

2007/2008 Research Season – Events

Antarctica New Zealand

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2007/2008 RESEARCH SEASON

EVENT SUMMARIES AND CONTACT INFORMATION

- Event K001 ANDRILL Operations & Logistics Preparation**
20-Aug-07 to 21-Feb-08 **Antarctica New Zealand, Christchurch. Jim Cowie, Phone: (03) 358 0240, Fax: (03) 358 0211, Email: j.cowie@antarcticanz.govt.nz**
Southern
McMurdo
Sound
ANDRILL (ANtarctic Geological DRILLing) is an international scientific drilling project involving more than 50 scientists from four countries. Antarctica New Zealand is the Project Operator on behalf of the four participating countries - Germany, Italy, NZ and USA. The purpose of the drilling is to recover sedimentary rock cores from sub-sea floor sites in the McMurdo Sound area using the McMurdo Ice Shelf and the annual sea ice as the drilling 'platform'. Analysis of the cores will shed light on the tectonic history of the region and past ice shelf responses to climate forces over the last 17 million years, and provide a way forward to speculate on future climate patterns and change. The first hole was drilled under the McMurdo Ice Shelf (MIS) about 10kms SE of Scott Base in 2006 and the second hole will be drilled from sea ice in Southern McMurdo Sound (SMS) about 30kms NW of Scott Base in late 2007.
- Event K002 Latitudinal Gradient Project (LGP)**
15-Nov-07 to 14-Jan-08 **Antarctica New Zealand, Christchurch. Shulamit Gordon (Project Manager), Phone: (03) 358 0200 Fax: (03) 358 0211 E-mail: s.gordon@antarcticanz.govt.nz**
Darwin
Glacier region
The Latitudinal Gradient Project (LGP) is aimed at increasing the understanding of the coastal marine, freshwater and terrestrial ecosystems that exist along the Victoria Land coastline in the Ross Sea region, and describing potential environmental variability that may occur in the future. Antarctica New Zealand is providing the logistical capabilities for research camps to be located at specific sites along the Victoria Land coast. K002 covers the terrestrial work that will be undertaken in the Darwin Glacier region under the LGP. The following events will be visiting the Darwin Glacier region this season: K024B, K081B, K056A,C and K123A (see individual event entries for research summary).
- Event K003 Latitudinal Gradient Project (LGP)**
02-Nov-07 to 18-Dec-07 **Antarctica New Zealand, Christchurch. Shulamit Gordon (Project Manager), Phone: (03) 358 0200 Fax: (03) 358 0211 E-mail: s.gordon@antarcticanz.govt.nz**
Gondwana
Station
See above for LGP abstract. K003 covers the marine and terrestrial studies that will be undertaken in the Terra Nova Bay area under the LGP. The researchers will be located at the German base, Gondwana. The following events will be undertaking research here: K018, K024C, K043A, K066 (see individual event entries for research summary).
- Event K018 Latitudinal Patterns in the Ross Sea Meroplankton – Terra Nova Bay**
02-Nov-07 to 14-Dec-07 **School of Biological Sciences, Auckland University, Private Bag 92019, Auckland. Dr Mary A Sewell, Phone: (09) 373 7599 Ext: 83758, Fax: (09) 373 7417, E-mail: m.sewell@auckland.ac.nz**
Gondwana
Station
The pelagic community of the Ross Sea consists of a permanent component (= holoplankton) and a temporary component which is primarily made up from the larval stages of benthic marine invertebrates and fish (= meroplankton). To date little attention has been paid to the distribution and abundance patterns of the meroplankton in the Ross Sea. In research conducted in the 2002/2003 season we used a combined morphological and molecular approach to identify the common larval "types" collected from McMurdo Sound near Scott Base. In the 2003/2004 and 2004/2005 seasons we extended sampling for marine invertebrate larvae out of McMurdo Sound and into the Ross Sea at Cape Hallett, allowing a broader based study of Antarctic larval forms.

In this research we will continue sampling the latitudinal gradient along the Victoria Land coast by collecting plankton for two consecutive seasons (2006/07, 2007/08) in the Terra Nova Bay area. Sampling will involve daily quantification of the distribution and abundance of the common larval forms identified in previous research and the study of “new” northern Ross Sea larvae. This research contributes to the Latitudinal Gradient Project.

Event K021 Cold Adaptation and Proliferation of Antarctic Fungi

A & B Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton.

20-Aug-07 to 24-Aug-07 **Professor Roberta Farrell, Phone: (07) 838 4704, Fax: (07) 838 4300,**

E-mail: rfarrell@waikato.ac.nz

11-Jan-08 to 29-Jan-08 This multi-disciplinary programme addresses biodiversity and ecosystem functioning with aims to fundamentally understand the underlying mechanisms of cold adaptation, proliferation and life in extreme environments, focusing on the model system of terrestrial filamentous fungi. Fungi are studied on and off the ice by using molecular “forensic” analysis to identify and study the unculturable, and in contrast classic microbial, physiological and biochemical analysis (focusing on crucial proteins and cellular components) to study the culturable microorganisms. The hypotheses are that indigenous Antarctic fungi (whether endemic or adapted, introduced microorganisms) have unique biochemical mechanisms to survive and proliferate in the Antarctic environment; the research outputs include demonstrating if the fungal cold-adaptive mechanisms are similar to those already identified in bacteria and archaea. This programme expands our research of the past six years, particularly to use unique methodology on the Antarctic continent to search for psychrophilic terrestrial fungi.

