Quaternary Australasia

Volume 20 No 1 March 2002 ISSN 0811-0433

The Australian Quaternary as analogue for Mars

Quaternary action at ANU Geology

Images from western Victoria

The 14th International Symposium on Ostracoda

Climate Change Science Forum - IPCC 3rd Assessment Report

IAS/SEPM Environmental Sedimentology Workshop on Continental Shelves

IGCP Project 464 conference report

Conference on the Cenozoic Evolution of the Asia-Pacific Environment

Book Review:
V. A. Gostin
Gondwana to Greenhouse: Australian Environmental Geoscience

...and much more.

Quaternary Australasia volume 20/1 March 2002

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Material for the next issue should reach the editor by **31st July 2001 (papers)** and **31st August 2002 (other).**

The **Australasian Quaternary Association (AQUA)** is an informal grouping of people interested in the manifold phenomena of the Quaternary. It seeks to encourage research by younger workers in particular, to promote scientific communication between Australia and New Zealand, and to inform members of current research and publications. It holds biennial meetings and publishes the journal *Quaternary Australasia* twice a year. *Quaternary Australasia* is edited by Kate Harle. The annual subscription is $A25 or $15 for students, unemployed or retired persons. To apply for membership please contact Christine Kenyon (address below). Members joining after September gain membership for the following year. Existing members will be sent a reminder in December.

Research Papers in Quaternary Australasia have been peer reviewed. Research reports are not reviewed.

Committee Members

Cover Illustration - "Mount Napier erupts" Ken Grimes of Hamilton standing beside the new roadside sign above the Byaduk valley lava flow of probable Holocene age, with Mt Napier lava shield and scoria cones on the skyline. Photo by Bernie Joyce

Penultimate note

A bumper issue this time around. Thankyou to all who responded to my plea for articles and information! Please keep the information flowing for the next issue, which will be my last. It has been fun, educational and rewarding, but the time has come for me to step down and let someone else take on the mantle of QA editor. An election for the position will be held at the next Biannual AQUA conference in Westport, New Zealand (see Quaternary Diary for details). If you are interested in the position, or you know of someone who would perform the task well, please contact either myself or Simon Haberle.

Now, to this issue. We have a number of conference reports, including an account by Jessica Reeves of the 14th International Symposium on Ostracoda held in Japan last August. Jessica received an AQUA 2001 postgraduate travel grant to attend this conference. Simon Haberle has reported on the Climate Change Science Forum held in Melbourne in February where the IPCC 3rd Assessment Report was presented. Wyss Yim has very productively provided three conference reports on: the International Geological Correlation Program Project 464 meeting in Hong Kong last October, the IAS/SEPM Environmental Sedimentology Workshop on Continental Shelves held in Hong Kong in January, and the 5th International Conference on the Cenozoic Evolution of the Asia-Pacific Environment held in last October-November. Bernie Joyce has provided a lovely gallery of photos from the AQUA 2001 Western Plains pre-conference field trip. My apologies to Bernie for not putting these in the last issue! Hopefully, these will soon be available on the web site where you will be able to see them in their full colour glory. Bernie has also written a review of *Gondwana to Greenhouse: Australian Environmental Geoscience* edited by Vic Gostin and published by the Geological Society of Australia. Patrick De Deckker has reported on the research being carried out by the Australian Marine Quaternary Program in the Geology Department at ANU and Laing and others have reported on the selection of an Australian Mars analogue research site. There are also four thesis abstracts from some of our more recent Quaternarists.
Looking forward to receiving your submissions for the next issue!

Kate Harle
Editor

Short but not so sweet

As I rush to get a message together this very short President's Pen I'm reminded of the effort that goes into producing each issue of QA and the increasing impact it is having and hopefully will continue to have on the Australasian Quaternary community. This is certainly due to the great work that Kate Harle has put into QA over the last 6 years. Kate has decided to retire from the position QA Editor as of the next Biannual AQUA conference in February 2003 so we will be looking for keen people with editorial aspirations to help fill the position. Christine Kenyon is also retiring next February. She has been a superb treasurer for AQUA and has been instrumental in pushing forward many reforms of the Association. To both these people I would like to express on behalf of AQUA members our gratitude for the work you have done. On that note I look forward to hearing from people who may be interested in taking on an editorship or treasury role in AQUA....

Yours Quaternarily,

Simon

Australasian Quaternary Association
Financial Statement for 2000

INCOME AND EXPENSE REPORT
(1 January 2001 to 31 December 2001)

Uncommitted balance brought forward from 2000	*$30,132.89*	*$28,998.85*
	2001	**2000**
INCOME		
Business income - Concession	805.00	1,110.00
Business income - Full	3,755.00	3,695.00
Business income - Institute	469.13	276.30
Business Income Total	**5,029.13**	**5,071.30**
C'wealth Bank Interest	28.29	35.95
Bank Melbourne Interest (12 month)	1,279.95	472.13
Bank Melbourne Interest (6 month)		652.38
Bank Interest Total	**1,308.24**	**1160.46**
Port Fairy - registration	13,416.70	516.00
Port Fairy - excursion guides	330	140.00
Port Fairy - T-shirts	87.50	
Total Port Fairy income	13,834.20	516.00
Miscellaneous income (bank refund & adjustment	18.06	35.00
Quaternary Australasia income	5.00	
Quaternary International special issue	2,300.00	
TOTAL INCOME	**22,494.63**	**6,782.76**

Continued on page 3

Treasurer's Report

	2001	2002
EXPENSES		
QA expense - postage	464.11	739.34
QA expense - printing	3,788.00	3,162.70
QA expenses	30.00	
QA Expenses Total	**4,282.11**	**3,902.04**
Commonwealth bank fee		
FID	11.15	3.59
GDT	33.8	14.5
Merchant bank fee	1,041.37	122.79
Science and Parliament forum registration	198.00	25.00
Bowlerfest sponsorship		500.00
Prize-travel	1,000.00	1,000.00
Incorporation cost	60.00	
Postage		37.80
General expenses	100.00	
Miscellaneous expense		46.00
Quaternary International cost	3,200.00	
Refund AAV	25.00	15.00
Refund	50.00	
Total Refunds	**75.00**	
Port Fairy - accommodation	2,654.00	
Port Fairy - refund	589.00	
Port Fairy Excursion guide	495.00	
Port Fairy - administration	580.79	
Port Fairy - food and drink	5,853.19	
Port Fairy - insurance	891.00	
Port Fairy - student prizes	850.00	
Port Fairy - student subsidy	200.00	
Port Fairy - T-shirt	9.16	
Total Port Fairy Costs	**12,122.14**	
TOTAL EXPENSES	**22,123.97**	**5,648.72**
INCOME LESS EXPENSES	**370.66**	**1,134.04**

Assets (31 December)		
Commonwealth Bank account	4,812.32	5,618.14
Bank of Melbourne Term Deposit (6 month)	12,578.69	12,114.92
Bank of Melbourne Term Deposit (12 month)	13,112.54	12,399.83
TOTAL	**30,503.55**	**30,132.89**

Forthcoming conferences & meetings

Australasian Quaternary Association and New Zealand Friends of the Pleistocene Conference

First call for papers

4th-7th February 2003
Westport, New Zealand

As per usual this will be a pretty informal meeting with no concurrent sessions. We would like a focus on graduate student work and work in progress. There are proposed sessions on Antarctica, PEPII, and Phytolith Research. Other sessions will be created on demand.

Venue: University of Canterbury - Brian Mason/Max Gage Fieldstation, Westport, South Island, New Zealand

Accommodation: There is some accommodation on site: NZ$10 per person/night (4 beds per room) – preference will be given to graduate students. There is a camp ground within 100 metres of the venue and numerous motels, hotels (pub style), backpackers and B+Bs. Full listings are available at

http://www.geocities.com/westportnz/ and http://www.westport.org.nz/

Pre-conference field trip: Wellington to Conference via NW South Island (3-4 days)
Leader - David Kennedy

Post-conference field trip: Westport to Christchurch (8th-9th Feb)
Leaders - Jamie Shulmeister and Peter Almond

Intra-conference field trip: Pnakaiki Rocks, classical NZ main terrace and glacial sequences
Leader - Pat Suggate

Registration: Costs are estimated at $120/$50 members (Full/Student) and $150/$75 (non-members)

For further information (or suggestions) contact either:

Dr Jamie Shulmeister
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University of Canterbury
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Christchurch, NEW ZEALAND
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Fax: 64+4+463 5186
Email: David.Kennedy@vuw.ac.nz

Please fill out the expression of interest form included in this issue and return to David Kennedy.

Other general events

Holocene environmental catastrophes and recovery
(29 August-2 September, 2002)
Brunel University, London, UK
Contact: Prof. Suzanne Leroy
Brunel University,
Uxbridge, London,
UB8 3PH, U.K.
E-mail: suzanne.leroy@brunel.ac.uk
Website: http://www.brunel.ac.uk/depts/geo/Catastrophes/

Archaeology

Radiocarbon and Archaeology
Fourth Symposium
(9-13 April, 2002)
Oxford, UK
Contact: Dr Tom Higham,
Oxford Radiocarbon Accelerator Unit
Research Laboratory for Archaeology and the History of Art
E-mail: thomas.higham@archaeology-research.oxford.ac.uk
Website: http://www.c14dating.com

Annual Symposium of the Association for Environmental Archaeology
Worlds apart? Human settlement and biota of islands
(24-25 April, 2003)
Queens University, Belfast
Contact: Dr Nicki J. Whitehouse
School of Archaeology and Palaeoecology
Queens University of Belfast
E-mail: N.Whitehouse@qub.ac.uk
Website: http://www.qub.ac.uk/arcpal/events/aea.htm

Dendrochronology

Sixth International Conference on Dendrochronology
(22-27 August, 2002)
Laval University, Quebec City, Canada
Contact: Dr Yves Begin,
Centre d'etudes nordiques
Laval University
Quebec, Canada
E-mail: dendro2002@cen.ulaval.ca
Website: http://www.cen.ulaval.ca/dendro2002/

Geochemistry

Stable Isotope Signatures for Establishing Palaeoenvironmental Change
223rd ACS National Meeting
(7-11 April, 2002)
Orlando, Florida, USA
Contact: Kliti Grice
School of Applied Chemistry
Curtin University of Technology
Perth, Australia
E-mail: rgricek@alpha1.curtin.edu.au

Goldschmidt conference (European Association for Geochemistry and the Geochemical Society)
Incorporating the International Conference on Geochronology,
(18-23 August, 2002)
Davos, Switzerland
Contact: The Conference Office
PO Box 27
Cambridge
CB1 8TR, UK
E-mail: gold2002@the-conference.com
Website: http://www.goldschmidt-conference.com

Applied Isotope Geochemistry Conference
(26-30 May, 2003)
Heron Island, Australia
Contact: Barry Batts
E-mail: bbatts@alchemist.chem.mq.edu.au

18th International Radiocarbon Conference
(1-5 September, 2003)
Wellington, New Zealand
Website: http://www.14Conference2003.co.nz

Geomorphology

Joint meeting Fifth International Conference on Aeolian Research and Global Change and Terrestrial Ecosystems-Soil Erosion Network (Wind)
(22-25 July, 2002)
Texas Tech University, Lubbock Texas
Contact: Tom Gill
E-mail: tom.gill@TTU.EDU
Website: http://www.lbk.ars.usda.gov/wewc/icar5/icar5.html

17th World Congress of Soil Science
Arid and Semi-Arid Soils: Records of Past Climates, Carbon Sequestration, Genesis and Management
(14-21 August, 2002)
Bangkok Thailand
Contact: Dr Brenda J. Buck
Department of Geoscience,
University of Nevada Las Vegas,
E-mail: buckb@nevada.edu

16th AGC Geological Society of Australia Conference
(30 June - 5 July, 2002)
Adelaide, South Australia
Contact: The Organising Committee
16th AGC
PO Box 6129
Halifax Street, Adelaide
South Australia 5000
AUSTRALIA
E-mail: 16thagc@sapro.com.au
Website: http://www.sapro.com.au/AGC/16thagct.htm

Annual meeting of the Geological Society of America
(various special sessions of interest to Quaternarists - see web site)
(27-30 October, 2002)
Denver, Colorado
Contact: John W. Geissman
University of New Mexico
Albuquerque
Conference Fax: 303-357-1072
E-mail: meetings@geosociety.org
Website: http://www.geosociety.org/meetings/2002

Holocene Paleoseismicity: geological criteria for mitigating future seismic catastrophes
(29 August-2 September, 2002)
Brunel University, London
Contact: Alessandro Maria Michetti
Dipartimento di Scienze Chimiche Fisiche Matematiche
Università dell'Insubria
Via Lucini, 3, 22100, Como, Italia
E-mail: michetti@FIS.UNICO.IT
Website: http://www.brunel.ac.uk/depts/geo/Catastrophes/

Geophysics

American Geophysical Union Western Pacific Geophysics Meeting
(9-12 July, 2002)
Wellington, New Zealand
Contact: AGU Meetings Department
2002 Western Pacific Geophysics Meeting
2000 Florida Avenue, NW
Washington, DC 20009
E-mail: meetinginfo@agu.org
Website: http://agu.org/meetings/wp02Sessions.html

