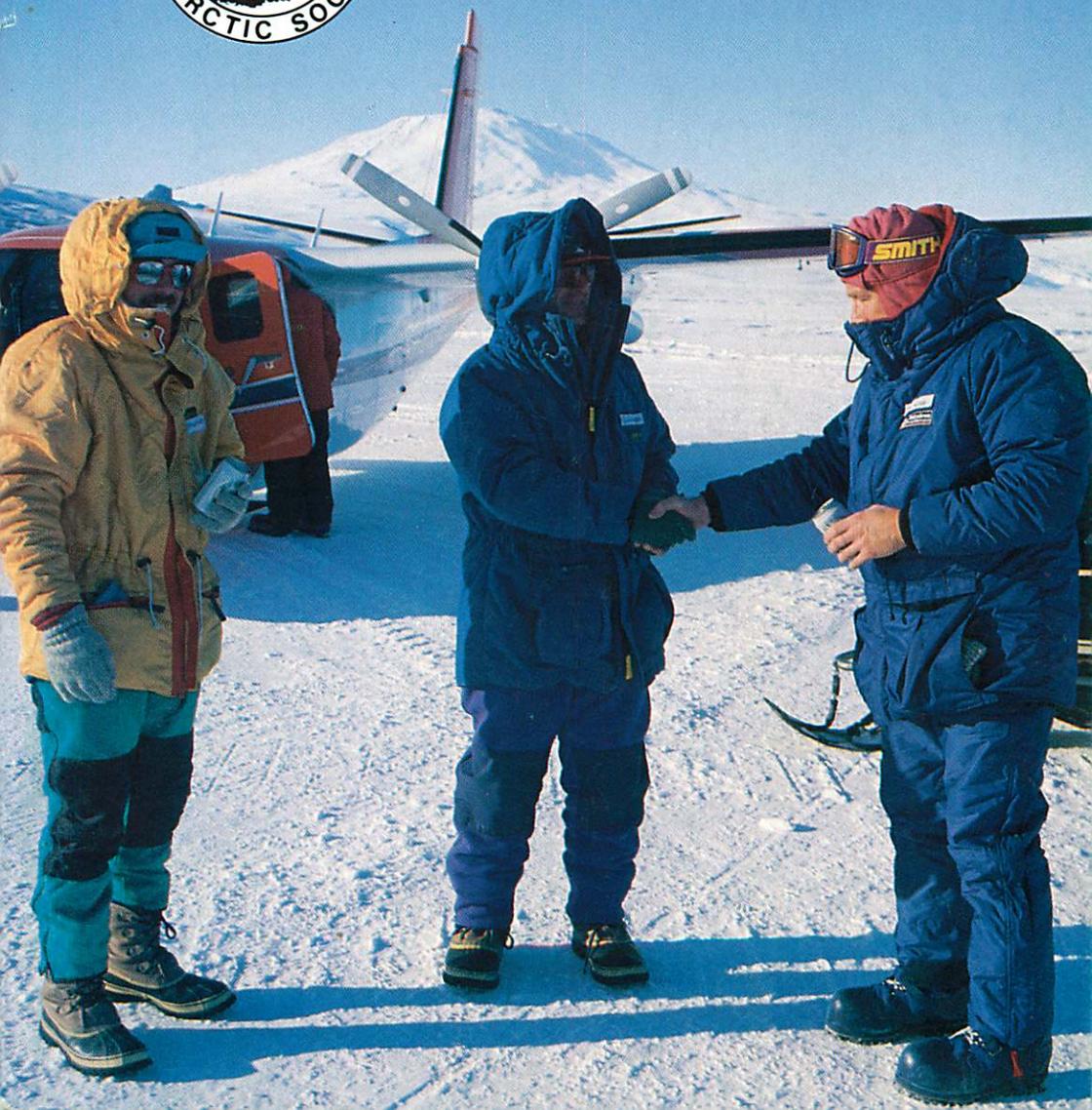


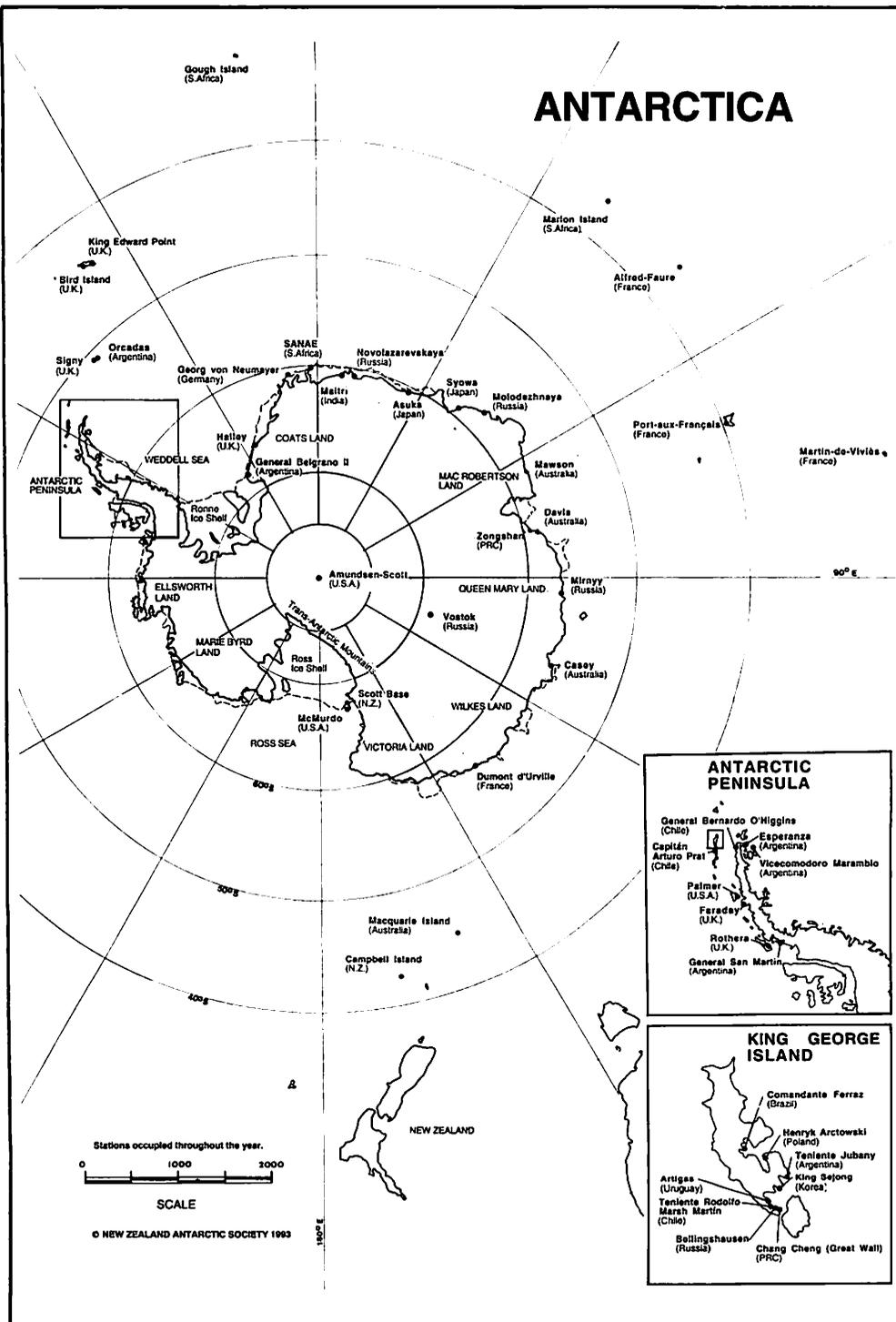
# ANTARCTIC



Bulletin Vol. 13 No. 5, March, 1994.



# ANTARCTICA



Stations occupied throughout the year.



SCALE

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## ANTARCTIC PENINSULA



## KING GEORGE ISLAND



# Antarctic

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Editor: Robin Ormerod  
Please address all editorial inquiries, contributions etc to the Editor, P.O. Box 2110, Wellington, N.Z.  
Telephone: (04) 4791.226  
International: +64 + 4+ 4791.226  
Fax: (04) 4791.185  
International : +64 + 4 + 4791.185

All New Zealand administrative inquiries should go to the Secretary, P.O. Box 404, Christchurch,  
All overseas administrative inquiries should go to the Secretary, P.O. Box 2110, Wellington New Zealand.  
Inquiries regarding back issues to P.O. Box 404, Christchurch,

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**Cover**David Geddes, Operations Manager for the New Zealand Antarctic Programme welcomes N.Z. Aerial Mapping Ltd.'s, chief engineer Les Appleford and chief pilot Colin Harris to Antarctica. The pair had just flown the Department of Survey and Land Information's Rockwell Commander 690B to Antarctica for a month of aerial mapping. Photo: Bill Bolton, RNZAF

## NZAP

# Two ozone studies among winter programmes

The last flight carrying New Zealand personnel involved in the 1993/94 New Zealand Antarctic Programme left from the Pegasus runway on 28 February 1994. On board was an army cargo handler Helen Simpson from Auckland who had remained at Scott Base to help oversee the unloading of the *MV Green Wave*. Eleven New Zealanders will spend the winter at Scott Base this year but they are less of a minority on the continent than usual because there are 12 more at McMurdo who are employed by the Americans to undertake a variety of tasks. Overall there are 251 personnel at McMurdo this winter of whom 129 are civilians. The first flights of the season were on October 6 and the last of the main body flights carrying personnel out of the area were on March 5.

One of the final events before the departure of last plane was the arrival of the cargo vessel, the *MV Green Wave* with help from the ice-breaker, *USCGC Polar Sea*. The New Zealanders were relieved, as it carried many of their supplies for the next 12 months. They are now equipped with such essentials as 50 kg of sausages, 45 kg of cherios, 280 kg of peas, 540 kg of French fries, 360 litres of ice cream, 600 kg of chicken, 52 kg of scallops, seven kg of prawns and seven of whitebait. There were also 18 dozen oysters and a carton of wonton wrappers. To help wash it all down came 39,840 cans of beer as well as beverages for special occasions. There was also a recommendation that this shouldn't be drunk all at once!

The team have now encroached on the space left by the retreating summer party and are settling to their work.

Temperatures during March have ranged from -28 to -33 deg C, winds from 10 - 15 knots. There have been no blizzards but it has been very cloudy.

Leader Grant Avery, comes from Lower Hutt and spent 1991-92 on the ice. Over the winter he is doubling as science technician with assistance.

Eric Trip from Christchurch is the Telecom technician responsible for the operation of the Satellite Earth Station, the 64 different telephones at Scott Base and maintenance of the local HF and VHF equipment.

Bruce Janes from Napier is the field support officer who, throughout the winter, will be maintaining all field equipment used by the summer parties including sledges, food boxes, tents, survival bags, a couple of thousand flags, skis, Search and Rescue equipment and much more! He is also storeman, the alternative leader of the

JASART team and deputy fire chief.

Dominic McCarthy from Christchurch is the base engineer. He will be keeping the "life support" systems running, control the fuel supplies, the operation and maintenance of heating, ventilation, water storage and reticulation, sewage disposal, drainage and, some would say most importantly, the bar coolers and associated equipment. He is also a member of the search and rescue team.

David Lucas is the engineering services manager and deputy winter manager for the base. He is responsible for all the base engineering, mechanical and electrical services as well as water making by reverse osmosis, some aspects of heating, ventilation and power generation.

Grant West is the electrician. He comes from Palmerston North and his work for the winter is the operation, maintenance, regulation and reticulation of power throughout Scott Base as well as the maintenance of electrical appliances. The fire protection systems and equipment are also his responsibility.

Jeremy Ridgen is the base mechanic. He comes from Christchurch and is in charge of the maintenance and upkeep of "our prime means of escaping from the base!". The fleet of vehicles now includes three Hagglunds pivot steer double-car tracked 'troop' transporters, two half tracked ASV's, six or seven four-wheel drive Toyotas, two heavy trucks, several pieces of heavy earth moving equipment and about a dozen skidoos or tracked snow bikes. Jeremy is also part of the search and rescue team.

Arturo Bosman, the chef comes from Hamilton. The winter team are already attributing any weight gained to him but appreciate the pleasure he derives from catering for festive occasions.

Domestic support is being provided

by Angela Bocoock from Oxford. Keeping the base in order, clean and tidy is her role. She is also the first aid officer, tending to minor illness or injuries and liaising with the doctor at McMurdo hospital for more serious ailments. She has been to the Antarctic before, working for the Americans for one summer and from Winfly in another year.

The winter manager is Grant Avery who, as already mentioned, also doubles as science technician with help from Belinda Bennett who is base support officer/science technician. Her main areas of control are the seismology, ionospheric and geomagnetic programmes. She also records the weather each day, handles the mail, general administration at the base as well as the shop and the bar. The hydroponics plant, the base computer network, the library are in her domain and she is the Fire Chief.

## The other work!

Joining the team this year is Stephen Wood, a scientist from NIWA at Lauder, who is part of a group who have been measuring trace gases in the atmosphere for several years and are interested in how they affect the amount of ozone there. This work has previously been undertaken with ground based measurements at Arrival Heights and maintained by visits from NIWA staff in the summer and NZAP technicians in other seasons.

This year's programme is designed to improve understanding of the chemistry that controls stratospheric ozone. This is crucial because the formation of polar stratospheric clouds (PSCs) in the winter stratosphere, when the temperatures get very cold, allow a process called heterogeneous chemistry on the surfaces of the cloud particles that cause the depletion of ozone by chlorine to be much more effective in the spring lead-

ing to the formation of the ozone hole.

In a collaborative project with the Universities of Denver and Wyoming, balloons will be launched at regular intervals. They will carry instruments to measure the concentration of nitric acid which becomes frozen into the cloud particles and the number of the particles themselves at heights from the ground to about 30 kilometres.

The balloons, launched from the helicopter pad at McMurdo, have a capacity of 160,000 cubic feet and carry a payload weighing 60 kg. Each carries radio transmitters to send back the data from the various instruments which is logged directly onto ground based computers. The landing spot of each balloon can be traced with GPS so retrieval can be attempted next season.

Smaller packages with additional measurements will also be flown, especially during the late winter when the PSC formation occurs most rapidly.

The preparation of these balloons are periods of intense activity for Steven. At other times he will help with the established ground based measurements including some of the data analysis which has all been done at Lauder in the past.

## Other ozone programmes

The continuing operation of the Dobson and Brewer spectrophotometers is part of the National Institute of Water and Atmospheric Research (Wellington) ozone measurement programme.

Ozone measurements are made with both spectrophotometers by measuring UV levels at particular wavelengths. During the winter the ozone measurements are made using moonlight.

The Brewer is located at Scott base and the Dobson is at Arrival Heights. Since the Brewer is an automated instrument, Grant Avery can effectively operate both spectrophotometers at the same time. On moonlight nights during

the winter Grant will first check the alignment of the Brewer with the moon, and then set it in operation so that it will automatically make the ozone measurements. Then he will go to Arrival Heights to operate the Dobson manually.

The data from the Dobson require some preliminary on-site calculation. Then, like the data from the Brewer, they can be electronically transmitted to NIWA in Wellington for analysis. The data are subsequently archived with the World Meteorological Organisation.

## Investigations of the mesosphere

Since 1984 a team from the Department of Physics at the University of Canterbury has been investigating the normal and disturbed mesosphere in Antarctica.

