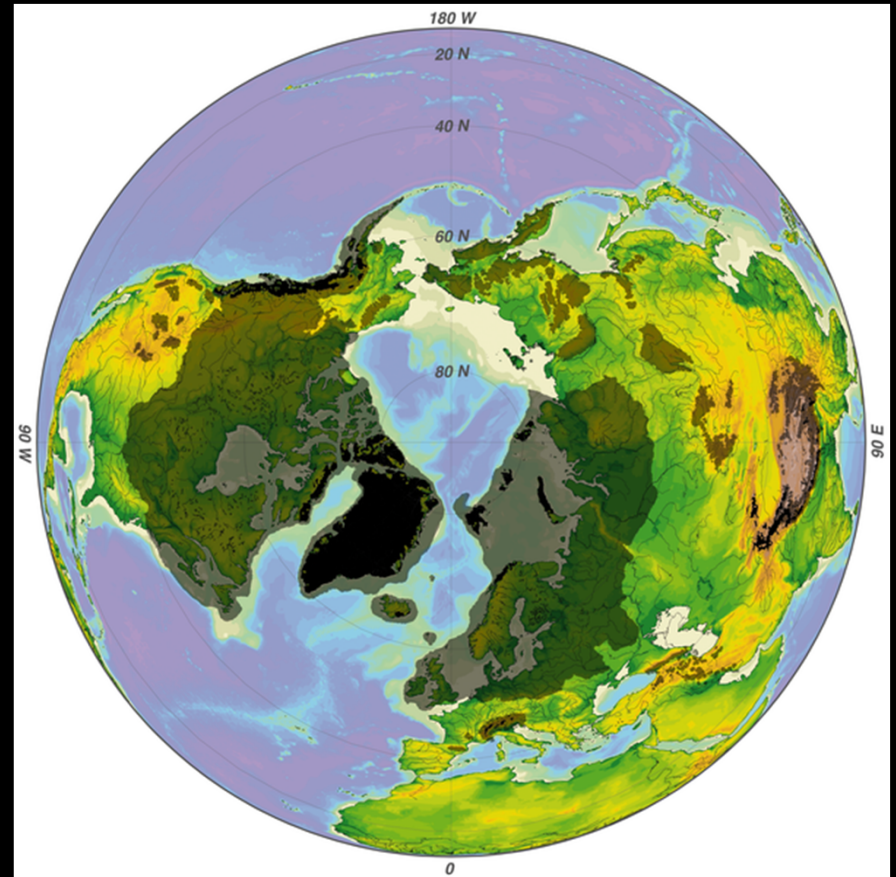
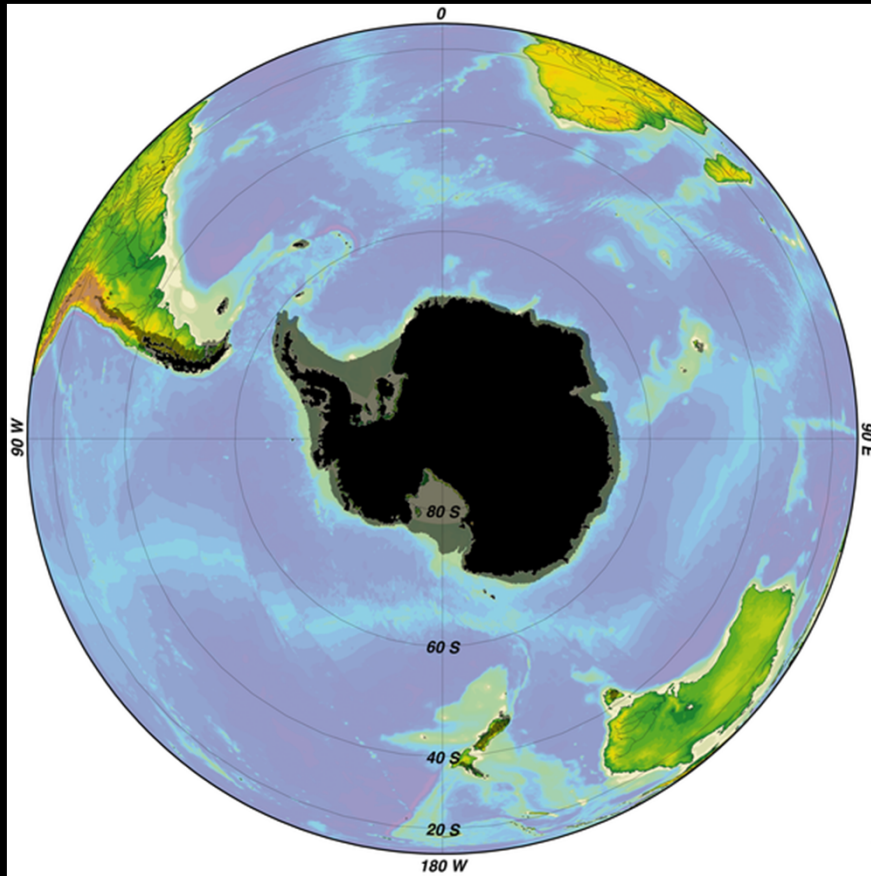