Micro and Macro Fossils

The Palynology and Micropaleontology of Boundaries
Special session: Annual meeting of the Geological Association of Canada
(26-29 May, 2002)
Saskatoon,
Saskatchewan, Canada
Contact: Alwynne B. Beaudoin
Provincial Museum of Alberta
12845-102nd Avenue,
Edmonton, Alberta, T5N 0M6, Canada
E-mail: abeaudoi@gpu.srv.ualberta.ca
Website: http://www.scirpus.ca/cap/cap.htm

Extant and Holocene Limnic Systems and Microorganisms in NW Mongolia
(August, 2002)
Ulan Bator, Mongolia
Contact: Dr Michael Schudack
Institut für Paläontologie
Freie Universität Berlin
Malteserstraße 74-100
12249 Berlin, Germany
E-mail: schudack@zedat.fu-berlin.de

4th International Meeting on Phytolith Research
(28-31, August 2002)
McDonald Institute for Archaeological Research
University of Cambridge, UK
Contact: Marco Madella
The McDonald Institute for Archaeological Research
University of Cambridge
Cambridge CB2 3ER

Quaternary Diary

6th European Palaeobotany - Palynology Conference
(29 August - 2 September, 2002)
Athens, Greece.
Contact: Prof. D. Evangelos Velitzelos,
Department of Historical Geology-Palaeontology
University of Athens
E-mail: velitzel@geol.uoa.gr

3rd International Conference of the International Society of Environmental Micropaleontology, Microbiology and Meiobenthology (EMMM)
(1-6 September, 2002)
Vienna, Austria
Contact: Dr Irena Motnenko
Osorno Enterprises, Inc.
Suite 301, 162-2025 Corydon Ave.
Winnipeg MB R3P 0N5, Canada
E-mail: congress@isemmm.org
Website: http://www.isemmm.org/meetings.html

Palynomorphs in dung, a key to diet, the environment and evolution
(11-13 September, 2002)
University College, London, England
Contact: Owen Davis
University Arizona, USA
E-mail: palynolo@geo.arizona.edu
Website: www.geo.arizona.edu/palynology/dung

Inaugural Meeting of the International Biogeography Society
Special session on Palaeobiogeography
(4-8 January, 2003)
Mesquite, Nevada
Contact: Julio L. Betancourt
U.S. Geological Survey
Desert Laboratory
Tucson, AZ 85745 USA
E-mail: jlbetanc@usgs.gov
Website: http://www.fhsu.edu/biology/rchannell/IBS/

3rd International Mammoth Conference
(24-29 May, 2003)
Dawson City, Yukon Territory, Canada
Contact: John Storer
Yukon Palaeontologist
Heritage Branch
Yukon Department of Tourism
PO Box 2703
Whitehorse, YT Y1A 2C6
E-mail: John.Storer@gov.yk.ca
Website:
http://www.yukonmuseums.ca/mammoth/index.htm

The 14th International Symposium on Ostracoda

(Shizuoka University, Japan, 1-4 August, 2001)

by Jessica Reeves (receiver of 2001 postgraduate travel grant)

School of Geosciences
University of Wollongong
Wollongong
NSW 2522, Australia
E-mail jmr07@uow.edu.au

The 14th International Symposium on Ostracoda, took place on 1-4 August, 2001. For the second time, it was hosted by Shizuoka University, Japan – a noted centre for research excellence in this field. Some 135 delegates attended the meeting, from 28 countries spanning all inhabited continents. Our region was well represented with five participants from Australia, and one from both New Zealand and Indonesia.

The theme of the meeting was entitled, 'Toward a New Ostracodology in the 21st Century' and focused on developments in both the understanding of living ostracods – their taxonomy, morphology and genetics and the use of ostracods as environmental indicators, both in a modern and 'palaeo' sense. The scientific sessions were thus divided into two themes; 'Earth Environments and Dynamic Ostracoda' and 'Evolution and Diversity of Ostracoda'.
Both the president of Shizuoka University, Hiroaki Sato and the Dean of Science, Toshimitsu Amagashi, gave welcoming addresses. Professor Noriyuki Ikeya of Shizuoka University and president of the International Research Group on Ostracoda provided the opening lecture, reminding us of the great potential of our chosen beast, given its ubiquitous aquatic dispersal, ease to culture in a laboratory environment and presence in the fossil record for over 500 Ma. Keynote addresses by Tom Cronin of the USGS and Bill Newman, Professor of Oceanography at the University of California spoke of the current state of ostracod shell chemistry as a proxy for environmental parameters and of the use of genetics in taxonomy, and shared their visions for future research in these areas.

In total, 39 speakers presented research on a wide range of topics and locations. The quality of the presentations was on the whole, excellent, with students providing both some of the most polished and scientifically interesting talks. Over 50 posters were also on display. Of particular note were the presentations from Shizuoka and Tokyo Universities, highlighting both the innovation and patience of their researchers. Emi Ito (University of Minnesota) and Patrick De Deckker (ANU) chaired a timely workshop on the use of ostracods for geochemical analysis, with words of caution regarding sample selection and treatment and the request for some standardisation in procedure between laboratories. I presented an oral paper in the session: Earth environments and dynamics of Ostracoda; geochemical analysis. I spoke on my PhD research of stable isotope analyses of ostracods from a sediment core (MD972132) from the Gulf of Carpentaria. The talk was well received and prompted valuable feedback from the audience.

Despite the humid, midsummer Japanese weather, the conference was well organised, academically stimulating and a lot of fun. The mid-conference field excursion allowed us time to collect both modern and Pleistocene ostracod samples from the Shizuoka district, have a swim at Cape Omaezaki and participate in a 'ocha no sato' – or tea ceremony at the tea museum – green tea being Shizuoka's principal crop. Social events such as the reception, featuring traditional Japanese music and of course sushi and the nostalgia slide show allowed us to get to know the faces behind the names and make contacts for future reference.

I thank the Australasian Quaternary Association for their financial support, enabling me to attend this meeting. The opportunity to meet with other researchers who share my interest was invaluable. I look forward to seeing them at the next meeting in Berlin, 2005.

Climate Change Science Forum - IPCC Third Assessment Report 28th February 2001

by Simon Haberle

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Monash University
Vic 3800
E-mail: Simon.Haberle@arts.monash.edu.au

The Intergovernmental Panel for Climate Change (IPCC) has just finalised its third report on the state of scientific knowledge on climate change and its predicted effects on natural systems and human society. At a forum held in Melbourne (28th Feb 2001) the results of the Report were communicated to an audience of industry, media, government and non-government groups. The presenters at the meeting, which included several lead authors of the report, highlighted a number of significant outcomes of this assessment including:

- There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.
- Global average temperature and sea level are projected to rise under all IPCC SRES scenarios.
- Anthropogenic climate change will persist for many centuries.
- Projected climate extremes could have major consequences.

Perhaps the most significant outcomes, and the ones picked up by the media, include the recognition that human activity is the primary cause of recent climate change (which is also the most significant change in the last 1000 years) and that this change will result in at least a 1.4-5.8 °C rise in temperature and a 0.9 m rise in sea level by 2100. The robustness and comparability of the models used to project future climate change has been the focus of this recent assessment. For Australia, the recently revised (1996) CSIRO scenarios for 2030 indicate temperature increases of 0.3-1.4°C and rainfall changes of up to 10% in magnitude (decreases in winter, increases or decreases in summer, and overall a tendency for decreases). The projected changes for 2070 are about twice those of the 2030 changes. Increases in the intensity of heavy rainfall events are indicated. For New Zealand, the temperature increases are expected to be similar to those for Australia, but the recent revision indicates the possibility of an increase in westerly winds (unlike the decreases of previous scenarios) and hence precipitation increases in the west and precipitation decreases in the east. The changes in scenarios serve to caution against over-interpretation of impact studies based on any single scenario.

The response of Australasia's biota to this climate change will be exacerbated by a highly altered landscape fragmented by urban and agricultural development. The rate at which climate changes and the increase in extreme disturbance events that are likely to accompany this change will produce significant impacts on biodiversity and distributions. There is already ample evidence for significant impacts in a number of key areas in the globe. Alterations in soil characteristics, water and nutrient cycling, plant productivity, species interactions (competition, predation, parasitism, etc.), and composition and function of ecosystems are highly likely responses to increases in atmospheric CO2 concentration and temperature and to shifts in rainfall regimes. These changes would be exacerbated by any increases in fire occurrence and insect outbreaks.
The media response has been predictable, generally leaning towards alarmist with tongue in cheek. A quick search of February news articles reveals the range of presentations including headlines like The leading with "Climate of Calamity, Experts predict weather chaos" (Herald Sun) , the with "Overtones of Armageddon" (Sunday Tasmanian) , and perhaps most interesting for readers in the subtropics, "Time to sell the snowboard" (The Gold Coast Bulletin). The Australian Government recognises this Report as the most authoritative source of information on the science of global climate change, though what it will actually do with it remains another matter. There is a $1 billion climate change package in place that includes measures to boost renewable energy efficiency as well as promote sustainable transport and land management. It is certainly clear that sufficiently tight control on Green House Gas emissions would be unlikely to keep both climate and sea-level as they are now. However, it is important to recognise that the Quaternary community will continue to play a very significant role in developing our understanding of the nature and consequences of climate change and it will be important that this research continues to be communicated to government and the wider community.

For further information on the IPCC Report visit the web site
http://www.ipcc.ch/

The International Geological Correlation Programme Project 464: Continental shelves during the last glacial cycle

(Hong Kong SAR, China, 25-28 October, 2001)

by Wyss Yim

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The University of Hong Kong
Hong Kong, China
E-mail: wwsyim@hkucc.hku.hk

Forty-eight participants from 14 countries attended this first annual conference out of a series of five. A total of 20 oral papers and 16 poster papers were presented including:

- Chemical evidence for marine/ estuarine/lacustrine transitions in the Gulf of Carpentaria (Chivas *et al.*)
- Growth history of coral reefs since the LGM in the western margin of Australia (Collins)
- Stratigraphy and sea-level history of the late Pleistocene Sunda Shelf (Hanebuth *et al.*)
- Postglacial sea-level rise and palaeo-shoreline movement along the northern continental shelf of the South China Sea (Zong *et al.*)
- Quaternary transgressive and regressive depositional sequences of the East China Sea (Liu *et al.*)
- Conceptual model of tidal sand ridge development since the LGM in the continental shelves of Bohai, the Yellow Sea and the East China Sea (Zhuang and Liu)
- Can the distribution of foraminifers in Holocene inner shelf sediment from the South China Sea be used as typhoon indicators? (Huang and Yim)
- Recognition of postglacial and pre-postglacial sediments on continental shelves: lessons learnt from the Hong Kong SAR, China (Yim)
- Distribution of diatoms in Holocene sediments in a core from Tai O Bay, Hong Kong SAR, China (Dickman *et al.*)
- Application of magnetic properties for studying modern seabed sediments contaminated by shipping activity in Hong Kong Harbour (Chan and Yim)
- Human activity of the Vistula delta plain and Vistula lagoon shoreline displacement during the Holocene (Zachowicz)
- Relative sea-level curve of the southern Baltic (Uscinowicz)
- Influence of the Holocene palaeoenvironment on shore protection measures in Flensburg Fjord, Baltic Sea (Schwarzer)
- Continental shelf morphostratigraphic features due to last sea-level rise: certainties and uncertainties with examples from Mediterranean margins (Chiocci)
- Palaeoenvironmental analysis of submerged speleothems formed during the Last Glacial Maximum in Argentarola Island, Italy (Antonioli and Silenzi)
- A high-resolution record of the LGM in the western Black Sea (Lericolais *et al.*)
- Palaeogeography and early human adaption of the Queen Charlotte Islands, Canada: drowned landscapes, palaeo-coastlines, and palaeo-marine habitats (Hetherington *et al.*)
- Post-LGM sedimentation on the outer shelf/upper slope of the northernmost part of the Sao Paulo Bight, southeastern Brazil (de Mahiques *et al.*)
- Geomorphological indicators of Quaternary sea levels on the continental shelf of southeastern Brazil (Conti and Furtado)
- Sea-level rise since the LGM: the eastern Mediterranean Sea off Israel (Gvirtzman *et al.*)
- Palaeoenvironments of the Gulf of Carpentaria since the last glacial: reconstruction from palaeobiota (Garcia *et al.*)
- Mapping the seabed sediments of the southern China continental shelf and slope (Hale)
- Stratigraphy and sea-level history of the late Pleistocene Sunda Shelf (Hanebuth *et al.*)
- Can the distribution of foraminifers in Holocene inner shelf sediments from the South China Sea be used as typhoon indicators? (Huang and Yim)
- Palaeodeltas during the last glacial period in the outer shelf of the East China Sea (Li and Li)
- Seismic and sedimentalogical characters of a 5th-order depositional sequence formed during the last glacio-eustatic cycle (Martorelli *et al.*)
- Palaeo-Indian archaeological evidence and two cases of land bridges in southern South America (Nami)
- Clastic sedimentary facies of low stand sea level during the LGM in the continental shelf and shelf edge of the East Sea, southeastern Korea (Park)
- Influence of the Holocene palaeoenvironment on shore protection measures in Flensburg Fjord, Baltic Sea (Schwarzer)

- Post-LGM coastline change as a major forcing of regional hydrodynamic variations: an example from the eastern Brazilian continental margin (Sousa *et al.*)
- The offlap break position versus sea level: a discussion (Tropeano *et al.*)
- The final stage of the Holocene transgression in the Puck Lagoon area, southern Baltic Sea as observed from the Rzucewo Headland case study (Uscinowicz and Miotk-Szpiganowicz)
- Submerged features related to the LGM in the Argentine continental shelf: the present knowledge (Violante)
- A preliminary study of the lower reaches of the Huanghe and Changjiang rivers during the LGM (Xia)
- Holocene evolution of the Subei coastal plain, Jiangsu, China and the contributions of Changjiang and Huanghe sediments (Yang *et al.*)
- Review of results of IGCP 396 'Continental shelves in the Quaternary' (Yim)

The 2nd annual conference will be held in Sao Paolo in Brazil in August 2002.

