LOGISTICS REPORT

K049: NZ ITASE
ANTARCTICA NEW ZEALAND 2008/09

Event Personnel:

Dr Nancy Bertler	Victoria University of Wellington and GNS Science

Name of compiler: Nancy A.N. Bertler

Signature of compiler:_____

*AIMS

The principal purpose of this year's field season was to conduct a maintenance work on automatic weather stations deployed at Evans Piedmont Glacier and Skinner Saddle and to measure mass balance at Victoria Lower Evans Piedmont Glacier as part of our long-term monitoring project. In addition, we recovered five shallow ice cores from the McMurdo Ice Shelf. This field work of the 2008/09 season is part of a larger, multi-year programme: NZ ITASE.

The NZ ITASE programme has five objectives:

1. **ITASE-Objective**
   The focus of the New Zealand ITASE group is to provide information from the climate sensitive, low altitude, coastal sites. This will capture the climate signature of the troposphere, which represents a regional account on the Ross Sea climate. The ice core data are expected to provide a record of air temperature, snow accumulation, precipitation source, atmospheric circulation strength, storm frequency, sea ice variation, ocean productivity, and anthropogenic influences. The results will help to decide whether the Ross Sea region is currently cooling or warming with a longer-term prospective, taking low frequency climate variability (100 to 1000 year cycles) into account. Furthermore, proposed tele-connections such as the Amundsen Low-ENSO correlation [Bertler et al. 2004; Meyerson et al. 2002] or the Southern Hemisphere Annual Mode [Thompson and Solomon 2002] can be further constrained.
2. **Latitudinal Gradient Project Objective**
   The project is expected to contribute substantially to the Latitudinal Gradient Project, as it can provide a history of temperature, humidity, sea ice cover, precipitation source, atmospheric circulation, and ocean productivity along the Victoria Coast for the last 200 to 10,000 years. Furthermore, the timing and velocity of the Ross Ice Shelf retreat some 9 to 5ka years ago is still discussed controversially [Hall and Denton 2000; Steig et al. 1998; Steig et al. 2000].
3. **ANDRILL Objective**
   The ice core locations 2 and 3 (Evans Piedmont Glacier and Mt. Erebus Saddle) are in the vicinity of planned ANDRILL coring locations (Granite Harbour and Windless Bight). The ice core records will provide a high resolution climate dataset, which serves as a reference for the younger part of marine record recovered through ANDRILL.
4. **Longer-Term Mass Balance Objective**
   During the 1999/2000 season mass balance measurement devices (submergence velocity method [Hamilton and Whillans 2000; Hamilton et al. 1998]) have been deployed at Victoria Lower Glacier. The device has since been revisited. The measurements show that the glacier has a slightly negative mass balance, losing around 12-15cm thickness per year. A continuation of the measurements will allow monitoring changes in the ablation intensity of the McMurdo Dry Valleys.
5. **The Antarctic – New Zealand Connection Objective**
   New Zealand's future economic and social development, environmental sustainability, and infrastructural planning critically relies upon the accurate assessment of the impact of "global warming" in our sector of the planet. Future

climate change is a result of both natural variability and anthropogenic influence. A joint programme between Victoria University, GNS Science, University of Maine, is investigating ice core records from New Zealand (Tasman Glacier and Mt. Ruapehu ice field). The comparison between our NZ and Antarctic ice core records will provide much needed data for the development of realistic regional climate models to predict NZ climate in the 21th Century [Mullan et al. 2001].

*PERSONNEL

Complete table below for each member of your event

Name	Role	Organisation	Departed Christchurch	Returned Christchurch
Bertler, N.A.N.	PI	Victoria University and GNS Science	10 Nov 08	21 Nov 08

*PLANNING

Discuss the pre-Antarctic planning phase of your event, detailing any suggestions for improvements to:

- *The application process*
  The application process was efficient and well documented
- *Communications with Antarctica New Zealand staff*
  Communication with Antarctica New Zealand staff was professional, timely, and effective.
- *Pre-season information*
  The information received was timely and valuable
- *Medicals, documentation and flights to Antarctica*
  The information received was timely and valuable. However, I would like to note that there is a loophole in the information flow for the medical assessment. I would like to suggest that the PI of any field group will be informed by the medical advisor of any condition of a team member relevant to the field deployment, such as allergies etc. Furthermore, I would like to suggest adding to the medical questionnaire the question on how long the examining doctor has known the patient. This would help the medical advisor to evaluate how comprehensive the medical assessment might be.
- *Environmental Advice*
  The pre-season information received was timely and valuable
- *Other comments*
  The multi-season experience of many Antarctica NZ staff makes the planning process field deployment a professional and efficient process.

*PREPARATIONS FOR THE FIELD

As applicable discuss your initial period at Scott Base relating to:

- *Reception and planning for your event*
  The reception was well organised, friendly and efficient. The main issues of the event were promptly discussed and organised.

- *Availability and condition of equipment received, noting any work required by your party to make the equipment serviceable*
  Overall, field equipment was in good condition and acceptable for our deployment. However, some items had been fully allocated and hence were not available for this project. This includes small tents, sleeping bags, gas bottles for cookers, fuel spill kits etc). We would like to thank Scott Base staff for providing alternative solutions.
- *Antarctic Field training and any additional or specialist training*
  The refresher training was efficient and useful.
- *Field party equipment 'shakedown' journey*
  Not applicable
- *Delays at Scott Base, whatever the cause*
  Weather delays postponed our visits to Skinner Saddle on three occasions.
- *Safety and Risk Management processes*
  The risk management process is useful.
- *General comments about Scott Base* (If you feel that any service was poorly carried out by support staff at Scott Base, please make a note of this, but include a positive recommendation for the improvement of this service. You should also have raised this at Scott Base at the time to enable improvements to be made)
  I would like to thank Scott Base staff for their very efficient, professional, and above and beyond support with our programme! I'm particularly grateful for the field support of Nathan Cross, Lyall Cross, and Paul Roger.