The focii of the programme are the ionisation mechanisms and the electromagnetic scattering characteristics of the Antarctic mesosphere. These include natural mechanisms inherent to the undisturbed medium as well as those that are characteristic of the medium during severely disturbed conditions such as PCA's and electron precipitation events.

The operation and maintenance of 2.9 MHz backscatter radar is the responsibility of Grant Avery.

Data collection is performed automatically every hour on a synoptic basis and the results are stored on magnetic disks for subsequent analysis and interpretation in Christchurch.

Grant will visit the installation at Arrival Heights several times each week to see that the equipment, upgraded this last season by project leader Andre von Biel and associates Wayne Smith and Roger Govind from the University of Canterbury, is operating.

The most significant result to date from this programme has been the dis-

covery of a layer of ionisation at a height of approximately 50 km. This layer appears to be most frequently observable during the Antarctic summer months, and has attracted a considerable amount of international scientific interest because in temperate latitudes of the world, the atmosphere is electrically neutral at that altitude. It is suspected that highly energetic electrons are responsible for this ionisation.

## Radars and the mesosphere

The University of Canterbury Physics Department operates two atmospheric wind radars, one near Christchurch and the other at Scott Base.

These radars measure winds in the mesosphere at altitudes of 60-100 km.

The data have been contributed to international co-operative observations on global scale changes in the middle atmosphere or thermosphere at altitudes between 10 and 100 km.

The receiving organisations include ICSU/SCOSTEP (the Lower Thermosphere Coupling Study and the Solar Terrestrial Energy Programme), the British Antarctic Survey and several universities. Three NSF-funded research projects on the polar middle atmosphere and a complementary NSF funded project in New Zealand, which uses optical spectrophotometers to measure wind and temperatures at altitudes of 85-100 km, also receive the data which is down loaded regularly by the winter science technician who also monitors the equipment.

## Seismography and.....

Scott Base has one of the few seismographs in Antarctica. It has been collecting seismological data since

1957, with improved equipment in 1963 when it became part of the Worldwide Standardised Seismograph Network.

In 1993, a remote seismograph at Vanda in the Wright Dry Valley was connected to Scott Base by radio telemetry and the signal is recorded digitally there, together with a backup instrument of the same type at Scott Base.

Scott Base makes a significant contribution to global earthquake studies by supplying data to international agencies.

Each day the science technician checks the operation of the seismograph, changes the records and undertakes an initial analysis of data before transmitting results to the US National Earthquake Information Centre in Colorado, on a regular basis for inclusion in their bulletins.

The final data analysis is done in Wellington at the Institute of Geological and Nuclear Sciences, and the results are transmitted to the International Seismological Centre in the United Kingdom for incorporation in their bulletin with other global data.

## Geomagnetics

Scott Base lies between the geographic and magnetic south poles. This position makes it a good site for one of a worldwide network of geomagnetic observatories in which three components of the geomagnetic field are recorded continuously.

A programme of absolute observations at Scott Base ensures that variations in the geomagnetic field are recorded to an accuracy of 1nT. Disturbance indices measured from the observatory's records are sent to the World Data Centre each month and the full data set is forwarded annually.

The observatory records are used in the ionospheric research programme at Scott Base and to remove temporal ef-

fects from spatial variations in local magnetic surveys.

The isolation of Scott Base and its location between the poles make the secular variation information derived from its accumulated data set particularly useful in the production of global magnetic field models.

The current (1990-95) International Geomagnetic Reference Field makes use of Scott Base data as will the next IGRF (1995-2000) currently in preparation. Among other applications such models provide magnetic variation information for navigation.

For another programme induction magnetometers installed at Arrival Heights on behalf of the University of Newcastle in Australia are checked daily by the science technician. Each week the data is down loaded.

This programme is a study of the characteristics of naturally occurring waves in the 0.1-5Hz band, geomagnetic pulsations, which are associated with

the earth's magnetic field. The waves propagate into the polar regions from the magnetosphere and through the ionosphere.

The instrument at Arrival Heights extends the network of stations already operated by the Australian Antarctic Division and the University of Newcastle at Mawson, Davis, Casey and Macquarie Island.

The observations relate to fundamental ion cyclotron and hydromagnetic wave processes in the polar cap and polar cusp regions.

The programme is part of the international Solar Terrestrial Energy Programme (STEP) involving coordinated spacecraft and ground-based studies and makes a specific contribution to the US Geospace Environment Modelling (GEM) programme and the US Polar Experiment Network for Geophysical Upper Atmosphere investigations (PENGUIN).

## *Selected summer programmes*

### Seismic traverse of Wilkes subglacial basin

Setting out to acquire multichannel seismic data along a 300km traverse of the East Antarctic ice cap this season were a team from the Institute of Geological and Nuclear Sciences Ltd, and Victoria University in Wellington, New Zealand, Stanford University, and the United States Geological Survey.

The joint project involved a geophysical transect designed to image the shallow sedimentary layers beneath the East Antarctic Ice Cap. The transect began ten kilometres west of the

McMurdo Dome ice-core drill site, 25 km west of the exposed bedrock of the Transantarctic Mountains at Mt. Lashly and ended 323 km west of the drill site over the Wilkes subglacial basin.

The traverse was located sub parallel to latitude 78deg S and 30 to 50 km north of the Victoria Land traverse of 1958-59. The logistics took nearly 18 months to finalise.

The team undertaking the traverse comprised Dr Stephen Bannister from IGNS in Wellington, Dr Uri ten Brink

from the USGS, Ron Hackney from Victoria University in Wellington, David King, an IGNS seismic technician from Wellington, Rafi Katzman from the Woods Hole Oceanographic Institute, and Itzik Makovsky from Stanford University.

Field support was provided by Bill King of Christchurch and Jon de Vries of Wellington working for the New Zealand Antarctic Programme as was Mike Collins, the mechanic for the traverse.

They were accompanied by John West a surveyor from the Department of Survey and Land Information in Nelson.

## Objectives

The objectives of the study are to test and provide quantitative constraints for modelling the uplift of the Transantarctic Mountains and the subsidence of the Wilkes Basin and to help determine whether the Ferrar dolerite sills and basalts are the result of an active mantle plume or the by-product of rifting and passive up-welling.

The data should also help resolve the debate on the size of the ice sheet in the Cenozoic, in particular whether parts of East Antarctica were deglaciated for much of the late Cenozoic.

One Hagglunds, two Tucker snowcats and four Alpine II skidoos were used for the traverse as well as 50 44 gallon fuel drums, 20 food boxes, one heated wannigan to cook in, and 2,600 hand-tied flags. In all it was close to 20,000 kg of equipment and supplies.

The Utility Twin Otter leased by NSF for the season was used to lay food and fuel depots along the route and the survey party were put in at McMurdo Dome by LC130 on December 1 with the main body of the expedition following from December 4 to 6. Six flights were required for put-in and for the

pull-out at the end of the traverse between January 27 and 29.

Seismic recording was carried out using a Geometrics 60-channel seismograph. With 114 db of dynamic range and a bit A/D converter, this system was a great improvement over the old DFS-V instrument used in previous seasons. A 300m long 60 channel snow streamer, borrowed from Norsk-Hydro of Norway, was used as the seismic receiver and towed behind the recording vehicle, an NZAP Hagglunds. The recording geometry was similar to that of a marine seismic operation.

Once in "recording mode" the convoy travelled at approximately one km per hour.

Seventeen days in the field were lost to weather but during the overall expedition the data collected included 236 km of multichannel seismic reflection data with a 150m interval between shots; 312.5 km of gravity data collected at 2.1 km intervals; 312.5 km of magnetic data (total field intensity) collected at an average interval of 500 m and 180 km of surface radar collected at intervals of 75 metres.

The relative locations and elevations of the entire traverse were measured by John West from DOSLI with ties at three locations measured by the USGS using GPS.

"overall..very productive"

Overall the party considered the season very productive in spite of the 17 days lost to weather and the difficulties with hard sastrugi of up to one metre high along sections of the route.

Now that they have returned to New Zealand and to the United States work has begun on analysing the two gigabytes of data.

Results are likely to take about a year to produce.

## Lost piece of “kiwi ingenuity” delays research

A study designed to help determine the timing of the retreat of the ice margin back to the Victoria Land Coast and north of McMurdo Sound was set back this season.

The specially designed battery powered Vibracorer, developed and built at Victoria University in Wellington, to recover complete and undisturbed cores of up to six metres from the sea floor, was lost.

The mishap occurred during operations at Granite Harbour at 1550 hours on November 24.

Initial attempts to recover the machine failed and after six days the party returned to Scott Base with their field camp and other equipment.

The accident occurred at a time when scientific interest in the dating of the ice sheet is increasing and the project is now expected to be delayed for a number of seasons as the focus of the University's activities will be on the Cape Roberts Project.

Previous experience by Victoria University from the fast ice and other shipboard investigations in the Ross Sea have shown that sediments near the sea floor are compacted presumably due to the retreat of glacial ice.

Normal coring methods are not very satisfactory in this situation. It is because of this that they designed the Vibracorer which they believed would have a greater chance of penetrating through the soft mud into the underlying diamicite sediments. (Diamicite is a term used for sediment that is a mixture of significantly different grain sizes.)

Radiocarbon dating of the ages from shell debris above diamicite in the core indicate the time at which the grounding line retreated past each site.

This machine, developed over the last four years, weighed only 1.5 tonnes and at this weight is considerably lighter than other similar devices. It could be flown to Antarctica, deployed by a small mobile crane through a 1.5m diameter hole in the fast ice around McMurdo Sound or used from ships and the winch can run from the Power Take-off of the hydraulic system on tracked vehicle.

The vibracorer had operated successfully in tests in Wellington Harbour during October 1992 with the recovery of a 3.7 metre core from the harbour and was deployed to Antarctica a few weeks later.

On this occasion scientists sought to obtain a core from 700 metres down in Granite Harbour, the outlet for the Mackay Glacier 150 km north west of Scott Base. In both attempts the corer tilled on the soft sea floor mud and the barrel bent as it was driven in and retrieval began.

Back in Wellington the team redesigned the machine with larger feet and a lower centre of gravity. Tests were successful in conditions muddier than Granite Harbour.

### Experience lost

This season the team led by Alex Pyne and comprising Les Singh, Rowan Leslie and Alan Rennie, all from the University, planned to core from the fast ice, up to ten sites in Granite Harbour. This would have provided them with a safe stable platform, near shore data and experience with the equipment prior to shipboard, with its extra time constraints, in future years.

Equipped with a D5 bulldozer, two five tonne cargo sledges, a sledge

mounted accommodation and laboratory wannigan, a steel sledge, a RN75 Nodwell and HIAB crane for lifting and drilling ice blocks, they left Scott Base at 14.00hrs on November 19 for Granite Harbour where they arrived in the evening of November 22.

A 2.3 metre thick ice access hole was drilled in the fast ice the following day while the Vibracorer was assembled and the systems checked. A small leak in the hydraulics was sealed.

On November 24, in fine but overcast conditions and temperatures of -5deg C, the corer was immersed. The air compression system leaked and the machine was retrieved so that the air regulators could be washed and dried.

During the second attempt the system functioned correctly, the weight of the corer was transferred to the winch rope and the chain hoist disconnected. Lowering began.

About three or four metres below the surface the rope broke at the spliced eye used to connect it to the corer and the machine fell about 350 metres to the sea floor.

## ROV to the rescue

Within four hours the team had made renewed contact with Dr Ross Powell from Northern Illinois University whose group had deployed a ROV at the site the previous day.

On November 25 they returned and by late afternoon the ROV had located and recorded on video the vibracorer. It was about 20 metres to one side of the hole at the precise GPS coordinates of 76deg56.631'S/162deg48.116'E sitting upright on the sea floor which sloped between 15 and 25 degrees. It appeared to be intact with no visible damage. The feet were buried some 15 cm into the surficial mud which blanketed the sea floor and over which boulders covered in mud and encrusting

organisms were scattered. The air compensator water trap appeared to be clear of water but pressure was likely to alter that.

"..but internal damage unknown..."

All up the team's observations suggested that the equipment had spiralled to the sea floor and landed on its feet. From the outside it looked alright but internal damage could be not ascertained.

On November 25 and 26 attempts were then made to locate the equipment. It was seen on the first occasion but on the second, when the ROV carried a hook line to attach to the corer so that the machines could be surfaced independently it was not located. Moreover the drag of the line exceeded the power of the ROV's motor and it became difficult to manoeuvre. When the cables endangered it the recovery attempt was abandoned.

Options for further attempts to recover the vibracorer next season are being considered.

The environmental impact of the machine remaining is likely to be limited to the organisms and the sea floor to within a few metres only as the machine contained a few litres of hydraulic fluid and some sulphuric acid in the batteries which would be neutrally dissipated.

Impact on a kilometre scale would be insignificant. Retrieval would have the advantage of determining the rates of encrustation and corrosion on the various metals used in the corer's construction.

In the meantime with the loss of the equipment and the University's commitment to the Cape Roberts project the sampling of this area of coast is likely to be deferred until such time as another Vibracorer can be built and the work reprogrammed.

## *GPS used by New Zealanders for mapping in the Ross Dependency*

Mapping in Antarctica was carried a step further this season by personnel from N.Z. Aerial Mapping Limited in Hastings, who flew a Rockwell Commander 690B from Invercargill directly to McMurdo Sound. They then spent four weeks undertaking a programme of aerial photography for the United States Geological Survey in conjunction with the National Science Foundation and the New Zealand Department of Survey and Land Information. They also handled some additional work for the Italian Antarctic Programme, the New Zealand Antarctic Programme and ICAIR.

The team comprised the Company's chief pilot Colin Harris, chief engineer Les Appleford and navigator David Napier. All three are based in Hastings. Kelvin Tait from the Department of Survey and Land Information in Wellington, Larry Hothem and Dale Benson from the USGS provided supplementary ground based survey and technical assistance.

For the trip to Antarctica the twin-engined turbo-prop pressurised aircraft was modified to carry more than twice the normal fuel load enabling it to make the 3,500 km journey without refuelling. It is thought to be the first time that such an aircraft has been used on the continent.

Accommodating the extra fuel involved mounting auxiliary fuel tanks inside the plane in accordance with strict specifications determined by the

New Zealand Civil Aviation Authority whose approval was required for the entire operation. The interior had effectively been stripped bare to accommodate the extra 3,300 lbs of fuel.

At takeoff the aircraft was overloaded by 33 percent, just three percent lighter than the permitted allowance.

Nothing, however, had been left to chance for the journey. Alternative methods for transfer of fuel to the engine covered possible cabin decompression and failure of the electrical system; it could be pumped by hand if necessary.

The aircraft carried the latest GPS (Global Positioning System) navigation, VLF Omega navigation, radar and two high frequency radios. For the transit flights the crew were guided by GPS which gave them constant readouts of their position, the aircraft speed, heading, cross track error, distance and time to destination.

Armed with the appropriate weather report the pilot was able to calculate the point at which he needed to check conditions at McMurdo which, if not suitable, would enable the aircraft to return to Invercargill with a two hours fuel reserve in case of emergencies.

Clothing and survival gear, including a life raft and a 406 MHz emergency locator beacon which can be positioned by satellites to within metres, were carried aboard as well.

All the camera and support equipment was flown south separately on a C-

### 130 Hercules.

It was Colin Harris's third trip to the continent. For the first he was a passenger aboard an Air New Zealand DC10 in 1978, for the second he flew with the crew of a US Navy C-130 Hercules to familiarise himself with the flight path and to check out the surface of the ice runway, instrument approaches, find out what radar coverage, weather forecasting and local flight planning was available. On this trip he was to be accompanied by Les Appleford. David Napier, Kelvin Tait, Larry Hothem and Dale Benson flew south on a Hercules.

