

# 2001/2002 RESEARCH SEASON

## EVENT SUMMARY AND CONTACT INFORMATION

- Event K012 Ecology of Antarctic Demersal Fishes**  
14 Nov to 26 Dec  
Cape Roberts,  
Cape Evans  
School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland  
*Dr John A Macdonald, Telephone: (09) 373 7599 extension 7207, Facsimile: (09) 373 7417. Email: ja.macdonald@auckland.ac.nz*  
The density and variability of populations of a common bottom-dwelling fish, *Trematomus bernacchii*, will be estimated using mark and recapture and video bait stations. One proposed location has been subject to four decades of fish collecting (Cape Armitage), while others remain unexploited (Cape Roberts, New Harbour, Backdoor Bay). Fishing stations will be set up in a grid pattern on the ice over water depths of 30 – 60 m and fish will be caught in baited bottom traps, supplemented by angling. Fish will be weighed, measured, and scales removed for age estimation. They will then be injected with tetracycline for calibrating growth rings, marked with a numbered tag, and returned to the bottom at the site of capture. Each station will be recorded as a differential GPS location, and sampling will be repeated a year later at the same locations. Standard fisheries formulae will be used to estimate population sizes, and mobility will be monitored by comparing recaptures within the grid. Results will provide a basis for assessing effects of human activities on Ross Sea fish populations, and for evaluating any proposed commercial fishery.
- Event K015 Deciphering the Glacial History of Northern Victoria Land**  
09 Nov to 14 Dec  
Mesa Range,  
Northern  
Victoria Land  
Department of Geography, University of Auckland, PO Box 92019, Auckland  
*Dr Paul Augustinus, Phone: (09) 373 7599 extension 7603, Facsimile: (09) 373 7435 Email: p.augustinus@auckland.ac.nz*  
Controversial and conflicting interpretations have been proposed regarding the history of the Antarctic ice sheet based on field data from different sectors of the Transantarctic Mountains (TAM). The main ice sheet draining the TAM into the Ross Ice Shelf (RIS) is constrained by the latter so that EAIS advances appear to be out of phase with global cold stages. However, the Talos Dome and other large neves in Northern Victoria Land (NVL) are isolated from the main EAIS and outlet glaciers draining them were not constrained by the RIS. Consequently the NVL glacial systems should respond much more sensitively to global climate controls than the main ice sheet. Previous work suggests that the glacial history varies regionally as a consequence of complex tectonic controls so that identification of climate controls on glaciation and separation of tectonic controls is problematic. Nevertheless, understanding of these complex controls is essential due to the ongoing and crucial debate regarding the long-term stability of the ice sheet and sensitivity of the ice sheets to climate change. The project will entail glacial geologic mapping careful sampling and dating of glacial sequences and surfaces in NVL using cosmogenic nuclides (CNs) and luminescence (OSL) dating methods.
- Event K021 Evaluation of Deterioration of Historic Huts & Bio-Diversity of Terrestrial Microorganisms**  
04 Jan to 16 Jan  
Cape Evans,  
Cape Royds,  
Mt Fleming  
Department of Biological Sciences, University of Waikato, PO Box 3105, Hamilton  
*Prof Roberta Farrell, Phone: (07) 838 4704, Facsimile: (07) 838 4976 Email: rfarrell@waikato.ac.nz*  
The extreme polar environment has protected many of the wooden huts and artefacts of the Heroic Period of exploration from rapid decay but they are not free from deterioration. This programme has three objectives; first, to identify the cause of

biological and non-biological deterioration present in the Historic Huts and artefacts of the Ross Dependency; second, to investigate the bio-diversity of the biological organisms in the Historic Hut areas, especially fungi and bacteria, using molecular DNA probes as well as traditional morphologically-based taxonomic approaches; and third, to test conservationally acceptable materials for their long-term preservation. In considering non-biological decay of the Huts and artefacts, such as UV light, iron corrosion products, salts and other caustic compounds that progress from wood surfaces to inner regions of the wood, we can study a sensitive global monitor of the Antarctic environment which has been 'operating' since the beginning of the 20<sup>th</sup> century. The second objective, by comparison to isolates in New Zealand and around the world, will aid in establishing organisms introduced to the Antarctic versus indigenous organisms, and establish the viability and biochemical responses of these organisms in the extreme environment.

**Event K023**  
21 Jan to 8 Feb  
Cape Crozier,  
Scott Base,  
Dry Valleys

**Probing and Exploiting DNA Diversity in Antarctic Biotopes**  
Department of Biochemistry and Molecular Biology, University College London  
*Dr Don Cowan, Email: don.cowan@ucl.ac.uk*  
Biological Sciences, Waikato University, PO Box 3105, Hamilton  
*Professor Roy Daniel, Telephone: (07) 838 4022, Facsimile: (07) 838 4324*  
*Email: daniel@waikato.ac.nz*

The Antarctic continent represents a relatively uncharacterised biological resource where the microbial biodiversity offers enormous potential for both fundamental and application-directed studies. Our recent data on ATP content in Ross Desert soils, which suggests that microbial biomass is many orders of magnitude higher than previously reported. The Antarctic environment contains a surprisingly wide range of extremophilic biotypes potentially harbouring a wide variety of different organisms living under differing extreme adaptive pressures. This project aims to continue and extend this successful preliminary research. A variety of modern molecular techniques, in use by and under development by the applicants, will characterise the microbial diversity in Antarctic marine and terrestrial biotopes, and identify and acquire specific gene products of potential biotechnological significance

**Event K024**  
29 Oct to 22 Nov,  
1 Feb to 6 Feb  
Botany Bay

**Biodiversity and Performance of Lichens and Mosses**  
Department of Biological Sciences, University of Waikato, PO Box 3105, Hamilton  
*Prof T G Allan Green, Phone: (07) 838 4225, Facsimile: (07) 838 4324*  
*Email: greentga@waikato.ac.nz*

This international programme will investigate the biodiversity of lichens and mosses along the entire latitudinal range of the Ross Dependency. It has strong linkages to related programmes studying the genetics of mosses and insects and DNA in soils. It also links with a new Antarctic Terrestrial Transect from the Sub-Antarctic into Continental Antarctica. Traditional techniques of survey and taxonomy will be used to continue the construction of a full inventory for the Ross Sea. The latest in-field methods for measuring productivity will be used to investigate adaptations to the Antarctic climate and rates of acclimation during the growing season. The length of the productive season is suspected to be a key control on biodiversity and this will be investigated using monitoring systems that run for the entire year. Possible linkages between productivity on land and nutrient inputs from marine systems will also be researched. Such linkages would provide a new level of complication to the ecosystems. The programme aims to considerably improve our knowledge of these terrestrial antarctic biota, to confirm and improve New Zealand expertise in the area and to provide information for the better management and conservation thus allowing New Zealand to meet treaty obligations.