FIELD TRANSPORT

As applicable report on the following, noting any improvements that can be made:

- *Vehicles* (Report on the suitability of field transport allocated to you and its condition when taken over)
  The PB1 PistenBully was used to recover shallow ice cores along from Windless Bight in a traverse from White Island to Scott Base. The vehicle performed well and was driven and operated by Lyall Cross.
- *Aircraft Operations* (Outline the success or otherwise of all fixed wing or helicopter operations supporting your event. As appropriate, detail the suitability of any landing sites used. Clearly mark these on your report map and provide GPS coordinates where possible)

  Field deployment to Skinner Saddle was carried out with HNO and to Evans Piedmont and Victoria Lower Glacier with NSF 36J. Both deployment and pickup of cargo and passengers was very professional, efficient, and safe. The extensive regional and local experience of the pilots, in particular, Rob McPhail is invaluable. We are grateful for the exceptional support and assistance in the field by HNO.

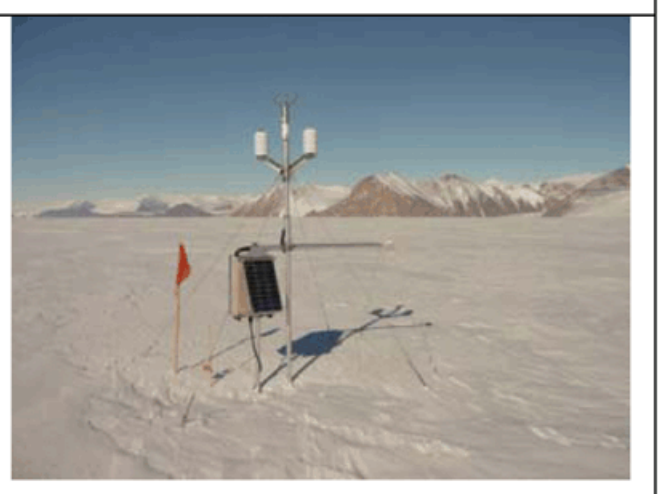
- *Ship Operations* (Outline cargo loading and embarkation procedures. Provide your cruise plan, sampling stations and landings made with GPS coordinates where possible. Comment on the degree of support provided by the ship's crew and facilities utilised on board, e.g. winches, laboratories.

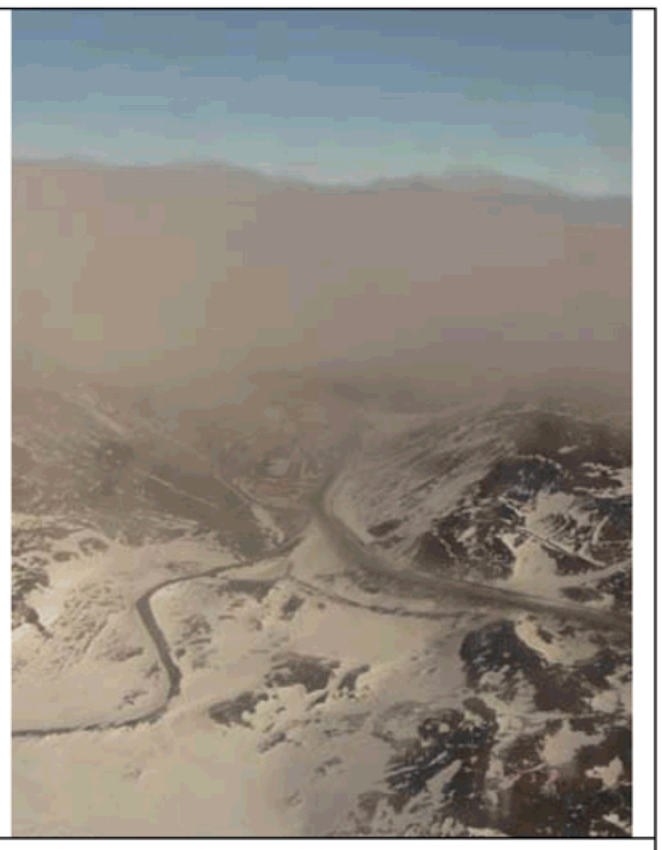
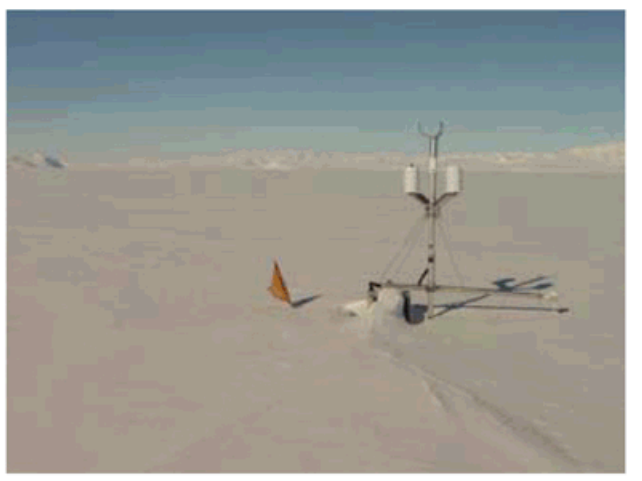
Describe any use made of seaborne helicopter or small support craft, e.g. Zodiac rubber rafts. Comment on the suitability of your clothing and survival equipment for your shipboard programme)

Not applicable

*EVENT DIARY

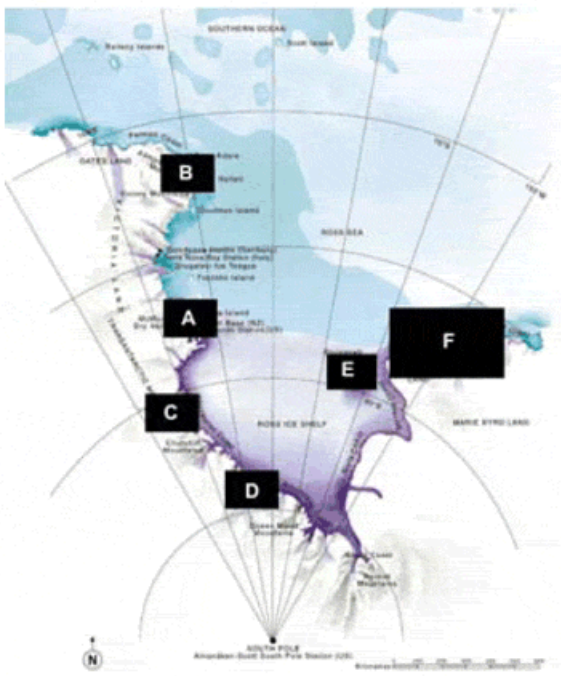
Describe your field activities and movements in a concise day-by-day diary form, including main activities, where the party stayed (hut, description of camp site) and if members are at different locations (note this and numbers at each location). Record general comments relating to weather, route finding problems, dangerous icefalls or crevasse fields (mark on event map), suitable campsites, surface conditions encountered etc.

