

**MEMBER COUNTRY:** New Zealand

**National Report to SCAR for year:** 2012-13

Activity	Contact Name	Address	Telephone	Fax	Email	web site
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**National SCAR Committee**

**SCAR Delegates**

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<b>1) Delegate</b>	Professor Bryan Storey	Gateway Antarctica University of Canterbury Private Bag 4800, Christchurch	+64-3-364 2368	+64-3-364 2197	<a href="mailto:bryan.storey@canterbury.ac.nz">bryan.storey@canterbury.ac.nz</a>	<a href="http://www.anta.canterbury.ac.nz">www.anta.canterbury.ac.nz</a>
<b>2) Alternate Delegate</b>						

**Standing Scientific Groups**

**Life Sciences**

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<b>2)</b>	Professor Craig Cary	Dept of Biological Sciences The University of Waikato Private Bag 3105 Hamilton	64 7 838 4466		<a href="mailto:c.cary@waikato.ac.nz">c.cary@waikato.ac.nz</a>	<a href="http://sci.waikato.ac.nz/about-us/people/caryc">http://sci.waikato.ac.nz/about-us/people/caryc</a>
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<b>4)</b>	Dr Miles Lamare	Department of Marine Sciences, University of Otago, PO Box 56, Dunedin	+64 3 479 7463		<a href="mailto:miles.lamare@otago.ac.nz">miles.lamare@otago.ac.nz</a>	

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<b>2)</b>	Dr Stuart Henrys	GNS Science, PO Box 30-368, Lower Hutt	64-4-570-4812	64-4-570-4603	<a href="mailto:s.henrys@gns.cri.nz">s.henrys@gns.cri.nz</a>	<a href="http://www.gns.cri.nz">www.gns.cri.nz</a>
<b>3)</b>	Dr Megan Balks	School of Science & Engineering, Earth & Ocean Sciences, University of Waikato, Private Bag 3105, Hamilton 3240	64-7-856 2889	64 7 856 0115	<a href="mailto:m.balks@waikato.ac.nz">m.balks@waikato.ac.nz</a>	<a href="http://www.waikato.ac.nz/home.shtml">www.waikato.ac.nz/home.shtml</a>

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2)	Dr Huw Hogan	Antarctic Research Centre, Victoria University of Wellington, PO Box 600, Wellington	.+64 4 463 6918		<a href="mailto:huw.horgan@vuw.ac.nz">huw.horgan@vuw.ac.nz</a>	
3)	Dr Olaf Morgenstern	NIWA, Lauder, State Highway 85 Central Otago, Private Bag 50061, Omakau	.64-3-440-421		<a href="mailto:Olaf.Morgenstern@niwa.co.nz">Olaf.Morgenstern@niwa.co.nz</a>	<a href="http://www.niwa.co.nz/people/olaf-morgenstern">http://www.niwa.co.nz/people/olaf-morgenstern</a>

### Scientific Research Program

**AAA**  
1)

### AntEco

1)	Professor Craig Cary	Dept of Biological Sciences The University of Waikato Private Bag 3105 Hamilton	64 7 838 4466		<a href="mailto:c.cary@waikato.ac.nz">c.cary@waikato.ac.nz</a>	<a href="http://sci.waikato.ac.nz/about-us/people/caryc">http://sci.waikato.ac.nz/about-us/people/caryc</a>
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### AnT-ERA

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2)	Dr Olaf Morgenstern	NIWA, Lauder, State Highway 85 Central Otago, Private Bag 50061, Omakau	.64-3-440-421		<a href="mailto:Olaf.Morgenstern@niwa.co.nz">Olaf.Morgenstern@niwa.co.nz</a>	<a href="http://www.niwa.co.nz/people/olaf-morgenstern">http://www.niwa.co.nz/people/olaf-morgenstern</a>

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1)	Dr Stuart Henrys	GNS Science, PO Box 30-368, Lower Hutt	64-4-570-4812	64-4-570-4603	<a href="mailto:s.henrys@gns.cri.nz">s.henrys@gns.cri.nz</a>	<a href="http://www.gns.cri.nz">www.gns.cri.nz</a>
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#### SCAGI

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2)	Ms Wendy Shaw	Land Information New Zealand, National Office, Private Box 5501, Wellington			<a href="mailto:wshaw@linz.govt.nz">wshaw@linz.govt.nz</a>	<a href="http://www.linz.govt.nz">www.linz.govt.nz</a>

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#### SCAR DATABASE

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## A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS\*:

### **K001B1**

Nov 2012 Mt Discovery, Minna Bluff, Black island, Howchin Glacier.

