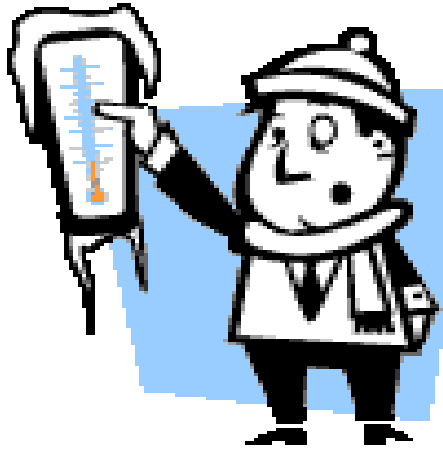


## Some Views of Antarctica



# ANTARCTICA

LAND OF SUPERLATIVES & CHALLENGES



77+ Degrees South



# TUFTS UNIVERSITY NATIONAL SCIENCE FOUNDATION ANTARCTIC EXPEDITION

## 1969-1970

Robert L. Nichols - Leader

Geology Student Field assistants:

**Robert M. Goodspeed – class of 1960**

**Roger A. Hart – class of 1962**

**William G. Meserve – class of 1962**

(Field Assistants' Assistants – Next Slide)



**RESEARCH GOALS** Include investigating:

**PHASE 1** the nature, height and ages of elevated beach ridges along deglaciated coastlines to determine the rise of the continental margin and sea level changes as the ice melted and over what period of time, and

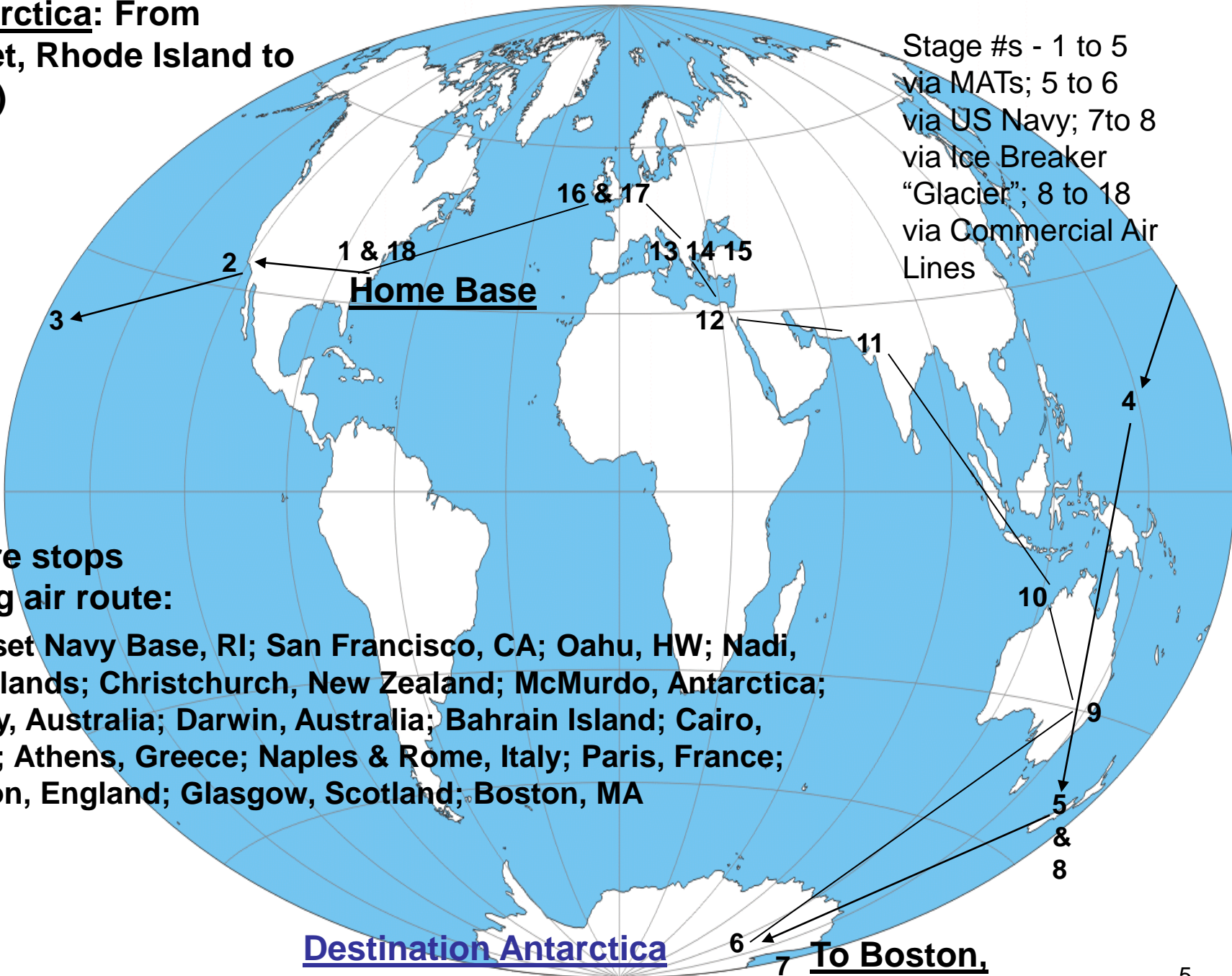
**PHASE 2** the glacial geology and volcanic history of the Wright Dry Valley region.



**Field Assistants' Friendly Assistants**

**To Antarctica: From  
Quonset, Rhode Island to  
( #s 1-6)**

Stage #s - 1 to 5  
via MATs; 5 to 6  
via US Navy; 7to 8  
via Ice Breaker  
"Glacier"; 8 to 18  
via Commercial Air  
Lines



**Home Base**

**Destination Antarctica**

**To Boston,  
Massachusetts (#s 7-18)**

**#s are stops  
along air route:**

**Quonset Navy Base, RI; San Francisco, CA; Oahu, HW; Nadi,  
Fiji; Islands; Christchurch, New Zealand; McMurdo, Antarctica;  
Sidney, Australia; Darwin, Australia; Bahrain Island; Cairo,  
Egypt; Athens, Greece; Naples & Rome, Italy; Paris, France;  
London, England; Glasgow, Scotland; Boston, MA**

## ANTARCTICA SUPERLATIVES

1. coldest, windiest, driest, cleanest, healthiest and largest desert (averages 2" water equivalent per year) in the world with most rapid & extreme climate change, eg. Temperature can drop 65 F in 12 minutes
2. no permanent human residents, has no government and is shared by all countries
3. ice sheet is over 3 miles thick (15,700 feet), averages 1.6 miles thick, and holds 70% of the earth's "fresh water", it contains 7, 250,000 cubic miles of ice (90% of world's total ice)
4. if all ice melted, world ocean levels would rise by 200 to 250 feet
5. the rock surface is pushed by the weight of the ice some 1,625 feet and would v...e...r...y s...l...o...w...l...y "spring back" over ~ 10,000 years
6. no rain has fallen in the "Dry Valleys" for at least 2 million years (similar to that of the planet Mars)
7. icebergs with surface area 4,250 square miles (size of Connecticut) (subsurface size up to 10 X greater)
8. ocean sea life around Antarctica is the richest in the world
9. lowest ever temperature recorded on earth occurred in Antarctica at minus 129 F
10. sea ice doubles the size of the continent during the winter months, increasing by 40,000 square miles each day
11. ice cap has 29,000,000 cubic kilometers of ice (which is 90% of all the fresh water ice on the planet) with only ~ 0.4 % of Antarctica ice-free
12. earth's largest Ozone Hole reaches a maximum area of ~ 27, 000,000 square kilometers during winter
13. ice cap is home to the least number of species and smallest number of native wildlife individuals of any continent
14. six months daylight & six months darkness
15. Katabatic winds at the continental edges blow up to ~ 190 mph
16. dry valleys have had no rain in thousands of years and the longest river in Antarctica is the Onyx River In Wright Dry Valley which = 12 miles long

