

University of Canterbury  
Antarctic Conference

Southern Exposure:  
Antarctic Research at the University of  
Canterbury

Book of Abstracts

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## Presentations

WHAT AND WHO IS AN A



# POSTERS

## Southern Hemisphere dispersion of volcanic aerosol from two notional major eruptions of Mt. Agung

Yusuf Bhatti, Graham Marshall (University of Leeds), Sandip Dhoriya (University of Leeds), Sarah Shallcross (University of Leeds), Lauren Marshall (University of Cambridge), Anja Schmidt (University of Cambridge), Nicolas Bellouin (University of Reading) and Ken Carslaw (University of Leeds)

There have been 5 major volcanic eruptions since 1850 which exerted periods of strong surface cooling in decadal surface climate trends. Tropical eruptions cool the climate by injecting sulphur dioxide into the stratosphere, creating a long-lived, optically thick volcanic aerosol cloud. Mt. Agung and Mt. Pinatubo had a major eruption in 1963 and 1991 respectively both identifiably reducing global surface temperatures for several years. Agung magmatically reactivated in 2017 presenting the possibility for a new climate perturbation.

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## Groundbased lidar processing and simulator framework for comparing models and observations

Peter Kuma, Adrian J. McDonald, Olaf Morgenstern, National Institute of Water & Atmospheric Research (NIWA), Richard Querrel, (NIWA) Israel Silber, (Pennsylvania State



## Historians in the Digital Age Answer

## The role of Weather, Water, Ice and Climate (WWIC) Information for Antarctic Tourism

Emma J. Stewart (Lincoln University) Daniela Liggett

The tourism sector in Antarctica has witnessed considerable growth and diversification over the last decade. To help facilitate safe travel in remote and dynamic polar environments more detailed and specialised weather, water, ice and climate (WWIC) information services are required. However, there is not a sufficiently detailed understanding of what such specialised polar environmental forecasting services should look like, to ensure that tourism operators receive timely and targeted information that can assist their decisionmaking.

Given the paucity of research, this poster seeks to explore the following overarching question: What is known about the role of WWIC information in Antarctic tourism (i.e. how is WWIC information used, and what are the WWIC needs of the sector?) This poster is the result of an extensive literature review coupled with three years of collective brainstorming, focusgroup discussions and a number of workshops involving researchers and representatives of the WWIC user community.

This research is part of the World Meteorological Organization (WMO) Polar Prediction Projects (PPP) Societal and Economic Research and Applications (SERAP) working group. The primary goal of the PPP is to advance scientific knowledge such that society may benefit through improved services. The authors of this presentation are members of SERAP.





## Past and Present: Can we use historical research to assess current Arctic trends and challenges?

Ron Doel (Florida State University)

What made it possible for researchers in the physical and biological environmental sciences to gain information about the current state of natural conditions in the Arctic? Were scientific research programs in the years since World War II a rational response to increased understanding of a vulnerable, fragile, and valued part of our planet? Or were other driving factors—including concerns over national sovereignty, determination to control economic resources in the far north, and military anxieties—more important in persuading leaders of nation-states to fund environmental sciences research in the Arctic during the second half of the twentieth century? Historical sources—including recently declassified documents from

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## Marine Protected Areas in the Southern Ocean: Reflections on an Evolving Web of Legal Mechanisms

Natasha Gardiner

Marine protected areas (MPAs) are a fundamental tool for effective marine conservation and areas beyond national jurisdiction prove the most challenging ocean spaces for their designation. Largely to blame is the current fragmented, ~~separate~~ <sup>scattered</sup> overarching governance framework under the United Nations Convention on the Law of the Sea. In the face of rapidly deteriorating biodiversity, negotiations are now underway for a new global instrument mandated to promote the conservation and sustainable use of ~~ecosystems~~ <sup>biodiversity</sup>.



in a still largely Westphalian world order there are profound and unresolved issues around whose rights and purposes do and should have standing in the Antarctic.