Glacial Geomorphology

Last Glacial Maximum



Last Glacial Maximum Eurasia

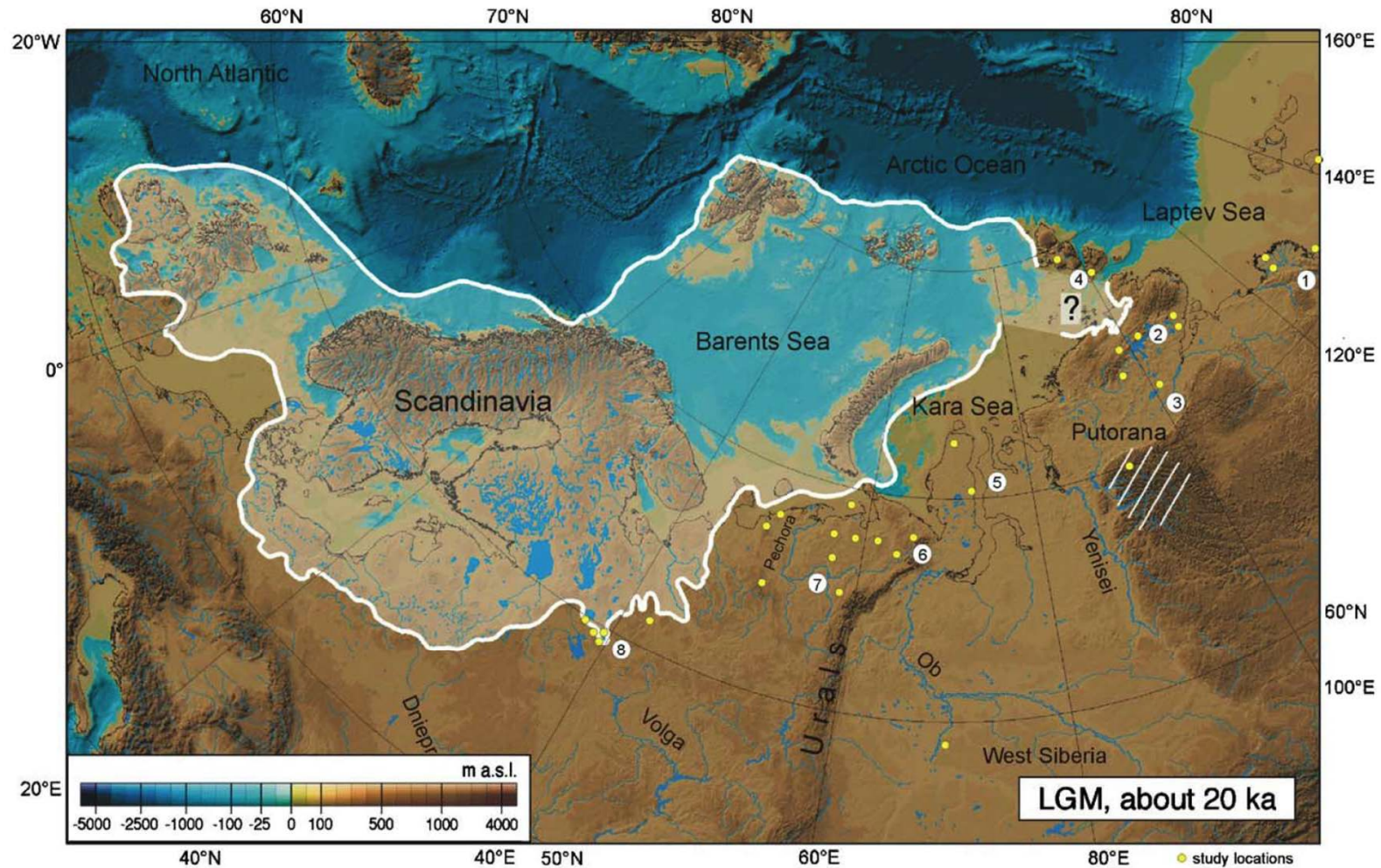


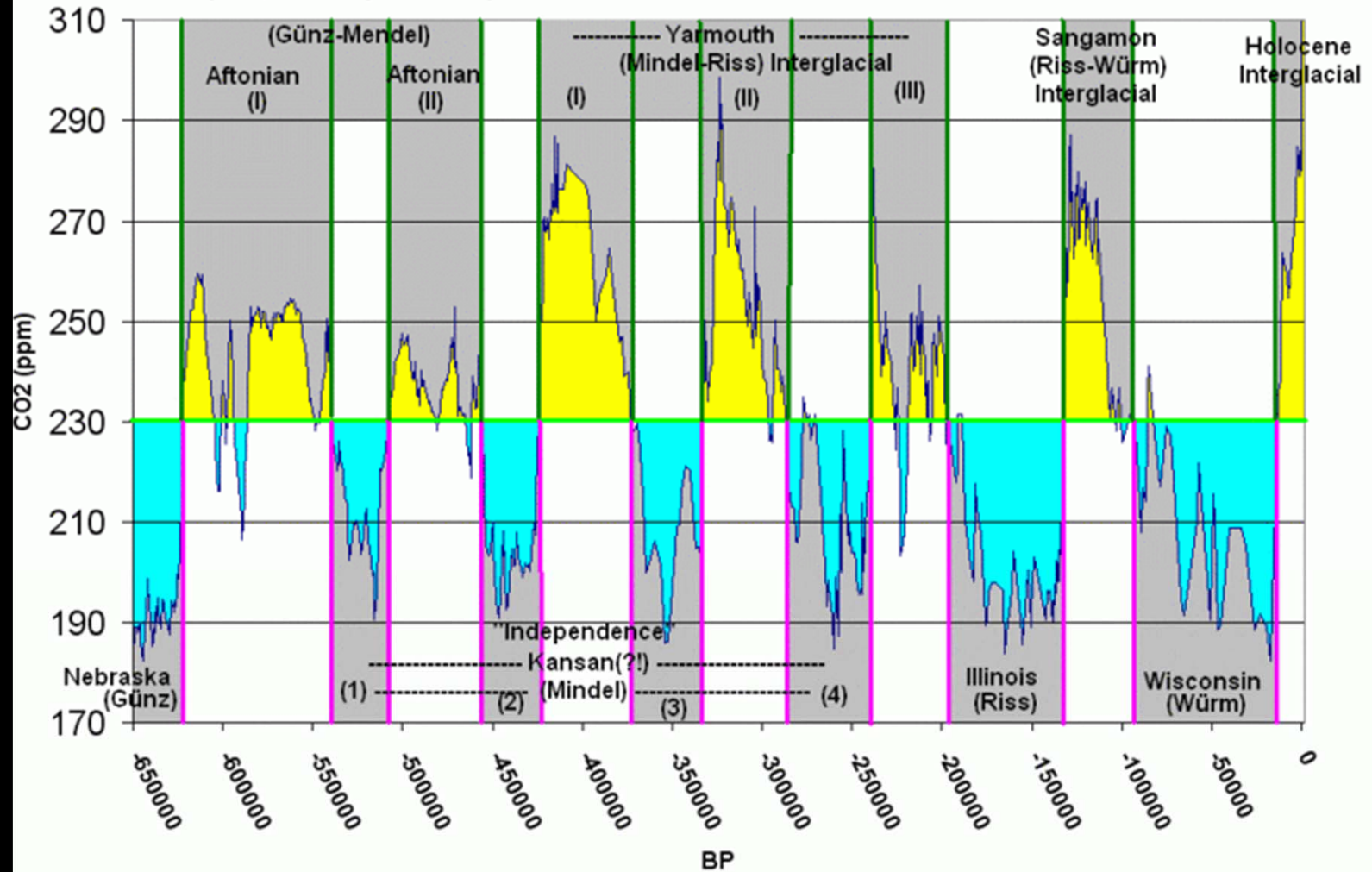
Fig. 1. Map showing the LGM Eurasian Ice Sheet according to Svendsen et al. (2004b), with the numbered working areas described in the text. (1) Laptev Sea Coast and Bykovsky Peninsula, (2) Central Taymyr Peninsula, (3) SE Taymyr Peninsula, Labaz Lake Region, (4) Severnaya Zemlya Archipelago, (5) West Siberia and Yamal Peninsula, (6) Ural Mountains, (7) Pechora Lowland, and (8) NW Russian Plain.

