

Fire and Ice: Measuring Antarctica's Frozen Sea

Dr. Cindy Furse, Dr. Ken Golden
David Lubbers, Dr. Joyce Lin Christian Sampson



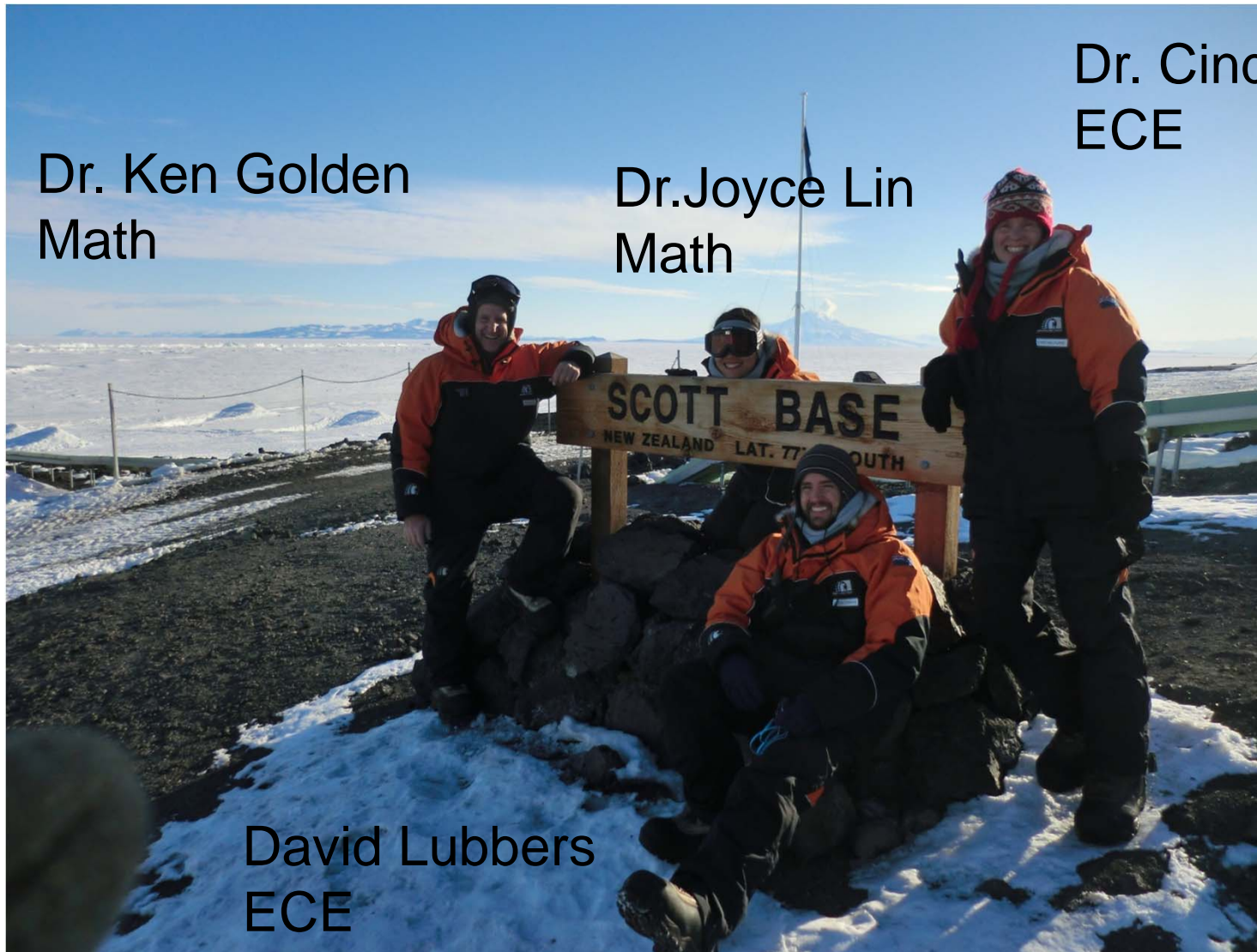


Antarctic Math & Engineering Expedition

Dr. Ken Golden
Math

Dr. Joyce Lin
Math

Dr. Cindy Furse
ECE



David Lubbers
ECE



International Research Collaboration



Photo: Ken Golden

Our expedition was a key activity in a 4 year interdisciplinary, international project:

U. of Utah - Math: Ken Golden PI

Elena Cherkaev, Jingyi Zhu

ECE: Cindy Furse

U. Alaska Fairbanks – Geophys. Inst.: Hajo Eicken

Victoria U., NZ – Chem. and Phys. Sciences: Malcolm Ingham

} Co-PI's



UTAH MATH: Joyce Lin, NSF Postdoc, Grad students Adam Gully, Christian Sampson, Senior Kyle Steffen

UTAH ECE: Seniors David Lubbers, Erik Gamez, Jake Hansen

UAF: Grad student Marc Mueller-Stoffels

VUW: Grad students Keleigh Jones, Sean Buchanan

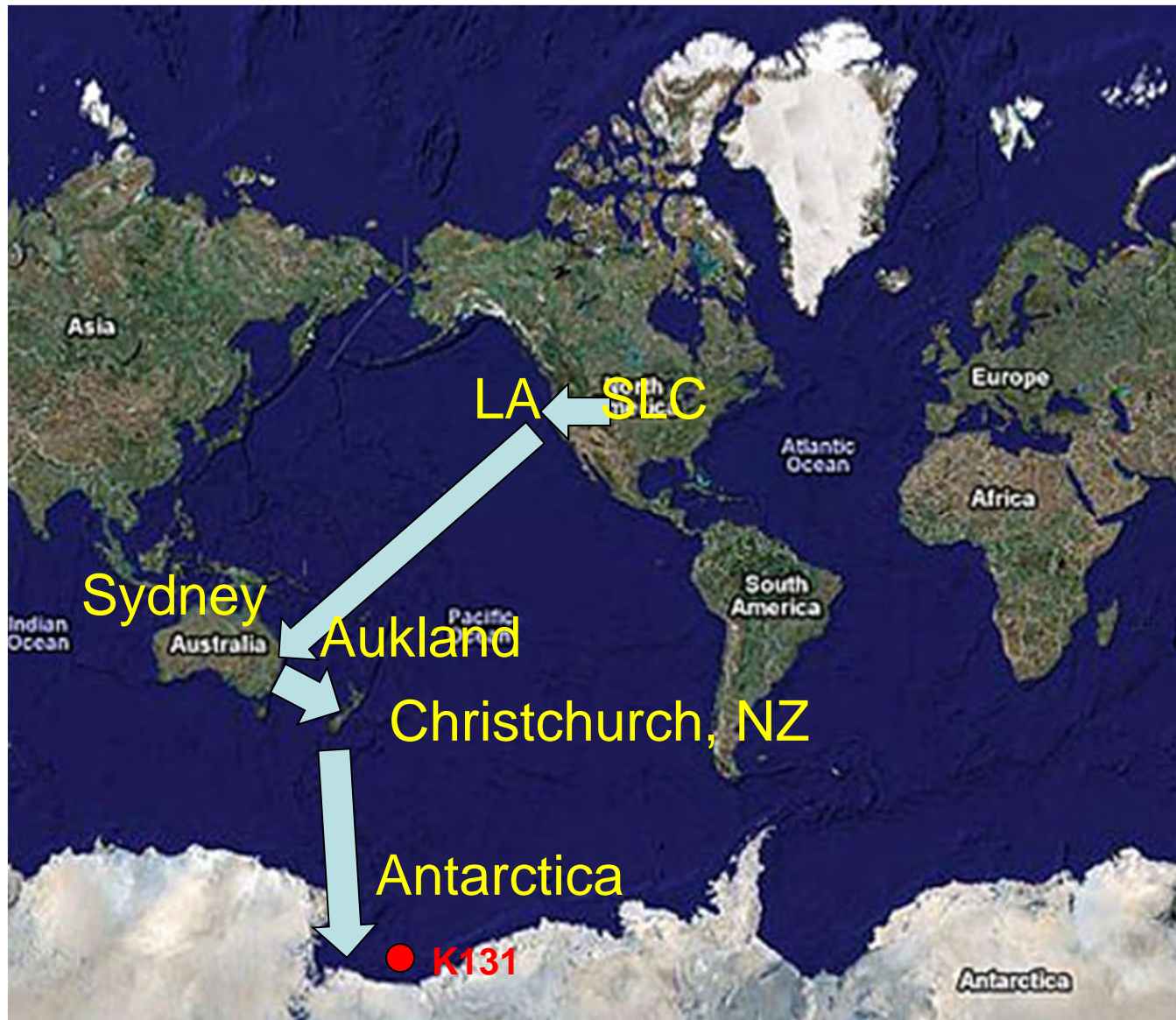
National Science Foundation Collaborations in Mathematical Geosciences