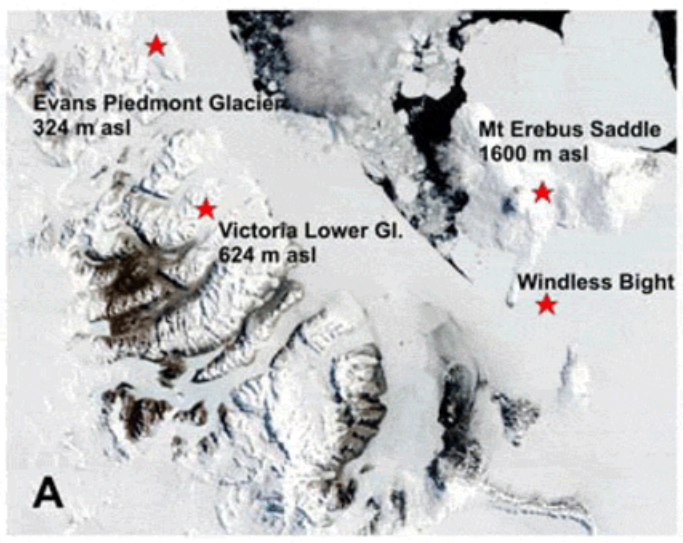
Date	Main Activities and Location	Other Comments
10/11/08 Monday	Arrive at SB	
11/11/08 Tuesday	Refresher AFT, locating cargo, staging of field equipment, testing of science equipment	
12/11/08 Wednesday	Hazard certification of hazardous cargo, supply cargo weights, and test field equipment	
13/11/08 Thursday	SB to Evans Piedmont Glacier with NSF 36J: Nancy Bertler, Nathan Cross, Paul Rogers, arrive at 11am. Weather Station in good condition, down loading of meteorological data, checking battery voltage and solar panel charging capacity. Replace Storage module CR10 with CR10X and upload new programme. Measure mass balance devices, which are now 27cm below snow surface. Will require extension during 2009/10 field season	
14/11/08 Friday	Unsuitable weather conditions over Darwin Glacier area led to cancellation of deployment to Skinner Saddle. Inspection of the new ice core reefer container showed minor damage on the exterior.	
15/11/08 Saturday	Suitable weather but lack in helicopter capacity (full schedule) – no deployment. Organisation of drilling equipment to recover shallow ice cores from McMurdo Ice Shelf	

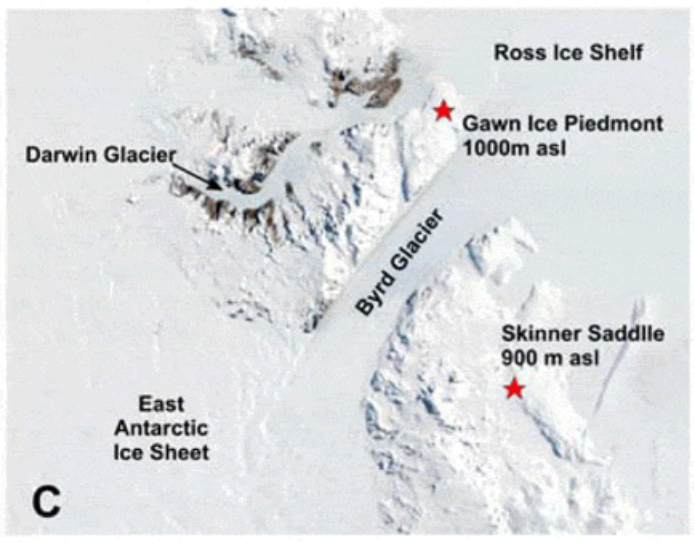
17/11/08 Monday	Attempted to deploy to Skinner Saddle with HNO but unsuitable weather conditions at SB and MCM cancelled deployment	
18/11/08 Tuesday	Deployment to Skinner Saddle with HNO: Nancy Bertler, Nathan Cross, and Paul Rogers. After refuelling at Darwin Glacier Fuel Camp, arrive at Skinner Saddle at noon. Weather Station in good condition, but buried in deep snow. 1.60m snow accumulation since deployment in 2007/-8 field season. Excavating weather station, down loading of meteorological data, checking battery voltage and solar panel charging capacity. Replace Storage module CR10 with CR10X and upload new programme.	
19/11/08 Wednesday	Traverse from White Island to Scott Base, following Black Island road, using PB02: Nancy Bertler, Lyall Cross, and Naomi. Recovery of a total of five cores of ~3m length at each site	
20/11/08 Thursday	Packing cargo, discuss with cargo handler shipment requirements for temperature sensitive cargo and general cargo	
21/11/08	Departure for Christchurch	

EVENT MAP

Append a map to show vehicle routes, aircraft landing sites, dangerous areas, depots and campsites etc. Highlight any inaccuracies on existing topographical maps and provide GPS coordinates where possible.







WEATHER

Provide a general overview of your local weather throughout the season and how this aided or hindered your party movements and decisions. This is especially important for events with deep field camps.

Not applicable as no overnight stays were required for our work

*HEALTH, SAFETY AND ENVIRONMENT

Comment on Antarctica New Zealand's HSE culture.

