

IceSked

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Newsletter of Te Puna Pātiotio—Antarctic Research Centre
Te Herenga Waka—Victoria University of Wellington

A word from our Director

The past few months have seen a wave of funding and award success for Te Puna Pātiotio—Antarctic Research Centre (ARC) researchers. We also reflect on the passing of Dr Lee Seng Tee, a benefactor to the ARC, whose donation at a critical moment in our history almost 20 years ago still helps support an annual lecture series and young scientist exchange with University of Alaska Fairbanks. We remain heavily indebted to all our supporters whose generosity have provided support for the young scientists who have been central to fulfilling our research ambitions over this time, and contributing to a better understanding of the impacts of Antarctic environmental change on New Zealand.

Rob McKay

Paleoclimatologist receives Blake Leader Award

Joint ARC and GNS Science researcher, Professor Richard Levy, received one of four prestigious Blake Leader Awards on 10 November for his commitment to helping us understand climate change issues and lead the necessary changes. Blake awards recognise and celebrate people whose leadership has contributed to a more sustainable future for New Zealand.

Richard's 23 years of scientific research includes more than a decade leading the Past Antarctic Climates and Future Implications programme at GNS Science. This work explored the distant past to help understand how warming temperatures will affect our planet in the future. It has taught us that Antarctic ice sheets are even more dynamic and vulnerable than we previously believed. He is currently co-leading the new SWAIS 2C drilling project, which is designed to reveal the sensitivity of the Ross Ice Shelf and West Antarctic Ice Sheet to past warming.

Closer to home, Richard also co-led the NZ SeaRise: Te Tai Pari O Aotearoa programme over the last five-years and now he is co-leading, Te Ao Hurihuri: Te Ao Hou—Our Changing Coast, programme learning how climate change and sea-level rise will affect different parts of New Zealand's coastline.

This project is geared towards practical solutions. Richard has personally connected with iwi, councils, and many other people to help them understand the risks of sea-level rise and plan more resilient infrastructure.

"Action and leadership are needed right now if we are to meet the challenges of climate change and build a sustainable future for our planet," says Richard.

The message is starting to get through, and more governments around the world are agreeing to cut the amount of carbon dioxide going into the atmosphere. A certain amount of warming is inevitable, but there is still time to keep this to manageable levels by focusing on mitigation and adaptation. Richard says,

"I'm much more confident that we as humans are trying to get on top of this problem. We've acknowledged it at last—and we're actually coming up with solutions."



Richard Levy at the Blake Awards ceremony (photo credit: BLAKE)



VICTORIA UNIVERSITY OF
WELLINGTON
TE HERENGA WAKA

Te Puna Pātiotio
Antarctic Research Centre

CELEBRATING

50
YEARS

1972–2022

Remarkable research funding success

ARC researchers have had a great result with funding applications this year, being awarded a Ministry of Business, Innovation and Employment Endeavour Fund grant, a Royal Society Te Apārangi Rutherford Discovery Fellowship, a Standard Marsden and a Marsden Fast-Start.

Endeavour: \$13m project to focus on predicting impacts of sea-level rise

Led by the ARC, Te Ao Hurihuri: Te Ao Hou—Our Changing Coast, aims to improve understanding of the impacts of sea-level rise on coastal communities and infrastructure. Programme co-leader Professor Tim Naish, says,

“We know the sea around Aotearoa is rising but we don’t yet know enough about how coastal regions will be affected to ensure our adaptation measures will be effective and appropriate.”

A key focus of the project is on improving the models currently used to understand the effects of sea-level rise, such as coastal flooding and groundwater salination, and risks to key infrastructure and cultural sites. The research will produce a new, publicly available online tool showing sea-level projections, at 100 metre spacing, along the New Zealand coastline. Risk assessment will be possible at the scale of individual houses and buildings. Estimates will also include the probability of major earthquakes causing changes in land elevation along the coast.

Co-leader Professor Richard Levy says the programme involves a multi-disciplinary team including researchers from GNS Science, University of Auckland, University of Canterbury, University of Waikato, Oceanum Ltd, Takiwa Ltd, and Te Whare Wananga o Awanuiarangi. The research team will work with central and local government agencies, iwi, and community organisations.

Marsden: Past Antarctic ice sheet melt

Professor Rob McKay’s Marsden project, Past abrupt Antarctic ice sheet melt events and impacts on sea level and climate, was awarded \$929k over three years.

His research will investigate past millennial-scale (1,000-10,000 years) climate events that can produce abrupt global changes over decadal timescales. While proxy data and models indicate the Antarctic ice sheets may have contributed to such events, it is widely considered that collapse of past marine-based Northern Hemisphere ice sheets played a dominant role. Most of these Northern Hemisphere ice sheets are now gone, so these ocean-ice feedbacks will likely not play out in the same manner during future ice sheet collapses. Models indicate the marine-based Antarctic ice sheets may display instabilities and associated meltwater release will widely impact global sea level, precipitation and wind fields. Rob will use sediment cores to assess if the Antarctic ice sheets experienced “millennial-scale” melt events during warmer than present climates in the deeper geological past when Northern Hemisphere ice sheets were absent.

Rutherford: Understanding the role of phytoplankton in a warmer world

ARC Research Fellow, Dr Holly Winton, has been awarded an \$800k Rutherford Discovery Fellowship for her research titled, Southern Ocean phytoplankton and climate: Understanding the ability of phytoplankton to modulate climate in a warmer world.

Southern Ocean phytoplankton (tiny marine plants) interact with the Earth’s climate by using sunlight to convert carbon dioxide into organic carbon. They also produce aerosols which help form clouds and regulate the Earth’s energy balance. Phytoplankton blooms are seasonal and altered by sea ice conditions, temperature, wind, and nutrient availability. Given our current warming climate, it’s important to understand how seasonal phytoplankton blooms have responded to Earth’s previous warm periods.

With this Fellowship, Holly will measure and compare the expanded suite of biomarkers found in ice cores and present-day aerosols for a more complete picture of how and why Southern Ocean phytoplankton have changed in the past and what we might expect in the future.

Another aspect of her Fellowship partners with mātauranga Māori experts to explore connections and co-create a maramataka—a Māori environmental and lunar calendar of Antarctica, providing a Māori worldview and holistic perspective of environmental change in the region.

Marsden Fast-Start: Glacier melting

Research Fellow, Dr Lauren Vargo, was awarded a \$360k Marsden Fast-Start grant for her project titled, How much are glaciers melting due to climate change?

Billions of people will be impacted by melting glaciers. Scientific consensus is high that human influence is the main driver of glacier retreat. However, methods to quantify how much of annual glacier melt is due to anthropogenic climate change do not exist. Lauren’s project will develop and apply an innovative framework to 230 glaciers worldwide, to determine how much melting in individual years is due to anthropogenic climate change by using computer models to simulate glacier mass change ‘without climate change’ (greenhouse gases are ~1/3 of modern) and ‘with climate change’ (greenhouse gases at modern levels). Lauren will also project future changes in extreme glacier melt as temperatures continue to rise. The results will inform climate change assessments and decision-makers as the impacts of glacier melt, including declining water availability and increases in natural hazards, continue and intensify.