

Joe Jennings: Father of modern Australian geomorphology

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Joe Jennings was appointed to the Geography Department at the Australian National University (ANU) in 1953, and over the next three decades he had a profound and lasting effect on Australian geomorphology. Although best remembered as a karst geomorphologist, Joe had wide-ranging research interests and boundless enthusiasm for the entire discipline of geomorphology. Nowhere is this better evidenced than in the graduate students he supervised (with year of completion in brackets), including Eric Bird (1959), Nel Caine (1966), Ian Douglas (1966), Martin Williams (1969), Jim Bowler (1970), Bud Frank (1972), John Chappell (1973), Colin Pain (1973), Ross Coventry (1973), Chris Whitaker (1976), Joyce Lundberg (1976) and David Gillieson (1982). As a PhD student of John Chappell, and therefore an academic grandson of Joe, I was privileged to know him in the late 1970's and early 1980's at ANU. In this paper I have constructed a "family tree" of Joe's academic descendents.

Introduction

Joseph Newell Jennings (1916-1984), or Joe to everyone who knew him (Fig. 1), was appointed to the fledgling Geography Department at the Australian National University (ANU) in 1953, and over the next three decades he had a profound and lasting effect on Australian geomorphology. Joe is best remembered as a karst geomorphologist, but in fact he had wide-ranging research interests and boundless enthusiasm for the entire discipline of geomorphology - see obituary and publication list in Spate & Spate (1985). Indeed, his first published paper on Australian geomorphology was not on karst, but rather on Lake George (Jennings 1954), the enigmatic lake near Canberra that later was to be the research topic of one of his PhD students, Ross Coventry.



It is not my intention to detail, here, the career of Joe Jennings. For further information the reader is directed to obituaries by Spate & Gillieson (1984), Spate & Spate (1985) and Bowler (1985), as well as the Australian Dictionary of Biography Online (Spate 2006). Rather, I wish to demonstrate Joe's remarkable legacy through construction of his academic family tree, modeled on the family trees which genealogists produce to depict family lineages. In the case of the academic family tree, graduate students are represented as "children" of their supervisor.

Fig 1. Joe Jennings in the field at Cooleman Plain (Photo courtesy of Andy Spate).

Twelve disciples and the academic family tree

Joe supervised twelve graduate students to completion at ANU (with year of completion in brackets), including Eric Bird (1959), Nel Caine (1966), Ian Douglas (1966), Martin Williams (1969), Jim Bowler (1970), Bud Frank (1972), John Chappell (1973), Colin Pain (1973), Ross Coventry (1973), Chris Whitaker (1976), Joyce Lundberg (1976) and David Gillieson (1982). A thirteenth student, Albert Goede, began a PhD in the 1960s, but did not complete. Thesis topics for each student are listed in Table 1 and well illustrate the breadth of Joe's interests.

Table 1. Graduate students supervised by Joe Jennings, their thesis titles and year of completion. All theses completed at ANU, except David Gillieson (University of Queensland).

Student	Year	Thesis title
BIRD, Eric Charles Frederick	1959	The Gippsland Lakes, Victoria: a geomorphological study
CAINE, Nelson	1966	The blockfields and associated features of northeastern Tasmania
WILLIAMS, Martin Anthony Joseph	1969	Rates of slopewash and soil creep in parts of northern and southeastern Australia: a comparative study
BOWLER, James Maurice	1970	Late Quaternary environments: a study of lakes and associated sediments in south-eastern Australia
FRANK, Ruben Milton (Bud)	1972	Sedimentological and morphological study of selected cave systems in Eastern New South Wales, Australia
CHAPPELL, John Michael Arthur	1973	Geology of coral terraces on Huon Peninsula, New Guinea
COVENTRY, Ross James	1973	Abandoned shorelines and the late Quaternary history of Lake George, New South Wales
PAIN, Colin Frederick	1973	The late Quaternary geomorphic history of the Kaugel Valley, Papua New Guinea
LUNDBERG, Joyce	1976	The geomorphology of Chillagoe Limestones: variations with lithology (MSc)
WHITAKER, Christopher Robert	1976	Pediment form and evolution in the East Kimberleys: granite, basalt, and sandstone case-studies
GILLIESON, David	1982	Geomorphology of limestone caves in the Highlands of Papua New Guinea