Cape Evans,
Cape Royds,
Hut Point,
McKelvey Valley

Event K023 Resolving Environmental Drivers for Microbial Biodiversity in Antarctic Dry Valley Mineral Soils

18-Jan-08 to 05-Feb-08 **Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton.**

Battleship Promontory, **Professor Craig Cary, Phone: (07) 838 5493, Fax: (07) 838 4324,**

E-mail: caryc@waikato.ac.nz

Beacon Valley, Miers Valley, Upper Wright Valley This project aims to extend our current research program designed to elucidate the environmental drivers controlling the diversity and genetic function of microbial communities in Antarctic Dry Valley mineral soils. We will address four basic questions: 1) What is the active fraction of the detectable microbial diversity in terrestrial cold-desert biotopes? 2) What physicochemical factors control microbial biomass, activity and diversity? 3) How can an assessment of metabolic gene diversity be used to evaluate microbial community structure and interactions. 4) How can metagenomic and classical methods be used to access valuable organisms, genes and gene products in uncultured Antarctic microbiota? Our intent is to continue to investigate unique physical/nutrient gradients (altitudinal, moisture, C/N enrichment, and specialized soil microhabitats) located in the Meirs Valley and other relevant Dry Valley sites. These studies will employ a suite of modern molecular genetic approaches in parallel with micro-environmental monitoring. While these methods are widely validated in studies of microbial molecular ecology, they have, to date, not been applied in any comprehensive study of microbial populations inhabiting Antarctic terrestrial environments.

Event K024 Terrestrial Biodiversity in Southern Victoria Land**A, B & C****Department of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton.****Professor T G Allan Green, Phone: (07) 838 4225, Fax: (07) 838 4324,****E-mail: greentga@waikato.ac.nz**

02-Nov-07 to

21-Dec-07

02-Jan-08 to

29-Jan-08

Battleship

Promontory,

Seuss Mt,

Sperm Bluff,

Cape Geology,

Smith Valley,

Wellman Valley,

Gondwana

Station

This research focuses on describing and interpreting biodiversity of terrestrial ecosystems in the Ross Dependency and continues previous research based on a successful mixture of classical and molecular taxonomy. Antarctic terrestrial research is about to go through several paradigm shifts. Rather than a decline in biodiversity at higher latitudes with increasingly extreme environments it seems more likely that we have a contraction to sites with better microclimates with actual species present determined by a colonisation lottery. The organisms present may not all be recent colonists but, rather, have expanded from refugia; endolithic systems, supposedly thousands of years old, are dated to less than a century. We intend to continue to test these new ideas by extending sampling (invertebrates, lichens and mosses) to the Darwin region (LGP site) and inland from Granite Harbour. Our research contributes to the LGP (Latitudinal Gradient Project).

Event K025 Determining Unique Evolutionary Patterns for Terrestrial Invertebrates in Antarctic Environments

30-Oct-07 to

27-Nov-07

04-Jan-08 to

29-Jan-08

Cape Bird

Allan Wilson Centre for Molecular Ecology and Evolution, Massey University, Palmerston**North. Ms Angela McGaughran, Phone: (06) 350 5515 ext 7626,****E-mail: a.mcgaughran@massey.ac.nz**

This project aims to decipher the evolutionary history of polar invertebrates by investigating energetic (activity) budgets of the springtail *Gomphiocephalus hodgsoni*. Specifically, activity will be investigated through measurement of: (1) metabolic rates (via oxygen measurements); (2) pitfall trapping (where presence of organism in trap indicates activity of the organism in the preceding hours); and (3) growth over time.

All three measures will be made across a range of spatial scales at Cape Bird, Ross Island, to examine the ways in which activity varies on an hourly, daily and seasonal scale. This project will provide information on the theoretical 'metabolic rate elevation' that has been proposed for polar species, and look at how activity varies across a range of temporal and scales to help determine some of the unique evolutionary patterns that prevail for terrestrial invertebrates in Antarctic environments.

Event K043 Antarctic Sea Ice and Pelagic Microbial Communities: Latitudinal Influences on Biodiversity and Productivity**A & B**

20-Aug-07 to

05-Oct-07

02-Nov-07 to

14-Dec-07

Cape Evans,

Gondwana

Station,

Scott Base

School of Biological Sciences, Victoria University of Wellington, Private Bag 600,**Wellington. Dr Ken Ryan, Phone: (04) 463 6083, Fax: (04) 463 5331,****E-mail: ken.ryan@vuw.ac.nz**

Each year, an area of Antarctic sea ice more than twice the size of Australia forms during winter and melts in summer; a process that is perhaps the most dramatic seasonal change on Earth¹. This ice provides a unique habitat for growth of the micro-organisms that provide the energy base for marine life in ice covered regions. This ice bound microbial community is one of the most diverse forms of life in Antarctica, but we still do not understand how it supports local ecosystems, and as far as the bacterial component is concerned, we do not even know what is there. We will assess the biomass and productivity of the algal component as well as their responses to environmental stresses using PAM fluorometry and oxygen microelectrodes. We will also determine bacterial biodiversity using DNA-identification technologies. We will link productivity and biomass measurements with physical and geographic data into a mathematical model of population dynamics for sites along the western coast of the Ross Sea. The model will describe a baseline for the state of health of the population

and will be used to predict future scenarios of reduced ice at sites further south. The work will be an integral part of the "Latitudinal Gradient Project", will build on previous seasons results, and will assess of the effect of global climate change on productivity and biodiversity in Antarctic coastal ecosystems.