# One Of Our Earliest Views Of The Antarctic Ice Cap



# Antarctic Ice Cap Surface With A Summer Melt Water Stream





# Close-Up Of Ice Cap Surface “Sastrugy” Caused By Extreme Winds

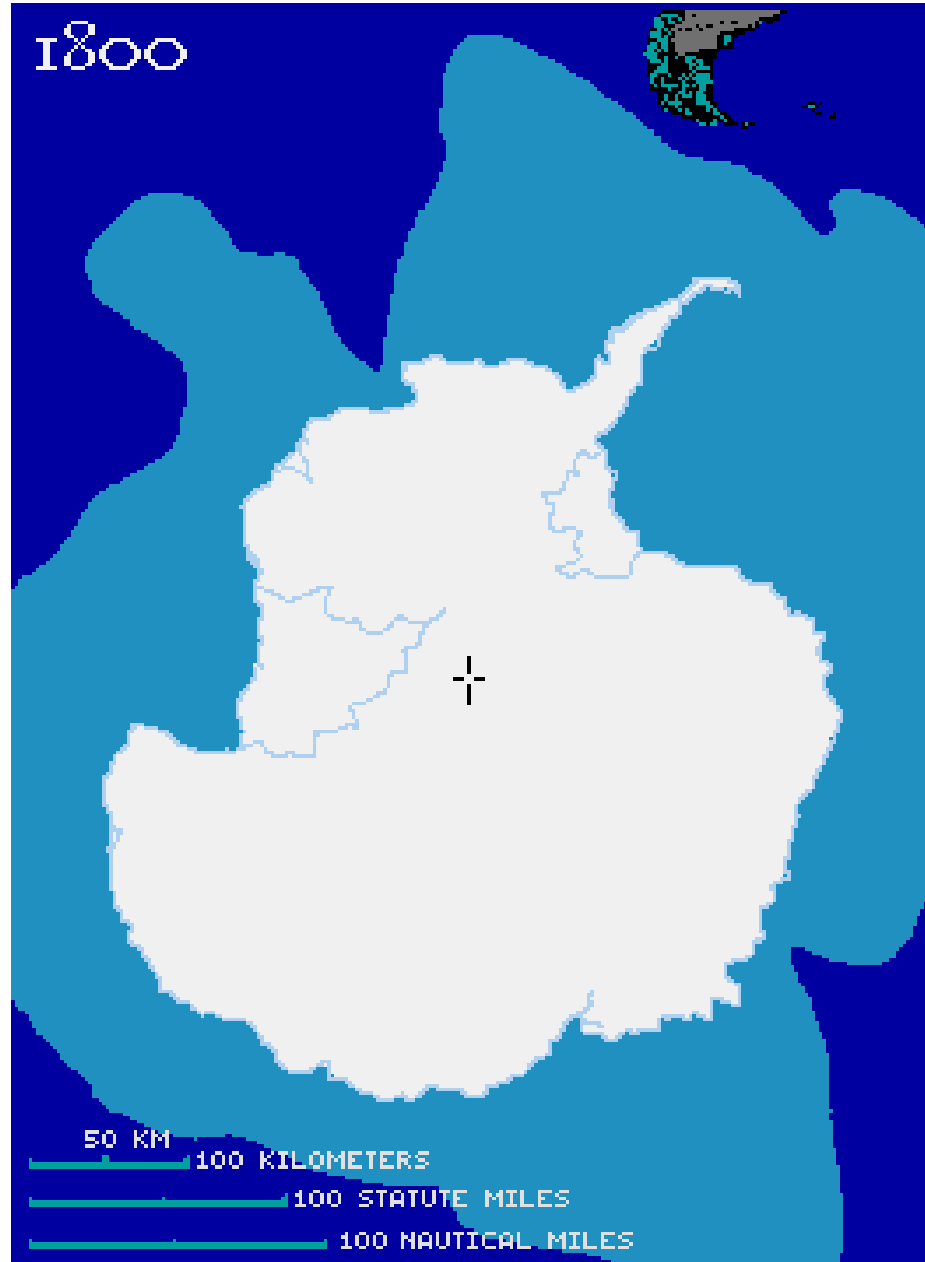


# Size Comparison Of USA And Antarctica Without It's Surrounding Sea Ice



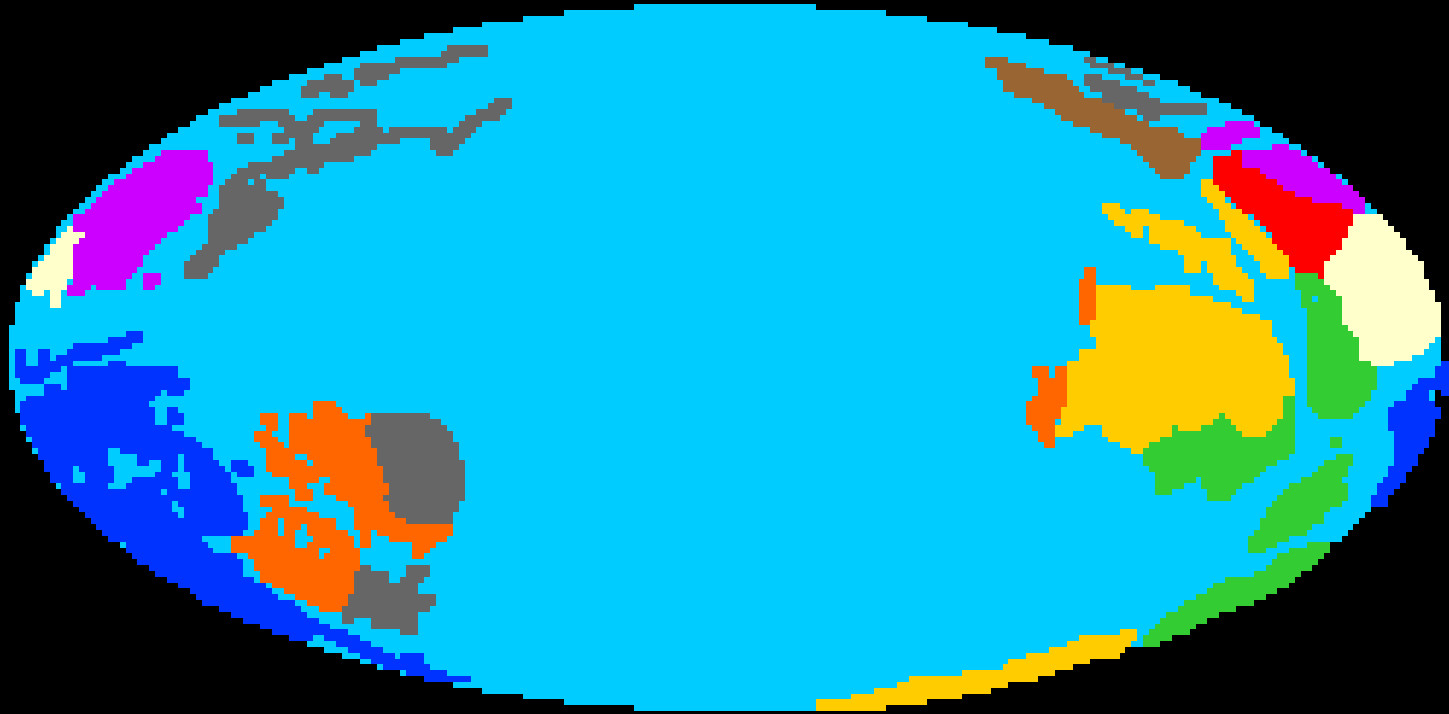
Sea Ice Is Shown In The Next Slide

# Continent Doubles In Size During The Winter Months



All 7 Continents Have Changed Location Through Time.

How Do We Know This?



Watch The White Area Migrate Over Earth's Surface Through Time

# McMurdo Station With Western Antarctica Across The Sea Ice

Continent

Ross Island

Sea Ice



# Williams Air Field At McMurdo, Antarctica (on sea ice) With Active Volcano In The Background



Mt. Erebus

**Where The Hell Are We Anyway?**



A wooden signpost with multiple directional arrows pointing to various global locations and distances. The arrows are arranged vertically and point to the right. The text on the arrows is as follows:

- NORTH POLE 11708 M
- CHRISTCHURCH 2457M
- SEATTLE WASH 9942 M
- ADNET PT 8538 M
- ST PAUL MINN 10002 M
- SOUTH POLE 831M
- MIAMI FLA 8622 M
- SALINAS CAL 8777 M
- HOUSTON TEXAS 9141M
- DALLAS 9548

**It's Not Exactly The Center Of Civilization**

Maybe This Will Help A Little, Well Maybe Not



SCOTT  BASE.

MILEAGES TO

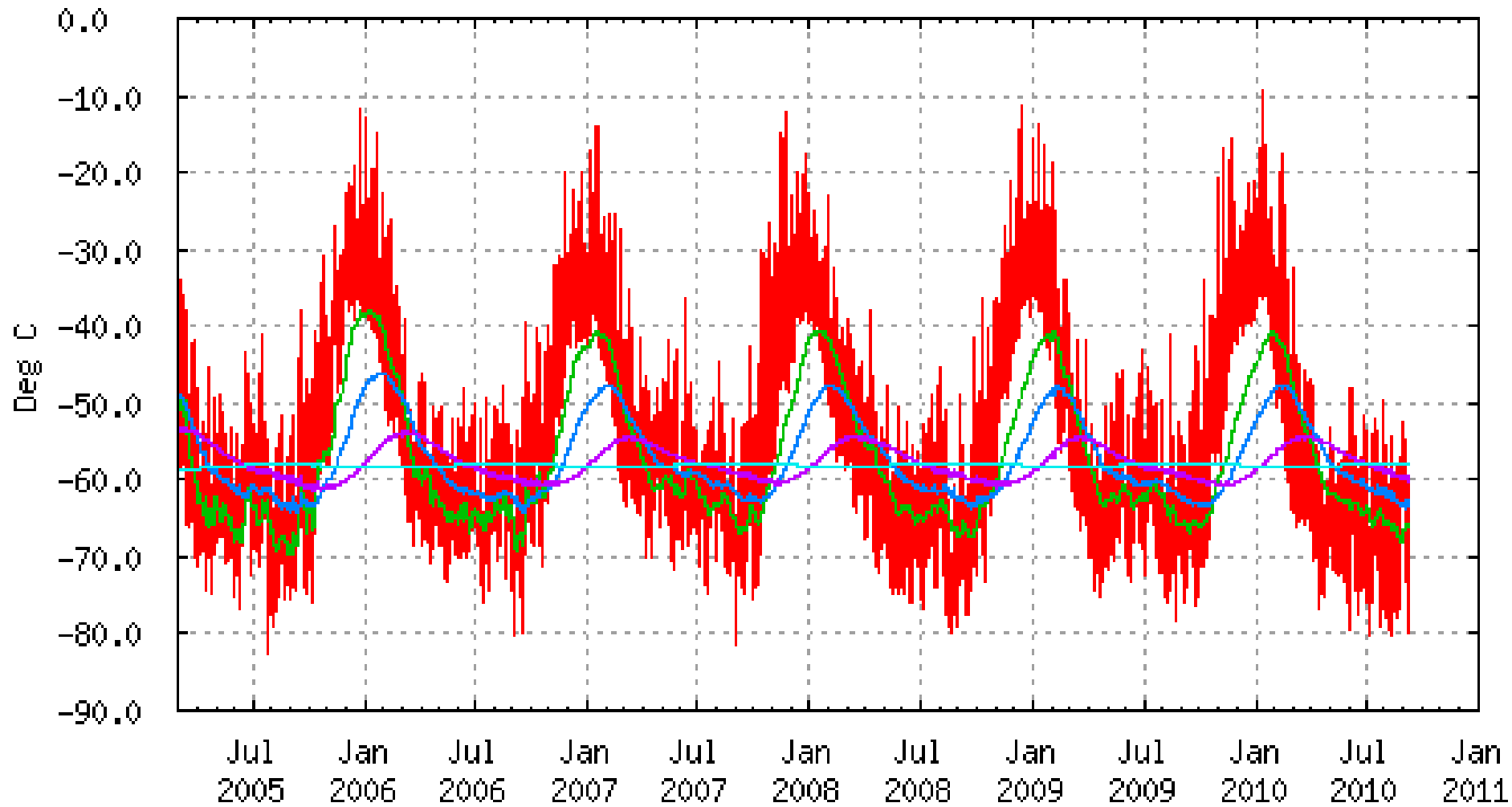
WELLINGTON 2 536	SOUTH POLE 841
LONDON 10 588	WASHINGTON 9 214
MOSCOW 10 501	TOKIO 7 929
CANBERRA 2 987	CAPETOWN 4 603
BUENOS AIRES 4 449	SANTIAGO 4 399
PARIS 10 382	BRUSSELS 10 520
OSLO 11 085	



# Now That We Know Where We Are, What Is It Like Here?



## Temperatures

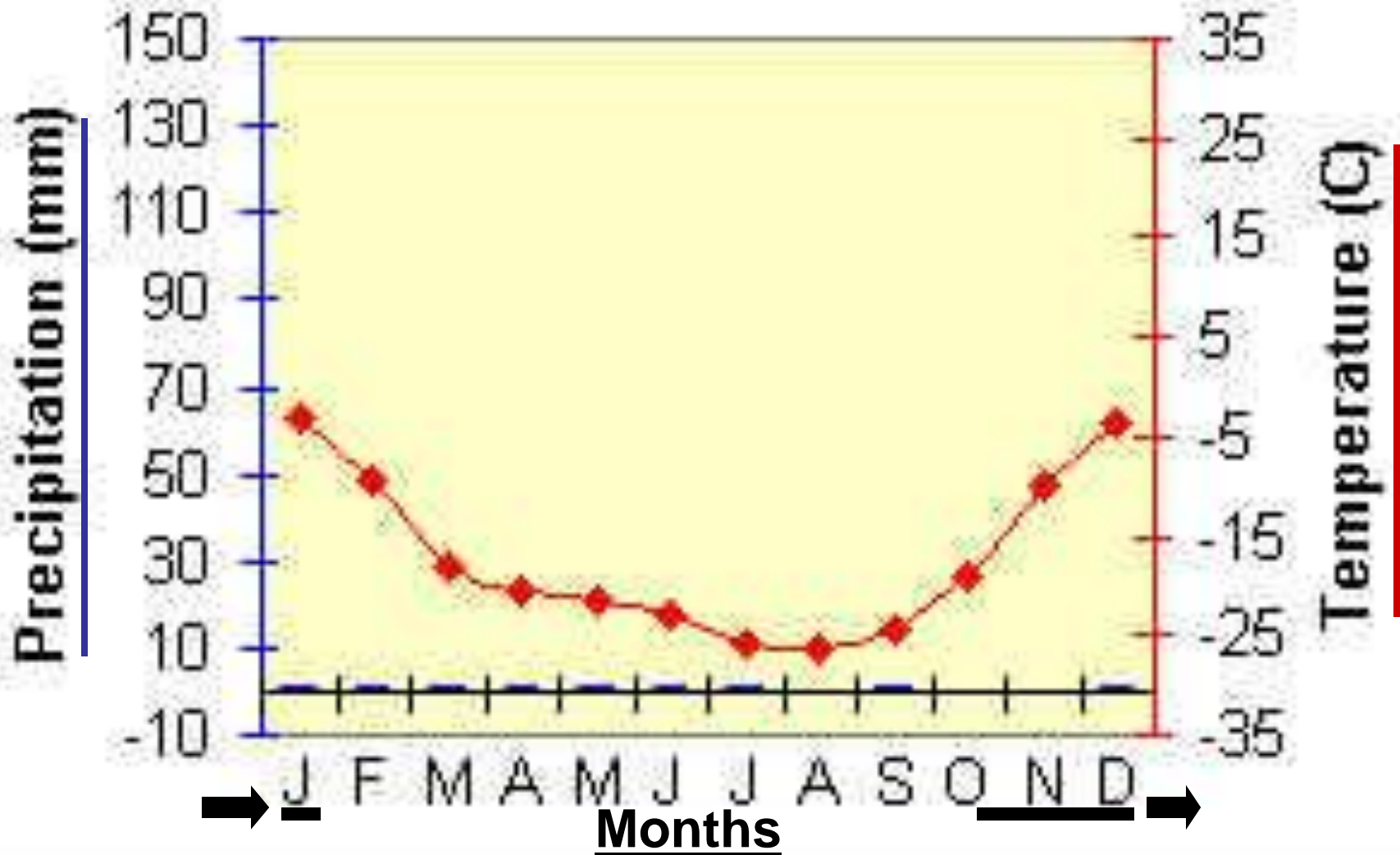


Thu Sep 09 17:58:55 2010

Air 1m — Sub-surface 1m — Sub-surface 10m —  
Sub-surface 0.1m — Sub-surface 3m —