Leaving at 10.00hrs. on October 29, and flying at 20,000 to 24,000 feet in good and mostly clear conditions, they headed towards Campbell Island where they verified by radar their position as indicated by GPS before turning to starboard at 60deg S where they intercepted the Christchurch

McMurdo track to the ice runway.

About 100 miles north of the continent the cloud cleared and they were able to see the pack ice. The first landmark was Cape Adare, then Coulman Island followed by the Drygalski Ice Tongue. Mt. Erebus could be seen from more than 200 miles away.

They had made the journey in eight hours but flew for a further half hour for orientation and to reduce their fuel load to the aircraft's designed landing weight before landing on the ice runway after a practice approach.

This runway is in operation from the end of the first week of October to the

*The men reported the weather to have been everything from perfect for surveying to the diabolical and experienced "a lot of everything." Here the aircraft is tethered on the ice runway on one of the 21 non-flying days. Photo David Napier.*



to the end of the first week in December by which time it is frequently too soft for safe use.

Later in the season the runway usually breaks out into open water. Larger than Auckland International Airport's runway; it is used by all the south bound aircraft early in the season.

The surface is graded down to the sea ice and a light covering of snow is blown over it to provide grip for the wheels.

## Touch touchdowns

Pilot Harris described the landings as "soft touchdowns" which were not always due to his skill! "Apparently the ice deflects with the aircraft weight and cushions the landing on impact," he says. "While care must be taken to keep the aircraft straight on take off and landing, there was a surprising amount of grip on the runway surface."

Accommodated at Scott Base for the next month the men reported the weather to have ranged from excellent survey conditions to the diabolical. They experienced a lot of everything including whiteout, strong winds and blowing snow. When flying they were grateful to have the Italians at Terra Nova Bay which provided an alternative landing area.

## Long days

Each day started at 05.50 with a look out the window and a phone call to the US Met Office at Mac Centre. If the weather was doubtful they would visit the aircraft to check the moorings and clear snow drifts and spend the remainder of the day assisting with tasks around the base. If conditions were good the GPS receiver was set up in a quiet area behind Scott Base before they departed for the airfield. It took time to prepare the aircraft for take off

They needed to heat the engines using a mobile heater/blower and plug into a ground power unit to provide electrical power for engine starts.

At the end of each day's flying every vent on the aircraft was plugged with foam to prevent snow blocking them up. These had to be removed before flying and replaced after landing.

The two GPS receivers and two laptops, on which the data would be logged, as well as the film magazines had to be installed for each days flying, as did the aircraft (lead-acid) batteries as they would freeze if left in overnight. Their clothing, essential in Antarctic conditions, restricted their movement and all up they reckoned on three times the preparation time required for flying in New Zealand.

## Designated flight lines

Once in the air the crew would fly designated lines devised to cover areas from which 1:50,000 topographical maps will eventually be produced. The coordinates at the beginning and end of the flight lines were loaded into the system and the crew were guided along the routes using GPS navigation.

Aerial photos were taken of each area. The camera was connected to the survey GPS units and when film was exposed a light sensitive diode sent a pulse to the receiver which is recorded against time so that the precise position of the camera at the moment of exposure is known. By recording simultaneously at ground stations located at the Satrack building at McMurdo, at Scott Base and intermittently at Terra Nova Bay, three dimensional positions can be calculated for the instant in time when the photograph is taken. Such an operation enables aerial triangulation to be undertaken with much less ground control. Had surveyors been required

to establish ground control more than 20 positions may have been required per sheet. This represents a major saving in survey control costs and in the laying and maintaining of photomarks.

### Nine days flying

During the month's operation they flew 13 missions on nine days. Their flying hours in the area totalled 44. In this time they covered some 21,000 square kilometres including all of the Convoy Range-Cape Roberts area (160-164deg E and 76deg 30-77, 15'South) for the USGS/DOSLI 1:50,000 topographical mapping from which ten sheets will be produced; Ross Island for another series of maps and some 30 adjacent areas for the National Science Foundation, ENEA, ICAIR and the New Zealand Antarctic Programme. This work involved further flying over Ross Island but also included the Dry Valleys, and areas near the Italian Station at Terra Nova Bay for a variety of projects relating to scientific research, penguin studies, Base camp site histories, environmentally sensitive areas as well as a reconnaissance of glaciers for an overland route to the South Pole.

### Return journey

At 10.15hrs. on November 29 the aircraft headed north for Invercargill and home base. Coulman Island was their last sight of the Antarctic as they entered cloud.

After two hours flying they encountered headwinds of 50 knots which were stronger than forecast. These persisted for a further two hours but from then on conditions remained as predicted. At 61 deg South they passed the last RNZAF Hercules flight of the season as it headed to the Continent; this gave them a further opportunity to check their position.

At 60deg South they turned to port, again checking their position at Campbell Island, before heading for Invercargill where they touched down at 19.00hrs. Their return journey had taken eight hours and 45 minutes.

### The next stage begins

The USGS is undertaking the initial photogrammetric work and later this year the information will be supplied to DOSLI who will complete the mapping and publishing of the new sheets.

### New sheets available

In the meantime new sheets covering the Beacon Valley, Knobhead, Cathedral Rocks, Granite Knolls and Cape Chocolate were printed and published in the USA late last year.

As well as undertaking the cartographic work for these maps DOSLI proposed a series of 29 names of glaciers, ridges, points, valleys, spurs, peaks, hills and nunataks which relate to commonly used survey terms.

Appearing on the Knobhead map are Plummet Glacier, Staff Ridge, Elevation Point, Level Valley, Bubble Spur, Vernier Valley, Eyeglass Cirque and Plumbob Point. In the area of the Beacon Valley there is now a Subtense Valley, Catenary Nunatak, Telemeter Glacier, Static Nunatak, Footscrew Nunatak, as well as three Bluffs named for Profile, Nadir and Horizon.

On the Granite Knoll Map glaciers have been named for Mollweide after an equal area map projection devised by Karl B. Mollweide, a German mathematician and astronomer, in which parallels and the central meridian are straight lines. Mollweide lived from 1774 to 1825. Karl Friedrich Gauss, another German mathematician, astronomer and physicist who lived in 1777-1855 and for whom a theory is named which pro-

vides analysis to geodesy and geometry, also has a glacier named for him as does Jean Dominique Cassini, a French Astronomer who lived from 1625 to 1712, and, who made pioneering studies of the planets. He is remembered by a cylindrical projection in which the cylinder is at right angles to the axis of the globe.

## Heke Peak

The Cathedral Rocks map features the names of two New Zealanders both of whom have acquired peaks. Tuati or John Sacs was the first New Zealander to sight the shores of Antarctica when he sailed on the *Vincennes*, the flagship of the United States Exploring Expedition (1838-42) led by Lieutenant Charles Wilkes of the United States Navy. The other is named for Randal

Heke, a former president and long-time member of the Wellington Branch of the New Zealand Antarctic Society, who was in charge of the construction unit which built Scott Base in 1957.

Subsequently, for many years, Randal was to remain involved with Scott Base as an adviser until his retirement from the then Ministry of Works in mid 1980's. The coordinates of Heke Peak are 77deg58'29"S/162deg52'47"E.

The sheets on which these names appear are part of the Dry Valley Project and are numbered 1-5.

Further sheets in preparation will cover Skew Peak, Mount Mahony, Debenham Glacier, Cape Roberts, The Spire, Mount Lister, Joyce Glacier, Marshall Valley, Twin Rocks, Mount Huggins and The Pyramid.

## Accolades for NZAPS

Bob Thomson, a former Director of New Zealand's Antarctic Programme, has been awarded the Order of the Sacred Treasure Gold Rays with Neck Ribbon for his contributions to the development of Japanese Antarctic activities. His extensive knowledge of the Antarctic has proved invaluable in assisting Japanese observation and research activities in the region and in helping members of the Japan research team carry out their activities over a period of many years. The order is one for overseas people who have contributed to Japan.

Norman McPherson has been awarded the Queen's Service medal for public service. Retiring from the Army with the Rank of Major in 1976 he joined DSIR's Antarctic Division where he worked for nearly ten years. Since then he spent two years with Operation Raleigh, been an executive officer for the 16th World Games for the Deaf, and was a founding member of the Coutts Foundation for Deaf Sports People, an organisation set up to help fund deaf athletes wanting to travel overseas. He has been extensively involved with Civil Defence and since 1986, has been a Justice of the Peace and has recently completed a term as president of the Canterbury Justices of the Peace Association.

## Visitors and other workers at Scott Base

Two parties of distinguished visitors travelled south this season. The first group, hosted by Malcolm MacFarlane from the New Zealand Antarctic Programme, comprised Air Vice Marshal John Hosie, the Chief of Air Staff, Brigadier Stuart Jamieson, the Assistant Chief of Operations at Defence Headquarters and Roger Farrell, Deputy Secretary of the Ministry of Foreign Affairs and Trade.

The second group was hosted by Gillian Wratt, the programme director, and comprised the Thai Princess Maha Chakri Sirindhorn, the Thai Police Chief, General Serm Charuratana and Christine Fletcher, the Member of Parliament for Eden.

Malcolm MacFarlane then returned later in the season with Margaret Lawton, the Chairperson for the Natural Resources and Environmental Sciences Committee of the Foundation for Research, Science and Technology; David Ross the Chief Executive of the Institute of Geological and Nuclear Sciences and Paul Hargreaves, a member of the Board of the National Institute of Water and Atmospheric Sciences.

## Defence personnel

Providing field training for RNZAF C130 crews in an Antarctic environment this season were Flight Lieutenant Kevin Beard, Flying Officers John Harding, Brian Moor, Dane Fea, Sergeant Brent Leong and Flight Sergeant Portas who came from 40 Squadron Operations.

Two detachments of RNZAF aircrew manned the RNZAF Iriquois UHI-H helicopter, number NZ3815, from No. 3 Squadron based in Hobsonville. It was

used to support New Zealand and United States Antarctic Programme science and logistical activities from mid-November 1993 until late in January. The aircraft went south on a C130 on November 6 and left McMurdo aboard the *MV Greenwave* on February 7 arriving at Lyttelton a week later.

The first detachment of aircrew comprised Squadron Leader Brian Coulter, Flying Officer Wal Thompson and Sergeant Ash Wilson. They were supported on the ground by Flight Sergeant Chris Littlewood, Sergeant Tom McCready, Corporals Mike Phipps and Kevin Dury and LAC Jason Myhill.

The second aircrew comprised Flight Lieutenant Shane Harrison, Flying Officer Logan Officer and Flight Sergeant Terry Houghton.

Flight Lieutenant Simon Jensen, Sergeants Brian Golan and Craig Hughan and LAC's Mike Mulcahy and Kerry Cousins provided the ground support.

Two Royal New Zealand Navy officers, Sub-Lieutenant Rodney Winder and Lieutenant Peter Bradshaw spent time on *USCGC Polar Sea* gaining experience in icebreaker operations in the Antarctic.

Lieutenant Colonel Lilley from the Operations Division at Defence Headquarters, Major Graeme Tod, a Commanding Officer, and Lieutenant Commander Peter Hurdell from the RNZN went south for three days as part of a familiarisation programme with Antarctic operations for NZ Defence Force staff.

Two parties also went south as part of Operation White Safari, under which Defence personnel provide assistance in various maintenance and environmental tasks. The first party comprising Jim Cowie, Debbie Branch, George McNeur and Dave Phipps from the RNZAF at Wigram were south from mid-November until early December.

The second party comprising Steve Hancock, Pete Lawless, Shelley Fraser and Christine Norton were in Antarctica for nearly three weeks in January.

Sergeant Alison Russell from the RNZAF also spent a week on the ice in late October as part of a programme to familiarise New Zealand Defence Force medical staff with Scott Base and Antarctic operations.

### Youth group

This season's youth group comprised Joanna Spratt, aged 19, from Upper Hutt and Catherine Smart, 18,

from Blenheim. Both are Girl Guides. Victoria Baird, aged 19, from Gore and Rachael Nicholson, 18, from Christchurch both represented the Girls Brigade.

### Field training

This season's Antarctic Field Training team comprised Andrew Thompson, Sean Brooks who assisted from October to December and Jon de Vries who was part of the team from October to mid-November. Forty-eight courses were held and 183 individuals received training.

## Scott Base weather

Meteorological data has been collected from Scott Base since 1957 and a new report published by the National Institute of Water and Atmospheric Research is now available. The report summarises the main meteorological parameters measured at the base over the period 1957 to 1992 and is intended as an introductory guide to weather statistics at Scott Base.

Prepared by A.M. (Tony) Bromley, it is published as NIWA/Clim/R/94-002 and called "The Climate of Scott Base 1957-1992."

Copies can be obtained by writing to the author: C/o PO Box 31-311, Lower Hutt, NEW ZEALAND

## NZAP Environmental audit

An environmental audit of the New Zealand Antarctic Programme is being undertaken by environmental consultants Royds Consulting Ltd of Christchurch. They were formerly Royds Garden. The final report is due to be completed by 31 March. The audit will evaluate NZAP activities with respect to the requirements of the Madrid Protocol on Environmental Protection to the Antarctic Treaty.

Two of the three members of the audit team, Jim Bradley and Linda Smith, travelled to Scott Base for ten days in January to examine base and field related activities. They visited Vanda Station, Bratina Island, Granite Harbour, Arrival Heights and Cape Royds. The audit will be the first independent detailed evaluation of any national Antarctic programme in terms of protocol requirements and is likely to attract international interest. The third member of the team is Christine Birch.

## Environmental Legislation

The Foreign Affairs and Defence Committee were hearing the last of the ten submissions on the Environment (Antarctica) Protection Bill at the time *Antarctic* went to press. The committee will then compile its findings and report to the House of Parliament.

### Vanda Station

Vanda station is being decommissioned. The first Initial Environmental Evaluation for the decommissioning of Vanda station will be released in early April. The final IEE takes into account the comments received on the draft document released in November 1993.

Preliminary work undertaken as part of the decommissioning in the 1993/94 season included removal of some contaminated soil where there was a potential for the lake to flood. One storage and two unused accommodation huts have also been dismantled and removed. The mess building, workshop, laboratory and main accommodation building will be dismantled and removed next season when site amelioration is also planned.

*Antarctic* will feature part two of the history of Vanda Station in the June issue.

### RDRC

The Ross Dependency Research Committee has appointed an ad hoc subcommittee to develop an Environmental Science Research Strategy for the Ross Sea Region. Its members are Brian Belshaw from the Royal Society, John Kay from FORST, Clive Howard-Williams and Vernon Squire from the RDRC, Alan Hemmings from Greenpeace and Mike Timperly from the Environmental Research Sciences. The team has prepared a draft document which was to be tabled at the RDRC meeting on March 25 after which it will be circulated to interested parties. It is proposed to organise a seminar in conjunction with the Royal Society to be held on May 5 at which the document will be fully discussed.

### Tales of huskies

*Antarctic* has received a letter from Shelagh Robinson, formerly editor of *Aurora*, magazine of the ANARE Club, who is writing a book tentatively entitled "Huskies in Harness - A love story in Antarctica."

Currently she is collecting anecdotal stories of up to 1000 words by expeditioners about their experiences

with the huskies. These may be humorous, heroic, tales of endurance, mateship, tragedy or any other aspects of individual experiences with the dogs. She hopes to involve as many former Australian and New Zealand expeditioners as possible and to make the book an historical record of the huskies' role in Antarctica.