The IAS/SEPM Environmental Sedimentology Workshop on Continental Shelves

(Hong Kong SAR - 7-10 January, 2002)

by Wyss Yim

Dept. of Earth Sciences
The University of Hong Kong
Hong Kong, China
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This is the third in the series of IAS/SEPM environmental sedimentology workshop to be held following Venice, Italy in October 1997 and Santa Fe, USA in September 2000. Although there were only about 50 participants, the topics covered were wide ranging and interdisciplinary in nature. Funds for supporting the attendance of some of the participants were provided by IAS, the Croucher Foundation and International Geological Correlation Project No. 464 'Continental shelves during the last glacial cycle'.

Research results from many projects were presented in 10 keynote addresses, 13 oral presentations and 21 poster presentations. The program was made up of three full days of scientific sessions including half-a-day devoted entirely to posters and two evening dinner functions together with a full-day field excursion to Lantau Island to study coastal deposits. Both the overseas and local participants have after attending gained a much better appreciation of continental shelves in the world less familiar to themselves which should be beneficial to their future research endeavours.

Some key observations:

- Researchers should tap into the cable route surveying information and samples collected from the different continental shelves of the world for mapping continental shelves and to identify former submerged shorelines, etc.
- Vast amount of information including offshore bore holes are available from the inner continental shelves of the world where major coastal infrastructures are being developed.
- Corals are excellent archives of environmental change.
- Sub-aerially exposed muddy continental shelves may have an important role in the global carbon cycle through acid-sulphate soil development resulting in the natural release of carbon dioxide into the atmosphere through chemical reaction with carbonates.
- Karstification of sub-aerially exposed palaeo-coral reefs during glacial periods is another important natural source of carbon dioxide released into the atmosphere.
- Gases such as methane released from the seabed of continental shelves need to be taken into account in global carbon budget studies.

Plans are made to publish a collection of the papers either as an IAS special publication or a special issue of a journal.

Keynote papers

- Budget of sediment on continental shelves as indicators for the fate of natural and anthropogenic components (Nittrouer)
- Some advances in Quaternary environmental sedimentology from studying the inner continental shelf of the northern South China Sea off Hong Kong (Yim)
- Coupled land-sea numerical sediment-transport models and the formation of shelf stratigraphy (Syvitski *et al.*)
- Architecture, composition and properties of shelf sediments adjacent to the Pearl River mouth (Thomas)
- Recent development in drilling and ground investigation techniques for exploring the continental shelves (Wood)
- Terrigenous sedimentation and coral reefs: role of flash floods along the Red Sea coast of Egypt (Tucker)
- Recent sedimentation and morphological change in Poole Harbour, Southern England (Pye & del M. Fernandez-Rodriguez)
- Proxy environmental records from corals (Lough)
- Several temporal and spatial controls on the carbonate build ups of the Australian northwest continental shelf (Glenn & O'Brien)
- Late Holocene delta evolution and sediment discharge of the Mekong River, southern Vietnam (Saito *et al.*)

Oral papers

- Stratigraphic modelling of a Plio-Pleistocene shallow marine glacio-eustatic cyclostratigraphic sequence, Wanganui Basin, New Zealand (Liu *et al.*)
- Correlation of mud sequences in the continental shelf of the Yellow Sea: implications for palaeoenvironmental studies (Gao *et al.*)
- Early Holocene relic mud ridges offshore of the Yangtze River mouth, China: decelerated rise in sea level and tidal deposition (Chen & Saito)
- Evidence of beach deposits from the Last Glacial Maximum on the continental shelves of east and southeast Asia (Hale)
- Preliminary results on the postglacial sea-level rise of the northern South China Sea continental shelf (Huang *et al.*)
- Preliminary findings on the transport of suspended particulates by streams into the continental shelf of northern Israel (Pekar *et al.*)
- Hydraulic analysis using a newly developed observing system of a saline wedge in the Gonokawa River, Japan (Ueno *et al.*)
- Harmful diatoms in Hong Kong's inner shelf during 1995-2000 (Dickman *et al.*)
- Magnetic susceptibility results of vibro cores for the mapping of contaminated seabed sediments in Hong Kong Harbour (Chan *et al.*)
- Strontium thermometer from modern Porites coral and its uncertainties (Sun *et al.*)
- Integrated coastal management: sustaining estuarine natural resources (Crook & Turner)
- Heavy metal accumulation in recent sediments of the Pearl River Estuary, South China (Li *et al.*)
- Marine geohazards of a populated basin on a tectonic margin: Georgia Basin, British Columbia, Canada (Barrie)

Poster papers-

- Surficial sediment distribution and human impact: Fraser River Delta, British Columbia, Canada (Barrie *et al.*)
- Quaternary environmental changes and engineering properties of offshore sediments in Hong Kong (Choy & Yim)
- Coastal erosion: a self-inflicted wound (Pethick & Crooks)
- Mapping the surficial sediments of the northern South China Sea continental shelf and slope (Hale)
- ENSO episodes documented in the Middle Pleistocene outer shelf succession of the Boso Peninsula, Japan (Horikawa & Ito)
- Holocene sedimentary record of typhoons in the Pearl River Estuary (Huang & Yim)
- Side-scan sonar surveys of bed orms produced by the Kuroshio Current over the Izu Ridge, Japan (Kubo *et al.*)
- Initial movement of sand under irregular waves (Lambkin & Collins)
- Chirp (2 to 7 kHz) acoustic characteristics of continental shelf deposits, central part of the eastern Yellow Sea: sedimentary processes and sediment dispersal systems (Lee *et al.*)
- Application of sediment hydrodynamic modelling in harbour and coastal engineering (Liu & Wang)
- Thermal stress and coral bleaching: past, present and future (Lough)
- Preliminary results of the geophysical, sedimentalogical and geotechnical properties of a vibro-core from the inner continental shelf of Hong Kong (Mok *et al.*)
- Long-term morphological change in the Ribble Estuary and adjoining Irish Sea, northwest England (Pye *et al.*)
- Preservation processes and grain-size characteristics of Holocene beach-shoreface successions: comparison of the Sendai and Kujukuri coastal plains, Japan (Tamura *et al.*)
- Development of saline wedge observation system and its application to estuarine management
- (Tokuoka *et al.*)
- Carbonate patch reef in a delta-front setting, Indonesia (Wilson)
- Review of results of International Geological Correlation Programme Project No. 396 'Continental shelves in the Quaternary' (Yim)

The 5th International Conference on the Cenozoic Evolution of the Asia-Pacific Environment
(Hong Kong SAR, 29 October-1 November, 2001)

by Wyss Yim

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This conference was attended by more than 60 participants from 11 countries. Papers presented included:

- Past global changes and their significance for the future (Alverson)
- Implications of the 4,000 yr BP cold event on the origin of Chinese civilisation (Liu and Wu)
- A 7-million year geochemical record of dust weathering and deposition in northern China (Gu *et al.*)
- Late Miocene onset of Asian monsoon: land and sea (Zheng *et al.*)
- History of Asian desertification since the late Neogene (Guo *et al.*)
- Environmental reconstruction of northwestern China during MIS 5, 3 and 1: progress and problems (Feng *et al.*)
- Pliocene to Ice Age environments of the Murray Basin, southeastern Australia: key to modern climatic evolution (Bowler)
- Pleistocene dust deposition history in Chinese Loess Plateau: constrained by revised orbital time scales (Ding *et al.*)
- Palaeoclimatic assessment of the 3.0-2.6 Ma red clay in central northern China (Han and Fyfe)
- Late Quaternary landscape evolution in the arid regions of China with special reference to the Badain Jaran Desert and the Taklamakan Desert (Yang)
- Climatic variation during the past 0.13 Ma indicated by the loess-palaeosol sequence at Xining, Qinghai, China (Lu *et al.*)
- Eolian deposition and palaeoenvironmental changes in the lower Changjiang valley (Yang and Li)
- Late Quaternary palaeoclimatic record in the Xiashu Loess of the lower Chiangjiang valley (Yang and Li)
- Glaciation of the Tibetan Plateau and bordering mountains (Rutter)
- Late Cenozoic uplift of the Qinghai-Tibetan Plateau and its environmental impact on adjacent regions (Li *et al.*)
- Pleistocene palynology of Nepal (Paudayal and Ferguson)
- Palynological evidence for Plio-Pleistocene vegetation and climate cyclicity in upland Victoria, southeastern Australia (Sniderman *et al.*)
- Application of in situ cosmogenic ^{10}Be and ^{26}Al exposure age dating in Antarctica in Australia: implications for glacial geochronology and landscape evolution (Fink *et al.*)
- Exposure age dating of glacial deposits in Tasmania using in situ cosmogenic isotopes (Colhoun *et al.*)
- Preliminary study on the carbon isotopic composition of herbs in northern China (Han and Wang)
- Radiocarbon apparent ages and $\delta^{13}C$ distribution in forest soils (Shen *et al.*)
- Estuarine interactions and evolution of coastal sand ridges: examples from southern Yellow Sea (Wang *et al.*)
- Land bridges and isolation basins at the LGM around Australia (Chivas)
- Sub-aerially exposed continental shelves and the global carbon cycle (Yim)
- Mid-Holocene sea-level changes in the Malaysian Peninsula (Zong and Hassan)
- Neogene and Pleistocene deposits of Hong Kong (Lai)
- Use of magnetic susceptibility profiling for mapping Quaternary shelf sequences off the Hong Kong SAR, China (Chan and Yim)
- Holocene sedimentary record of typhoons in the Pearl River Estuary (Huang and Yim)
- Hong Kong phytoplankton abundance, species composition and monsoon events (Dickman *et al.*)
- Reverse engineering: how the physiological requirements of vertebrates can be used to reconstruct the mode and the tempo of environmental change (Jablonski)
- On the origin of modern humans in China (Wu)
- Palaeolithic culture and human migration (Huang)
- *Homo erectus* in south and southeast Asia: problematic questions of age and association with stone artefacts (Corvinus)
- The skeletal evidence for two species of *Homo erectus* in Java (Tyler)

- Environmental and faunal change in the latest Miocene Siwaliks of northern Pakistan (Flynn *et al.*)
- Assessing relations between recent and past climatic patterns: nature's challenge and gift (Lal)
- Composition and provenance of clay minerals in the northern part of Lake Tonle Sap, Cambodia (Okawara and Tsukawaki)
- The etching of quartz and the former environment of boulder colluvium in Hong Kong (Ruxton)
- Influence of aridity of carbon isotopic composition of pedogenic carbonates (Jiang *et al.*)
- Optical dating of dune sands in the northeastern deserts of China (Li *et al.*)
- Magnetic susceptibility as a palaeoclimatic indicator in the study of loess sequences (Liu)
- A 1,000-year time lag between the marine and terrestrial climate records during the last deglaciation in East Asia (Lu *et al.*)
- The effects of fire under tropical rainforest and its recognition in the geological record (Ruxton)
- Carbon isotopes as indicators for the restoration of forest ecosystems (Shen *et al.*)
- Palaeotemperature reconstruction in Daihai Lake, Inner Mongolia, China (Shen *et al.*)
- Strontium thermometer of a modern Porites coral from the South China Sea (Sun *et al.*)
- Coral reef development and sea-level changes in Yongshu Reef, South China Sea since the late Miocene Sun *et al.*)
- Significance of foraminifera in loess deposits of last glacial age along the coast of Bohai, China (Wang)
- Terrestrial mollusc and palaeoclimatic changes during the past 350 ka in the Loess Plateau of China (Wu *et al.*)
- Geomorphology of the Three Gorges, Changjiang River (Yang and Li)
- Phanerozoic denudation history from the study of alluvial tin placers in northeastern Tasmania, Australia (Yim)
- Cenozoic tectonic evolution of the South China Sea (Zhan *et al.*)
- Holocene monsoon variations recorded in sediments of Erhai Lake, Yunnan Province, southwestern China (Zhang *et al.*)
- Cenozoic plant succession and palaeoenvironmental change in northern China (Li and Wang)

AQUA 2001 - Western Plains of Victoria

Photos by Bernie Joyce

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En route to the 2001 AQUA Biennial meeting in Port Fairy, a group of Aquarists participated in a fantastic field trip across the Western Plains of Victoria, lead by Bernie Joyce. This was a highly informative and very enjoyable journey through this unique and dynamic region. Conditions had been dry in the region for some time, causing many of the lakes to be the lowest seen in years. Following is a gallery of some of the many images that Bernie took during this trip as well as from the mid-conference field trip to Mt Eccles, and the Byaduk lava flow from Mt Napier and its caves and lava tumuli.

