quaternary Sciences for Social Service. Papers were delivered on the following topics: Climate, Earth Surface Processes, Oceans, Humans, Fossils, and Landscape Evolution.

The Program and Abstracts can be found here and the entire Congress was recorded and can be found here.

The Congress provided abundant evidence of a vibrant and mostly young Quaternary community in India that is doing cutting-edge research in a place that is rich in Quaternary records. As someone who has done research in India over several decades, I was delighted to see this vibrancy. I also learned a lot about approaches to, methods for, and interpretation of diverse records from parts of the country that I both know and don't know. But for those who don't know the Indian Quaternary, you will learn a lot.

To me, working in other countries provides a way of reflecting on Australian records in ways that are very instructive. I hope that you have the same experience.

AEOLIAN SILTS INDICATE THE LGM ENVIRONMENT IN THE RIVER LEVEN VALLEY, LOONGANA, TASMANIA

Adrian Slee[1], Peter D. McIntosh[1], Ningsheng Wang[2] and Elena Lounejeva[3]

1 Forest Practices Authority, 30 Patrick Street, Hobart, Tasmania

2 Luminescence Dating Laboratory, School of Geography, Environment and Earth Sciences, Victoria University of Wellington, Wellington, New Zealand

3 Centre for Ore Deposit and Earth Sciences, University of Tasmania, Hobart, Tasmania

The middle River Leven valley at Loongana in northwest Tasmania is floored by Ordovician limestone, largely overlain by Tertiary basalt. On the northern valley sides, siliceous colluvium derived from the underlying Ordovician sandstones and conglomerates, as well as from Cambrian felsic volcanic rocks, covers many slopes (Pemberton and McKibben, 1996). During investigations of landforms in the valley the authors observed a low cutting (GDA94 ZONE 55: 408932mN: 5417544mE, 395 m asl) on Crane Road, immediately north of McHughs Flats at the confluence of Olivers Creek and Dempster Creek which are tributaries of the River Leven (Figure 1). The cutting exposed approximately 3 m of sediment on the slightly concave lower midslope of a hill (altitude 425 m asl) with a southeasterly aspect (Figure 2). Five layers were identified (CR-A to CR-E).

Two of these layers (CR-B and CR-C) had fine texture and pale colour untypical of most colluvium in the area. Samples of these layers were analysed at the University of Tasmania for their particle size distribution using conventional wet sieving and a modern QICPIC instrument for high-throughput dynamic image analysis (sympatec.com/en/particle-measurement; Sun et al., 2019). The wet sieving procedure was adapted from Australian Standard 1289.3.6.1. The QICPIC analysis was undertaken using a LIXELL wet dispersing unit, an M4 optical cuvette (2–2253 µm range) and a peristaltic pump speed of 25 rpm. Images were collected at 20 Hz for 120 s, and a particle density of 2.65 g/m^3 was assumed.

An undisturbed block of the silty layer (CR-B) was dated at Victoria University of Wellington by optically stimulated luminescence (OSL). The UV luminescence was measured during blue stimulation of fine quartz (4–11 µm) after IR stimulation (the so-called post-IROSL). The luminescence age was determined by the Single Aliquot Regenerative method (SAR). The dose rate was determined on the basis of gamma spectrometry measurements. The age was estimated using the Central Age Model (Wallinga and Cunningham 2014).

Layer CR-A (260–300 cm) consists of moderately cemented gravelly mottled silty clays. The gravels are rounded quartzite, up to 50 mm diameter. This layer is likely to be a terrace remnant.

Layer CR-B (220–260 cm) is a mottled silt consisting of a white (2.5Y8/1) matrix with 20 % yellow (2.5Y8/6) mottles. It has a very coarse angular blocky structure but displays no bedding. Wet sieving indicates that the layer consists of c. 90 % silt and 7 % sand (Table 1). Particle-size analysis by the QICPIC-LIXELL method on the ultrasonically dispersed < 2mm fraction is shown in

Figure 1: Study site location. LiDAR imagery (https://maps.thelist.tas.gov.au/listmap/app/list/map) shows the morphology of the study site including the floodplains of Dempster Creek and Olivers Creek, and McHughs Flats at their confluence. Yellow arrows show likely wind directions for sourcing the white silts from the Dempster Creek floodplain and McHughs Flats area.