The second part of the book will cover the dogs' removal from Antarctica including the reasons behind the

decision and comments from people involved, officially and otherwise. There will also be a section on the future of the dogs.

As she hopes to produce the book by December, time is a factor. Shelagh

would appreciate contributions. She can be contacted at 4/243 Dandenong Road, Windsor, Victoria, Australia 3181. Her telephone number is 0061 3 529 5990

## ANARE

# The forty years of Mawson Station

Australia's Mawson station, the oldest continuously operated scientific research base south of the Antarctic circle, passed a significant milestone on Sunday February 13 when it celebrated its 40th anniversary. Dr Philip Law, leader of the expedition which established the station in 1954, attended a celebratory lunch and seminar in Hobart to mark the occasion. During the seminar a live satellite conference line link was established with the present station leader Bob Jones.

Mawson was established by a party aboard the chartered Danish ice vessel the *Kista Dan*; they landed on a rocky shore at Horseshoe Harbour, a sheltered inlet on the coast of MacRobertson Land in Antarctica on 13 February 1954.

Dr Law had already chosen the site of the station using photographs of the coast taken by the US Navy's Operation Highjump which undertook an aerial survey of coastal Antarctica in 1946-47. The site was considered to be the best on 4000 kilometres of coastline. Bob Dovers, for whom a summer station has been named, led the first wintering group of ten men.

Besides its key role as an observatory for meteorology and space physics,

Mawson has served, and continues to serve, as a base for studies of Antarctic animals, rocks and ice, some of which have taken scientists far into Antarctica.

## Chronology

**1953** The vessel, *Kista Dan*, left Melbourne on 12 December bound for Antarctica via Macquarie and Heard Island.

**1954** Dr Phillip Law established Mawson Station on February 13, named in honour of Sir Douglas Mawson, Australia's pioneer Antarctic explorer.

The year marked the beginning of Mawson's climate record (the longest such record for any Antarctic station), the first ground exploration along the coast from Mawson, and the first inland traverse to the Frammes Mountains.

**1955** The station's scientific operations were among the most sophisticated in Antarctica. They included cosmic ray observations - the first such installation south of the Antarctic circle.

Nineteen buildings were in use by the end of the year.

**1956-60** RAAF provided year-round aircraft support at Mawson. In 1956 alone, extensive aircraft exploration out of the station covered 900,000 square kilometres of territory and nearly 20,000 km of coast. This included the first sighting of the Lambert Glacier, the world's largest, and the first visit to Enderby Land.

**1957** A party of Mawson expeditioners flew in a Beaver aircraft to Mirny, a Soviet station 1300 km east of Mawson

**1958** Sir Douglas Mawson died, aged 76

**1961** Antarctic Treaty enters into force.

**1962-64** Ground traverses and surveys of Lambert Glacier - Amery Ice shelf region.

**1968 - 74** Detailed geological and glaciological research programme consolidated in the Prince Charles Mountains, 400 km inland from Mawson.

**1971** Construction of a permanent underground vault makes Mawson the only combined surface-underground observatory at polar latitudes for studies of cosmic ray phenomena. A fire at Mawson damaged the power house and recreation room.

**1973** Weather satellite pictures transmitted daily by HF link on a trial basis for the year.

**1979** Rebuilding programme at Mawson began

**1984** Supply vessel *Nanok S.* struck a rock on departing Mawson, losing bunker fuel, which required the ship to take on fuel from Mawson's power-generating supplies for the return journey

to Hobart.

**1989** Diana Patterson, Mawson station leader, became the first woman to lead a wintering party in the Australian Antarctic Territory.

**1991** Protocol to Antarctic Treaty on Environmental Protection (the Madrid Protocol) signed.

**1992** Under the terms of the Madrid Protocol, 22 working huskies left Mawson bound for a new life in the forests of Minnesota.

**1993** The last five older huskies left Mawson for homes with former expeditioners.

A six man Australian glaciology team undertook a four month 2,500 km traverse around the basin of the Lambert Glacier the largest in the world during the summer and were the first to travel overland between the two Australian Antarctic stations Mawson and Davis. They were surveying ice movement, depth and snow accumulation on the massive one million square kilometre basin of the Lambert Glacier which drains an area the size of the Murray-Darling basin.

An automatic weather station 1250 km inland from Mawson, has been deployed by the team. It is able to send real-time information on weather in the region to the Antarctic Division scientists in Hobart.

The team was completely self-sufficient, carrying emergency medical, clothing and food supplies, shelter and vehicle spares. By December 23, they were over half way. For 1200 kilometres of their route they were beyond the range of aircraft in the region.

**1994** Rebuilding of Mawson nears completion. Mawson celebrates its 40th Anniversary.

## Germany

# Marine geophysics being studied in Amundsen and Bellingshausen Seas

The *Polarstern* left Punta Arenas on January 14 to deploy scientists for land-based studies in the Peninsula area prior to undertaking a programme of marine geophysical research in the Amundsen and Bellingshausen Seas aimed at analysing the crustal structure at the western margin of the Antarctic continent.

Sixty six scientists are involved in the programme. Two come from Belgium, one from Chile, 56 from Germany, and one each from Sweden, the UK and the United States. The cruise, for which the Captain is C. Allers, is scheduled to end in Capetown on March 27.

Land-based activities will be concentrated in the area of Horseshoe Island and comprise geological sampling of old rock formations as well process oriented geomorphological studies. A series of snow measurements will also be made as part of a meteorological programme. Ground truthing of the melting process on the island and in adjacent regions will be undertaken to determine whether the process, in a region south of the polar circle, shows changed dynamics or whether the structures can be depicted equally well in ERS-I-SAR scenes.

The geophysical component of the programme comprises a combined land-sea deep seismic sounding experiment using recording instruments on the inland ice as well as ocean bottom seismographs. At the same time, multichannel seismic reflection lines will be observed over the continental shelf and the adjacent deep sea.

From the programme scientists

hope to resolve the origin of the sedimentary cover, and through that, gain an understanding of the depositional history of the area particularly during the Cenozoic.

Although part of the proposed ANTALITH project, the deep seismic sounding experiments will also further understanding of the history of Antarctic glaciation since it is expected that major advance and retreat stages can be documented from the sediments.

The programme will be augmented by marine geological sampling of transects perpendicular to the coast from the deep sea to the shelf environment and a link to the deeper sedimentary structures established through sediment echography using the PARASOUND system. Such sampling of the upper sediments will allow the scientists to study the recent glacial marine sedimentation processes.

Using the on-board Hydrosweep multibeam echo sounder continuous bathymetric measurements will be made generally along the ships tracks or in areal mode within selected areas. The results will further enhance the geophysics component of the cruise and hopefully also provide the first bathymetric information in previously uncharted waters.

Ground truth studies for ERS-1 Altimeter and SAR data sets will also be undertaken. These, together with the various satellite data sets, will yield a detailed picture of the kinematic and dynamic variations of the sea ice in the area and help to improve satellite data interpretation.

The optical properties of the sea ice

will also be studied so that scientists might better understand the light and energy transmission and their relevance to the ice cover as well as the biological communities beneath. Other biological research undertaken during the cruise will be essentially exploratory in nature

as little is so far known about the marine life in the area. The focus will be on understanding both the benthic and neritic ecology with the emphasis on studies of krill and copepods in the latter region.

## BAS

# Fire curtails marine science programme and dogs make final journey

A marine science cruise aboard the *RRS Bransfield* in the Weddell Sea was cut short this season when fire broke out in the propulsion motor room late on February 20. There were no injuries, but the ship, in an area of 7/10 pack ice, 11 nautical miles from open water and 1300 nautical miles from Port Stanley, was, at first unable, to proceed without assistance and with changes in the wind direction she was drifting towards an iceberg.

The vessel had picked up scientists from Halley Research Station, having just deployed equipment and provisions for an international research project deep on the continent. There were 26 officers and crew aboard as well as 37 BAS personnel.

The *HMS Endurance*, the Royal Navy's ice patrol vessel, offered help but the *RRS James Clark Ross* was diverted to assist and tow the stricken vessel to the Falkland Islands for repairs. She made contact with the *Bransfield* at 16.00 GMT on February 24 and cleared a path through the ice overnight. By the following day both ships were in open water and were expected to arrive at Port Stanley between March 3 and 5 providing the

weather held.

In the meantime the crew and scientists aboard the *Bransfield*, (affectionately known as the "Brannie"), had managed to restore half power to the aft motor, and, in open water, the vessel was able to reach a speed of eight knots.

As a result of the accident the marine science cruise aboard the *James Clark Ross* was cancelled as she was now required to complete the station resupply and uplift summer personnel from the bases and the field.

## Science programme

Seventy four projects had been planned for 1993-94 and all but 12 had a field component. They were being undertaken by the six divisions of the British Antarctic Survey and technical and other staff contracted to run the stations.

Both the *RRS James Clark Ross* and the *RRS Bransfield* were to provide logistic support for up to seven and half months from October onwards; their seaborne activities being supplemented by *HMS Endurance* operating in two periods from January to March.

Southbound ferry flights began on

October 11 and there was considerable Twin Otter support for field parties.

The British Antarctic Survey programme continues to follow the themes detailed in the document *Antarctica 2,000* issued by NERC in 1989. Among these themes is one broadly embracing pattern and change in the physical environment of Antarctica. Within it, five projects focus variously on the dynamics of the Antarctic climate system, covering the dynamical and physical climatology, the stable boundary layer, a number of numerical experiments for various analyses, synoptic and mesoscale atmospheric processes and satellite climatology.

Three ice and atmospheric chemistry projects are being undertaken. They concentrate on stratospheric chemistry and dynamics, the past climate and environment and the chemistry and physics of Antarctic ice.

The dynamics of the West Antarctic ice sheet are being studied in seven different projects which include the contribution of the Antarctic Peninsula to sea level rise, applied glaciology and remote sensing as well as the thermal regimes.

The evolution of the late Mesozoic and Cenozoic paleoenvironments are being studied through programmes relating to climate and biological change and controls on active margin sedimentation. The Southern Ocean Palaeo-oceanography and paleoclimate is another sub-theme in the study of pattern and change in Antarctica's physical environment.

The geological evolution of West Antarctica is being analysed through the sub-themes of West Antarctic crustal development and plate tectonic evolution and the subduction related processes, each of which comprises five separate projects.

Various survival strategies employed by micro organisms, their ecosystems

and conservation and management issues are the focus of the theme dynamics of Antarctic terrestrial and freshwater ecosystems.

Pelagic ecosystem and higher predator studies are being undertaken as part of the programmes work on the structure and dynamics of the Southern Ocean system for which ecological and physiological adaptations of a host of invertebrates and fish are being targeted.

Solar terrestrial phenomena is part of the work of the Upper Atmospheric Sciences Division whose staff are studying radio wave generation and propagation, and energy flow dissipation within Geospace.

Antarctic geographic information and mapping programmes continue with work on GIS and the topographic database, a geology database, topographic and thematic mapping.

The human element is not being overlooked either. Those wintering at the British bases will have their health and diet closely examined, their circadian rhythms analysed and the bacteria they pass onto others and into the environment scrutinised.

## Last Antarctic trip for the British dogs

On 11 January 1994 Britain's Antarctic sledge dogs made their last expedition commemorating their contribution to 50 years of scientific research.

Two men from BAS, a surveyor John Killingbeck, and glaciologist and polar guide John Sweeny and 14 dogs made the final journey from the Uranus Glacier across Alexander Island, an area the size of Denmark but lying west of the Antarctic Peninsula.

Under the terms of the Antarctic Treaty Environmental Protocol, all dogs

must be removed from the continent by 1 April 1994.

The men were undertaking a programme of mapping and glaciological research which began 50 years ago and for which the techniques have changed dramatically.

Satellite technology has been used to produce base maps of Antarctica but sledge party "Alpha" was to establish basic ground control points to help scientists to adjust and correct the images. They were also to make glaciological measurements which will help show the climatic differences between the west side of Alexander Island, which takes the full brunt of incoming depressions, and the more sheltered east side.

The climate of the Antarctic Peninsula region has warmed significantly over the last 40 years and the information they obtain will help improve predictions of sea level rise if this warming continues.

Prior to their departure the men issued a statement: "The project links the historic era of dog sledge exploration with this final season of the huskies in Antarctica. We remember the generations of loyal and faithful dogs and their drivers. The skills and traditions have been passed down and the methods remain almost identical to the early days. We are looking forward to the coming season as a unique opportunity to relive the old days, while at the same time, achieving a useful goal in scientific research using the most modern technologies."

The British have used huskies in Antarctica continuously since 1945 when the wartime Operation Tabarin introduced the first dogs from Labrador. Further dogs came the following year, again from Labrador and then in 1954 the breed was enhanced by new dogs from Greenland, Canada and Britain, from Greenland again in 1961 and 1969, from an Argentine base in 1971

and from New Zealand's Scott Base in 1984.

Since the 1970's, when motorised toboggans came into use, the dogs have provided recreation for BAS staff.

Huskies were first used in Antarctica by a British expedition led by Carsten Borchgrevink in 1898 and later by Amundsen and Scott.

New Zealand, Australia and Argentina have removed their dogs from the continent and the BAS dogs were due to leave Rothera at the end of February destined for the U.S.A. via the Falkland Islands.

## Station activities curtailed

Future winter operations at Signy Station have now been cancelled and the station will be maintained as a summer base only.

Faraday is to be closed unless another national operator is interested in taking it over and maintaining the current monitoring programmes. Two scientists from the Ukraine were due to visit the station in March to determine whether it would be suitable for their Antarctic interests.

## France

### Airstrip damaged days before use

Reports in *Le Monde* in late January and the *New Scientist* on 26 February 1994 indicate that the airstrip built by the French at Dumont D'Urville was badly damaged in late January by a tidal wave caused by the shelving of ice from the nearby Astrolabe Glacier during a storm. A hangar, associated with the structure, has also been destroyed. The

incident occurred about two weeks before the first aircraft, a French Hercules from Christchurch, was due.

*Antarctic* asked the French authorities to confirm the press reports and indicate their plans for the future but no reply has been received. It is, however, understood that a team of experts has been sent to assess the damage and that the runway could be out of action for up to two years if, or while, it is repaired. The French government is also understood to be refusing to state how much it is willing to pay to repair the airstrip already thought to have cost 110 million francs.

Logistically the runway would make an enormous difference to French Antarctic operations as, at present, ships cannot reach the station until mid-December. It would greatly assist the construction of the planned station, Dome C, with its inherent continental operations. But opponents of the project, of which there have been many, consider that the government has already wasted too much money trying to build the runway which may never be able to withstand the region's extreme weather.

Work on the 1,100 metre runway began in 1987 amid a great deal of controversy. Three islands, close to the base, were flattened and the fill used to link them and create the structure which cut across the nesting grounds of emperor and Adelie penguins, Giant Petrels, the Southern Fulmar, Cape and Snow Petrels, Wilson's storm petrel and the South Polar Skuas. Although the French have undertaken not to use the runway during the nesting season, environmentalists are now arguing that the repairs to the structure will cause further disruption to the birds which are only now recovering from the initial construction work.

The French authorities have undertaken not to use the airstrip dur-

ing the penguin nesting season, so, even if it is repaired in the spring, the first possible opportunity to use will be in February of 1995.