Rim of a scoria cone at the eastern lookout, part of the probably Holocene Red Rock volcanic complex, Western Victoria. Red scoria overlain by spatter dips outwards to the left; crater to the right

AQUA group at Red Rock, overlooking lava flows and Lake Corangamite

Dry and nearly dry maar crater lakes at Red Rock, with Lake Corangamite in the background. February 3rd 2001

Alan Chivas viewing the drastically low water levels of one of the crater lakes at Red Rock

Cross section in road cutting of a stony rises with a lava tube frozen as it formed - on the road south from Red Rock, east of Lake Corangamite

Manifold Memorial Clock Tower, main street, Camperdown- evening on the first day, February 3rd 2001

Roger Jones holds audience entranced at the lookout at Camperdown Botanic Gardens, above Lake Gnotuk, as day 2 starts

Lake Gnotuk maar crater northwest from the Camperdown Botanic Gardens lookout

Outward-dipping tuff layers exposed in quarry in tuff ring of Lake Purrumbete maar - crater to the right

Main crater of Mt Noorat scoria cone - about 150 m deep

Seismologist Gary Gibson at the Mt Noorat crater rim information sign

Roger Jones pointing and explaining evolution of Lake Keilambete from the eastern side of the tuff ring

Block of country rock rounded by eruption in tuff of Lake Keilambete maar

Unusual rosettes of calcareous plates imbricated by wave action and now emerging from Lake Keilambete

Jim Bowler explaining evolution of Lake Keilambete

Calcareous plates sandwiching organic lake mud (interglacial?) - lens cap for scale

Jim's highly-trained dog locating freshwater spring on the shore of Lake Keilambete

Anthropogenic input to Lake Keilambete

Kate Harle speaks to the group at Lake Wangoom, now dry - looking south to the tuff ring quarry

Aquarites being addressed on aeolianites by John Sherwood Rusden (Warrnambool Campus) at the Hopkins River car park, Warrnambool

Northwest Crater, Tower Hill volcanic complex

Mt Napier (in distance) and Byaduk Valley lava flow

At the Harmans Valley lava flow, one of the excellent new information signs for tourists written by Ken Grimes

One of the collapse entrances to Bridge Cave lava tunnel showing layered lava at Byaduk in the valley flow from Mt Napier

Looking across the Wallacedale lava tumuli on the Byaduk flow to the far wall of the valley

One of the volcanic tumuli (formerly described as "lava blisters") at Wallacedale, near the end of the Byaduk lava flow from Mt Napier

Looking south over crater Lake Surprise with the half-cone of Mt Eccles on the far left

The Australian Marine Quaternary Program in the Geology Department at ANU

by Patrick De Deckker

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The **Australian Marine Quaternary Program** is a loose association of researchers who came to the Geology Department since approximately 1990 when Patrick De Deckker took on the charter to work on the marine Quaternary record of the Australasian region as part of a new initiative in the Geology Department.

Below is a list of theses and papers published in international and national refereed journals by those associated with the group. No abstracts are listed here.

Over the years, 7 postdoctoral fellows have been associated with the group [M. Ayress, T. T. Barrows, F. Gingele, I. Martinez, S. Nees, A. Rathburn and P. Wells], 2 long-term Visiting Fellows [C. Hiramatsu from JAPEX in Japan and J.- J. Pichon, from the CNRS in France] and 4 short-term Visiting Fellows [Prof. A. Altenbach from Germany, the late Prof. B. Funnell from Britain, Prof. H. Okada from Japan and Prof. Wang Pinxian from China]. These latter persons helped advise students and researchers during their stay and their visit helped shape the directions of research of the group. Five PhD [1 being based elsewhere on campus], 1 MSc and 4 Honours students were supervised [see list below]. There are currently 2 PhD and 1 Honours students in the process of completing their projects.

Nationalities represented by the group comprise: Australia, China, Colombia, France, Germany, Japan, New Zealand, UK and USA. Many members of the group also participated on 4 marine cruises led by P. De Deckker on the *RV Franklin*. In addition, several members of the group participated on other national and international cruises: L. Armand [*Marion Dufresne*], T. Corrège [2 *RV Franklin* cruises], D. Franklin [*Aurora australis*], I. Martinez {ODP Leg 134], S. Nees [2 *Marion Dufresne* cruises], V. Passlow [*RV Franklin*], *A.* Rathburn [*Aurora australis*] and P. Wells [*Rig Seismic*].

We have assembled a large collection of deep-sea cores stored in the Geology Department as well as numerous sub-samples of other cores from our region. A map detailing the location of the cores studied by members of the group is attached. This map does not show the location of other cores acquired during our 4 *Franklin* cruises and which are to be worked on soon.

Theses:

- Armand, L. 1997. *The use of diatom transfer functions in estimating sea-surface temperature and sea-ice in cores from the southeast Indian Ocean.* Ph D. Thesis ANU, 392 pp.
- Barrows, T. T. 1995. *Three aspects of late Quaternary palaeoclimatic reconstruction in eastern Australia.* BSc. (Honours) Thesis, ANU.
- Burckle, P. 1997. *The dissolution and ecology of planktonic foraminifera in the eastern Indian Ocean.* BSc. (Honours) Thesis, ANU, 124 pp.
- Corrège, T. 1993. *Late Quaternary palaeoceanography of the Queensland Trough (Western Coral Sea) based on Ostracoda and the chemical composition of their shells.* PhD Thesis, ANU, 213 pp.
- Franklin, D. C. 1991. *The marine environment of Prydz Bay, Antarctica: microbiota and facies distribution.* BSc (Hons) thesis, ANU, 106 pp.
- Hesse, P. P. 1993. *A Quaternary record of the Australian environment from aeolian dust in Tasman Sea sediments.* PhD Thesis, ANU, 396 pp.
- Martinez, I.J. 1993. *Late Pleistocene Palaeoceanography of the Tasman Sea.* PhD Thesis, ANU, 214 pp.
- Passlow, V. 1994. *Late Quaternary history of the Southern Ocean offshore southeastern Australia.* PhD Thesis, ANU, 265 pp.

- Spooner, M. I. 2001. *The Late Quaternary palaeoceanography of the Banda Sea east of Timor with implications for past monsoonal climates.* BSc. (Honours) Thesis, ANU, 106 pp.
- Swanson, K. 1993. *Late Quaternary and Recent benthic Ostracoda, from the eastern Tasman Sea.* MSc. Thesis, ANU, 160 pp.

Theses not done at ANU but utilising some of our material:

- Harle, K.J. 1998. *Patterns of Vegetation and Climate Change in Southwest Victoria over Approximately the Last 200,000 Years.* PhD thesis. Department of Geography and Environmental Science, Monash University, 472 pp.
- Takahashi, K. 2000. *Calcareous nannoplankton in the southeastern Indian Ocean: modern biogeography and palaeoceanography for the last 30,000 years.* Hokkaido University, Sapporo.

Publications:

- Armand, L.K. and Zielinski, U. 2001. Diatom species of the genus Rhizosolenia from Southern Ocean sediments: distribution and taxonomic notes. *Diatom Research* 16, 259-294.
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- Ayress, M. A. 1994. Cainozoic palaeoceanographic and subsidence history of the eastern margin of the Tasman Sea Basin based on Ostracoda. In: Van der Lingen, G. J., K. M. Swanson and R.J. Muir (editors) *The Evolution of the Tasman Sea Basin.* Proc. Tasman Sea Conference (November 1992, Christchurch, New Zealand). Balkema, Rotterdam, 139-157.
- Ayress, M., Neil, H., Passlow, V. and Swanson, K. 1997. Benthonic ostracods and deep water masses: a qualitative comparison of Southwest pacific, Southern and Atlantic Oceans. *Palaeogeography Palaeoclimatology Palaeoecology* 131, 287-302.
- Barrows, T. T., Juggins, S., De Deckker, P., Thiede, J. and Martinez, J. I. 2000. Sea-surface temperatures of southwest Pacific Ocean during the Last Glacial Maximum. *Paleoceanography* 15, 95-109.
- Barrows, T.T., Ayress, M.A. & Hunt, G.R. 1996. A reconstruction of Last Glacial Maximum sea-surface temperatures in the Australasian region. *Quaternary Australasia* 14, 27-31.
- Corrège, T. 1993. The relationship between water masses and benthic ostracod assemblages in the western Coral Sea, southwest Pacific. *Palaeogeography Palaeoclimatology Palaeoecology* 105, 245-266.
- Corrège, T. 1993. Preliminary results of palaeotemperature reconstruction using the magnesium to calcium ratio of deep-sea ostracode shells from the Late Quaternary of Site 822, Leg 133 (western Coral Sea). *Proceedings of the ODP, Scientific Results* 133, 175-180.
- Corrège, T. and De Deckker, P. 1997. Faunal and geochemical evidence for change in intermediate water temperature and salinity in the western Coral Sea during the Late Quaternary. *Palaeogeography Palaeoclimatology Palaeoecology* 131, 183-205.
- De Deckker, P. 1997 (editor) The Late Quaternary evolution of the oceans in the Australasian region. *Palaeogeography Palaeoclimatology Palaeoecology* (special issue) 131(3/4), 179-518.
- De Deckker, P. 1997. Introduction to the special issue on the palaeoceanography of the Australasian region. *Palaeogeography Palaeoclimatology Palaeoecology* 131, 179-182.
- De Deckker, P. 1997. The significance of the oceans in the Australasian region with respect to global palaeoclimates. *Palaeogeography Palaeoclimatology Palaeoecology* 131, 511-515.
- De Deckker, P. 2001. Late Quaternary cyclic aridity in tropical Australia. *Palaeogeography Palaeoclimatology Palaeoecology* 170, 1-9.
- De Deckker, P. 2002. A discussion on the possible significance of the "Warm Pool" on global oceanic circulation during the Late Quaternary. In A.C. Chen-Tun (editor) *Marine Environment: The Past, Present and Future*, Sueichan Press, Taipei, 1-8.
- De Deckker, P., Tapper, N.J. and van der Kaars, S. in press. The status of the Indo-Pacific Warm Pool and adjacent land at the Last Glacial Maximum. *Global and Planetary Change.*

- De Deckker, P., Corrège, T. and Head, J. 1991. Late Pleistocene record of eolian activity from tropical northeastern Australia suggesting the Younger Dryas is not an unusual climatic event. *Geology* 19, 602-605.
- De Deckker, P. and Gingele, F. X. in press. On the occurrence of the giant diatom *Ethmodiscus rex* in a 80 ka record from a deep-sea core, southeast of Sumatra, Indonesia: implications for tropical palaeoceanography. *Marine Geology*.
- Drapala, V. 1993. The use of ostracods in detecting fine grained turbidites in deep sea cores. In K.G. McKenzie and P. J. Jones (editors), *Ostracoda in the Earth and Life Sciences*. Balkema, Rotterdam, 559-568.
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- Franklin, D. C. 1993. Recent diatoms and foraminiferal assemblages in surficial sediments of Prydz Bay, Antarctica. *ANARE Research Notes* 90, 1-28.
- Gingele, F. X., De Deckker, P. and Hillenbrand, C.D. 2001. Clay mineral distribution in surface sediments between Indonesia and NW Australia - source and transport by ocean currents. *Marine Geology* 179, 135-146.
- Gingele, F. X., De Deckker, P. and Hillenbrand, C.D. 2001. Late Quaternary fluctuations of the Leeuwin Current and palaeoclimates on the adjacent land masses – clay mineral evidence. *Australian Journal of Earth Sciences* 48, 867-874.
- Gingele, F.X., De Deckker, P., Girault, A. and Guichard, F. in press. High resolution history of the South Java Current during the last 80ka. *Palaeogeography Palaeoclimatology Palaeoecology*
- Hesse, P. P. 1994. The record of continental dust from Australia in Tasman Sea sediments. *Quaternary Science Reviews* 13, 257-272.
- Hesse, P. P. 1994. Evidence for bacterial palaeoecological origin of mineral magnetic cycles in oxic and sub-oxic Tasman Sea sediments. *Marine Geology* 117, 1-17.
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- Hiramatsu, C. and De Deckker, P. 1997. The calcareous nannoplankton assemblages of surface sediments in the Tasman and Coral Seas. *Palaeogeography Palaeoclimatology Palaeoecology* 131, 257-285.
- Hiramatsu, C. and De Deckker, P. 1997. The Late Quaternary nannoplankton assemblages of three cores from the Tasman Sea. *Palaeogeography Palaeoclimatology Palaeoecology* 131, 391-412.
- Martinez, I. J. 1994. Late Pleistocene dissolution cycles in the Vanuatu region. Western Pacific Ocean. *Proceedings of the ODP, Scientific Results* 134, 293-308.
- Martinez, I. J. 1994. Late Pleistocene palaeoceanography of the Tasman Sea: implications for the dynamics of the warm pool in the western Pacific. *Palaeogeography Palaeoclimatology Palaeoecology* 112, 19-62.
- Martinez, I. J. 1994. Late Pleistocene carbonate dissolution patterns in the Tasman Sea. In G. J. van der Lingen, K. Swanson and R. J. Muir (editors) *Evolution of the Tasman Sea Basin*. Balkema, Rotterdam, 215-228.
- Martinez, I. J. 1997. Decreasing influence of Subantarctic Mode Water north of the Tasman Front over the past 150 kyr. *Palaeogeography Palaeoclimatology Palaeoecology* 131, 355-364.
- Martínez, J. I., De Deckker, P. and Barrows, T. 2001. The extent of the western Pacific warm pool (WPWP) into the eastern Indian Ocean during the last glacial maximum. In A.C. Chen-Tun (editor) *Marine Environment: The Past, Present and Future*, Sueichan Press, Taipei, 9-13.
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- Nees, S. 1997. Late Quaternary palaeoceanography of the Tasman Sea: the benthic foraminiferal view. *Palaeogeography Palaeoclimatology Palaeoecology* 131, 365-389..
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- Passlow, V. 1997. Slope sedimentation and shelf to basin sediment transfer: a cool-water carbonate example from the Otway margin, southeastern Australia. *SEPM Special Publication* 56, 107-125.
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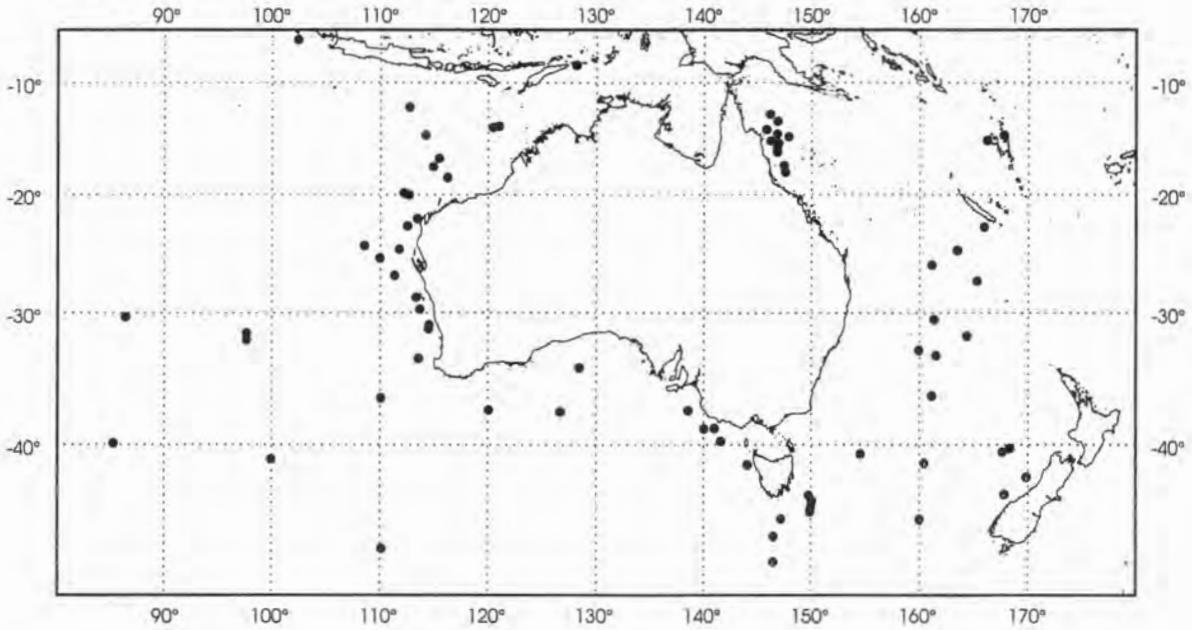
Location of cores studied by members of the



