

Curriculum Vitae

1a. Personal details				
Full name	<i>Title</i>	<i>First name</i>	<i>Second name(s)</i>	<i>Family name</i>
	Prof.	Timothy	Raymond	Naish
Present position		Director Antarctic Research Centre		
Organisation/Employer		Victoria University of Wellington		
Contact Address	PO Box 600			
	Wellington			
		Post code		
Work telephone	+ 4 5868282	Mobile	0272358101	
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Personal website (if applicable)	http://www.victoria.ac.nz/antarctic/about/staff/timothy-naish			

1b. Academic qualifications	
1985-1988	BSc (Earth Sciences), University of Waikato
1989-1990	MSc (1st class Hons), (Earth Sciences) University of Waikato
1992-1996	DPhil (Earth Sciences), University of Waikato

1c. Professional positions held	
2012-present	Deputy Pro-Vice Chancellor of the Faculties of Science Engineering, Architecture and Design, Victoria University of Wellington (0.2 FTE).
2009-2013	Director, Joint Antarctic Research Institute, Wellington
2008-present	Professor in Earth Sciences & Director of the Antarctic Research Centre, Victoria University of Wellington (0.8-0.95 FTE)
1998-present	Research /Senior/Principal Scientist, GNS Science (1.0-0.05 FTE), Lower Hutt
2006-2008	Deputy Director, Joint Antarctic Research Institute, Wellington.
2005-2008	Associate Professor and Deputy Director (0.2-0.4 FTE), Antarctic Research Centre, Victoria University of Wellington.
1996-1997	Australian Research Council Post-Doctoral Fellowship, James Cook University of Northern Queensland
1990-1995	Assistant Lecturer, Department of Earth Sciences, University of Waikato

1d. Present research/professional speciality	
National and international Antarctic and climate research leadership	
Research management and governance	
Research technology transfer	
Science expertise:	
<ul style="list-style-type: none"> • Paleoclimatology from glaciated and non-glaciated continental margins. • Sequence stratigraphy, integrated chronostratigraphy, cyclostratigraphy and sedimentology. • Specialising in reconstruction of past sea-level and ice volume variability. • Data and numerical model comparison and integration. 	

1e. Total years research experience	24 years
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1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)	
2014	Elected Fellow of the Royal Society of New Zealand
2014	Martha T Muse Prize for Excellence in Antarctic Science and Policy (USD\$100K)
2014	Victoria University Research Excellence Award
2014-	NZ/Australia Representative on the Science Evaluation Panel of the International Ocean Discovery Programme
2013	Victoria University Public Contribution Award
2007 -	NZ Universities PBRF - A-Grade Researcher
2005-	Lead Principle Investigator on 4 RSNZ Marsden Funded Projects ~\$3.5M.
2002- 2013	Chair of the International ANDRILL Science Committee.

2010-13	Lead Author, Intergovernmental Panel on Climate Change (IPCC) AR5, WG1
2009-12	Royal Society of New Zealand Marsden Fund Council Member and Convenor of the Earth Science and Astronomy Assessment Panel
2005-12	Member, Executive Committee, SCAR Antarctic Climate Evolution (ACE) Scientific Research Project, and Chair of the Pleistocene Sub-Committee.
2011	Finalist, Dominion Post Wellingtonian of the Year Awards
2011	My ex-PhD student and post-doctoral research fellow, Dr Rob McKay, was awarded 2011 Prime Minister's MacDiarmid Emerging Scientist Prize
2005-11	Co-Chief Scientist of the international ANDRILL McMurdo Ice shelf Project.
2010-11	US National Academy of Sciences, National Research Council Committee to review US scientific ocean drilling programs and make recommendations on a future US\$1B science plan to National Science Foundation.
2010	New Zealand Antarctic Medal (Royal New Zealand Honour, New Year 2010)
2005-10	Leader, \$5M FRST ANDRILL Programme
2009	New Zealand Science and Technology Medal (Royal Society of New Zealand)
2008	James Lee Wilson Award for Excellence in Sedimentary Geology by the SEPM (Society of Sedimentary Geology).
2006	Geological Society of New Zealand, McKay Hammer awarded for most meritorious contribution to New Zealand Earth Sciences in the last 2 calendar years
1999-2010	Member of the Editorial Board of the Elsevier Journal, Sedimentary Geology
1998	Royal Society of New Zealand, Hamilton Prize

1g. Postgraduate students supervised

PhD, Georgia Grant, 2014 -Principal supervisor, VUW.
 PhD, Bella Duncan, Feb 2013-, Co-supervisor, VUW
 PhD, Rosie Cody, Feb 2008-, Principal supervisor, VUW
 PhD, Molly Patterson, Jan 2010 – Principal supervisor, VUW
 PhD, Lana Cohen, Jan 2010 – Co-supervisor, VUW
 PhD, Robert McKay, Jan 2005-Jan 2008 – Principal supervisor, VUW
 PhD, Alberto Ferrin, 2003-2006 – Principal supervisor, VUW (Vigo, Spain)
 MSc, Libby Galbraith, 2013 – Principal Supervisor, VUW
 MSc, Christoph Kraus, 2013 – Supervisor, VUW
 MSc, Juliet Sefton, 2013- Principal supervisor, VUW
 MSc, Evelien ven der Ven, 2009-2010 - Principal supervisor, VUW
 MSc, Georgia Grant, 2010-2011 - Principal supervisor, VUW
 MSc, Sanne Maas, 2010-2011 - Principal supervisor, VUW
 MSc, DhiresH Hansaraaj, 2006-2007 - Principal supervisor, VUW
 MSc, Joanne Whitaker, 2003-2005- Co-supervisor, VUW
 MSc, Jo Prebble, 2003-2005- Co-supervisor, VUW
 MSc, Nora Patterson, 2003-2004 - Principal supervisor, VUW
 MSc, Florian Wehland, 2003-2004 - Principal supervisor, Tubingen, Germany
 MSc, Jeremy Mitchell, 2002-2003 - Principal supervisor, VUW
 MSc, Sally Edwards, 2002-2003 - Co-supervisor, VUW (JCU, Australia)
 Msc, Dougal Gordon 1994-1996 - Co-supervisor, Waikato
 MSc, Tim Journeaux, 1993-1995 - Co-supervisor, Waikato
 BSc, (hons), Natalie Balfour, 2000-2001 - Principal supervisor, VUW

1h. Selected invited keynote and plenary presentations

- August 25th, 2014, Invited Muse Prize Plenary Lecture. "Paleoclimate perspectives on Antarctic ice sheet and global sea-level sensitivity". 2014 Scientific Committee on Antarctic Research Open Sciences Meeting, Auckland, New Zealand.
- January-February, 2013, Invited on Japan Society for the Promotion of Science Fellowship with invited lectures at Korean Polar Research Institute, JAMSTEC, University of Kochi.
- 13th March 2013, Invited Keynote Speaker, NZARI Planning Workshop, Auckland.