## USAP

# Continental programmes reviewed, rescue undertaken and a season's statistics

*(In the last two issues Antarctic covered the projects being undertaken by the US Antarctic Programme in the Peninsula and McMurdo areas. In this article we cover some of the continental programmes.*

*In our next issue we will be looking at US activities at McMurdo and Amundsen Scott South Pole Station over the winter.)*

Continental operations, exclusive of the major stations, this season utilised the facilities at the McMurdo Dome field camp and the Upstream Bravo field camp.

The **McMurdo Dome field camp**, located at 77deg47minS/156deg49minE, supported some 19 investigators including ten from the Polar Ice Coring Office (PICO). Activities included installing a deep coring drill rig and drilling approximately 800 metres of ice core to derive paleoclimatic information, and observations of ice dynamics on McMurdo Dome and on the Taylor Glacier.

The camp was also used as the initial staging area for a seismic traverse from the Transantarctic Mountains to

the Wilkes subglacial Basin. Approximately 170 LC-130 flight hours were required to support these projects.

**Upstream Bravo field camp** is located at 83deg36minS/137deg,57minW and supported 28 investigators from four institutions.

Activities included investigation of the seismic characteristics of the ice sheet and its bed outside a marginal shear zone of the ice stream, drilling ice boreholes, measuring temperatures in the boreholes and surveying the ice streams on the western edge of the Ross Ice Shelf. Some 212 LC-130 hours supported activities at this camp during the summer.

## McMurdo Dome

Ten of the 11 PICO personnel, who deployed to McMurdo Station, continued to the Dome camp to work from approximately 1 November to 25 January 1994.

The core, which was drilled to bedrock on a small ice dome near the head of the **Taylor Valley** in southern Victoria Land, was expected to yield a climate record of the Holocene and the last part of the last glaciation.

A University of Washington programme are, and will be, making use of the core as part of research being undertaken by Dr Pieter M. Grootes from the Quaternary Isotope Lab AK 60 in Seattle, whose team were in the Antarctic from early November to late January.

An age-depth model for ice flowing from the divide into the Taylor Glacier will be constructed from measurements of accumulation, ice thickness and ice flow. The model's results will then be checked against time markers in the ice core.

The team will also compare the isotope proxy climate record with the radiocarbon-dated proxy climate record

derived from perched deltas, strandlines and moraines in the nearby dry valleys. This will improve the interpretation, not only of the climatic and environmental significance of the oxygen-isotope fluctuations in ice cores, but, also of the history of lake-level fluctuations and ice positions in the McMurdo Dry Valleys.

The results may reveal the response of the east and west Antarctic ice sheets to the glacial-interglacial temperature increase and sea-level rise.

Members of the scientific field team for this programme were to process the core as soon as it was received from the PICO drilling crews at the McMurdo Dome but subsequent work was undertaken at the Cray Laboratory at McMurdo Station.

## Profiles

A second group of four from the Geophysics Program AK-50 at the University of Washington, led by Dr Edwin D. Waddington, were in Antarctica from early November to late January and flew from McMurdo Station to the Taylor Glacier by helicopter to resurvey each of the three pole profiles across the glacier and measure the ice depth along the profiles using ground-based radar.

After completing the surveys the team deployed to McMurdo Dome in late November to conduct radio echosounding, optical surveying and weather station servicing.

## Seismic survey

Working with geophysicists from New Zealand, Dr's Uri ten Brink from the U.S. Geological Survey's Atlantic Marine Geology Branch in Massachusetts and George Thompson from Stanford University, and their team of eight associates, some from the New Zealand Antarctic Programme, de-

ployed to the camp early in December. (See page 182) Twin Otter support was utilised to survey a route for a traverse of approximately 350 km along which seismic investigations were conducted.

Their objectives were to collect data that could be used to test and provide constraints for uplift models of the Transantarctic Mountains by imaging the stratigraphic structure of the west side.

The data will help them constrain models of the origin of the Ferrar magmas by determining the geographic extent of the unit under the east Antarctic ice sheet so that they can evaluate models of magmatism that involve mantle plume activity versus melting in response to regional rifting.

The data will also help resolve the debate about the climatic conditions and size of the east Antarctic ice sheet by determining if the Wilkes Basin contains marine sediments that could have been a source material for the Sirius Formation, a till that contains Pliocene diatoms and has been found at many high-altitude sites in the Transantarctic mountains.

The traverse was completed late in January.

## Upstream Bravo

The manner and rate of deformation of the earth's major ice sheets depend on a complex interplay of their geographic and climatic setting as well as their internal dynamics. In the west Antarctic ice sheet, it is known that rapidly moving ice streams alternate with large areas of stagnant ice, and that the transition between streaming and non-streaming flows can be quite narrow.

In these lateral shear margins, scientists believe that the physical controls of ice stream dynamics must show signifi-

cant differences. This study will examine the geophysical differences between an ice stream and a stagnant ridge along the **Siple Coast** in West Antarctica.

From early November to late January, a team led by Dr Charles R. Bentley from the University of Wisconsin-Madison probed the ice with electromagnetic and seismic waves to infer the internal temperature and its crystalline structure as well as the proportion that is old ice (Wisconsin Ice Age).

Their interest in these features stems from knowledge that ice-flow laws depend exponentially on temperature, that ice crystals are much less resistant to deformation in the plan of their hexagonal faces than in other directions, and that old ice may decay much more readily than that which is geologically more recent.

Measurements of radar diffraction patterns and analysis of micro-earthquake records can be used to determine whether the base of the ice sheet is frozen to the underlying bedrock.

## Ice sheet studies

The rapid flow of the west Antarctic ice streams which occurs probably as glacier ice slides over deformable till beneath it, has recently been studied in ice stream B by means of boreholes drilled to the bottom. Measurements of physical conditions, materials, properties and motions in the basal zone can be made in such boreholes.

In the 1993-94 season a group from the California Institute of Technology in Pasadena California comprising Drs Barclay Kamb and Herman Engelhardt and eight other investigators and support personnel used these techniques to study the ice sheet outside of ice stream B in the **Unicorn**.

Comparison of the results will further clarify the nature of the ice streaming mechanisms. They also studied

how shear margins control ice stream motion, which depends crucially on the magnitude of the marginal shear stress. This was assessed by obtaining ice core samples at depths in the **Dragon** and testing them mechanically to determine the shear stress required to give the observed marginal shear strain rate.

The search for an understanding of the ice stream control mechanisms is aimed at reliably assessing the possible contribution of ice streams to ice-sheet collapse brought about either by climate change or by internal instabilities.

Drilling of holes of approximately 400 metres, for measurement of ice temperature and evaluation of sheet heating in the **Dragon** was undertaken in collaboration with research by Dr William D. Harrison, from the Geophysical Institute of the University of Alaska-Fairbanks and his team of three investigators and support staff.

This group investigated the mechanics acting at the margins of ice stream B on the **Siple Coast** in West Antarctica. An analysis of existing temperature data near the center of the ice stream and of surface shear-strain rates at its margins indicate that strain heating in the margins should be easily measured in holes 300 to 400 meters deep.

Temperature was measured in a line of hot-water-drilled holes that bracket one of the margins of the stream and the measurements interpreted in terms of strain heating, possible strain softening of the marginal ice. The shear stress acting on the ice stream, the history of the ice stream and the stability of the margins will help scientists confirm the existence of daily variation in the vertical straining of the ice, which previously has been observed on ice stream B.

The regions of the ice streams in West Antarctica is the most rapidly changing portion of any ice sheet that is reliable documented. An anomaly ex-

ists, however, with the phenomena of the fast ice streams.

## Control of motion

A party from the Byrd Polar Research Centre at the Ohio State University deployed a six member field team to West Antarctica from mid-November to mid-January as the first stage of a three phase programme designed to determine why the ice streams exist, what controls their motion and their current state of balance. The programme tests the leading theory on the mechanics controlling the ice streams, provides data to refine that theory and extends the mass balance calculation to include more of the ice sheets.

To address the mechanics of ice stream B. they used a strain grid and precision GPS surveying. Last year's GPS work was accurate to the 1.5 millimetre level.

The **Dragon** camp at the edge of ice stream B was the base for operations. The mass balance of ice streams D and E was investigated in cooperation with R. Bindshadler NASA GSFC.

Additionally short visits were planned to the South Pole and Byrd Station by the team to service the precision mass balance installations near those sites.

## Augered samples

In the second phase of the programme Dr Whillans' party from the Ohio State University co-ordinated with this team and used the Twin Otter out of Byrd Surface Camp to conduct surveys and auger shallow ice samples

**Byrd Surface Station** was scheduled to be open from October 30 until 1 February 1994. It was used as an operational base for a utility Twin Otter, chartered by NSF for the season, and to support, among other projects, part of the work being undertaken by

Drs Whillans (Byrd Polar Research Centre, Ohio State University) and Dr Bindshadler from the Goddard Space Flight Centre at the National Aeronautics and Space Administration.

## Ice and climate

In recent years the importance of the connection between ice sheets and global climate has become increasingly apparent, the most direct effect being the changing ice-sheet volume on sea level. The most dramatic examples of the ice sheet/climate connection occur when marine ice sheets collapse and cause the sea level to rise rapidly as happened 12,000 years ago when the large north American ice sheets began to recede and the sea level rose 38mm per year or more.

Because theoretical studies indicate that marine-based ice sheets (those grounded on bedrock well below sea level) are particularly susceptible to collapse, glaciologists have focused on the stability of the west Antarctic ice sheet (the largest remaining marine-based ice sheet). Since 1983, US Glaciologists have studied ice streams that feed into the Ross Ice Shelf along the Siple Coast in an effort to better understand the status of the ice sheet and the processes that determine its behaviour.

During 1993-94 summer Dr Robert A. Bindshadler from the Goddard Space Flight Centre of the National Aeronautics and Space Administration and his party established a survey line across the mouths of ice streams D and E on the eastern edge of the Ross Ice Shelf and took ground-based and airborne radar soundings, including measurements of ice thickness along the grounding line, in order to determine the discharge flux of the two ice streams. They also completed surveys of velocity, accumulation rates and temperatures at the depth of 10 metres in the

catchment of all the ice streams and, using sequential satellite imagery, determined the surface velocities on ice streams Siple Coast region/Downstream D/E and Byrd Surface Camp.

The first phase of their project comprised a return to Downstream D/E in the **Siple Coast** region. Using snowmobiles and a series of field camps they conducted a Global Positioning System (GPS) survey of existing markers for approximately three weeks. In the second phase they shifted to the **Byrd Surface Camp** and worked with members of Dr Whillans party using the Twin Otter to collect shallow ice cores at various locations in the region.

## Automatic Weather Stations

These measure surface pressure, air temperature, wind speed and direction, and at some sites, also humidity. The data are transmitted to polar orbiting satellites and are rebroadcast and stored for later interpretation by ground stations. This season, a team five led by Dr Charles R. Stearns from the Department of Atmospheric and Oceanic Sciences at the University of Wisconsin-Madison and by George A. Weidner made two separate deployments covering the McMurdo area, the South Pole and the Byrd Surface Camp to install and maintain networks of AWS.

Twin Otter support was required at the Byrd Surface Camp for the installation of up to eight new stations before taking the team to the South Pole for further installation and maintenance.

A second group were deployed by icebreaker and visited 11 established sites in McMurdo Sound before continuing their activities on the Ross Ice Shelf and high polar plateau regions.

The data is being used to study the barrier wind along the Transantarctic

Mountains, vertical motion, sensible and latent heat flux from the Ross Ice Shelf, warm west winds flowing from the Beardmore and Byrd Glaciers, katabatic flow in East Antarctica, mesoscale systems around the South Pole and for the

meteorology of the west antarctic/Siple Coast region.

Long term records are being established at some locations, but, in the meantime, the information is useful for aircraft operations.

## Payment for rescue of Norwegians likely to be requested

Norwegian authorities asked the National Science Foundation for help this season. A party of four of their nationals involved in Filchner Ice Shelf Project or Aurora Programmet, led by Monica Kristensen, had become trapped on a heavily crevassed plain close to the Shackleton Mountains. They were on their way to the South Pole from where they had hoped to recover Amundsen's tent left there in 1911, and return it to Norway in time for the Lillehammer Olympics.

By the time the call reached the NSF at McMurdo one member of the party had spent 28 hours some 50 metres down a crevasse and another was reported injured but safe. US and New Zealand personnel responded to the call.

The first approach for help went to Adventure Network International which was operating out of its blue-ice runway at Patriot Hills and had already provided some support for the expedition. Poor weather conditions in their area precluded aircraft operations at the time the call was made.

US personnel in McMurdo received their call early in the evening of 28 December 1993 and by 7.30 p.m they had contacted Scott Base. Andrew Thompson, leader of the field training programme, and Bruce Janes responded and the full New Zealand and US search

and rescue teams assembled at McMurdo.

By 11.45 p.m., a well equipped rescue party of nine were aboard at Hercules LC130 aircraft at Williams Field, airborne, and destined for the South Pole. The others remained at the Station in case of further emergencies.

The leader was Steve Dunbar from the US and the party comprised Andrew Thompson from New Zealand and Americans, Bill McCormick, Royal Tilly, Jim Musielewicz, Oriol Sole Costa, Jeff Bills and Brian Fliegel, one of two US medics.

At 3 a.m. they landed at the Pole. The temperature was -16deg C with a wind chill factor of -44deg C. Within 45 minutes the equipment was split between the Hercules and the Twin Otter. Both aircraft set off for the Norwegian camp, the Hercules to undertake a reconnaissance of the area and establish a landing site for the Twin Otter from which the rescue was to be undertaken. Aboard the smaller aircraft when it took off at 3.45 a.m. were Dunbar, Thompson, McCormick and Fliegel.

At 7.30 a.m. the Twin Otter reached the area after flying 580 nautical miles from the Pole at approximately 15,000 feet. Individual skidoo tracks, pitted

with collapsed snow bridges, led to the camp site at 81dg23'9"S/14dg3'41"W. The holes were large and their direction inconsistent. The aircraft landed approximately two miles away. A crevasse, some 15 feet from the runway, was spotted as the team, unloaded their equipment and prepared for the journey to the camp.

By 8.45 a.m. they had laden the stretcher with rescue equipment and roped up, remaining some 50 feet apart and staggering their approach to avoid crevasses, the first of which they found some 30 feet in front of the aircraft.

Travel was slow and difficult. Sastrugi made the sledge awkward to pull and the snow was often knee deep. Frequently members of the party belly crawled across snowbridges to disperse their weight and avoid the crevasses below. Between them they dropped into some 20 to 25 crevasses, one member wryly observing that this was the most he had fallen into during one day.

### Camp sighted

Finally they sighted the Norwegian camp amid a larger and more intensively crevassed area. At 1.20 p.m. they reached the site, having taken three hours and 40 minutes to travel two miles.

All the Norwegians at the camp, Lars ole Ekerhovd, Per Haakon, Eike Berg, Egil Isaksen, spoke good English. One, Egil Isaksen, had sustained concussion and bruising after falling 70 feet into a crevasse with a skidoo but he was safe. Another, Jostein Helgestad, had by now been some 50 metres down another crevasse for 48 hours. Using a combination of ropes secured to a skiddoo which was anchored with snow stakes, Steve Dunbar rappelled down to him and confirmed, what the party already feared: He was dead.

By 6 p.m. the group had de-rigged their rescue set up and established a plan to take the remaining party out to the Twin Otter. Contact with the Pole was established using the Norwegian's 100watt, VHS radio set. Although the Norwegians required instruction for travel through the area, returning to the aircraft was easier as the route had been flagged and most of the crevasses were now open and could be easily seen.

