B9.1 Most significant contributions to this research field

As one of Australia's pre-eminent mid-career earth scientists, I have been at the forefront of evidence-based research integral to our understanding of how continents work. Known internationally for my innovative and insightful observations into geological phenomenon my research has allowed for compelling new understandings of the processes that have shaped the continents. I have been at the forefront of the dialogue between the more empirical observation-based geologists and the numerical modeling community, helping to build a new predictive capability in our understanding of continental dynamics. The broad scope of my research, now published in over 100 articles in international research journals, is reflected in ~1900 citations with almost a third of my publications having been cited 30 or more times. My research has been recently recognized by the award of the Mawson Medal for 2004 (a national award administered by the Australian Academy of Science in recognition of "*outstanding contributions to earth science in Australia*"). My key contributions to continental dynamics research include:

The nature of the deep crust and dynamics of mountain belts

My PhD research provided a new framework for understanding processes occurring deep within the crust [see references #1 & #3 in section B9.3]. This highly cited work (240 citations) was the first to link the deep crustal record to the collapse of ancient mountain systems, now the prevailing paradigm. In a series of papers in the early 1990s I outlined a new parameterization for understanding the dynamic evolution of mountain belts (the f_c-f_l parameterization [#5 section B9.3]). This work provides an important framework for teaching continental dynamics and highlights one of the hallmarks of my scientific work, namely the use of innovative visual representations to provide insights into earth dynamics.

The thermal structure of the continents and the notion of tectonic feedback

My work on the links between geothermal regimes [#22, 27 & 32 section B9.2] and continental deformation [#9 section B9.3] has produced fundamental new insights into the evolution of the continents [#2 section B9.3]. In particular, this work shows for the first time that the geochemical structuring of the continents can be understood as a natural, emergent phenomenon of a tectonic system governed by a set of thermally-sensitive feedbacks. An offshoot of this work has been the development of a new framework for conceiving Archaean tectonics that will help guide the debate about how tectonic processes have changed through time [#15 section B9.2]. Ultimately this work provided the impetus for my ARC Professorial Fellowship for the period 2000-2004. An important outcome of this work has been the spawning of interest in the nascent Australian geothermal industry sector. The work of my group in defining the South Australian heat flow anomaly [#27 section B9.2] has provided a prime scientific impetus for the successful float of Petratherm on the Australian Stock Exchange (ASX) in June 2004. Similarly, my scientific input is helping Scopenergy (a NSW based geothermal energy consortium with interests in South Australia) prepare an ASX float in late 2004/early 2005.

The origin of the tectonic stress field

My work on the dynamics of tectonic plates in collaboration with David Coblentz (then at the University of Arizona) provides a fundamental template for understanding the nature of stress fields within the continents [#7 section B9.3]. We introduced the important concept of the ambient stress state, resolved existing uncertainty in the origins of the stress field in the Australian and African continents [#6 section B9.3] and provided new insights into the mechanisms responsible for the break-up of supercontinents [#10 section B9.3]. This work stems from the need of the petroleum industry to understand stress distributions in prospective basins, and our research has provided an important guidance for petroleum resource exploration and extraction. This enduring collaboration with David Coblentz (now at University of California-LANL) continues to the present day with our most recent analysis of deformation in the Central Indian Ocean providing an important new constraint on the currently controversial subject of the coupling between subducting slabs and the surface plates [#4 section B9.3].

The active deformation and evolution of the Australian landscape

In recent years my research has increasingly focused on the young evolution of the Australian continent [#8 section B9.3] including the relationship between historic earthquake activity and the longer-term geologic record of deformation. In addition to providing the background to much of this proposal, this work has received much attention both in the professional and public arena (see *New Scientist*, 7th June, 2003, p17). This work is now exploring the relationship of landscape evolution to plate-scale dynamics and global climate change, as well as feeding into the national earthquake hazard program coordinated by Geoscience Australia. It is leading to a significant reassessment of the evolution of our Australian landscapes. The impact and excitement this work is generating is highlighted by the invitation to present the inaugural lecture (the Mawson Lecture) at the 2004 Australian Geological Convention and the 2003 Australian Geological Society Public Lecture Series. This public lecture series provided an integrated view of the evolution of the modern Australian landscape to a combined audience of ~1000, in all the main capital cities of Australia, and was accompanied by numerous interviews in the national and regional media (see section B9.5).