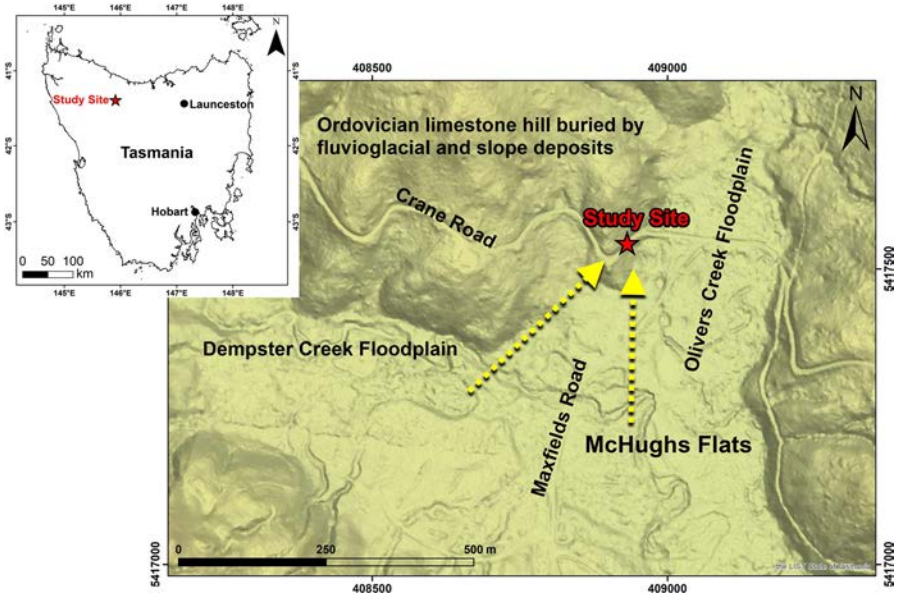
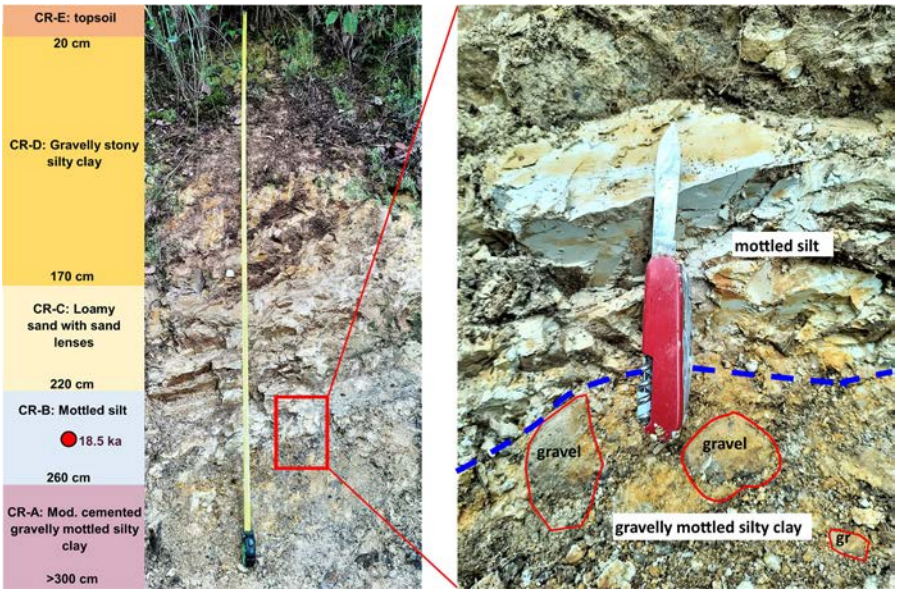