***Develop electromagnetic methods
to monitor sea ice processes which
are critical to understanding climate
and
improving global climate models.***



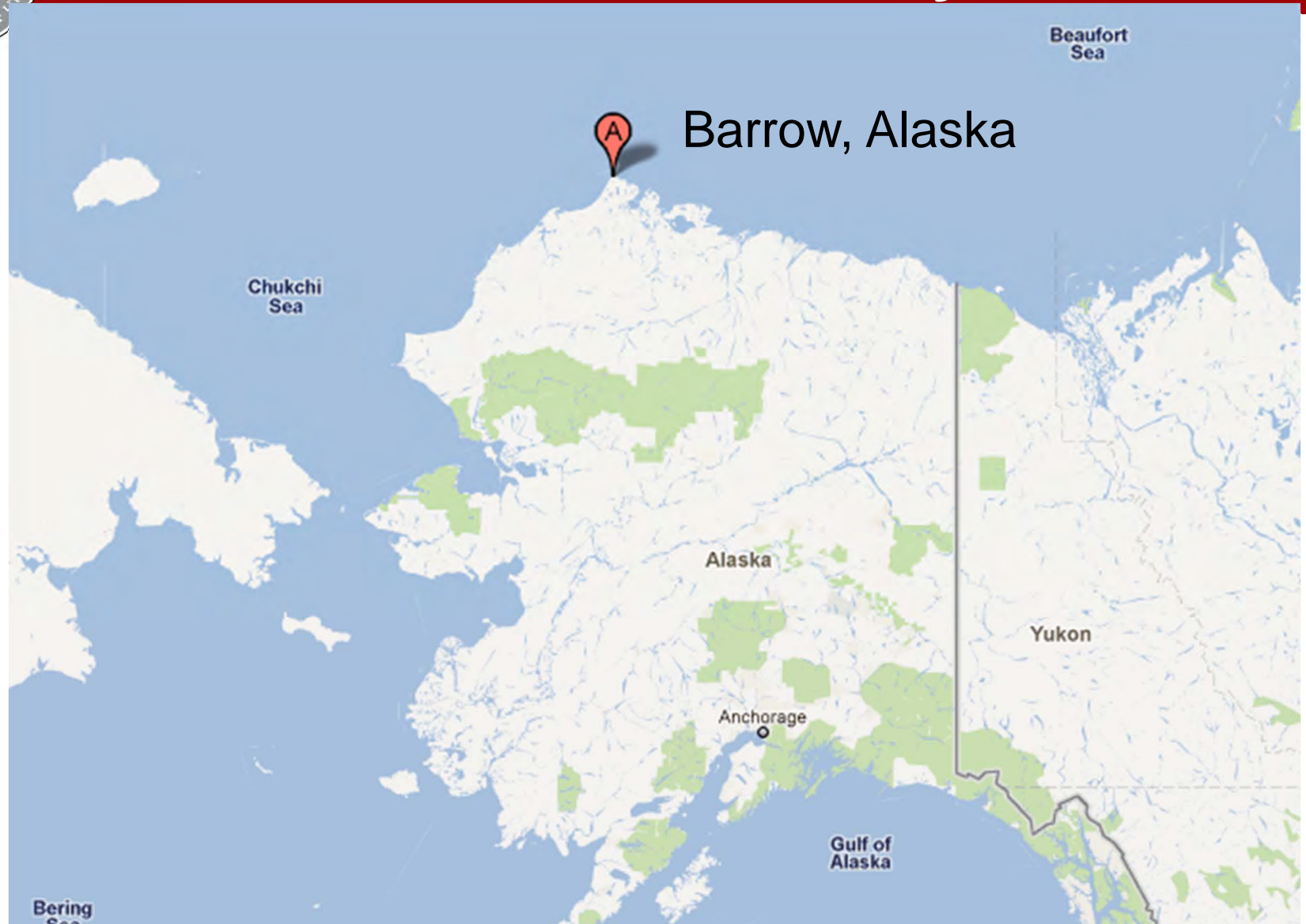


Where Did We Go? Nov 2010





Where Did We Go ? May 2011





SLC, Utah -- Nov. 15, 2011





Christchurch, New Zealand





What I Packed ...



