



ANTARCTIC CLIMATE  
& ECOSYSTEMS CRC

YEAR IN REVIEW 2010

YIR01-2010-110621  
ISSN 1839-1435

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The ACE CRC is a unique collaboration between core partners the Australian Antarctic Division, CSIRO, the University of Tasmania, the Australian Government's Department of Climate Change & Energy Efficiency, the Alfred Wegener Institute for Polar and Marine Research (Germany) and the National Institute of Water and Atmospheric Research Ltd (New Zealand) and a consortium of supporting partners. It is funded by the Australian Government's Cooperative Research Centres Program.



**Cover picture** - Mathieu Mongin (ACE CRC)

**Inside cover** - From left: At work on the Southern Ocean © ACE CRC; Ice-coring camp © Vin Morgan (AAD, Commonwealth of Australia); Antarctic coastline from the air © ACE CRC; Collapsing sea wall in the Hobart suburb of Sandy Bay © John Hunter (ACE CRC); Leopard Seal © Adrian Boyle



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## FROM THE CEO

2010 saw a smooth transition to the new ACE CRC after our successful rebid in 2009 secured funding from the Australian Government's Cooperative Research Centres Program.

The new ACE has six core partners on board and 17 supporting partners (five of whom are commercial). The new ACE board has begun meeting formally, the science programs have taken their new shape and staff have been recruited to all vacant positions.

Late 2009 and 2010 saw a significant shift in the climate change debate. The anticipated development in Australia of a price on carbon around the time of the Copenhagen climate change negotiations did not eventuate at that time and governments shifted some of their emphasis from climate change mitigation to adaptation. Our research continues to provide critical input to government and industry, enabling them to more accurately project future changes in climate and to plan accordingly, whether by way of mitigation or adaptation.

In 2010, the Intergovernmental Panel on Climate Change released the author list for its Fifth Assessment Report (AR5). ACE's Dr Steve Rintoul will be a coordinating lead author of the "Observations: Oceans" chapter and Professor Nathan Bindoff a coordinating lead author of the "Detection and Attribution of Climate Change: from global to regional" chapter. These appointments of ACE researchers ensure input into the IPCC process, fundamental to the CRC's goals of contributing to global understanding and science.

A number of notable scientific achievements were made during 2009-2010, demonstrating the value of ACE's partnership and its multidisciplinary collaborations.

Within **The Oceans Program**, ACE scientists contributed to the design of the next decade of global ocean observations through their participation in the OceanObs09 conference, a gathering of more than 600 scientists from 36 nations. Dr Rintoul led a team of international scientists in the design of a global observing system for the deep ocean and overturning circulation.

Significant publications from the Oceans Program included a two-part series of papers analysing the structure and variability of the Antarctic Circumpolar Current. This analysis showed that strong regional increases in sea level can be attributed to a southward shift of the current, in turn driven by a southward migration of the westerly winds.

**The Cryosphere Program**, under the leadership of Dr Tas van Ommen, produced an important publication in Nature Geoscience detailing a link between Antarctic snowfall and drought in south-west Western Australia. The significance of this link is that it establishes, through data from a 750-year-old ice core, that the increasing dryness of southwest Western Australia over the past 30 years is unprecedented.

Under the leadership of Professor Tom Trull, **The Carbon Program** continued ACE's work to increase understanding of the role of the oceans in absorbing CO<sub>2</sub>. Fifteen papers were submitted to a special issue of Deep-Sea Research II to complete the SAZ-Sense interdisciplinary field study of the sensitivity to climate change of carbon cycling in the Subantarctic Zone.

The impacts of elevated CO<sub>2</sub> on Southern Ocean organisms were investigated by examining shell weights of carbonate-secreting zooplankton across the Southern Ocean, and by exposing phytoplankton communities to elevated CO<sub>2</sub> levels in portable aquaria installed at Davis Station in Antarctica.