Event K028 **Biodiversity of Terrestrial Invertebrates**  
4 Jan to 15 Jan Department of Biological Sciences, University of Waikato, Private Bag 3105,  
Cape Crozier, Hamilton 2001  
Botany Bay, *Dr Ian Hogg, Telephone: (07) 838 4225, Facsimile: (04) 838 4324*  
Marble Point, *Email: hogg@waikato.ac.nz*  
Terra Nova Bay, Department of Biological Sciences, University of Waikato, Private Bag 3105,  
Cape Evans, Hamilton 2001  
Cape Bird *Dr Chrissen Gemmill, Telephone: (07) 838 4053, Facsimile: (04) 838 4023*  
*Email: c.gemmill@waikato.ac.nz*

This programme is investigating the biodiversity of terrestrial and near-shore marine invertebrates (particularly collembolids, acari, amphipods), and mosses along the entire latitudinal range of the Ross Dependency. It has linkages to related programmes studying the biodiversity of lichens and DNA in soils. Traditional, morphologically-based, taxonomic approaches for assessing biodiversity will be combined with more recent molecular techniques (e.g. allozyme and DNA analyses). Individuals from each study site will be evaluated using protein electrophoresis, mtDNA and morphological analyses. These analyses are designed to accurately assess existing levels of biodiversity and to provide information on the origin, evolutionary relationships and present day dispersal patterns of antarctic invertebrate taxa. This programme will improve our knowledge of the antarctic terrestrial and near-shore fauna and flora, develop New Zealand expertise in the area and provide information for the better management and conservation of antarctic terrestrial habitats.

Event K030 **Molecular Ecology of Antarctic Fauna**  
2 Nov to 30 Jan Department of Ecology, Massey University, Private Bag 11 222, Palmerston North  
Cape Bird *Professor David Lambert, Telephone: (06) 350 5799 extension 2607, Facsimile: (06) 350 5623. Email: D.M.Lambert@massey.ac.nz*

On Ross Island Antarctica and other locations on the Victoria Land Coast, there are stratified deposits of subfossil bones of Adélie penguins which underlie existing colonies. Some of these bones have been carbon dated to more than 15,000 years. The Antarctic environment represents an ideal one for the preservation of DNA. Using DNA technology, we are analysing samples from both extant and extinct penguin populations and, in conjunction with Prof Carlo Baroni from the University of Piza, we aim to continue our carbon dating of such bones. Specifically, our research aims to directly measure, for the first time, the rate of evolutionary changes in microsatellite and mitochondrial genes over a substantial time frame. Our data will provide fundamental knowledge about the genetic processes which underlie evolution in the Antarctic. In collaboration with Ass Prof Peter Metcalf from the University of Auckland we are also estimating evolutionary rates of change in avian influenza virus and comparing these results to our penguin data.

Event K034 **Stress and Corticosterone Responses in the Adélie Penguin**  
26 Oct to 27 Nov Institute of Veterinary, Animal and Biomedical Sciences, Massey University,  
Palmerston North  
*Dr John F Cockrem, Telephone: (06) 350 4483, Facsimile: (06) 350 5636*  
*Email: J.F.Cockrem@massey.ac.nz*

Adélie penguins (*Pygoscelis adeliae*) survive and breed in a climatic conditions that would be considered stressful for birds of lower latitudes. Corticosterone is the major adrenal steroid in birds, and plasma corticosterone levels increase in response to stressors such as capture and handling. It has been suggested that corticosterone responses differ between Arctic and other birds, but there is little information on corticosterone responses in Antarctic birds. We will quantify variation in corticosterone responses within and between individual Adélie penguins and

characterise changes in corticosterone responses during fasting. Corticosterone responses will be measured in Adelie penguins exposed to a south polar skua (*Stercorarius maccormicki*) which is a natural predator of penguin eggs and chicks, and the effects of corticosterone on incubation behaviour in Adelie penguins will be examined. Corticosterone responses of Adelie penguins to the presence of people will be measured, and the minimum distance for a person to approach a penguin without initiating a corticosterone response will be determined. These studies will contribute both to knowledge of stress in birds and to our understanding of the impact of human activities on penguins in Antarctica.

**Event K042**  
19 Nov to 20 Dec  
Allan Hills  
**Glacial History of East Antarctic Ice Sheet at Allan Hills**  
School of Earth Sciences, Victoria University of Wellington, PO Box 600, Wellington  
*Prof Peter Barrett, Telephone: (04) 463 5336, Facsimile: (04) 463 5186*  
*Email: peter.barrett@vuw.ac.nz*

This project is a detailed study of ancient glacial deposits termed the Sirius Group at Allan Hills, Southern Victoria Lane, Antarctica. The Sirius Group is a collection of Neogene deposits that crop out at high elevations (mostly >1500 m) throughout the Transantarctic Mountains (TAM). They are of considerable interest because they represent the last major expansion of the East Antarctic Ice Sheet (EAIS). Allan Hills occupies a low point in the TAM, making the site more susceptible to overriding by the EAIS during minor volume fluctuations. The aim of this project is to show whether the Sirius Group was deposited by valley glacier or continental ice sheet, by wet- or dry-based glacial ice, by single depositional event or several overriding events and to determine paleoflow direction.