# McMurdo, Antarctica

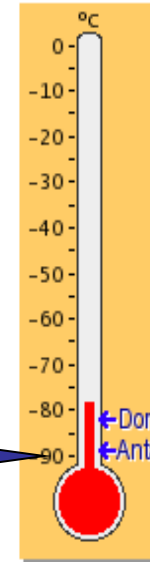
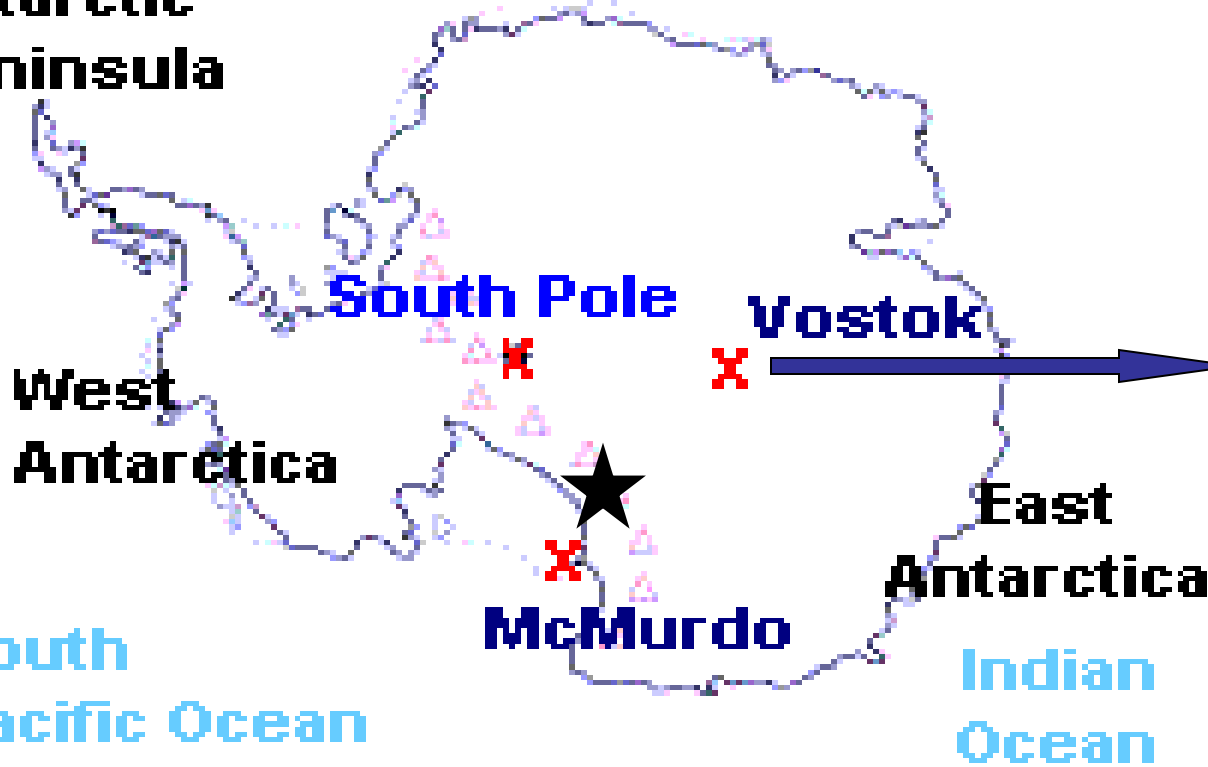
➔ = Our Field Season Months



# Operation "Deep Freeze"

Antarctic Peninsula

Atlantic Ocean

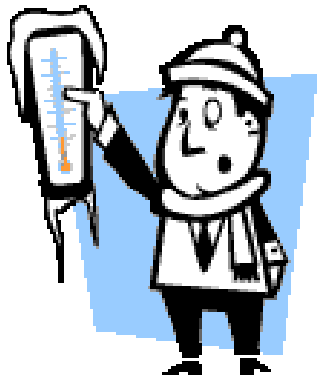


Dome A coldest ever -82.5°C  
Antarctica coldest ever -89.2°C  
Minus 129 F



Earth's Lowest Ever Recorded Temperature  
Vostok, Antarctica In 1983 = Minus 129 Degrees F

★ = Our Location



# **McMurdo Station From The Air**

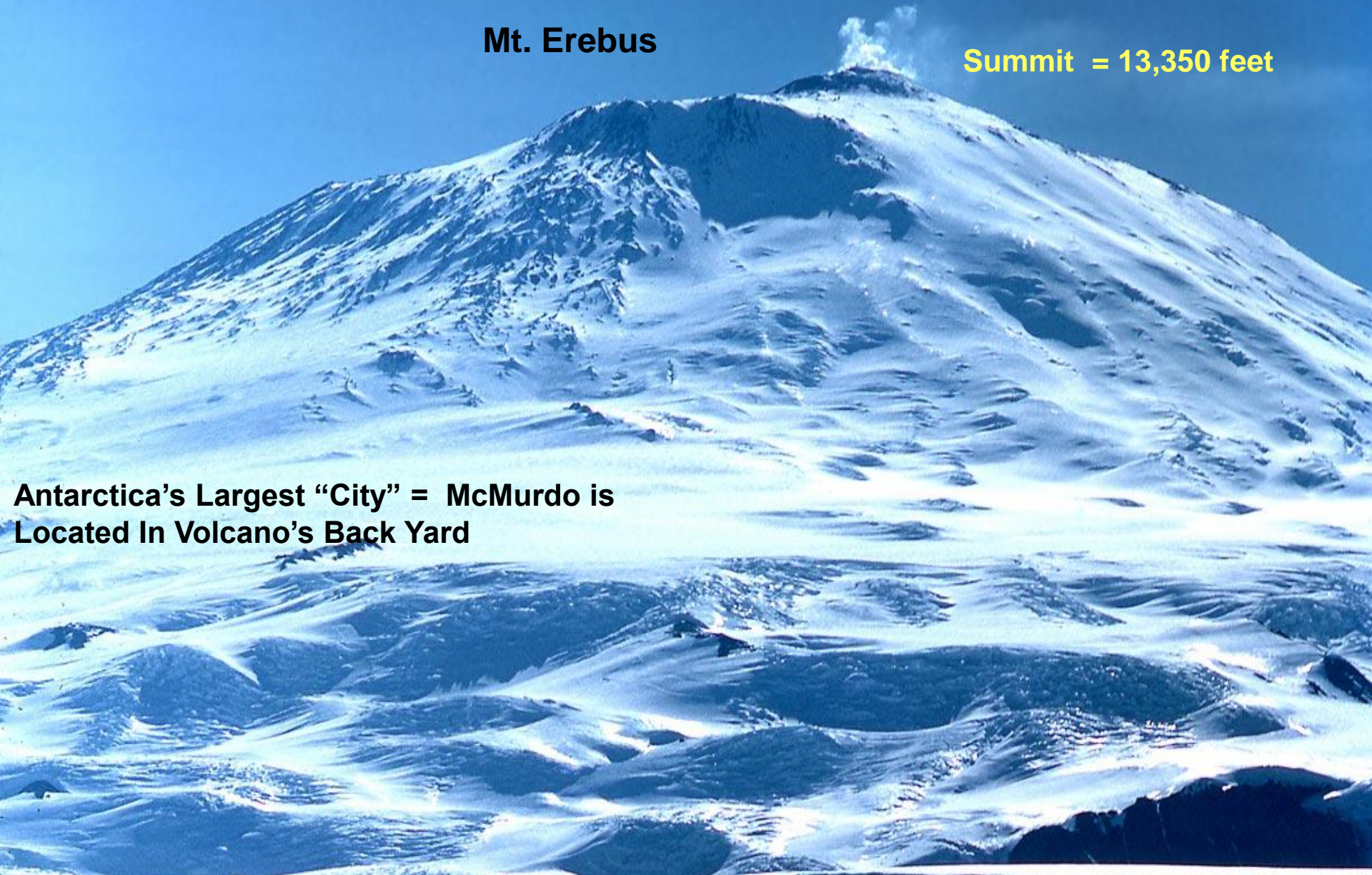
**Our Temporary Home When Not In The Field**