Selecting an Australian Mars analogue research site

Jennifer Laing[1], Dr Jonathan Clarke[2] & Dr Victor Gostin[3]

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Images of Mars brought back by Earth via probes such as the Pathfinder rover mission in 1997 showed a red, rock-strewn and alien landscape. To some however, that harsh and barren topography of the Red Planet looked strangely familiar. It could easily have been a scene from the Australian outback, colloquially known as the Red Centre. These similarities of landscape make the Australian desert the potential setting for Mars analogue research.

Martian analogue sites are essentially places on Earth possessing characteristics similar to environments on Mars. There are many to be found here in Australia, and some have already been catalogued and incorporated into an online database by Mars Society Australia, known as Project Jarntimarra ('star' in the Aboriginal Warlpiri language of central Australia).

The Australian chapter is part of a world-wide organisation known as the Mars Society, which, amongst other goals, is dedicated to conducting Mars analogue research. The Society has already established this type of research facility in other parts of the world, namely Devon Island in the Canadian Arctic and Utah in the American South-west. A third facility is planned for Europe, possibly Iceland.

The Jarntimarra-1 Expedition

The Jarntimarra-1 expedition conducted by Mars Society Australia resulted in the selection of a site which they believe will provide a unique and suitable location for a semi-permanent Mars analogue research base, known as Mars Oz.

Projects Mars Oz and Jarntimarra form part of a suite of technical projects which Mars Society Australia labels 'Operation Red Centre.' Other elements involve a rover vehicle, new spacesuit technologies and communication with the research base.

The group found a number of suitable places for testing equipment, technology and procedures that could assist future human missions to Mars, and for the location of an outback space research facility.

Jarntimarra-1 consisted of a party of up to twenty people who visited and evaluated a number of sites in central Australia as possible places for Mars analogue research. The expedition ran from October 26th to November 2nd, 2001. Sites in South Australia and the Northern Territory were accessed by road, using 4-wheel drives, and the expedition clocked up more than 4,000 km.

Those participating in Project Jarntimarra travelled through some of the most iconic and desolate parts of Australia, from Coober Pedy and the Birdsville Track, to the Simpson Desert and Lake Eyre.

The primary goals of the Jarntimarra-1 expedition were to:

- Visit sites in South Australia and Northern Territory previously identified on the Jarntimarra database and assess their analogue value.
- Sample the hot cores of the Birdsville Track for extremophiles (microbial life which is able to survive in extreme environments and which may hold the key to discovering whether life exists or existed on Mars).
- Decide on a site for Operation Red Centre and specifically Mars-Oz.
- Decide on an operations plan for Operation Red Centre.
- Raise public awareness of Mars Society Australia.

The Expedition Team

The expedition received widespread media coverage, despite the lead-up to an Australian federal election, partly due to the strong academic credentials of its participants. They included astrobiologist Professor Malcolm Walter of Macquarie University and the Australian Centre for Astrobiology, robotics expert Dr Graham Mann of Murdoch University and geologists Dr Jonathan Clarke and Dr Vic Gostin.

Dr Carol Stoker and Dr Larry Lemke from NASA's Ames Research Centre in California, provided the benefit of their experience as members of crews working on Mars analogue activities on Devon Island, most recently in summer 2001.

Professor Walter, the recipient of NASA funding, has been examining the possibility that life on Mars may have existed or still might exist in the form of extremophiles. Dr Mann has designed and built a number of innovative robots, including a walking biped and a domestic floor-cleaning machine, and is assisting Mars Society Australia to build a Mars analogue rover vehicle, known

as the Human Operations Prototype or HOP.

Dr Clarke is studying the history and evolution of the Australian landscape, and has also practised geology in New Zealand, the Philippines, and the Atacama desert of northern Chile, one of the most Mars-like areas on earth. He was appointed the leader for the Jarntimarra-1 expedition and is co-ordinating the design of the Mars Oz habitat.

Dr Gostin also has a long-standing interest in planetary geology and astronomy. In 1985, he identified a unique layer in the ancient rocks of the Flinders Ranges formed by a giant meteorite impact splatter. This exciting discovery turned his attention to the study of meteorites, the effects of giant impacts, and planetary geology, especially that of Mars. As a result, Dr Gostin has been honoured by having an asteroid named after him

Dr Stoker is a planetary scientist who is actively involved in planning for robotic and human exploration of Mars, and since 1990, has led a NASA Ames project to develop telepresence and virtual reality technology for mission operations and scientific visualisation to enhance control of mobile rovers on the surfaces of other planets. Dr Stoker was a participating scientist on the Mars Pathfinder project. Dr Lemke, an engineer, is currently the Special Assistant for Strategic Planning at NASA Ames, responsible for defining, acquiring and managing advanced space and astrobiology missions, with an emphasis on Mars exploration.

James Waldie from RMIT University is a specialist in new spacesuit technology and worked with the University of California San Diego and Honeywell in the United States on the development of a mechanical counter-pressure (MCP) spacesuit, which exerts external pressure to the body via a tight elastic compression garment rather than gas pressurisation. He carried out some of this research during Jarntimarra-1, with subjects wearing a MCP glove to test its dexterity when using common sampling/scientific tools.

Matilda Thomas of Geoscience Australia, who joined the expedition in Arkaroola, completed an Honours degree in geology at Macquarie University in 2000 on the hyperspectral analysis of ancient hydrothermal deposits, making her Australia's first astrobiology graduate. This work involved a comparison of the ancient hydrothermal deposit at Mount Painter, her field study area in the rugged Northern Flinders Ranges of South Australia, with possible Martian analogue sites.

At each site visited, individuals carried out pre-assigned tasks, such as taking photographs, assessing the geological features and their similarity to those found on Mars, and taking samples for further analysis. This information will form part of the Jarntimarra database of Australian Mars analogue sites.

The Value of Australia for Mars Analogue Research

Australia offers a number of advantages for this type of research that are missing from present localities in southern Utah and Devon Island. These include:

- The ability to undertake long range and duration traverses. This is important for the testing of rover operations from a central base.
- Abundant dust, and the need for dust control. This is likely to be a problem on Mars, which experiences frequent and violent dust storms.
- The ancient geology in Australia. Some Australian rocks are as old as Martian rocks and date from a time when the differences between the two planets may have been less pronounced. Australia's ancient regolith (weathered rocks, groundwater, and sediments) and ancient eroded landscapes also provide valuable analogues to those on Mars.
- General aridity and presence of salts.
- Groundwater discharge areas such as Mound Springs, thermal springs and fresh or salty discharge channels.
- Stream channels formed by infrequent catastrophic mega-floods that also interface with sand dunes, as on Mars.
- The opportunity to study extremophiles.
- The opportunity to collect microfossils of ancient microbial life.

These features make it possible to simulate aspects of the human exploration of Mars that are unable to be simulated elsewhere in the world.

Sites Visited During Jarntimarra-1

- Island Lagoon, south of Woomera
- The Breakaways, Moon Plain, and the Painted Desert, north of Coober Pedy
- Henbury Craters, south of Alice Springs
- Finke Riverbed
- Mt Hammersley Plain east of Dalhousie Springs
- Dalhousie Springs
- Algebuckina Hill, south of Oodnadatta
- Strangways Springs
- Lake Eyre South
- Coopers Creek
- The Birdsville Track
- Sturts Stony Desert
- Mt Gee, Arkaroola
- Paralana Hot Spring, Arkaroola

Most of these areas for the most part can be clustered into regions, each consisting of circles of approximately 100 km radius, which approximated the minimum desirable radius of the HOP analogue pressurised rover. Six regions and some of the key features of Mars analogue interest features associated

with them were identified over the course of the expedition.

Site 1 - Dalhousie Springs

- groundwater fed ephemeral river channel
- Mars-like plains with ephemeral ponds
- Dalhousie mound springs
- salt pans
- thermal pools and bores
- gibber plains and breakways
- dunefields

Site 2 - Moon Plain

- Breakaways
- major ephemeral rivers (Arkaringa Creek) and associated minor drainage
- salt lakes
- gibber plains
- saline toxic soils
- potential astrombleme (Mt Toodinna)
- Proterozoic microfossils in Peake and Denison range

Site 3 – Woomera

- mesas
- playa lakes
- sand dune fields
- exhumed landscapes of multiple ages
- gibber plains
- extensive ancient volcanism
- ancient lake deposits

Site 4 – Arkaroola

- a major playa lake (Lake Frome)
- active sand dunes (Gurra Gurra Water hole)
- gibber plains
- hot springs
- Mount Painter hydrothermal complex
- mound springs
- exhumed landscapes of the Northern Flinders Ranges
- Proterozoic micro fossils
- modern and ancient alluvial fans

Site 5 – Sturts Stony Desert

- active soils with patterned ground
- major ephemeral river system (Coopers Creek)
- extremophiles in hot bores
- active sand dunes
- extensive gibber plain on different surfaces

Site 6 – Lake Eyre South

- major playa lake (Lake Eyre south)
- multiple carbonate mound spring complexes
- microfossils (in mound spring tufas)
- palaeoclimate studies (in mound spring tufas and Lake Eyre sediments)
- gibber plains
- sand dunes
- ancient lake sediments
- breakway landscapes

Regional Selection

The regions were ranked by the group as a whole according to their engineering and scientific research value (maximum of 10 points each) and the logistics and security issues (5 points each). The definitions used are outlined in the table below.

Criteria for Regional Selection

Good Access (maximum 5 points)

- one day's drive from major capital city
- sealed, all weather roads for most of the way.
- Air strips

Security (maximum 5 points)

- number of people who visit the area
- accessibility from roads
- access to help
- size of local population
- control of access

Engineering (maximum 10 points)

- Lack of vegetation important

Science (maximum 10 points)

There are two types of science that could occur at a Mars analogue research base.

- desirable science that people would want to do there anyway.
- science relevant to Mars analogue research.

Arkaroola – Preferred Site for Mars Analogue Research

The three most favoured sites were Moon Plain, Woomera, and Arkaroola. The group then voted on these three with the result that Arkaroola was the preferred site, followed by Moon Plain and then Woomera.

The primary attraction of Arkaroola over the other sites for the initial site for Mars analogue research in Australia was the fact that the sand dunes at Gurra Gurra waterhole, the ancient hydrothermal system at Mt Gee, and the radioactive Paralana hot spring have already been studied as Mars analogues.

The Arkaroola site also enjoys good access by road year-round, proximity to infrastructure such as an airstrip and the Arkaroola resort run by the Sprigg family, and visual characteristics which are analogous to Mars, such as the red soil and dust.