**Event K047**  
19 Nov to 15 Dec  
Table Mt,  
Dry Valleys  
**Climate and Landscape History from Shallow Drilling in the Dry Valleys**  
School of Earth Sciences, Victoria University of Wellington, PO Box 600, Wellington  
*Dr Warren Dickinson, Telephone (04) 495 5233 extension 8405, Facsimile: (04) 495 5186. Email: Warren.Dickinson@vuw.ac.nz*

Detailed climate records from Antarctic ice cores are used by many scientists to test predictive models of global climate change. These cores are limited by age but may extend back to about 400,000 years ago. The climate history prior to this time is obscure, but marine and sediment records show clear evidence of major fluctuations in the ice cover and glacial intensity of Antarctica. The primary aim of this project is to recover a climate record from Antarctic ground ice which potentially holds detailed climate information and dates back to 15 million years ago. The project is based on new portable drilling techniques which allow shallow coring of permafrosted glacial sediments. The cored material will not only be used to determine climate history from the geochemistry of the ground ice but will also provide stratigraphic information for ground penetrating radar studies and outcrop maps of glacial sediments.

**Event K049**  
24 Oct to 02 Jan  
Lower Victoria  
Glacier,  
Polar Plateau  
**Holocene Climate History from Coastal Ice**  
School of Earth Sciences, Victoria University of Wellington, PO Box 600, Wellington  
*Ms Nancy Bertler, Telephone (04) 495 5233 extension 8391, Facsimile: (04) 495 5186*  
*Email: nancy.bertler@vuw.ac.nz*

This study investigates the regional Holocene climate of the South Victoria Land coast, with special emphasis on the glacial history of the Wilson Piedmont Glacier (WPG) as a key indicator of the prevailing climate of the Dry Valleys, and sea ice extent in the McMurdo Sound. To achieve this aim, ice cores will be analysed, which are the most detailed, continuous, and direct recorder of past climate change.

Event K052 **Natural Spatial Subsidies in Continental Antarctic Soils**  
27 Dec to 21 Jan Plant & Microbial Sciences, University of Canterbury, Private Bag 4800, Christchurch  
Garwood Valley, *Dr L G Greenfield, Telephone (03) 364 2797, Facsimile: (03) 364 2083*  
East Beacons *Email: l.greenfield@botn.canterbury.ac.nz*

Dry valley plant-soil systems are stressed and rely on external resources (spatial subsidies). The effect (s) of such subsidies on these ecosystems is largely unexplored but may influence community and ecosystem level properties.

We plan to conduct an experiment at two sites in Antarctica – a stressed site (Garwood Valley) and an extreme site (Beacons) where resources may enter by aerial deposition. We will estimate and use resources of differing quality (bird droppings, microbial mats, surface foams and dust) and measure how the decomposer subsystem develops including community composition and diversity microbial activity and key decomposer processes including decomposition and nitrogen release patterns.

Event K054 **Geophysical Response of Contaminants in Soil and Permafrost in the Vicinity of Scott Base**  
19 Nov to 15 Jan Department of Geological Sciences, University of Canterbury, Private Bag 4800,  
Scott Base, Christchurch  
Mount Pleasant, *Dr David Nobes, Telephone: (03) 364 2987 extension 7733, Facsimile: (03) 364 2769*  
Lake Vida, *E-mail: d.nobes@geol.canterbury.ac.nz*  
Lake Vanda,  
Bull Pass

Controlled spill and laboratory studies of contaminants in temperate climates have indicated that petroleum products and organic solvents are electrically resistive and highly reflective for radar energy. Recent field tests suggest that sites with older contaminant plumes are electrically conductive and absorb radar energy. The work proposed is to: 1) test the geophysical response of contaminants in a cold climate, specifically in the area immediately surrounding Scott Base; and 2) map the extent of contaminants, both laterally and with depth, in the soils and permafrost, again in the area immediately surrounding Scott Base. The results will initially be correlated closely to previous studies of, for example, oil contaminants near Scott Base, but the goal is to extend the work and to determine the vertical and horizontal extent of contamination using near-surface geophysical methods.

Event K055 **Dynamics and Ionisation in the Antarctic Middle Atmosphere**  
11 Jan to 25 Jan Department of Physics and Astronomy, University of Canterbury, Private Bag 4800,  
Scott Base, Christchurch  
Arrival Heights *Dr Grahame Fraser, Telephone: (03) 364 2987 extension 7588, Facsimile: (03) 364 2469. E-mail: g.fraser@phys.canterbury.ac.nz*

The programme is based on continuous monitoring of winds in the middle atmosphere at altitudes of 60-100km using a ground-based radar at Scott Base. The dynamical processes of this region are significant in controlling the circulation at lower altitudes, including the stratospheric ozone layer. The circulation is dominated by pole-to-pole flow, from the summer pole to the winter pole. This circulation is largely driven by atmospheric waves with time scales from 15 minutes to 15 days. The large scale of the phenomenon benefits considerably from co-operative optical observational at the South Pole and in New Zealand by US colleagues, and by our radars near Christchurch. We also use satellite data for the region between Antarctica and New Zealand.

The goal of the programme is to study the seasonal behaviour of this wave-driven circulation, particularly its dependence on major disturbances in the stratosphere which result in the transport of energy and momentum by waves to the higher altitudes.

A portion of the programme is directly in support of Antarctic logistics by providing ionospheric data used in forecasting HF communication propagation conditions.

Event K057  
14 Nov to 13 Dec  
Scott Base

### **Cardiovascular and Respiratory Physiology of Antarctic Fish**

Department of Zoology, University of Canterbury, Private Bag 4800, Christchurch  
Assoc Prof Bill Davison, Telephone: (03) 364 2029, Facsimile: (03) 364 2024  
Email: [w.davison@zool.canterbury.ac.nz](mailto:w.davison@zool.canterbury.ac.nz)

Antarctic fish in McMurdo Sound live in a constant thermal environment of  $-1.8^{\circ}\text{C}$ . Despite their isolation in this cold water, these fish are afflicted by diseases and parasites. One disease, termed X-cell disease affects large numbers of the cryopelagic *Pagothenia borchgrevinki*. The disease affects the gills, reducing oxygen uptake and thus ultimately the ability of the fish to function. This programme will determine the extent of this problem, including an examination of hypertension created by increased resistance to blood flow through the gills, and oxygen uptake by the gills. There is a general belief that anaerobic processes in fish do not adapt well to cold waters and this is seen in Antarctic notothenioids. There is, however, the potential that this is a function of ecotype rather than cold adaptation. Using both Antarctic and temperate water notothenioid fish we will investigate the anaerobic capacities of this group.