# Ross Island's Smoking Gun

**Mt. Erebus**

**Summit = 13,350 feet**



**Antarctica's Largest "City" = McMurdo is  
Located In Volcano's Back Yard**

# Quonset Hut: Our Quarters While In McMurdo Station On Ross Island

Few miles from the active volcano

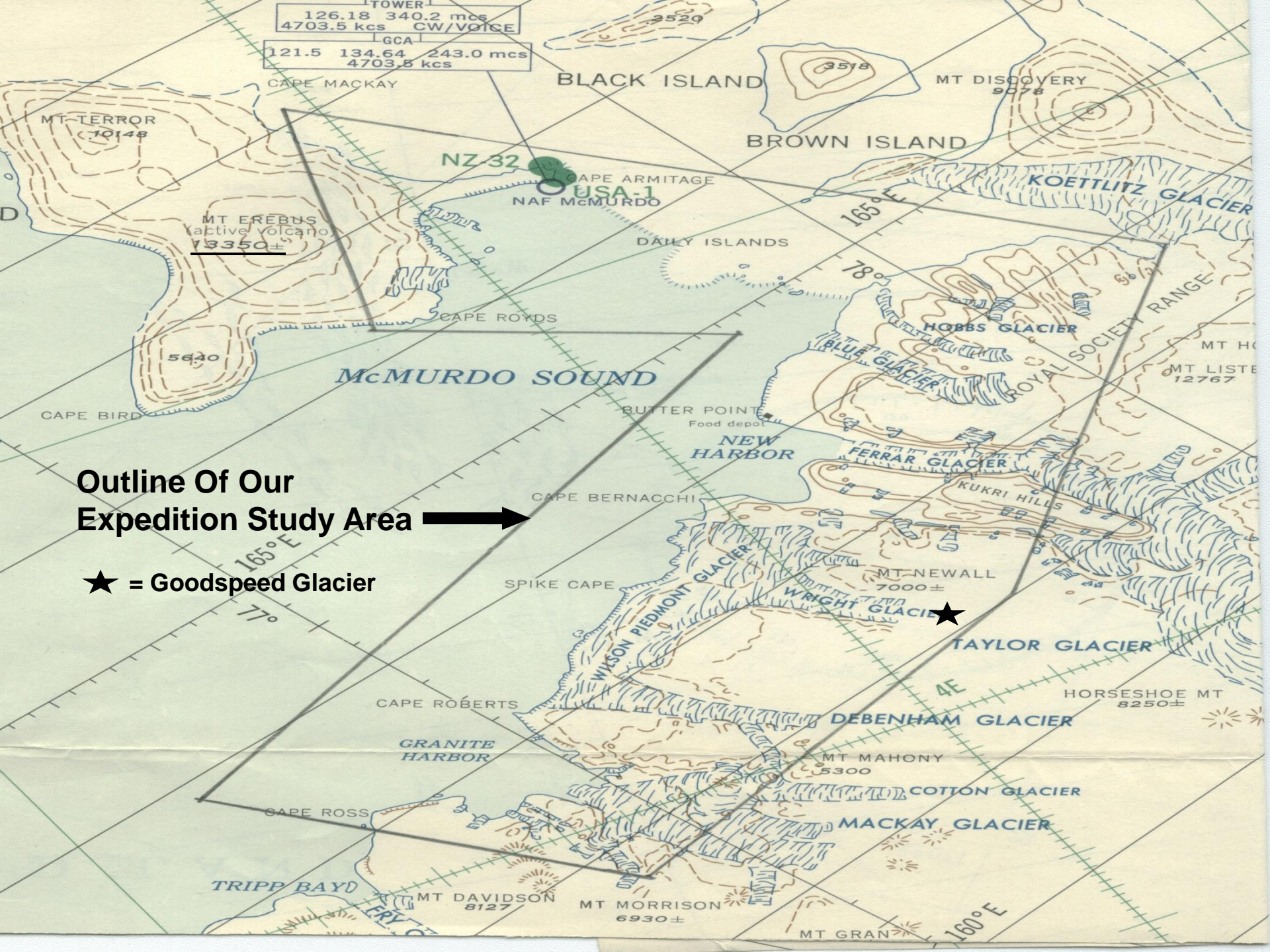


Early Summer Conditions



**What The Well-Dressed Antarctic Explorer Wears -  
Most All Of It At Any Given Time**

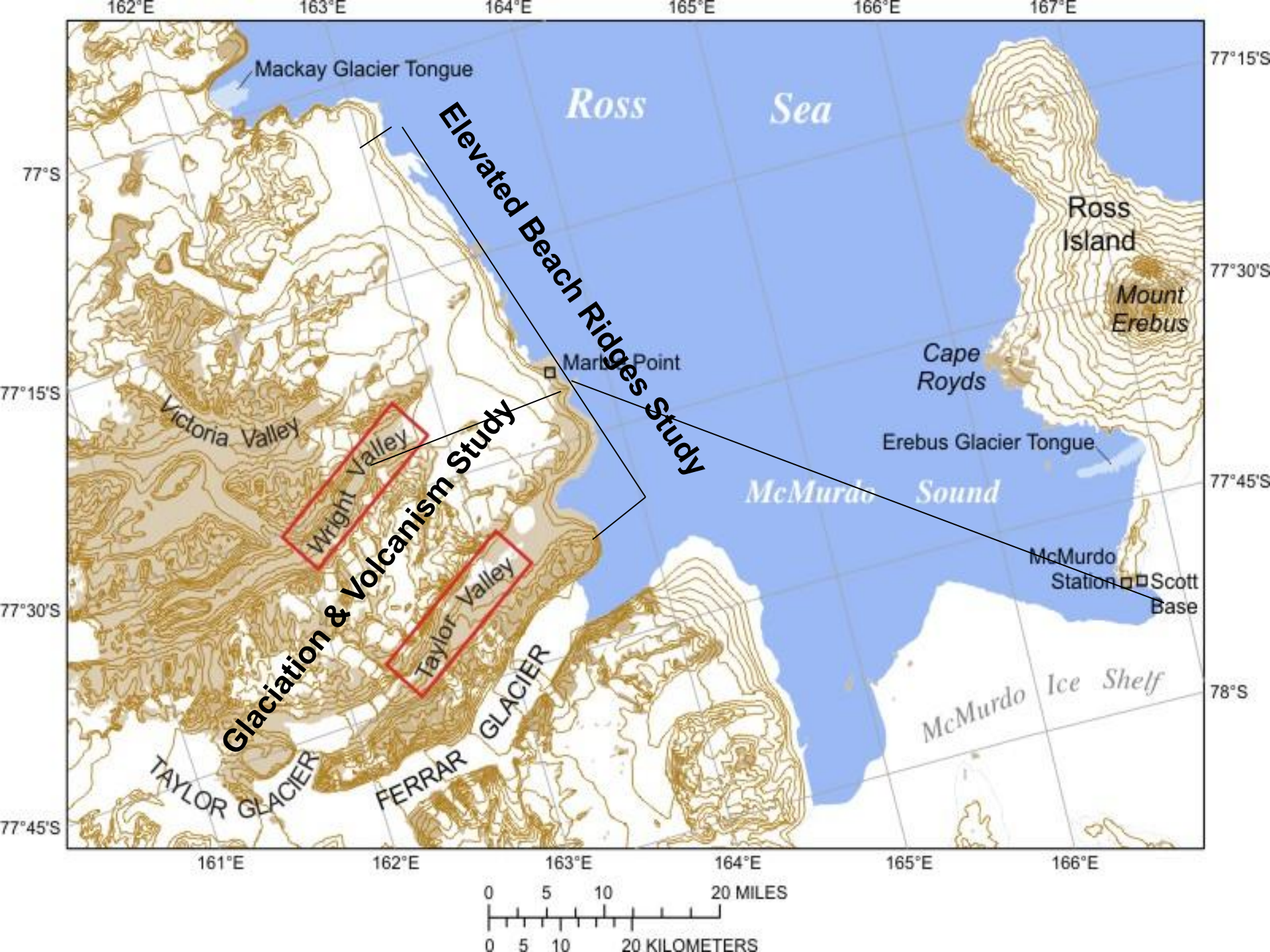
TOWER  
126.18 340.2 mcs  
4703.5 kcs CW/VOICE  
GCA  
121.5 134.64 243.0 mcs  
4703.5 kcs



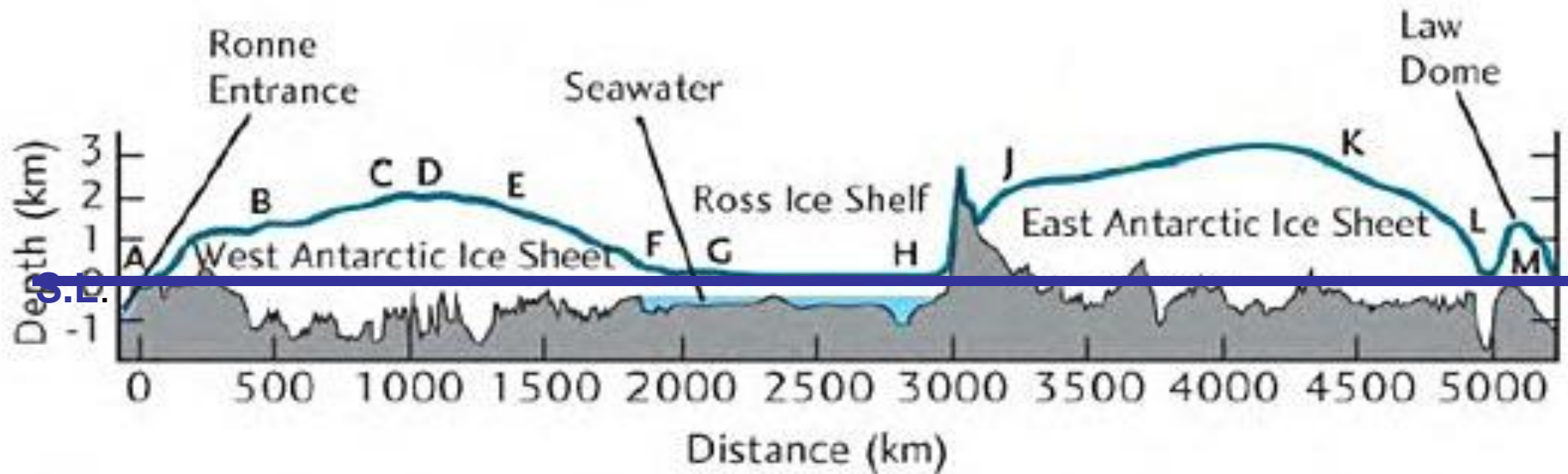
**Outline Of Our Expedition Study Area** →