B9.2 Refereed publications, last five years

an asterisk signifies publications relevant to this application.

Book chapters

1. *Clark, D., Cupper, M., Sandiford, M., Kiernan, K., in press, Style and timing of late Quaternary faulting on the Lake Edgar Fault, southwest Tasmania, Australia: implications for hazard assessment in intracratonic areas. (eds) Audemard, F., McCalpin, J., Michetti, F., *Paleoseismology*, Geological Society of America Special Volume.
2. *Sandiford, M., McLaren, S., in press, Thermo-mechanical controls on heat production distributions and the long-term evolution of the continents, in *Evolution and differentiation of the continental crust* (eds, Brown, M. & Rushmer, T.).
3. *McLaren, S., Sandiford, M., Hand, M., Neumann, N., Wyborn, L., Bastrakova, I., 2003, The hot southern continent, Heat flow and heat production in Australian Proterozoic terranes, eds Hillis, R.R. Muller, D., Evolution and dynamics of the Australian Plate, *Geological Society of Australia and Geological Society of America, Special Publication*, 22, 151-161.
4. *Sandiford, M., 2003, Neotectonics of southeastern Australia: linking the Quaternary faulting record with seismicity and in situ stress, eds Hillis, R.R. Muller, D., Evolution and dynamics of the Australian Plate, *Geological Society of Australia and Geological Society of America, Special Publication*, 22, 101-113.
5. *Sandiford. M, Leonard, M., Coblentz, D, 2003, Geological constraints on active seismicity in southeast Australia, In *Earthquake Risk Mitigation*, (eds, Wilson, J.L, Lam, N.K., Gibson. G.), Australian Earthquake Engineering Society, 1-10.
6. *Sandiford, M., 2002, Late Neogene faulting record in southeastern Australia, In *Victoria Undercover*, (eds. Phillips, G.N., & Ely, K.S.,), 131-135.
7. *Tokarev, V., Sandiford, M., Gostin, V., 1999, Landscape evolution in the Mount Lofty Ranges: implications for regolith development. In *Regolith'98: new approaches to an old continent*, (eds) Taylor, G., Pain C., 131-139.
8. *Sandiford, M., Hand, M.,McLaren, S., 2001, Tectonic feedback, intraplate orogeny and the geochemical structure of the crust: a central Australian perspective, In "Continental Reactivation and Reworking", (eds, Miller, J., Holdsworth, R., Buick, I., Hand, M.), *Geological Society Special Publication*, 184, 195-218.
9. *McLaren, S., Sandiford, M., 2001, Long-term thermal consequences of tectonic activity at Mount Isa, Australia: Implications for polyphase tectonism in the Proterozoic.In "Continental Reactivation and Reworking", (eds, Miller, J., Holdsworth, R., Buick, I., Hand, M.), *Geological Society Special Publication*, 184, 219-236.

Journal articles

10. *Braun, J., Gesto, F. N., Burbidge, D. R., Cummins, P. R., Sandiford, M., Gleadow, A. J. W., Kohn. B. P., Constraints on the current rate of deformation and surface uplift of the Australian continent from a new seismic database, *Australian Journal of Earth Sciences*.
11. *Sandiford, M., Coblentz D., Schellart, W., 2004, Evaluating slab-plate coupling in the Indo-Australian plate, *Geology,* 32, in press.
12. *de Broekert, P., Sandiford, M., 2004, Buried inset-valleys in the eastern Yilgarn Craton, Western Australia: geomorphology, age and allogenic control, *Journal of Geology*, 112, in press.
13. *Sandiford, M., Wallace, M., Coblentz, D., 2004, Origin of the in situ stress field in southeastern Australia, *Basin Research*, 16, 325-338.

14. *Wallace, M., Dickinson, J.A., Moore, D., Sandiford, M., 2004, Late Neogene strandlines of Southern Victoria: A unique record of eustasy and tectonics in southeast Australia, *Australian Journal of Earth Sciences,* 51, in press.