An interesting statistic concerning Joe's twelve graduate students is that only one, Ross Coventry, was an ANU undergraduate. At that time, in stark contrast to today, undergraduate students were actively encouraged to pursue postgraduate study at other institutions. Indeed, the ANU Geology Department, where Ross Coventry completed his BSc(Hons) in 1967, had an in-house policy of not accepting its own undergraduate students for postgraduate study, a policy which was still in place when I completed my own BSc(Hons) degree in 1974. However, the newly created Department of Biogeography & Geomorphology, in the Research School of Pacific Studies at ANU, was considered sufficiently distant (several hundred metres) and sufficiently isolated (there was little interaction between the undergraduate teaching departments and the research schools of ANU at the time) for Ross to be allowed to undertake his PhD under Joe's supervision. Similarly, I was permitted to undertake PhD study in the ANU Geography Department (Faculty of Arts) under the supervision of John Chappell.

In constructing Joe's academic family tree (Appendix 1), I have contacted most of his former graduate students, and many of their students. Their inputs are gratefully acknowledged. I have not attempted to extend the tree any further back than Joe himself, because my prime focus here is Joe's legacy, through his students, to Australian geomorphology and related disciplines. Note that, although the focus here is on graduate students, the role of undergraduate teaching should not be overlooked in stimulating and encouraging very able students to move into postgraduate research.

Some personal recollections of Joe

Anyone who met Joe could not fail to have strong recollections of his geomorphic enthusiasm. A number of his caving friends recorded their memories of Joe in the journal of the Australian Speleological Federation, *Australian Caver*, in 2004 (Spate 2004). Indeed, the bond was so strong between Joe and one of his early PhD students, Ian Douglas, that Joe was "father of the bride" at Ian's wedding (Fig. 2).



Fig. 2. Joe Jennings at the wedding of Ian and Maureen Douglas in Canberra in 1963. From left to right: Jim Whitelaw, Ian Douglas, Maureen Douglas and Joe Jennings. (Photo courtesy Ian Douglas).

As a PhD student at ANU during the 1970s, and later as a staff member, I came into regular contact with Joe. It wasn't quite day-to-day contact because Joe was based in the Department of Biogeography & Geomorphology in the Research School of Pacific Studies, whereas I was based in The Geography Department, in the Faculty of Arts, on the other side of the campus. Nevertheless, there was sufficient interaction to provide some unforgettable experiences. I, and many others, well recall typical telephone conversations with Joe, during which it was possible (necessary, actually) to place the receiver on the desk and still hear Joe's loud voice quite clearly!

In 1977, John Chappell went on study leave, and installed me as coordinator of his second-year geomorphology class. I was not required to give any lectures, just act as conductor to the orchestra of luminary guest lecturers that John had organized – Jim Bowler, Bruce Thom and Joe, to name a few. I well remember one particular lecture of Joe's, on the history of geomorphology. He launched into the topic with his usual enthusiasm, his booming voice echoing around the lecture room, but after an

hour or so he stopped and surveyed the audience, most of whom were exhibiting tell-tale signs of boredom. "I can tell that you probably don't want me to go on" said Joe, but then he added rather hopefully, almost pleadingly, "Or do you?" Dead silence! A few days later, Joe led a class field trip to London Bridge, a natural arch in limestone not far from Canberra. The combination of Joe's passion, a fine sunny afternoon and the interesting field setting finally won them over.

In an interview with Robyn Williams on the ABC Science Show in 2003, Jim Bowler recalled how he began his PhD on Lake Mungo. According to Jim it was a chance remark by Joe that, on a flight from Broken Hill to Sydney, he had seen what looked like evidence of former lakes in the arid landscape of Western New South Wales. Subsequent examination of aerial photographs confirmed Joe's sighting and sent Jim into the field where exciting geomorphological and archeological discoveries awaited (c.f. Bowler *et al.* 1970, 2003).