Event K049 NZ ITASE: Climate Change along the Victoria Land Coast

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

23-Oct-07 to 07-Dec-07 **Dr Nancy Bertler, Phone: (04) 463 5233 ext 8391, Fax: (04) 463 5186,**

E-mail: nancy.bertler@vuw.ac.nz

Gawn Ice
Piedmont,
Skinner Saddle,
Victoria Lower
Glacier

Unprecedented changes are occurring in the Earth's climate. The 1990's were the warmest decade in the last 2000 years and average global temperature is projected to rise between 1.4°C and 5.8°C by 2100 [IPCC, 2001]. Although the scientific evidence of global warming is now widely regarded as incontrovertible, predicting regional impacts is proving more problematic. Especially, conclusions of the Southern Hemisphere record are limited by the sparseness of available proxy data at present. We propose to use ice cores from the Antarctic margin to address the lack of longer-term, high-resolution climate observations in the Southern Hemisphere. We will recover a series of ice cores from glaciers along a 14 degree latitudinal transect of the climatically sensitive Victoria Land coastline and thereby directly contribute a critical dataset of ITASE, AGGS, ACE, and the Latitudinal Gradient Project, as well as providing essential reference records for the NZ-led ANDRILL objective to obtain a high-resolution sedimentary archive of Ross Ice Shelf stability. Our results will help to improve our understanding of regional patterns of climate behaviour, leading to more realistic regional climate models. Such models are needed to sensibly interpret Antarctic climate records and for the development of appropriate mitigation strategies for New Zealand.

Event K051 The Heimdall Erosion Surface

02-Jan-08 to 11-Feb-08 **Department of Geological Sciences, University of Canterbury, Private Bag 4800,**

Boreas Mt, **Christchurch. Dr Margaret Brandshaw, Phone: (03) 364 2954, Fax: (03) 364 2769,**

E-mail: Margaret.brandshaw@canterbury.ac.nz

Nibelungen
Valley, Upper
Wright Valley,
Knobhead,
New Mountain,
Rotunda

The project looks at the sedimentary history of the lower Taylor Group and seek possible tectonic triggers for the formation and development of the initial Beacon basin. The quartz enriched composition of the Taylor Group has been taken to indicate a relatively quiescent tectonic setting. There has been little research on the origin and cause of the subsidence of the sedimentary basin in which the Taylor Group was deposited, or on the origin of the erosion surface that appears to subdivide the lower part of the group. Recent research suggests that new sediment sources, the result of uplift, are associated with the Heimdall Erosion Surface and may indicate a tectonic driver for sedimentation.

Does the discontinuous nature of the Erosion surface indicate the rejuvenation of remnant paleogeography by broad tectonic warping or does it indicate local faulting and tectonic motions within the southern Victoria Land basin? The proposed research will focus on the Heimdall Erosion Surface and will test the hypothesis that the surface is of regional significance and is one of the 'far-field' effects of orogenesis in the Australia-Antarctica Lachlan Fold belt.

Event K055 Dynamics and Ionization in the Antarctic Middle Atmosphere

04-Jan-08 to 15-Jan-08 **Department of Physics and Astronomy, University of Canterbury, Private Bag 4800,**

Christchurch. Dr Adrian McDonald, Phone: (03) 364 2281,

Arrival Heights, **Fax: (03) 364 2469, E-mail: a.mcdonald@phys.canterbury.ac.nz**

Scott Base

This program continues the long-term monitoring of the middle atmosphere with the MF radar at Scott Base. The monitoring is of significant interest because General Circulation Model simulations have suggested that the mesosphere is a particularly

sensitive region to climate change. In particular, the variations in temperature predicted in the mesosphere are significantly larger than those predicted at the surface. This long-term monitoring function is particularly important because the radar system has been in operation since late 1982 and makes up the longest duration continuous climate record of this type in the world. The fundamental goal of this research programme is to study the seasonal and intra-seasonal behaviour of the wave-driven circulation, particularly its dependence on major disturbances from the troposphere and stratosphere which result in the transport of energy and momentum by waves to higher altitudes. This transport generates forces that drive the flow in the middle atmosphere and play a significant role in the formation of the polar vortex. Planetary scale waves in the stratosphere have also been shown to have a significant impact on year-to-year variations in the ozone depletion observed over Antarctica.

Event K056 Dynamics and Change of the Darwin-Hatherton Glacial System

A & C Gateway Antarctica, University of Canterbury, Private Bag 4800, Christchurch.

16-Oct-07 to **Professor Bryan Storey, Phone: (03) 364 2368, Fax: (03) 364 2197,**

21-Dec-07 **E-mail: bryan.storey@canterbury.ac.nz**

Darwin Glacier,
Smith Valley,
Wellman Valley

The Darwin-Hatherton glacial system offers a unique opportunity to investigate the response of the Antarctic Ice Sheet to future climate change. As well as draining the East Antarctic Ice Sheet into the Ross Ice Shelf, there is plenty of evidence of its past glacial history preserved in marginal moraine sequences. Earlier research has produced differing estimates of the amount and rate of recent change in the system, partly because of the absence of measurements of key controlling parameters including ice thickness, mass balance and climate. This research takes an integrated earth systems approach by combining glacial, geomorphological and climatological methodologies to obtain a set of information that will enable the system to be characterised and understood. This will include the collection of field data on glacier dynamics and thickness, the origin, nature and age of moraine sequences and the key characteristics of the mesoscale and local climate regimes. Remote sensing will be used to develop preliminary geomorphological maps of the area that will aid the field interpretation of its recent glacial history as well as determine the surface velocity field of the glacial system. Numerical modelling will then be employed to describe the past history of the system and to predict how it might respond to different future scenarios of climate change.