- 24th June, 2013, Invited Keynote Speaker, Strategic Science in Antarctica Meeting, Hobart, Australia.
- 9th October 2013, Invited Keynote Speaker, Greenhouse 2013 Conference, to launch IPCC5th Assessment Report, Adelaide, Australia
- 13th November 2013, Invited keynote at the International Continental Drilling Program 10 year Science Planning Workshop, Potsdam, Germany.
- 26th November, 2012, Invited Plenary on Sea-Level Change, at the 2nd Earth System Outlook Meeting, Australian Academy of Science, Canberra.
- 9th August, 2012, Invited Plenary at the International Geological Congress on “How geological records inform us on future climate change”. Audience of 3000, Brisbane Convention Centre.
- 19th July, 2012. Invited keynote talk at the Scientific Committee on Antarctic Research (SCAR) Open Sciences Conference, Portland, USA on, “Antarctic Plio-Pleistocene Climate Evolution”.
- 14th July, 2012. Invited presentation to ocean drilling workshop, Portland, USA.
- 10th-11th May, 2012. Convenor and MC for panel discussion at the NZCCC Sea-level rise conference, Te Papa, Wellington.
- 4th, May, 2012, Invited talk in Symposium organised by the Australian Academy of Science to recognise 100 years of Australian Antarctic Science, Canberra Australia.
- 28th, April, 2012. Invited talk at European Geosciences Union, Vienna Austria on “Antarctic and Southern Ocean Influences on Late Pliocene Global Cooling”.
- 11/07/2011. Invited Plenary Speaker Naish T. 2011. Cenozoic evolution of the Antarctic Ice Sheets and the Southern Ocean. International Symposium on Antarctic Earth Sciences, Edinburgh, Scotland.
- 08/06/2010 Lead Convenor of Theme Sessions - Climate and Paleoclimate dynamics and processes International Polar Year Conference, Oslo, Norway
- 05/07/2010, Invited Plenary Speaker. Naish T, Antarctic Southern Ocean Influences on Late Pliocene Cooling, Canberra, Australia Australian Earth Sciences Conference, Canberra Australia
- 16/12/2008 Invited Speaker in the Union Session. Naish T et al. Neogene Climate history of Antarctica: Initial results from the ANDRILL McMurdo Ice Shelf Project Fall American Geophysical Union Meeting, San Francisco, USA.

1i. Total number of <i>peer reviewed</i> publications and patents	Journal articles	Books, book chapters, books edited	Conference proceedings	Patents
	80	12	4	

- 2900 career citations, h-index=30 (Google Scholar)

Selected significant publications

- Patterson, M., McKay, R., **Naish, T.**, Escutia, C., Jimenez-Espejo, F., Raymo, R., Meyers, S., Tauxe, L., and Brinkhuis., H. 2014 Orbital forcing of the East Antarctic Ice Sheet during the Pliocene and Early Pleistocene. *NATURE GEOSCIENCE*, 7, 841-847.
- Masson-Delmotte, V., M. Schulz, A. Abe-Ouchi, J. Beer, A. Ganopolski, J. F. González Rouco, E. Jansen, K. Lambeck, J. Luterbacher, **T. Naish**, T. Osborn, B. Otto-Bliesner, T. Quinn, R. Ramesh, M. Rojas, X. Shao and A. Timmermann, 2013: Information from Paleoclimate Archives. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T. F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P. M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- **Naish, T. R.** & 56 others, 2009. Obliquity-paced Pliocene West Antarctic Ice Sheet Oscillations, *NATURE*, 458, 322-328. (200 citations)
- **Naish, T. R.**, & 28 others. 2001. Orbitally induced oscillations in the East Antarctic ice sheet at the Oligocene/Miocene boundary, *NATURE*, 413, 719-723. (150 citations)
- **Naish, T. R.** & Wilson, G., 2009. Constraints on the amplitude of Mid-Pliocene (3.6–2.4 Ma) eustatic sea-level fluctuations from the New Zealand shallow-marine sediment record.

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A. (367, 169-187.
doi:10.1098/rsta.2008.0223. (35 citations)

- McKay, R., **Naish, T.**, Carter, L., Riesselman, C., Sjunneskog, C., Winter, D., Dunbar, R., Sangiorgi, F., Warren, C., Pagani, M., Schouten, S., Willmott, V., Levy, R., DeConto, R., Powell, R. 2012. Antarctic and Southern Ocean Influences on Late Pliocene cooling. *PROCEEDINGS OF THE NATIONAL ACADEMIES OF SCIENCES*, 109, 6423-642. (50 citations)
- **Naish T. R.**, Abbott, S. T., Alloway, B. V., Beu, A. G., Carter, R. M., Edwards, A. R., Journeaux, T. D., Kamp, P. J. J., Pillans, B., Woolfe, K., 1998: Astronomical Calibration of a Southern Hemisphere Plio-Pleistocene Reference Section, Wanganui Basin (New Zealand). *QUATERNARY SCIENCE REVIEWS*, v. 17, p. 695-710. (80 citations)
- **Naish T. R.**, 1997: Constraints on the amplitude of late Pliocene eustatic sea-level fluctuations: new evidence from the New Zealand shallow-marine sediment record, *GEOLOGY*, v. 25, p. 1139-1142. (50 citations)
- **Naish T.R.**, Kamp P.J.J., 1997: High resolution sequence stratigraphy of 6th order (41 ka) Plio-Pleistocene cyclothems, Wanganui Basin, New Zealand: A case for the Regressive Systems Tract. *BULLETIN OF THE GEOLOGICAL SOCIETY OF AMERICA*, v. 109, 978-999. (>150 citations)
- Pillans, B.J and **Naish, T.R.**, 2004. Defining the Quaternary. *QUATERNARY SCIENCE REVIEWS*, 23, 2271-2282. (55 citations)
- Pillans, B. J., Chappell, J. and **Naish, T.**, 1998, The Milankovitch climatic beat: template for Plio/Pleistocene sea level changes and sequence stratigraphy, *SEDIMENTARY GEOLOGY*, v. 122, p. 5-22. (100 citations)