15. *Sandiford, M., Van Kranendonk, M., Bodorkos, S., 2004, Conductive incubation and the origin of granite-greenstone dome and keel structure: the Eastern Pilbara Craton, Australia, *Tectonics*, 23, TC1009, DOI: 10.1029/2002TC001452.

16. *Bodorkos, S., Sandiford, M., Minty, B.R.S., Blewett, R.S., 2004, A high-resolution, calibrated airborne radiometric dataset applied to the estimation of crustal heat production in the Archaean northern Pilbara Craton, Western Australia, *Precambrian Research*, 128, 57-82,

17. *Sandiford, M., Frederiksen, S., Braun, J, 2003, The long-term thermal consequences of rifting: implications for basin reactivation, *Basin Research*, 15, 23-43.

18. *Sandiford, M., 2003, Geomorphic constraints on the late Neogene tectonics of the Otway Ranges, *Australian Journal of Earth Sciences*, 50, 69-80.

19. *Sandiford, M., McLaren, S., 2002, Tectonic feedback and the ordering of heat producing elements within the continental lithosphere, *Earth and Planetary Science Letters*, 204, 133-150.

20. *Sandiford, M., 2002, Low thermal Peclet number intraplate orogeny in central Australia, *Earth and Planetary Science Letters*, 201, 309-320.

21. Foden, J.D., M.A. Elburg, S.P. Turner, M. Sandiford, J. O'Callghan, S. Mitchell, 2002, Granite production in the Delamerian Orogen, South Australia, *Journal of the Geological society of Londo*n, 159, 557-575.

22. *McLaren, S., Dunlap, J., Sandiford, M. McDougall, I., 2002, The thermochronological record of extraordinary heat production at Mount Painter, South Australia: implications for tectonic reactivation of continental interiors, *Tectonics*, 10.1029/2000TC001275.

23. Alías, G., Sandiford, M., Hand, M., Worley, B., 2002, The P-T record of synchronous magmatism, metamorphism and deformation at Petrel Cove, southern Adelaide Fold Belt, *Journal of Metamorphic Geology*, 20, 351-363.

24. Bodorkos, S., Sandiford, M., Oliver, N.H.S., Cawood, P.A. 2002, High-T, low-P metamorphism as the middle crustal response to a mantle-related transient thermal pulse: a numerical model and its application to the Palaeoproterozoic Halls Creek Orogen, northern Australia, *Journal of Metamorphic Geology*, 20, 217-237.

25. *Sandiford, M., McLaren, S., Neumann, N, 2002, Long-term thermal consequences of the redistribution of heat-producing elements associated with large-scale granitic complexes, *Journal of Metamorphic Geology*, 20, 87-98.

26. *Haines, P, Hand, M., Sandiford, M., 2001, Palaeozoic syn-orogenic sedimentation in central and northern Australia: a review of distribution and timing with implications for the evolution of intracontinental orogens, *Australian Journal of Earth Sciences*, 48, 911-928.

27. *Neumann, N, Sandiford, M., Foden, J., 2000, Regional geochemistry and continental heat flow: Implications for the origin of the South Australian heat flow anomaly. *Earth and Planetary Science Letters*, 183, 107-120.

28. Fraser, G., Worley, B., Sandiford, M., 2000, High precision geothermobarometry across the High Himalayan metamorphic sequence, Langtang Valley, Nepal. *Journal of metamorphic Geology*, 18, 665 - 682.

29. *McLaren, S., Sandiford, M., Hand, M., 2000, High radiogenic heat producing granites and metamorphism - an example from the western Mount Isa Inlier, Australia, reply to comment, *Geology*, 28, 672.

30. *Paul, E., Sandiford, M., Flottman, T., 2000, The structural geometry of a thick-skinned fold-thrust belt termination : the Olary Block in the Adelaide Fold Belt, South Australia. *Australian Journal of Earth Sciences*, 47, 281-290.

31. Arnold, J., Powell, R., Sandiford, M., 2000, Amphibolites with staurolite and other aluminous minerals: calculated mineral equilibria in NCFMASH, *Journal of metamorphic Geology*, 18, 23-40.