- *Is Scott Base a comfortable environment where personnel feel confident and safe?*
  In my opinion, Scott Base provides a very comfortable and safe environment. This could be improved further by empowering staff and visiting groups with a higher degree of personal responsibility and by further reducing generalised rules (for example what to wear) and unnecessary signage around the base.

- *Comment on the quality of the HSE systems at Scott Base with regards to briefings, risk assessments and the reporting procedure*
  Sufficient and well advertised and promoted.

- *Outline any accidents, incidents or near miss events*
  None

- *Detail any hazards you observed that may require further action or notification to others*
  None

*MORALE AND WELFARE / BASE SERVICES

Provide feedback on the overall services at Scott Base.

- *Are the services provided (food, rooms, lounge, library, briefing room, gym, etc.) suitable for your requirements? If not, please provide suggestions.*
  Scott Base offers an extraordinary level of services. I particularly would like to point out the usefulness of the Hillary Field Centre and also the well designed recreation area

adjacent to the mess. Work conditions in the office area adjacent to the library would improve with better lightening and a more ergonomic set-up (eg. better chairs, some shelving or draws).

- *Comment of activities available and your ability to participate in them (social events, FAM trips, activities at McMurdo)*
  Scott Base offers a very active and in my mind important recreational programme, that allows staff to feel safe, comfortable, and confident in the Antarctic environment. Also, I believe that FAM trips in particular are very useful to give base staff a sense of field deployments that is helpful in putting requests from field parties into perspective. For these reasons I can only suggest to maintain and if possible strengthen this programme. Furthermore, I believe that the current system for participation is fair and simple.

- *Other*

FIELD EQUIPMENT

Comment on the following where appropriate. In all cases, fully explain any modification made by you to this equipment during the season. Positive suggestions are encouraged for the improvement of all equipment.

- *Quality, suitability and performance of field clothing issued to you by Antarctica New Zealand*
  The new field clothing is functional, of high quality, well thought through, and attractive. Small improvements could be made for the fleece trousers (too thin and hence cold) and the ECW jacket is missing a 'skirt', preventing cold air to enter in cold, windy condition. I found in particular the down-jacket and wind-shell combination very useful. Overall, I would like to congratulate Antarctica NZ and the manufacturer for this excellent new range of clothing!

- *Performance and design of field equipment such as tents, technical climbing equipment, kitchen gear, stoves, sleep kits and sledges*
  Field equipment was in short supply this year, but was received in good and well maintained conditions.

- *20 person day ration box or bulk food system. Include suggestions to improve the packaging of items or improve palatability and calorific value*
  Not applicable

- *Condition and performance of 'wannigans'*
  Not applicable

- *Performance and use of generators, spill kits, alternative energy systems*
  We used a 2kVA generator, which was provided well maintained and tested.

- *Specialised field equipment (e.g. Sipre hand auger, Jiffy auger)*
  Not applicable

- *Other comments*

RADIO COMMUNICATIONS

- *Suitability and effectiveness of the radio and/or Iridium equipment (including comment on battery power, condition of aerials and utilisation of solar panels)*
  I used VHF and HF radio as well as a Satellite Phone. The equipment was provided in excellent conditions, tested, and with good and useful explanations and advice on new changes, maintenance, and usage.
- *Reception/transmission conditions (especially where repeater stations were in use). Particularly note any periods during your field trip, or regions you visited, where radio reception was especially bad or unexpectedly good.*
  Radio and satellite transmission was clear
- *Suitability of radio schedule timing*
  Not applicable
- *Scott Base's general efficiency during radio schedule in providing details of forthcoming field movements, weather forecasts, re-supply, or news service*
  Radio communication was efficient and helpful.
- *Other comments*

TECHNICAL FACILITIES

Provide feedback on the following:

- *Assistance the science technicians gave with computer / IT issues*
  Not applicable
- *Assistance the science technicians gave in the field and with requirements from McMurdo*
  I would like to thank Nathan Cross for his excellent assistance in the field with the maintenance of our automatic weather stations at Evans Piedmont Glacier and Skinner Saddle.
- *Public computer facilities in the Hatherton Laboratory*
  Public computer facilities are useful and adequate
- *Internet connectivity and data transfer ability*
  Internet connectivity is useful and adequate.

*ENVIRONMENTAL IMPACT

Information from this section helps us to assess the environmental (including cumulative) impacts and overall environmental performance of New Zealand's activities each year. This reporting is a requirement of the Antarctica (Environmental Protection) Act, which implements the internationally agreed Protocol on Environmental Protection to the Antarctic Treaty in New Zealand. The report also forms the basis for annual input into Antarctica New Zealand's environmental database, an electronic record of all New Zealand activities in the Ross Sea region since 1957.

Please be as specific as possible. For locations occupied, provide the site or protected area name, and GPS coordinates or map references where appropriate. GPS coordinates should be given in degrees, minutes and decimal minutes (e.g. 78° 20.835'S 166° 33.541'E). Note that the geodetic reference used should be WGS84.

Two sub-sections are compulsory as they are relevant to **all** events. Sub-sections without asterisks need only be completed if relevant. Unnecessary sections should be deleted. Comments on any area of environmental management are welcome and can be added beneath the relevant table.

***Sites Visited** (please complete a table for each site visited)

Site name	Evans Piedmont Glacier
Site coordinates	76°43.5335' S, 162° 35.2940' E, 314m asl
Is this site in an ASMA or ASPA? If so, which one?	McMurdo Dry Valleys ASMA
Dates occupied (from – to)	13 Nov 2008
Total time (days /hours) at site	3
Maximum number of people at site (your event)	3
Total person-days (or person-hours) at site	9 person hours
Main activity undertaken	Maintenance of automatic weather station and retrieval of recorded data; and mass balance measurement
Cumulative impacts observed	None
Helo landing site coordinates if not established AND marked	None

Site name	Victoria Lower Glacier
Site coordinates	77°19'48.31"S, 162°31'55.29"E, 626.2 m asl
Is this site in an ASMA or ASPA? If so, which one?	McMurdo Dry Valleys ASMA
Dates occupied (from – to)	13 Nov 2008
Total time (days /hours) at site	3 hours
Maximum number of people at site (your event)	3
Total person-days (or person-hours) at site	9 person-hours
Main activity undertaken	Mass balance measurements
Cumulative impacts observed	None
Helo landing site coordinates if not established AND marked	N.A.