#### **Past Antarctic Climate and Future Implications (PACaFI)**

Dr Richard Levy, Phone: (04) 570 4236, Email: [r.levy@gns.cri.nz](mailto:r.levy@gns.cri.nz) GNS Science, 1 Fairway Drive, Avalon, Lower Hutt.

This event contributes to the PACaFI objectives that focus on climate evolution and glacial history of the East and West Antarctic ice sheets along their margins. The overall goal of this particular event is to map and sample glacial geological deposits on the flanks of Mount Discovery, Minna Bluff, Brown Peninsula and the Koetlitz Glacier, with two aims:

1. To determine a chronology for recent glacial grounding events in southern McMurdo Sound. A pilot cosmogenic dating study of Eocene sandstone erratics from the Southern McMurdo Sound has demonstrated that these materials are an excellent target for dating these moraines to constrain recent glacial history. We will now construct detailed glacial geologic maps from these key regions and collect samples with appropriate field settings for additional cosmogenic dating.
2. To collect Paleogene and early Neogene erratics to reconstruct environmental histories contained in rock layers that are currently hidden beneath the Antarctic Ice. We plan to collect fine grained lithologies ranging from Eocene to Miocene in age for geochemical and microfossil analysis to guide and enhance the interpretation of in-situ rocks recovered by future drilling at Coulman High.

### **K001B1**

Jan 2013 Mt Discovery, Minna Bluff, Black island, Howchin Glacier.

#### **K001BR2 Past Antarctic Climate and Future Implications (PACaFI)**

Jan 2012 – Base of Mt Gran, Gondola Ridge / Mt Suess, Cuff Cape, Kar Plateau

Dr Richard Levy (04) 570 4236, Email: [r.levy@gns.cri.nz](mailto:r.levy@gns.cri.nz)

The overall goal of this work is to understand the retreat of Antarctic ice sheets during the last deglaciation (20,000 years ago to present). During this period the East and West Antarctic Ice Sheets receded from advanced positions at the continental shelf margin to the present-day ice sheet configuration. We do not currently know when the ice sheet started to retreat, whether this retreat was gradual or episodic, and when it stopped. The East Antarctic Ice Sheet has been suggested as one of the possible sources a 10-20 m global sea level rise which occurred between 15-14,000 years ago. However, work to date in East Antarctica does not support this view. We aim to use exposure age dating to help test the hypothesis that Antarctica was the source of this meltwater pulse.

Our objective during this field season is to map and date glacial deposits in the lower section of the Mackay Glacier. Results will be integrated with other glaciological and geological data to help constrain a numerical ice sheet for this area, which in turn will be used to help understand the response of these glaciers to climate forcing.

### **K016**

Dec 2012 – Jan 2013 Dailey Islands, Cape Crozier, Spike Cape, Marble Point

#### **Genomic Indicators of Climate Change**

Dr Craig Millar, Phone: (09) 373 7599 Ext: 85186, Email: [cd.millar@auckland.ac.nz](mailto:cd.millar@auckland.ac.nz)

School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland 1142

We aim to identify the molecular basis by which Adélie penguins have responded to a ~10°C increase in temperature since the last glacial maximum. We will sequence the genomes of a number of ancient Adélie penguins from the late Pleistocene. The hypothesis is that a series of molecular based physiological changes have enabled modern Adélie penguins to cope with warmer temperatures, in comparison to individuals that lived 18,000+ years ago. From the ancient genome data and using the modern genome as a reference, we can identify changes in the ~20,000 avian genes. Hence, we can identify which of these changes are likely to represent the molecular basis of adaptation to climate change.