## History of Architecture in Antarctica through a biophilic lens

Katelyn Hudson (Bond University)

Architectural interventions in Antarctica started with the Huts of the Heroic Age of

## Toward a standardized monitoring program for obligate predators in the Southern Ocean

Michelle LaRue

A monitoring plan for the Ross Sea MPA and future protected areas in the Southern Ocean – is critically needed to evaluate success of the protected area. Distribution and abundance of indicator species is one of the four key elements of the CEMP, and the one that is most easily addressed by use of high-resolution satellite imagery (VHR). Here I will address the state of the science of using VHR to assess abundance and population change of obligate predators in the Southern Ocean and discuss lessons learned and future plans.

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# Combining satellite and ground based observations of cloud phase over the Southern Ocean

Cameron McErlich



Importantly, the data set also provides a baseline for research and monitoring associated with the Ross Sea region Marine Protected Area.

## The New Zealand Antarctic Programme: What We Do and How You Can Contribute

Fiona Shanhun (Antarctica New Zealand)

New Zealand has been undertaking research in the Ross Sea region of Antarctica since the International Geophysical Year in 1957. Together with international partners, Antarctica New Zealand supports a collaborative, multidisciplinary science programme, underpinned by a unifying theme of global change. Researchers contribute to our collective understanding of Antarctic and Southern Ocean environments through a range of studies, from ice dynamics in a warming world, to biological resilience and adaptation to change, to Antarctica's connectivity with the rest of the world and future projections of change.

This presentation will provide an overview of Antarctica New Zealand's role, current research in Antarctica and the Southern Ocean, and the process for requesting Antarctic logistics support.

## Exploring how musical compositions can reflect scientific, natural and historical phenomena as part of a broad picture of Antarctica

Patrick Shepherd

In 2004 I travelled to Antarctica as an artist educator with Antarctica NZ, returning in 2016/17 as a tutor with the PCAS programme. During that time, I have produced a substantial portfolio of original musical compositions, many of which relate directly to the science, natural environment and the history of Antarctica, furthering public understanding and providing a further lens through which to view the continent. In addition to presenting short musical extracts from several of my works (Cryosphere; Adeliesong; Fanfare for a Frozen Land and Pip the Penguin) I will also display two corresponding artworks (the acrylic paintings Cryosphere I & II) which are both visual representations of the orchestral score Cryosphere.

## Fire and Ice Looking for New Thermophilic Micro Organisms on Mt Erebus

Matthew Stott

In this presentation, I will discuss a Mars-funded project to identify and cultivate new thermophilic bacteria and archaea from geothermal soils on Mt Erebus. Mt Erebus is the world's most southern active volcano and contains a globally unique phonolite-based lava lake. Previous research has shown that the geothermally heated soils on the flanks of Mt Erebus support unusual microbial communities with a number of bacterial and archaeal

species found nowhere else on Earth. Furthermore, metagenomic analysis of these communities have identified novel and possibly unique metabolic pathways employed to enable growth in Mt. Erebus's unusual geothermal setting. This presentation will show some historical data related to the microbial community diversity from Mt Erebus, plus the results from our first field season on Mt Erebus just completed (November 2019).

## Maori Connections to Antarctica

Vincent van Uitregt (Massey University, Manaaki Whenua), Jill Arwehi (Manaaki Whenua),  
Krushil Watene (Massey University)

## Satellite imagery and citizen science reveal the ecology of Crabeater seal distribution in the Weddell Sea

Mia Wege, Leo Salas (Point Blue Conservation Science), Michelle LaRue

Crabeater seals (*Lobodon carcinophaga*) are labelled as the most abundant seal species in the world. Native to Antarctica, with a circumpolar distribution, their population estimates range from 2-75 million (current best estimate = 8 million). Based on observations from shipboard and aerial surveys, crabeater seals prefer to live and breed on loose pack ice, however, this potentially biases current knowledge about crabeater seal ecology given ship surveys are limited by sea ice conditions. Thus, much of the inaccessible and highly concentrated pack ice has been little explored for seal abundance. Here, we combine satellite images and citizen science to determine firstly the population size and density of crabeater seals in the Weddell Sea and secondly, to understand the abiotic factors that influence crabeater seal distribution. High-resolution satellite images covering an area of ~18,000 km<sup>2</sup> in the Weddell Sea (October 2018) were used on the crowd