Site name	Skinner Saddle
Site coordinates	80°55’54.66”S, 159°30’11.56”E, 917.5m asl
Is this site in an ASMA or ASPA? If so, which one?	No
Dates occupied (from – to)	18 Nov 2008
Total time (days /hours) at site	6
Maximum number of people at site (your event)	4
Total person-days (or person-hours) at site	24
Main activity undertaken	Relocation and maintenance of automatic weather station and retrieval of recorded data
Cumulative impacts observed	None
Helo landing site coordinates if not established AND marked	N.A.

Site name	Windless Bight
Site coordinates	78°03.273’S, 166°57.604’E 77°59.224’S, 166°59.673’E 77°56.201’S, 167°00.063’E 77°53.502’S, 166°00.053’E 77°51.324’S, 166°57.250’E
Is this site in an ASMA or ASPA? If so, which one?	No
Dates occupied (from – to)	19 Nov 2008
Total time (days /hours) at site	10
Maximum number of people at site (your event)	3
Total person-days (or person-hours) at site	30 person-hours
Main activity undertaken	Recovery of 5 shallow (~3m deep) firn cores
Cumulative impacts observed	None
Helo landing site coordinates if not established AND marked	N.A.

Geological Material

Detail any collection of geological material (including meteorites, ventifacts, fossils or sub-fossils) or soil. For **each sample** (or group of samples) taken provide:

Location		*Specimen type*	*Quantity (kg)*
Site name	Coordinates		
Windless Bight	78°03.273'S 166°57.604'E	Shallow firn core	10 kg
Windless Bight	77°59.224'S 166°59.673'E	Shallow firn core	10 kg
Windless Bight	77°56.201'S 167°00.063'E	Shallow firn core	10 kg
Windless Bight	77°53.502'S 166°00.053'E	Shallow firn core	10 kg
Windless Bight	77°51.324'S 166°57.250'E	Shallow firn core	10 kg

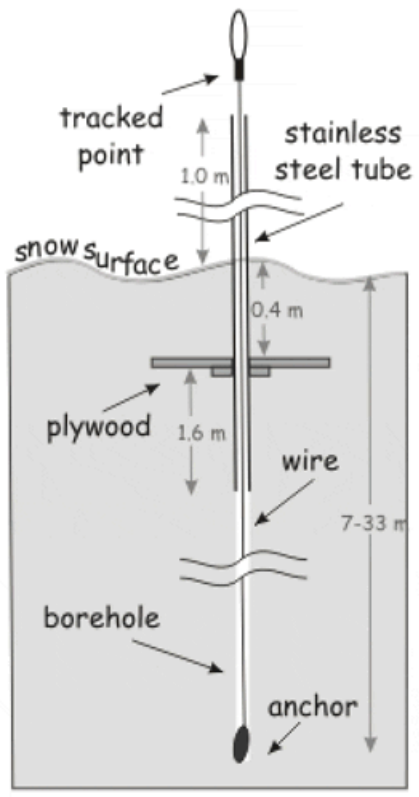
Equipment installed/left in field

List any equipment, markers, stakes or cairns installed in the field during your visit. Upon completion of your event there should be no trace of any equipment or markers, etc., unless permitted to do so. This should include the removal of any constructed stone cairns. If any equipment installed and/or remaining in the field, provide:

Type of equipment/marker installed	*Year of installation*	*Location (name and coordinates)*	*Number of items left in field*	*Dimension (in metres: H, W, L)*	*Removal status**
Automatic weather station	2007	Skinner Saddle, 80°55'54.66"S, 159°30'11.56"E	1	3m, 4m, 4m	Ongoing Use
Automatic weather station	2004	Evans Piedmont Glacier 76°43.5335' S, 162°35.2940'E	1	3m, 4m, 4m	Ongoing Use
Mass balance device	2004	Evans Piedmont Glacier 76°43.5335' S, 162°35.2940'E	1	20cm (~12m below surface) x 3cm x 3cm	Ongoing Use
Mass balance device	1999	Victoria Lower Glacier 77°19'48.31"S, 162°31'55.29"E	2	0.5m (~12m below surface) x 3cm x 3cm	Ongoing Use
If equipment has been left in the field please provide a justification and insert or append a photograph of the installation(s):					

Automatic Weather Station:

The meteorological data will be used to establish transfer functions between ice core proxies and atmospheric parameters. The AWS records temperature, wind direction and speed, humidity, snow accumulation, snow temperature, pressure, and solar radiation. Both sites have identical weather stations. The figure shows the set-up at Skinner Saddle



Mass Balance Device:

The mass balance data are used to establish the longer term mass balance of coastal ice masses in Antarctica. We measure the net loss or gain via submergence velocity measurements. We will remove as much of the device as possible once the base is buried too far below the surface to continue the measurements. Both sites have similar mass balance set-ups. The figure shows the set-up at Victoria Lower Glacier

*Removal status categories are: 'Ongoing Use' (provide date of removal); 'Remaining' (provide date of removal); 'Removal Intended' (provide date of removal); 'Removed'; 'Unknown'; 'Unlikely'; 'Unrecoverable'.

*Bioprospecting activities

New Zealand is collecting data for discussions on bioprospecting in Antarctica at the Antarctic Treaty Consultative Meetings. Here, we define bioprospecting as '*The search for chemical compounds and genetic materials from plants, animals and micro-organisms; the extraction and testing of those compounds and materials; and the research and commercial development of those that show activity.*'

To your knowledge, does your science involve any bioprospecting activity?
No

*Differences from original Preliminary Environmental Evaluation (PEE)

If the activities described above differ from the environmental impact assessment (usually a Preliminary Environmental Evaluation (PEE)) completed for this event (and any approved changes), or from the Environmental Authorisation issued to it, explain how and why they differed. If there were no differences, please specify 'None'.