**The Sea-Level Rise Impacts** team continued to deliver its research to the broader community by providing seminars and workshops on sea-level rise and the use of the risk assessment

tool developed by the ACE CRC ([www.sealevelrise.info](http://www.sealevelrise.info)). This project was co-funded by the Australian Government's Department of Climate Change and Energy Efficiency. Seminars and workshops were run for almost 1000 participants across Australia. The Sea-Level Rise team also published a key paper in *Climatic Change* demonstrating how to estimate the risk of future coastal inundation, taking into account the uncertainty in projections of sea-level rise and storm surge occurrence.

**The Ecosystems Impacts Program**, under the leadership of Dr Andrew Constable, continued to consolidate our understanding of the complex Antarctic marine ecosystem and the impacts of climate change on Antarctic marine life. The results of the Southern Ocean Sentinel workshop (April 2009), which was sponsored by the ACE CRC, the Australian Antarctic Division and World Wildlife Fund, were published in late 2009. The Southern Ocean Sentinel is an international collaboration to assess impacts of climate change on Southern Ocean marine ecosystems.

**The Climate Futures for Tasmania** project has highlighted the value of producing climate change projections at a local scale, developing the outputs in close collaboration with the people who will use them, in formats that are meaningful to a cross section of the community. The Climate Futures for Tasmania model has received recognition from those who are using the research in Tasmania and there is interest in using these kinds of model projections for other regions of Australia.

ACE collaborated with pitt&sherry to develop ClimateAsyst®, a decision support tool that helps owners, managers and planners assess the susceptibility of their infrastructure to projected changes in climate.

In June, Dr Miguel de Salas was shortlisted for a 2010 Eureka Prize (with Professor Gustaaf Hallegraeff and others), while Dr Ian Allison and Professor Nathan Bindoff (and others) were nominated as finalists for the 2010 Eureka Prize for Advancement of Climate Change Knowledge for their contribution report "The Copenhagen Diagnosis: Updating the World on the Latest Climate Science".

Major utilisation and training achievements included an ACE forum in Canberra for representatives from key Australian Government departments. This forum allowed ACE to explain its proposed science program and for policymakers to provide input on their needs. ACE also ran a short vocational training course for policymakers on the latest Antarctic and climate change science in March 2010. This built on successful previous short courses held during the last CRC.

ACE continues to focus on building stronger and wider links at many levels in science, government and industry. This assists ACE in ensuring our research remains relevant to those who will use it. We are focused on publishing research results and syntheses which will provide input to the IPCC 5th Assessment Report. We are committed to delivering targeted scientific advice that will help in the formulation of cost-effective policy that achieves a balance between climate change mitigation, adaptation and economic performance.



A J Press  
(CEO)







## CLIMATE SCIENCE FOR AUSTRALIA'S FUTURE

ACE is a multidisciplinary partnership of 23 national and international organisations. We provide science, knowledge and understanding to help Australia meet the challenges of climate change.

We do this by understanding the crucial role played by Antarctica and the Southern Ocean in global climate, and the impacts of climate change on Australia and the world. We inform governments, the community and scientists about climate change to guide Australia's future.

## THE PARTNERSHIP

*"Antarctic and Southern Ocean science is very collaborative. It relies on complex logistics and is expensive. Strong national and international collaborations have developed over many years among researchers and institutions engaged in Antarctic science. ACE is a unique partnership and provides the 'glue' for Australian and international research collaborations on the role of Antarctica and the Southern Ocean in global climate and climate change.*

*"In recent years our research has been enhanced by collaborations with partners from the commercial sector who are interested in the practical use of our science.*

*"The ACE CRC partnership should not be underestimated: research conducted in the ACE CRC has been critical in the world's understanding of how climate change is evolving, and the central role of the Antarctic in that change."*

**CEO of the ACE CRC, Dr Tony Press**

ACE is built on a strong, long-standing and productive collaboration between six core partners. It also has 17 supporting partners. Five of the supporting partners in ACE are commercial. These commercial collaborations underline the increasing recognition of the potential commercial impacts of climate change.

### CORE PARTNERS

The Australian Antarctic Division leads Australia's Antarctic program. Its charter is to ensure Australia's Antarctic interests are advanced. The AAD provides ACE with research expertise and considerable logistics support.