By 8.30 p.m. they were back at the Twin Otter and the SAR team probed the runway for further crevasses prior to takeoff at 9.35 pm.

By 1 a.m. on December 30 they had reached the Pole and they transferred to the Hercules for the flight back to McMurdo. Isaksen was with them. The following he was flown back to Christchurch for medical treatment prior to leaving New Zealand for Norway. The other two Norwegians were picked up at Pole Station by ANI and they returned to Norway via Punta Arenas.

### Estimated cost

The National Science Foundation estimate the rescue to have cost between US\$94,000 and \$125,000. Two years ago they implemented a policy of charging for such operations but, during that period, assistance has been required only by other treaty nations. It seems likely that they will seek reimbursement for this rescue either from the Filchner Ice Shelf Project or the Norwegian Government.

#### *Antarctic deadline*

The deadline for copy and advertising for the June issue of *Antarctic* is May 20. *Antarctic* will be available to branches for distribution on June 15.

## Some statistics from this season's activities

WINFLY comprised eight LC-130 flights. They were undertaken by **VXE-6** between August 22 and 27 and carried a total of 205 passengers south. Some 28 people returned to New Zealand. The total southbound payload was 138,468 lbs with 37,904 lbs brought back to Christchurch.

### The main body flights:

The **USAF** made 21 C141B turnaround flights from Christchurch to McMurdo between October 6 and November 13. A further flight from the Pegasus runway was made on February 7, and excluding this, the USAF carried 1186 passengers south, along with 674,320 lbs of cargo. Three hundred and forty passengers flew north on the aircraft which carried 231,155lbs of cargo back to Christchurch.

**RNZAF C130** flights for the season totalled 12 and were flown between November 6 and 29. They carried 32 passengers south and 52 back to Christchurch. Their total southbound payload comprising 298,023 lbs of cargo was 307,098lbs; their total northbound payload was 66,564 lbs of which 54,956 lbs was cargo.

Between October 12 and November 27 the **Italian Airforce** made nine C130 turnaround flights between Christchurch and McMurdo. They carried 79 passengers south, 78 of whom

were part of the Italian Antarctic Programme. Southbound cargo amounted to 152,660 lbs and the total payload on these flights south was 173,396 lbs.

The **New York Air National Guard** (NYANG) made six flights between Christchurch and McMurdo between November 7 and 28. They carried 176 passengers south, 137,344 lbs of cargo and a total payload of 182,917 lbs. Flying north they carried 128 passengers with 51,968 lbs of cargo and a total payload of 84,453lbs.

Between October 18 and December 9 the **VXE-6**, TC-130's made 20 turnaround flights between Christchurch and McMurdo. They carried 305 passengers south, 397,464 lbs of cargo and a total payload of 481,115 lbs. Coming north they carried 798 passengers, 163,314 lbs of cargo and a total payload of 391,239 lbs. These figures included a further 13 turnaround flights from the Pegasus runway made between February 3 and 28.

**VXE-6's** LC130's made 12 flights from Christchurch to McMurdo between October 14 and December 4 and a further 46 flights between December 12 and February 27. Their 1 southbound passengers totalled 558, their cargo was 747,769 and payload 905,166lbs. Flying north they carried 1,112 passengers and 315,534 lbs of cargo making a total payload of 624,534 lbs.

All up there were 149 flights south and north; (they call came back this season!)

Two thousand, three hundred and thirty nine passengers went south with 2,407,580 lbs of cargo representing a total southbound payload of 3,065,977lbs.

Two thousand, four hundred and sixty-three passengers came north. Northbound cargo amounted 816,437 lbs making a total payload of 1,494,868 lbs.

## Sub Antarctic

# Fire destroys accommodation hut on Enderby Island

Among the official expeditions to the subantarctic this season was the shortest one on record for monitoring the Hookers' sealion. It lasted nine hours.

Led by Nick Gales from the Department of Conservation in Wellington and comprising Hugh Best also from DOC, Wellington, Rob Mattlin from Victoria University, and Martin Cawthorn, an independent adviser and veteran of many longer expeditions, the team had just arrived at Enderby Island aboard the *Marine Countess* from Bluff.

A 5 a.m. on December 29 they began unloading and by 10.15 a.m. the task was complete. Supplies for one month and equipment were stowed in the accommodation hut and the team made coffee for themselves and the crew of the *Marine Countess* who had assisted. A short time later they left the hut and from the beach, approximately a quarter of a mile away, they observed smoke pouring from the chimney followed by a flash of flame at the window. The hut was on fire.

Offshore were the *Marine Countess* whose crew were repairing a minor problem with the anchor, and the *Petersen*, a scampi boat operated by Simunovich Fisheries, Auckland, and skippered by Dave Paterson. Both crews raced to assist, the men from the *Petersen* bringing a portable pump and 200 metres of hose. But, in spite of all their efforts, some twenty-six minutes later the hut was a pile of embers. The party had, at least contained the blaze which might otherwise have turned into a disastrous

long lasting peat fire.

The monitoring party returned to the *Marine Countess*, and within nine hours they were on their way back to Bluff having all lost at least some items of equipment as well as their food and other supplies.

Prior to their arrival Chris Thomas, an internationally known wildlife cinematographer and Toby Cantwell a Fisheries Officer from MAF, both of whom are based at Greta Point in Wellington, had spent the previous three weeks filming on Enderby Island. They had travelled south aboard the *Sam Arawa*, a fishing vessel operating out of Timaru. Chris Thomas's equipment was lost but it is not at this stage known whether any of the heat damaged film can be salvaged. They too, returned to Bluff, but as planned aboard the *Marine Countess*.

Originally, it had been intended that the Hookers sealion party would sail north aboard the *Evohe*, a privately owned 75 feet steel hulled ketch operating out of Deep Cove in Fiordland. This vessel went south in late January, as planned, carrying three parties but returned without their passengers.

Those southbound, aboard the vessel, comprised a team of four led by Mat Maglone from Landcare in Christchurch who went to Port Ross. They were examining the vegetation, pollens and peat in relation to climate change and were taking advantage of the vessel's accommodation to share costs and logistics.

Also aboard were Peter Dilks from

DOC in Christchurch and four others who were continuing the monitoring of the Wandering Albatross on Adams Island. The third party was led by Andy Cox from Invercargill (who also assisted with the albatross programme), and comprised Nick Torr from Te Anau and Gary Aburn from the West Coast. They searched Adams and Rose Islands for rabbits following the eradication programme undertaken during the last two seasons. None was found but the exercise will be repeated for the last time in April when Mike Slater the project Manager from DOC in Invercargill and Andy Cox will lead a DOC team, personnel to be finalised, aboard the navy's vessel *HMNZS Canterbury* back to the Island to rebuild the accommodation hut. Construction of the new hut will be four by two timber with ply exterior. It will be slightly larger but no smarter than the last one because, as DOC personnel hasten to point out, it is not cold on the Island, only wet.

All three parties returned to Bluff aboard the Russian icebreaker and tour ship the *Kapitan Khlebnikov* which happened to be one of the three tourist vessels operating in the subantarctic during the summer. Like the *Geomarine* and *Pacific Ruby* the *Kapitan Khlebnikov* visited the Auckland and Campbell Islands landing passengers on both. The *Pacific Ruby* made three trips south and allowed passengers to cruise in zodiacs at Bounty and Snares and like the *Geomarine* also landed passengers at Macquarie Island. Those aboard the *Khlebnikov* also undertook some zodiac cruising.

Still in the subantarctic at press time were a team of three on Snares Island, led by Ron van Mierlo from Christchurch. They are undertaking the annual census, monitoring and banding of the mollymawks and are scheduled to return to New Zealand towards the end of March.

## IWC

# Intersessional meeting to discuss sanctuary proposal

An intersessional meeting of the International Whaling Commission was held at Norfolk Island between 20 and 24 February 1994 to discuss the whale sanctuary in waters south of 40 deg latitude. Essentially the meeting addressed the outstanding differences on the French sanctuary proposal in order that the IWC can take a full decision on it at the annual meeting to be held at Puerto Vallarta in Mexico in May 1994. Some 26 of the countries participating in the IWC, including New Zealand, attended. UNEP and the IUCN sent observers.

The proposal for the sanctuary requires three quarters of the IWC members to attend and to vote. It was clear from the meeting that there was insufficient support for the proposal and that it will be difficult in May to secure the necessary majority.

A major outcome of the meeting, however, was a recommendation that the IWC note that there are no irreconcilable objections to establishing a sanctuary and that it could be created by the commission should its members decide to do so. Antarctic treaty organisations, especially CCAMLR, indicated clear support for ongoing dialogue.

David Taylor from the Ministry of Foreign Affairs and Trade attended the intersessional meeting for New Zealand. Ian Stewart, formerly New Zealand's Whaling Commissioner will join the new commissioner the Hon. Jim McLay at the next meeting in May.

*At the last meeting the IWC decided.....*

## Further work would be undertaken on sanctuary proposal

The 45th annual meeting of the International Whaling Commission was held in Kyoto, Japan from 16 to 20 May 1993. It was preceded by a meeting of the scientific committee and other subcommittees and concluded with a continuation of the moratorium and agreement to further consider the establishment of a whale sanctuary in waters south of 40deg latitude.

The sanctuary was one of the main items of debate at Kyoto. Other key topics discussed at the meeting were the Revised Management Scheme, RMS, an emergency relief allocation of minke whales for Japan, and the questions of humane killing, small cetaceans and scientific whaling.

Norway re-confirmed its intention stated at the 44th meeting in 1992 to resume commercial whaling and according to media reports the first meat sold well on the Norwegian market before the end of June.

The Commissioners for Australia, Finland, France, Germany, Ireland, Monaco, Netherlands, New Zealand, Oman, the Seychelles, South Africa, Spain, the United Kingdom and the United States signed a joint statement condemning the Norwegian intentions and urging the country to continue to work with the commission for the completion of the Revised Management Scheme before the moratorium could be reconsidered.

### The Sanctuary

In 1992 the Commission adopted a resolution inviting member governments

to submit questions and comments on a French proposal to establish a sanctuary south of 40deg latitude and requested the scientific committee to review them at the Kyoto meeting.

In 1993, under the chairmanship of C.G. Ducret from Switzerland, a Working Group on a Sanctuary in the Southern Hemisphere considered an extract from the report of the Scientific Committee and its subcommittee on Southern Hemisphere baleen whales as well as responses from interested organisations and member countries

The working group comprised representatives from Australia, Brazil, Chile, the People's Republic of China, Denmark, Dominica, France, Germany, Japan, the Republic of Korea, Mexico, the Netherlands, New Zealand, Norway, the Russian Federation, St. Lucia, St Vincent and the Grenadines, Spain, Sweden, Switzerland, UK, and the United States of America.

The sanctuary was later also discussed by the Technical Committee and at the Plenary Session, the first consideration however, was undertaken by the scientific committee.

### Scientific Committee

This Committee had time only to consider the questions raised by members and interested organisations and noted that the proposed sanctuary would constitute a replacement for the Revised Management Procedure in that area.

(The RMP is an integral part of the

RMS. Should the RMS be formally adopted by the IWC, a decision on whether or not to lift the moratorium would be necessary.) The committee considered that advice about many of the options should be based on systematic evaluation (including computer simulated trials where appropriate) and whether the evaluation should be global, regional or species oriented.

Their meeting yielded two main views:

1. The proposal had no scientific elements to justify the sanctuary as the RMP could provide adequate conservation and management of baleen whales in their feeding grounds. As the RMP accommodated all likely, and some unlikely, eventualities the sanctuary was not necessary.

2. The sanctuary needed to be considered in the context of a broader scheme of management of whaling and the conservation in the southern hemisphere and globally.

Considered globally the sanctuary would limit the impacts of unforeseen problems in areas where the RMP was applied.

In debate, some in the committee, expressed the view that if the RMP proved unsound for unforeseen reasons, the sanctuary would complement the Revised Management Scheme, RMS, until the problems were solved. (Some computer trials already conducted evaluated aspects of the effects of a sanctuary assuming a duration of 50 years. Further trials could be conducted to determine the effects of protecting at least one population of each southern ocean species throughout its migratory range. Other trials could be developed, if necessary, but this would involve more than one meeting of the scientific committee.)

## i. Intergovernmental organisations

After considering the scientific committee comments on the southern ocean sanctuary, the working group briefly examined the views of intergovernmental organisations and then looked at the legal and political, scientific, financial and management issues. It was clear from discussion that, in addition to France, only a limited number of countries including New Zealand and Australia supported the current sanctuary proposal. A number of countries indicated that they were not opposed to the principle of a sanctuary but they had reservations about some elements of the proposal. Still others, including Japan, Norway and the Caribbean countries were opposed to the concept.

SCAR's assessment concluded that there was little scientific justification for proposing the whole area as a whale sanctuary and that exploitation of species, other than minke whales, would be managed under the RMP, protected and therefore conserved. However, there was probably sufficient justification to set part of the Southern Ocean aside as a control area for research which could be compared with other studies associated directly with commercial whaling. The northern boundary of such a sanctuary should, according to SCAR be at 40deg S, with its longitudinal boundaries defined by the IWC Scientific Committee.

UNESCO's Inter-Governmental Oceanographic Commission indicated that it was not able to predict the implications of the proposed sanctuary. It emphasised that further research in the Southern Hemisphere was necessary. They considered that the proposal was balanced in terms of social and political considerations but probably could not be supported by scientific arguments, moreover, the

establishment of the sanctuary could preclude active management which might lead to better protection of the ecosystem.

The IUCN recommended that sanctuaries should be created within a comprehensive system for the conservation of whales. It emphasised that the minimal boundaries of a sanctuary in the Southern Hemisphere should be such, that the full migratory range of at least one population of each whale species present, was covered but, because, the range of movement on feeding grounds in Antarctic waters was uncertain the IUCN felt that any sanctuary should cover a considerable area. It supported the establishment of a sanctuary of appropriate extent but stressed the need to ensure adequate management outside it.

CCAMLR's advice was covered by the scientific committee.

In summing up the discussion, the Chairman noted the large number of differing views and interpretations of the comments from the intergovernmental organisations.

## ii. Legal and political

The legal and political issues of establishing a sanctuary related mainly to the rights and jurisdictional responsibilities of the states whose coasts would border the area. It was felt by some delegations that problems could be addressed by adjusting the extent of the sanctuary.

Others considered that the national regulations of the countries involved were already stronger than those which would be embodied in the sanctuary.

Still others, considered that it should be possible to appropriately recognise the concerns of such nations while the Netherlands, Russians and Australians saw nothing in the proposal that detracted from the rights of the coastal states. They recommended that the

views of those for whom the sanctuary was an issue should be considered.

The Russians stated that obligations accepted by the states under the 1946 Convention superceded the need for mandatory accommodation of sovereign rights of coastal states to be a condition of the sanctuary.

Norway, Chile and Brazil suggested the proposal reflect the following principle: "A possible sanctuary should not infringe upon coastal states' rights and jurisdictional responsibilities".

The question of the relationships with other legal instruments and agreements was also raised; Chile wanted more time to study this; France maintained that their sanctuary proposal was within the principles of the 1946 Convention. Norway, supporting Chile, considered that any proposal would require careful drafting. Japan then drew attention to the Protocol for the Protection of the Environment under the Antarctic Treaty, as signed in Madrid in 1991, which stated that nothing in the Protocol shall derogate from the rights and obligations of parties under the Convention for the Conservation of Antarctic marine Living Resources, the Convention for the Conservation of Antarctic Seals and the International Convention for the Regulation of Whaling. This drew a comment from the Russians that the proposal, as discussed, did not interfere with any of the existing Conventions.