Mars Society Australia will consult with traditional and existing owners/leaseholders before making definite proposals to undertake activities at any of the favoured locations in the future.

Operations Plan

The team, during a workshop at Arkaroola, identified key components to the operations plan for Mars Oz, namely technology, research and operations.

Technology

The HOP rover vehicle must be completed, and Mars Oz constructed. Several aspects need to be clarified but the group leaned towards a design based on a horizontal cylinder, rather

than the vertical cylinder of the Devon Island and Utah habitats. Such a design offers major savings in logistics and would simulate some of the bionics landers explored by a number of mission architectures.

Analogue spacesuits also need to be developed under Project MarsSkin.

The expedition highlighted the importance of good communications for safety and data transmission. Key microsatellite communications technology needs to be progressed under Project SAFMARS.

Research

The expedition identified the following list of research topics that could be carried out, including remote sensing of hydrothermally altered rocks and deposits, extremophile research at Paralana Hot Springs, analogue spacesuit construction and testing, the geochemistry of hot springs, teleoperations, a site survey of regolith terrain mapping and environmental management.

Operations

Other aspects to be investigated and clarified include design and construction of Mars Oz, access to the site, logistics, communications and logistics. Input of logistics issues will be a key part of the habitat design.

All work requires an understanding of the environmental impact and the possible rehabilitation of the area necessary at the end of the project. There may also be health and safety issues involved in working at the site.

Future Plans

The next step is to return to the Arkaroola site later in 2002 for more detailed analysis and to raise funds for the establishment of Mars Oz. This second expedition will identify a specific location for Mars Oz. The type and size of the Australian facility will be confirmed, with Mars Society Australia investigating a number of options.

For further information on sponsorship or Project Jarntimarra, see the Mars Society Australia Website at http://www.marssociety.org.au/

We would love to hear about your research and/or that being carried out by your department.
Please send in articles!
Deadlines are listed on the inside front cover.

AQUA travel bursaries for 2003 New Zealand

This year only AQUA will be offering 10 travel bursaries to help support participation by postgraduates wishing to attend the next Biannual AQUA meeting in Westport, New Zealand. The funds will be distributed as follows: a total of **5** travel bursaries of AUD**$500** each are offered to postgraduates from Australia, University of PNG or University of the South Pacific. A further **5** travel bursaries of AUD **$100** each will be offered to postgrads from New Zealand. If you wish to apply for these travel bursaries you will be required to register for the conference to give an oral presentation or poster at the conference and submit an extended abstract of your paper (~1000 words). Accepted papers/abstracts will be eligible for the travel bursaries and the extended abstract will be published in QA. Bursaries will only be given to those who have registered and submitted their extended abstract prior to the conference. Early application is recommended if you required additional financial support to attend this conference.

Please submit extended abstract along with evidence of conference registration by 2nd December 2002 to:

Dr Henk Heijnis
AQUA Secretary
Environment Division
ANSTO (Bld 34)
PMB 1
Menai NSW 2234

Baby news!

Jack Christopher Tibby was born at 1:10 am on Sunday 3rd March. At approximately 3 weeks early, he weighed in at 8 lb 14 oz (over 4 kg). Congratulations to proud parents John Tibby and Jenny Fluin!

New members

We thought it would be a good idea to welcome new members to AQUA in the newsletter. Here are our newest members for 2002.

Simon Connor
School of Anthropology, Geography and Environmental Studies, University of Melbourne.

Michael Fletcher
School of Anthropology, Geography and Environmental Studies, University of Melbourne.

Alexandra Hilgers
Department of Geography
University of Cologne, Germany.

Sean Ulm
Aboriginal and Torres Strait Islander Studies Unit
University of Queensland

Stephen Phipps
IASOS, University of Tasmania

Susan O'Connor
ANH, Australian National University

Andrew McMahon
CRC LEMME, University of Canberra

Marty Young
ANH, Australian National University

Andrew Jones
Urban Geoscience Division
Geoscience, Australia

Awards

Gusti Anshari, who has completed his thesis at Monash University (see Publications - Thesis Abstracts) and returned to a lectureship at Tanjungpura Univeristy, Pontianak, West Kalimantan, is one of 4, PAGES related, 2001 START young scientists awardees. He received the award for his paper "A late Pleistocene and Holocene pollen and charcoal record from peat swamp forest, Lake Sentarum Wildlife Reserve, West Kalimantan, Indonesia" *Palaeogeography, Palaeoclimatology, Palaeoecology* 171(2001), 213-228. Gusti began his affliation with PAGES as a grantee to present his work at the Global Change Open Science Conference in Amsterdam, 2001.

The bid for XVII INQUA 2007 in Australia continues

The proposed bid (to be presented at Reno 2003) by Australian Quaternarists to host the XVII INQUA in 2007 was discussed at the recent AQUA annual meeting (Feb18th). It was agreed that it would be highly beneficial to submit an draft proposal to INQA at their next meeting. This is to be done by Alan Chivas, with various members of the AQUA committee contributing information. The proposed venue for the Australian INQUA is the Cairns Convention Centre. Cairns was chosen because it is centrally located to a number of key Quaternary sites on a regional as well as international scale (e.g. Great Barrier Reef, Atherton Tablelands, Huon Peninsula). It is also highly attractive to overseas visitors, a fact that we hoped would aid our bid.

A steering committee is being established to facilitate the INQUA bid and we would like to invite interested members of the Australasian Quaternary community to join the AQUA committee to be part of this endeavour. Those who are interested in being part of organising the conference, developing fieldtrips or running symposia are encouraged to submit their ideas to Simon Haberle or Alan Chivas for inclusion in our bid for the 2007 congress. An initial consideration is our participation in the XVI INQUA in Reno, 2003. We would encourage all those who can, to attend this meeting, and to consider organising Poster Sessions and Symposia in their area of expertise.

New radiocarbon calibration program available

Bernhard Weninger, Olaf Jöris & Uwe Danzeglocke have announced the availability of their new Radiocarbon Calibration Program, called CALPAL (Cologne Radiocarbon Calibration & Palaeoclimate Research Package). It can be downloaded free-of-charge for the scientific community from the CALPAL site: http://www.calpal.de

The main incentive underlying the development of CALPAL is that it may be useful to show calibrated 14C-ages in graphic context with selected palaeoclimate proxies. This allows us to study human/geo/environmental events and processes vs climate. The palaeoclimate data base integrated in CALPAL presently contains 60 climate proxies, mainly from the polar and equatorial ice-cores. Another incentive is to explore data & methods applicable to the Glacial extension of the 14C-calibration curve.

CALPAL runs on PC under the operating systems WIN9x/NT/2000. The package requires c. 20 MByte free storage on a hard-disk drive named c:/ and a 200 MHz 586 Processor or faster.

Carbon Commission Website

The new Web page address for the INQUA Carbon Commission is http://qen.oursite.at/. The Carbon Commission is a fairly informal group of scientists who share a common interest in aspects of the past and future carbon cycle. They welcome new participants and a wide range of viewpoints. The site contains information on forthcoming meetings that relate to the carbon cycle (both INQUA and non-INQUA); the latest publications of existing members relating to the carbon cycle (anyone can send in a list of publications to be included); and contact details and home pages of working groups on particular aspects of the carbon cycle.

Virtual tephra workshop

The INQUA Commission for Tephrochronology and Volcanism (COTAV) announce a virtual workshop on practical techniques for detecting, extracting and geochemically analysing microscopic volcanic glass. The workshop is a new initiative for the Commission as it will be presented via the Internet. It will be of particular interest to COTAV members and will also be freely available to members of all INQUA Commissions. From 15th April 2002, by simply logging on to http://www.qub.ac.uk/arcpal/Tephra/Tephratrace/Home.htm, attendees will have free access to activities which will detail the value of using microscopic tephras for correlative purposes. Practical demonstrations on detecting, extracting and geochemically-analysing minute quantities of volcanic glass will be available and a case history describing the value of the microscopic tephra to the Quaternary scientist will be presented. Particular attention will be given to techniques used when performing Electron Microprobe single-tephra shard analyses.

To support the Commission's international membership, the presentations will be made in English with Chinese and Italian text available at the time of the workshop or soon thereafter. Interactive sessions when Commission members may contact fellow scientists for discussions will comprise a further aspect of the workshop. To take part in the latter, please send a text message 'join tephra firstname lastname' to jiscmail@jiscmail.ac.uk

NOAA Climate and Global Change Program Announcement

The Program Announcement for the National Oceanic and Atmospheric Administration Climate and Global Change Program FY 2002 is available for viewing at the web site www.ogp.noaa.gov. Paleoclimate research opportunities are described under the program element Climate Change Data and Detection.

Quaternary Web-based resources moved

The web-based resources compiled and managed by Alwynne Beaudoin have moved from their location at the University of Alberta to a new location at http://www.scirpus.ca/. All resources can be reached from the URL above or from direct URLs as given below:

The Canadian Association of Palynologists Home Page now at http://www.scirpus.ca/cap/cap.htm

A Dictionary of Quaternary Acronyms and Abbreviations now at http://www.scirpus.ca/cgi-bin/dictqaa.cgi

The Dung File now at http://www.scirpus.ca/dung/dung.htm

E-SCAPE (Edmonton component of SCAPE project) now at http://www.scirpus.ca/escape/escape.htm

The SCAPE File now at http://www.scirpus.ca/escape/bibintro.htm

Please update your links and bookmarks. The pages at UofA will remain available for some time but will not be maintained or updated.

New data at NOAA

The International Tree-Ring Data Bank managed by the NOAA Paleoclimatology Program, has received the largest data contribution in it's 20-year history. Dr Fritz Schweingruber and colleagues at WSL-Birmensdorf (Swiss Federal Institute for Forest, Snow, and Landscape Research) contributed a global data set containing nearly 500 sites, including ring width and wood density measurements, and site chronologies. The data are on the Paleoclimatology Program website at:
http://www.ngdc.noaa.gov/paleo/treering-wsl.html

Tropical Ice Core data available

The NOAA Paleoclimatology Program has archived data from tropical ice cores in Bolivia and Peru. Published by Thompson *et al.*, these data have been used to reconstruct tropical climate history over the past 20,000 years. The data confirm that global climate changes have been reflected in tropical regions since the last ice age, and show strong warming over the past 200 years. The data and research summary are on the Paleoclimatology Program website at:
http://www.ngdc.noaa.gov/paleo/pubs/thompson1995/
and
http://www.ngdc.noaa.gov/paleo/pubs/thompson1998/

Macrofossil Database now online

The North American Plant Macrofossil Database (NAPMD) has been added to the Paleoclimate website at:
http://www.ngdc.noaa.gov/paleo/plantmacros.html
The information includes published and unpublished macrofossil records from lakes, wetlands, meadows, and other chemically reduced environments (eg., fluvial, estuarine, buried soils, etc.) as well as exposed or buried 14C-dated logs and stumps. The database offers maps through WebMapper of macrofossil occurrences that can be used to test paleoclimates simulated by GCMs or inferred from other data (eg., pollen). The maps also reveal those regions and time periods in which data are critically needed. The data can also provide estimates of past species ranges and migration rates, corroborating inferences from pollen data.

You can keep track of the new holdings and other news at:
http://www.ngdc.noaa.gov/paleo/whatsnew.html

Palaeoclimate slide sets online

Recently the NOAA Paleoclimatology Program put together online versions of the nine educational slidesets that were originally developed primarily for undergraduate audiences studying climate change and variability. Because these slidesets are graphically rich, some delay in the load time may occur. Each of the slide sets can be viewed as separate images with corresponding text, or as an online slideshow. Topics include:
-The Ice Ages
-Collapse of the Classic Maya Civilization
-Coral Paleoclimatology: Natural Record of Climate Change for High School Student
-Polar Ice Cores
-Packrat Middens: Vegetation & Climate Variability in the Southwestern United States
-Tree Rings: Ancient Chronicles of Environmental Change
-Heinrich Events: Marine Record of Abrupt Climate Changes in the Late Pleistocene
-Low Latitude Ice Cores: High Resolution Records of Climatic Change and Variability in the Tropics and Subtropics

They can be accessed via
http://www.ngdc.noaa.gov/paleo/slides.html

Feedback is sought and can be provided by emailing Mark McCaffrey at mark.mccaffrey@noaa.gov

Website to help graduate students with research proposals

This may be of some use, even though it will be orientated to the US. There is a new site on the UCB Institute of International Studies web site (globetrotter.berkeley.edu), devoted to assisting graduate students prepare a doctoral dissertation research proposal with an eye to securing funding from various research agencies. This site was developed students from a number of social science disciplines with support from the Rockefeller Foundation. It offers much-needed assistance to students (and answers the most common questions) in thinking about preparing a research proposal and submitting it to the major social science and humanities funders (NSF, SSRC, Fulbright, and the major Foundations).

The design of the site is intended to walk students through the key issues in preparing a proposal and alerting them to pitfalls and problems, and to various sources of information. A number of proposals are posted on the site, drawn from a variety of disciplines, designed to elucidate some of the key concerns in thinking about research design, funding strategies, fieldwork and so on.