Event K059  
10 Oct to 29 Oct,  
25 Jan to 13 Feb  
Scott Base,  
Turtle Rock

### **Human Impacts and the Microbial-Chemical Ecology of Antarctic Sponges**

Australian Institute of Marine Science,  
Dr C N Battershill, Telephone (0061) 747 534 444, Facsimile: (0061) 747 534 285  
Email: [c.battershill@aims.gov.au](mailto:c.battershill@aims.gov.au)

Department of Chemistry, University of Canterbury, Private Bag 4800, Christchurch  
Professor Murray Munro, Telephone: (03) 364 1434, Fax (03) 364 2110  
Email: [m.munro@chem.canterbury.ac.nz](mailto:m.munro@chem.canterbury.ac.nz)

This project will examine human impacts on the microbial and chemical ecology of antarctic sponge species. When considered as an indicator of coastal marine benthic condition sponges represent the most sensitive relevant metazoan phylum. Furthermore, their symbiotic microbial flora has recently been shown to be an even more sensitive indicator of environmental health. We propose to examine the microbial flora associated with several important Antarctic sponge species, with emphasis on symbiotic relationships. The total microbial communities will be described using cultivation and molecular techniques to facilitate examination of population changes with respect to increasing levels of pollution. Sponges, sediment and water will be screened for the presence of hydrocarbons, heavy metals and other anthropogenic pollutants such as nutrients. The effects of increased contaminant corals are to be investigated using settlement plates with focus on chemical cues during settlement. This is the first study of human effects on Antarctic benthic communities using such a multi-disciplinary approach, and the first to examine Antarctic sponge-symbiont relationships.

Event K061  
21 Nov – 27 Dec  
Allan Hills

### **Phreatomagmatic Eruption Processes of Incipient Ferrar Volcanism**

Geology Department, University of Otago, PO Box 56, Dunedin  
Dr James D.L. White, Telephone: (03) 479 7519, Facsimile: (04) 479 7527  
Email: [james.white@stonebow.otago.ac.nz](mailto:james.white@stonebow.otago.ac.nz)

The proposed study of Mawson Formation at Allan Hills would extend results from a successful field season in December 1999 in which Mawson Formation in the Coombs Hills was examined. Mapping revealed a large inferred vent structure in the Coombs Hills area, filled entirely by phryoclastic rocks characterised by strong local variation along steep contacts, abundant peperitic intrusions, a lack of layering except at the structurally highest outcrop and in disrupted blocks, and intense ingestion of sedimentary material from the enclosing Beacon strata. The area seems to represent

a huge, proportionally shallow-formed, volcanic root zone, similar in many respects to those of diatremes. Similar huge root zones have not been previously identified, and it is important to extend the study from the Coombs Hills to the adjacent Allan Hills in order to better characterise contacts with enclosing strata over a larger area, and to assess the degree of deposit variation with distance from the Coombs Hills. Determination of the controls on such large-scale phreatomagmatic volcanoes is an important goal. Combining information from Coombs Hills and Allan Hills will allow rigorous assessment of eruptive processes for what I tentatively view a single eruptive centre and adjoining deposits.

**Event K062 Magmatism in the Transantarctic Mountains**

16 Nov to 18 Dec **Department of Geology, University of Otago, PO Box 56, Dunedin**  
Reeves Bluff, **Assoc Prof Alan Cooper, Telephone: (03) 479 7515, Facsimile: (03) 479 7527**  
Mulock GI, **Email: alan.cooper@stonebow.otago.ac.nz**  
Worcester Range

Magmas generated during the early stages of the Neoproterozoic – lower Paleozoic Ross Orogeny have similar compositions and similar emplacement histories in both the Southern Royal Society Range and Skelton Glacier areas. These alkaline or ‘A’-type magmas have not been described from elsewhere in the TAM. In the Dry Valleys to the north, and the Central TAM to the south, Ross magmatism has the characteristic calc-alkaline signature of convergence and subduction along the paleo-Pacific margin of the East Antarctic craton. ‘A’-type magmas, however, require an extensional, or transtensional tectonic regime, despite their occurrence in a supposed convergent margin. This programme proposed to try to establish the scale of segmentation between convergent and extensional sections of the TAM by investigating the nature of magmatism immediately south of the Skelton Glacier. Comparison of the Ross Orogen of Southern Victoria Land with present day active margins around the world will enable a paleotectonic reconstruction of this segment of the Gondwana Margin and an assessment of its relevance to the evolution of the orogenic belt extension through New Zealand and Australia.

**Event K063 The Effect of Spatial and Temporal Variation in Marine**

12 Oct to 12 Dec, **Productivity on energy acquisition in Female Weddell Seals**  
21 Jan to 4 Feb **University of Otago, Department of Zoology, PO Box 56, Dunedin**  
Hutton Cliffs, **Dr Lloyd S Davis, Telephone (03) 479 7654, Facsimile: (03) 479 7584**  
Cape Royds **Email: adelie@stonebow.otago.ac.nz**

The fate of populations of marine predators is ultimately determined by the oceanic processes that influence the spatial and temporal distribution of primary productivity. This study will quantify the links between the foraging performance of Weddell seals breeding in McMurdo Sound and a range of oceanographic parameters, including sea surface temperature, productivity and bathymetry encountered during their winter foraging in the Ross Sea. These data are a crucial component in understanding how antarctic predators will respond to changes in the distribution of marine resources as a result of global climate change or commercial fisheries activity

**Event K064 Basal Ice and Substrate Deformation at Subfreezing Temperatures**

3 Dec to 18 Dec, **Department of Geography, University of Otago, P O Box 56, Dunedin**  
4 Jan to 14 Jan **Dr Sean Fitzsimons, Telephone: (03) 479 8786, Facsimile: (03) 479 9037**  
Lower Wright **Email: sjf@perth.otago.ac.nz**  
Valley

This proposal seeks support for an investigation of glaciological and geological processes that occur beneath glaciers that have basal ice temperatures significantly below freezing (<-10°C). The proposed research has three elements two of which involve excavating a 50m tunnel in the ice:

1. Making observations of the physical characteristics of landforms (moraines) and sediments at the ice margin;
2. Conducting experiments on the motion of the base of a glacier and its bed and;
3. Studying the physical and chemical composition of the base of a glacier.