## iii. Scientific issues

The use of research in whale biology and ecology, management and monitoring of global environmental change was considered. France, asked by Japan to clarify its reasons for the sanctuary, indicated that it was both for scientific and management purposes and that it would allow an opportunity to monitor fluctuations in the relative abun-

dance of whales over a vast area remote from major direct human influence. New Zealand reiterated its wish to see more behavioural and ecological research undertaken; Denmark considered there to be insufficient information on which to give clear and precise advice and that further analysis of existing material was required before the commission could decide.

The chairman drew members' attention to the differences between the scientific justification for the establishment of the sanctuary and the uses to which the area may be put.

Spain considered it important to ensure the complementarity of other research being undertaken by other bodies in the area. France indicated that the proposed sanctuary would also refer to the terrestrial components of the environment and that there were other important seabird and mammal populations within the area. Australia, in drawing attention to the range of research already being carried out suggested that the area would benefit from long-term monitoring.

The questions of international cooperation and efforts in the study of the whole environment was drawn to the Commission's attention by Japan and the UK. The US, with supporting statements made by Australia, New Zealand and the UK, considered that the sanctuary could act as a focus for studies such as those in marine biology, oceanography and climate and looked forward to expanding such studies which would have a direct bearing on whale populations in the Southern Ocean.

Two diverse views then became apparent: firstly, that the establishment of a sanctuary could provide a focus for research both on whales and on other global environmental issues or, it could lead to little or no research, most particularly because there would be no incentive to obtain information for man-

agement.

The Group agreed that further discussion should take place in the Technical Committee and Plenary. And that the Scientific Committee could be invited to examine what research would be required on whales and their ecology, should a sanctuary be established. This should take into account wider studies to be carried out in coordination with other bodies with interests in the region.

#### iv. Finance

The budgetary implications for the IWC and the funding of required research and monitoring were considered. The group was not able to reach any clear conclusion on these matters and agreed that further discussion in Technical Committee and the Commission were required.

#### v. Management issues

Discussion centred on the compatibility of the proposal with Agenda 21. (This was a document of 40 chapters produced at UNCED, the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. It is a forward-looking action plan or framework for the international community looking towards sustainable development. Much of the debate at Kyoto centred on the rational use of marine resources in terms of Chapter 17 of the UNCED document.) The concept of sustainable development, the idea of the safety net and precautionary principles were discussed. There were widely divergent interpretations as to whether the sanctuary was complementary, supplementary to the RMP or a replacement.

#### vi. Geographical boundaries

Noting the wide range of opinions

on the most appropriate northern and longitudinal boundary for a possible sanctuary in the Southern Ocean the working group concluded that it could not recommend specific action on the proposal. It noted that it had agreed under several items that further discussion would be required in the Technical Committee and the Commission. And it decided to draw the attention of the Technical Committee to those items in which further work or discussion by the Scientific Committee was recommended.

## The Technical Committee

The sanctuary was an important element of discussion in the technical committee (which has essentially the same composition as the plenary but it provides a mechanism for difficult questions to be discussed!!!).

France, as the sponsor of the resolution, was determined to secure a vote on the sanctuary proposal and it was agreed that within the technical committee that a vote should be held.

The vote produced a simple majority of IWC members in favour of the sanctuary proposal. This was sufficient for the proposal to be put forward to plenary for its consideration. However, as a three quarters majority was necessary in plenary for the sanctuary to be adopted, and, it was clear that the proposal did not enjoy that level of support, an alternative approach was developed for plenary.

## Plenary

As a vote in plenary with less than a three quarter majority would have been a serious defeat for the sanctuary, Brazil, Chile, Finland, Switzerland and Sweden advanced a resolution to keep the issue alive for further consideration

at the 1994 IWC meeting. This was adopted with 19 member countries in favour, eight against and four abstentions.

The resolution noted that the International Convention for the Regulation of Whaling provides for the adoption of regulations fixing open and closed waters, including the designation of sanctuary areas.

It recalled France's proposal that a sanctuary be designated in the waters of the Southern Ocean; was conscious of the views of member states. It also recalled the Commission's resolution on a sanctuary in the Southern Ocean and on the need for research on the environment and whale stocks in the Antarctic region, adopted at IWC 44.

The resolution then went on to endorse the concept of establishing a sanctuary in the Southern Ocean, resolved to address the outstanding legal, political, ecological, geographical, management, financial and global environmental issues relating to such a sanctuary and invited member states and other states concerned as well as the interested organisations active in the area to enhance their scientific and monitoring activities relevant to the purpose of the sanctuary.

An offer from the Government of Australia to host an intersessional open-ended working group of member states was accepted. (See page 209). The resolution then expressed the hope that this meeting would address the outstanding issues and enable participants to formulate recommendations so that the Commission could take a full decision on the Sanctuary at IWC 46.

Those against the resolution were Dominica, Grenadines, Japan, Korea, Norway, St. Lucia, St., Vincent. The Solomon Islands. China, Russia, Seychelles and South Africa abstained.

In plenary Japan threatened to leave

the IWC if the sanctuary was adopted.

## The RMS

At IWC 44 the RMS was elaborated. It included the RMP, and other elements which had to be completed before the commission could consider adopting new rules for whaling.

The scientific committee was asked to complete further work on the RMP. It focussed on aspects such as the protocol for surveys, their frequency and techniques for establishing population abundance.

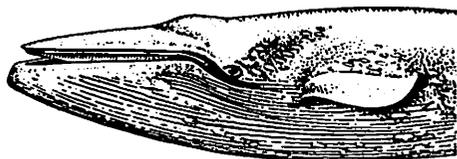
At the conclusion of its meeting the committee accepted the procedure and referred it to the Commission for inclusion in the Schedule.

(This was one of the two foundation documents of the IWC, and contains the rules for whaling. The moratorium is paragraph 10E of the Schedule; the other document is the Convention for the Regulation of Whaling.)

Member governments consider that it was premature to lock the RMP into the schedule.

Norway and Japan proposed a resolution to adopt the RMP and include it in the Schedule but this failed. The Grenadines, St. Lucia, St. Vincent and the Solomons supported Norway and Japan but 18 countries voted against them. Chile, China, Russia, Denmark, the Seychelles and Sweden abstained and Dominica was absent during the vote.

Effectively this means that the RMP is complete until work on the RMS is finalised and the IWC can consider whether to adopt the full package.



Before that can happen items such as the rules relating to inspection and observation need to be further considered.

## Japan's emergency relief quota or small type coastal whaling

Japan has for several years sought an emergency relief quota for minke whales for its coastal communities. It has argued that whaling by its coastal communities, - small type coastal whaling should be regarded as a separate category similar in some respects to, but distinct from, pelagic commercial whaling and aboriginal subsistence whaling.

In 1993 Japan made good progress towards its goal by making sweeping changes to its proposal (including a promise that whale meat caught by small type whaling interests would not be commercially distributed).

A resolution was adopted by consensus which recognised the cultural and social impact of the moratorium on several coastal communities and agreed to further consider the small type coastal whaling question in 1994.

## Humane killing

As a result of UK pressure, and with NZ support, it was agreed that there should be a further workshop on humane killing in 1995. This will allow members to consider whether whale killing methods are as humane as possible and to make recommendations. New Zealand and Brazil advanced a resolution containing a forward looking approach on how the IWC might consider the protection of small cetaceans in future. This was adopted by a large majority.

## Next meeting

The next meeting of the International Whaling Commission will be held in Mexico in May.

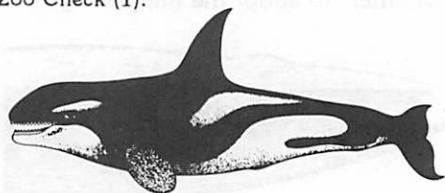
## 1993 representation

Countries represented at the 1993 meeting included Argentina (with a delegation of 1), Australia (6), Brazil (3), Chile (3), the People's Republic of China (4), Denmark (11), Dominica (3), Finland (3), France (5), Germany (3), Grenada (2), India (1), Ireland (1), Japan (56), The Republic of Korea (3), Mexico (3), Netherlands (3), New Zealand (3), Norway (19), Oman (1), Peru (1), the Russian Federation (1), St. Lucia (1), St. Vincent and the Grenadines (2), Senegal (2), Seychelles (2), Solomon Islands (3), South Africa (3), Spain (2), Sweden (4), Switzerland (2), United Kingdom (11), and the United States of America (23). The Scientific Committee was chaired by P.S. Hammond from the United Kingdom.

Non-government observers came from Austria (1), Canada (12) and Iceland (1). Intergovernmental Organisation Observers came from ASCPNAMS, CCAMLR, EEC, FAC, ICES, IUCN, NAMMCO, UNEP/CMS with one from each organisation.

The following non-government organisations also sent observers: A & M Records (1), All Japan Seamen's Union (1), the Alliance of Marine Mammal Parks and Aquariums (1), the American Association of Zoological Parks and Aquariums (1), the American Friends Service Committee (1), the Animal Kingdom Foundation (3), the Animal Welfare Institute (1), the Antarctic and Southern Ocean Coalition (1), Appel pour les Baleines (1), the Association for Protection of Japanese Fisheries (1), Beauty without Cruelty (1), Campaign Whale (1), Care for the Wild (1), Center for Marine Conservation (1), Cetacean Society International (2), Citizens League for Preservation of Whaling (1), Coalition Clean Baltic (1), David Shepherd Conservation Foundation (1), Dolphin Connection (1), Earth Island Institute (1), Earthtrust (1), Elsa Nature Conservancy (2), the Environmental Investigation Agency (1), the European Bureau for Conservation and Development (1), the European Environmental Bureau (2), the European Union for the Protection of Animals (1), the Fauna and Flora Preservation

Society (2), the Federation of Japan Tuna Fisheries Cooperative Associations (2), the Foundation for International Law and Development (2); Friends of Whalers (2), GLOBE International (1), Greenpeace International (1), the Group to Preserve Whale Dietary Culture (1), High North Alliance (2), Human/Dolphin Foundation (3), Humane Society International (1), Indigenous World Association (1), Institute for European Environmental Policy (1), the Institute for the Study of Animal Problems (1), the International Association for Religious Freedom (1), International Coalition of Fisheries Associations (1), International Commission of Jurists (1), the International Dolphin Watch (1), International Environmental Advisors (1), the International Fund for Animal Welfare (1), the International Institute for Environment and Development (1), the International League for the Protection of Cetaceans (1), the International Marine Animal Trainers Association (2), the International Marine Mammal Association Inc. (1), the International Ocean Institute (1), the International Society for the Protection of Animals (1), the International Wildlife Coalition (1), the International Work Group for Indigenous Affairs (1), Inuit Circumpolar Conference (2), the IWC Kyoto Task Force (1), the Japan Fisheries Association (1), the Japan Small-type Whaling Association (1), the Japan Whaling Association (1), the Minority Rights Group (1), Monitor (1), Monitor International (1), the National Federation of Fisheries Cooperative Associations (1), the Nordic Council for Animal Welfare (1), the Nordic Ecoforum (1), Robin de Bois (2), the Royal Society for the Prevention of Cruelty to Animals (1), SAVE International (1), Save the Children (1), Sink or Swim (1), Special Expeditors (1), Survival International (1), TRAFFIC International (2), Task Force (1), Waterlife Association (1), Werkgroep Zeehond (1), Whale and Dolphin Conservation Society (1), Whaling Problem Discussion Committee (1), Women's International League for Peace and Freedom (2), Working Group for the Protection of Marine Mammals, World Council of Indigenous Peoples (1), World Society for the Protection of Animals (1), World Wide Fund for Nature (1), Zoo Check (1).



## From a journey to Cape Crozier to the voyage of the *Marco Polo*

*Television New Zealand's Natural History Unit are currently producing a film on the history of Antarctic exploration.*

*In January a team of four from the unit joined the cruise ship Marco Polo in Antarctica to film sequences for this production and gather material for another on penguins.*

*Max Quinn, who wintered at Scott Base in 1991 while making a programme on Emperor penguins, was able to return and view the Antarctic continent from a totally new perspective - the luxury of a cruise liner.*

Late on the evening of 27 January 1994 the cruise ship *Marco Polo* slipped out of Punta Arenas. This southern most city on the Chilean mainland is the home to some 80,000 hardy souls who endure a climate best described as Sub-Antarctic.

For the Chilean Antarctic programme it's an ideal jumping off point for that dash across the Drake Passage to where they support a dozen or so bases in the Antarctic Peninsula area. For the 700 passengers and crew on board the *Marco Polo* the Drake passage held a certain apprehension, supported, no doubt, by many stories of heroic encounters with the vast seas that this stretch of water is renowned. They say, however, that you haven't really visited Antarctica unless you've gone there by sea, and that is what this trip was offering.

Put together by the enigmatic Lars-Eric Lindblad who first pioneered tourism to Antarctica in 1965 using the *Magga Dan*, and later his own ship the *Lindblad Explorer*, this cruise was offering the ultimate Antarctic voyage.... "A grand Antarctic circumnavigation...giving the chance to relive the heroic age of Antarctic exploration....", while enjoying the comforts of a modern cruise liner.

Over 400 passengers took up the challenge to not exactly circumnavigate the continent, but sail from South America to the Antarctic peninsula and then on to McMurdo Sound, before sailing back through the southern ocean to Christchurch, New Zealand.

On board, Lars-Eric had gathered an impressive group of guests and lecturers to accompany the cruise and add to the unique flavour of the voyage. Sir Vivian Fuchs and Sir Edmund Hillary of Trans Antarctic Expedition fame were there. So too, was Lady Philippa Scott, wife of the late Sir Peter Scott and director of the Wildfowl and Wetlands trust in England. Accompanying her was son, Falcon Scott, grandson to Robert Falcon Scott. To represent the Amundsen family was Ann-Christine Jacobsen, grand niece of Roald Amundsen. Geologist Gilles Allard, zoologist and author Robert Burton, marine biologist Marie Buchler, and renowned penguin authority Bernard Stonehouse represented the Antarctic sciences. As well, wildlife artist Robert

Bateman, award-winning wildlife film makers Des and Jen Bartlett, and writer and tour leader Nigel Sitwell gave passengers the opportunity to mix it with some of today's most notable Antarcticans.

The first two days of the voyage took us through the famed Straits of Magellan and into Beagle Channel in the heart of Tierra del Fuego. Here the glaciers tumble down into the seas. Ushuaia, in Argentina territory, has the distinction of being the world's most southern city. This would be the last berth for the *Marco Polo*; from now on all landings would be made by zodiacs.

Passengers were able to visit the 155,000 acre Lapetania National Park which represents the most southerly aspect of the Andean Mountain Chain, and cruise aboard a catamaran to nearby island wildlife sanctuaries.

## Drake Passage

But Antarctica was beckoning and the 30th of January saw us in 10 metre swells of the Drake Passage. Normally a 20,000 ton cruise liner equipped with stabilisers would handle this with minimum discomfort to those on board. But water in the fuel line brought us to an abrupt halt. The ship lurched violently and the crockery in the two restaurants flew. For almost two hours we heaved and rolled at the will of the seas. We were certainly getting the feel for the heroic age....!