★ = Goodspeed Glacier



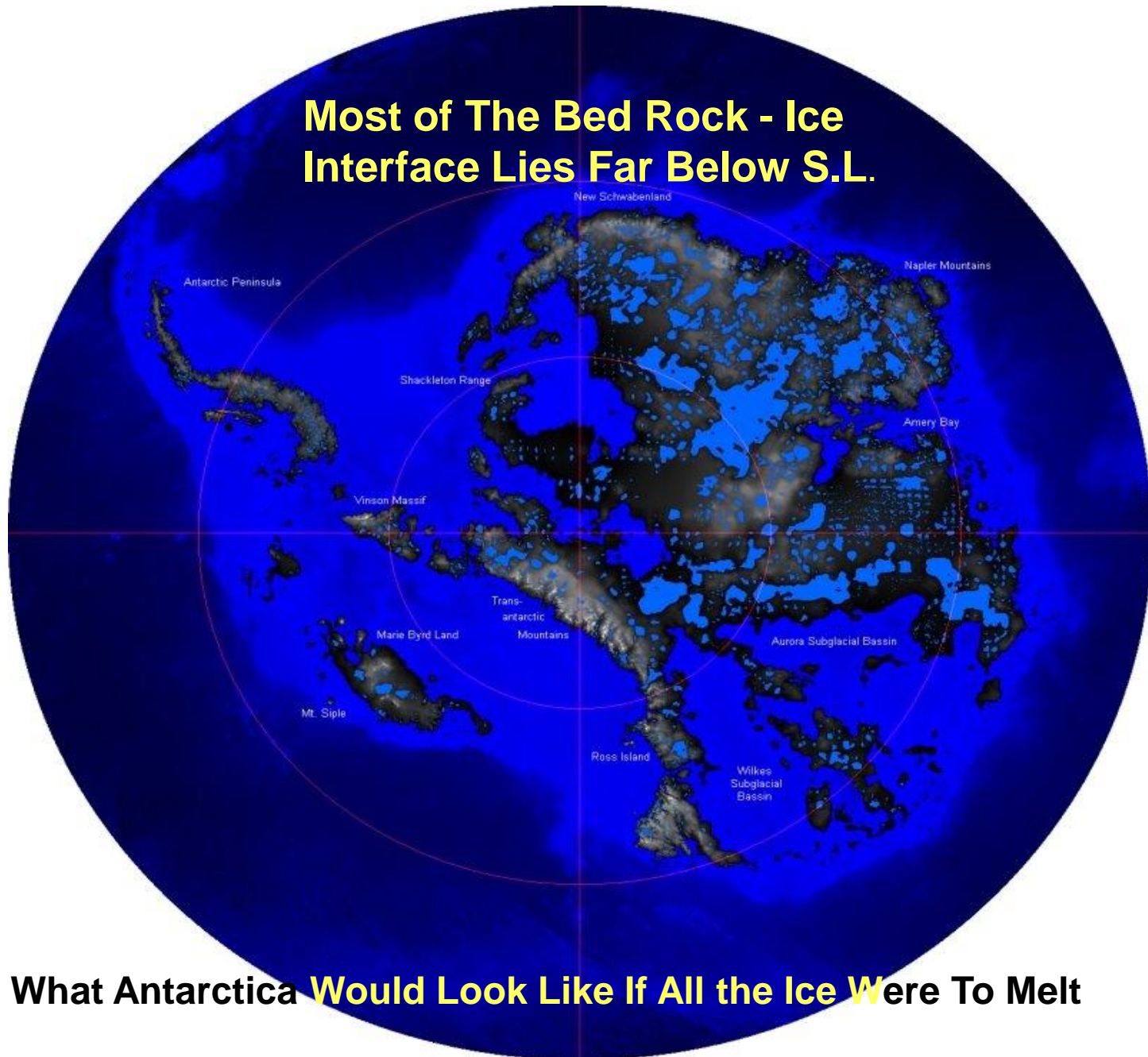


# Cross-Section Of West And East Antarctic Ice Sheets



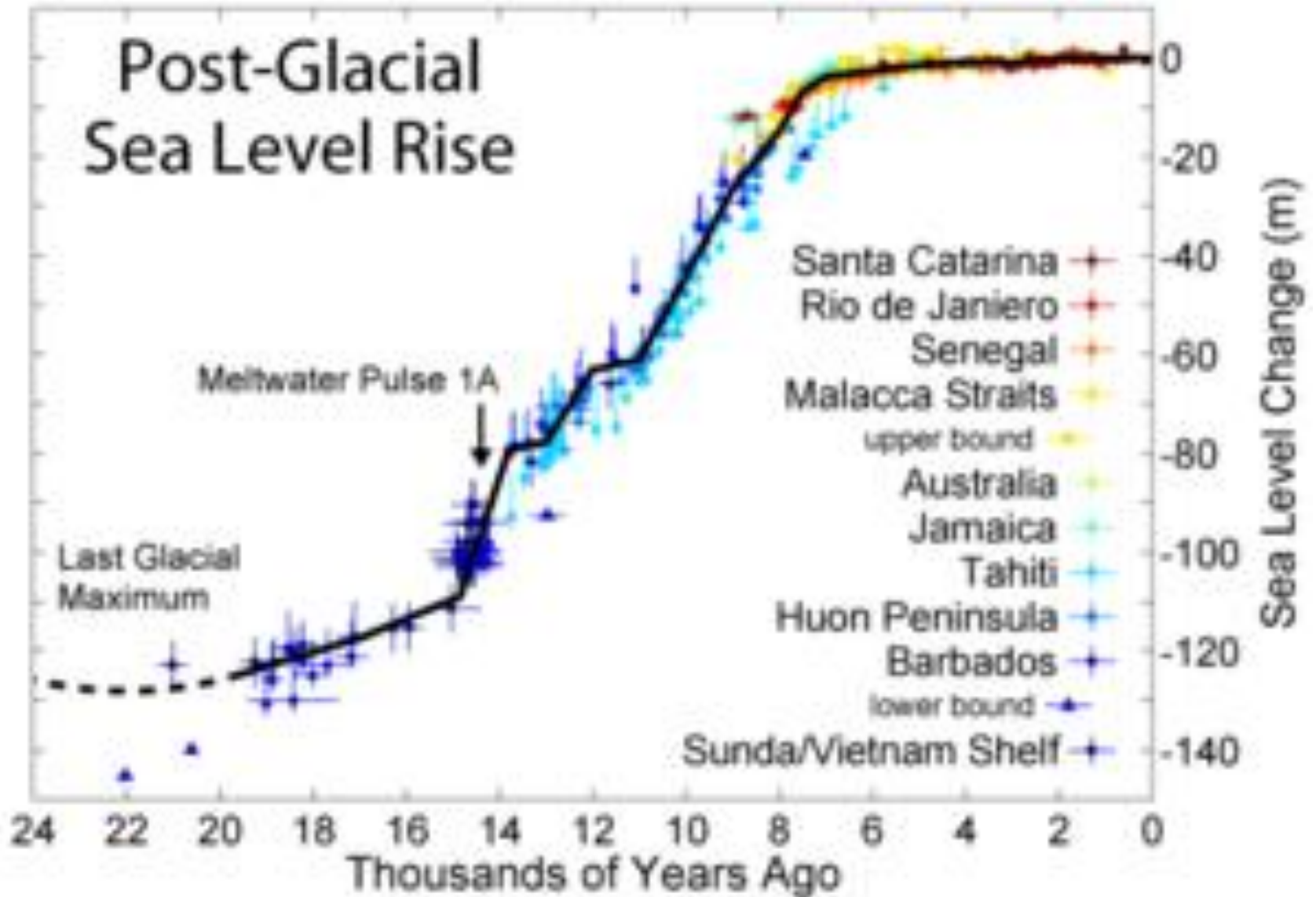
**Much of the rock crust lies well below sea level as the result of the weight of miles of overlying ice.**

# Most of The Bed Rock - Ice Interface Lies Far Below S.L.



What Antarctica **Would Look Like If All the Ice Were To Melt**

# Part Of Phase 1 Work



**Environmental Conditions Of Coastlines Where We Were Working  
During The First Phase Of Our Expedition**



Camping on the Sea Ice – 6 to 14 feet thick, We hoped!



A wide-angle photograph of an Antarctic sea ice landscape. In the foreground, a flat expanse of white sea ice is dotted with several small, brown, conical tents. A few dark figures of people are visible near the tents. The middle ground shows a vast, undulating sea ice field with various textures and shadows. In the background, a range of rugged, snow-covered mountains rises against a clear, pale blue sky. The mountains have sharp peaks and deep shadows, suggesting a high-altitude environment.

**What It's Like To Go Camping On Sea Ice During The Antarctic Summer**

# This Is How We Traveled During Phase I

Sledging – Note Our Power Source!







**Man-Haul Sledging – Up Close & Personal**

# Very Smooth Blue Ice Creates Ideal Sledging Conditions



# Some Rough Sea Ice Conditions For Sledging & Camping



## Example Of Sea Ice Camping Conditions – Phase 1



## Another One Of Our Camp Sites On The Sea Ice



You Don't See Any Dogs. Do Ya?



Bill

Me

Roger

Dr. Nichols

# Our Home on the Sea Ice

Staged Group Photo

# Our Sole Means Of Communicating With Anyone Outside Our Party While In The Field



## Operating Frequencies:

Primary = 6835 kcs (voice) Rcv = 3.74;

Secondary = 6708 kcs (voice) Rcv = 2.705, &

Emergency = 9001 kcs (voice & CW) Rcv = 18.17

'59 – '60 Call Names: **“Man-Haul Traverse” = generate – 03 (NGD-03) = Us;** NAF McMurdo = McMurdo Radio (NGD); Hallet Station = Alameda (NIC); Marble Point = Marble Point Radio; Victoria Land Traverse = Generate Zero One (NGD – 01)

McMurdo Ham Radio Station = KC4USV = Present Day

# “Normal” Field Setup For “ANGRY 9” Radio

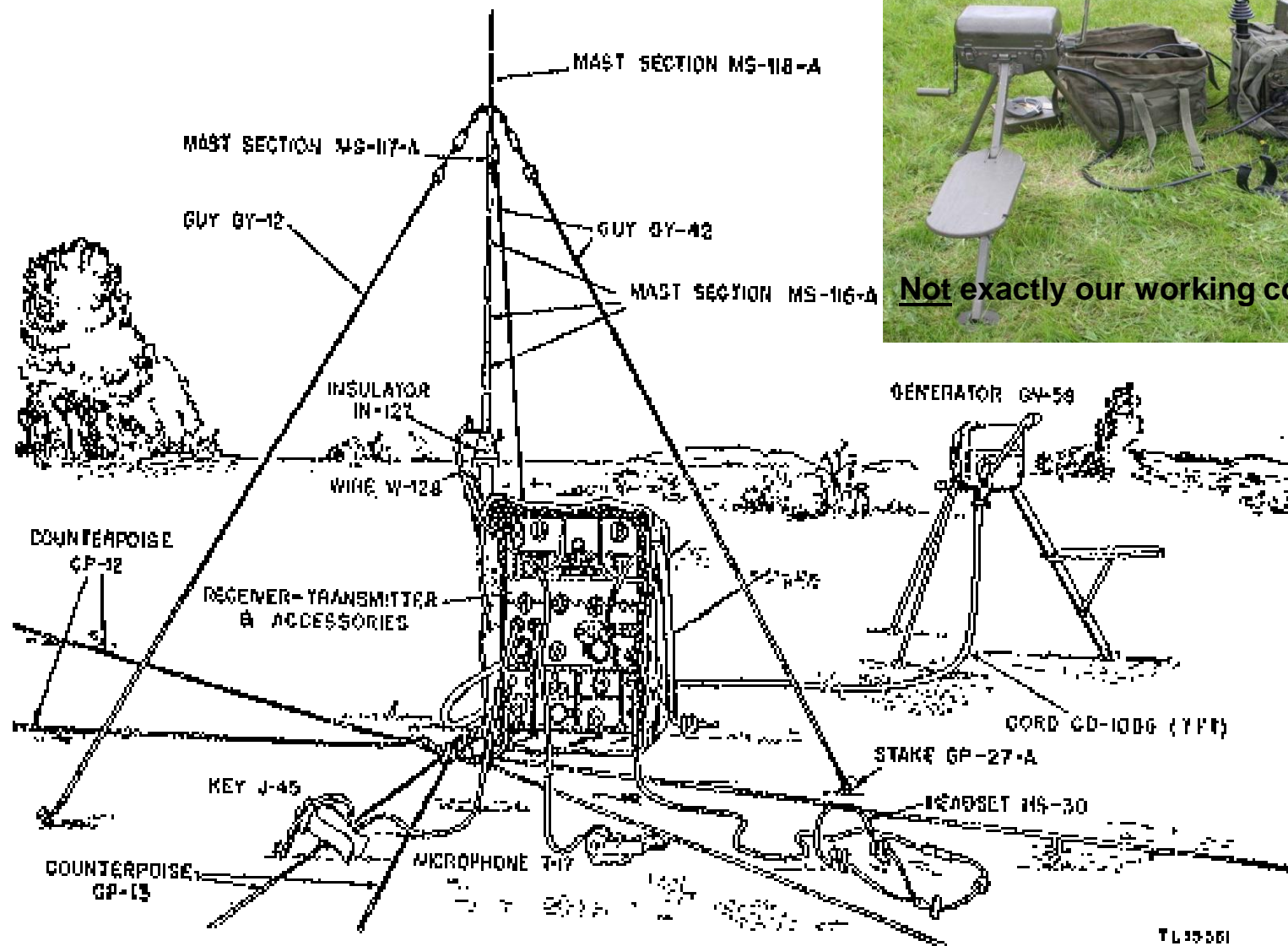


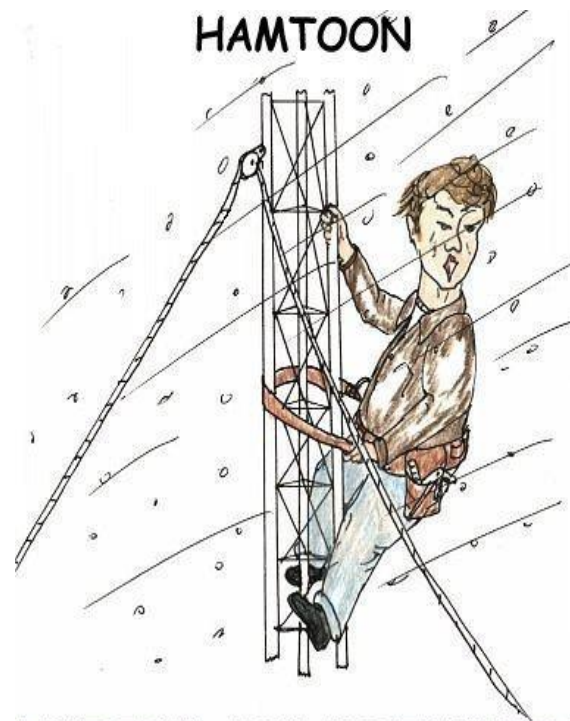
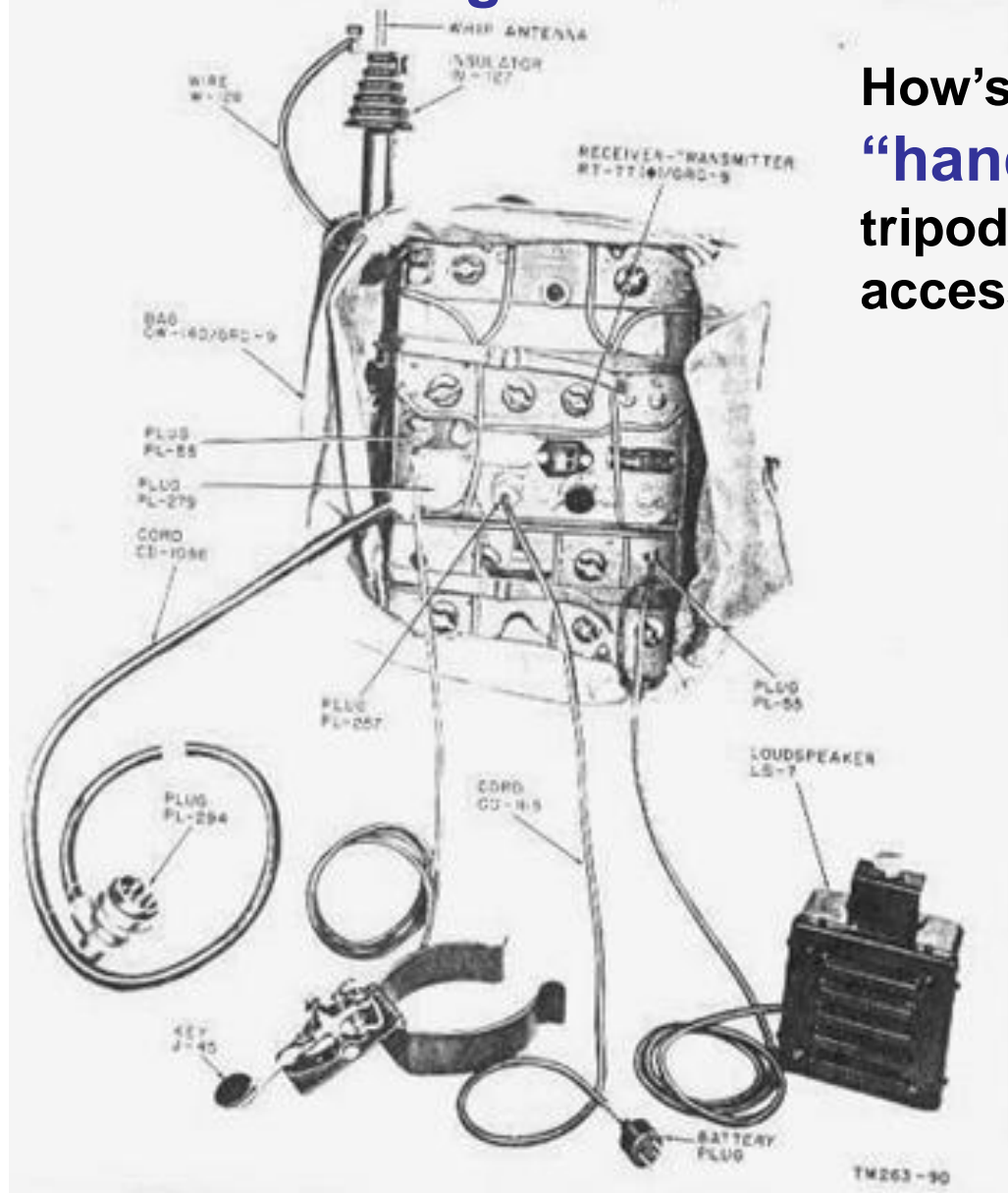
Figure 85. Radio set AN/GRC-9 set up for normal field use.