Event K057 Temperature and Cardiovascular Physiology of Antarctic Fish

23-Oct-07 to **School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch.**

14-Dec-07 **Associate Professor William Davison, Phone: (03) 364 2029, Fax: (03) 364 2024,**

Scott Base **E-mail: Bill.Davison@canterbury.ac.nz**

Global climate change appears to be increasingly affecting the world's ecosystems. Antarctic fish are generally regarded as examples of extreme stenotherms, lacking an ability to compensate for even small changes in water temperature, and thus susceptible to climate change. However, recent research has shown that at least some species are able to tolerate and even acclimate to increased temperatures, showing major changes to swimming ability, cardiac function and enzyme activity. The proposed programme seeks to investigate the mechanisms behind these changes, in particular looking at cardiovascular and respiratory systems, as uptake of oxygen and its distribution are fundamental to survival. The function of the cardiovascular system in whole animals will serve as a base line for studies at the organ and tissue level and ultimately at the cell and molecular level. This integrated approach will allow us to unravel the mechanisms that allow these fish to survive in what are regarded as hostile environmental conditions.

Event K058 Lipid Metabolism and Temperature Adaptation in Antarctic Fish

19-Oct-07 to
14-Dec-07
Scott Base
**School of Biological Sciences, University of Canterbury, Private Bag 4800, Christchurch.
Dr Victoria Metcalf, Phone: (03) 364 2987 ext 4848, Fax: (03) 364 2590, E-mail:
Victoria.metcalf@canterbury.ac.nz**

Notothenioid fish, the dominant fauna of the Southern Ocean, show substantial adaptation to the frigid waters they inhabit. Their preferred oxidative metabolic fuels are fatty acids and they also lay down significant lipid deposits, which aid in buoyancy. Yet at least one notothenioid species, the Antarctic toothfish, *Dissostichus mawsoni*, lacks the major fatty acid transporter albumin in its blood and instead transports fatty acids using high density lipoprotein. The loss of albumin in the toothfish may be a means of further reducing blood viscosity, aiding survival in subzero water temperatures. This project will use biochemical and genetic approaches to determine if loss of albumin is common and to establish the mechanism of LCFA transport in Antarctic fish. Whether notothenioid fish lack expression of the albumin protein, lack transcription of the mRNA or lack the albumin gene will be determined. The determination of genetic sequences for other genes involved in lipid metabolism will start to provide a more complete picture of the primary metabolic pathway in Antarctic fish. To complement this, assaying for changes in gene expression of selected genes, including those involved in lipid metabolism, when fish are acclimated to warmer temperatures, will tell us much about how temperature adaptation occurs and provide insights into what their capacity is for adaptation, given the likelihood of global warming.

Event K061 Clues from Ferrar Province: Dikes and Sills in the Transantarctic Mountains about Interaction of Flood-Basalt Magmas with Tectonics at the Time of Gondwana Break-Up

16-Nov-07 to
08-Jan-08
Solitary Rocks,
Terra Cotta Mt
**Department of Geology, University of Otago, PO Box 56, Dunedin. Dr James D L White,
Phone: (03) 479 7519, Fax: (03) 479 7527, E-mail: j.white@otago.ac.nz**

Large Igneous Provinces (LIPs) form by the movement of large volumes of magma from the mantle to the crust and earth's surface. Magma is distributed in both lava flows (flood basalts) and through subsurface sheets whose solidified remnants are dikes and sills. The mode of magma distribution in the plumbing system of LIPs is not well known, and this study of Ferrar Dolerite dikes and sills, well-exposed in the Dry Valleys and other parts of the Transantarctic Mountains, will help constrain interpretations of magma emplacement in this province. We will combine physical volcanology, structural geological analysis, and focussed petrological study to determine the tectonic context of intrusion, modes of magma movement, and degree of interaction with the walls of the magma transport system. The resulting multicomponent dataset will be the first of its kind. In addition, we will assess the physical effects of these intrusions as thick and extensive tabular sheets of rock in the structural evolution of the Transantarctic Mountains. Results of the research will inform studies of other basaltic large igneous provinces, of intrusion dynamics in all types of volcanic systems, of processes that shaped the Transantarctic Mountains, and of the breakup of Gondwana.

Event K064 Thermal and Mechanical Processes Beneath Cold Ice

13-Nov-07 to
11-Dec-07
Joyce Glacier,
Petrel Glacier
**Department of Geography, University of Otago, PO Box 56, Dunedin. Associate Professor
Sean Fitzsimons, Phone: (03) 479 8786, Fax: (03) 479 9037,
E-mail: sjf@geography.otago.ac.nz**

This research investigates the thermal and mechanical processes that occur beneath cold ice. It is aimed at understanding the interactions between glacier ice and its substrate by examining the composition, structure and deformation of ice at the margins of glaciers. The specific objectives of the research are: to understand whether the co-isotopic signal of regelation can be concealed by coarse-scale sampling of ice;

to understand how the composition of water is altered as it is frozen to the bottom of floating and grounded ice; to develop an understanding how regelation processes drive sediment entrainment. This study is a development of research that has previously been focussed on the mechanical behaviour of basal ice in glaciers in the McMurdo dry valleys.

Event K066 Latitudinal Gene Drift in Marine and Terrestrial Organisms from the Ross Sea Region

02-Nov-07 to
14-Dec-07
Gondwana
Station

Department of Biochemistry, University of Otago, PO Box 56, Dunedin. Dr Craig Marshall, Phone: (03) 479 7570, Fax: (03) 479 7866, E-mail: craig.marshall@stonebow.otago.ac.nz

Marine and terrestrial organisms have been exposed to quite different environments since Antarctica separated from the rest of Gondwana and cooled. There is evidence of significant variation in sea temperature and in the extent of ice shelves since Antarctica froze. Antarctic marine systems are thought to be potentially well-mixed allowing organisms to move from place to place relatively easily. Notothenioid fish dominate the Antarctic fish fauna and are quite speciose implying that some mechanism must exist to isolate individual populations long enough for new species to arise. It is not clear what mechanisms might be responsible for such isolation and whether ice shelf advance or retreat, or both, may be important in sympatric isolation. In contrast, land organisms such as nematodes, typically inhabit ice-free refugia that comprise only a few percent of the area of the continent. Animals from these areas show much stronger regional variation and a different pattern of speciation to those from marine environments and it is clearer what mechanisms might operate to isolate each site. To try and understand the relationship between changes in climate and speciation, we will collect material from both marine and terrestrial animals, determine their phylogenetic histories, and compare these with what is known of changes in climate. This research contributes to the Latitudinal Gradient Project.