### **K020**

Jan 2013 Miers Valley, McKelvey Valley, Victoria Valley, Alatna Valley and Taylor Valley

#### **Protection of Antarctic Terrestrial Ecosystems**

Professor Craig Cary, Phone: (07) 838 5493, E-mail: [caryc@waikato.ac.nz](mailto:caryc@waikato.ac.nz)

Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton

This research will deliver a bio geographical characterisation for the entire Ross Sea region, together with a predictive model for the effects of climate change. We will achieve this by greatly extending and upgrading our existing model that links the biodiversity with landscape and environmental features. We will extend its coverage to include biota in all ice-free regions of the Ross Sea region and increase its prediction capability by importing detailed analyses of the physical, chemical and biological drivers responsible for the biodiversity combined with a sensitivity analysis of the model using detailed survey and ecophysiological studies of biodiversity hotspots. This will allow us to test various climate change scenarios and to determine the impacts and risks of changing global climate.

#### **K025**

Jan 2013 Bratina Island, Miers Mouth, Koettlitz Glacier

##### **Biodiversity, Dynamics and Metabolics of Heterogeneous Meltwater Ponds (working with K081)**

Stephen Archer, Phone: (07) 856 2889, E-mail: [archers55@msn.com](mailto:archers55@msn.com)

Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton

The goals of this project are to characterise the pond microbiology across the Bratina Island, Miers Mouth, and Koettlitz Glacier study sites using DNA fingerprinting and high throughput sequencing. We will compare the communities within and between sites as well as along the geochemical gradients found within selected ponds in an attempt to identify key geochemical environmental drivers. Additionally we will develop a molecular method to determine microscopic human impact to the environment using off the shelf highly sensitive genetic technologies and attempt to identify the effects unintentional contamination may have on the pond environments.

#### **K043**

Nov – Dec 2012 Cape Evans

**Life In The Ice: Microbial Diversity and Function in Antarctic Sea Ice Ecosystems** Dr Ken Ryan, Phone: (04) 463 6083, E-mail: [ken.ryan@vuw.ac.nz](mailto:ken.ryan@vuw.ac.nz)

School of Biological Sciences, Victoria University of Wellington, Private Bag 600, Wellington.

Our hypothesis is that 'spatial and temporal variations in diversity and ecosystem function of the sea ice microbial community are sensitive indicators of changing climatic conditions'. The research will develop baseline long-term data on microbial biodiversity and community structure in the "grass" of ice-covered regions – the primary and secondary producers at the base of the food web. We will do this using both conventional methods and molecular technology, and will quantify abundances and species identifications using a range of traditional and modern techniques including DNA fingerprints, high throughput sequencing and single cell genome amplification. We will develop an understanding of the functional role of various components of the sea ice microbial community using ecophysiological methods we have developed over nearly 20 years of Antarctic research coupled with new technologies brought together with our international collaborators on this project.

#### **K049**

Oct 2012 – Jan 2013 Roosevelt Island

##### **Roosevelt Island Climate Evolution – RICE Project**

Antarctic Research Centre, Victoria University of Wellington, PO Box 600, Wellington.

Dr Nancy Bertler, Phone: (04) 463 5233 ext 8391, E-mail: [nancy.bertler@vuw.ac.nz](mailto:nancy.bertler@vuw.ac.nz)

The potential for rapid deglaciation of West Antarctica remains a primary uncertainty in the Intergovernmental Panel on Climate Change predictions for 21st Century sea level rise. The recent collapse of multiple ice shelves and rapid acceleration of discharge of Antarctic ice suggests that dynamical responses to warming play a more significant role than is currently understood and captured in ice sheet models. Such models can be improved and validated by replicating known past changes. The RICE Project is an international partnership seeking to understand past, present, and future changes of the Ross Ice Shelf. 5 to 3 million years ago (the last time atmospheric carbon dioxide concentrations and temperatures were similar to those predicted for the end of the 21st Century), the Ross Ice Shelf disintegrated multiple times, initiating the collapse of West Antarctica. To determine the rate of change, RICE aims to provide an annually resolved ice core record for the past 20,000 years and beyond. In the past Most of the Ross Ice Shelf retreat occurred when global sea level had already reached modern levels. For this reason, the precise correlation between increasing air and ocean temperatures, and the velocity and characteristics of the ice shelf retreat, provides a unique opportunity to determine accurately the sensitivity of the Ross Ice Shelf to warming.