A paper of Joe's published in 1986, two years after his death, is particularly revealing of the man. The paper (Jennings 1986) is the introductory chapter to Volume 1 (The Natural Environment) of Denis Jean's two-volume book "Australia – A Geography". At the outset, Joe warns the reader not to expect a traditional introduction of synthesis and historical reflection. Rather, his stated goal was to present some "quintessential impressions" that the character of the Australian landscape had made on him. What follows (Jennings 1986, p.1-2) is a wonderful mix of science and anecdotes, written in a style that has all but disappeared from modern scientific writing:

'Within weeks of arriving in Australia I had tasted with appreciation a certain South Australian ale with the yeasts still fermenting in the bottle – an honest brew. Yet it was a year or two before I consciously recognized how outstanding this drink was amongst the scores of fizzypops pumped hard with carbon dioxide from the gasworks; it dawned on me that my thirst had been so great that anything cold and wet had tasted like an elixir.

Just as Australia's dryness clouded my judgement in the matter of beer so has it led many to perpetuate the mild error that it is the driest continent on earth when for several decades enough Antarctic observations have been made for us to know that it is the latter that has that role – unsurprisingly. Some might hold this to be a pettifogging point when Antarctica has been outside the ecumene until the past few years and when in any case present residents live easily enough on the solid accumulation of precipitation from past millenniums. Nevertheless it is advisable to keep to the forefront of one's mind that with low temperatures there is little water vapour in the air for condensation. Australian scientists too readily took over the notion from Europe and North America that the Pleistocene glacials of high latitudes were the pluvials of middle and low latitudes and applied it somewhat uncritically here in palaeoenvironmental reconstruction of a theoretical kind.... Now it seems established that the periods of maximum cold during the Upper Pleistocene were generally drier times than now in Australia.... though this does not mean to say that glacial stages were times of low absolute precipitation throughout their duration.'

What scientific journal editor would allow such prose to be published these days?

The legacy – a remarkable academic family tree

Joe's remarkable legacy lives on through his many academic descendents, who hold (or have held) academic positions at more than half of Australia's thirty nine universities (Table 2). Many more members of the family tree are employed by government agencies such as CSIRO and Geoscience Australia or work as consultant geomorphologists. Strong international branches of the tree also grew from two of Joe's students who took up university positions overseas – Ian Douglas (University of Manchester) and Nel Caine (University of Colorado), both of whom supervised more than 30 postgraduate students.

Table 2. Academic descendents of Joe Jennings have held teaching and research positions at 24 out of 39 Australian Universities.

Australian Catholic University	
Australian National University	John Field, John Chappell, Brad Pillans, John Magee, Pauline Treble, Toshi Fujioka, David Gillieson
Bond University	
Central Queensland University	Robert Miles
Charles Darwin University	Dimity Boggs
Charles Sturt University	Tony Dare-Edwards, Penny Davidson
Curtin University of Technology	Zhongrong Zhu
Deakin University	
Edith Cowan University	
Flinders University	
Griffith University	Ron Neller, Grant McTainsh, Errol Stock, Craig Strong, Andrew Chan
James Cook University	David Gillieson, Ross Coventry
La Trobe University	
Macquarie University	Martin Williams, Paul Hesse, Jim Kohen, Kerrie Tomkins, Tim Ralph, Trish Fanning, Sandy Harrison
Monash University	Martin Williams, David Dunkerley, Nigel Tapper, Paul Bishop, Meredith Orr, Kate Brown, Geoff Goldrick, Dan Penny
Murdoch University	
Queensland University of Technology	
RMIT University	
Southern Cross University	
Swinburne University of Technology	
University of Adelaide	Martin Williams
University of Ballarat	
University of Canberra	Xiang Yang Chen
University of Melbourne	Eric Bird, Jim Bowler, Ian Rutherford, Matt Cupper, John Hellstrom
University of New England	Ian Douglas
University of New South Wales	Colin Pain
University of Newcastle	Bob Loughran, Diana Day, Russell Drysdale
University of Notre Dame Australia	Peta Sanderson
University of Queensland	Annie Ross, David Neil
University of South Australia	Chris Whitaker
University of Southern Queensland	Harry Butler
University of Sydney	Diana Day, Paul Bishop, Eleanor Bruce
University of Tasmania	Richard Doyle, Jamie Kirkpatrick, Kate Brown
University of Technology Sydney	
University of the Sunshine Coast	Ron Neller
University of Western Australia	Ian Eliot
University of Western Sydney	
University of Wollongong	Ian Eliot, Marji Puotinen
Victoria University	