Event K068 DNA Photo-Repair in Antarctic Invertebrate Embryos and Larvae

16-Oct-07 to
20-Nov-07
Scott Base

Department of Marine Science, University of Otago, PO Box 56, Dunedin. Dr Miles Lamare, Phone: (03) 479 7463, Fax: (03) 479 8336, E-mail: miles.lamare@stonebow.otago.ac.nz

We are interested in further understanding physiological aspects of ultraviolet radiation (UV-R) induced DNA damaged and subsequent repair in Antarctic marine invertebrate larvae. Our recent research has shown that enhanced UV-R can damage these larvae despite the presence of a relatively opaque sea ice covering that can reduce UV-R to <1% of ambient. Low UV-R intensities and high rates of DNA damage in Antarctic embryos suggest that they are particularly sensitive to UV-R. UV-R sensitivity is a function of protection of sensitive biological structures (i.e. sunscreens) and the repair of UV-induced damage (particularly DNA repair). Slow rates of DNA repair in Antarctic embryos could be a function of reduced metabolic rates associated with cold sea temperatures (-1.9°C). The key aim of our research is to further our investigations into the process of DNA repair by the enzyme photolyase (photo-reactivation), assessing (at the physiological and molecular level) if Antarctic embryos repair DNA by photoreactivation at rates equivalent to their temperate equivalents, and if they do not, why not?

Event K069 Monitoring Magnetosphere-Ionosphere Coupling and Space Weather in the polar region
11-Jan-08 to 18-Jan-08
Arrival Heights, Scott Base
Department of Physics, University of Otago, PO Box 56, Dunedin. Professor Richard Dowden. Department of Physics, University of Newcastle, NSW 2308, Australia. Professor Brian Fraser, Phone: (+61) 2 4921 5445, Fax: (+61) 2 4921 6907, E-mail: bbfjf@cc.newcastle.edu.au

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.

Event K081 Antarctic Inland Aquatic Ecosystems
A & B NIWA, PO Box 8682, Christchurch. Dr Brian Sorrell, Phone: (03) 348 8987, Fax: (03) 348 5548, E-mail: b.sorrel@niwa.co.nz
11-Jan-08 to 29-Jan-08
Bratina Island, Darwin Glacier, Diamond Hill
This programme will provide information on Antarctica’s inland aquatic ecosystems, focusing on ponds and lakes. It will determine how climate (temperature, wind, and irradiance) influence physical and chemical characteristics of these habitats, and how these characteristics in turn affect diversity and productivity of biological communities. This will be done by linking climate-driven models that describe the physical and chemical processes that in turn determine key biological processes (photosynthesis, respiration, nutrient transformations) within the dominant microbial communities. Work will focus on the Darwin Glacier region and the McMurdo Ice Shelf. As part of the Latitudinal Gradient Project, we will use natural environmental gradients to provide a range of conditions within which to further develop and test these models. As part of the US Long Term Dry Valleys Ecological Research project we will also use the long-term datasets to examine inter-annual variability. The ultimate goal is to assess the resistance and resilience of aquatic ecosystems to climate variability and other disturbance.

Event K082 Structure and Function of Ross Sea Coastal Marine Ecosystems
29-Oct-07 to 22-Nov-07
Cape Evans, Granite Harbour
NIWA, Private Bag 14-901, Wellington. Dr Vonda Cummings, Phone: (04) 386 0300, Fax: (04) 386 0574, E-mail: v.cummings@niwa.co.nz
Characterising the structure and function of benthic communities and determining their relationships to key environmental factors is essential to an improved understanding of Antarctic ecology and wise management of the Antarctic coastal zone. This programme will investigate the environmental processes that influence community dynamics and the spatial structure of populations, and hence the potential for climate variability and anthropogenic influences to impact ecosystem structure and function. Natural gradients in environmental conditions and productivity within the latitudinal range of the Ross Sea will be used to address how the structure, diversity, trophic interactions and

productivity of communities relate to site-specific physical variables. This research builds on our previous research and will enable us to link disturbance and primary production regimes to patterns of resource utilisation by benthos and the biodiversity of benthic communities over different spatial scales. This research provides fundamental information on the structural and functional biodiversity of Antarctic coastal ecosystems. It also establishes a baseline for distinguishing natural environmental variability, occurring over short ecological time and space scales, from larger scale phenomena, such as changes in ice cover and disturbance regimes associated with climate variability. This work contributes to the Latitudinal Gradient Project.

Event K084 Tropospheric Ozone Depletion and Bromine Explosions

20-Aug-07 to 30-Nov-07
McMurdo Sound sea ice, Cape Bird, Scott Base
NIWA, Private Bag 50061, Omakau. Dr Karin Kreher, Phone: (03) 440 0447, Fax: (03) 447 3348, E-mail: k.kreher@niwa.co.nz

Tropospheric ozone depletion events occur regularly in the Antarctic springtime. It has been confirmed that bromine oxide (BrO) plays an important role in this process. However, in-depth knowledge about the reactions involved is still missing. So far neither spatial nor temporal distribution of ozone depletion events can be modelled or predicted; halogen precursors have not been completely identified; and the involvement of frost flowers is unconfirmed. This programme aims to determine the relationship between sea ice surfaces, BrO production and ozone depletion. It is linked with the international programme "Air-Ice Chemical Interactions – IPY coordinated studies" and will contribute to this programme during the International Polar Year. We believe that some ozone depletion and bromine explosion events might go unnoticed at Arrival Heights due to the elevation and distance of the observatory from the sea ice. We therefore propose to perform continuous measurements of near-surface BrO and ozone concentrations and vertical profiles, and mercury using portable measurement equipment. These measurements will be performed on the sea ice to the north of Arrival Heights early in the season when BrO production is known to be greatest.