Event K066  
05 Nov to 04 Dec  
Scott Base,  
McMurdo

### **Mechanisms of Evolutionary Adaptation in Antarctic Fish**

Department of Biochemistry, University of Otago, PO Box 56, Dunedin

*Dr Craig Marshall, Telephone: (03) 479 7570, Facsimile: (03) 479 7866*

*Email: craig.marshall@stonebow.otago.ac.nz*

This project aims to investigate the evolutionary events associated with physiological adaptations to the unique environment of the Antarctic and Southern Ocean. The separation of Antarctica from its Gondwanan neighbours altered its climate profoundly and led to the freezing of the continent and surrounding waters. Many organisms were unable to adapt to the new conditions. Prominent among those organisms able to exploit the new environment were the notothenioid fish which resisted freezing by virtue of a new blood protein. The development of an antifreeze glycopeptide is not the only evolutionary cold-adaptation found in these fish; all icefish lack haemoglobin and some have also lost the related protein, myoglobin; the lipid transporter, serum albumin, appears to be absent in this group of fish; the enzymes of Antarctic notothenioid fish show higher activity at -2°C than expected from comparison with temperate fish. The relatively recent divergence (~45Ma) and complete molecular evolutionary history of this group of fish make it an ideal system for investigating the specific molecular events responsible for evolutionary adaptation both in these Antarctic fish and in vertebrates generally.

Event K069  
4 Jan to 17 Jan  
Scott Base,  
Arrival Heights

### **Monitoring Magnetosphere-Ionosphere Coupling and Space Weather at High Latitudes**

Physics Department, University of Newcastle, NSW 2308, Australia

*Professor Brian Fraser, Telephone: (+61 2 49) 21 5445, Facsimile (+61 2 49) 21 6907*

*Email: bhbjf@cc.newcastle.edu.au*

This project will provide a better understanding of the dynamics and volatility of the near-Earth space, a plasma region populated by ionised gas embedded in the geomagnetic field. The dynamic behaviour of this plasma system, now referred to as “space weather” is of vital importance to the operation of modern technological systems, and its effects are most apparent at high latitudes, eg the aurora. Space weather can disrupt the operation of satellites, radio navigation and power distribution systems. The results of this study 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 in the study of high latitude plasma dynamics and magnetosphere-ionosphere coupling. Scott Base magnetometer and optical imager data, in conjunction with multi-point and multi-instrument observations from Australian manned bases and USA-UK polar cap automatic geophysical observatories (AGOs), will provide the basic data set for the study.

Event K073  
20 Aug to 24 Aug,  
8 Oct to 15 Oct,  
13 Feb to 18 Feb  
Scott Base

### **Cold Expectations: The Impact of Prior Perceptions on Mood in Antarctica**

Human Sciences Division, PO Box 84, Lincoln University, Canterbury

*Dr Gary Steel, Telephone: (03) 325 2811 extension 8784, Facsimile: (03) 325 3857*

*Email: steelg@lincoln.ac.nz*

Research into the influence of expectations on emotions has had a long history in psychology, although a beginning has been made on empirical examination of the patterns and causes of moods in extreme polar environments, no published research exists on the expectation-emotion connection. Using a series of brief interviews, data will be collected regarding respondents' prior beliefs and expectations about the affective, social, and physical nature of Antarctica, and their subsequent, on-site perceptions of Antarctica. These interviews will be assessed for the degree to which there is discrepancy between expectations and perceptions. The level of discrepancy will then be compared to Profile of Mood States subfactor scores, which will be collected at the time of the interviews.

Event K081  
24 Oct – 6 Dec,  
15 – 22 Jan  
New Harbour,  
Cape Evans,  
Bratina Island

### **Ecology of Coastal Benthic Communities in Antarctica**

NIWA, P O Box 8602, Christchurch

*Dr Ian Hawes, Telephone: 348 8987, Facsimile: 348 5548*

*E-mail: i.hawes@niwa.cri.nz*

National Institute of Water & Atmospheric Research, PO Box 11-115, Hamilton

*Drs. Alf Norkko/Simon Thrush, Telephone: (07) 856 7026, Facsimile (07) 856 0151*

*Email: a.norkko@niwa.cri.nz, s.thrush@niwa.cri.nz*

This new two-year project will increase our understanding of the environmental processes, which influence the spatial structure of populations and communities of coastal soft-bottoms in Antarctica. It is concerned principally with how productivity gradients within and between habitats are functionally linked to the structure and biodiversity of the benthic system. During the course of the project we will address how the spatial structure of benthic communities relate to site-specific productivity, the role of benthic animals in recycling of pulsed food sources, and the behaviour and resource utilisation by mobile benthic key species (urchins and scallops) over different spatial scales. This work will involve sampling depth and resource gradients within locations and, ultimately, between locations along the latitudinal gradient of the Victoria Land coast. Characterising the structure and function benthic communities and its link to site-specific productivity is essential to an improved understanding of Antarctic ecology and creates a baseline for distinguishing natural environmental variability, occurring over short ecological time and space scales, from larger scale phenomena such as global warming.

Event K085  
WINFLY,  
12 Oct to 19 Oct,  
14 Nov to 27 Nov,  
21 Jan to 4 Feb  
Scott Base,  
Arrival Heights

### **Processes and Interactions in the Antarctic Atmospheric**

NIWA, Private Bag 50061, Omakau, Central Otago

*Dr Stephen Wood, Telephone: (03) 447 3411 Facsimile: (03) 447 3348*

*Email: s.wood@niwa.cri.nz*

Although the Antarctic atmosphere has a unique physical and chemical character, its nature can influence all latitudes. The goal of this programme is to improve our understanding of the Antarctic atmosphere's role in global change and the consequences of its response to that change. It is a coordinated research effort focused in three areas: the evolution of ozone depletion over Antarctica, the effect of that depletion on New Zealand and globally, and the influence of the Antarctic region on greenhouse trace gases. The most dramatic effect of anthropogenic changes in the stratosphere is ozone depletion over Antarctica, which causes an increase in biologically-damaging radiation that may damage Antarctic ecosystems. Although ozone-destroying chlorine will soon begin to decline, ozone recovery may be delayed 1-2 decades due to climate change. Testing the agreement between observations in the Antarctic and predictions based on models will give early insight into the future of the ozone layer. Changes in greenhouse gases, including ozone, affect the radiative balance of the atmosphere in ways that are not yet fully understood.