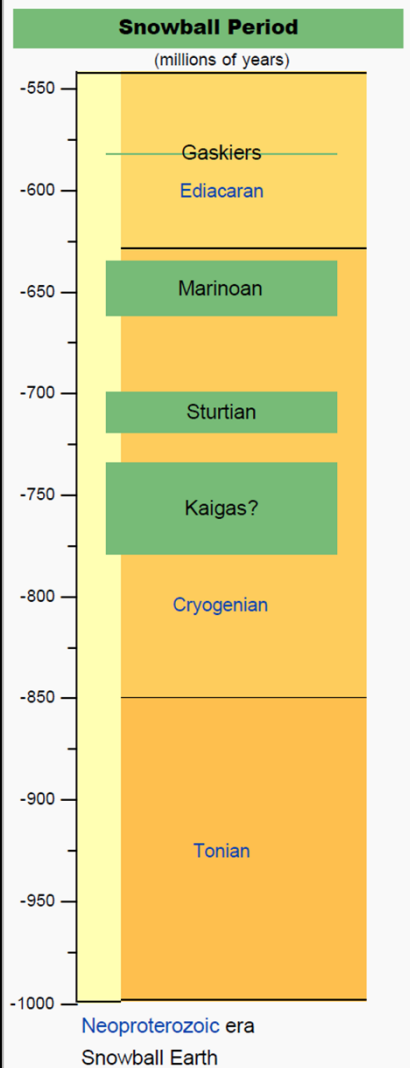
Late Pleistocene: Atmospheric CO2 and the Glacial cycles

(650,000 - 0 years BP)