The CSIRO Division of Marine and Atmospheric Research aims to advance Australian climate, marine and earth systems science. It provides ACE with research expertise across our programs.

The University of Tasmania, the fourth oldest in Australia, is an international university located in Hobart. It provides higher education for up and coming scientists and operational support for ACE.

The Department of Climate Change and Energy Efficiency delivers the Australian Government's climate change framework. It is an end user of our research.

The Alfred Wegener Institute for Polar and Marine Research, Germany, carries out research in the Arctic and Antarctic and coordinates German polar research. It collaborates across ACE research programs and provides logistics support.

The National Institute of Water and Atmospheric Research, New Zealand, is a research and consultancy company with a global reputation in water and atmospheric research. It collaborates with ACE on cryosphere and Southern Ocean circulation research and provides logistics support.





Scientists prepare for field experiments at a helicopter ice station.  
© Klaus Meiners (ACE CRC)

## SUPPORTING PARTNERS

The Department of Sustainability, Environment, Water, Population and Communities develops and implements national policy, programs and legislation to protect and conserve Australia's environment and heritage. The department uses ACE research to help guide this decision making.

The Tasmanian Government uses ACE's research in formulating policy. It provides key funding for the Climate Futures for Tasmania project.

The Centre for Polar Observation and Modelling, UK, is a research centre that studies processes in the Earth's polar latitudes. It collaborates with ACE on our cryosphere research.

The Chinese Academy of Meteorological Sciences concentrates on research in applied meteorology and atmospheric science. It collaborates with ACE on cryosphere research.

The Institute of Low Temperature Science, Japan, promotes interdisciplinary studies on various natural phenomena in the cryosphere. It collaborates with ACE on specific research projects and provides logistics support.

The First Institute of Oceanography, China, is a comprehensive oceanographic research institute engaged in applied and basic research. It collaborates with ACE on Southern Ocean research projects and provides logistics support and observational equipment.

Laboratoire d'Etudes en Géophysique et Océanographie Spatiales, France, is a multi-disciplinary research organisation concerned with environmental research centred on physical oceanography, marine geochemistry and biogeochemistry, spatial hydrology and the dynamics of polar ice sheets. It collaborates with ACE on specific research projects and provides logistics support.

The Memorial University of Newfoundland, the largest university in Atlantic Canada, collaborates with ACE on cryosphere research.

The National Institute of Polar Research, Japan, is an inter-university research organisation and a key institute for implementing Japanese Antarctic research programs. It collaborates in research across our Cryosphere, Carbon and Ecosystem Impacts programs.

The University of Texas, Austin, uses airborne, land-based and marine geophysical methods to better understand ice sheet evolution, climate and geologic setting in polar regions. It collaborates with the ACE Cryosphere Program on specific research projects.

The University of Texas at San Antonio Laboratory for Remote Sensing and Geoinformatics uses remote sensing equipment to investigate sea ice and collaborates with ACE on sea ice research.

The Vrije Universiteit Brussel collaborates with ACE on research projects on the Southern Ocean biological pump.