The web site address is:
http://globetrotter.berkeley.edu/DissPropWorkshop/

This is obviously a site that can be continually improved and updated and to this extent please send comments you may have to Letitia Carper (letitiac@globetotter.berkeley.edu)

Assoc. Professor position at James Cook University

The School of Tropical Environment Studies & Geography, James Cook University, (Townsville) is advertising for an Associate Professor. This is a replacement position in environmental science and/or physical geography and they would like to attract a wide field.
Closing Date: 10-MAY-2002
Reference No: 2054
Enquiries: Professor David Gillieson
Ph: 07 4042 1389
E-mail: David.Gillieson@jcu.edu.au

Two positions with Caring for Country Unit, Northern Land Council, Darwin

Wetlands officer
Classification: AS06/P02
Contract until 30 June 2004 (2 years, further funding will be sought)
Ref No: N18

Integrated Conservation & Development Planning Facilitator,
Classification: AS06/P02
Contract until 30 June 2003 (12 months, further funding will be sought)
Ref No: N24

Contact: Michael Storrs
Executive Officer
Caring for Country Unit
Ph: 08 89205186.
Position description: 08 89205100
E-mail: employment@nlc.org.au
Closing date: 26 April 2002.

Research assistant

University of Durham, Department of Archaeology

The Department of Archaeology at the University of Durham (UK) are seeking a post-doctoral archaeological scientist or geochemist. They are after someone with experience in:
- inductively-coupled plasma mass-spectrometry;
- thermal ionisation mass spectrometry;
- isotope ratio mass spectrometry; or
- human osteoarchaeology.

The successful applicant will assist in the conduct of a project using new techniques in combined Pb-, Sr- and O-isotope biogeochemistry to study archaeological immigration and settlement through the analysis of human teeth and bones.
Further details and application procedures can be found at http://www.dur.ac.uk/Personnel/vacancies/A1715.html

Research fellowships

Institute for Water and Environmental Resource Management
The Institute for Water and Environmental Resource Management invites applications from suitably qualified persons with a strong record in research and publication in one or more of the following fields: plant ecophysiology; salinity-vegetation interactions; plant ecology (especially riparian or wetland systems); groundwater-dependent ecosystem studies; ecosystem/ water resource management; tree water use; or related disciplines. This position is a fixed term 3 year position funded through the Institute at UTS.
Contact: Professor Derek Eamus
E-mail: Derek.Eamus@uts.edu.au
or Human Resources at UTS.

PhD opportunities

Geology Discipline of the School of Environmental & Life Sciences
The Geology Discipline of the School of Environmental & Life Sciences invites applications for a PhD scholarship commencing in 2002. The scholarship is linked to a multi-disciplinary research project entitled: High-resolution palaeoenvironmental reconstruction of Holocene coastal valley evolution in NSW: A magnetic, geochemical, sedimentological and microfossil investigation.
Supervisors: Dr Tim Rolph,
A/Prof Ron Boyd
Contact: Dr Tim Rolph
Geology
School of Environmental & Life Sciences
University of Newcastle
Callaghan, NSW 2308
Email: Tim.Rolph@newcastle.edu.au

EL NINO history recorded in kauri tree-rings
An opportunity exists to undertake PhD studies with a research team in Auckland, New Zealand, investigating the potential for climate reconstruction from kauri tree- rings. Recent work has identified a relationship between kauri growth and the El Niño – Southern Oscillation (ENSO) phenomenon. Three-year funding has been received to investigate this, including provision for one new PhD. A focus on climate reconstruction is anticipated, but the scope of the PhD is not pre-determined; it will partly depend on the interests and skills of the candidate. The position is available immediately.
Contact: Anthony Fowler
E-mail: a.fowler@auckland.ac.nz

Centre for Ecology and Hydrology, Edinburgh, UK
An PhD opportunity is being offered at the Centre for Ecology and Hydrology, Edinburgh (UK) to model the role of biogeochemical cycles in glacial-interglacial and future climate change
Contact: Dr Tim Lenton
E-mail: tlent@ceh.ac.uk)

Journal/book news

IPC proceedings available

Copies of the *Proceedings of the 9th International Palynological Congress* are now available at US$90 (inc. shipping). The proceedings volume includes 65 articles divided among five sections:

- Palaeozoic Palynology
- Mesozoic Palynology
- Tertiary Palynology
- Quaternary/Pleistocene Palynology,
- Recent Palynology,

They can be obtained from vbryant@tamu.edu.

Book offers

Flammable Australia The fire regimes and biodiversity of a Continent.
Edited by Ross Bradstock, Jann Williams and A. Malcolm Gill
Cambridge University Press
Cost $150.00 plus postage and handling $6.60.
This is a special offer until March 31 2002.
Contact Cambridge University Press
E-mail: info@cambridge.edu.au

For academic inspection copies contact James Cayley Academic Marketing Department Cambridge University Press
E-mail: jcayley@cambridge.edu.au

Forest of Ash an Environmental History
by Tom Griffiths
Published by Cambridge Australia
Cost $34.95 (Pb)
or $99.00 (Hb)
There is a 20% discount on this book if you have the order form so
Contact Cambridge University Press
E-mail: info@cambridge.edu.au

Lake Pedder: Values and Restoration
The Proceedings of a Symposium 8 April 1995, University of Tasmania.
Editor Chris Sharples.
Cost $30.00 plus postage
Order from:
Centre for Environmental Studies
Dept Geography and Environmental Studies
University of Tasmania
E-mail: Glenda.Fahey@utas.edu.au

Special issue on ice sheets and sea level of the LGM

The first issue of Quaternary Sciences of this year (v. 21, nos 1-3) is devoted to the topic: "Ice Sheets and Sea Level of the Last Glacial Maximum." The issue is a contribution to the EPILOG Program. Thirty-one papers in the issue cover topics on glacial reconstructions of glaciers and ice sheets, geophysical (ice sheet and isostatic) modelling of ice volume, geochemical proxies of ice volume, and climate-ice sheet interactions. The table of contents can be viewed at: http://www.elsevier.com/inca/publications/store/6/3/6/

Copies of the special issue may be purchased for US$45, which includes shipping and handling. Submit orders to:
Femke Wallien
Senior Publishing Editor
Earth and Environmental Sciences
Elsevier Science
Molenwerf 1
1014 AG Amsterdam
The Netherlands

Reviews

Gondwana to Greenhouse: Australian Environmental Geoscience

edited by V.A. Gostin

Geological Society of Australia Special Publication 21, 356 pp.
ISSN 0072-1085 ISBN 1 876125 22 5

by Bernie Joyce
School of Earth Sciences
The University of Melbourne

Call for book reviewers

If you are interested in reviewing books for Quaternary Australasia please contact Paul Hesse:
ph: (02) 9850 8384
e-mail: phesse@laurel.ocs.mq.edu.au

In 1997 Vic Gostin noted that there was a need for a set of articles that provided good examples of geology aimed at environmental practitioners around Australia. So he deserves congratulations for seeing this 356 page volume through to publication. The title, "Gondwana to Greenhouse", reflects the long timescale of the development of Australia, to its modern status, subject to both locally imposed and worldwide environmental problems.

The book helps illustrate the range encompassed by modern geoscience, with articles on climate change, soils and regolith, landscape and landforms, hazards, mining, surface and groundwater, and coasts and oceans; also covered are topics such as isotope dating, geochemistry, heritage, pollution, environmental management, salinisation and engineering.

Colin Chartres in his Foreword makes the point that it is not mining but agriculture and urban development which are to be our main environmental challenges in the future, compounded by natural hazards, and a water supply under stress - virtually all southern Australia's water is already allocated to users. It is fortunate that we have only recently turned to the exploitation of groundwater, and with care we may be able to do this sustainably.

Vic Gostin's Introduction describes the six Themes of the book, and provides a useful bibliography grouped by topics and including web addresses. He refers to the maps inside the front cover, where we can clearly see how the areas discussed in the chapters can be related to geology, and to population distribution. Not unexpectedly the "Coastal and nearshore environments" Theme has 11 of the book's 28 chapters, including two on what must surely be our major Quaternary feature - the Great Barrier Reef.

The concluding Theme is "Marine geoscience". Of the sixteen pages of colour plates collected at the end of the book, six are related to the offshore studies. CSIRO and the National Oceans Office are currently working off the coast of Southeastern Australia, for there is an urgent need to map Australia's Exclusive Economic Zone which stretches 200 nautical miles from the coast and is twice the size of the continent. Much new information on Australia's Quaternary should be the result - the future seems to be offshore! We still seem to have that mental break at the coastline, which after all is just an artefact of the present sea level (as all good Quaternarists know).

To the Quaternary scientist, there is much of interest in this book. Checking the index, I found "Quaternary" listed for three articles. The first reference is to Martin Williams's chapter "Quaternary climatic changes in Australia and their environmental effects" which begins the book. Another is Vic Semeniuk and C. A. Semeniuk's chapter "Human impacts on geoheritage features of the Swan Coastal Plain and coastal zone, southwestern Australia", and the third is "Late Quaternary sea-levels, climate change and South Australian coastal geology" by Nick Harvey, Tony Belperio and Bob Bourman. With Martin Williams at the start, and John Chappell discussing the coastal and estuarine plains of northern Australia at the far end (almost) of the book, Quaternary is actually better covered that the rather brief index might suggest.

So far, some familiar names to AQUA members - other familiar names, if not of Quaternarists, come from the organisation formerly known as AGSO, from CRC LEME, the Bureau of Rural Sciences, CSIRO, state geological surveys, and geography and geology departments at universities across Australia (some of these organisations helped sponsor the book). A number of authors provide an address indicating a consultant or retiree, another sign of the times! And I note that three to five authors per chapter seems to be the norm for institutional contributors.

Soils and regolith, and their often unusual Australian properties are covered in early chapters. Many of these are ancient (see the useful map of "maximum age of exposure" on p.15 in Graham Taylor and Greg McNally's regolith chapter). Expansive clay soils provide problems in many parts of Australia, as Rob Fitzpatrick and other demonstrate in a recent case study of optical fibre cable network installation.

Regional studies include two ancient landscapes of Western Australia - the Avon River area (Mike Freeman) and Kambalda (Jonathan Clarke). Other regional studies include the Murray Basin, Gippsland, the Swan Coastal Plain, and the Illawarra scarp. More might have been included on disasters or geohazards; there is a report by Ken Granger on AGSO's Cities Project which includes the Cairns area and discusses risk analysis and mitigation, but as population pressures increase around coasts, on steep slopes, on flood plains, expansive soils, and known earthquake hazard areas, such studies become critically important.

Environmental education needs more case studies and local examples, and fortunately they can be found in other Australian publications. There is Ed Bryant's "Natural Hazards" in 1991 and David Chapman's book of the same title in 1999, engineering geology books such as "Engineering Geology of Melbourne" (Balkema) in 1992, the GSA's Engineering Geology, Hydrology and Environmental Geology Specialist Group publication series of Case Studies, and publications by the Australian Geomechanics Society. The Australian Journal of Earth Sciences devoted half of Volume 47 Number 1 (February 2000) to seven environmental geology papers. Books by Mary White can be valuable sources of relevant information on Australia, and there are books on specific topics such as Eric Bird's "The Coast of Victoria" in 1993, and Sandra Brizga & Brian Finlayson's "River Management: The Australian Experience" published in 2000.

Some possible additions to this book (if space allowed) might have been studies of Tasmanian and mainland glacial and periglacial regions, neotectonic processes (now of increasing interest in Australia) and the volcanic regions of Victoria and Queensland (*mea culpa* for Victoria, Victor). More on karst problems, including caves, and more on the difficult topic of urban geology, could also be relevant. A minor comment on the book production itself - it is in the standard Geological Society style of A4 paper, soft cover, and shiny paper, and can be hard to read when it is lying flat on the desk.

This book will be useful for students in environmental and applied geology courses, and in engineering geology courses. School teachers will find it a good source of information and a reference for senior students' projects. For the Quaternarist it will help broaden knowledge of our continent, particularly about problems along our coasts, where Quaternary processes and materials can be of major importance.

If you are interested in purchasing this book orders can be placed through:
The Business Manager, Geological Society of Australia, 706 Thakral House, 301 George Street, Sydney, NSW 2000 Australia

Price: $71.50 inc. postage ($60.50 to GSA members; overseas $75.00)

Order form:

http://www.gsa.org.au/bookshop/flyers/advert.pdf

Thesis abstracts

Bedrock channel morphodynamics and landscape evolution in an arid zone gorge; Sandy Creek Gorge, northern Barrier Range, south-eastern central Australia

John D. Jansen (PhD)
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A rock-cut riffle-pool sequence provides the focus for this study of morphodynamic relationships along a boulder-bed, ephemeral stream: Sandy Creek Gorge in arid south-eastern central Australia. An hierarchical approach underpins the analysis of depositional and erosional (bedrock) landforms at the channel-, subreach- and catchment-scales.

Facies assemblages at pools reliably indicate river behaviour and history in Sandy Creek Gorge; their sedimentary preservation patterns display consistent morphology and stacking order in response to floods. An interpretation of late Holocene alluvial history is proposed based on detailed morphologic, stratigraphic, sedimentologic and radiocarbon analyses of materials and forms composing the riffle-pool landform assemblage. Fine-sediment flux through the Gorge has increased markedly following the advent of European pastoralism (AD 1860s). However, a 100-year flood in December 1992 possessed minimal geomorphic effectiveness with respect to the coarse sediments lining the bedrock channel. The HEC-RAS step-backwater hydraulic model is used in conjunction with coarse-sediment entrainment equations to simulate flow conditions generated by the bankfull flood, the 1992 flood, plus two much larger flood magnitudes determined from field evidence.