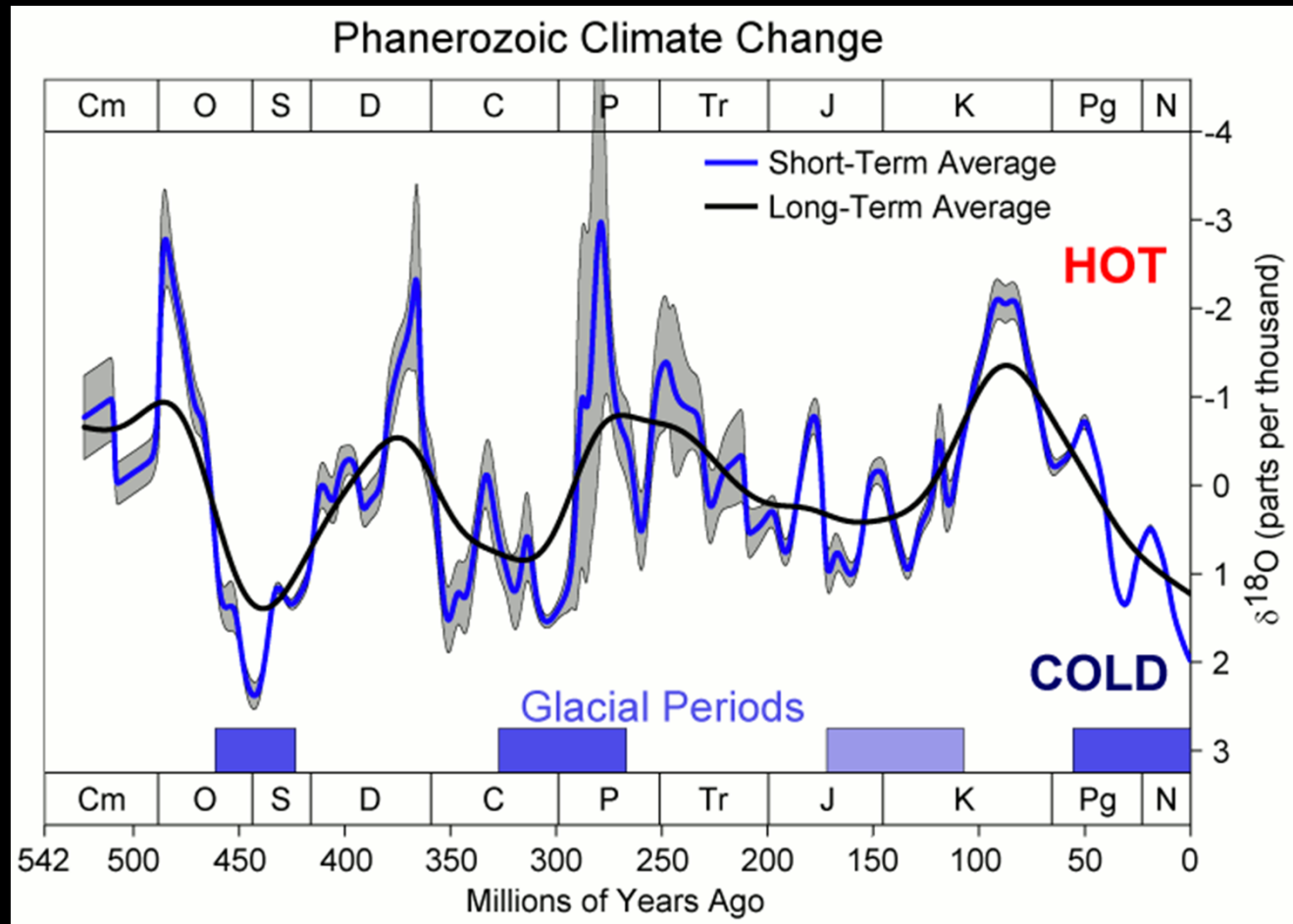
(ppm)