The key work here is “normal”



# We Had To Sledge & Back Pack This Monster “Radio”

How’s this for our **73+ pound** “**hand-held,**” not counting the tripod-generator, antenna, & accessories?



NEXT TIME, HOW ABOUT WE PUT UP THE ANTENNA BEFORE THE SNOW BLOWS ?

# Elevated Beach Ridges At One Of Our Phase One Work Sites

Mt. Erebus: active volcano 13,350 ft high

Large ice bergs in sea ice

Ice Berg

This Ain't Your Typical Sandy Beach Material

Elevated beach ridges





**Our Fresh Water Source  
During Phase I**

# Hugh Ice Berghs Frozen In Sea Ice



Note: Human for scale 

**We didn't have it even this good!!! We Need A Windbreak. Where is the nearest ice berg or large rock?**



# Elevated Beach Ridges



# Attack Of The Skuas



**How High Is The Glacier Barrier?**

**How Far Is It To The Front Of The Glacier?**

**Who Is That Strange Person?**

**What Does This All Mean?**

**Who Cares?**







Inside A Glacier's Melt Water  
Cave – Looking Seaward

# **A Couple Of Our Friendly Natives Kissing On Sea Ice**



**Waddell Seal Pup is Only Few Days Old**

**Plane That Transported Us Back & Forth  
Between McMurdo & Marble Point**



**Single Engine Canadian "Otter"**

# Our Radio “Communications” While Doing Field Work

# KC4USV



McMurdo Sound  
ANTARCTICA

Modern-Day McMurdo Station QSL Card

# Ham Shack & Antennas At McMurdo Long After We Were There

(Not Exactly Up-To-Date By Today's Standards)



# Much Later Photo of McMurdo Ham Shack & Antenna



< McMurdo Ham Shack

# A Much More Recent Communications Building At McMurdo Station



# McMurdo Station Communication Building





**Couple of Recent Hams At McMurdo –  
long after we left**



Ham Shack – Long After We Left



**McMurdo Ham Antenna – erected long after we left**



VP8 King Edward Point (G)  
VP8 Bird Island (G)

ZD9 40.36S  
Gough Is (ZS)

3Y 54.42S  
Bouvet Is (LA)

ZS8 46.78S  
Marion Is (ZS)



**It Sure Wasn't Like This When I Was There!**

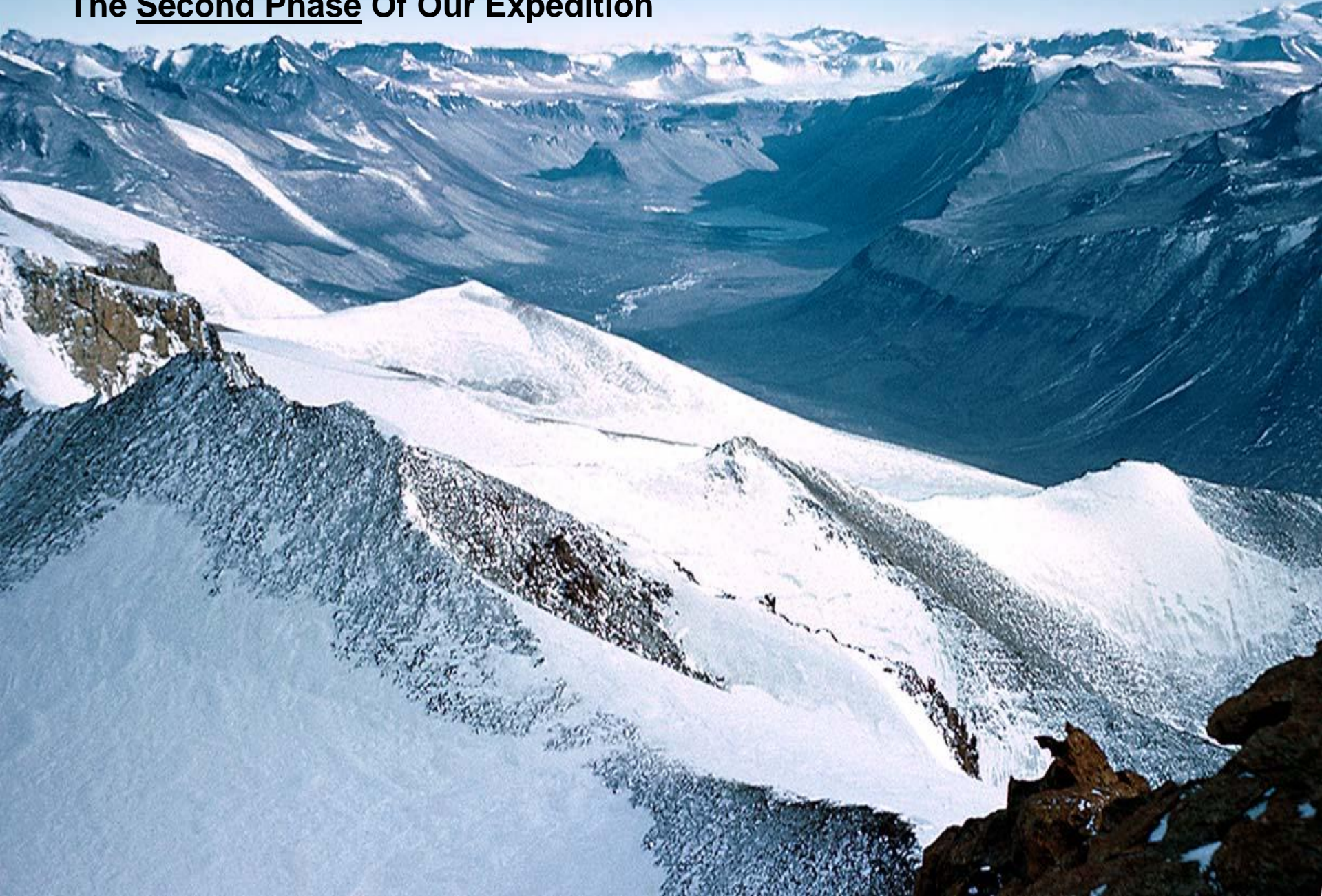
This map is part of the Global Overlay Mapper suite. See online demo at [www.qsl.net/ei8ic](http://www.qsl.net/ei8ic)

Chatham Is  
ZL7  
44.00S

Auckland & Campbell Is  
ZL9  
50.70S

Macquarie Is (VK)  
VK0  
54.50S

**Environmental Conditions Of Dry Valleys Where We Worked During  
The Second Phase Of Our Expedition**



A vintage photograph showing a field camp in Wright Dry Valley. Two light-colored tents are pitched on a rocky, gravelly ground. A person, identified as Doc, stands between the two tents. The background features a range of rugged mountains with patches of snow under a clear sky. The image has a slightly faded, historical quality.

Our Auspicious Leader = Doc

One Of Our Field Camps In Wright Dry Valley



**No More Sledging! It's Now Hiking & Back Packing**



**How's This For A Coffee Break Location?**



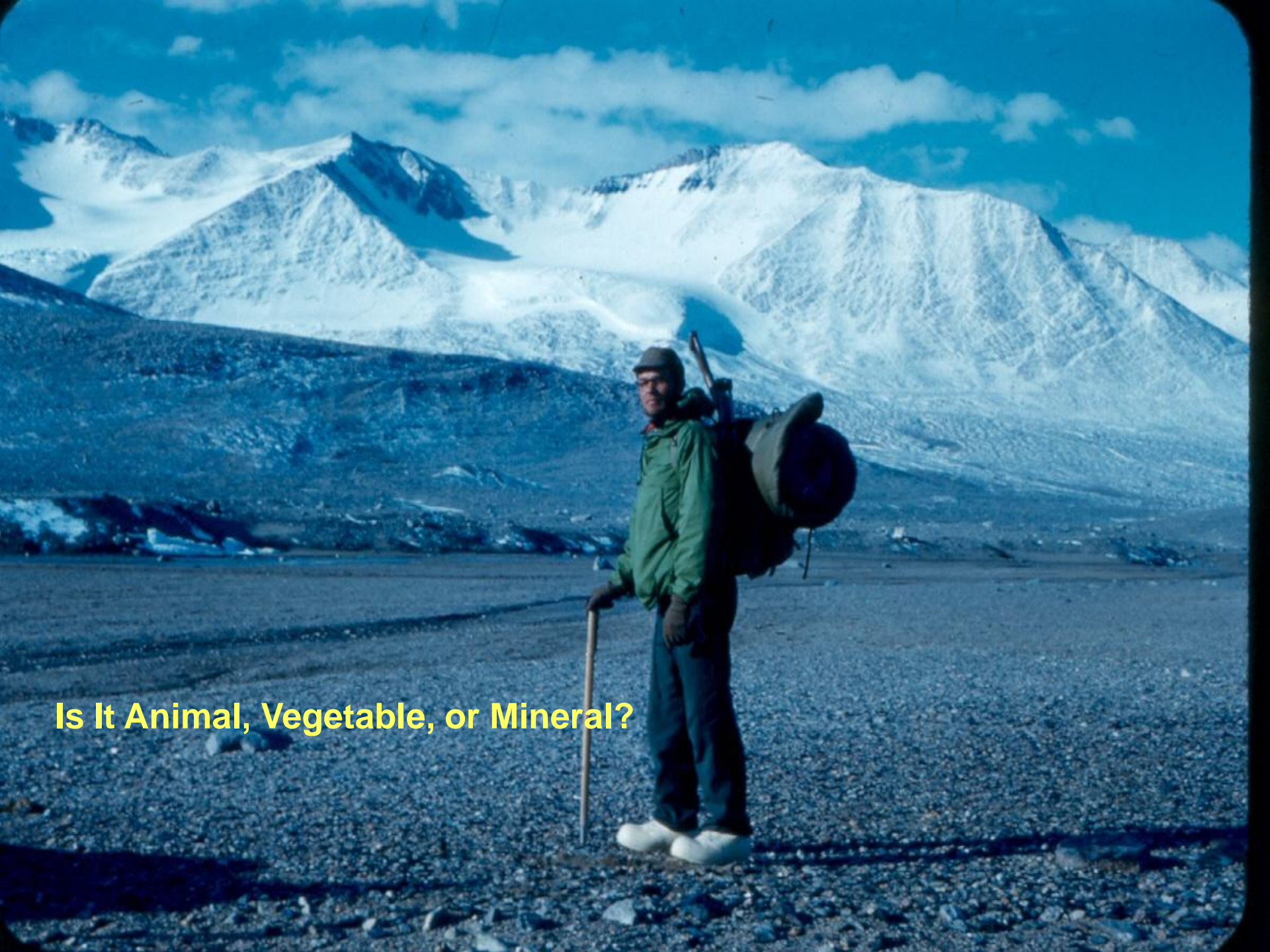
**Petrified Seal In Wright Dry Valley: 4,500 to 5,000 Years Old  
As Age-Dated Back In The States. Yum – Yum !!**