32. *McLaren, S., Sandiford, M., Hand, M., 1999, High radiogenic heat producing granites and metamorphism - an example from the western Mount Isa Inlier, Australia, *Geology*, 27, 679-682.

33. *Hand, M., Sandiford, M., Wyborn, L., 1999, Some thermal consequences of high heat production in the Australian Proterozoic. *AGSO research Newsletter*, 30, 20-23.

34. McLaren, S., Neumman, N., Sandiford, M., Wyborn, L., 1999, Post-intrusion heating associated with high-heat-producing Proterozoic granites - Implications for mineralisation? *AGSO research Newsletter*, 30, 23-26.

35. *Hand, M., Sandiford, M., 1999, Intraplate deformation in central Australia, the link between subsidence and fault reactivation, *Tectonophysics*, 305, 121-140.

36. *Sandiford, M., 1999, Mechanics of basin inversion, *Tectonophysics*, 305,109-120.

37. Paul, E., Flottmann, T., Sandiford, M., 1999, Structural geometry of the northern Flinders Ranges in the Adelaide Fold Belt, South Australia, *Australian Journal of Earth Sciences*, 46, 343-354.

38. Foden, J., Sandiford, M., Dougherty-Page, J., Williams, I., 1999, Geochemistry and geochronology of the Rathjen Gneiss: implications for the early tectonic evolution of the Delamerian Orogen. *Australian Journal of Earth Science*, 46, 377-389.

B9.3 Ten career-best publications

1. Sandiford, M., Powell, R., 1986, Deep crustal metamorphism during continental extension, ancient and modern examples. *Earth and Planetary Science Letters*, 79, 151-158.

A seminal paper that continues to provide a framework for understanding the geodynamic significance of high temperature metamorphism, 176 citations.

2. Sandiford, M., McLaren, S., 2002, Tectonic feedback and the ordering of heat producing elements within the continental lithosphere, *Earth and Planetary Science Letters*, 204, 133-150.

The first explanation of how a thermo-mechanical feedback may facilitate the geochemical stratification of the continental lithosphere, introducing the concept of "tectonic feedback". As such a major contribution to our understanding of the long-term evolution of the continental crust.

3. Sandiford, M., 1989, Horizontal structures in deep crustal granulite terrains: a record of mountain building or mountain collapse? *Geology*, 17, 449-452.

The first paper to relate the structure in deep crustal metamorphic terrains to the extensional collapse of anciant mountain belts, 65 citations.

4. Sandiford, M., Coblentz D., Schellart, W., 2004, Evaluating slab-plate coupling in the Indo-Australian plate, *Geology,* 32, in press.

The first definitive, quantitative constraint on the nature of the controversial subject of slab-plate coupling on the basis observational evidence rather than the results of forward modelling thereby providing new insights into the energetics of plate motion.

5. Sandiford, M., Powell, R., 1990, Some thermal and isostatic consequences of the vertical strain geometry in convergent orogens, *Earth and Planetary Science Letters*, 98, 154-165.

A landmark paper in understanding the factors that control the evolution of orogenic belts. Introduced the f_c-f_l parametrization now widely used to illustrate evolution of orogenic belts, 45 citations.

6. Coblentz, D., Sandiford, M., Richardson, R, Zhou, S., Hillis, R., 1995, The origins of the Australian stress field, *Earth and Planetary Science Letters*, 133, 299-309.

The first paper to convincingly link the *in situ* stress field in the Australian continent to the plate boundary forces operating in the Indo-Australian plate, 30 citations.

7. Coblentz, D., Richardson, R.M., Sandiford, M., 1994, On the gravitational potential of the Earth's lithosphere, *Tectonics*, 13, 929-945.

A fundamental paper in defining the relationship between plate motion, plate-scale stress fields and driving forces, 36 citations.

8. Sandiford, M., 2003, Neotectonics of southeastern Australia: linking the Quaternary faulting record with seismicity and in situ stress, eds Hillis, R.R. Muller, D., Evolution and dynamics of the Australian Plate, *Geological Society of Australia and Geological Society of America Special Publication*, 22, 101-113.

The first paper to show contemporary seismicity in south-eastern Australia occurs in the context of an ongoing faulting record that has contributed to locally significant relief generation. As such it will set the scene for a significant re-evaluation of Australian landscape evolution.