#### **K055**

Jan 2013 McMurdo Sound

##### **Assessment of the Current State of the Antarctic Middle Atmosphere and Climate Model Validation**

Dr Adrian McDonald, Phone: (03) 364 2281, E-mail: [a.mcdonald@phys.canterbury.ac.nz](mailto:a.mcdonald@phys.canterbury.ac.nz)

Department of Physics and Astronomy, University of Canterbury, Private Bag 4800, Christchurch.

This research programme will underpin improvements in key components of middle atmosphere climate models. We will produce an integrated high resolution database, formed from a wide variety of remote sensing and in-situ measurements, which will elucidate the current state of the Antarctic middle atmosphere. Production of this database will make it possible to validate climate model outputs, produced using the University of Canterbury Super Computer (UCSC), and feed forward the resultant improved fundamental physical understanding of this region to improve these climate model components.

#### **K057**

Oct – Nov 2012 McMurdo Sound

**Thermal Acclimation in Antarctic Fish** Professor Bill Davison, Phone: (03) 364 2029, E-mail: [bill.davison@canterbury.ac.nz](mailto:bill.davison@canterbury.ac.nz)  
School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch.

This project aims to examine the effects of both short term (acute) and longer term (chronic) increases in temperature on the physiology of a number of Antarctic fish. The research will examine oxygen uptake and its use at the cell level (tissue metabolism), at the organ level (gill function, heart function) and at the whole animal level (whole animal metabolic rate, exercise ability), integrating these different aspects into a model of how changes at each level act to allow survival at what are potentially lethal temperatures. Specifically the work will look at the effects of acclimation on heart rate, ventilation rate, the ability to swim coupled with a determination of aerobic scope and the effects that hypoxia has on these processes. Overall the study will determine whether hypoxia tolerance is a major determinant of survival at high temperatures and whether acclimation alleviates this.

#### **K060**

Nov and Dec 2012 Arrival Heights, Scott Base

**Space Weather Monitoring (AARDDVARK)** Dr Craig J. Rodger, Phone: (03) 479 4120, E-mail: [crodger@physics.otago.ac.nz](mailto:crodger@physics.otago.ac.nz)  
Department of Physics, University of Otago, PO Box 56, Dunedin 9016.

It is important to understand the response of all regions above the Earth to climate change in order to improve our modelling and prediction capabilities. This should include consideration of the contribution of solar input and its variability through the transmission of solar energy from the Earth's upstream region to the lower atmosphere. This project provides a better understanding of the volatility of near-Earth space, a plasma region populated by ionised gas embedded in the geomagnetic field. One example of the solar variability to lower atmosphere linkage comes from solar-induced energetic particle precipitation leading to ozone losses in the upper stratosphere; experimental observations show increased ozone losses occurring during the polar winter and caused by solar-generated events, particularly dramatic explosions on the Sun and aurora producing geomagnetic storms. This variability may contribute to the recovery times of the man-made ozone hole. Polar ozone depletion has a key-influence on the global climate system, directly impacting NZ both through changes in local ultraviolet (UV) levels and producing regional climate variability.

#### **K064**

Jan 2013 Minna Bluff, Blue Glacier

**The Glaciological Basis for Palaeoclimatic Reconstructions of Ice-Shelf Moraines** Associate Professor Sean Fitzsimons, Phone: (03) 479 8786, E-mail: [sjf@geography.otago.ac.nz](mailto:sjf@geography.otago.ac.nz)  
Department of Geography, University of Otago, PO Box 56, Dunedin.