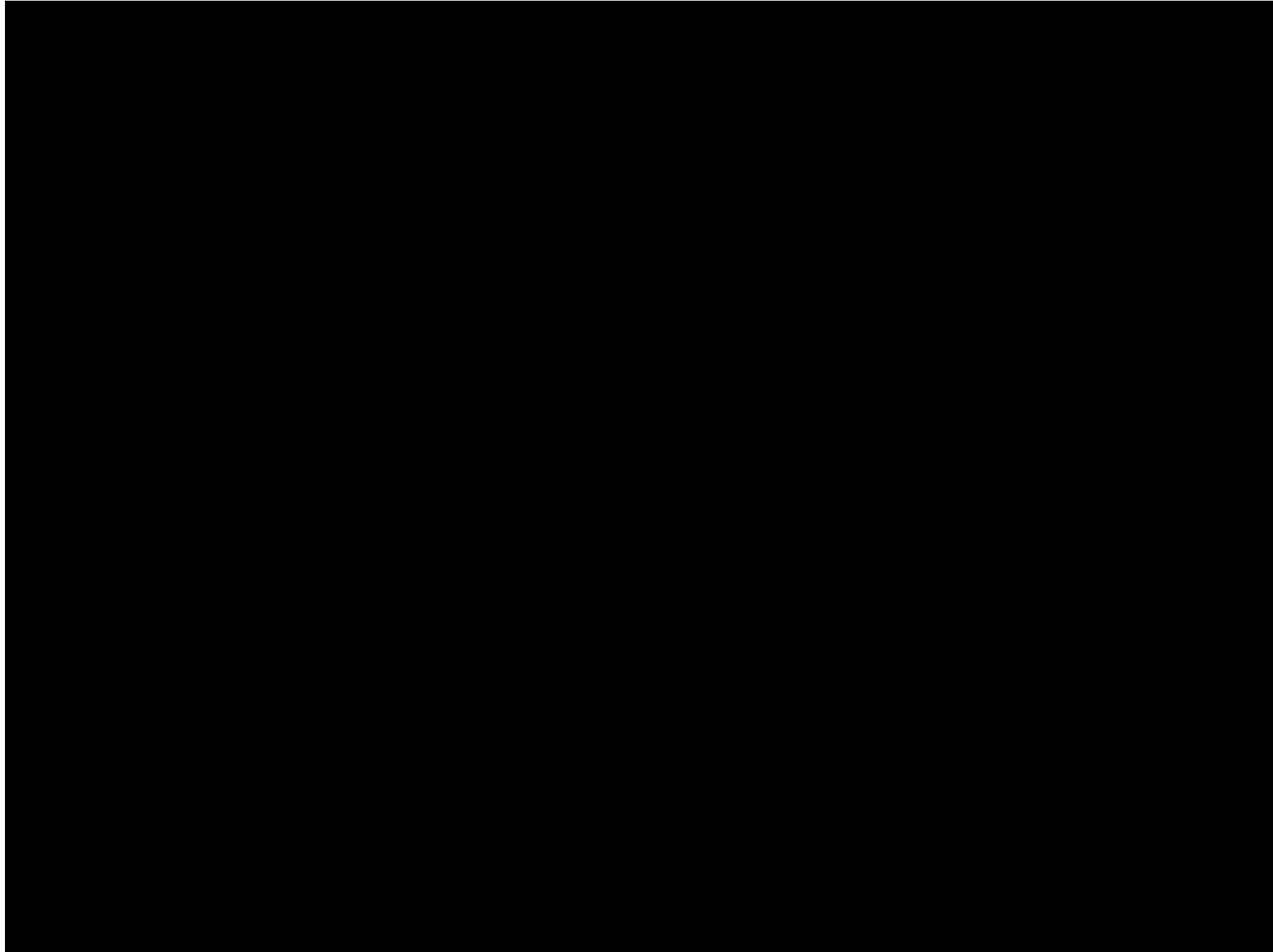


Getting Prepared





Dress for Success ...





Palm Trees and Polar Gear







Flying to Antarctica







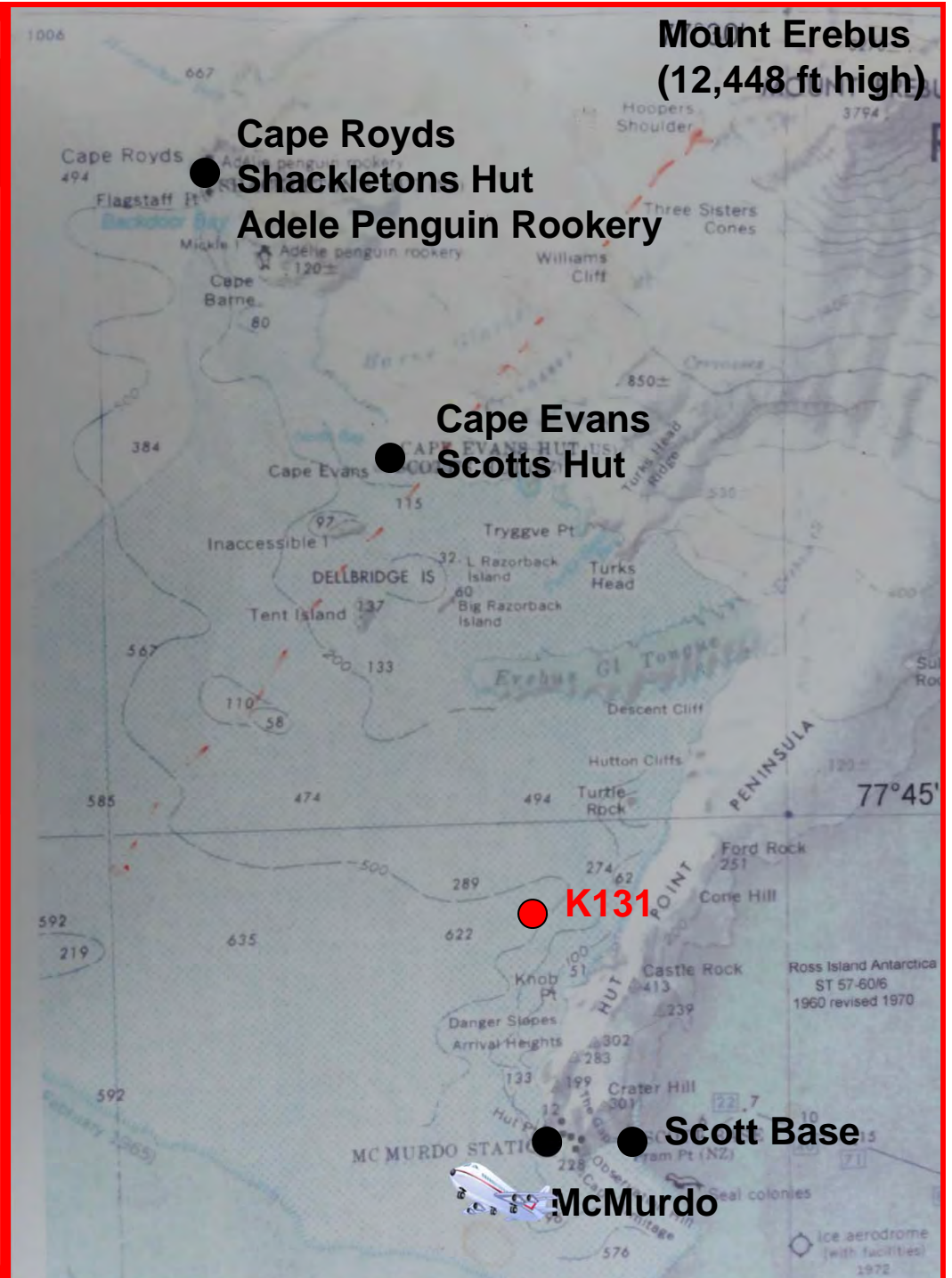


Flying to Antarctica











Landing on ICE!





McMurdo (American)





Scott Base (Kiwi)



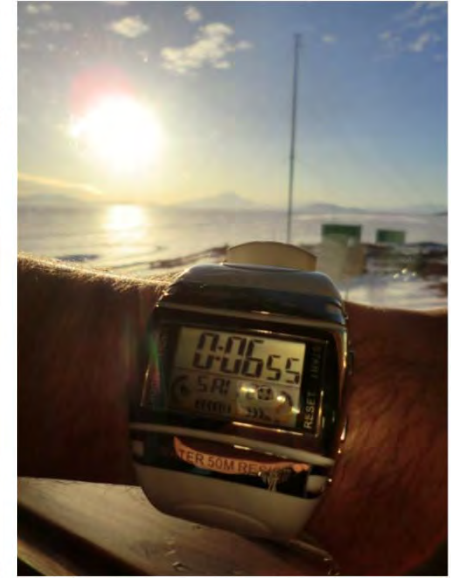


David at Scott Base





Scott Base





Conservation is Critical

The recycling system... WHAT GOES WHERE?