9. Sandiford, M., Hand, M., 1998, Controls on the locus of Phanerozoic intraplate deformation in central Australia, *Earth and Planetary Science Letters*, 162, 97-110.

An important contribution to the debate on the factors that control the distribution of intraplate deformation in continental interiors.

10. Sandiford, M., Coblentz, D., 1994, Plate-scale potential energy distributions and the fragmentation of ageing plates, *Earth and Planetary Science Letters*, 126, 143-159.

An innovative explanation of why continents embedded in large, ageing plates may spontaneously fragment.

B9.4 Leadership and ability to build world-class research capacity

A key initiative of this proposal is its intention to build a unique science capability focussed on understanding how continents work with an Australian continental-scale perspective. This capability will be achieved by building a group of leading and emerging scientists based at University of Melbourne linked to major national and international activities. The long-term objective is to foster a group of elite scientists with a broad geological outlook who will help guide the Australian research effort for many decades beyond the life of the fellowship. The strategic objective is to focus on fundamental science that provides new inspirational insights (such as geothermal energy, global change, landscape evolution) that link to broader community interests and economic benefits for the resource sector. The award of a Federation Fellowship will provide a unique opportunity to build such a group. The university funding provided in support of this application (see Section E) will enable the appointment of two research fellows thereby providing leverage for further support through new initiatives to the ACcESS MNRF, CEDy and the ARC Discovery and Linkage schemes (see section D). Of particular note is the opportunity to bring Dr David Coblentz to Australia as part of this initiative. Dr Coblentz, an early-mid career researcher 9 years out of his PhD, is the leading world authority on plate-scale stress modelling. Together we have made fundamental contributions to plate dynamics (see #4, 6, 7 & 10 in B9.3), with 10 joint-authored papers providing testimony to the success of our collaboration. Dr Coblentz's expressed enthusiasm for joining such a group, evidenced by his willingness to relocate from his native USA and leave a continuing position at University of California (LANL), presents a rare opportunity for me to build a distinctive, world-leading science capability here in Melbourne. Dr Coblentz will fill one of the two University of Melbourne funded research positions as a Senior Research Fellow, with the other offered as a junior appointment to a young earth scientist with expertise in quantitative landscape chronology. My ability to build and mentor such a world-class group is further supported by my:

Outstanding track record in mentoring young scientists and research training: My research has always had strong engagement with young scientists who have continued on to become important contributors to the national and international research effort. Over the last 10 years I have managed a research group comprising 5-10 research students and postdoctoral fellows, supervising in total more than 50 student research projects (PhD and honours) and 16 postdoctoral fellows. My ex-students and postdoctoral fellows now constitute a significant component of the early career earth science community, occupying teaching and research positions (including a current Federation Fellow and 2 ARC APD's) at the Universities of Melbourne, Adelaide, Macquarie, Monash, ANU, Graz (Austria), California (USA) and Aarhus (Denmark), as well as many positions in industry (including ExxonMobil, BHP, Woodside) and government agencies (GA, PIRSA, NTGS, GSWA). This ability to provide outstanding leadership to young scientists has been well recognized by the ARC fellowship scheme, with five ARC APD and ARF fellowships being awarded to young scientists to work in my group in the last 10 years.

Pivotal role in defining and communicating the national research agenda: As one of the leading Australian earth scientists (evidenced by the award of the 2004 Mawson Medal) I have played a pivotal role in defining and communicating the national earth science research agenda. As a project leader and member of the Science Advisory Board of the ACcESS MNRF, I am at the forefront of a major national effort in earth science simulation with few international peers. As a CI in the Centre in Earth Dynamics (CEDy) proposal to the ARC 2005 Centre of Excellence round, I will potentially be involved in directing one of the most important research-focussed, national efforts in earth science over the next 5 years. As a member of the science review panel of the *pmd**CRC, I have been involved in providing guidance to the major national research effort in exploration geology. Finally as one of the key public advocates for the earth sciences (evidenced by the 2003 GSA Public Lecture Series and the 2004 Mawson Lecture) I have been at the forefront of the effort to explain the significance of the Australian earth science research effort to the broader community.