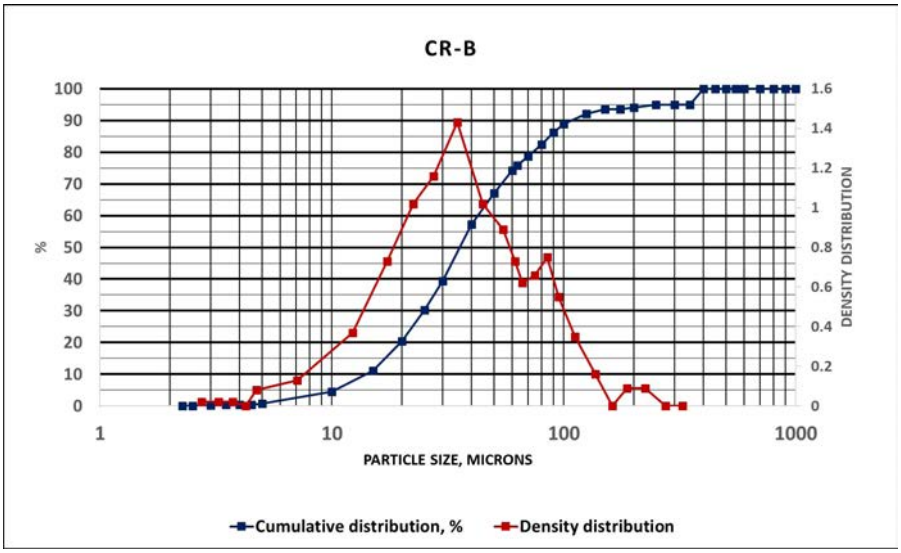
Figure 3 and shows less silt in the sample (c. 75 %) than that measured by wet sieving. The median particle size is 35 µm and 5 % of the particles are <10 µm diameter, indicating negligible clay (<2 µm) in the sample (the resolution of the QICPIC method did not allow the percentage of clay to be accurately determined.) The size-distribution curve has an S shape typical of aeolian deposits in Canterbury, New Zealand (Yates et al. 2017, Figure 2). In the profiles considered by Yates et al. (2017) silt-sized particles predominate (as they do in most loess deposits in New Zealand), but the silt content in the deposits analysed by Yates et al. (2017) is lower (c. 65 % silt) than in layer CR-B, because the profiles studied by these authors were more weathered and had clay content in the range 10–30 %. Layer CR-B is deduced to be an aeolian deposit, derived by deflation of silt and minor fine sand from the braided floodplains of the Dempster Creek and Olivers Creek, around the McHughs Flats area neither the massive character of the silt nor the topography of the site favour interpretation of the silt as a lake deposit. The ultimate source of the silt and sand is likely to be Ordovician sandstone and conglomerate in the upper catchment of Dempster Creek. For such deflation to have occurred, the floodplains of these streams must have been largely unvegetated, which in turn indicates a dry climate unfavourable to tree and shrub growth. The OSL date obtained was 18.5 ± 2.5 ka BP (Table 2), indicating that the silty layer accumulated during the late phase of the Last Glacial Maximum (LGM).

Layer CR-C (170–220 cm) is a white loamy sand (61 % sand) with coarse sand lenses. 53 % of the sand falls in the fine fraction. The <60 µm fraction is dominated by silt, with negligible clay, as was found for the



Above - Figure 2: Stratigraphy and detail of the Cranes Road section.

Below - Figure 3: Particle-size analysis of a sample from layer CR-B.



underlying CR-B sample. Layer CR-C is deduced to have a similar origin to layer CR-B, but to have been deposited in a period of higher winds, capable of transporting more sand to the neighbouring hills.

The aeolian silt and loamy sand units are interpreted to be ultimately derived from erosion of the siliceous Ordovician sandstones and conglomerates outcropping in the hilly and steep southern-aspect slopes north of the study site. Erosion of these rocks would have deposited silt and gravels on the previously braided floodplains of Dempster Creek and Olivers Creek around McHughs Flats.

Layer CR-D (20–170 cm) is a stony silty clay. The stones are angular. The layer, which forms the present-day subsoil, is deduced to be slope colluvium. The layer is likely to have formed in the period of rapid warming and erosion in the deglacial period, when the climate was wetter but freeze-thaw processes continued in a landscape still only partly revegetated after the LGM.

Layer CR-E (0–20 cm) is an organic-rich topsoil (A1 horizon of the present-day soil).

Two other outcrops of white silty deposits of likely aeolian provenance, also buried beneath younger colluvial deposits, occur further west along Crane Road and are likely to have similar date and provenance to the dated deposits described here.

Under the present climate the Dempster Creek valley hosts wet sclerophyll forest, rainforest, and patches of native grassland in frost hollows. However, the presence of wind-deflated sands and silts on hillsides suggests that during the LGM the valley floor was largely unvegetated and the Dempster Creek floodplain was a source of sediment for deflation and transport to the study site by southerly and southwesterly winds. This interpretation is supported by LiDAR imagery which shows low terraces and a number of relict channels in the area (Figure 1).