The objective of this research is to develop an understanding of the entrainment, transfer and deposition of sediment by ice shelves. The outcome will be the development of a model for the accretion and transfer of ice and debris in ice shelves and a glaciological basis for palaeoclimatic reconstructions derived from ice shelf moraines. Defining the glaciological basis of ice shelf moraine formation is essential to understanding the age and chronology of ice shelf moraines, which are widely used to reconstruct the timing and magnitude of Late Pleistocene ice advances. We plan to achieve these objectives by undertaking an integrated study of the entrainment, transfer, deposition and deformation of sediment adjacent to the margin of a thin, partly grounded ice shelf (the McMurdo Ice Shelf).

#### **K067**

Oct – Nov 2012 McMurdo Sound, Cape Evans, Cape Royds, Cape Bird

**Does Sea Ice Microbial Production Support Benthic Consumers in the Ross Sea, Antarctica?**  
Associate Professor Stephen Wing, Phone: (03) 479 9038, E-mail: [steve.wing@stonebow.otago.ac.nz](mailto:steve.wing@stonebow.otago.ac.nz)  
Department of Marine Science, University of Otago, PO Box 56, Dunedin.

The goal of the proposed project is to test whether sea ice microbial communities are an important source of organic material supporting benthic communities in the Ross Sea. We

will use bulk and compound specific isotopic composition of organic matter sources to trace their contribution to consumers across spatial gradients corresponding to different sea ice extent and persistence. This will be extended to a systems level modeling approach to understand organic matter flux in the Ross Sea benthic community. The project addresses an important unknown for Antarctic communities: the connectivity between primary production within sea ice and availability of organic material for benthic consumers. It will provide new understanding of the role of sea ice for ecosystem functioning in Antarctica.

**K068**

Oct – Nov 2012 McMurdo Sound Cape Evans

**Developmental and Metabolic Responses of Antarctic Marine Invertebrate Larvae to a Warmer, Acidified Ocean**

Dr Miles Lamare, Phone: (03) 479 7463, E-mail: [miles.lamare@stonebow.otago.ac.nz](mailto:miles.lamare@stonebow.otago.ac.nz)  
Department of Marine Science, University of Otago, PO Box 56, Dunedin.

The objective of our research is to advance our understanding of the effects of climate change (seawater pH and temperature change) on Antarctic marine larvae by applying experimental conditions that realistically simulate predicted future pH and temperature changes in a range of marine environments to quantify responses in terms of metabolic rates, acid-base regulation, the activity and gene expression of the key enzyme, carbonic anhydrase, fertilization, development, mortality and calcification rates. This research will contribute to a greater understanding of the responses of Antarctic marine invertebrates to climate change by addressing: (1) mechanisms that can be used to adjust physiology in response to change, (2) how these adjustments contribute to compensating for change and; (3) trade-offs that result from any such physiological adjustments.

**K069**

Jan 2013 Arrival Heights

**Monitoring Magnetosphere-Ionosphere Coupling and Space Weather in the Polar Region**

Professor Brian Fraser, Phone: (+61) 2 4921 5445, E-mail: [bhbjf@cc.newcastle.edu.au](mailto:bhbjf@cc.newcastle.edu.au)  
Department of Physics, University of Newcastle, NSW 2308, Australia.

This project will provide a better understanding of the volatility of near-Earth space, a plasma region populated by ionised gas embedded in the geomagnetic field. Energy from the Sun must pass through many important regions and boundaries to reach Earth, including the magnetosphere and the ionosphere. The dynamic behaviour of this plasma system, now referred to as “space weather” is of vital importance to life on our planet, and its effects are best studied at high latitudes, e.g. the aurora. Space weather can disrupt the operation of satellites, radio and GPS navigation and power distribution systems. The results of this project will provide important input parameters to global magnetospheric circulation models currently under development for space weather forecasting. In particular, it will study the dynamics and topology of the southern high latitude cusp and polar cap, geomagnetic field regions open to direct solar influence. Ultra-low frequency (ULF) waves will be used as tracers to study plasma dynamics and magnetosphere-ionosphere coupling. The Scott Base magnetometer and optical imager data, in conjunction with international observations from Australian bases, USA-UK-Japan-China polar cap remote sites will provide the basic dataset.