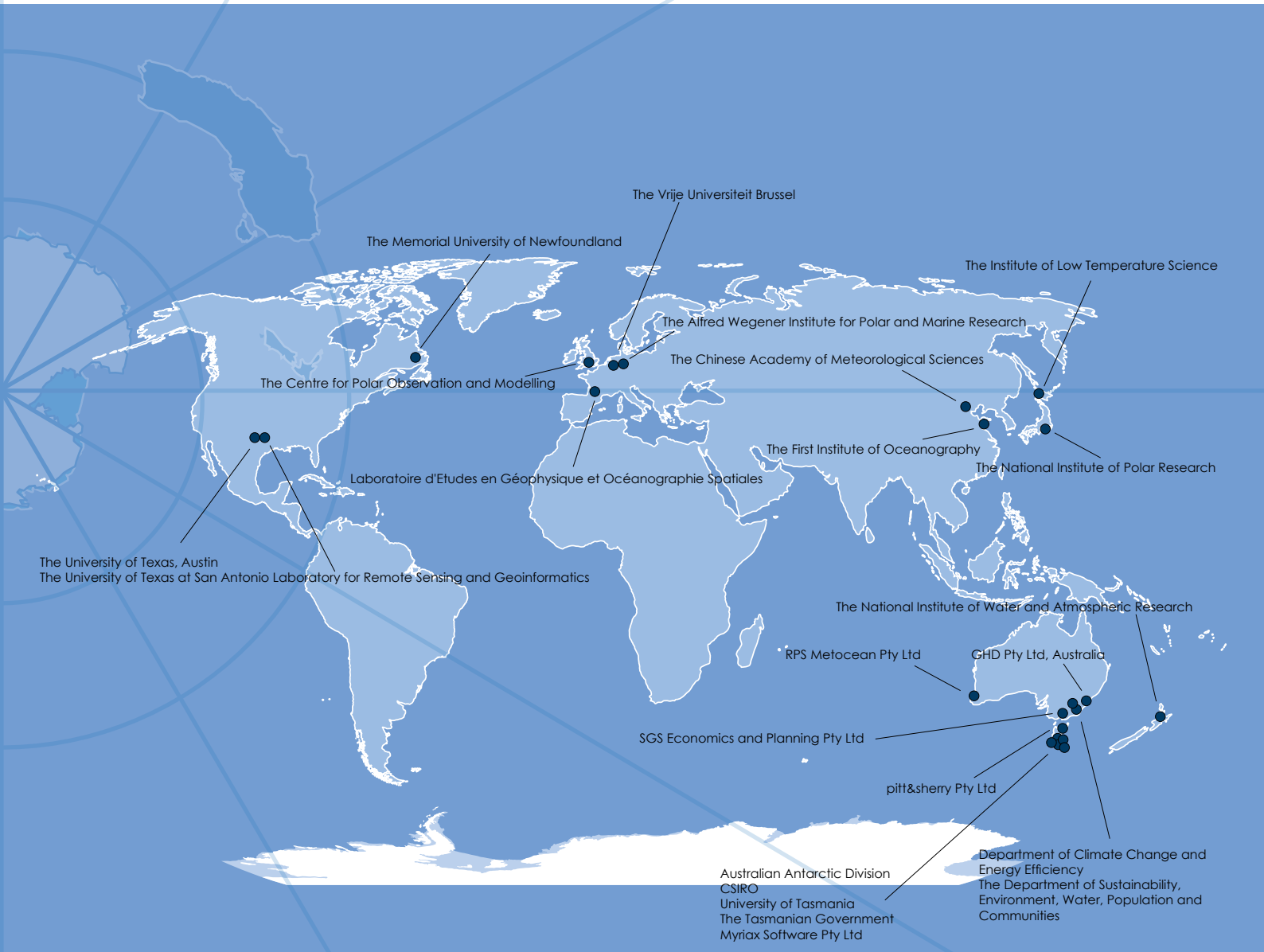
GHD Pty Ltd, Australia, is a professional services company operating in all market sectors including water, energy and resources, environment, property and buildings, and transportation. It collaborates on consulting projects and our sea-level rise impacts research.

Myriax Software Pty Ltd, Australia, specialises in sophisticated fisheries acoustics technology and 4D geospatial software. It supports our research with specialised visualisation software.

pitt&sherry is an award-winning Australian professional services company providing consulting engineering, scientific and building surveying services. It collaborates on consulting projects and our Sea-Level Rise Impacts and Climate Futures for Tasmania research projects.

RPS MetOcean, Australia, is a leading consultancy providing oceanographic and meteorological services in support of coastal and ocean engineering and environmental protection. It collaborates on our Sea-Level Rise Impacts research.

SGS Economics and Planning Pty Ltd, Australia, is a specialist economics and planning consulting company. It collaborates on consulting projects and our Sea-Level Rise Impacts research.



## THE BOARD

### Katherine Woodthorpe (Chair)

Dr Woodthorpe is a management adviser and professional director, specialising in innovation and commercialisation. She is currently the Chief Executive of AVCAL, the Australian Private Equity and Venture Capital Association. She has a varied background in science, technology, human resources and government interaction.