Joe was a memorable after-dinner speaker at the first Australian & New Zealand Geomorphology Group (ANZGG) meeting in 1982 and the text of that talk was published in the following year (Jennings 1983). Since 1982, there have been a further twelve ANZGG conferences, held approximately biennially, with the last (13th) meeting held in Queenstown in Tasmania in February 2008. Joe's academic descendents have a strong presence in ANZGG, and will continue to do so, because ANZGG meetings are designed to encourage the participation of graduate students which means that the tree will continue to grow. For example, registration costs are kept as low as possible, meetings are held in smaller regional towns rather than major cities and the general ethos is one of informality, with active mentoring of students by more senior attendees.

The recently published book, *Australian Landforms*, (Bishop & Pillans 2010) is, in part, a tribute to Joe Jennings. Not only does it mark the recent retirements of two of Joe's most illustrious students, John Chappell and Martin Williams, but it represents the third of a series of edited books on Australian geomorphology, the first of which was co-edited by Joe (Jennings & Mabbutt 1967) and the second of which was a tribute to Joe on his retirement (Davies & Williams 1978). Furthermore, apart from Martin Williams and John Chappell, several contributors to this book are also members of Joe's academic family tree – Paul Bishop, Jim Bowler, David Dunkerley, Ian Eliot, Trish Fanning, Toshi Fujioka, David Haberlah, Arjun Heimsath, Paul Hesse and Brad Pillans.

References

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Copies of this article can be downloaded from the website of the Australian & New Zealand Geomorphology Group: www.anzgg.org

APPENDIX 1. THE GENEALOGY OF JOE JENNINGS

Compiled by Brad Pillans, last updated 23-11-2010. Please contact Brad to make any additions or corrections (brad.pillans@anu.edu.au)

Students supervised by Joe, and their students, and their students...:
(PhD students only, unless otherwise indicated)

1959. Eric Bird (Melbourne)

Jamie Kirkpatrick 1973 (latter stages only)
Ian Miles (MSc) 1976 (DSE Victoria)
Teh Tiong Sa (MSc) 1977 (Nanyang Tech. Univ. Singapore)
Michael Williams (MSc) 1977
Neville Rosengren (MA) 1978
Ken Boston (MA 1971) PhD 1981

1966. Nel Caine (Colorado)

Ian Owens (MA) 1967 (Canterbury Univ.)
 Nigel Tapper 1975 (Monash Univ.)
 Des Gaffney 1995 (Bureau of Meteorology, retired)
 Allyson Williams 1997 (QDPI)
 Noreen Krusel 1996 (Country Fire Authority)
 L Zhou 1998
 Alan Wain 1998 (Bureau of Meteorology)
 Sharon O'Sullivan 1999
 Jason Beringer 1999 (Univ of Alaska, Monash Univ.)
 Dewi Kirono 2000 (CSIRO)
 David McJannet 2000 (CSIRO)
 Sarah Burns 2008 (NASA JPL)
 Margaret Loughnan 2008 (Monash Univ)
 Alison Oke 2009 (Bureau of Meteorology)
 Tadhg O'Loingsigh 2008 (Monash Univ)
 Badr Al Harbi 2008 (Saudi Arabia EPA)
 Lisa Alexander 2009 (Univ NSW)
 Kasturi Kanniah 2009 (University of Technology, Malaysia)
 Willow Hallgren 2009 (considering options)
 Jacqui Hellings 2009 (considering options)

Jordy Hendrikx (NIWA, Christchurch)

Christine Elliott (Canterbury Univ.)

Colin H. Taylor (MA) 1967 (Trent Univ.)

Bill Mahaney 1971 (York Univ.)

Michael Bovis 1974 (Univ. British Columbia)

James A. Clark (MA) 1974 (Baldwin-Wallace College)

Neil H. Berg 1977 (US Forest Service, Berkeley)

Thomas R. Carroll 1977 (NOAA; retired)

Dennis Netoff 1977 (Houston State Univ.)