**K081**

Jan 2013

Lake Fryxell, Lake Vanda, Koettlitz Glacier, Bratina Island, Miers Valley Mouth

**Identification and Management of Change in Inland Antarctic Aquatic Ecosystems**

Dr Ian Hawes, Phone: (03) 364 2330, E-mail: [ian.hawes@canterbury.ac.nz](mailto:ian.hawes@canterbury.ac.nz)  
University of Canterbury, Private Bag 4800, Christchurch.

This programme’s goal is to determine how climate-driven hydrological change controls the biological structure and biodiversity values of Antarctica’s inland aquatic ecosystems by quantifying and modelling the climate-hydrology-biodiversity linkages. We will apply new molecular, biological process and environmental modeling techniques in the field and in laboratory experiments to identify key biodiversity and ecosystem components and values.

**K083**

Nov – Dec 2012 Taylor Glacier – Lake Eddy

**Stable Carbon Isotope Constraints on Methane Sources During Fast Climatic Transitions**

Dr Hinrich Schaefer, Phone: (04) 386 0316, E-mail: [h.schaefer@niwa.co.nz](mailto:h.schaefer@niwa.co.nz)  
NIWA, Private Bag 14-901, Wellington.



Atmospheric methane, i.e. CH<sub>4</sub>, is a powerful greenhouse gas and its natural sources are strongly climate dependent. In response to anthropogenic climate change, natural CH<sub>4</sub> emissions could therefore increase strongly, leading to further warming through higher greenhouse forcing. We will measure the stable carbon isotope ratio of CH<sub>4</sub>, a characteristic that is indicative of its different source types. This global atmospheric parameter has been preserved in air occlusions of polar ice. A record covering the last deglaciation from Taylor Glacier, where ancient ice is pushed to the glacier surface will reveal detailed changes throughout warming periods with unprecedented precision, thus overcoming the limitations of previous work. The results will constrain if, and what, natural methane sources responded to climate warming in the past and have the potential to do so in the future.

#### **K084**

Aug – Nov 2013 McMurdo Sound, Scott Base

##### **Measurements of bromine and iodine oxide in the Antarctic marine boundary layer**

Dr Karin Kreher, Phone: (03) 440 0447, E-mail: [k.kreher@niwa.co.nz](mailto:k.kreher@niwa.co.nz)

NIWA, Private Bag 50061, Omakau.

Within this event, we plan to make measurements of halogen oxides (BrO and IO) in the Antarctic marine boundary layer using several complementary measurement techniques. It is very important for us to make these measurements as close as possible to first year sea ice and/ or open and refreezing water. Snow samples will also be taken at the locations where the atmospheric measurements are made. This will provide us with information about mercury deposition on the snow surface. These data sets will then be used to investigate the connections between bromine explosion, ozone depletion and mercury deposition events. We also expect some new insights in the vertical iodine oxide (IO) distribution and a better understanding of the amount of IO in the interstitial air of the Antarctic snowpack and its sources.

#### **K085**

Oct 2012 and – Feb 2013 Arrival Heights, Scott Base

##### **Investigating ozone depletion and climate change: trace gas measurements in the Antarctic atmosphere**

Dan Smale, Phone: (03) 440 0424, E-mail: [d.smale@niwa.co.nz](mailto:d.smale@niwa.co.nz)

NIWA, Private Bag 50061, Omakau.

The Antarctic atmosphere is an important and unique part of the global climate system. It provides a unique opportunity for us to measure global trends in atmospheric trace gases at sites isolated from anthropogenic sources. The goal of this research is to improve understanding of how the Antarctic atmospheric chemistry drives and responds to global atmospheric change. Research topics include: ozone depletion chemistry, greenhouse gas measurements, sea-ice/atmosphere trace gas interactions and the pole-ward transport of atmospheric constituents. To this end, we measure the atmospheric composition throughout the year using ground-based remote sensing instruments and surface in-situ air samples, located at Scott Base and Arrival Heights.