**Event K087 Tropospheric and Stratospheric Air Sampling**

WINFLY, NIWA, P O Box 14 901, Kilbirnie, Wellington

8 Oct, *Mr G Brailsford, Telephone: (04) 386 0393, Facsimile: (04) 386 2501*

28 Jan to 1 Feb *Email: g.brailsford@niwa.cri.nz*

Scott Base,  
rt flight

As a major contribution to the balance of greenhouse gases, uptake of excess atmospheric CO<sub>2</sub> by the Southern Ocean is assumed in predictions of future climate change, but remains poorly quantified and understood. The Southern Ocean is expected to play a major role in CO<sub>2</sub> uptake for several reasons. CO<sub>2</sub> solubility is higher in colder waters, high wind speeds over the Southern Ocean drive rapid gas exchange across the air-sea interface, and deep ocean mixing in the high southern latitudes provides an efficient connection between the atmosphere and the very large carbon reservoir in the deep ocean. At present the most practical way of addressing the uncertainty in CO<sub>2</sub> uptake is to use precise measurements of atmospheric CO<sub>2</sub> in the Antarctic and high latitudes to infer surface fluxes and to complement this work where possible with in-situ measurements of relevant ocean chemistry and biology.

**Event K089 Climate Data Acquisition – Scott Base and Arrival Heights**

16 Jan to 24 Jan NIWA, PO Box 8602, Christchurch

Scott Base, *Mr Andrew Harper, Telephone: (03) 348 8987, Facsimile: (03) 348 5548*

Arrival Heights *Email: a.harper@niwa.cri.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 now 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.

**Event K102 Seismological and Geomagnetic Observatories**

IGNS, P O Box 1320, Kelburn, Wellington

*Dr Fred Davey, Telephone: (04) 473 8208, Facsimile: (04) 471 0977*

*Email: fred.davey@gns.cri.nz*

The seismological observatory records data on a continual basis from earthquakes occurring around the world. These data are analysed and transmitted to New Zealand and international agencies. The Scott Base – Dry Valleys seismograph system is one of the few in Antarctica and makes a significant contribution to New Zealand and global earthquake studies.

The magnetic observatory at Scott Base is an important site because of its long operation period. This observatory gives a record of long-term changes in the Earth's geomagnetic field. The observatory equipment at the Hatherton laboratory will be calibrated and checked this season. The Scott Base magnetic observatory is part of an international network monitoring the Earth's magnetic environment.

**Event K114 Seismic and Reconnaissance Survey for Stratigraphic Drill sites**

09 Oct to 15 Dec Institute of Geological and Nuclear Sciences Ltd,

New Harbour, *Dr Tim Naish, Telephone: (04) 570 4767, Facsimile: (04) 570 4603*

Windless Bight, *Email: t.naish@gns.cri.nz*

Brown Penn

This proposal seeks Antarctica New Zealand logistical support for a seismic reflection

survey at Windless Bight and a 10-day reconnaissance survey on the Ross Ice Shelf in the Brown Peninsula and Black Island region. The reconnaissance survey will involve shallow drilling (to 20m) to establish shelf ice thickness and condition, and bathymetric sounding to establish sub-ice water depth. The data will form an essential part of the preparation for a seismic survey to be run in late 2002 and a drilling programme proposed as part of the ANDRILL Consortium, McMurdo Portfolio in 2003-2008. It is proposed that the contracted drilling team move to the Black Island-Brown Peninsula region after completion of shot hole drilling in Windless Bight, thus taking advantage of equipment, expertise and personnel already at Scott Base.

Event K122  
30 Nov to 28 Jan  
Cape Bird,  
Cape Crozier,  
Cape Royds

### **Adelie Penguin Population Dynamics**

Landcare Research, Private Bag 6, Nelson

*Dr Peter Wilson, Telephone: (03) 548 1082, Facsimile: (03) 546 8590*

*Email: wilsonpr@landcare.cri.nz*

This collaborative project (joint NZ/US) addresses the theoretical question “What mechanisms control population size and colony distribution of Adelie penguins (*Pygoscelis adeliae*)?” and has application in understanding the impact of climate change and human impacts (fisheries, tourism, pollution) on the Antarctic marine ecosystem. We will distinguish the relative importance of key resources (nesting space and food) that constrain growth of colonies, and examine behavioural (immigration/emigration and breeding effort/success) mechanisms that may influence colony size. The research will be carried out at three Adelie penguin colonies on Ross Island, each differing in size by an order of magnitude. We will quantify reproductive effort and success, energetic cost of foraging, foraging range, diet quality, habitat use, emigration/immigration rates and sea-ice cover using techniques including aerial photography, telemetry, satellite imagery, stable isotopes, automated weighing systems, and the use of time-depth recorders and doubly-labelled water to assess energetic costs of foraging. Factors responsible for colonisation and growth in colonies will be modelled to help understand population regulation, the present effects of climate and to predict future trends.

Event K123  
30 Nov – 26 Jan  
Marble Point,  
Bull Pass,  
Dry Valleys,

### **Impacts of Fuel Spills on Antarctic Soils**

Landcare Research New Zealand Ltd, Private Bag 3127, Hamilton

*Dr Jackie Aislabie, Telephone: (07) 858 3713, Facsimile: (07) 858 4964,*

*Email: aislabiej@landcare.cri.nz*

Antarctic soils are unique as they occur in an extremely cold, arid environment. There is increasing concern about the impacts of human activities in the Antarctic. In occupied regions there is evidence of terrestrial oil contamination. To assess more effectively the effects of fuel spills, and to determine whether amelioration measures are necessary, it has become apparent that information is needed on the properties of Antarctic soils, and how they respond to hydrocarbon contamination. The goal of this programme is to determine the impact of fuel spills on Antarctic soils. The research is divided into three objectives. Two are focused on the effects of hydrocarbons on the biological, physical and chemical properties of soils, and the third on developing a decision support system for prevention of and remedial action after (oil) spills in ice free areas of the Ross Sea Region.