2a. Research publications and dissemination

Peer-reviewed journal articles

1. Patterson, M., McKay, R., **Naish, T.**, Escutia, C., Jimenez-Espejo, F., Raymo, R., Meyers, S., Tauxe, L., and Brinkhuis., H. 2014 Orbital forcing of the East Antarctic Ice Sheet during the Pliocene and Early Pleistocene. *NATURE GEOSCIENCE*, 7, 841-847.
2. Kennicutt, C and 69 others (including **Naish, T.R.**), 2014. A roadmap for Antarctic and Southern Ocean science for the next two decades and beyond. *Antarctic Science*, in press.
3. Kennicutt, C and 69 others (including **Naish, T. R.**), 2014. Comment: Six priorities for Antarctic Science. *Nature*, 512, 23-25.
4. Masson-Delmotte, V., M. Schulz, A. Abe-Ouchi, J. Beer, A. Ganopolski, J. F. González Rouco, E. Jansen, K. Lambeck, J. Luterbacher, **T. Naish**, T. Osborn, B. Otto-Bliesner, T. Quinn, R. Ramesh, M. Rojas, X. Shao and A. Timmermann, 2013: Information from Paleoclimate Archives. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T. F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P. M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
5. Carr, S. A., S. W. Vogel, R. B. Dunbar, J. Brandes, J. R. Spear, R. Levy, **T. R. Naish**, R. D. Powell, S. G. Wakeham, and K. W. Mandernack. 2013. Bacterial abundance and composition in marine sediments beneath the Ross Ice Shelf, Antarctica. *Geobiology* 11 (4): 377-95.
6. Cody, R., R. Levy, J. Crampton, **T. Naish**, G. Wilson, and D. Harwood. 2012. Selection and stability of quantitative stratigraphic age models: Plio-Pleistocene glaciomarine sediments in the ANDRILL 1B drillcore, McMurdo ice shelf. *Global and Planetary Change* 96-97 : 143-56.
7. Talarico, F. M., R. M. McKay, R. D. Powell, S. Sandroni, and **T. Naish**. 2012. Late Cenozoic oscillations of Antarctic ice sheets revealed by provenance of basement clasts and grain detrital modes in ANDRILL core AND-1B. *Global and Planetary Change* 96-97 : 23-40.
8. Galeotti, S., L. Lanci, F. Florindo, **T. R. Naish**, L. Sagnotti, S. Sandroni, and F. M. Talarico. 2012. Cyclochronology of the Eocene-Oligocene transition from the Cape Roberts Project-3 core, Victoria Land Basin, Antarctica. *Palaeogeography, Palaeoclimatology, Palaeoecology* 335-336 : 84-94.
9. **Naish, T.**, and D. Zwartz. 2012. Palaeoclimate: Looking back to the future. *Nature Climate Change* 2 (5): 317-8.
10. Wilson, G. S., R. H. Levy, **T. R. Naish**, R. D. Powell, F. Florindo, C. Ohneiser, L. Sagnotti, et al. 2012. Neogene tectonic and climatic evolution of the western Ross Sea, Antarctica -