	Paper <i>Compactable</i>	Plastic <i>Compactable</i>	All Glass <i>Non-compactable</i>	Cans <i>Compactable</i>	Cans <i>Compactable</i>	Metal <i>Non-compactable</i>	Food <i>Non-compactable</i>	Food <i>Compactable</i>	Batteries <i>Non-compactable</i>	WASTE AEROSOLS
What goes here?	<ul style="list-style-type: none"> ✓ All clean paper ✓ Envelopes (with windows also) ✓ Cardboard ✓ Magazines ✓ Newspapers 	<ul style="list-style-type: none"> ✓ All clean plastic (including plastic strapping, plastic bags, polystyrene) 	<ul style="list-style-type: none"> ✓ Rinsed glass 	<ul style="list-style-type: none"> ✓ Crushed aluminium cans only 	<ul style="list-style-type: none"> ✓ Rinsed steel and tin cans 	<ul style="list-style-type: none"> ✓ Iron and steel scraps 	<ul style="list-style-type: none"> ✓ All food scraps 	<ul style="list-style-type: none"> ✓ All food contaminated waste e.g. wrappers, napkins etc 	<ul style="list-style-type: none"> ✓ Dry cell batteries 	<ul style="list-style-type: none"> ✓ Damaged or used aerosols
What NOT to put here?	<ul style="list-style-type: none"> ✗ One-sided 	<ul style="list-style-type: none"> ✗ Unclean plastic 	<ul style="list-style-type: none"> ✗ Broken glass ✗ Drinking glasses ✗ Window glass 	<ul style="list-style-type: none"> ✗ Steel and tin cans 	<ul style="list-style-type: none"> ✗ Aluminium cans 		<ul style="list-style-type: none"> ✗ Food wrappers 	<ul style="list-style-type: none"> ✗ Food scraps ✗ Uncontaminated paper etc. 	<ul style="list-style-type: none"> ✗ Lead acid batteries 	
			Recycled by NZ aluminium planters. 90% of product sent offshore.	85% of NZ steel cans recycled by Sims Pacific Metals. 15% sent offshore. Recycled steel used for wire and bars.	Returned to NZ for recycling.	Returned to NZ. Sterilised, then landfilled.	Returned to NZ. Sterilised, then landfilled.	Returned to NZ for recycling.	Returned to NZ for recycling.	Returned to NZ for recycling.

Waste Management Handbook or contact Miranda Huston, m.huston@antarcticnz.govt.nz





Scott Base





10% Wind Power for Scott Base





Infamous Antennas of the World





Midnight at Scott Base ...