**Adelie Penguin In Wright Dry Valley About 20 Miles Inland From The Sea Ice. This Critter Was Alive!**

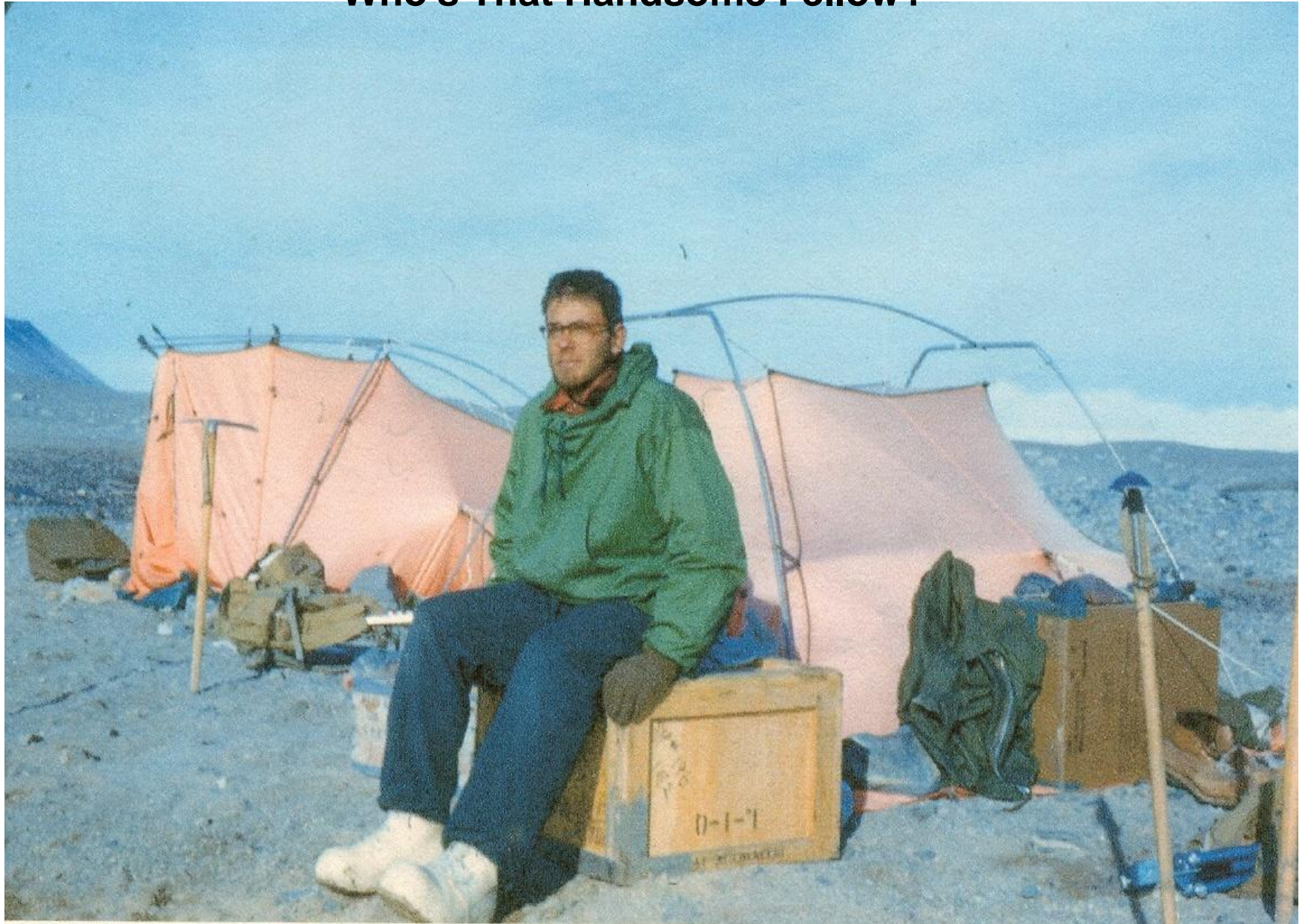


**My shadow**



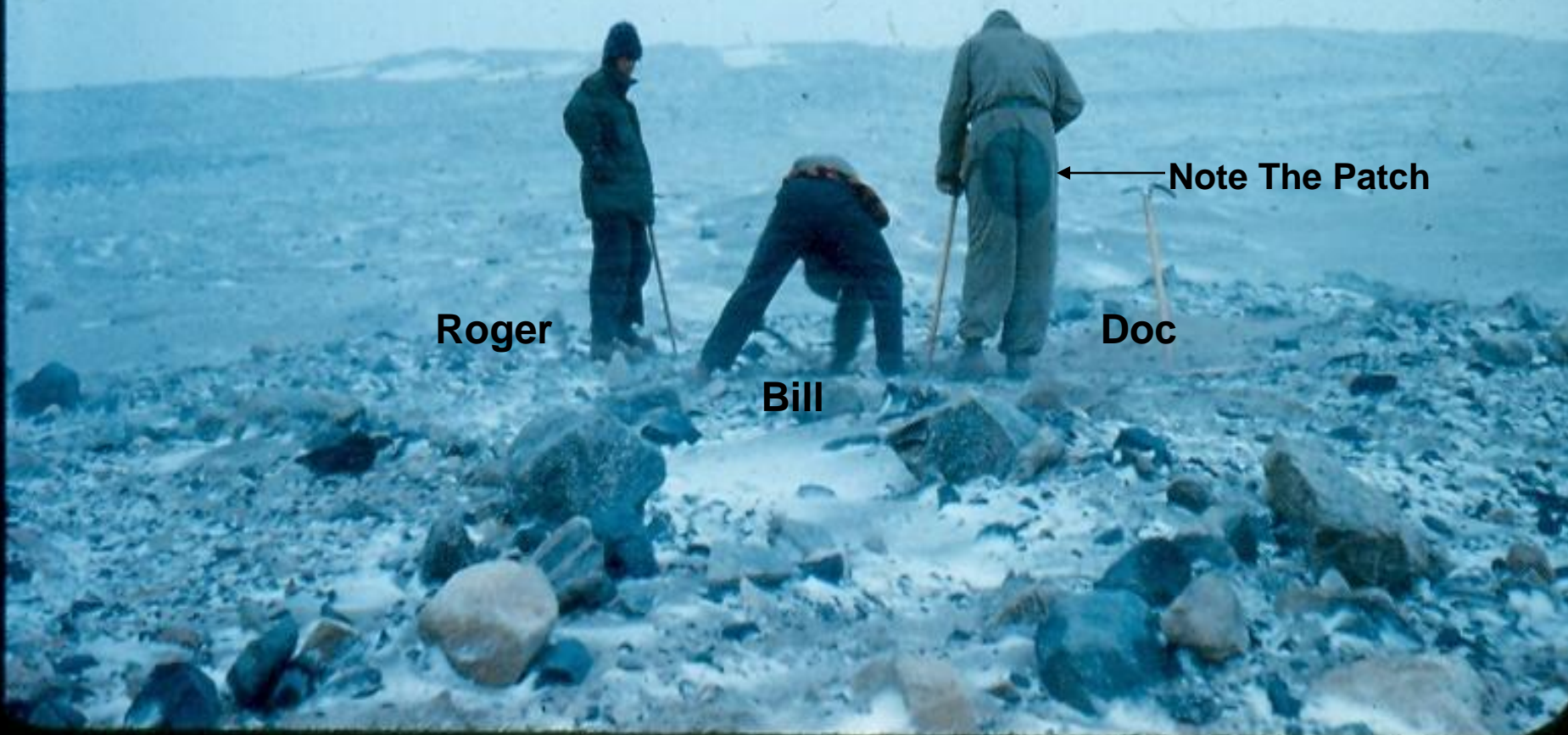
**Is It Animal, Vegetable, or Mineral?**

## Who's That Handsome Fellow?



**Digging A Hole For Blasting.**

**Here's Where I Learned The True Meaning Of "F.U.B.A.R."**





Doc



Bill



Roger

**Geologist Hard At Work!**

Me? I'm Taking the picture, stupid.

# Dry Valley & Coastal Area Common Winter Wind Conditions

Summer Winds Are Commonly 40+ mph

## Katabatic Wind

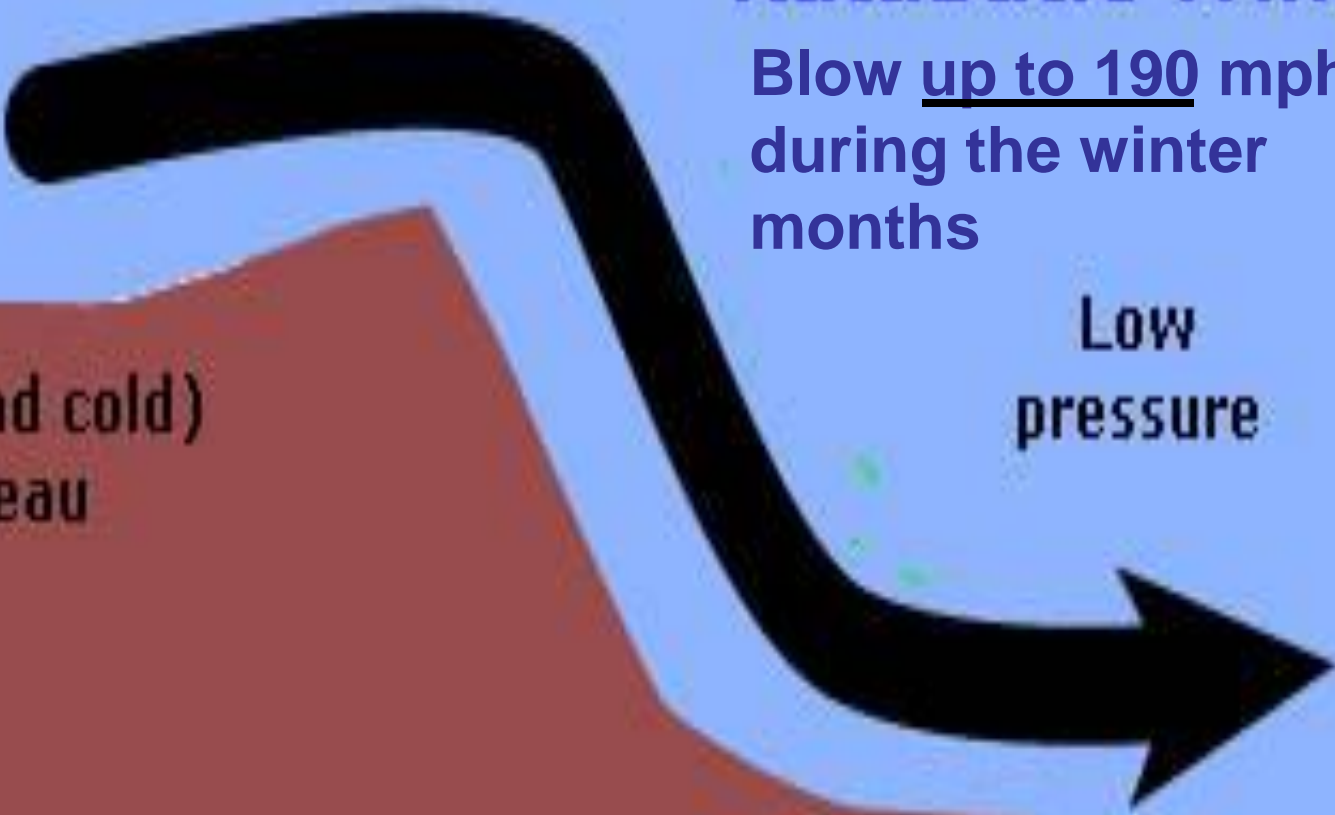
Blow up to 190 mph during the winter months