Event K131  
WINFLY,  
15 Oct – 22 Nov  
Cape Evans,  
Scott Base

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

Industrial Research Ltd, P O Box 31 310, Lower Hutt

*Dr T G Haskell, Telephone: (04) 569 0000, Facsimile: (04) 569 0754*

*Email: t.haskell@irl.cri.nz*

A consortium made up of four NZ Universities, international collaborators and IRL

proposes a programme or research 'Sea Ice and Southern Ocean Processes' that is of direct relevance to southern hemisphere climate and the fisheries of interest to New Zealand. This is being achieved by research on two complementary and intersecting objectives:

- i. *intermediate-scale properties of faults in sea ice*, which focuses on aspects of sea ice that disturb its homogeneity;
- ii. *ocean wave / sea ice linkages relevant to climate*, where the aim is to discover how sea ice is changed by waves with particular notice taken of spatial variability and abrupt transitions;

Specific research projects include: physical and mechanical measurements of sea ice imperfections using conventional and novel techniques including NMR; thermal conductivity; optical characterisation; experiments and modelling of wave propagation in heterogeneous media; the characterisation of the varied growth processes controlling the formation of sea ice.

Event K136  
10 Oct to 9 Nov  
Cape Evans

### **UV-B Effects on Bottom-Ice Algae**

New Zealand Institute for Industrial Research Ltd

*Dr Ken G Ryan, Telephone: (04) 569 0444 ext 4279, Facsimile: (04) 569 0132  
Email: k.ryan@irl.cri.nz*

The energy budget of the Southern Ocean is a vital component of global climate, and an understanding of the factors that influence primary productivity will provide a baseline for climate modellers. Productivity in ice-covered regions is dominated by ice algae, and we can now make in situ measurements of their photosynthetic rates without disturbing them at all. In previous programmes we made initial assessments of the impact of UV-B on bottom-ice algal productivity and biodiversity. This proposal will continue and extend that work by examining the biochemical response and nutritional status of the algae to UV-B stimulus. Unlike higher plants, Antarctic algae do not synthesise the UV-B absorbing flavonoids of terrestrial plants, and other compounds such as MAAs may have an equivalent UV-B protective function. Ultimately, the UV-B induced predominance of a less palatable but **more UV-B tolerant alga** may be more important ecologically than any loss of productivity. In 2001 we will begin a tripartite investigation (New Zealand/Australia/UK) of the effects of climate change on total primary productivity (sea ice, phytoplankton and benthic communities) in coastal ecosystems, focussing on the impact of changes or reduction of sea ice extent

Event K294  
2 Nov - 16 Nov

### **Natural History New Zealand**

*Vivienne Allan, Antarctica New Zealand, Private Bag 4745, Christchurch, Phone 358 0200. Email: v.allan@antarcticanz.govt.nz*

Filming for 'Hot Science' programme for National Geographic

Event K352A  
28 Jan 02 –  
18 February 02  
Scott Base

### **Study on the Role of Gravity Waves in the Dynamics and Energetics of the Antarctic Boundary Layer. (Malaysian Antarctic Programme)**

Air Pollution Research Unit, University

New Zealand Institute for Industrial Research Ltd

*Assoc. Prof. Aziz A Samah, Telephone: 603 759 5504, Facsimile: 603 759 5457  
Email: f4aziz@umcsd.um.edu.my*

This research project intends to study the role of gravity waves in the dynamics of the Antarctic boundary layer in the Ross Sea Region. Gravity waves activity has been detected in the British antarctic Survey Stable I/II program associated with shear instabilities in the Katabatic flow (Darby and Mobbs 1988). This study will

investigate further the role of gravity waves flow interactions. The first phase of the study will be the observation and detection of the gravity waves using an array of microbarographs and related flux measurements using sonic anemometers and two automatic weather stations. The second phase will be an extension of the first study and boundary layer radiosonde flights to determine the vertical profile of the boundary layer. The third phase of the study will be the use of observation and rams model to model and understand the interactions of gravity waves with the boundary layer. This study too will enable a comparison to be made between the dynamics of a stably stratified boundary layer with a strong coriolis force and convectively driven boundary layer with near zero coriolis force

Event K352B  
18 Oct – 29 Oct  
Cape Evans

### **Model Development and Application of Microwave Remote Sensing in the Antarctic**

Multimedia University

*Prof. Dr. Chuah Hean Teik, Telephone: 03 8312 5257, Facsimile: 03 8318 3029*

*Email: htchuah@mmu.edu.my*

This project proposes to develop a theoretical model that studies the interaction of electromagnetic waves with sea ice. Previous studies on the microwave remote sensing with applications in vegetation and snow have been carried out and can be extended to applications in sea ice. In microwave remote sensing, understanding the sea ice-wave scattering mechanisms is important, as this will affect the sea ice backscattering radar returns measured by the remote sensing satellites. The effects of different sea ice parameters on the polarimetric radar returns and brightness temperature for co and cross-polarization will be explored and theoretical calculations will be compared with ground truth measurement results. The satellite radar images will be a useful tool for monitoring the physical properties of sea ice, such as age (first year or multiyear), thickness and extent. In addition, inversion techniques based on theoretical models and remotely sensed satellite data can be applied to retrieve sea ice parameters. This will definitely support the exploration and monitoring work in the large Antarctic sea ice area. The use of satellite radar allows large area coverage and is independent of the Sun as the illumination source. A classification scheme will also be developed to classify the land cover and sea ice extent in the Antarctica, using available satellite images of the continent.