Strong international linkages: I have maintained strong international linkages over many years through my research and role in training young scientists, many of whom are now based overseas. The number of invited and keynote lectures at international conferences, publications in high pro-

file international journals such as *Earth and Planetary Science Letters*, *Geology*, *Tectonophysics*, *Tectonics*, etc and appointment as Editor-in-chief of *Tectonophysics* provide strong testimony to my international standing. This proposal will continue to build international links through collaboration in the field of simulation and modelling particularly with Dr David Hansen (University of Aarhus, Denmark) and Professor Jean Braun (University of Rennes, France). Collaboration with Dr Hansen forms an essential part of his prestigious Carlsberg fellowship, awarded for the years 2004-2006 and as part of his research he will undertake extended visits to work with me in Melbourne. The proposed move of Dr Coblentz to Melbourne will bring numerous ongoing collaborations with colleagues in the USA including Profs Karl Karlstrom (University of New Mexico) and Gene Humphreys (University of Oregon), both key scientists in the NSF flagship earth science program "Earthscope" which aims to detail the structure and evolution of the North American continent.

Engagement with Australian industry and government agencies: My work has significant impact outside of academia, particularly in defining exploration targets for the emerging geothermal energy industry (eg., Scopenergy) and in the earthquake hazard program coordinated by Geoscience Australia. The strategic objective of developing a group of young scientists engaged with fundamental issues but linked to the broader community outcomes will be facilitated by the alignment of this proposal with the national research priorities (NRPs) as specified by: (1) the 2003 Australian Academy of Science's "*National strategic plan for the geosciences*" NRPs 3 & 4 "understanding of the present and recent tectonic history of Australia", and (2) the ARC NRP of "an environmentally sustainable Australia" with regard to the priority goal of "Developing deep earth resources".

Unique contribution to Australian geoscience: Earth science is one of the stars of the Australian research effort with amongst the highest national levels in key indicators such as publication and citation rates. For example, Australia produces more than 5% of all geoscience publications worldwide and receives an equivalent proportion of citations [L. Butler, Monitoring Australia's Scientific Research. Australian Academy of Science, Canberra, 2001]. The prominence of Australian earth science in the international scene reflects many stimuli including the fact that beneath our feet, we have an extraordinary natural laboratory unlimited by geopolitical borders. The continental perspective has resulted in an unusually broad national research agenda. My own research exemplifies this having, in the last few years, published research results pertinent to every major epoch in earth history as well as numerous papers that focus on global issues of earth system dynamics. As such my research contributions have covered an enormous spectrum of contemporary Australian earth science activity, providing me with an exceptional foundation to build a research environment that capitalizes on Australia's unique earth science legacy and extraordinary international profile.

Outstanding record in attracting external research funding: My record in attracting external research funding needed to support the operation of the proposed research group is substantial. Through the various ARC funding schemes my group has attracted ~$1.3 million dollars in the last 5 years, while the ACcESS MNRF has provided ~$380,000 over the five year period 2002-2007 and Geoscience Australia a further $70,000 towards my work on neotectonics in the last 2 years. Grant applications currently pending with ARC for research support over the next five years amount to a further $1.4 million, in addition to the ~$1.67 million (cash and infrastructure component) promised by the University of Melbourne in support of this proposal.

Finally, as one of the highest profile and best equipped earth science departments in the country, the University of Melbourne School of Earth Sciences provides the ideal setting to host such a group. The school has exceptional strengths in many areas that overlap with this proposal, particularly in thermochronology (Professors Andrew Gleadow and Associate Professors Barry Kohn and Jon Woodhead), tectonics (Professors Dave Gray, Chris Wilson), geologic modelling (Professor Roger Powell) and landscape evolution (Emeritus Professor Jim Bowler, Dr Malcolm Wallace). Testimony to the extraordinary achievement of the school is the fact that it is currently host to four ARC professorial fellows, and this proposal will continue the long history of collaboration between my research group and each of these internationally-acclaimed researchers.