Thomas Meierding 1977 (Univ. Delaware)

David Sauchyn (MA) 1979 (Univ. Regina)

Rebecca Summer 1980

Dan Muhs 1980 (USGS, Denver)

Horst Sterr 1980 (Kiel)

Julian Dowdeswell (MA) 1982 (Cambridge Univ.)

Scott Morris 1983 (Idaho)

John C. Dixon 1983 (Univ. Arkansas)

Jon Harbor (MA) 1984 (Purdue Univ.)

David Furbish 1985 (Florida State then Vanderbilt)
Jeff Warburton (MA) 1985 (Univ. Durham)
Lee Dexter 1986 (Univ. Northern Arizona)
Carol P. Harden 1987 (Univ. Tennessee)
Andrew Marcus 1987 (Univ. Oregon)
Judith Drexler (MA) 1991 (USGS, Davis)
Sandra Ryan 1993 (US Forest Service)
Thomas Davinroy (MA) 1994 (Metropolitan State Univ., Denver)
Donald Cline 1995 (NOAA, Minnesota)
Steven Welter 1995 (Univ. Colorado)
Jeffrey Colby 1995 (Appalachian State Univ.)
Susan Cannon 1995 (USGS, Denver)
Brian Menounos (MA) 1996 (Univ. British Columbia)
Matthew C. Larsen 1997 (USGS, Reston)
Hillary Hamann 1998 (Univ. Denver)
Andrew Fox (MA) 1999 (Univ. Sheffield)
Jason Janke 2004 (Metropolitan State Univ., Denver)
Jonathan Godt 2004 (USGS, Denver)

1966. Ian Douglas (New England, then Manchester)

- Anton Imeson** (Vrije Universiteit Amsterdam) 1970
Low Kwai Sim (Univ. Malaya then Asia Pacific Env. Consultants) 1971
Roy Morgan (Cranfield, now retired) 1972
David Burgess (Anglian Water then Dept. Env., Food & Rural Affairs) 1973
Bob Loughran (Univ. Newcastle (final stages only)) 1973
Zakaria Awang Soh (Universiti Kebangsaan Malaysia, retired) 1976
Diana Day (Univ. Newcastle, then Federal Government, Sydney Univ.) 1978
Lam Kin-Che (Chinese University of Hong Kong) 1978
Abraham Bello (University of Zaria, Nigeria) 1978
Ron Neller (Griffith Univ., Hong Kong, now Sunshine Coast Univ.) 1979
Geoff Francis (completed under Cliff Ollier) (Geol. Survey PNG) 1981
John Field (CRA Exploration then ANU) 1983
 M D Shafiq Rahman (Univ. of Dakhar) 1991
 A K M Afzal Hossain (to Bangladesh, then Aust Govt) 1990
Andrew Stott (Gloucestershire, Northern Ireland Dept. of Environment, UK Countryside Commission, Natural England) 1984
Stephen Belbin (South Africa and West Indies, now in USA) 1986
Hamish Mykura (BBC, now Channel 4 Television) 1988
Jia Yafei (Univ. Mississippi) 1990
Liam Kelly (Stirling, then Scottish Executive) 1990
Shaharuddin Ahmad (Universiti Kebangsaan Malaysia) 1991
Asenath Omwega (Kenyatta Univ., then ActionAid, Africa, now UNHabitat) 1992
Zhang Dian (West Indies then Uni. Hong Kong) 1993
Waidi Sinun (Cons. & Env. Management Div., Yayasan Sabah) 1996
Yang Rongfu (moved to Canada) 1997
Jasem Al Ali (Universit of Kuwait) 1997
Balamurugan Guruswamy (Env. Consultant, Kuala Lumpur) 1997
Lai Food See (Universiti Putra Malaysia) 1997
Wan Ruslan Ismail (Universit Sains Malaysia) 1997
He Min (moved to Canada) 1997
Yin Qiang (Manchester but collaborating with Beijing University) 1998
Zulkifli Yusop (Forest Res. Inst., now Univ. Teknologi Malaysia) 1998
Jennifer Lim Nyuk Wo (Leeds) 1998
Noorazuan Hashim (Universiti Kebangsaan Malaysia) 2004
Andy Surdevan (Environmental Consultant) 2004
Monica Palesenau-Lovejoy (USGS Coastal & Watershed Studies) 2004