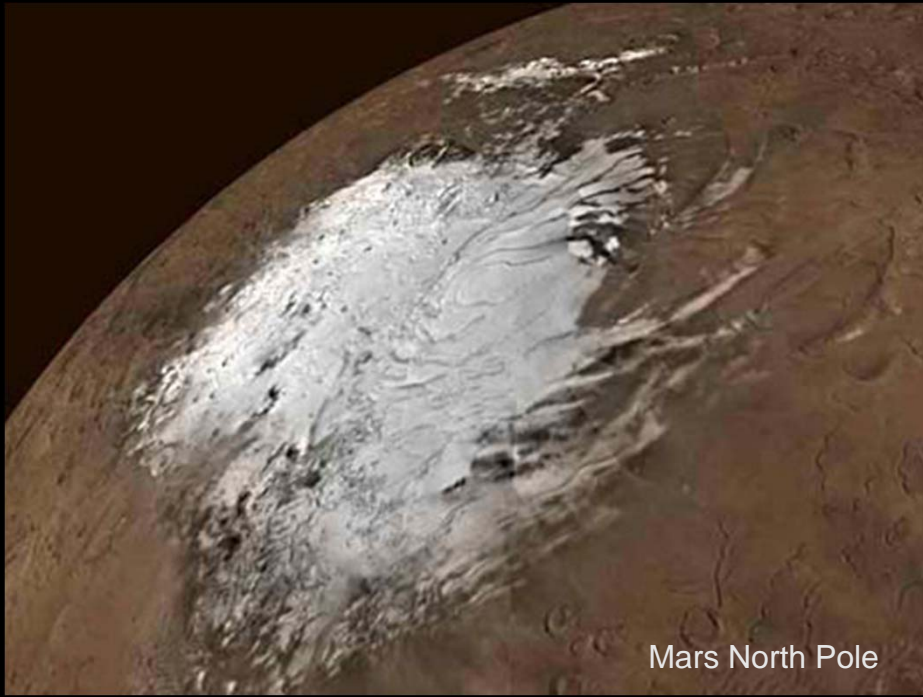
N.American & (Alpine) names



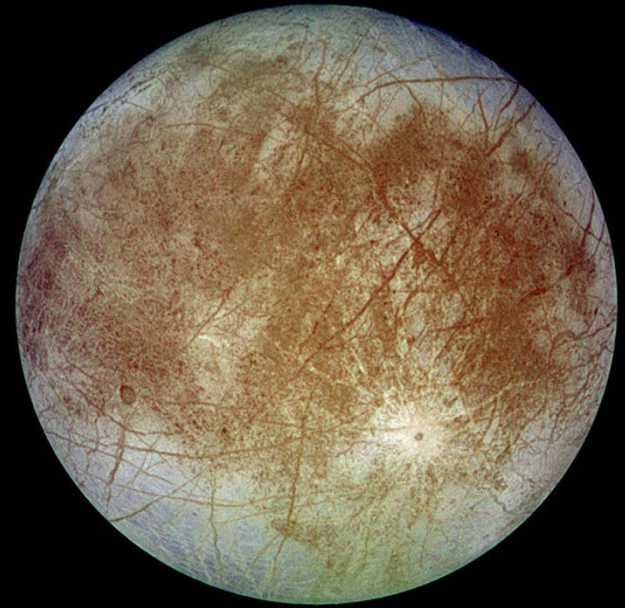


A recent estimate of the timing and duration of Proterozoic glacial periods. Note that great uncertainty surrounds the dating of pre-Gaskiers glaciations. The status of the Kaigas is not clear; its dating is very insecure and many workers do not recognise it as a glaciation. From Smith 2009.^[1]