Aeolian deposits dating close to the peak of the LGM are not unusual in Tasmania and several LGM-dated source-bordering dunes, dune complexes, and silt accumulations are present in the south and central parts of the state (McIntosh et al., 2020). However, non-coastal aeolian deposits are rare in northwest Tasmania, possibly because most major rivers in the northwest have a north-south orientation over most of their length and (except for those in the far northwest) flow in incised valleys – a combination not favouring silt and sand deflation by the prevailing winds.

Table 1. Size analysis of <2 mm fraction of Cranes Road samples by wet sieving

FIELD ID	CR-B	CR-C
Sampled depth (cm)	250–255 cm	200–210 cm
Coarse sand, 2–0.6 mm (%)	0.6	0.6
Medium sand, 0.6–0.2 mm (%)	0.8	7.1
Fine sand, 0.2–0.06 mm (%)	5.8	53.4
Silt and clay, <0.06 mm (%)	92.6	38.9
TOTAL (%)	**99.8**	**100.0**

*The a-value is estimated.

**The total dose rate includes the cosmic dose rate of 0.1669±0.0083 Gy/ka.

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Table 2: Water content, radionuclide contents, a-value, equivalent doses, dose rate, and luminescence age.

LAB CODE	WATER CONTENT (%)	U FROM ^{234}TH (PPM)	U FROM ^{226}RA ^{214}PB ^{214}BI (PPM)	U FROM ^{210}PB (PPM)	TH FROM ^{208}TL ^{212}PB ^{228}AC (PPM)	K (%)
WLL1514	26.2	4.80±0.42	4.34±0.21	4.17±0,31	14.98±0.17	2.84±0.06
LAB CODE	**A-VALUE***	**DE (GY)**	**DOSE RATE** (GY/KA)**		**OSL AGE (KA)**	
WLL1514	0.05±0.03	92.02±11.66	4.97±0.27		18.5±2.5	

THESIS ABSTRACT

PALAEOECOLOGY OF SOUTHEAST AUSTRALIAN ECOSYSTEMS, WITH A FOCUS ON THE BASS STRAIT AREA: IMPLICATIONS FOR ECOSYSTEM MANAGEMENT

Matthew Adeleye (PhD)

Department of Archaeology and Natural History, School of Culture, History and Language, The Australian National University

Global change poses a major threat to ecosystems and biodiversity. This is particularly evident in southeast Australia, where never-before-seen wildfires are associated with ecosystem destruction, as well as the loss of wildlife, human lives, and significant infrastructure. In order to tackle these challenges, there is a need for better understanding of long-term ecosystem changes in the region. This understanding will help in building robust knowledge baselines for management and restoration goals.

The Bass Strait Islands provide a rare opportunity to investigate the long-term roles of climate and human land use in driving ecosystem and fire regime changes due to their unique history of human occupation, which contrasts with surrounding southeast Australian regions. The Bass Strait Islands saw declining populations at the same time as population intensification occurred in southeast Australia in the mid–late Holocene. The Bass Strait Islands can thus be regarded as rare natural laboratories where climatic and anthropogenic drivers of long-term ecological dynamics can be disentangled. The knowledge of the different roles of climate and anthropogenic land use on ecosystems and fire regimes gained from these natural laboratories can be applied to areas of southeast Australia to inform management strategies in an era of significant ecological changes. Therefore, this thesis provides a deeper understanding of past links between ecosystem change, changes in climate, fire regimes, and human land use in southeast Australia, using the Bass Strait area as a case study. Specific questions addressed include: (1) What drove vegetation and wetland changes in southeast Australia during the last glacial and Holocene? (2) What was the role of humans in vegetation and fire-regime changes in southeast Australia during the Holocene? (3) How can this deep-time knowledge contribute to better management of the ecosystems and fire regimes of the Bass Strait Islands and southeast Australia at large? In order to answer these questions, multiple wetland sediment cores were analysed to reconstruct vegetation, fire, and wetland histories of one of the least-researched Bass Strait islands (i.e. truwana/Cape Barren Island) and compared to existing palaeoecological records from neighbouring regions of southeast Australian mainland and Tasmania. The thesis places these findings into a broader regional context by analysing changes in vegetation and fire regimes and associated drivers of change across southeast Australia, applying a quantitative approach for the first time.