Field Training





**Mount Erebus
(12,448 ft high)**

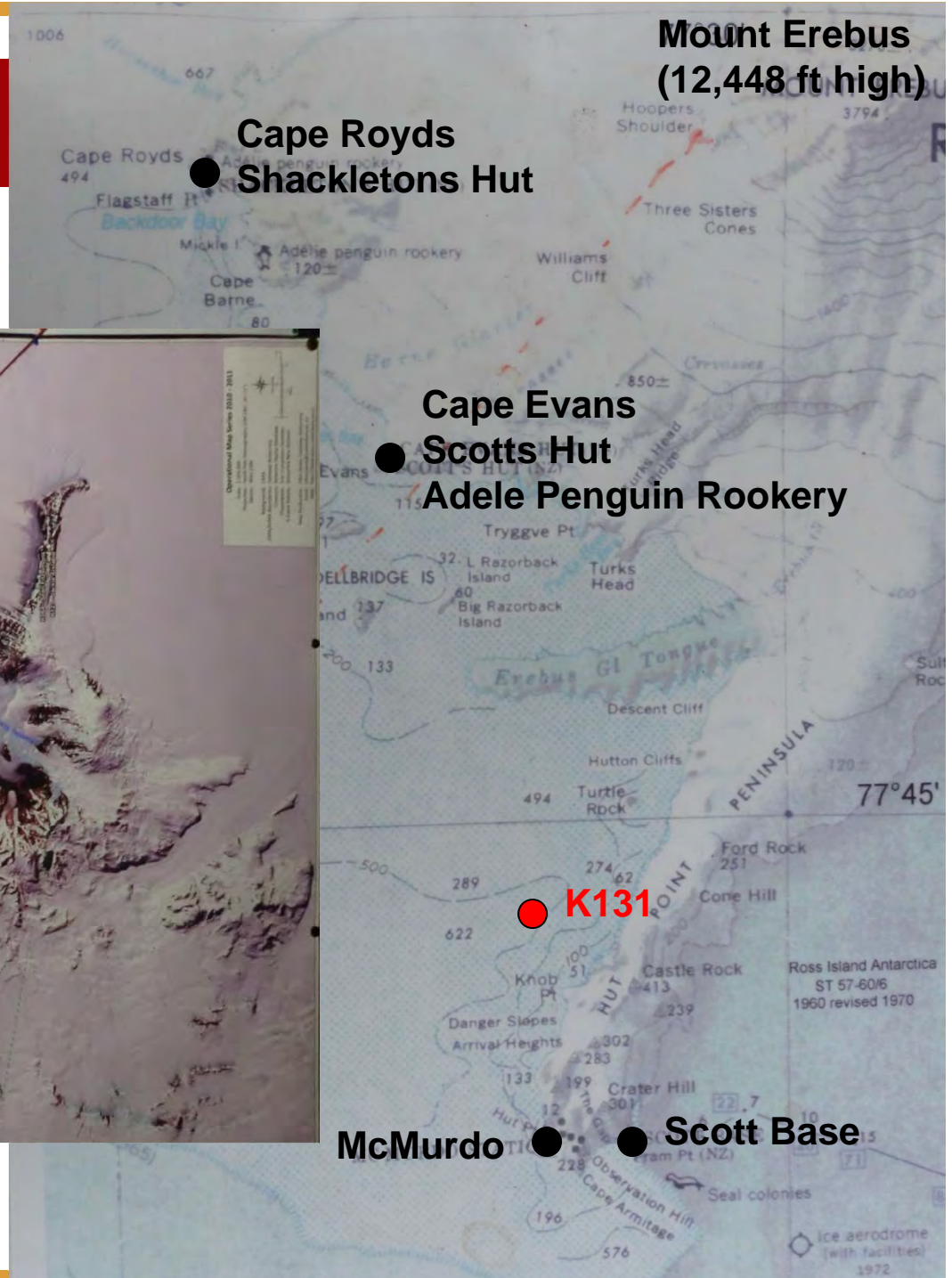
**● Cape Royds
● Shackletons Hut**

**● Cape Evans
● Scotts Hut
● Adele Penguin Rookery**

K131

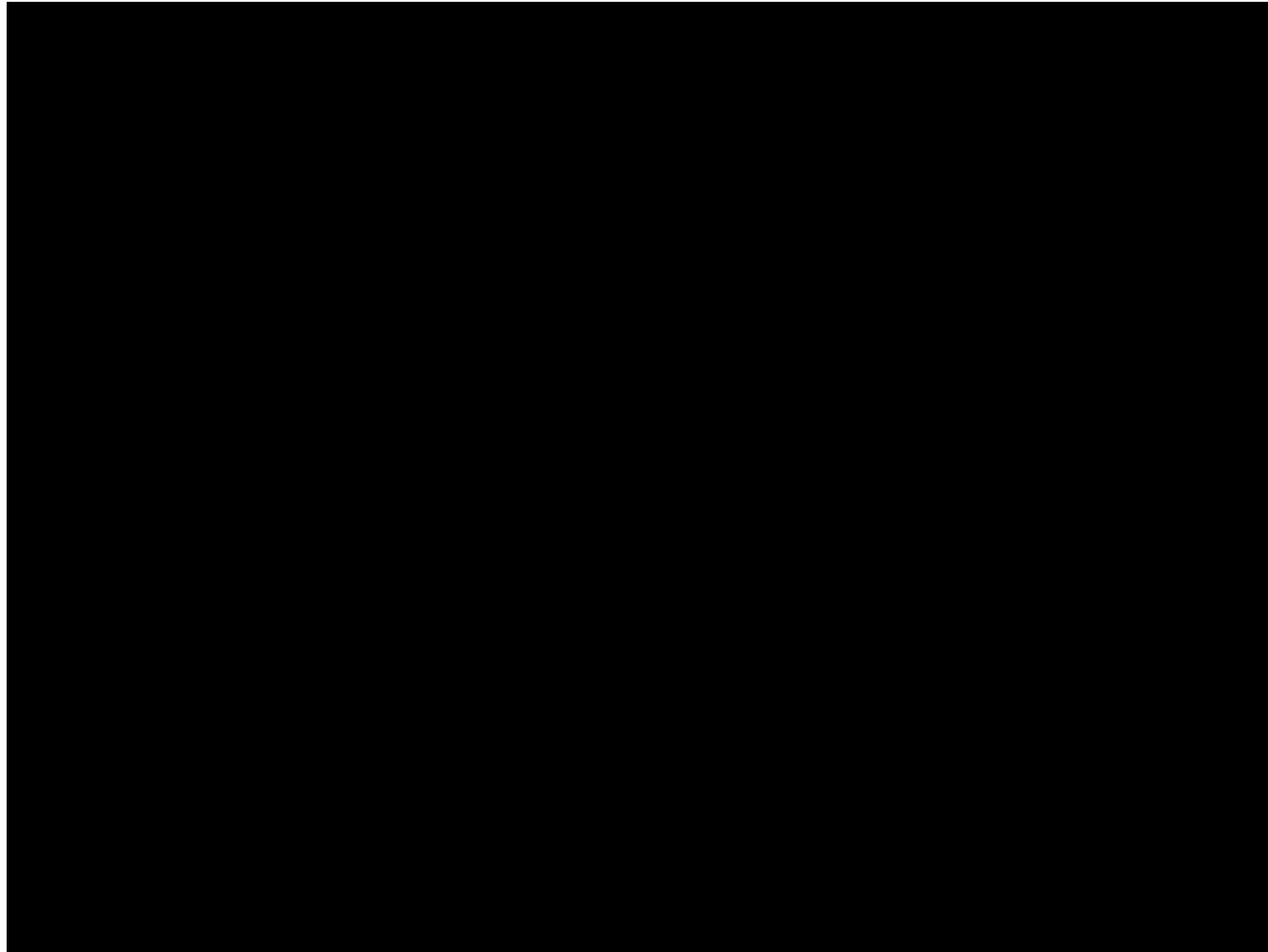
● K131

● McMurdo ● Scott Base





Hagglund Aquatic Vehicle



Thanks to Greg Anderson



K131 – Haskell Camp





The Weather ..





Horsing Around







Penguins





Penguins





Penguins





Penguins



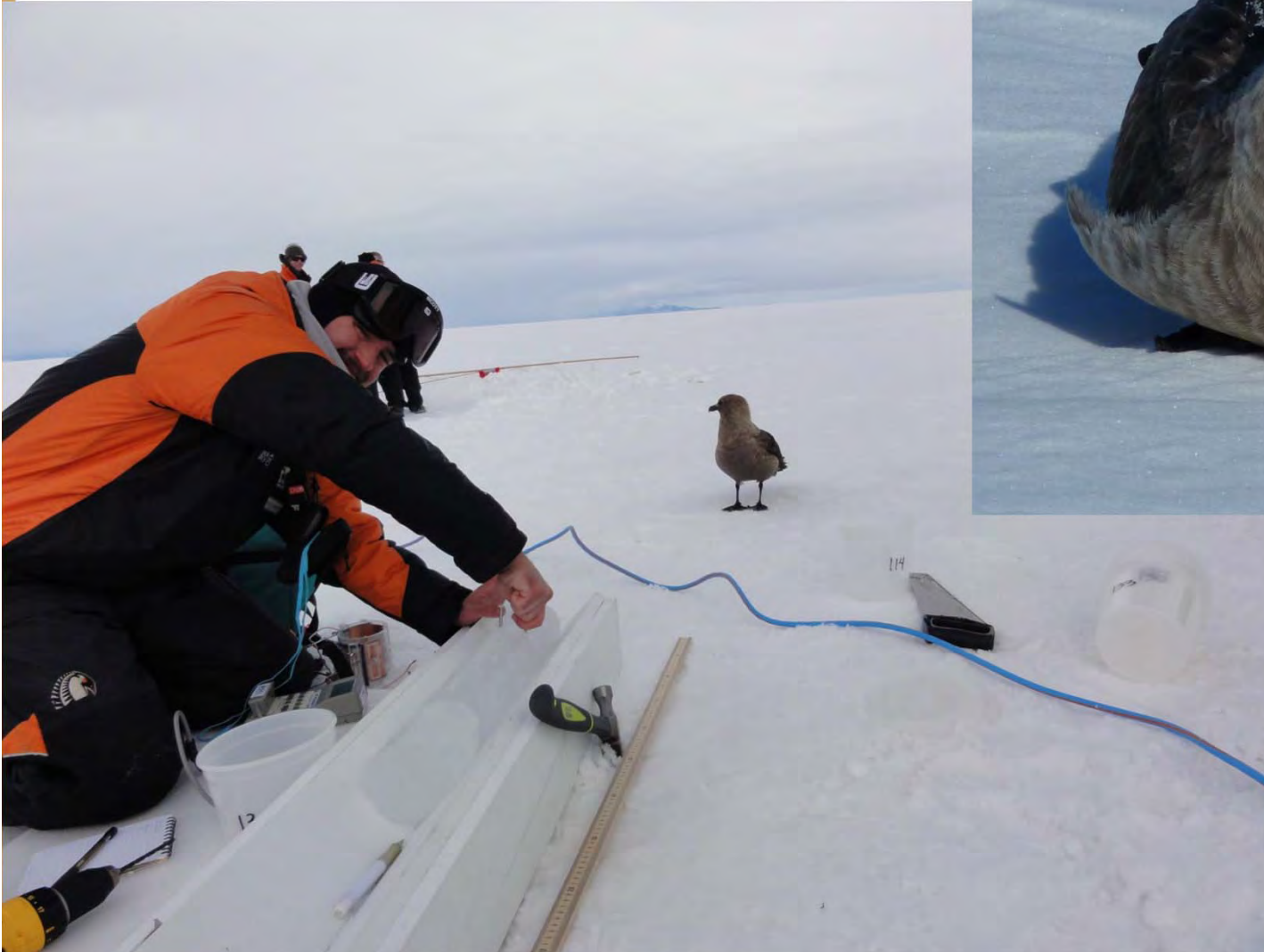


Skuas eat Penguin Eggs ...