Event K085 Drivers of Global Change in the Antarctic Atmosphere: Atmospheric Remote-Sensing

06-Oct-07 to 05-Feb-08
Arrival Heights, Scott Base
NIWA, Private Bag 50061, Omakau. Dr Stephen W Wood, Phone: (03) 440 0426, Fax: (03) 447 3348, E-mail: s.wood@niwa.co.nz

The Antarctic atmosphere with its unique physical and chemical attributes is an important part of the global system. This research aims to improve understanding of how the Antarctic atmosphere drives and responds to global change and its interaction with New Zealand. It focuses on Antarctic ozone depletion, the effect of that depletion beyond Antarctica, and the Antarctic's influence on global greenhouse gas (GHG) concentrations. Antarctic stratospheric air, depleted in ozone as a result of anthropogenic interference, is transported to southern mid-latitudes in summer, decreasing ozone and increasing UV radiation over the New Zealand region. Although ozone-destroying chlorine is declining, it may take several years to detect a consistent decrease in Antarctic ozone depletion. Natural variability complicates this detection and increasing GHG concentrations may delay the recovery. Changes in GHG concentrations, including ozone, affect the radiative balance of the atmosphere in ways that are not fully understood. The Antarctic provides a unique opportunity to measure global trends in atmospheric trace gases at sites isolated from anthropogenic sources, assess human impacts on a pristine environment, and quantify the Southern Ocean uptake of CO₂.

Event K087 Drivers of Global Change in the Antarctic Atmosphere: Atmospheric Air Sampling

11-Jan-08 to 15-Jan-08
Arrival Heights, Scott Base
NIWA, PO Box 14 901, Wellington. Mr Gordon Brailsford, Phone: (04) 386 0308, Fax: (04) 386 2153, E-mail: g.brailsford@niwa.co.nz

The Antarctic region provides a vast area that is not influenced by man, and therefore

the atmosphere is unaffected by local anthropogenic activity. The main goals of our programme are to study trace gas species in the Antarctic troposphere and lower stratosphere to better understand the way in which the global changes impact on the Antarctic region. Our studies include collections of whole air at Arrival Heights and in the free troposphere between Christchurch and Ross Island; these samples are later analysed for mixing ratio of trace gases such as methane, carbon dioxide, nitrous oxide and carbon monoxide, as well as the isotopic composition of H₂O, CH₄, CO₂, and CO. The information obtained from these analyses can assist in determining the transport of these species from other locations and the way in which they are produced or removed from the atmosphere. Our programme also includes the collection of air samples in the lower stratosphere; these samples are then later analysed to better understand the interaction of trace gas species within the Antarctic vortex, and the way in which these interactions change with the development of the ozone hole in spring. Part of this work involves the study of water vapour and its role in the formation of polar stratospheric clouds; these clouds provide sites for the destruction of ozone.

Event K089 Climate Data Acquisition – Scott Base and Arrival Heights, Antarctica
11-Jan-08 to 18-Jan-08
Arrival Heights, Scott Base
NIWA, PO Box 8602, Christchurch. Mr Andrew Harper, Phone: (03) 343 7890, Fax: (03) 343 7891, E-mail: a.harper@niwa.co.nz

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.

Event K122 Adélie Penguin Population Responses Mediated by Climate Change
9-Nov-07 to 01-Feb-08
Cape Bird, Cape Crozier, Beaufort Island
Landcare Research, PO Box 69, 40 Gerald Street, Lincoln 8152. Dr Phil Lyver, Phone: (03) 325 6700, Fax: (03) 325 2418, E-mail: lyverp@landcareresearch.co.nz

Our programme will maintain an internationally significant long-term database by continuing the annual aerial census of three Adélie penguin populations on Ross Island (e.g. Capes Crozier, Bird and Royds) and along the Victoria Land coast approximately every 3 years. 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. Differences between demographic and provisioning strategies across a latitudinal gradient will be compared and linked to sea-ice scenarios and/or atmospheric-oceanic patterns. Ecosystem and food-web models will be developed in collaboration with NIWA to inform Antarctic managers (e.g. Antarctica New Zealand, CCAMLR) of potential population changes related to human-related pressures such as tourism and commercial fishing in the Ross Sea.

Event K123 Environmental Protection of Soils of the Ross Sea Region**A & B****Landcare Research Ltd, Private Bag 3127, Hamilton 3240. Dr Jackie Aislabie,****Phone: (07) 858 3700, Fax: (07) 585 4964, E-mail: AislabieJ@Landcareresearch.co.nz**

04-Dec-07 to
 02-Jan-08
 11-Jan-08 to
 18-Jan-08
 Bull Pass,
 Fleming Mt,
 Granite Harbour,
 Marble Point,
 Minna Bluff,
 Victoria Valley,
 Scott Base,
 Smith Valley,
 Wellman Valley

The goal of this research is to support environmental protection and management of ice-free areas of the Ross Sea region, Antarctica by: increasing fundamental knowledge and understanding of Antarctic soils including soil distribution and climate, bacterial diversity, and vulnerability to human impacts. Under the auspices of the Latitudinal Gradient Project (LGP), we propose to undertake field soil mapping in the Brown Hills/Darwin Mountains/Britannia Range region and collect samples for microbial and chemical analysis. Soil maps will be developed and with underlying soils data will be added to the Antarctic soils database in our On-line Ross Sea region GIS (<http://gis.massey.landcare.cri.nz/rsr/soils/>). Soil climate stations at 7 locations in the Ross Sea region will continue to be maintained for at least 10 years. Each year we need to download the climate stations and carry out routine maintenance.