The results suggest that climate primarily drove ecosystem change across the southeast Australian region in the last ~35,000 years. Specifically, temperature change and shifts in Southern Westerly Winds (SWW) were key drivers of vegetation and wetland changes during the last glacial period, while sea-level change and precipitation changes related to El Niño-Southern Oscillation (ENSO) and SWW were more important during the Holocene. Indigenous people used fire to maintain open and diverse woodlands during the Holocene, and a combination of climate and anthropogenic land use controlled Holocene fire regimes across southeast Australia. On a finer spatial scale, insights from the Bass Strait Islands suggest Indigenous frequent burning reduced the area burnt by climate-driven fires during the Holocene. Indigenous fire management minimised contiguous woody fuel accumulation over the landscape, which in turn reduced fire spread. The suppression of Indigenous cultural fire management by European colonisation, combined with climate change, created novel fire regimes in southeast Australia in the last 200 years.

The reinstatement of an Indigenous cultural burning approach is recommended to help reduce the occurrence of destructive fires in southeast Australian forests and to preserve rare ecosystems, such as heathlands. This will help in restoring ecosystem health and biocultural heritage in southeast Australia. Monitoring of wetland hydrology and salinity is also recommended to preserve wetlands of significant ecological values in Bass Strait and the wider region.

Link to full thesis: https://openresearch-repository.anu.edu.au/handle/1885/261547

UPCOMING MEETINGS

Editors COVID-19 note: While every effort has been made to confirm that these meetings are still 'going ahead' as planned (or that details have changed) please double check with individual meetings organising committees, or on their webpages for the latest information and possible virtual conference options.

OCTOBER 2022

3rd IPICS Open Science Conference "Ice Core Science at the three Poles"

Venue: Crans-Montana, Switzerland
Date: 2-7 October 2022
https://pastglobalchanges.org/calendar/26967

NOVEMBER 2022

PAGES-INQUA joint ECR workshop: Past Socio-Environmental Systems (PASES)

Venue: La Serena y Coquimbo, Chile
Date: 20-24 November 2022
An initial online session was held in November 2020, and the in-person meeting was rescheduled for 2022.
www.pases2020.com/index.php/programme/

DECEMBER 2022

AQUA Conference
Venue: University of Adelaide
Dates: 6-8 December
https://aqua.org.au/conference/

Australian Archaeological Association Conference
Venue: Darwin Convention Centre
Date: 7-9 December 2022
https://aaaconference.com.au

2023

Palaeo Down Under 3
Venue: Perth, Australia
Date: 11-15 July 2022
https://www.australasianpalaeontologists.org/pdu3

XXI INQUA Congress
Venue: Rome, Italy
Date: 13-20 July 2023
https://inquaroma2023.org/

ICAZ
Venue: Cairns Convention Centre, Australia
Date: 7-12 August 2023
https://www.facebook.com/ICAZ2023cairnsaustralia

SEMINAR SERIES

Pal(a)eoPERCS (Palaeo Early Career Seminars) Series

Weekly seminars given by ECRs across palaeo –disciplines
https://paleopercs.com

Women in Earth and Environmental Sciences in Australia (WOMEESA) Virtual Seminars

Monthly seminars by women in Earth or Environmental Sciences on their research and career pathway
https://www.womeesa.net/seminarseries

RECENT PUBLICATIONS

Griffiths, A.D., Treble, P.C., Hope, P., & Rudeva, I. (2022). Rainfall Stable Water Isotope Variability in Coastal Southwestern Western Australia and Its Relationship to Climate on Multiple Timescales. *Journal of Geophysical Research-Atmospheres* 127(1), e2021JD035433. https://doi.org/10.1029/2021JD035433

McDonough, L.K., Treble, P.C., Baker, A., Borsato, A., Frisia, S., Nagra, G., Coleborn, K., Gagan, M.K., Zhao, J-x., Paterson, D. (2022). Past fires and post-fire impacts reconstructed from a southwest Australian stalagmite. *Geochimica Et Cosmochimica Acta*. https://doi.org/10.1016/j.gca.2022.03.020