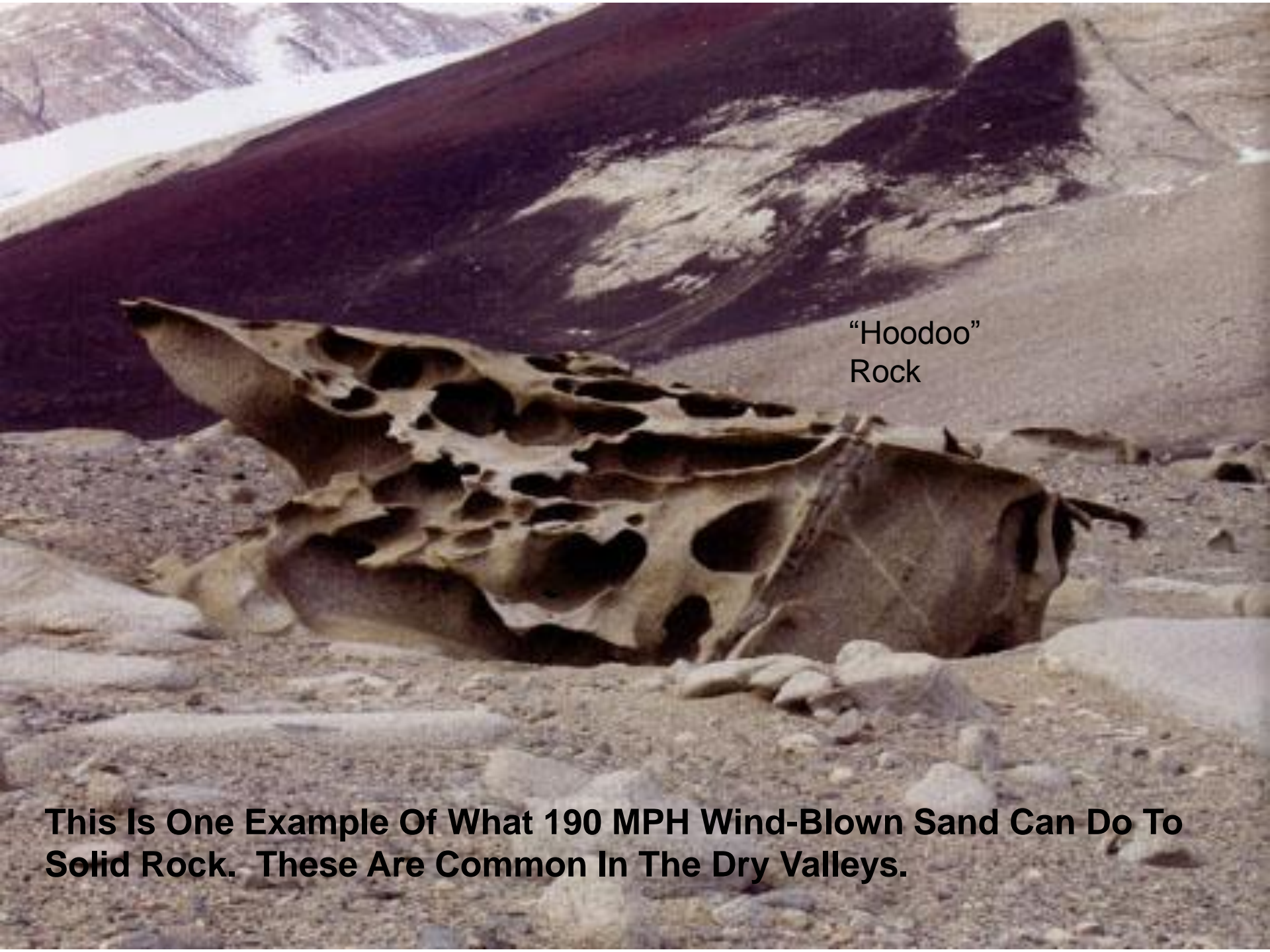
High pressure

Ice Cap

High (and cold) plateau

Low pressure





“Hoodoo”  
Rock

**This Is One Example Of What 190 MPH Wind-Blown Sand Can Do To Solid Rock. These Are Common In The Dry Valleys.**



## Typical Dry Valley Surface Material Deposited By Glaciers

It's About The Same Size And Shape As The Materials Composing Elevated Beach Ridges



# Field Geologists Hard At Work

Sea Ice →

Wright Glacier –  
Landward Edge

Wright Lake (Frozen)

• We Ice-Cored This Lake

← Ice Cap

Roger

Doc

Bill

Guess who took this photo

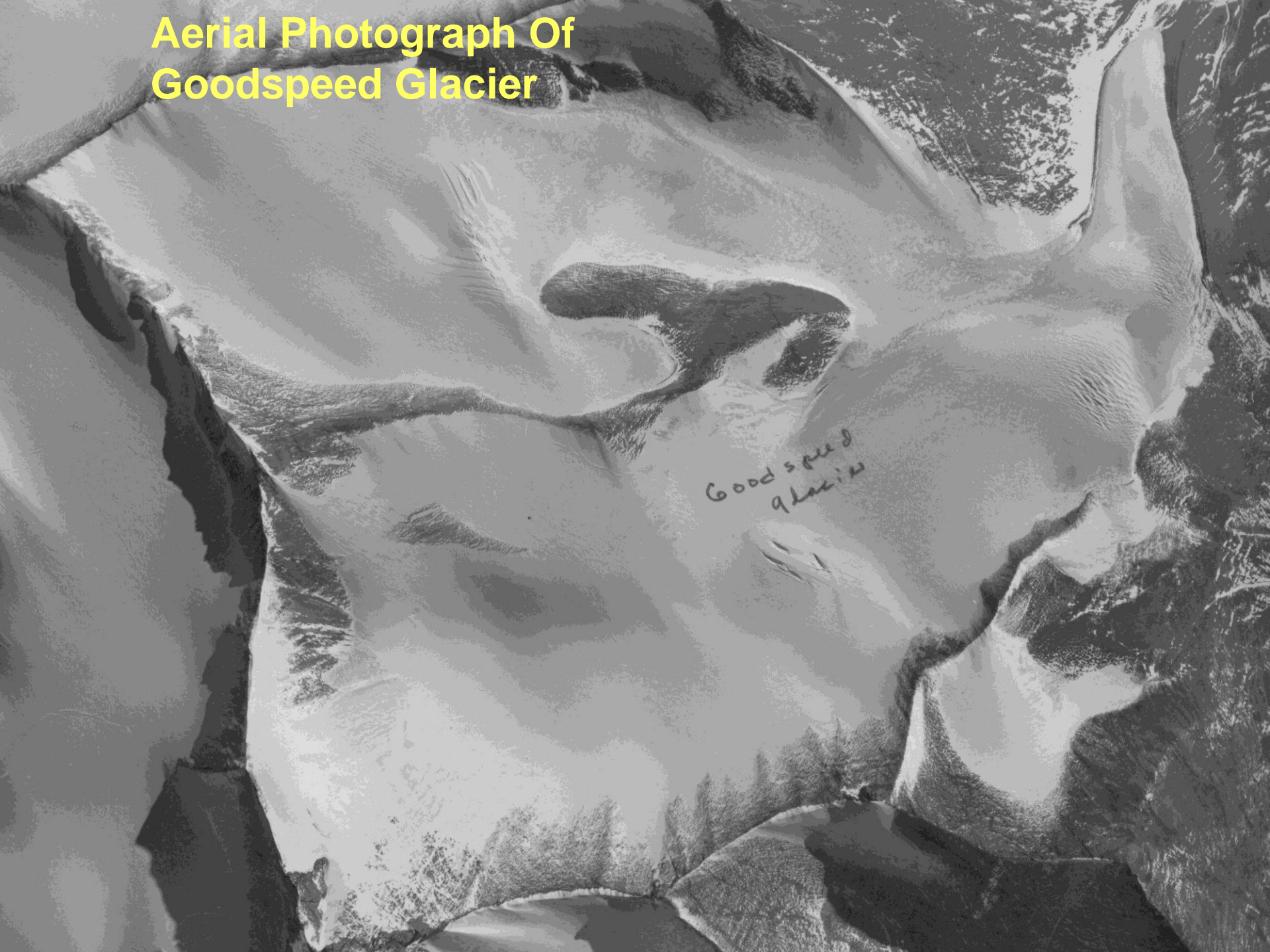
**Aerial View Of Glaciers In Wright Dry Valley, Antarctica Named After Dr. Nichol's '59 - '60 Field Assistants ( sorry, field assistants' assistants weren't included)**



“Bob’s 15-Minutes of Fame”

# Aerial Photograph Of Goodspeed Glacier

Goodspeed  
Glacier

An aerial photograph of a large glacier system. The glacier is the central focus, showing various features like crevasses and flow lines. The surrounding terrain is rugged and appears to be covered in snow or ice. The text 'Goodspeed Glacier' is handwritten in the center of the image.

Goodspeed Glacier





**Goodspeed Glacier**

**Bob's Glacier Terminus**

**Onyx River = Longest River In Antarctica - 12 miles long**

**Person For Scale**

# Terminus of Goodspeed Glacier



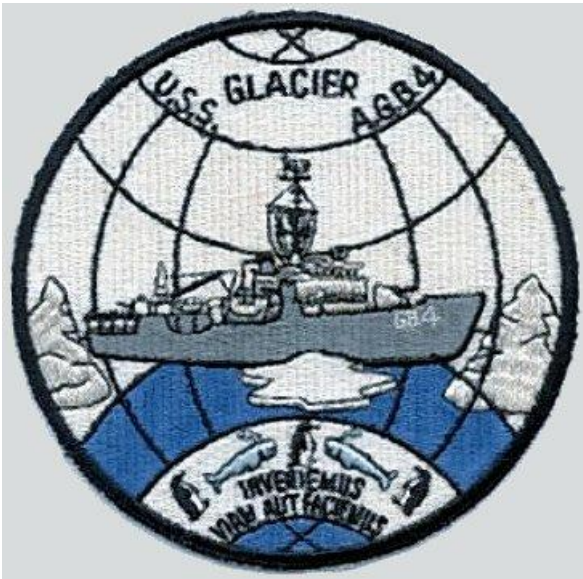
Person For Scale



# Crazy Geologists Doing Field Work In Near- Surface “Whiteout” Conditions

Part Of Depth To Permafrost Study: Phase 2





**Our Mode Of Transportation Back  
To Christchurch, New Zealand**



## Our Expedition Field Season Ends & It's Time To Head Home

An aerial photograph of the USS Glacier (AGB-4) icebreaker, a large dark-hulled ship, moving through the ocean. The ship is viewed from a high angle, showing its long hull and the wake it leaves behind. The water is a deep blue color. The ship is oriented diagonally across the frame, moving from the upper left towards the lower right.

AGB – 4 USS “Glacier” Ice Breaker - I took this photo from one of the ship’s helicopters just before we landed on it’s helo-deck as it was moving toward New Zealand

**USS "Glacier's" Helicopter On Helo-Pad: It flew us from our camp at Marble Point onto the ice breaker for our trip back to New Zealand**



What's This?

**Ya, I know. I must have scanned my Kodochrome slide "basackwards"**

# USS "Glacier" Breaking Sea Ice In The Ross Sea As It Begins Its Journey To New Zealand



Seal on sea ice

# Penguins Waving Goodbye & Taking Pictures Of Us As We Head North



www.northern.com



**Open Water Ahead – Ross Ice Shelf Margin & Ice Berg**



**Hey! In case you're wondering, this isn't Antarctica!**





**My Home In The Woods – Winter**



**My Home In The Woods – Summer**



**Many, Many Years Later.**

**I Guess I Haven't Learn Very Much Over The Years!**