#### **K089**

Jan 2013 Arrival Heights, Scott Base

##### **Climate Data Acquisition – Scott Base and Arrival Heights, Antarctica**

Mr Andrew Harper, Phone: (03) 343 7890, E-mail: [a.harper@niwa.co.nz](mailto:a.harper@niwa.co.nz)

NIWA, PO Box 8602, Christchurch.

The goal of this programme is to obtain a high-quality continuous climate record for Scott Base and Arrival Heights in Antarctica, and archive it in NIWA's publicly accessible climate database. Scott Base is one of 47 reference climate stations for the New Zealand region managed by NIWA, and climate observations (wind speed and direction, air temperature, relative humidity, barometric pressure, global solar radiation, diffuse solar radiation and direct solar radiation) are recorded there daily. This climate record began in 1957 and is one of the longest continuous records in Antarctica. Wind speed and direction, air temperature, relative humidity and global solar radiation are also recorded at Arrival Heights. The measurements are needed for characterising the local climate and state of the environment, identifying climate variations and changes, and in research on climate-sensitive processes and ecosystems. This programme also includes measurements from the sea level recorder installed at Scott Base.

#### **K121**

Nov – Dec 2013 Western McMurdo Sound

##### **Abundance and Spatial Distribution of South Polar Skua (*Stercorarius maccormicki*) in the Western Ross Sea**

Dr Phil Lyver, Phone: (03) 325 6700, E-mail: [lyverp@landcareresearch.co.nz](mailto:lyverp@landcareresearch.co.nz)

Landcare Research, PO Box 69, 40 Gerald Street, Lincoln 8152.

Our primary hypothesis is that South Polar skua (*Stercorarius maccormicki*) population abundance broadly tracks summer food availability in the southern McMurdo Sound region. Skuas and Adélie penguins (*Pygoscelis adeliae*) both prey heavily on Antarctic silverfish (*Plueragramma antarcticum*) and krill (*Euphausia crystallophias* and *E. superba*) and overlap in breeding space during the summer in this region, though not entirely. If we make the assumption that physical (e.g. persistent sea-ice cover) and biological (e.g. prey abundance) conditions, in the absence of other factors, affect population dynamics and growth of both seabird species', then similar trajectories for each population could emerge. On the other hand, in McMurdo Sound, and especially along the Victoria Land Coast, appreciable numbers of skuas nest where there are no penguins. Therefore, factors not applying to penguins (e.g. historical human occupation) would seem to be important as well to the skuas.

#### **K122**

Nov 2012 – Jan 2013 Cape Royds, Cape Bird

**Protecting the Structure and Function of Ross Sea Ecosystems, Antarctica** Dr Phil Lyver, Phone: (03) 325 6700, E-mail: [lyvern@landcareresearch.co.nz](mailto:lyvern@landcareresearch.co.nz)  
Landcare Research, PO Box 69, 40 Gerald Street, Lincoln 8152.

This research will contribute to showing how Ross Sea ecosystems can be managed to achieve conservation and fishery outcomes in a precautionary manner. It will contribute to the quantification of food web linkages within the ecosystems of the pelagic and benthic communities of the Ross Sea shelf, slope, abyss and seamounts, development of indicators for monitoring change, assessment of risk to critical biological processes, and support the establishment of protected areas. In collaboration with the US Adélie penguin team, demographic rates (e.g., survival, productivity, breeding rates) and provisioning strategies (e.g., foraging behaviour, dietary composition, chick condition) will be recorded annually at the Ross Island colonies. Variation in demographic rates and provisioning strategies will be used to predict population trajectories and plausible sea-ice and krill abundance scenarios that may be mediated by climate change.

#### **K123**

Dec 2012 – Jan 2013 Minna Bluff, Convoy Range, Coombs Hills, Black Island, Mt Morning, Mt Discovery, Mt Gran, Alatna Valley.