Event K131 Sea Ice and Southern Ocean Processes

09-Nov-07 to
 11-Dec-07
 Tent Island,
 New Harbour,
 Scott Base

Industrial Research Ltd, PO Box 31-310, Lower Hutt, 5040. Dr Timothy G Haskell,**Phone: (04) 569 0000, Fax: (04) 569 0754, E-mail: t.haskell@irl.cri.nz**

This programme consists of a consortium of the Universities of Auckland, Wellington and Otago and the Crown Research Institutes the National Institute of Water and Atmosphere and Industrial Research Ltd. The 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. The programme contributes to the New Zealand Antarctic Strategy by determining processes directly relevant to the understanding of high latitude climate and its links to the rest of the globe, and consequently to better understanding and prediction of climate in New Zealand and the surrounding ocean.

Event K141A/B Malaysian Antarctic Programme

19-Oct-07 to
 26-Oct-07
 25-Jan-08 to
 08-Feb-08

Antarctica New Zealand. Dr Dean Peterson, Phone: (03) 358 0200, Fax: (03) 358 0201, E-mail: d.peterson@antarcticanz.govt.nz

Supporting the Malaysian Antarctic Programme.

Event K150 Land Information New Zealand

29-Oct-07 to
 03-Dec-07

Land Information New Zealand (LINZ), PO Box 5501, Wellington, 6145. Aaron Jordan, Geospatial Data Analyst, Phone: (04) 460 0191, Fax: (04) 498 3837,**E-mail: ajordan@linz.govt.nz**

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.

Event K160 Postgraduate Scholarships

Postgraduate Scholarships Antarctica New Zealand, Christchurch. Shulamit Gordon, Phone: (03) 358 0200, Fax: (03) 358 0211, E-mail: s.gordon@antarcticanz.govt.nz

The four current scholarships are:

a) Sir Robin Irvine Doctoral Scholarship: awarded to Angela McGaughran from the Allan Wilson Centre for Molecular Ecology and Evolution, Massey University for her PhD research. See K025 for further details.

b) Helicopters New Zealand Doctoral Scholarship: awarded to Tracey Jones from the University of Waikato to study the origins and partner choices of Antarctic lichens. Associated with K024.

c) New Zealand Post Scholarship: awarded to Julia Bull from Victoria University of Wellington. Julia's Masters research is looking at trace element chemistry of Antarctic snow as a record of past climate. Associated with K049.

d) Kelly Tarlton's Scholarship: awarded to Natalie Robinson at University of Otago, in association with NIWA. Natalie's research is on the seasonal variation in ocean density stratification during the growth and decay of Antarctic sea ice. Associated with K131.

Event K170 Antarctic Heritage Trust (AHT).

20-Aug-07 to 19-Feb-08 **AHT. Al Fastier, Programme Manager. Phone (03) 358 0212. Fax 03 358 0244.**

E-mail: aht@nzahat.org

Evans Cape, Royds Cape, Scott Base
AHT cares for the expedition bases associated with the early Antarctic explorers Captain Robert Falcon Scott, Sir Ernest Shackleton and Carsten Borchgrevink. AHT's Ross Sea Heritage Restoration Project (RSHRP) aims to conserve the sites and their contents for future generations. Employees and contractors will be working at Cape Royds, Cape Evans and Hut Point.

Event K172 Antarctic Heritage Trust (AHT).

08-Feb-08 to 20-Aug-08 **AHT. Al Fastier, Programme Manager. Phone (03) 358 0212. Fax 03 358 0244.**

E-mail: aht@nzahat.org

Evans Cape, Royds Cape, Scott Base
The Shackleton's Hut Artefact Conservation Programme is part of the AHT's project to conserve the great explorers' expedition bases for future generations. Working from a dedicated conservation lab, professional conservators will be based year round in Antarctica working on the programme.

Event K175 Antarctic Heritage Trust (AHT).

06-Nov-07 to 16-Nov-07 **AHT. Al Fastier, Programme Manager. Phone (03) 358 0212. Fax 03 358 0244. E-mail: aht@nzahat.org**

Evans Cape, Royds Cape, Scott Base
Familiarisation visit for key AHT stakeholders.

Event K211 Film for the Antarctic Attraction

20-Aug-07 to 24-Aug-07 **Antarctica New Zealand, Private Bag 4745, Christchurch. Lou Sanson, Phone: (03) 358 0200, Fax: (03) 358 0211, E-mail: l.sanson@antarcticanz.govt.nz**

18-Jan-08 to 05-Feb-08
Through the lens of award winning cinematographer and veteran Antarctic Filmmaker Mike Single, a 13 minute big screen movie, the "Antarctica Film Experience" will be made for the Antarctic Visitor Centre in Christchurch.

Event K215 ANDRILL (Education) – LEARNZ

25-Oct-07 to 06-Nov-07 **Antarctica New Zealand, Private Bag 4745, Christchurch. Neil Gilbert, Phone: (03) 358 0200, Fax: (03) 358 0211, E-mail: n.gilbert@antarcticanz.govt.nz**
South McMurdo Island, Scott Base
LEARNZ is an online education programme for students in New Zealand state schools producing virtual field trip experiences designed to meet New Zealand Curriculum

objectives. Experiences include audio conferencing, web board, diaries, images and videos uploaded daily. This year LEARNZ will be travelling to Antarctica to develop an ANDRILL virtual experience. They will liaise directly between scientists and project personnel, and state schools back in New Zealand, providing real time involvement, interaction and experiences covering a range of scientific and operational aspects of the Antarctic Drilling project.