K391 A  
19 Nov - 29 Nov  
Cape Evans

### **Education programme: Secondary Schools Antarctic Education Initiative**

*Natalie Cadenhead, Antarctica New Zealand, Private Bag 4745, Christchurch*

*Phone 358 0200. Email: n.cadenhead@antarcticanz.govt.nz*

*Liam Nolan, Tauranga Girls College, 930 Cameron Road, Tauranga*

*Phone (07) 578 8114, Fax (07)578 8447. Email: liamnolans@yahoo.com*

Looking at the processes and difficulties of scientific research in Antarctica, focussing on the importance of Antarctica in environmental monitoring, and the impact of global human activities on Antarctica. Joining K081 to gather first hand experience of conditions, scientific research, logistical constraints and environmental monitoring in Antarctica. Production of educational resources on return to New Zealand.

K391 B  
5 Nov - 12 Nov

### **Education programme: Familiarisation visit for Antarctic education institutes and educator from Lincoln College.**

*Natalie Cadenhead, Antarctica New Zealand, Private Bag 4745, Christchurch*

*Phone 358 0200. Email: n.cadenhead@antarcticanz.govt.nz*

Familiarisation visits for educators representing the Antarctic Visitors Centre, Christchurch, Kelly Tarlton's Underwater world and Antarctic Encounter, Auckland,

and Otago Museum, Dunedin, which provide Antarctic information on a day to day basis to a wide audience. Visit to provide credibility to educators. This event will work with an educator from Lincoln College research for the new Arts Curriculum, a ceramic artist as an Antarctic Foundation funding opportunity and a familiarisation visit by a NZDF media representative.

K391 C  
29 Oct - 5 Nov

### **Education programme: Education Initiatives in Antarctica Programme**

*Natalie Cadenhead, Antarctica New Zealand, Private Bag 4745, Christchurch  
Phone 358 0200. Email: n.cadenhead@antarcticanz.govt.nz*

Visit by educators from Christchurch and Wellington Colleges of Education to gather information to create curriculum based educational resources relating to Antarctica in the curriculum areas of Social Studies, Geography, science and environmental education.

Event will work with (K393KG) who is a media representative who will profile New Zealand supported science events

K391 D  
28 Jan - 4 Feb

### **Education programme: Education Initiatives in Antarctica Programme**

*Scott Base Operations Manager will act as minder for this group while in Antarctica  
Natalie Cadenhead, Antarctica New Zealand, Private Bag 4745, Christchurch  
Phone 358 0200. Email: n.cadenhead@antarcticanz.govt.nz*

Visit by University of Otago educator (Jim Higham) to gather information to create curriculum and university based educational resources relating to Antarctica in the areas of tourism and environmental education.

K393KG  
29 Oct - 5 Nov

### **Media Initiatives in Antarctica Programme**

*Natalie Cadenhead, Antarctica New Zealand, Private Bag 4745, Christchurch  
Phone 358 0200. Email: n.cadenhead@antarcticanz.govt.nz  
Kim Griggs, 52 Helston Road, Johnsonville, Wellington  
Phone: 04 938 4852. Email: kim@griggs.net*

Visit by media representative to profile New Zealand supported science events. This event will work with educators from Christchurch and Wellington Colleges of Education who will gather information to create curriculum based educational resources relating to Antarctica (K391C)

K393KH  
5 Nov - 10 Nov

### **Media Initiatives in Antarctica Programme**

*Vivienne Allan, Antarctica New Zealand, Private Bag 4745, Christchurch  
Phone 358 0200. Email: v.allan@antarcticanz.govt.nz*

Familiarisation visits for media representing New Zealand Defence Force. This event will work with (K391B) education familiarisation group and (K394MN) foundation funding arts opportunity event.

K393VM  
14 Nov - 27 Nov

### **Media Initiatives in Antarctica Programme**

*Vivienne Allan, Antarctica New Zealand, Private Bag 4745, Christchurch  
Phone (03) 358 0200, Fax (03) 358 0211. Email: v.allan@antarcticanz.govt.nz*

Opportunity for media representative to profile science events supported by New Zealand.

K394AN  
8 Jan - 22 Jan

### **Artists to Antarctica Programme**

*Scott Base Operations Manager will act as minder for this event while in Antarctica  
Vivienne Allan, Antarctica New Zealand, Private Bag 4745, Christchurch  
Phone 358 0200. Email: v.allan@antarcticanz.govt.nz*

Visit by Ann Noble, photographer, to take photographs of science activities and an in-depth study of an Antarctic environment

- K394DC Artists to Antarctica Programme**  
 30 Nov - 13 Dec Scott Base Operations Manager will act as minder for this event while in Antarctica  
*Vivienne Allan, Antarctica New Zealand, Private Bag 4745, Christchurch*  
*Phone (03) 358 0200, Fax (03) 358 0211. Email: v.allan@antarcticanz.govt.nz*  
 Visit by Artist Denise Copland to create installation exhibition on return to New Zealand of work based on Shackleton and Scott, and the theme of Antarctica as a global barometer.
- K394JH Artists to Antarctica Programme Historic Hut Photography Project**  
 8 Jan - 22 Jan This event will be accompanied at all times by a representative from the Antarctic Heritage Trust while at the historic huts.  
*Antarctic Heritage Trust, Private Bag 4745, Christchurch*  
*Phone 358 0200. Email: n.watson.aht@antarcticanz.govt.nz*  
 Visit by photographer to professionally photograph historic huts.
- K394MN Artists to Antarctica Programme – Antarctic Foundation funding opportunity visit**  
 5 Nov - 10 Nov *Natalie Cadenhead, Antarctica New Zealand, Private Bag 4745, Christchurch*  
*Phone 358 0200. Email: n.cadenhead@antarcticanz.govt.nz*  
 Familiarisation visit by ceramic artist as Antarctic Foundation funding opportunity. This event will work with educators representing education institutes, which provide Antarctic information on a day to day basis to a wide audience (K391B) and the visit by NZDF media personnel (K393KH).
- K394RT Artists to Antarctica Programme**  
 12 Nov - 23 Nov Scott Base Operations Manager will act as minder for this event while in Antarctica  
*Natalie Cadenhead, Antarctica New Zealand, Private Bag 4745, Christchurch*  
*Phone 358 0200. Email: n.cadenhead@antarcticanz.govt.nz*  
 Visit by Richard Thompson, painter to do photographs of Antarctic environment and gather information for installation exhibition on return to New Zealand