#### **Environmental Domains Classification for the Ross Sea Region**

Dr Fraser Morgan Phone: (09) 574 4149, email: [morganf@landcareresearch.co.nz](mailto:morganf@landcareresearch.co.nz)  
Landcare Research Ltd, 231 Morrin Road, St Johns, Auckland 1072

The research develops an environmental classification for terrestrial ecosystems of Ross Sea region. The classification includes associated data and models and is underpinned by new knowledge on soil distribution, climate and microbial diversity and/or abundance. Its delivery, via a one-stop web portal will produce a classification that is dynamic, widely accessible, and functional. We provide new data on these ecosystems by:

- Developing a terrestrial environmental classification for the Ross Sea region using environmental domains analysis that encompasses climate, landform, soil, and biology layers;
- Mapping soil attributes using soil-landscape models, validated with field data to establish the spatial distribution of soils in the McMurdo Dry Valleys;
- Extending our existing soil climate network to include upland slopes for monitoring the impact of climate change on soil active layer and permafrost depth;
- Characterising soil microbial communities.

#### **K131**

Oct – Dec 2012 McMurdo Sound, Coulman High, Cape Roberts.

#### **Sea Ice and Southern Ocean Processes**

Dr Timothy G Haskell, Phone: (04) 569 0000, E-mail: [t.haskell@irl.cri.nz](mailto:t.haskell@irl.cri.nz)  
Industrial Research Ltd, PO Box 31-310, Lower Hutt, 5040.

This programme aims to characterise the relationship between the sea ice, ocean and atmosphere of Antarctica in order to better understand and predict high-latitude coupled climate variability, and to underpin the management of Antarctica and the Southern Ocean in the context of the global climate system. It concentrates on the climate-related processes occurring within McMurdo Sound to the marginal ice zone. It covers a range of scales, from microns in structure of sea ice, to the order of thousands of kilometres in the process of sea ice dispersal in the Southern Ocean, and the relationships linking Antarctica to global climate variability and change.

#### **K150**

Oct – Nov 2012 Cape Royds, Cape Evans, Cape Roberts

#### **Land Information New Zealand**

Graeme Blick, Geospatial Data Analyst, Phone: (04) 460 0191, E-mail: [gblink@linz.govt.nz](mailto:gblink@linz.govt.nz)  
Land Information New Zealand (LINZ), PO Box 5501, Wellington, 6145.

LINZ and its predecessor agencies have operated surveying, charting and mapping programmes in the Ross Sea region, as well as place naming administration, for some 30 years. The Department has an agreement with the United States geological Survey, which provides for co-operation in these activities and in particular joint topographic mapping, geodetic surveying and place naming programmes.

**K160 Postgraduate Scholarships**

Postgraduate Scholarships Antarctica New Zealand, Christchurch.

Dr Ed Butler, Phone: (03) 358 0200, E-mail: [e.butler@antarcticnz.govt.nz](mailto:e.butler@antarcticnz.govt.nz)

The four current scholarship awardees are:

- **Sir Robin Irvine Doctoral Scholarship:** awarded to *Stephen Archer* from the University of Waikato who aims to evaluate the risks of the highly productive, but sensitive, aquatic systems of Antarctica. Event number K025 – Biodiversity, Dynamics and Metabolics of Heterogeneous Meltwater Ponds.
- **New Zealand Post Scholar:** awarded to *Kristi Bennett* from the University of Waikato, who is an MSc student working with K020 *Identifying hotspots of terrestrial biodiversity in the Ross Dependency*.
- **Kelly Tarlton's Scholar:** awarded to *Ken Hughes* from the University of Otago, who is an MSc student working with Professor Pat Langhorne on *Supercooling and Sub-Ice Platelet Layers in McMurdo Sound, Antarctica*.

**Helicopters New Zealand scholar:** awarded to Bob Noonan from the University of Canterbury, who is an MSc student working on the *Evaluation of the surface mass balance of the Darwin-Hatherton Glacial System, Antarctica, using the Polar Weather Research and Forecasting numerical model*.