Oriani, F., Treble, P.C., Baker, A., & Mariethoz, G. (2022). WlCount: Geological lamination detection and counting using an image analysis approach. *Computers & Geosciences* 160, 105037. https://doi.org/10.1016/j.cageo.2022.105037

Treble, P.C., Baker, A., Abram, N.J., Hellstrom, J.C., Crawford, J., Gagan, M.K., Borsato, A., Griffiths, A.D., Bajo, P., Markowska, M., Priestley, S.C., Hankin, S., Paterson, D. (2022). Ubiquitous karst hydrological control on speleothem oxygen isotope variability in a global study. *Communications Earth & Environment* 3(1), 29. https://doi.org/10.1038/s43247-022-00347-3

Lynda Petherick with Craig Sloss on Fraser Island (Photo credit: Patrick Moss) See Obituary for Dr Lynda Petherick

Quaternary AUSTRALASIA

Quaternary Australasia publishes news, commentary, notices of upcoming events, travel, conference and research reports, postgraduate thesis abstracts and peer-reviewed research papers of interest to the Australasian Quaternary research community. Cartoons, sardonic memoirs and images of mystery fossils are also welcome.

The Australasian Quaternary Association (AQUA) is an informal group of people interested in the manifold phenomena of the Quaternary Period. It seeks to encourage research by younger workers in particular; to promote scientific communication between Australia, New Zealand and Oceania; and to inform members of current research and publications.

It holds biennial meetings and publishes the journal Quaternary Australasia twice a year. Full annual membership of AQUA with an electronic subscription to QA is AUD50. For students, unemployed or retired people, the membership is AUD20.

The AQUA website (www.aqua.org.au) has information about becoming a member; alternatively please contact the Treasurer. Members joining after September gain membership for the following year.

Existing members will be sent a reminder in December.

2022 AQUA EXECUTIVE

PRESIDENT

A/Prof John Tibby
School of Social Sciences
Department of Geography, Environment and Population
University of Adelaide
Adelaide, Australia
PH: +61 (0)8 8313 5146
president@aqua.org.au

VICE PRESIDENT

Prof Tim Barrows
The School of Earth, Atmospheric and Life Sciences
University of Wollongong
Wollongong, Australia
vicepresident@aqua.org.au

SECRETARY

Patricia Gadd
Environment Theme
Nuclear Science and Technology
ANSTO
Lucas Heights, Australia
PH: +61 (0)2 717 3140
secretary@aqua.org.au

TREASURER

Dr Annie Lau
School of Earth and Environmental Sciences
The University of Queensland
Brisbane, Australia
Ph: +61 (0)7 3365 6654
treasurer@aqua.org.au

SHADOW TREASURER

Dr Heather Haines
Chronos 14Carbon-Cycling Facility
UNSW NSW, Australia
PH: +61 (0)4 2828 0606
h.haines@unsw.edu.au

COMMUNICATIONS AND IT COORDINATOR

Dr Micheline Campbell
School of Biological, Earth and Environmental Sciences
University of New South Wales
Sydney, Australia
communications@aqua.org.au

GENERAL MEMBERS

Johanna Hanson
School of Earth and Environment
University of Canterbury
Christchurch, New Zealand
johanna.hanson@pg.canterbury.ac.nz

Olivia Truax
Department of Geology
University of Otago
Dunedin, New Zealand
truol520@student.otago.ac.nz

Charles Maxson
School of Social Sciences
Faculty of Arts, Business, Law and Economics
University of Adelaide
Adelaide, Australia
charles.maxsoniv@adelaide.edu.au

Nicholas Patton
School of Earth and Environment
University of Canterbury
Christchurch, New Zealand
PH: +64 (0)2 1174 6103
nicholas.patton@pq.canterbury.ac.nz

Dr Caroline Mather
Centre for Rock Art Research and Management, School of Social Sciences
The University of Western Australia
Perth, Australia
PH: +61 (0)8 6488 6863
caroline.mather@uwa.edu.au

QUATERNARY AUSTRALASIA EDITOR

Dr Emma Rehn
Centre of Excellence for Australian Biodiversity and Heritage (CABAH)
James Cook University
Cairns, Australia
editor@aqua.org.au

SHADOW EDITOR

Dr Lydia Mackenzie
School of Earth Sciences
Zhejiang University
Hangzhou, China
lydia_mackenzie@zju.edu.cn