- chronology of events from the AND-1B drill hole. *Global and Planetary Change* 96-97 : 189-203.
11. Wilson, G. S., **T. R. Naish**, R. D. Powell, R. H. Levy, and J. S. Crampton. 2012. Introduction - Late Neogene chronostratigraphy and depositional environments on the Antarctic margin: New results from the ANDRILL McMurdo Ice Shelf project. *Global and Planetary Change* 96-97 : 1-8.
 12. McKay, R., **T. Naish**, L. Carter, C. Riesselman, R. Dunbar, C. Sjunneskog, D. Winter, et al. 2012. Antarctic and southern ocean influences on late Pliocene global cooling. *Proceedings of the National Academy of Sciences of the United States of America* 109 (17): 6423-8.
 13. McKay, R., **T. Naish**, R. Powell, P. Barrett, R. Scherer, F. Talarico, P. Kyle, et al. 2012. Pleistocene variability of Antarctic Ice Sheet extent in the Ross Embayment. *Quaternary Science Reviews* 34 : 93-112.
 14. Miller, K. G., J. D. Wright, J. V. Browning, A. Kulpecz, M. Kominz, **T. R. Naish**, B. S. Cramer, Y. Rosenthal, W. R. Peltier, and S. Sosdian. 2012. High tide of the warm Pliocene: Implications of global sea level for Antarctic deglaciation. *Geology* 40 (5): 407-10.
 15. Levy, R., R. Cody, J. Crampton, C. Fielding, N. Golledge, D. Harwood, S. Henrys, et al (**incl. T.R Naish**). 2012. Late Neogene climate and glacial history of the southern Victoria Land coast from integrated drill core, seismic and outcrop data. *Global and Planetary Change* 80-81 : 61-84.
 16. McKay, R., G. Browne, L. Carter, E. Cowan, G. Dunbar, L. Krissek, **T. Naish**, et al. 2009. The stratigraphic signature of the Late Cenozoic Antarctic ice sheets in the Ross Embayment. *Bulletin of the Geological Society of America* 121 (11-12): 1537-61.
 17. **Naish, T.**, R. Powell, R. Levy, G. Wilson, R. Scherer, F. Talarico, L. Krissek, et al. 2009. Obliquity-paced Pliocene West Antarctic Ice Sheet Oscillations. *Nature* 458 (7236): 322-8.
 18. **Naish, T. R.**, and G. S. Wilson. 2009. Constraints on the amplitude of mid-Pliocene (3.6-2.4Ma) eustatic sea-level fluctuations from the New Zealand shallow-marine sediment record. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 367 (1886): 169-87.
 19. Harwood, D., F. Florindo, F. Talarico, R. Levy, G. Kuhn, **T. Naish**, F. Niessen, R. Powell, A. Pyne, and G. Wilson. 2009. Antarctic drilling recovers stratigraphic records from the continental margin. *Eos* 90 (11): 90-1.
 20. McKay, R. M., G. B. Dunbar, **T. R. Naish**, P. J. Barrett, L. Carter, and M. Harper. 2008. Retreat history of the Ross Ice Sheet (shelf) since the last glacial maximum from deep-basin sediment cores around Ross Island. *Palaeogeography, Palaeoclimatology, Palaeoecology* 260 (1-2): 245-61.
 21. Fielding, C. R., J. Whittaker, S. A. Henrys, T. J. Wilson, and **T. R. Naish**. 2008. Seismic facies and stratigraphy of the cenozoic succession in McMurdo Sound, Antarctica: Implications for tectonic, climatic and glacial history. *Palaeogeography, Palaeoclimatology, Palaeoecology* 260 (1-2): 8-29.
 22. Crundwell, M., G. Scott, **T. Naish**, and L. Carter. 2008. Glacial-interglacial ocean climate variability from planktonic foraminifera during the mid-Pleistocene transition in the temperate southwest pacific, ODP site 1123. *Palaeogeography, Palaeoclimatology, Palaeoecology* 260 (1-2): 202-29.
 23. Dunbar, G. B., **T. R. Naish**, P. J. Barrett, C. R. Fielding, and R. D. Powell. 2008. Constraining the amplitude of late Oligocene bathymetric changes in western Ross Sea during orbitally-induced oscillations in the East Antarctic Ice Sheet: (1) implications for glacial-marine sequence stratigraphic models. *Palaeogeography, Palaeoclimatology, Palaeoecology* 260 (1-2): 50-65.
 24. Johnston, L., G. S. Wilson, A. R. Gorman, S. A. Henrys, H. Horgan, R. Clark, and **T. R. Naish**. 2008. Cenozoic basin evolution beneath the southern McMurdo Ice shelf, Antarctica. *Global and Planetary Change* 62 (1-2): 61-76.
 25. Siegert, M. J., P. Barrett, R. Deconto, R. Dunbar, C. Ó Cofaigh, S. Passchier, and **T. Naish**. 2008. Recent advances in understanding Antarctic climate evolution. *Antarctic Science* 20 (4): 313-25.
 26. **Naish, T. R.**, G. S. Wilson, G. B. Dunbar, and P. J. Barrett. 2008. Constraining the amplitude of late Oligocene bathymetric changes in Western Ross Sea during orbitally-induced oscillations in the east antarctic ice sheet: (2) implications for global sea-level changes. *Palaeogeography,*

Palaeoclimatology, Palaeoecology 260 (1-2): 66-76.

27. Alloway, B. V., D. J. Lowe, D. J. A. Barrell, R. M. Newnham, P. C. Almond, P. C. Augustinus, N. A. N. Bertler, et al (**incl. T.R Naish**). 2007. Towards a climate event stratigraphy for New Zealand over the past 30 000 years (NZ-INTIMATE project). *Journal of Quaternary Science* 22 (1): 9-35.
28. Krissek, L., G. Browne, L. Carter, E. Cowan, G. Dunbar, R. McKay, **T. Naish**, R. Powell, J. Reed, and T. Wilch. 2007. Sedimentology and stratigraphy of the AND-1B core, ANDRILL McMurdo Ice Shelf Project, Antarctica. *Terra Antartica* 14 (3): 185-222.
29. Wilson, G. S., R. Levy, G. Browne, R. Cody, N. Dunbar, F. Florindo, S. Henrys, et al (**incl. T R Naish**). 2007. Preliminary integrated chronostratigraphy of the AND-1B core, ANDRILL McMurdo Ice Shelf project, Antarctica. *Terra Antartica* 14 (3): 297-316.
30. **Naish, T.**, R. Powell, and R. Levy. 2007. Background to the ANDRILL McMurdo ice shelf project (Antarctica) and initial science volume. *Terra Antartica* 14 (3): 121-30.
31. **Naish, T.**, R. Powell, R. Levy, F. Florindo, D. Harwood, G. Kuhn, F. Niessen, F. Talarico, and G. Wilson. 2007. A record of Antarctic climate and ice sheet history recovered. *Eos* 88 (50): 557-8.
32. **Naish, T.**, R. Powell, R. Levy, S. Henrys, L. Krissek, F. Niessen, M. Pompilio, R. Scherer, and G. S. Wilson. 2007. Synthesis of the initial scientific results of the MIS project (AND-1B core), Victoria Land Basin, Antarctica. *Terra Antartica* 14 (3): 317-27.
33. **Naish, T.**, R. Powell, R. Levy, F. Niessen, G. Kuhn, F. Florindo, F. Talarico, G. Wilson, and D. Harwood. 2007. Examining Antarctica. *Geotimes* 52 (10): 30-3.
34. Bertler, N. A. N., **T. R. Naish**, H. Oerter, S. Kipfstuhl, P. J. Barrett, P. A. Mayewski, and K. Kreutz. 2006. The effects of joint ENSO-Antarctic oscillation forcing on the McMurdo dry valleys, Antarctica. *Antarctic Science* 18 (4): 507-14.
35. Bertler, N. A. N., **T. R. Naish**, P. A. Mayewski, and P. J. Barrett. 2006. Opposing oceanic and atmospheric ENSO influences on the Ross Sea region, Antarctica. *Advances in Geosciences* 6 : 83-6.
36. Harwood, D., R. Levy, J. Cowie, F. Florindo, **T. Naish**, R. Powell, and A. Pyne. 2006. Deep drilling with the ANDRILL program in Antarctica. *Scientific Drilling* 1 (3): 43-5.
37. **Naish, T. R.**, B. D. Field, H. Zhu, A. Melhuish, R. M. Carter, S. T. Abbott, S. Edwards, et al. 2005. Integrated outcrop, drill core, borehole and seismic stratigraphic architecture of a cyclothem, shallow-marine depositional system, Wanganui Basin, New Zealand. *Journal of the Royal Society of New Zealand* 35 (1-2): 91-122.
38. Pillans, B., B. Alloway, **T. Naish**, J. Westgate, S. Abbott, and A. Palmer. 2005. Silicic tephras in Pleistocene shallow-marine sediments of Wanganui Basin, New Zealand. *Journal of the Royal Society of New Zealand* 35 (1-2): 43-90.
39. Patterson, N. G., N. A. N. Bertler, **T. R. Naish**, and U. Morgenstern. 2005. ENSO variability in the deuterium-excess record of a coastal antarctic ice core from the McMurdo dry valleys, Victoria Land. *Annals of Glaciology* 41 : 140-6.
40. Bertler, N. A. N., P. A. Mayewski, S. B. Sneed, **T. R. Naish**, U. Morgenstern, and P. J. Barrett. 2005. Solar forcing recorded by aerosol concentrations in coastal Antarctic glacier ice, McMurdo dry valleys. *Annals of Glaciology* 41 : 52-6.
41. **Naish, T. R.**, F. Wehland, G. S. Wilson, G. H. Browne, R. A. Cook, H. E. G. Morgans, M. Rosenberg, et al. 2005. An integrated sequence stratigraphic, palaeoenvironmental, and chronostratigraphic analysis of the Tangahoe Formation, Southern Taranaki coast, with implications for mid-Pliocene (c. 3.4-3.0 ma) glacio-eustatic sea-level changes. *Journal of the Royal Society of New Zealand* 35 (1-2): 151-96.
42. **Naish, T. R.** 2005. New Zealand's shallow-marine record of Pliocene-Pleistocene global sea-level and climate change. *Journal of the Royal Society of New Zealand* 35 (1-2): 1-8.
43. Abbott, S. T., **T. R. Naish**, R. M. Carter, and B. J. Pillans. 2005. Sequence stratigraphy of the Nukumaruan stratotype (Pliocene-Pleistocene, c. 2.08-1.63 ma), Wanganui Basin, New Zealand. *Journal of the Royal Society of New Zealand* 35 (1-2): 123-50.
44. Horgan, H., **T. Naish**, S. Bannister, N. Balfour, and G. Wilson. 2005. Seismic stratigraphy of the plio-pleistocene ross island flexural moat-fill: A prognosis for ANDRILL program drilling beneath McMurdo-Ross ice shelf. *Global and Planetary Change* 45 (1-3 SPEC. ISS.): 83-97.
45. Alloway, B. V., B. J. Pillans, L. Carter, **T. R. Naish**, and J. A. Westgate. 2005. Onshore-offshore