Early on Monday 31 January we made landfall at the smouldering caldera that is Deception Island. The entrance to the sheltered harbour is through the towering cliffs of Neptune's Bellows. A fitting welcome to the Antarctic. As recently as 1968 an eruption here destroyed the Chilean and British bases. We put ashore near the ruins of the Chilean base where tourists could wander through the monochromatic vol-

canic landscape. Hot springs near the waters edge meant visitors could enjoy a warm bath at low tide. Unfortunately for this cruise, the tide was in but several still made the plunge just to say they had been swimming in the Antarctic.

## Rendezvous with Russians

A rendezvous with a Russian freighter, now acting as a cruise ship albeit on a more modest scale than the *Marco Polo*, meant another landing later in the day at Halfmoon Island. This was necessary as much of the passengers' luggage had been inadvertently sent on to the Falkland Islands prior to departure. The Russians agreed to ship it to Antarctica and leave it high and dry on a beach near to a Chinstrap penguin colony.

By early February the Chinstrap chicks are well developed and parents seemed to be totally preoccupied with the gathering and feeding of their young and apparently were concerned with the arrival of over 400 humans all wearing bright red jackets. Bernard Stonehouse observed carefully. Now based at the Scott Polar Research Institute in Cambridge, he is currently leading a research team studying the impact of tourism on Antarctica. This research could be timely. 1994 saw 15 cruise ships operating in the Antarctic region, and for the first time tourists outnumbered the science fraternity on the continent.

## Incongruous activities

During the day it was penguins - that evening it was penguin suits. One of the more incongruous activities on board was the observing of formal occasions. A chance for everyone to dress up now that all the luggage was on board, and officially meet and be photographed with the captain at his welcoming cock-

tail party. Afterwards a special Wolfgang Puck Dinner featuring cuisine from Hollywood's famous Spago restaurant, all washed down with the best of Chilean and Argentinean wines. Then it was off to the Ambassador Lounge for Variety Show time. The Orient Line which runs the Marco polo brought on board a full complement of entertainers who were able to perform a different show every night of the cruise. The Irving Davis Singers and Dancers presented a sophisticated Paris style review complete with feather boas and high kicking showgirls. Adam and Nicki Derrick, or the Musical Derricks as they are known, featured xylophones and drum machines, while Dave Diamond and Angelique created spellbinding illusions and magic.

If the Ambassador lounge wasn't to your liking you could always retire to the comfort of the Polo lounge and enjoy the soothing sounds of pianist and singer David Perry or to the Charleston Club where the Cafe Concerto strings would be waiting to serenade you. And at 11.30 p.m. if it still wasn't late enough for you the Charleston club turned into a disco. The liveliest spot south of the 50th parallel.

Then of course, when you eventually make it back to your cabin and discover your bed has been turned back and a little red card wishing you sweet dreams and a chocolate placed on your pillow, you can always turn on the television. A choice of five channels offered news direct from the satellite or the latest movies with a few classics thrown in. A couple of channels of relayed Antarctic and wildlife documentaries as well as replays of the days lecture programme.

On more than once occasion I had to pinch myself to remind me that this was the Antarctic we were in! But these activities were really just a diversion to the real reason for being here - to see as much as possible of the huge continent

in a the limited time available.

## Rigid itinerary

Cruise ships like *Marco Polo* stick to a rigid itinerary. There is no guarantee that landings can take place. If the weather is bad or ice conditions prevent access there is no waiting around - it's on to the next location.

For this cruise it was Port Lockroy on Weincke Island, site of the deserted British 'A' base first set up during the second world war apparently to counter any claims the Germans may have had on the Antarctic continent. Long since abandoned, the base has been taken over by nesting Gentoo penguins and scavenging sheathbills, who seek shelter among the piles of rusting fuel drums. Port Lockroy was also the site of whaling activities and the bones of these giants are scattered among the colony. Once again the Gentoos seemed little troubled by the sudden invasion of their private space so long as a distance of about 10 metres was observed.

## Wildlife hotspots

Surrounding the colony Crabeater seals lazed on small icebergs, while Leopard seals patrolled in the water on the look-out for wayward penguins. Further out Humpback and Minke whales could easily be seen breaking the surface. Amongst the nesting penguins the spectacular Blue-eyed Cormorant also made its nest making this place a wildlife hotspot.

The human activity of past and present brought home to everyone just how vulnerable a place like this would be in the event of any ecological mishap occurring within the vicinity.

That afternoon a landing was made on the mainland of Antarctica for the first time. Once again an abandoned base - this time the Chilean Gonzalez



Videla Station - marked the landing site in Paradise Bay. But the penguins and the sheer beauty of the surrounding country were the real rewards for the visitors. Gentoos could be observed at close range as they raced through the crystal clear water at astonishing speed. A rare albino Gentoo also created a lot of interest as did the rather sinister spectacle of Sheathbills attacking unguarded Gentoo chicks and tearing them apart just a few metres in front of startled onlookers. Here also a cairn marked the sight of an interesting chapter in Antarctic exploration. It showed the sight where two young Englishmen spent the winter of 1921 camped under an upturned boat after being marooned by an ill-planned British Imperial Expedition.

The next day it was up on deck early as we entered the famed Lemaire Channel. The entrance-way is guarded by two massive pinnacles apparently

*Passengers saw Antarctica in all her moods. Here they observe the Peninsula from the relative comfort of the decks of the Marco Polo. Photo: Max Quinn*

named, as we were informed over the ships tannoy, after a buxom woman called Una, well known to whalers of a past era who passed through Port Stanley in the Falklands while on their way to whaling grounds in the south. The channel seemed barely wide enough for the *Marco Polo* to navigate through. Steep sided walls of rock and ice plunged down hundreds of metres straight into the sea. There was no space left on deck as we slowly cruised through the most spectacular parts. At the southern end in a beautiful iceberg strewn bay we were able to make another landing. This time on Hovgaard island where moulting Elephant seals sprawled amongst the nesting Gentoos.



The process of getting everyone ashore was run with military precision. Up to eight zodiacs, each capable of carrying 14 passengers shuttled back and forth. The landings were spread out over at least four hours so there were never more than 100 people on shore at any one time. Passengers were divided into six groups and issued with coloured tags. At each landing site the coloured group that went ashore first would go last at the next site and so on giving each group a chance to go ashore first.

After Hovgaard Island the first of a series of disappointments occurred. On the advice of the British base, Rothera, on Stonington Island, the landing there was by-passed due to the pack-ice. This news came as a blow to Sir Vivian Fuchs who was particularly keen to see the site of many of his early visits as leader and geologist prior to the Trans-Antarctic Expedition in 1957. Stonington Island

*The television crew outside the TAE Hut at Scott Base: Left to right, Max Quinn, (camera); Errol Samuelson (sound); Sir Vivian Fuchs, Sir Edmund Hillary, Falcon Scott, Peter Hayden (Director); Russel Garbutt (Producer).*

is one of the Antarctic Peninsula's most historic sites with Bernard Stonehouse having acted as the station base leader during the 1947-48 research expedition of the Ronne Ice Shelf.

The *Marco Polo* then headed for McMurdo Sound virtually on the opposite side of the continent. It was eight days of cruising through the Bellingshausen, Amundsen and Ross seas but there was never any time for boredom to set in. A full programme of lectures both morning and afternoon was maintained. Sir Vivian spoke of his Trans-Antarctic Expedition on one day and Sir Edmund Hillary spoke of his experiences during the same expedi-

tion on the next, culminating of course in that historic meeting between Fuchs and Hillary at the South Pole. Hillary's decision to push on to the pole and become the first person to achieve this since Scott in 1912 led to speculation that all wasn't happy between the two men at the time.

Nearly 40 years later it still sounded like a thriller and to have the two great men together talking of their experiences as we cruised through the Amundsen sea was a privilege to all those on board who recognised the significance of the occasion.

As we cruised further west, huge ice bergs of all shapes and sizes surrounded the ship. Then it was into the pack-ice where for two days the ship picked its way through with the help of an on board helicopter. Emperor and Adelie penguins drifted past us on the ice flows while Minke, Humpback and Orca whales were often seen rising among the leads of the pack ice.

### Not all roses

When you put a group of 400 people together you're not going to please everyone and on more than one occasion grumblings were heard about the length of time it was taking to cruise to McMurdo - as if this great continent can be conveniently shrunk to cater for today's impatient travellers. Most, however, revelled in the changing environment around us. Antarctica can be a very confusing place for those not used to this land of continuous daylight. One passenger, when confronted by vast amounts of rock, ice and snow, enquired of one of our experts 'if we were very high up here.' When assured that this was in fact sea level the incredulous tourist looked at the water and wondered if it was salty or fresh! On one morning in the Ross Sea when the captain announced to everyone at break-

fast that there were whales on the port side at ten-o'clock, an elderly American checked her watch and wondered how the captain knew.....

It wasn't until Friday February 11 that we sighted Ross Island; but Mount Erebus failed to show under a tick blanket of cloud. This was the first of a series of disappointments that the ship would encounter in the Ross Sea region. Pack ice still dogged the *Marco Polo*, finally reaching McMurdo Station in deteriorating weather at 3.30 p.m. The spray flew as passengers were ferried ashore and most of us arrived with a thick coating of sea spray frozen to our jackets. The temperature here was -10 deg Celsius and for the first time on this voyage passengers started to get the feeling of Antarctica's bitter cold.

The New Zealanders on board were invited to Scott Base three kilometres over the hill from McMurdo Station. Here a little bit of history was made. It was Sir Vivian Fuchs' 86th birthday and the New Zealanders provided afternoon tea and a cake. As well, Lady Fuchs, Lady Phillipa Scott, Falcon Scott, Anne-Christine Jacobsen and Sir Edmund and Lady Hillary made up the distinguished guest list. Before they left the base Fuchs and Hillary had another surprise in store for them. The old Trans Antarctic expedition Hut; one of the original Scott Base buildings, had survived the rebuilding programmes of recent years had been restored to its original state. For the first time since the completion of the Trans Antarctic Expedition in 1958, the two men again stood in the Mess and Hillary was able to sit at his old desk. The memories came flooding back.....

The cruise now headed North to Cape Evans and Royds to visit the old huts of Scott and Shackleton. But the bad weather had not let up and the landings by Zodiac were impossible. We pressed on to Capes Hallett and Adare

but once again landings were cancelled due this time to the sea ice blocking the approach of the ship. There was no alternative but to head north back to New Zealand. While those on board were bitterly disappointed at the events in the Ross Sea, most accepted that this was the unpredictable nature of Antarctica.

We had seen it in all of its moods, and could still look back on the exhilarating times we had experienced in the

Antarctic Peninsula region. As we ploughed through the great southern ocean one could reflect over the past three weeks knowing that we were part of something special. Perhaps the age of tourism in Antarctica is only just beginning but..... an expedition in a ship of this size and luxury, and with a gathering of such notable Antarctic people, may not happen again for a very long time.

## ANI

### *Unscheduled rescue in season's programme*

Adventure Network International has completed another successful season of operations during which they provided support for a party of Koreans travelling to the South Pole, some 30 climbers and guides tackling the Vinson Massif, a flight to the South Pole and a visit to an Emperor Penguin Colony. They also assisted with the retrieval of the Norman Vaughan Expedition after their aircraft crashed some nine miles away from ANI's base at Patriot Hills.

Personnel carried aboard Twin Otters from Ken Borek in Canada opened the Patriot Hills camp on November 5. They left the Ellsworth Mountains to return to Calgary on 29 January 1994 having flown a total of 400 hours in support of ANI's field operations. A Cessna 185 was also used by the organisation for continental operations.

The major logistic support between Punta Arenas and Patriot Hills was provided by a wheeled Hercules from Safair, a South African company operating out of Johannesburg with a fleet of Hercules

and other aircraft. Their pilots have experience in the Arctic and in operations spanning Africa. The aircraft touched down at Patriot Hills for the first time on 21 November 1993 at 1945 GMT. This is believed to be the first landing by a civilian Hercules on the continent but by the end of the season they had completed 11 return flights between the two centres. The Hercules replaced the DC6 normally used by ANI, could carry a larger payload of passengers and cargo, reduced the flight time between Chile and the continent and proved to be more reliable overall.

Among the first expeditions to leave Patriot Hills this season was a party of four Koreans who set out on 28 November 1993 to make an unsupported journey to the South Pole. In temperatures of minus 40 degrees celsius and with winds frequently over 70 knots they arrived on January 9 after a journey of 42 days.

Comprising Young-ho Heo, Sung

Hwam Kim, Yoo Jai Chun and Hong Sung Taek they are believed to be the first Korean nationals to visit the South Pole. Support at Patriot Hills was provided by their leader Im-gyung Go, a radio operator Keel-soon Chung and Pyong gu Yoon, a journalist from the Hankook Ilbo, the largest newspaper company in Korea.

Young-ho Heo was among the most experienced of the team. He has been overland to the North Magnetic pole and reached the summit of Mount Everest twice without oxygen.

Thirty climbers and guides reached the top of the Vinson Massif, 4897 metres. Expedition leaders included Alejo Contreras from Chile, Ralf Dujmovits from Germany, Jay Smith and Peter Whittaker from the USA, Rob Hall from New Zealand, Ramon Portilla from Spain and Gerald Edwards from Canada.

On December 6 Nick Commande became the first firefighter to reach the top of the Mountain. He climbed to the peak to raise funds for the American Cancer Society accruing a total of US \$10,722.69 for his efforts. It was the third summit he has climbed for this cause.

This year ANI made one trip to the South Pole with 29 passengers and guides including the youngest person to travel so far south. Robert Schumann aged 11 from London had already been to the North Pole with his father and the pair arrived at the South Pole on December 29 by air.

ANI made their third visit to the Emperor Penguin Colony at the Dawson Lambert Glacier. This year they took passengers to see the 20,000 adult birds and half as many chicks.

## Vaughan Expedition

The Mount Vaughan Antarctic Expedition, plagued by bad weather and

technical problems even before they left Punta Arenas, were further set back when their chartered DC-6 crashed nine miles south of the blueice runway at Patriot Hills on its first flight to the continent with the supplies for the expedition, all the dogs and eight of the team members. Only the radio operator was injured but four of the 20 dogs disappeared and are presumed dead. ANI staff transferred personnel and dogs to their camp at Patriot Hills and planned to fly them out to Punta Arenas aboard their Hercules. Vaughan, however, was undeterred and requested assistance from ANI in continuing with his plans to cover the 500 miles between Patriot Hills and Mount Vaughn, named for him by Admiral Byrd for his part in the 1928-29 Byrd Expedition.

Bad weather, however, continued to plague the team and eventually it was agreed to defer the expedition to next season. His wish to be the last person to drive dogs on the continent will however not be met as the Antarctic Treaty Nations have agreed that the last dogs should be removed by 1 April 1994.

## Society News

Sir Ranulph Fiennes visited New Zealand in February. He gave public lectures on his unsupported crossing of Antarctica - on foot - in Auckland, Wellington and in Christchurch. Reed Publishing (NZ) Ltd, and the Society organised the lectures. Reeds are the New Zealand distributors of Sir Ranulph's book *Mind over Matter* - the Epic crossing of the Antarctic Continent - published in 1993 by Sinclair Stevenson in England. Four hundred and fifty Aucklanders turned out for the first of the lectures, 650 attended in Wellington and 200 in Christchurch where the address was given in memory of Bill Burton, Scott's Last Man.

Entry to the lectures was free or by donation at the door to the Multiple Sclerosis Society of New Zealand Inc. Some \$NZ3,000 was raised for the organisation.

**The New Zealand Antarctic Society Inc.**, was formed in 1933. It comprises New Zealanders and overseas friends, many of whom have been to the Antarctic and all of whom are vitally interested in some phase of Antarctic exploration, history, development or research.

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