Event K220 University of Canterbury Graduate Certificate in Antarctic Studies
18-Dec-07 to Gateway Antarctica, University of Canterbury, Private Bag 4800, Christchurch.
02-Jan-08 **Professor Bryan Storey, Professor of Antarctic Studies & Director Gateway Antarctica.**
Windless Bight, **Phone: (03) 364 2368, Fax: (03) 364 2197, E-mail: bryan.storey@canterbury.ac.nz**
Scott Base

The goal of the Graduate Certificate in Antarctic Studies is to engage participants in a critical examination of the contemporary scientific, environmental, social and policy issues and debates facing the Antarctic region. The Antarctic field component incorporates field studies at Scott Base and its environs. Students will complete Antarctic Field Training, participate in base activities and undertake supervised studies related to geology, ecology, art, glaciology and meteorology.

Event K225 Antarctic Youth Ambassador Scheme
6 Dec 07 to **Antarctica New Zealand, Christchurch. Dr Neil Gilbert, Phone: (03) 358 0200, Fax: (03)**
5 Feb 08 **358 0211, E-mail: n.gilbert@antarcticanz.govt.nz**

Scott Base, The Antarctic Youth Ambassador award is a joint initiative between the Sir Peter Blake
Dry Valleys, Trust and Antarctica New Zealand. Launched last season by the Prime Minister, Sir
Evans Cape, Ed Hillary and Sir Peter's son, James, the award provides an opportunity for a young
Royds Cape, New Zealander to work with Antarctica New Zealand on environmental projects,
including a period of time at Scott Base. The inaugural winner will be undertaking
project work related to the Dry Valleys ASMA.

Event K230 Artists to Antarctica Programme
23-Oct-07 to **Antarctica New Zealand, Christchurch. Dr Neil Gilbert, Phone: (03) 358 0200, Fax: (03)**
05-Nov-07 **358 0211, E-mail: n.gilbert@antarcticanz.govt.nz**

Scott Base, Author Tessa Duder plans to produce two works, a novel and a photographic book,
Evans Cape, based on her impressions of Scott Base and the surroundings. She was very aware
Royds Cape, of the books and films about heroic Antarctic explorers while growing up. Multi-media
artist Ronnie van Hout is fascinated by Antarctica as a frontier. He aims to examine
the human in an extreme alien environment. The alien is a strong feature of his art.

Event K235 Invited Artist Programme
23-Oct-07 to **Antarctica New Zealand, Christchurch. Dr Neil Gilbert, Phone: (03) 358 0200, Fax: (03)**
05-Nov-07 **358 0211, E-mail: n.gilbert@antarcticanz.govt.nz**

Scott Base, Artist John Walsh, a painter who works primarily with oils, is often inspired and
Evans Cape, informed by both his mixed heritage and today's multi-cultural encounters.
Royds Cape

Event K240 Media Programme – Execam
19-Oct-07 to **Antarctica New Zealand, Christchurch. Dr Neil Gilbert, Phone: (03) 358 0200, Fax: (03)**
30-Oct-07 **358 0211, E-mail: n.gilbert@antarcticanz.govt.nz**
Scott Base

Execam is producing a series of half-hour television documentaries for Prime TV entitled 'Extraordinary Kiwis.' They propose to film Canterbury University scientist Victoria Metcalf doing her research work on fish. They will follow Victoria's movements, including on the flight down and at her AFT training. Execam may also film some news stories for Prime News, and possibly some archival footage of Antarctica for future use.

Event K242 Media Programme - Mike Scott (Fairfax Media)

12-Nov-07 to
22-Nov-07
Scott Base,
McMurdo Sound

Antarctica New Zealand, Christchurch. Dr Neil Gilbert, Phone: (03) 358 0200, Fax: (03) 358 0211, E-mail: n.gilbert@antarcticanz.govt.nz

Mike Scott is a reporter and photographer who has been endorsed by Fairfax Media. Mike is keen to focus on science-related projects around the Ross Sea, such as ANDRILL and LGP. He is also interested in speaking to scientists living and working at Scott Base.

Event K247 Climate Change Film

06-Nov-07 to
04-Dec-07
McMurdo Sound

Victoria University of Wellington, Private Bag 600, Wellington, Professor Peter Barrett, Phone: (04) 463 5336, Fax: (04) 463 5186, E-mail: peter.barrett@vuw.ac.nz

This is a collaborative venture between Victoria University of Wellington, with its history of Antarctic research, and Oxford University in England. With the working title The Tipping Point, the film will be produced and directed by documentary film-makers David Sington and Dr Simon Lamb, who collaborated 10 years ago to produce the acclaimed BBC television series Earth Story. The film will feature scientists' perspectives of Earth's changing climate, how and why it is happening and the options we have for responding. Antarctica will figure prominently.

Event K250 Scout Anniversary - Youth on Ice

27-Nov-07 to
04-Dec-07
Scott Base,
Evans Cape,
Royds Cape

Antarctica New Zealand, Private Bag 4745, Christchurch. Evelyn Ussher, Phone: (03) 358 0200, Fax: (03) 358 0211, E-mail: e.ussher@antarcticanz.govt.nz

To celebrate the Centennial of Scouting NZ and International Polar Year, a group of 5 scouts and 1 leader will travel to Antarctica. Their programme will include a visit to the historic huts at Cape Evans and Cape Royds. The main task the group will undertake while at Scott Base is the construction of a walking/recreation track to Crater Hill.