- correlation of Pleistocene rhyolitic eruptions from New Zealand: Implications for TVZ eruptive history and paleoenvironmental construction. *Quaternary Science Reviews* 24 (14-15): 1601-22.
46. Mildenhall, D. C., C. J. Hollis, and **T. R. Naish**. 2004. Orbitally-influenced vegetation record of the mid-Pleistocene climate transition, offshore eastern New Zealand (ODP leg 181, site 1123). *Marine Geology* 205 (1-4): 87-111.
 47. Pillans, B.J and **Naish, T.R.**, 2004. Defining the Quaternary. *QUATERNARY SCIENCE REVIEWS*, 23, 2271-2282.
 48. Florindo, F., R. B. Dunbar, M. J. Siegert, R. M. DeConto, P. J. Barrett, A. K. Cooper, C. Escutia, et al (**incl. T.R Naish**). 2003. Antarctic climate evolution (ACE) research initiative. *Terra Antarctica Reports*(9 SPEC. ISS.): 127-32.
 49. Florindo, F., J. Francis, D. M. Harwood, R. H. Levy, **T. Naish**, F. Niessen, R. D. Powell, and G. S. Wilson. 2003. The ANDRILL initiative: Stratigraphic drilling for climatic and tectonic history in Antarctica. *Terra Antarctica Reports*(9 SPEC. ISS.): 123-6.
 50. Browne, G. H., and **T. R. Naish**. 2003. Facies development and sequence architecture of a late quaternary fluvial-marine transition, Canterbury plains and shelf, New Zealand: Implications for forced regressive deposits. *Sedimentary Geology* 158 (1-2): 57-86.
 51. Wilson, G. S., A. P. Roberts, D. M. Harwood, C. R. Fielding, D. K. Watkins, **T. R. Naish**, F. Florindo, et al. 2003. Integrated chronostratigraphic calibration of the Oligocene-Miocene boundary at 24.0 ± 0.1 ma from the CRP-2A drill core, Ross Sea, Antarctica: Reply. *Geology* 31 (1): e11-2.
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- 28th August, 2014, Melting Ice. Rising Sea, Tim Naish during World Science Week, Veronika Meduna.
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- 18 March, 2009. Study: West Antarctic Melt a Slow Affair. Andrew Revkin.
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Popular Scientific Magazine Features

Nature

- 7 March 2007, Vol 446, 129-131. International Polar Year Special Feature on "ANDRILL Polar Research – School of Rock", Alexandra Witze,
- 24 April, 2008, Vol. 453. *Nature News*. "Sediment cores reveal Antarctica's warmer past". Quirin Sciermeier
- 18 March, 2009, Vol. 458, 258. "Making of the Paper: Tim Naish & Ross Powel".
- 18 March, 2009, Vol.458, 295-296. "Global Change: West-side story of Antarctic Ice", News & Views on Naish et al. paper. Philippe Huybrechts.

Science

- 1 July, 2010, Vol. 328, 1612-1613. "Could East Antarctica be heading for the big melt". Doug Fox.
- 30 May, 2008, Vol. 320, 1152-1154. "Antarctica: Freeze-dried findings support a tale of two ancient ice sheets". Douglas Fox.
- 15 May, 2009, Vol. 324. 888-889. "Ice Sheet stability and Sea level". Erik Ivins.