B9.5 Other evidence of impact and major contributions to the field

Further evidence of my impact and contribution to the earth sciences is provided by the following list of medals, awards, appointments, public and keynote lectures and national media interviews covering the period of the last five years

Medals and awards

- Mawson Medal, 2004
  awarded biennially by the Australian Academy of Science to "*recognize outstanding contributions to earth science in Australia*"
- Stillwell Medal, 2001
  awarded annually by the Geological Society of Australia for the best paper (#26, B9.2) in the *Australian Journal of Earth Sciences*
- ARC Professorial Fellowship, 2000-2004

Appointments

- Editor in chief, *Tectonophysics*
  Appointment 2004-2006, the premier international journal focused specifically on tectonics
- Editorial board, *Australian Journal of Earth Science*
  Appointment 2005-2007, the leading national earth science publication, with wide distribution to end-user groups in government departments and industry
- Editorial board, *Geology*
  Appointment 1999-2000, the most popular and widely read earth science journal in print
- *pmd**CRC review panel, 2002-2003
- ACcESS MNRF science advisory board, 2002-2007

International conferences: keynote and invited lectures

- *Continental interior tectonics: a recent Australian perspective*
  keynote lecture, *SGTSG conference*, Kalbarri, 2003
- *Melting the crust: Where is the heat?*
  invited lecture, *Ishihara Symposium*, Sydney, 2003
- *When shear zones don't reactivate*
  keynote lecture, *Transport and flow processes in shear zones conference*, Geological Society London, 2002
- *Heat production, tectonic feedback and the thermal evolution of the continents*
  invited lecture, *University of Bristol*, Bristol UK, 2002
- *h qc on k*
  keynote lecture, *Chapman Conference: Exploration Geodynamics*, Dunsborough, 2001
- *Linking neotectonics in Tibet and Australia*
  invited lecture, *Chinese Acadeny of Sciences*, Beijing, 2001
- *Tectonic feedback and the geochemical structure of the crust: an Australian perspective*
  keynote lecture, *Conference: Orogenesis in the outback*, Alice Springs, 1999
- *Thermo-mechanical controls on heat production distributions and the long-term evolution of the continents*
  keynote lecture, *Penrose conference: Processes of Crustal Differentiation*, Verbania, Italy, 1999
- *High temperature metamorphism in the conductive limit*
  keynote lecture, *Conference: What drives metamorphism*, Geological Society London, 1998

National conferences: inaugural, keynote, and invited lectures

- *Why Oz quakes*
  inaugural lecture (Mawson Lecture), *Australian Geological Convention*, Hobart, 2004

- *Geological constraints on active seismicity in southeast Australia*
  keynote lecture, *Australian Earthquake Engineering Society Annual conference*, Melbourne, 2003
- *Emergent properties, geometry form and organization in landscape*
  invited lecture, *Conference*: *Australian Crustal Research Centre*, Melbourne, 2003
- *Tectonics and stratigraphy in Neoproterozoic Basins, Australia*
  invited lecture, *Powell Symposium, Australian Geological Convention*, Adelaide, 2002
- *Neotectonic framework of Australia*
  invited lecture, *Sprigg Symposium, Adelaide, Australian Geological Convention*, Adelaide, 2002
- *Topography and tectonics*
  invited lecture, *Selwyn Symposium*, Melbourne, 2001
- *Neotectonics of SE Australia, and the origins of the intraplate stress field*
  invited lecture, *Defining Australia*, *Australian Geological Convention*, Sydney, 2000
- *Heat production distributions, tectonic styles and the thermal evolution of the continental lithosphere*
  invited lecture, *Vernon Symposium, Australian Geological Convention*, Sydney, 2000

Public lectures

- *Making Australia: landscape, tectonics and climate*
  public lecture, *Geological Society of Australia Public lecture Series*, all capital cities, Australia, 2003
- *Topography, tectonics and climate*
  public lecture, *Royal Society of Victoria*, Melbourne, 2003
- *The nature of change*
  public lecture, *Science Week*, Melbourne, 2002

National radio interviews

- *Radio National Breakfast* with Peter Thompson, 20th December 2002, “Earthquake Study"
- *Radio National Breakfast* with Peter Thompson, 5th June 2003, “Australian Earthquakes"
- *Radio National Late Night Live* with Phillip Adams, 10th February 2004, “Australia moves north"