'None'

IMMEDIATE SCIENCE REPORT

K049: NZ ITASE
ANTARCTICA NEW ZEALAND 2008/09

Event Personnel:

Dr Nancy Bertler	Victoria University of Wellington and GNS Science

1. Scientific Programme

This section should short and concise. The information you provide will be used for post-season publications such as Antarctica New Zealand's annual report, media releases and other information documents, so that we can give informed coverage of your science. As a result, the audience is likely to be largely non-scientists so we ask that you present your submission in an easy to read 'laymans' style.

a. Context of research in terms of the contribution to scientific knowledge and to the Science Strategy and the relevance of the research

Unprecedented changes are occurring in the Earth's climate. 2005 and 1998 were the warmest two years in the instrumental global surface air temperature record since 1850. The global average surface temperature has increased, especially since about 1950 with 100-year trend (1906–2005) of 0.74°C ± 0.18°C (IPCC, 2007). 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 (Mann & Jones, 2003).
While meteorological records from instrumental and remote sensing data display the large intercontinental climate variability, the series are insufficient to infer trends or to understand the forcing, which renders prediction difficult (Jones et al., 1999; Mann & Jones, 2003). The long ice core records from the Antarctic interior and Greenland revolutionised our understanding of global climate and showed for the first time the occurrence of RCE (Rapid Climate Change Events) (for review e.g. Mayweski and White (2002)). To understand the drivers and consequences of climate change on timescales important to humans, a new focus of ice core work is now moving towards the acquisition of 'local' ice cores that overlap with and extend the instrumental records of the last 40 years back over the last several thousand years.
This has been a key motivation behind the US-led International Transantarctic Scientific Expedition (ITASE) of which New Zealand is a member. The NZ ITASE objective is to recover a series of ice cores from glaciers along a 14 degree latitudinal transect of the climatically sensitive Victoria Land coastline to establish the drivers and feedback mechanism of the Ross Sea climate variability (Bertler et al., 2004a; Bertler et al., 2004b; Bertler & 54 others, 2005; Bertler et al., 2005a; Bertler et al., 2005b; Patterson et al., 2005). Furthermore, the ice core records will provide a baseline for climate change in the region that will contribute to the NZ-led multinational Latitudinal Gradient Project as well as providing a reference record for the NZ-led ANDRILL objective to obtain a high-resolution sedimentary archive of Ross Ice Shelf stability.

b. Research objectives

Automatic weather station set-up, maintenance, and data retrieval
In 2004/05 we deployed an automatic weather station on EPG. The data permit the calculation of transfer functions between ice core proxies and meteorological parameters, such as temperature, precipitation, meso-scale atmospheric circulation pattern, katabatic winds, and seasonality of snow accumulation. In addition a new snow accumulation sensor and high precision snow temperature probes allow us to monitor snow accumulation rates, the potential influence of snow loss through sublimation, wind erosion or melt, and the quality of preservation of the meteorological signal in the snow. Furthermore, the data allow us to estimate the uncertainty of re-analysis data (NCEP/NCAR and ERA-40 data) in the region. In addition we set-up a new automatic weather station at Skinner Saddle for the interpretation for our planned ice cores from Skinner Saddle and Gawn Ice Piedmont.

Fig.1: Automatic weather station at Skinner Saddle after excavation (left image) and before (right image)

Submergence Velocity Measurements at Victoria Lower and Evans Piedmont Glacier

The response time of a glacier to changes in accumulation or ablation is dependent on the size and thickness of the ice mass. In general, the response time of cold-based glaciers is positively correlated with the size of its ice mass, leading to long response times in Antarctica. For glaciers in the McMurdo Dry Valleys, with lengths on average of 5-10km and flow rates of 1 to 3 m/a, the response times are thought to range from 1,500a to 15,000a (Chinn, 1987; Chinn, 1998). Consequently, annual variations in surface elevation may only reflect changes in loss rates. As a result surface measurements of mass balance are difficult to interpret in terms of long-term mass balance (Hamilton & Whillans, 2000). This is especially the case in places like the McMurdo Dry Valleys where mass loss is thought to be predominately due to sublimation at ice cliffs and glacier surface caused by wind and solar radiation (Chinn, 1987; Chinn, 1998). For Victoria Lower Glacier (VLG), two mass balance measurements are available in the literature for 1983 and 1991 based on ice cliff characteristics and the motion of the glacier snout (Chinn, 1998). The measurements indicate that VLG was advancing 1.24m/a into Victoria Valley during this time period. However, the small number of observations (2) and the cliff's sensitivity to sublimation (contemporary surface ablation) result in a high uncertainty of longer term mass balance. To determine the longer-term mass balance of the glaciers, unaffected by annual surface variations, three 'coffee-can' or 'submergence velocity' devices (Hamilton et al., 1998; Hamilton & Whillans, 2000) were deployed at Victoria Lower Glacier in 1999/2000 and two at Evans Piedmont Glacier in 2004/05. These are annually re-measured to monitor mass balance changes.