EOS

- 11 December, 2007, Vol. 88, 557-558. "A Record of Antarctic Climate and Ice Sheet History Recovered." Naish et al.
- 17 March, 2009, Vol. 90, 90-91. "Antarctic Drilling Recovers Stratigraphic Records From the Continental Margin."

New Scientist

- 11 April, 2009, 34-37. Feature. "Driller Thriller". The future of Antarctica's ice is written in its shocking past. Douglas Fox meets the geologists drilling into history.

The Economist

- 29th May, 2007. "Antarctic Science. The World from the Bottom Up". Feature including ANDRILL drilling project.

Scientific Drilling

- September, 2006, No. 3, 43-45. "Deep drilling with the ANDRILL program in Antarctica". Published by Integrated Ocean Drilling program with the International Scientific Drilling Program.
- July, 2008, No. 6, 29-31. "ANDRILL's Success During the 4th International Polar Year". Published by Integrated Ocean Drilling program with the International Scientific Drilling Program.

Geotimes

- October, 2007, Vol. 52, No. 10, 30-33. "Examining Antarctica". Naish et al. Published by the American Geological Institute.

PAGES News

- January, 2009, vol. 17, 32-34. "New Records of the role of Antarctic Ice Sheets in Late Cenozoic Climate". Powell and Naish. Paleoclimate newsletter of the International Geosphere-Biosphere Project.

Documentary Films

- 2001 - National *Geographic*. "Hot Science in Antarctica".
- 2010, *NOVA/PBS International*. 60 minute documentary film following ANDRILL Scientists (featuring Tim Naish) to Antarctic, international meetings and to the field to see evidence for Antarctic Ice Sheet changes and consequences of global warming. Due for release in late 2010.
- 2010, *Thin Ice*. Full length Documentary Film of scientists reporting on evidence for global warming. This is a collaboration between Victoria and Oxford Universities, with British Film Producer Peter Singleton and New Zealand on Air. Due for commercial release in early 2010.

Lectures to Public and Policymakers

- 11th October. Presentation with Marc Wilson on the Psychology of Climate Change at New Zealand Ice Fest, Christchurch.
- 26th August, 2014, Public Presentation in Auckland at AUT on ice sheets and sea-level rise during World Science week.
- July-October, 2014. Consultation for the Parliamentary Commission for the Environment on report series on New Zealand sea-level rise and review comments.
- 13th August, 2014. Opening of the Pole-to-Pole Photographic Exhibition at VUW. Collaboration between Antarctica Research Centre and the High Commission of Canada.
- 12th August, 2014. Live radio panel discussion with the "Naked Scientist" – BBC/RNZ, Paramount Theatre, Wellington. <http://www.royalsociety.org.nz/events/the-naked-scientists-live/>
- 6 August, 2014, VUW Free Public Lecture Series "9 billion people, global warming and climate change", Blenheim. Nelson.
- 21st-24th April. One of 70 invited international Antarctic Scientists to attend the Scientific Committee on Antarctic Research, Horizon Scan to set the direction of Antarctic Science for the next 20 years. Queenstown. New Zealand.
- 7 August 2013, VUW Free Public Lecture Series "9 billion people, global warming and climate change", Blenheim.
- 19 September 2013, VUW Free Public Lecture Series "9 billion people, global warming and climate change", Blenheim.
- 5th-7th September, 2013, "9 billion people, global, warming and climate change". Talk to VUW Alumni, NZ House, London; NZ Residence, Berlin; NZ UN Mission, New York.
- 10th October 2013, Presented IPCC 5th Assessment Report, SGEES School Seminar, VUW, Wellington
- 11th October 2013, Presented IPCC 5th Assessment Report at RSNZ IPCC Stakeholders Workshop (With D. Wratt, D. Frame, J, Renwick), Royal Society of New Zealand, Wellington.
- 16th October 2013, Briefing to members of NZ Parliament on the outcomes of the IPCC 5th Assessment Report (With D. Frame, J, Renwick), Wellington
- 29th November 2012, Briefed Green Party Caucus on climate change and sea-level rise impacts for New Zealand prior to the Doha UNFCCC COP 18,
- 6th September, 2012, Host *Malaysian Antarctic Science delegation* from University Technology of Malaysia for 1 day workshop at VUW
- 13th August, 2012, Briefing to *New Zealand Antarctic Research Institute Board* on JARI and future science strategy
- 23rd September, 2012, *IceFest Science Cafe "Climate Change Up Close and Uncomfortable"*
- 22nd September, 2012, IceFest, *MBIE Big Issues: Climate Change, What it Means for New Zealand, Presentation and panel discussion*, chaired by Kathryn Ryan.
- 18th-22nd June, 2012, – VUW Alumni Talks at NZ ambassadors residences in Kuala Lumpur and Singapore on climate change.

- Wednesday 2nd May 2012, Public Talk by Tim Naish on “Taking Antarctica’s Pulse” with Gareth Morgan following “Our Far South Expedition”
- 18th-22nd June, 2012 – VUW Alumni Talks at NZ ambassadors residences in *Kuala Lumpur and Singapore* on climate change.
- 10th-11th May – *Convenor and MC for panel discussion at the NZCCC Sea-level rise conference*, Te Papa, Wellington.
- 1st August, Public Lecture for VUW at the Rutherford Hotel Nelson, 350 people on “9 Billion People, climate change and sea-level rise”.
- 1 April 2012, Invited to give the *Robert Harris Oration*, at the 21st Convocation of the Royal Australasian College of Dental Surgeons, Queenstown, New Zealand.
- May 2011, *RSNZ Speakers Forum on Sea-Level and Ice Sheets*. New Zealand Parliament.
- 12th March, 2009. Naish, Barrett & Carter – visit by *Hon Phil Goff* (Leader of the Opposition) and Grant Robertson (Wgtn MP). Presentation on behalf of the ARC.
- 12th March, 2008. Naish & Falconer – *International Polar Year Day. Online-Webcast*
- 23rd April, 2009. Naish – *Presentation on ANDRILL Science at International Polar Year Celebration* to Antarctic and climate change Stakeholders, Treaty Nation Ambassadors, Science Minister, Hon. Wayne Mapp.
- 20th March, 2008. Naish – Minister Hon. *Pete Hodgson tour of ARC*: Presentation on behalf of ARC.
- 18th December, 2007. *International Polar Year Presentation and Live Webcast, from the San Francisco Exploratorium*, during Fall American Geophysical Union Meeting.
- 29th November, 2006. Tim Naish and Ross Powell present at the *United Nations Conference “Our Common Humanity”* on climate change and the Polar Regions. New York.
- May, 2005, Tim Naish and Peter Barrett address parliamentarians at the “*Speakers Forum – “How does Antarctica auger for our future?”*”. *Grand Ballroom. New Zealand Parliament Building*.
- January, 1999. Presentation at McMurdo Station in Antarctica to the Environmental Ministers of the Antarctic Treaty Nations “*Ministerial on Ice*”, hosted by Hon. Simon Upton.
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Education and outreach