- 1969. Martin Williams (Macquarie, Monash, Adelaide)**
Sandy Harrison (MSc) 1973 (Bristol Univ., now Macquarie Univ.)
 Ge Yu 1996 (Chinese Academy of Sciences, Nanjing)
 Yuri Vassiliev 1997 (Univ. Technology, Estonia)
- Francois Gasse** 1975
- Grant McTainsh** 1982 (Griffith Univ.)
 Idris Kikula 1986 (VC, University of Dodoma, Tanzania)
 Peter Hairsine 1987 (CSIRO)
 Robert Miles 1994 (Central Queensland Univ.)
 Richard Robins 1994 (Consultant archaeologist)
 Errol Stock 1995 (Griffith Univ)
 Lore Kiefert 1996 (Director, AGTA New York)
 Andrew Chan 1998 (Griffith Univ.)
 John Leys 1999 (NSW, Dept Env & Climate Change)
 Harry Butler 2004 (Univ. of Southern Queensland)
 Grahame Walsh 2007 (Rock art consultant)
 Craig Strong 2007 (Griffith Univ.)
- Paul Bishop** 1984 (Sydney Univ., Monash Univ., Univ. of Glasgow)
 Graeme Rawson (MSc) 1990 (NSW DNR)
 Ken Rowe 1995 (retired)
 Nicola Smith (MSc) 1997 (NSW DNR)
 Ivars Reinfelds 1997 (NSW DNR)
 Dan Penny 1998 (Monash Univ., Univ. of Sydney)
 Geoff Goldrick 2001 (Monash Univ.; school teacher)
 Cristina Persano 2002 (Univ. of Glasgow)
 Jong-Yeon Kim 2004 (President's Office Korea, Chungbuk Nat. Univ.)
 Liam Reinhardt 2005 (St Pauls Minnesota; Exeter)
 Kate Dobson 2006 (Univ. of Glasgow)
 Daniel Campanile 2008 (GETECH, Leeds)
 Alexandru ('Tibi') Codilean 2008 (Univ. of Glasgow; GFZ Potsdam)
- Annie Ross** 1984 (Univ. Of Queensland)
- Jim Kohen** 1986 (Macquarie Univ.)
- Peter Hunt** 1986 (deceased)
- Ian Rutherford** 1992 (Melbourne Univ.)
 Ivars Reinfelds 1997 (NSW DNR)
 Helen Locher 1997 (Tas HEC)
 Bruce Abernethy 1999 (SKM)
 Rebecca Bartley 2001 (CSIRO)
 Lindsay White 2001 (River Murray Commission)
 Nick Marsh 2002 (NSW EPA)
 Scott Wilkinson 2003 (CSIRO)
 Dom Blackham 2005 (consultant geomorphologist)
 Dean Judd 2006 (consultant geomorphologist)
- Liping Zhou** 1994 (Peking Univ.)
- Ken Rowe** 1995 (retired)
- Mark Harris** 2000 (Univ. of Carribean)
- David Haberlah** 2009
- 1970. Jim Bowler (ANU, Melbourne Univ.)**
Tony Dare-Edwards 1979 (Charles Sturt Univ., retired)
Xiang Yang Chen 1989 (University of Canberra)
Roger Jones 1996 (CSIRO, Aspendale)
Meredith Orr 1998 (Monash Univ)
Matt Cupper 2003 (Melbourne Univ)

1972. Bud Frank (Newcastle Upon Tyne)

1973. John Chappell (ANU)

Ian Eliot 1974 (Wollongong, Univ. of Western Australia)
Bruce Hegge 1994 (Oceanica)
Eleanor Bruce 1997 (Sydney Univ.)
Peta Sanderson 1997 (Notre Dame, Fremantle)
Julianna Priskin 2004 (Canadian Forestry Commission)
Ailbhe Travers 2007 (Kay Consulting)
Dimity Boggs 2008 (Charles Darwin Univ.)