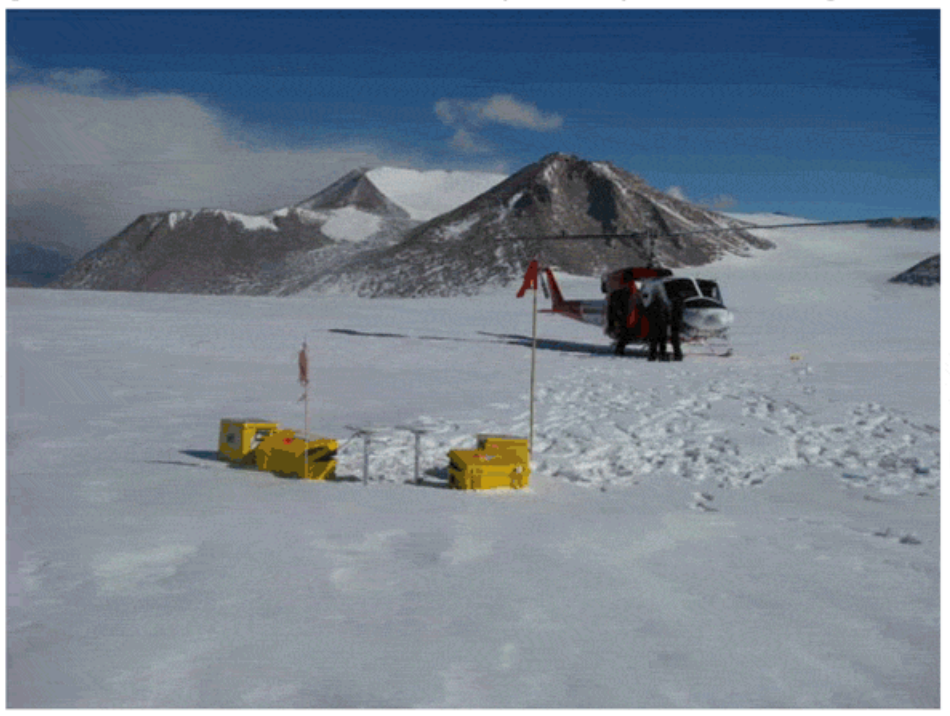


Fig.2: Submergence Velocity Measurements at VLG

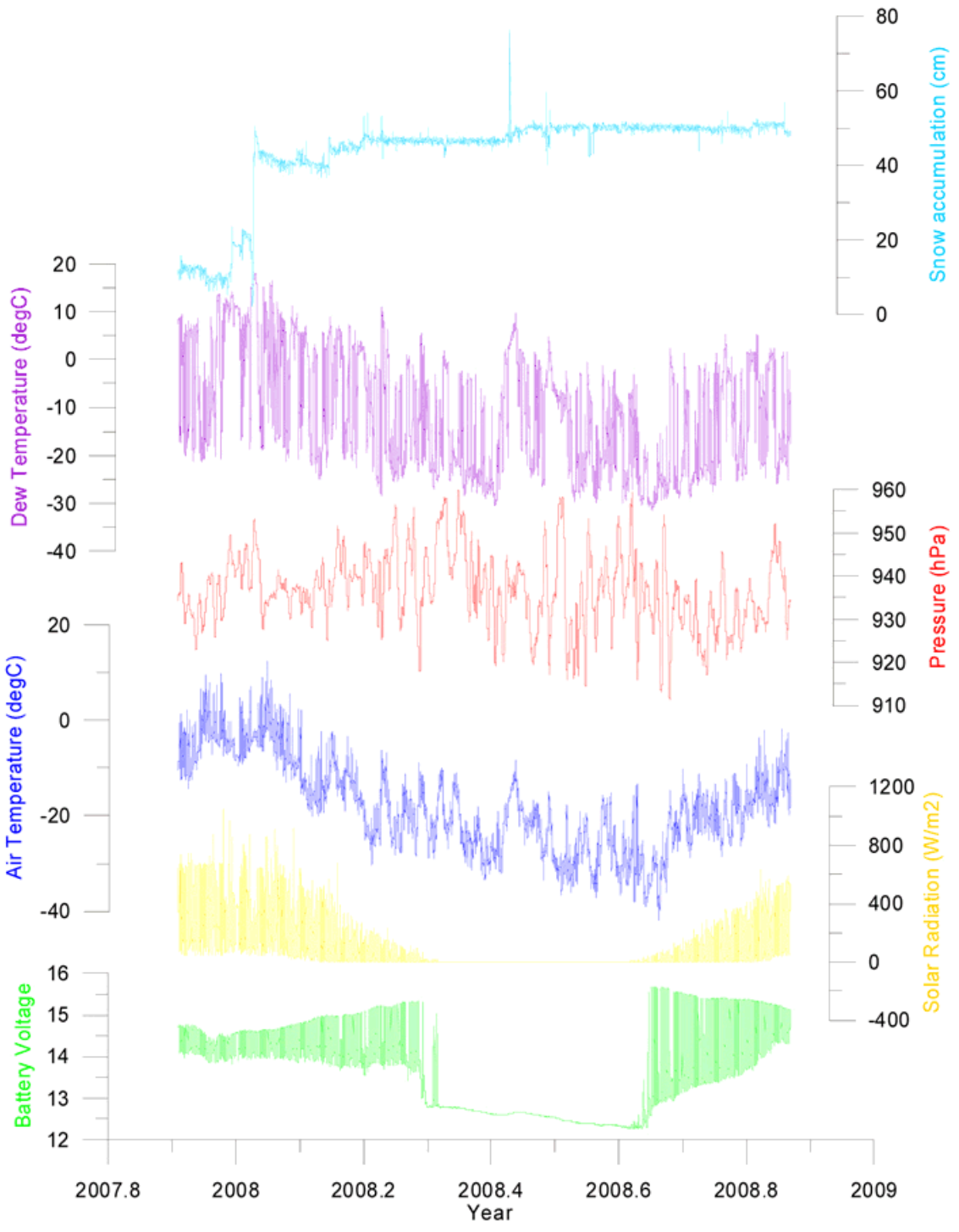
Drilling of five shallow firn cores from Windless Bight / McMurdo Ice Shelf

Fig.3: Firn core drilling along Black Island Road

To determine dust flux through the McMurdo Ice Shelf and onto the seabed beneath, a series of shallow firn cores were recovered from the Windless Bight area. This region was chosen as a previously collected 20m firn core showed distinct dust layers that are dateable to the large storm events in the area, such as the winter storm of 2004. The shallow 3m cores are expected to contain the 2004 storm and will allow quantification of the amount of dust deposited during the storm in the region.

c. Preliminary results and discussions

Both weather stations at Evans Piedmont Glacier (EPG) and Skinner Saddle (SKS) were operational and collected data over the last season. Below the data are shown.



Our weather data show that over the past year snow accumulation at the two sites varied. EPG received a total of 50cm snow, predominantly during the summer period. SKS received a total of 1.60m snow accumulation, precipitating throughout the year. Our data suggest that both sites have above average snow accumulation making them high resolution climate recorders.