- 26th June, 2014. Ran 2 Science Clinics on Antarctica at Ngaio Primary School, Wellington.
- June-September, 2014, Advisory Board Member and contributor to the the Antarctic Time Travel Exhibition, IceFest, New Zealand
- 2006-2007. *LEARNZ* is **an online** education programme for students in New Zealand state, private and integrated schools. LEARNZ actively participated on-ice during ANDRILL to develop curriculum and virtual field trips for schools. LEARNZ <http://www.learnz.org.nz/trips06/andrill64.php>
- 2006-2007. *ARISE* - ANDRILL Research Immersion for Science Educators, was established as an immersion experience for science educators (ARISE) to facilitate development of mechanisms and materials to effectively connect ANDRILL with the public. I supported 2 NZ teachers who spent 2 months on ice each during the 2006-2007 field seasons
- 2006-2007. *International Polar Year*. ANDRILL Program was one of the lead projects developing education and outreach initiatives with the IPY Office in Cambridge ranging from websites, webcasts, teacher education and tools, exhibits, blogs, lectures. See www.andrill.org and http://www.ipy.org/index.php?ipy/detail/antarctic_continental_margin_drilling.

Appendix 1: RESEARCH CAREER HISTORY

Following 3 years post-doctoral research at James Cook University of North Queensland, Australia, I spent 10 years (1998-2008) substantively employed as a research scientist at GNS Science leading their Antarctic and climate programmes. Since 2005 I have held a joint position with Victoria University of Wellington and have led and developed the Antarctic Research Centre (as Director since 2008) to be widely regarded as one of the world's leading Antarctic climate research groups.

The Antarctic Research Centre's external income and staff have doubled under my tenure, to \$2.2M p.a., 20 staff and 30 MSc and PhD students. In 2009 I became Director of the Joint Antarctic Research Institute, a research alliance between GNS, NIWA, VUW Otago and Canterbury Universities providing national strategic leadership, and through this I facilitated the development of New Zealand's ice core research facility established at GNS Science and jointly led by VUW. I have worked proactively with GNS CEO, Dr Alex Malahoff to foster a close relationship between GNS and VUW which has recently seen the development of a joint postgraduate research programme.

I continue to lead the US\$30M international ANTarctic Geological DRILLing (ANDRILL) Program as Chair of its International Science Committee, to secure funding for the next phase of research. As Co-Chief scientist of ANDRILL's highly-successful first project, I led an international team of 100 scientists and technologists to recover a unique climate history of Antarctica from beneath the Ross Ice Shelf. This resulted in publication of new insights in the journals *Nature* and *PNAS* on the stability of the West Antarctic Ice Sheet. With collaborators and graduate students my research career has focussed on past global climate and sea-level change and implications for the future. I have published 77 peer-reviewed articles in leading journals. I have 2500 citations, and an h-index 28. My productivity remains high with 10 new journal articles and 319 citations in 2012. I am regularly invited to give plenary and keynote addresses at major international meetings, participate on international panels and committees (e.g. NSF, SCAR, IPCC) and to brief government officials and the public on Antarctic and climate change issues. I have developed new international research partnerships (e.g. Korea), and contribute to the leadership of national and international research alliances and strategies in Antarctic and climate change science. I have led 3 Marsden Fund programmes (\$2.5M) and have led the FRST/MSI/MBIE ANDRILL programme (\$5M). I Chair the Marsden Fund Earth Sciences and Astronomy Panel and am on the Marsden Fund Council. I am Lead Author for IPCC 5th Assessment Report, help lead the Committee of Scientific Committee on Antarctic Research (SCAR) Antarctic Climate Evolution Project, and I maintain a strong public and media communication profile on issues of Antarctica and climate change.

As my research career has evolved over the last 20 years, my major focus and that of my colleagues, has been on understanding how our planet responds to natural external climate forcings - primarily orbitally-influenced variations in the amount of solar radiation received at its surface known as the "Milankovitch Cycles". In particular I have focussed on the response of the polar ice sheets and their influence on global sea-level changes. The first 10 years of my career involved describing and characterising the impact of global sea-level fluctuations during the last 3 million years, produced as consequence of repetitive ice ages on the northern hemisphere continents. This multi-disciplinary, collaborative research revealed the world's most complete geological record of the hypothesised Milankovitch sea-level changes were preserved in New Zealand's Wanganui Basin. With collaborators I have had the opportunity to visit and publish on equivalent geological sections in Italy, Japan and the USA. This research has had an international impact on the application of sequence stratigraphy and integrated chronostratigraphy in the reconstruction the past natural, orbitally-driven sea-level changes. The Late Professor Sir Nicholas Shackleton, who developed the deep ocean isotopic records predicting these global ice volume and sea-level changes, acknowledged our work in Wanganui Basin as providing the physical evidence or proof of more than 60 of the sea-level fluctuations. Naish et al. (1997; *Bulletin of the Geological Society of America*) and Naish et al., (1998; *Quaternary Science Reviews*) are two significant highly-cited publications from this work.