Morphodynamic relationships fundamentally reflect interactions between bedrock structure and the riffle-pool sequence in Sandy Creek Gorge. Sediment storage and transfer is governed by stage-dependent contrasts in flood power stemming from competence-reversal along the riffle-pool sequence. Morphologic change is characterised by non-equilibrium behaviour. Episodic, high-magnitude floods with recurrence intervals of several centuries dictate the configuration and adjustment of the bedrock channel. Indeed, the most recent major formative flood occurred *c.* 300 cal BP and a superflood eroded most of the Lower Gorge valley fill *c.* 3390–1710 cal BP. Older, Pleistocene floodplain materials line the less-confined upper reaches.

The implications of these formative events for long-term landscape development are examined, including the role of sediment supply and storage in processes of bedrock channel incision in Sandy Creek Gorge. An interpretation of post-Cretaceous landscape history in the northern Barrier Range is proposed in order to establish the long-term geologic context for extrapolating contemporary stream behaviour. The post-mid-Tertiary bedrock incision rate along the Lower Gorge is estimated at 0.6–4.7 m/Ma (extremely low by global standards).

It is postulated that low rates of denudation and therefore sediment supply—characteristic of tectonically-passive, intra-plate settings—foster distinctive morphodynamic interactions between bedrock structure and fluvial processes, and that these are recognisable in contemporary bedrock channels. In Sandy Creek Gorge, coarse riffle boulders cap bedrock convexities and insulate the underlying bedrock from erosion. Thus, the rate of fluvial incision is closely linked to the frequency of floods competent to mobilise riffle boulders—thereby exposing the underlying bedrock. The magnitude and frequency of formative events is estimated, and a qualitative channel-scale model of bedrock incision is proposed based on knickpoint propagation and entrainment of riffle boulders during extreme floods.

By concentrating the rate of energy expenditure (stream power) at knickpoints, the configuration of fluvial landforms maximises energy loss through processes other than sediment transport; particularly via transcritical flow and channel boundary roughness. This is an effective means of maintaining the exceedingly low rates of bedrock fluvial incision observed in sediment-deficient streams draining tectonically-passive terrain.

The Hydrology, Geomorphology and Quaternary Palaeochannels of the Lachlan Valley, New South Wales

Justine Kemp (PhD)
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The Australian National University, Canberra 0200

This thesis examines the present-day and Late Quaternary fluvial geomorphology and hydrology of the upper Lachlan Valley in central western New South Wales. The sediments and morphology of the channel and floodplain are described from its principal alluvial reaches: the confined, single-channel reach from Cowra to Gooloogong, the unconfined, single-channel reach between Gooloogong and Cadow, and the anabranching reach on the Condobolin Plain.

Present-day channel and floodplain morphology in single-channel reaches of the Lachlan River is dominated by the highly variable hydrologic regime, which is accentuated in confined reaches of the river, but is also influenced by inherited channel forms. In confined reaches, where the effective floodplain is <1km wide, the floodplain is a high-energy surface dominated by large flood features, which elsewhere in the world are attributed to catastrophic flood flows, but which here are forming under the normal regime of the river. Floodplains are characterised by elliptical scour scars, zones of floodplain stripping, chutes and chute bars, compound flood levees and parallel flood channels. In contrast, the channel itself contains low-energy features such as fine-grained, accreting bench deposits which point to remarkable stability of the channel position. Floodplain deposits resulting from fluvial processes operating at a variety of scales are poorly sorted and become coarser with height above the river bed. The hydrologic character of the river, described from streamflow and historical flood records, is consistent with the sedimentary and morphological evidence of a flood-dominated floodplain, and dating evidence indicates that this has been a long-standing characteristic of this river system in this location.

In less confined reaches, large flood features are more subdued and channel inheritance locally controls meander patterns and channel slope. Inherited influences increase downstream as confinement of flood flows is less, and channels may become entrenched within highly sinuous palaeomeanders, developing only a narrow floodplain. The effect of variable streamflow is still exhibited in chute channels, scour complexes and zones of stripped floodplain, although the channel itself is governed by bankfull flows. Lateral channel activity increases in the downstream direction, reflected in both the sinuosity and width of the active floodplain. These channel and floodplain characteristics continue throughout the anabranching reach on the plains.

Hydraulic geometry relationships in both single and anabranching reaches were constructed from streamflow records and surveyed channel cross-sections, and include sediment parameters. The relationship between channel shape and silt-clay content on the Lachlan differs from that described elsewhere. The exponents found for depth and velocity as a function of discharge also exhibit notable departures from trends reported for rivers elsewhere in the world, as the standard relationships are based on rivers which increase in size downstream, while both slope and particle size decrease. The Lachlan presents a reverse situation, where discharge, slope and sediment size all decrease downstream, and illustrates the need to develop regional rather than global relationships to estimate bankfull discharges for ungauged channels with a given set of characteristics.

Palaeochannels were described for the Lachlan Valley downstream from Cowra, where they are associated with two major alluvial terraces, and on the Plains downstream from Forbes, where they intersect with each other and with the modern floodplain. Three discrete fluvial systems were defined. The Gulgo Fluvial System is characterised by relatively narrow and deep channels and has a stable, anabranching pattern. A single TL date from point bar sediments of this system suggests these channels were active by at least 57,000 yrs ago and were replaced by channels of the Ulgutherie Fluvial System, characterised by sinuous, regular and scrolled meanders with wide and shallow channels. OSL dates on channel sediments and an overlying source-bordering dune suggests Ulgutherie channel construction and aeolian deflation of fluvial sediments were underway by 34,000 yrs and the system may have declined soon afterwards. Discharge estimates based on several formulae, including relationships developed for the modern river, indicate bankfull discharges of the Ulgutherie system were at least 4 to 7 times those of the present-day river. Ulgutherie channels were replaced by channels of the Nanima Fluvial System, which had a similar morphology to the Ulgutherie channels, with scrolled, regularly sinuous meanders, but smaller channel capacities

and width-depth ratios, and sediment characteristics more similar to the modern Lachlan. Radiocarbon dates indicate Nanima channels were active by 6,000 yrs, if not before, and were replaced by smaller, irregularly meandering channels of the present fluvial system soon after 3000 yrs ago. Discharge reconstructions of Nanima channels indicate they carried bankfull discharges 1.5 to 2 times that of the present river. The higher discharges associated with meandering palaeochannels in the Lachlan Valley around 34,000 yrs and from >6,000-3,000 yrs is in good agreement with lake-level and other environmental records within the catchment.

Vegetational and climatic changes during the last 40,000 years at Burraga Swamp, Barrington Tops, NSW

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School of Biological Science
University of New South Wales

Burraga Swamp is a small enclosed basin at 985 m altitude in Barrington Tops, in the Eastern Highlands of New South Wales, Australia. It lies in the midst of a *Nothofagus moorei* cool temperate rainforest, which is at its southern limits here. The swamp is close to the boundaries between temperate rainforest, subtropical rainforest, sclerophyll forest and sub-alpine formations and may be a sensitive recorder of past changes in the vegetation.

The palynology and the sediments have been studied to a depth of 6.5 metres and were dated with eleven 14C dates. The base of the sediment is about 40,000 years old.

The results showed the following:
From 40,000-30,000 years BP, Burraga was a lake with a very slow rate of deposition of fine grained sediments and flourishing aquatic/swamp vegetation. The dryland vegetation was an open or sparsely treed grassland/herbfield. From 30,000-21,000 years BP, the dryland vegetation remained much the same, but the aquatic vegetation disappeared. From 21,000-17,000 years BP, sandy sediments were deposited at an accelerated rate in a relatively shallow lake, culminating in a layer of gravelly sand. The vegetation was a treeless grassland between about 21,000 and 15,000 years BP. After 17,000 years BP, the rate of sediment accumulation slowed and after 15,000 years, some mesic elements appeared. *Dicksonia antarctica* became prominent between about 13,000 and 12,000 years BP and *Nothofagus* was consistently present after about 11,500 years BP. Peat deposition started about 6,500 years BP. By 6,000 years BP the cool temperate rainforest was fully developed, remaining on the site until the present.

These changes suggest that the climate at 40,000 years BP was drier than the present, becoming drier and reaching maximum aridity about 17,000 years BP, when temperatures were also at their lowest. Subsequently, the temperature increased and around 15,000 years BP the climate became wetter. Maximum moistures and temperatures were reached between about 9,000 and 5,000 years BP. The climate then varied until it reached the present.

Burraga extends the record of treeless vegetation over most of southeastern Australia, during the last glacial maximum, to more northerly localities than previously known.

Late Quaternary vegetation and environments in the Lake Sentarum Wildlife Reserve, West Kalimantan, Indonesia

Anshari, Gusti Z. (PhD)
School of Geography and Environmental Science
Monash University

This thesis examines long term historical vegetation and environmental change in the humid tropical Lake Sentarum Wildlife Reserve, West Kalimantan, Indonesia, using proxy data derived from pollen and micro-charcoal analysis. The reserve embraces a large a fluvio-lacustrine system dominated by a mosaic of semi-permanent lakes, peat swamp and riparian forests with some lowland rainforest. It is situated in the upper reaches of the Kapuas River, at an altitude of below 50 m ASL and straddles the equator. Four sediment cores were analysed from the southeast part of the reserve; two from the bed of Lake Pemerak that was exposed during the severe drought of 1997 and two from peat swamp forests surrounding the lake. In addition, a number of surface pollen samples were taken from described forest plots to assist in interpretation of the fossil records. A total of 23 conventional or accelerator mass spectrometry radiocarbon dates were used to provide ages for the fossil records.

Although the cores for pollen analysis were only 1.5 m or less in length, they generally covered a substantial period of time. The establishment of ages for each sequence was complicated by radiocarbon date inversions and discontinuity in sediment accumulation, while record correlation was made difficult by the distinctive nature of pollen assemblages in each of the records. However, it is considered that evidence for much of the last 40,000 years is recorded. At no site did coring reach to the base of unconsolidated sediments and it is anticipated that longer records can be retrieved with more robust sampling equipment.

In contrast to previous studies on the history of peat forests, undertaken in coastal parts of the Indonesian region where the bulk of peat accumulation has taken place in association with rising and high sea levels during the Holocene, the major phase of peat accumulation around Lake Pemerak appears to date to the last glacial period before the Last Glacial Maximum (LGM). At this time precipitation appears to have been relatively high but less variable than today while temperatures were slightly lower than those of the Holocene. The LGM is not fully represented in sediment sequences but available evidence suggests that rainfall may have been somewhat lower than today during this period but was still sufficient to allow the maintenance of a rainforest cover. The degree of representation of predominantly montane/submontane taxa is sufficient to suggest that these made up a component of lowland vegetation during the LGM and that temperatures may have been up to 6° C lower than today. These results on the nature of LGM vegetation and climates are consistent with recent data from other humid tropical lowlands. There is no sediment dated to the very late glacial and early Holocene periods and this period may, for some unknown climatic reason, have not been conducive to the accumulation or preservation of lake or peat sediment. Climatic conditions appear to have been similar to those at present through the last 3000-4000 years.

The presence of charcoal throughout all records indicates that fire has been an environmental factor over at least the last 40,000 years. Radiocarbon dating of the archaeological site of Niah caves suggests that people have been in the interior of Borneo for this length of time and therefore could have been totally responsible for the fire signal. However, it is considered more likely that a natural low level fire regime was operational until about 30,000 years ago when there is evidence for an increase in fire activity. Burning may have further increased during the LGM with somewhat drier conditions and slightly more open vegetation, but has been highest in the late Holocene, particularly the last 1,400 years. It is considered that these highest levels of burning activity are associated with the development of slash and burn agriculture although increased climatic variability may have been a contributing factor.

Other Recent Publications

Walker, D., Atkin, G. and Owen, J. A. K. 1994. Uncertainty in the determination of pollen concentrations. *Dissertationes Botanicae* 234, 537-554. (Festschrift Gerhard Lang).

Neale, J.L. and Walker, D. 1996. Sampling sediment under warm deep water. Quaternary Science Reviews 15, 581-590.

Walker, D. 1999. Some physical and chemical features of two upland crater lakes in tropical north-eastern Australia. *Marine and Freshwater Research* 50, 159-177.

Walker, D. and Owen, J. A. K. 1999. The characteristics and source of laminated mud at Lake Barrine, Northeast Australia. *Quaternary Science Reviews* 18, 1597-1624.

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Walker, D., Head, M. J., Hancock, G. J. and Murray, A. S. 2000. Establishing a chronology for the last 1000 years of laminated mud accumulation at Lake Barrine, a tropical upland maar lake, northeastern Australia. *The Holocene* 10, 415-427.

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This mostly applies to those submitting research papers. However, the formatting information will also be of use to those submitting research/conference reports and other material.

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Quaternarist, A.B., 2000. The top twenty field sites in Australia. *Journal of Field Studies*, 62 (2), 191-200.

Quaternarist, A.B. and Palynologist, C.D., 2000. The top twenty field sites in Australia. In A.N. Smith (editor). *A Guide to Happy Quaternary Studies*. Fun Book Company, Sydney. 109-146.

Quaternarist, A.B., Palynologist, C.D. and Geomorphologist, E.F., 2000. *A Guide to Happy Quaternary Studies*. Fun Book Company, Sydney. 300 pp.

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