Fig. 4: AWS data recovered this year from Evans Piedmont Glacier

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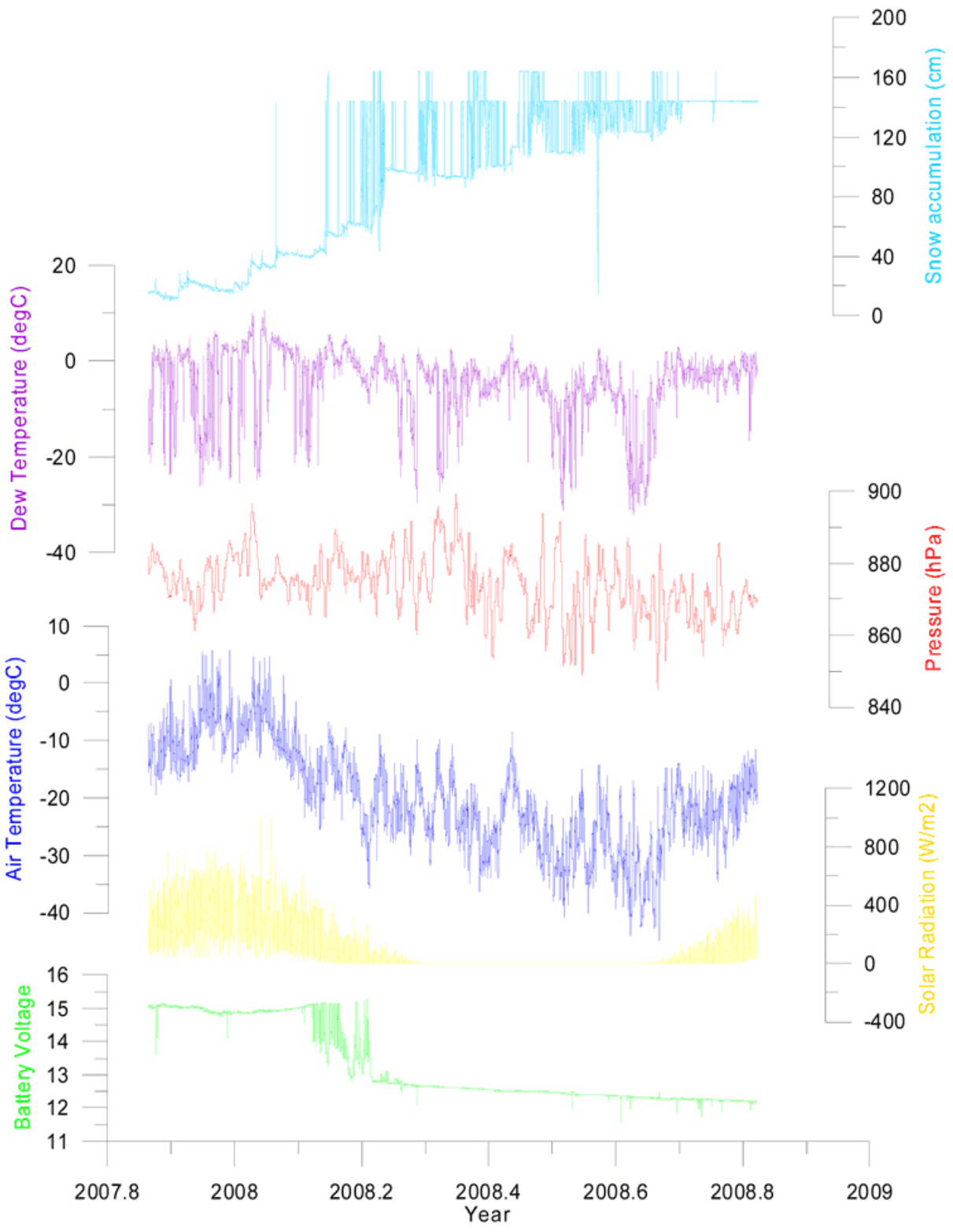

Maximum summer temperature at EPG and SKS reached +12°C and +5°C, respectively. Minimum winter temperature at EPG and SKS reached -42°C and -45°C, respectively. At both sites battery voltage never dropped below 12V, despite the solar panel being buried at SKS for the crucial spring period.

Fig.5: AWS data recovered this year from Skinner Saddle. The spiky, high snow accumulation data peaks indicate times when the snow sensor was ice covered. For reconstructing true snow accumulation, minimum base line is used.

2. Publications

As part of the measurement of research outputs that we are now undertaking, it is important that all your publications for the past year are included as these will be used for searching the Web of Science for citation data. Note that reprints of any publications resulting from work supported by Antarctica New Zealand are to be forwarded to the Science Advisor at Antarctica New Zealand. These are kept in a reprint collection for reference, recorded in our bibliography (available on the web), and titles are submitted to the Cold Regions Bibliography Project (www.coldregions.org/).

a. Publications since your last Antarctic season

P. A. Mayewski, M. P. Meredith, C. P. Summerhayes, J. Turner, A. Worby, P. J. Barrett, G. Casassa, N. A. N. Bertler, T. Bracegirdle, A. C. Naveira Garabato, D. Bromwich, H. Campbell, G. H. Hamilton, W. B. Lyons, K. A. Maasch, S. Aoki, C. Xiao, and Tas van Ommen: State of the Antarctic and Southern Ocean climate System (SASOCS): Reviews of Geophysics, doi:10.1029/2007RG000231, in press

b. Planned publications

N.A.N. Bertler, Naish, T.R., and Mayewski, P.A.: "A 150-year reconstruction of the Southern Annular Mode"

Rhodes, R., Bertler, N.A.N., Baker, J., Sneed S.B., and Oerter, H.: "Effects of large icebergs on sea-ice and primary productivity in the Ross Sea Region

Bull, J.R., Bertler, N.A.N., Baker, J.A.: Ice core signal preservation of atmospheric circulation changes in Victoria Land, Antarctica, over the last 50 years

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