Through this work, I became increasingly interested in the role that the Antarctic ice sheets may have played on past global sea-level changes, particularly during "warmer-than-present times" in the Pliocene Epoch (5-3 million years ago). This was a time when there were no ice sheets on the Northern Hemisphere, yet I was observing major sea-level fluctuations of ~ 20-40m in Wanganui Basin. The Pliocene is the last time in Earth's history that climate was as warm as it is today, and as warm as it will be in the coming century, and is an important climate analogue in the context of future climate projections. So I became intrigued with an ongoing unresolved debate about the stability of the Antarctic Ice Sheet during this time, and in particular the potential of the more unstable WAIS (along with Greenland ice) to contribute to these sea-level changes both in the past, but also in the future as a consequence of human induced warming.

However, I had to wait a few years to follow this up, as my first research in Antarctica was as a member of the international Cape Roberts Project, where we drilled older Oligocene and Miocene

(34-17 million years ago) strata on the margin of the East Antarctic Ice Sheet (EAIS). This project recovered the first evidence for large, orbitally-driven cycles in the size of the EAIS driving global sea-level fluctuations of up to 50m. These occurred 29-20 million years ago when Earth was 3-4°C warmer than today and atmospheric CO₂ levels were up 600ppm (2 x preindustrial levels). We published these results in *Nature* (Naish et al., 2001), and later a paper attempting to resolve the amplitude of these sea-level changes (Naish et al., 2007; *Paleoclimatology, Paleogeography, Paleoecology*). Since this time models are now showing that the gravitational influences on sea-level as ice sheets melt complicate the near-field sea-level reconstructions, and in the future I will be working with collaborators to resolve some of these effects.

Following the Cape Roberts project, and after developing some new approaches for reconstructing variations in ice sheet extent, my interests turned back to extracting a Pliocene geological drill core with a direct history of the (up until then anecdotally) even more dynamic WAIS. This required the establishment of a new international drilling project with colleagues from the USA, Germany, and Italy. I was one of the founding members of the international science committee that helped to find funding to put together the US\$30M ANDRILL Project. I was Co-Chief Scientist of a 50-strong on ice science team during ANDRILL's first mission, which recovered a 1.2km long history of the WAIS from beneath the Ross Ice Shelf. We published the results in a number international journals including 2 papers in the *Nature* (Naish et al., 2009; Pollard & DeConto, 2009), 1 paper in *Geological Society of America Bulletin* (McKay et al., 2009) 1 paper in *PNAS* (McKay, Naish et al., 2012) and summarised the significance of this research in *Nature Climate Change* (Naish and Zwartz, 2012). The results of the drilling combined with ice sheet modelling showed complete collapse of the WAIS with Ross Sea surface temperatures of up to +5°C during the warmest Pliocene interglacials (4.5-3.5 million years ago). This work is particularly policy-relevant because Earth's surface was on average 2-3°C warmer and atmospheric pCO₂ was 400ppm – similar to climatic conditions expected in the coming decades. Our results generated a wide range of media interest, and were reported in *Science* and *Nature News*, *New Scientist*, *EOS*, *Chicago Tribune* (front page), *New York Times*, *USA Today*, *The Economist* etc. The research has also just been the subject of a 50 minute NOVA documentary that aired on US PBS channel at the end of 2011.

More recently I have become interested in the Pliocene sea-level budget, and am working with colleagues to reconcile the global array of geological evidence for the height of Pliocene (~3 million years ago) sea-level with geological and model evidence for the size of Earth's polar ice sheets. This is important because it provides an accessible example of what is possible as a consequence of 21st century warming (not that this sea-level rise will all happen in the next 100 years, but based on projected atmospheric CO₂ concentrations we may be committed to it). With colleagues we have published a global sea-level synthesis in the journal *Geology* (Miller et al. 2012), which shows that that sea-level was +22m higher than present involving the complete deglaciation of Greenland, the WAIS, a small portion of the EAIS and ocean thermal expansion of +2m. In terms of Intergovernmental Panel Climate Change (IPCC) uncertainty language we show statistically that at 400ppm atmospheric CO₂ it is likely (68% probability) that this sea-level rise will exceed +15m, and very likely that it will exceed +9m. This paper and our papers from ANDRILL on the West Antarctic Ice Sheet are cited in the draft of IPCC 5th Assessment Report.

Over time my research contributions have evolved from providing observations, or reconstructions, of past ice sheet and sea-level fluctuations to understanding the processes by which relatively weak external forcing can be amplified through a range of feedbacks within the climate system to produce large scale changes to the surface of the Earth. This change in focus has been facilitated by strong international collaborations with climate and ice sheet modellers (Rob DeConto and Dave Pollard), orbital forcing modellers and theorists (Peter Huybers and Maureen Raymo), and sea-level experts (Ken Miller). Through the study of processes, feedbacks and responses of ice sheets and paleo-sea-level to past warm climates, our research is providing insights into future climate change as a consequence of human-induced warming. This emphasis has led to my involvement as Lead Author on the "Paleoclimate Archives" Chapter of the AR5 – a task I am strongly committed to.

The IPCC Working Group 1, 5th Assessment Report was released in October, 2013. This concluded my 4 year involvement in helping write "Chapter 5 – Information from Paleoclimate Archives, and we are now involved in Education and Outreach in promoting the key findings of the report. In 2013 and 2014 I have been invited to give plenary and keynote addresses and brief the public and

policymakers and a diverse range of venues and meetings ranging from Parliament to public lectures in the provinces.

I feel very fortunate to have been given the opportunity to work in large collaborative teams which is reflected in the large authorships on my papers. I have always put great emphasis in developing and working in teams. This is critical to address complex multidisciplinary issues such as climate change. Presently these teams start at local scale (e.g. Antarctic Research Centre) and extend to collaborations in New Zealand (e.g. JARI), as well as an international network of collaborators through the ANDRILL Program and Scientific Committee on Antarctic Research's, Antarctic Climate Evolution Project. This work has enabled new data sets from Antarctica to be integrated with the latest generation of ice sheet and climate models, and is providing societally relevant new knowledge on the rate and magnitude of ice volume and sea-level change under past "warmer-than-present" climatic conditions.