### Tony Press (CEO)

Dr Press has been CEO of ACE since January 2009. Before this appointment, He was director of the Australian Antarctic Division from 1998 to 2009. He has been a board member of the ACE CRC (and its predecessor) since 1998. As CEO, he is an ex-officio member of the ACE board.



### Ulrich Bathmann

Professor Bathmann is the board appointee of the Alfred-Wegener Institute for Polar and Marine Research (AWI). He is the section head of Biological Oceanography within the AWI, head of the AWI Bioscience research division and a member of the directorial board of the AWI.



### Tony Coleman

Mr Coleman is a director of Lonergan Edwards & Associates Ltd and has extensive experience in senior roles in the insurance, investment and finance sectors. He has worked with WWF-Australia since 2004 as part of the Australian Climate Group, and with the Australian Conservation Foundation since 2005 on initiatives including the 2006 Australian Business Roundtable on Climate Change. Mr Coleman was a contributing author to the IPCC's Fourth Assessment Report in 2007.



### John Gunn

Mr Gunn is Chief Scientist with the Australian Antarctic Division, having previously served as Deputy Chief, CSIRO Marine and Atmospheric Research. His scientific background is in marine ecology with particular emphasis on the application of science to the management of Australian and international marine resources. As AAD Chief Scientist he is an ex-officio member of the ACE Board.



### Greg Johannes

Mr Johannes is Deputy Secretary (policy) with the Tasmanian Department of Premier and Cabinet. He brings substantive board experience from both the research and community sectors, with a background in industry, policy, environmental management and public affairs. His areas of expertise include commercialisation of R&D, small business development, biotechnology and innovation.



### Geoff Leeper (until February 2011)

Mr Leeper is Deputy Secretary of the Department of Climate Change and Energy Efficiency, and is currently responsible for the Adaptation, Science and Communications Division, the Corporate Support Division, the Governance and Program Support Division and the Regulatory Division. He has had a 30-year career in the public service with a background primarily in social policy development, service delivery, program administration and corporate affairs.



### Lyn Maddock

Ms Maddock is Director of the Australian Antarctic Division. She has high-level executive management experience in both policy and operational roles in the public and private sector, having previously been the Deputy Chair of the Australian Communications and Media Authority, acting chair of the Australian Broadcasting Authority and interim CEO of Screen Australia.



### Bruce Mapstone

Dr Mapstone is Chief of CSIRO's Division of Marine and Atmospheric Research. His research leadership and management experience spans 20 years, including as CEO of the ACE CRC and as Director of the Centre for Australian Weather and Climate Research (a research partnership between CSIRO and the Bureau of Meteorology).



### Robert Murdoch

Dr Murdoch has more than 12 years senior executive experience at the National Institute of Water and Atmospheric Research in New Zealand (NIWA), where he is General Manager (Research). He is Deputy Chair of the board of World Wildlife Fund New Zealand and a member of a range of science advisory and management boards. His scientific expertise is in biological oceanography and marine ecology.



### Paddy Nixon

Professor Nixon took up the post of Pro Vice Chancellor for Research at the University of Tasmania in 2010. Before this he was University College Dublin's first Science Foundation Ireland Research Professor. As SFI Research Professor in Distributed Systems he led the Systems Research Group at UCD.



### John Pitt

Mr Pitt is the Managing Director of pitt&sherry, a leading Australian professional services company. He is focused on the company's operations in land transport, industrial and community infrastructure and on the mitigation and adaptation challenges associated with climate change.



### Board changes

There were a number of board changes during 2010: Howard Bamsey from DCCEE resigned and was replaced by Ian Carruthers, who later resigned and was replaced by Geoff Leeper. Professor Johanna Laybourn-Parry retired from UTAS and was replaced by Professor Allan Canty who was later replaced by Professor Paddy Nixon. Dr Steve Rintoul from CSIRO resigned and was replaced by Dr Bruce Mapstone. Mr Bill Trestrail resigned and was replaced by Mr John Pitt.