Kapunui School visit — December 2003

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Vanessa Thorn

Antarctica: unfreezing the continent (ESCI 132)

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The course is directed at science students and non-science students alike and each year about 80 students take the course. Student feedback is always complimentary and indicates that we are being successful at producing a dynamic, varied and informative course.

The topics covered in ESCI 132 are wide indeed. We usually start with the history of exploration (you can’t give an Antarctic course without mentioning Scott and Shackleton). We can then cover the history of the ice sheets and their significance in climate change, Antarctic weather, geological history, and the life that lives on the continent and in the seas that surround it. We also include lectures on the politics of the continent and its conservation from VUW lecturers Joanna Mossop and Cath Wallace. In previous years Nigel Roberts has stepped away from his role as a political scientist to round off the course with his predictions for Antarctica’s future.

Course stalwarts from outside the University include Erick Brenstrum from MetService, who talks about Antarctic weather, heritage architect Chris Cochran tells us about the historic huts and their preservation, and the well-known painter Margaret Elliot outlines how her visits to Antarctica have affected her painting. Antarctica New Zealand and the Ministry of Foreign Affairs and Trade also support us by providing guest speakers.

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Each year we invite tutors who went down to the ice for the first time the previous year to give a presentation. This brings the experience vividly to life for the audience. Each year the tutors present their talk differently – we have had everything from readings from a diary of the trip to a montage of images accompanied by loud rock music!

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Our second newsletter focuses on the wide range of student activity connected with the Antarctic Research Centre. A recent highlight is the completion of two PhDs, but you will also read about everything from first-year undergrad teaching through to MSc research, and even links with primary school students.

PhD — Cliff Atkins

Cliff Atkins recently completed his PhD thesis entitled “Characteristics of striae and clast shape in glacial and non-glacial environments”.

Most people think of striae as simply scratches on rocks formed beneath sliding glaciers. However, there are many non-glacial processes that produce striae, including debris flows, tectonic deformation and volcanic blasts to name just a few. The research focused on characterising striated clasts in various modern glacial and non-glacial deposits ranging from cold-based glaciers in Antarctica to the Wellington Fault in New Zealand. The overall driving question behind this was, “Are there measurable differences between striae formed in different environments?”

So what can scratches on rocks tell us? There is huge variation in striae within each environment and although some striae features appear diagnostic of a certain process, many others are common to all settings. In general, it is possible to distinguish glacial striae from non-glacial striae such as debris flows, but it can be more difficult when dealing with tectonic striae. Overall, striae need to be analysed in conjunction with the shape of the clasts on which they occur in order to make a sound judgement on their origin. This is particularly relevant when interpreting clasts from drill cores such as those from the Cape Roberts Project in Antarctica.

Mike Hannah

PhD — Nancy Bertler

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Victoria University of Wellington
Antarctic Field Assistants
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Reflections

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The wildlife was amazing, the scenery spectacular, and the weather extreme. However, the thing that impressed me most while down on the ice was the people. Scott Base brings together people from exceptionally diverse backgrounds, from mechanics to cooks, scientists to cleaners, drillers to military personnel, throwing them all together into its unique, bright green quarters.

With little or no opportunity for personal time and space, I expected to encounter people stretched to breaking point and ready to snap. However, it would appear that the isolation forces the 85 or so Scott Base residents to become like one big family. From the day we arrived we were made to feel welcome, and nothing was too much trouble.

Due to the unpredictable nature of life in Antarctica, roles are often chopped and changed, with mechanics becoming bar staff; cleaners becoming firemen, and CEOs transporting field parties’ toilet waste. However, to their credit, complaints and fights are almost non-existent. A Scott Base resident must be prepared to ‘do whatever hat necessary’, and all I encountered would do so willingly.

Louise Christie

The vegetation 32 million years ago was dominated by Nothofagidites type pollen (Southern Beech), and dinoflagellates during the Oligocene in the Ross Sea, and is supervised by Mike Hannah, Peter Barrett (VUW) and Ian Raine (GNS).

The Cape Roberts drilling project cored through over 50 shallow marine sedimentary cycles from the period from 34 to 17 million years ago. These reflect repeated advance and retreat of an ice sheet located near the Trans Antarctic Mountains. Throughout this time period pollen and phytothl (siliceous plant microfossil) studies have shown a gradual deterioration of climate.

Pollen and marine palynomorphs (dinoflagellates and microscopic marine algae) have been extracted at a high resolution from two of the glacial sedimentary cycles. The pollen study will allow documentation of changes in terrestrial vegetation within, and between two glacial cycles. The marine microfossil study will document changes in the size and taxonomy of the marine microfossils within the glacial cycles, some of which are due to changes to their paleo habitat as the glacier advanced and retreated.

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Seismic data gives information about the seafloor as well as geological features present below the seafloor. To produce the waves that reflect back from the sea floor and below, up to six air guns are trailed behind the ship and a streamer stretching 1.2 kilometres from the ship collects the returning signals. The logistics of such a setup, especially in the hazardous, iceberg-strewn conditions of Antarctica, were somewhat complex and at times it was impossible to collect seismic data. The other scientific aims of the cruise were to collect multibeam bathymetry (detailed mapping of large swaths of the seafloor) and dredge seamounts and other interesting seafloor features to obtain rock samples.

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Jo Whittaker

MSc — Natalie Robinson

Natalie joined the Antarctic Research Centre prior to the 2002-2003 field season, coming into the earth sciences with a background in physics and maths. While in Antarctica in January and February 2003, she helped obtain data from the ocean beneath the McMurdo-Ross Ice Shelf with instruments suspended through holes made with a Hot Water Drilling system. The data form a unique set of measurements, this being the first time that this type of current meter data, along with temperature-salinity profiles, have been obtained from beneath any of the Antarctic ice shelves.

As well as analysing and interpreting the data directly, she is incorporating them into her own adaptation of a model previously developed for the Filchner-Ronne Ice Shelf. The model uses the relationship between the ice, the water beneath and bathymetry to set up circulation in the ocean. She will also incorporate the measured tides from Scott Base and the seasonal cycle of sea ice formation into what will be a realistic reproduction of the real world.

Natalie’s study will contribute to the climate change research theme of the ARC, she is interested in comparing the ocean environment of today with that of previous climates, and will be able to achieve this by varying the conditions under which the model is running. Of particular interest is the deposition of sediment at the sea floor under the various climate scenarios. This will help interpret the ANDRILL core to be recovered from the site over the next 2-3 years.

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One highlight was the discovery of striae and related abrasion marks produced by a cold-based glacier in the Allan Hills, Antarctica. This has created some exciting new insights into the behaviour of cold-based glaciers and is helping change the view that these glaciers are incapable of erosion.

Overall, the study challenged some long and widely held beliefs and opened up possibilities for future striae research. Personally, the experience has exposed Cliff to an incredible range of places, processes, rocks and people and has reinforced the value of questioning everything, especially the established “text book” views.

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