Ian Halkett 1975

David Dunkerley 1976 (Monash)
Kate Brown 1997 (Univ. Tasmania then Monash Univ.)
Sharon Davis 2000 (Murray Darling Basin Commission)
Stuart Boucher 2002 (Environmental Protection Agency, Victoria)
Shaun Berg 2007 (Dept Sustainability & Environment)
Tadhg O'Loinsigh 2008

Skip Rhodes 1980 (Aust. Institute of Marine Science)

Paul Aharon 1980 (Louisiana State Univ.)

Brad Pillans 1981 (Victoria Univ. of Wellington, ANU)

Geoff Holgate (MSc) 1985
Richard Doyle (MSc) 1991 (Univ. Tasmania)
Phil Shane 1993 (Auckland Univ.)
Gary Wilson 1993 (Univ. of Otago)
David Manning 1995 (SEQ Catchments Ltd)
John Hellstrom 1998 (Univ. Melbourne)
Robin Gatehouse 2001 (DEH)
Ray Stanton 2001 (consultant)
Martin Smith 2006 (Geoscience Australia, Newmont)

Stan Herwitz 1982 (Clark Univ.)

John Grindrod 1983 (Monash Univ.)

Royd Bussell 1988 (Woodside Energy)

Ian Prosser 1988 (CSIRO)

Xiang Yang Chen 1989 (University of Canberra)

Zhongrong Zhu 1990 (Curtin Univ., Geoscience Australia)

Rob Vertessy 1990 (CSIRO)

Paul Hesse 1993 (Macquarie Univ.)
Kerrie Tomkins 2008 (CSIRO)
Tim Ralph 2008 (Macquarie Univ)

David Neil 1994 (Univ. of Queensland)

Nasser Ejazul Huq 1995 (Bangladesh)

Ralph Ogden 1996 (CSIRO)

Patrick Lane 1996 (CSIRO; Univ. of Melbourne)

Matt Hayne 1997 (Geoscience Australia)

John Magee 1997 (ANU)

Mary Bourke 1998 (Oxford Univ.; Planetary Science Institute)

Lesley Rogers 1999

Justine Kemp 2001 (Northumbria Univ.)

Pauline English 2001 (Geoscience Australia; CSIRO)

Paul Rustomji 2003 (CSIRO)

Pauline Treble 2003 (ANU; ANSTO)

Youping Zhou 2005

Bridget Ayling 2006 (Geoscience Australia)

Toshi Fujioka 2007 (ANU, ANSTO)

External: Arjun Heimsath (Berkeley, Dartmouth, Arizona State Univ.), Adrian Fisher (UNSW), Huang (Shanghai)

1973. Ross Coventry (CSIRO, James Cook Univ.)

A. Manyatsi 1997
A. Amar 1999
S. Berthelsen (MSc) 2000
J.-A. Cavanagh 2000
P. Ngaruiya 2000
O. Lense (MSc) 2003
L. Vawdrey (MSc) 2003
S. Tamagawa 2003
Y. Endah (MSc) 2006
J. Rangel 2007
David Mitchell 2007 (NSW Dept of Agriculture)
D. Saraswati 2008
L. de Silva 2008

1973. Colin Pain (UPNG, UNSW, Geoscience Australia)

Lisa Worrall (did not complete) (CSIRO, Geoscience Australia)
Trish Fanning (MSc) Macquarie University

1976. Chris Whitaker (Adelaide CAE)

1976. Joyce Lundberg MSc (Carleton Univ.)

Henriette Linge 1990 (Bjerknes Centre for Climate Change, Norway)
Marguerite Toscano 1996 (Smithsonian Institute, Washington)
Stephen Turgeon 2001 (University of Alberta)

1982. David Gillieson(ANU, ADFA, James Cook Univ.)

Russell Drysdale 1995 (Newcastle)
Karen Carthew 2003
Janece McDonald 2006
Michael Griffiths 2007
Greg Jackson 1996
Praphon Vibulsukh 1999 (RTAF Academy, Bangkok)
Yun Chen 2001 (CSIRO)
Hugh Pringle 2001 (WWF, Namibia)
Marji Puotinen 2004 (University of Wollongong)
Penny Davidson 2004 (Charles Sturt University)
John Guinotte 2006 (Marine Conserv. Biol. Unit, Washington D.C.)

Notes:

1. **Albert Goede began a PhD with Joe in the mid 1960's but did not complete.**