Skuas





Seals





Ernest Shackleton – Nimrod Expedition



"Men wanted for hazardous journey. Low wages, bitter cold, long hours of complete darkness. Safe return doubtful. Honour and recognition in event of success."

– 1907-1909



Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





South Pole ...almost



- *Reached Magnetic South Pole*
- *Turned back 97 miles from true South Pole*
- ***"I thought, dear, that you would rather have a live ass than a dead lion."***



THE SOUTHERN PARTY ON BOARD THE "SIMON." LEFT TO RIGHT: WILK, SHACKLETON, MARSHALL, ADAMS



Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





it





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Shackleton's Nimrod Hut





Scott's Terra Nova Expedition



1910-1913



Scott's Terra Nova Expedition





Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut







Scott's Terra Nova Hut





Scott's Terra Nova Hut







Scott's Terra Nova Hut







Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut





Scott's Terra Nova Hut

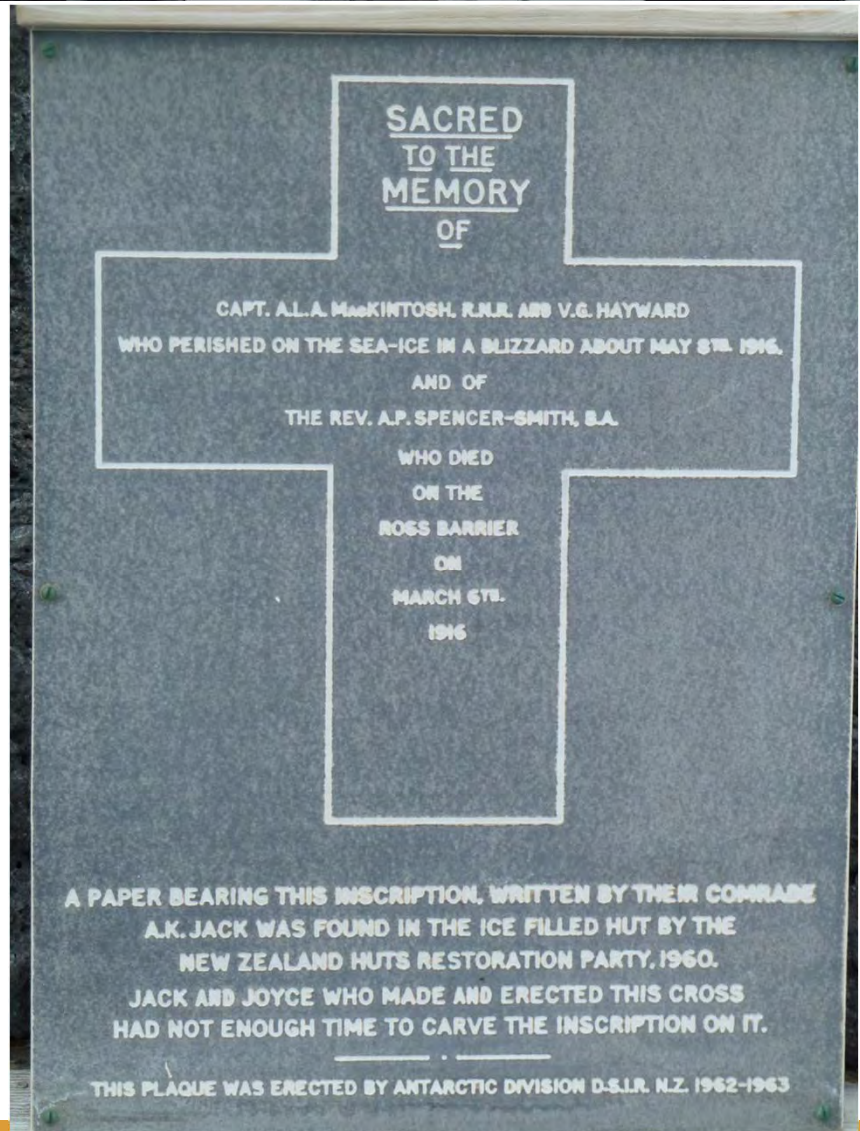






Scott's Terra Nova Hut







Scott's Terra Nova Hut





A VERY Bad Day....





Admundsen Got There First 1912









Fire: Volcanic Mount Erebus





Mount Erebus





Sea Ice at Cape Royds









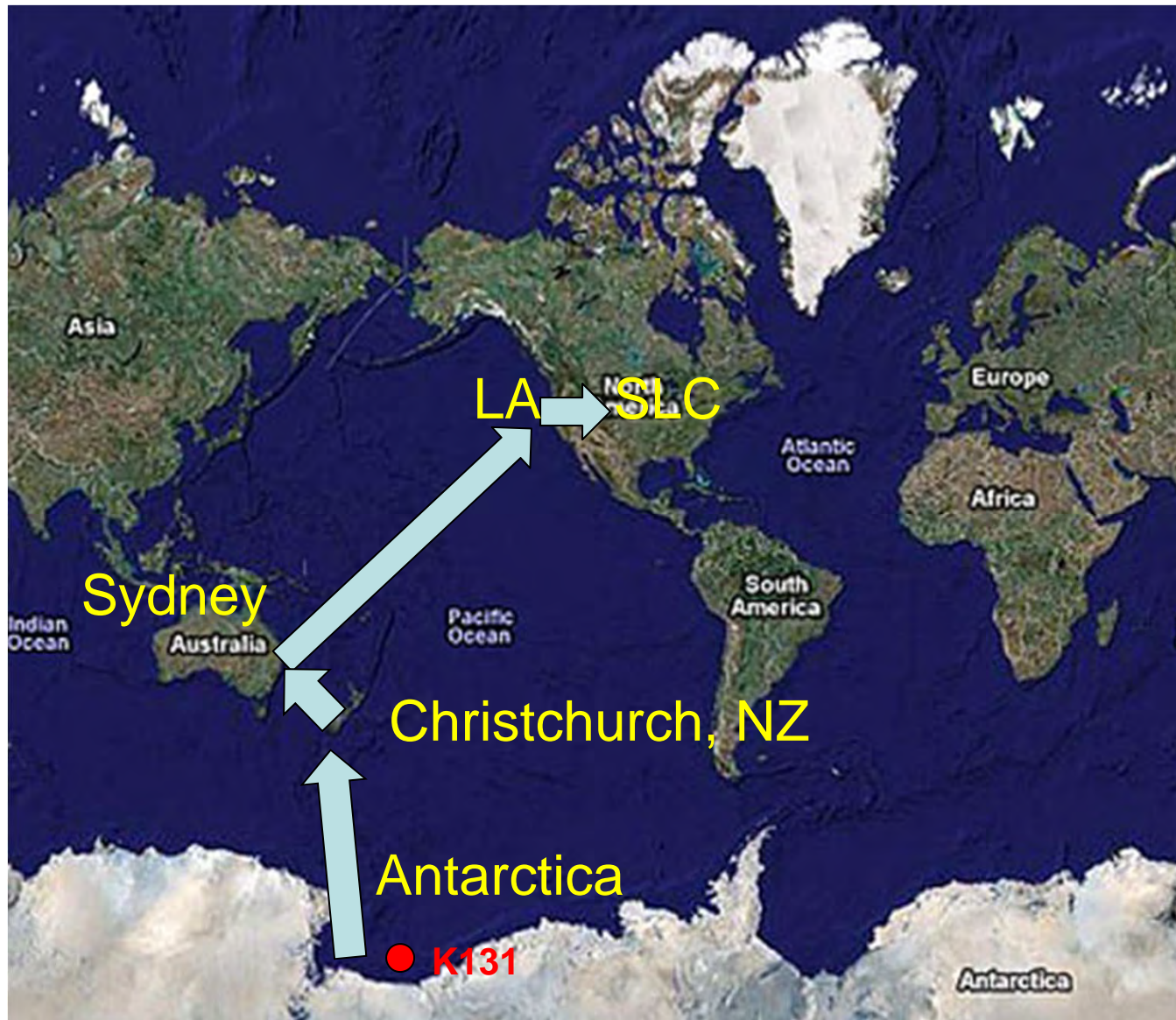
Antarctica: Fire & Ice







Going Home









Leaving Antarctica











From Antarctica ...



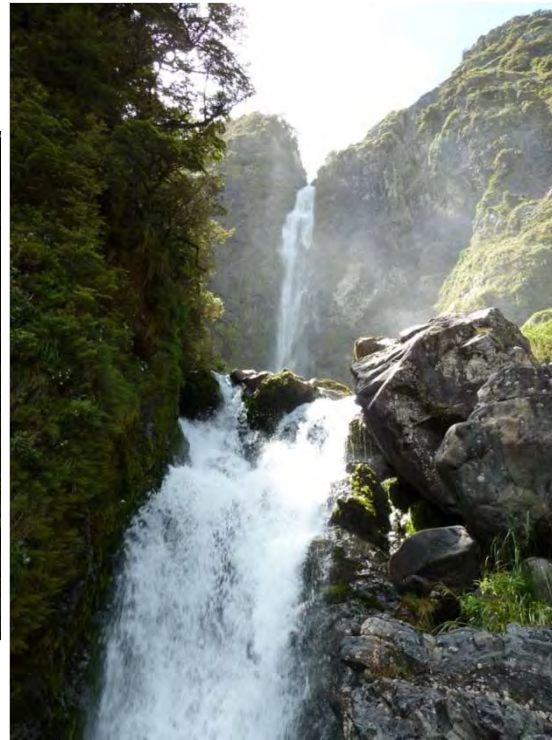


To New Zealand!





New Zealand



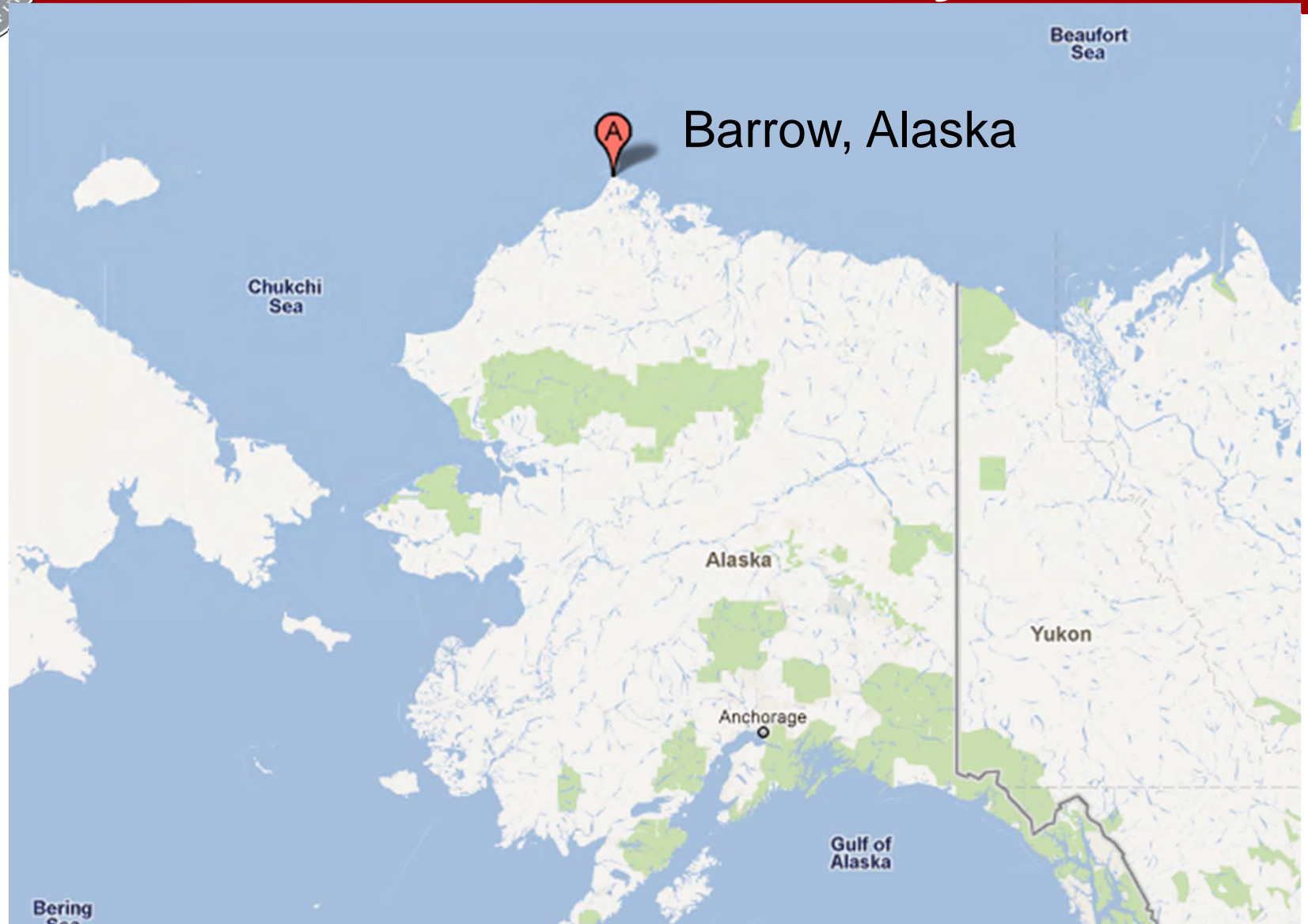


Aaaaaahhhhhhhhhhhhhhhh ...





Where Did We Go ? May 2011





The UofU Team



Dr. Ken Golden
Math



David Lubbers
ECE



Dr. Cindy Furse
ECE



Christian Sampson
Math



Engineering – Not Your Average Desk Job





Three Engineers





'Was It Cold?'





600 pounds of STUFF





Packing It In





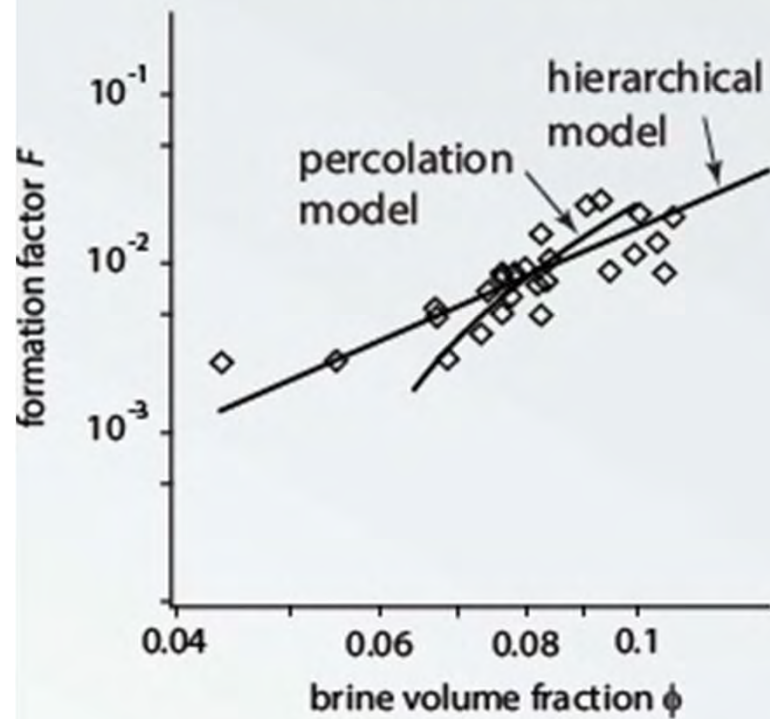
2012 Aurora Australis



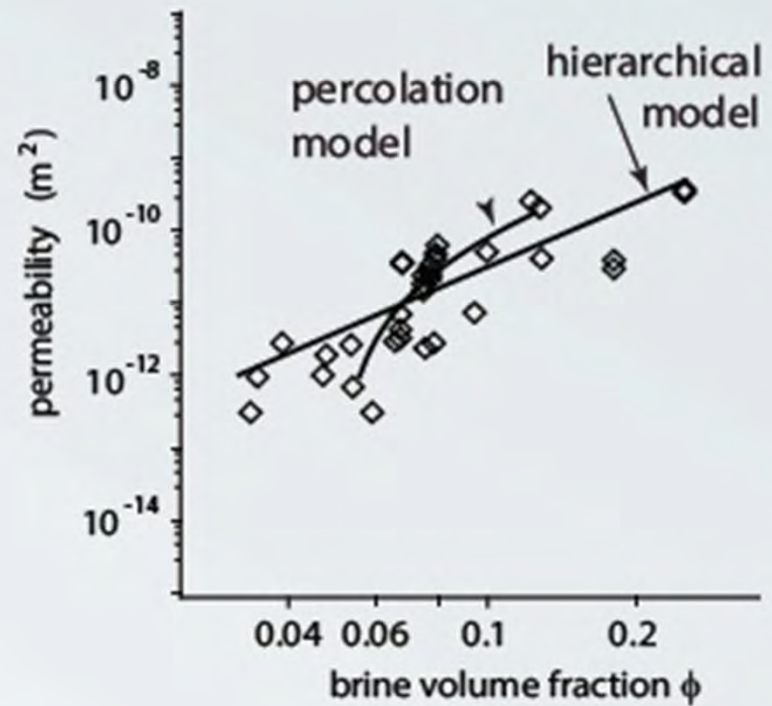


Agreement!

Antarctic electrical conductivity

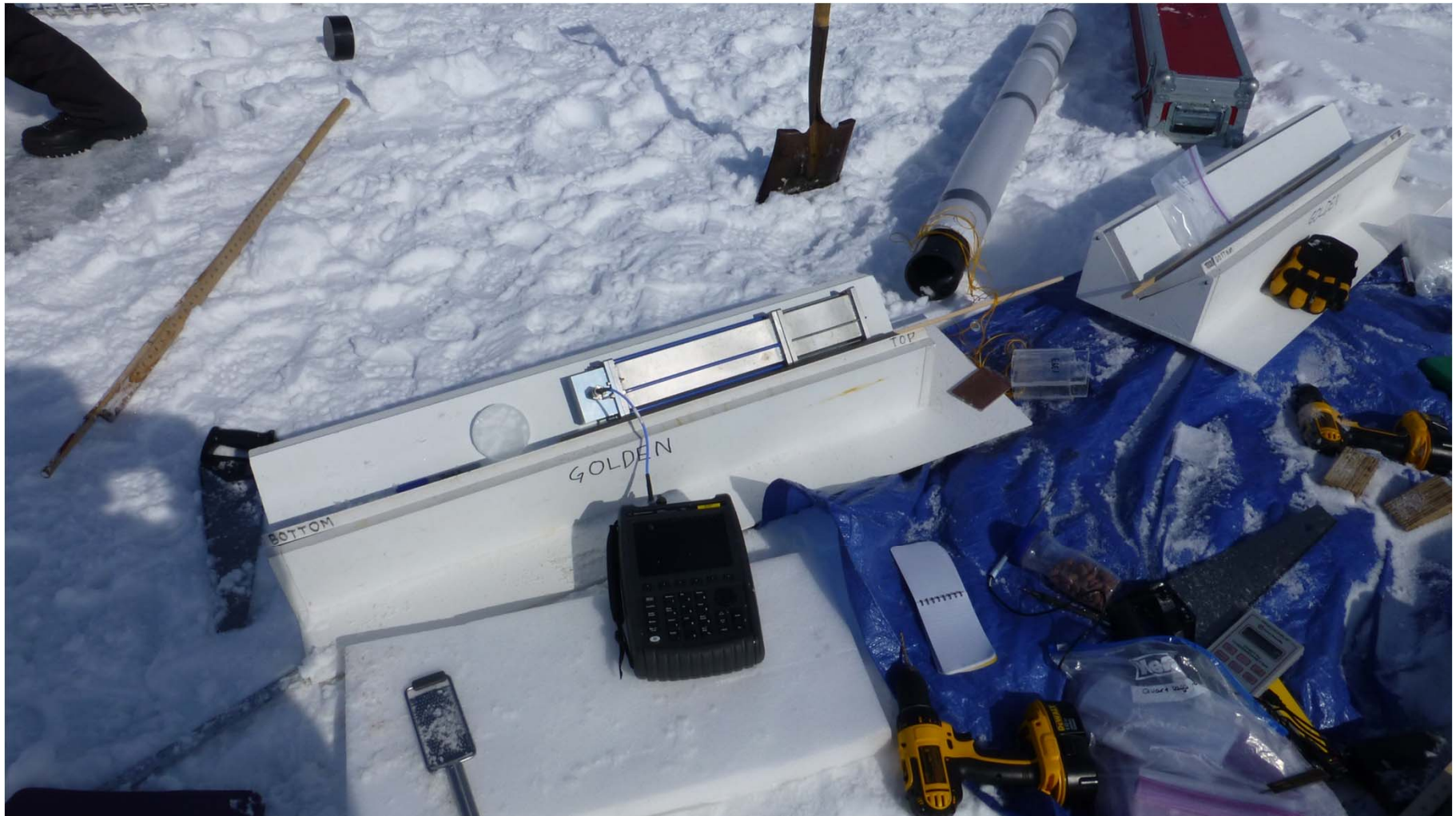


Arctic fluid permeability





Barrow 2013 Waveguide Measurements



What is coming next?
Data analysis
Data analysis
Data analysis...



<http://cfurse.wordpress.com>