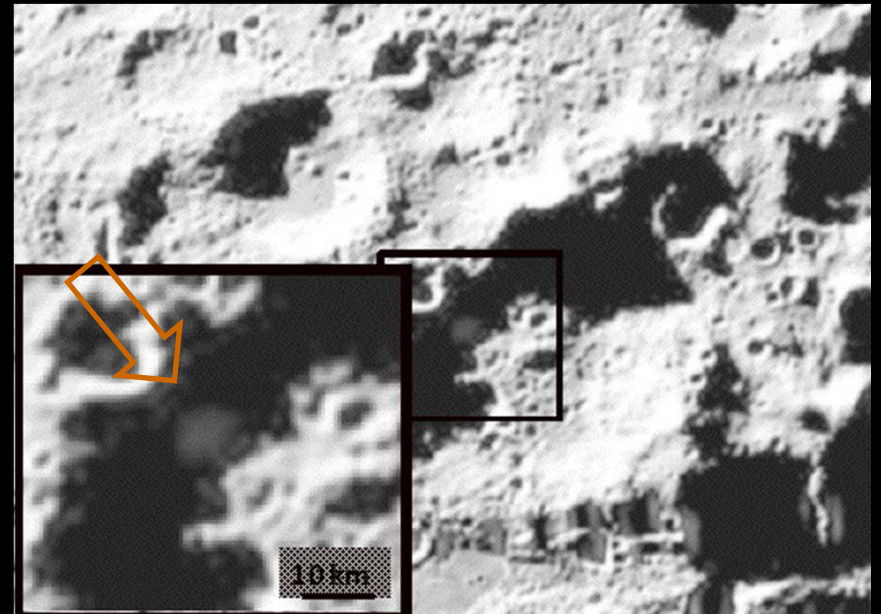
Mars North Pole



Europa, moon of Jupiter



Comet Hartley 2



Icy plume of the Moon's south pole

The relevance of Glaciers

Climatic Indicator: past and present

Landscape Modification



Information in the ice



The relevance of Glaciers

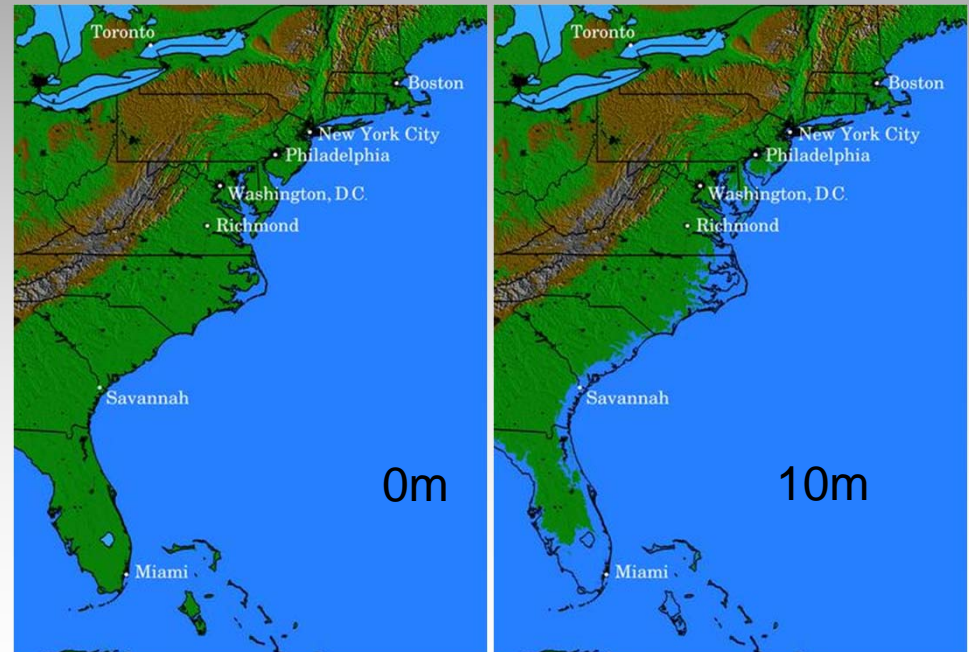
Water Flow: Frozen Reservoirs

Alpine Streams



Robert Stallard

Global Sea Level Rise



Dave Pape

The relevance of Glaciers

Hazards:

Outburst Floods



Vatnajokull, 1996

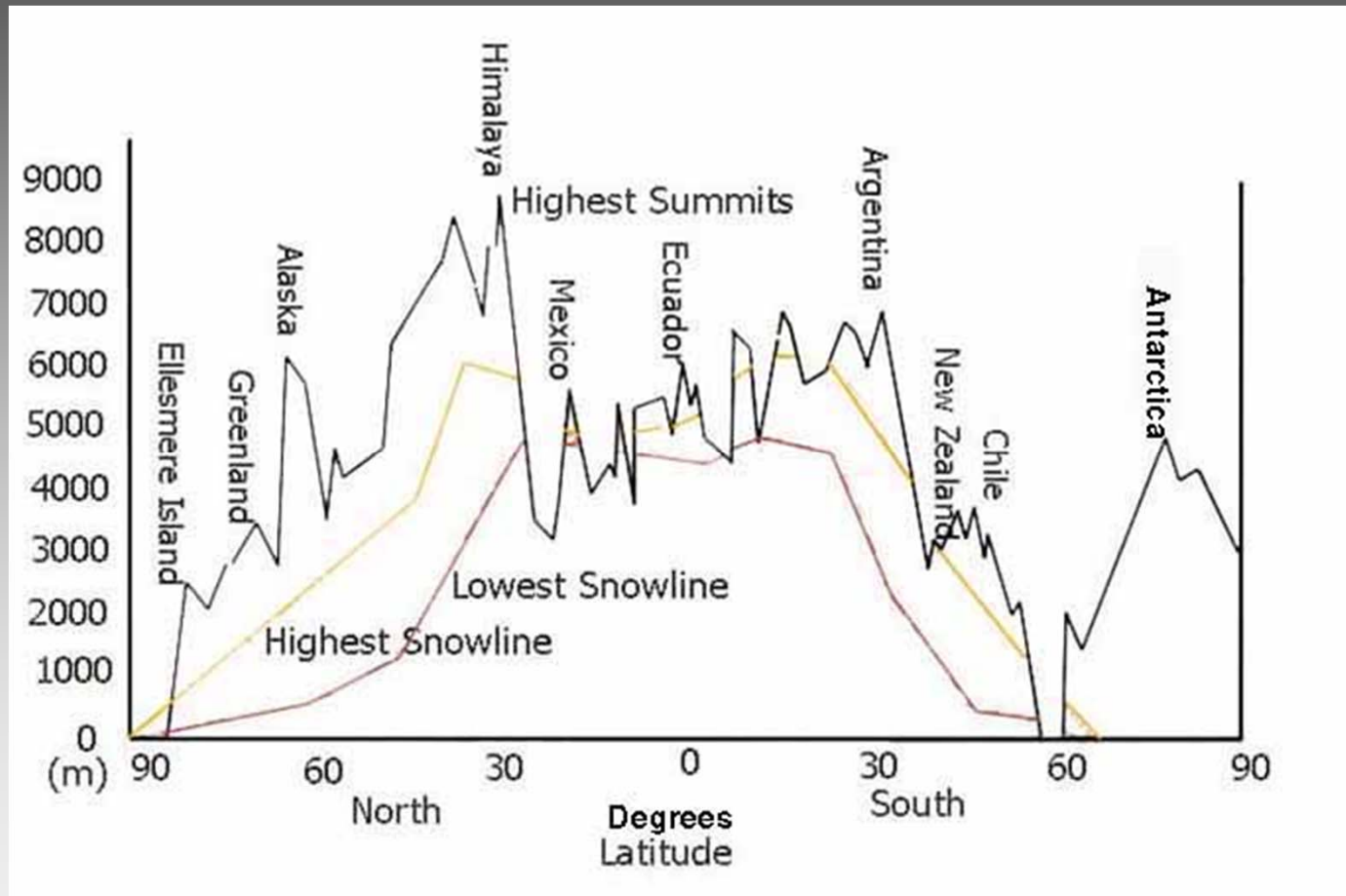
Debris Flows



White Glacier, Mt. Hood

The relevance of Glaciers

Landscape Change

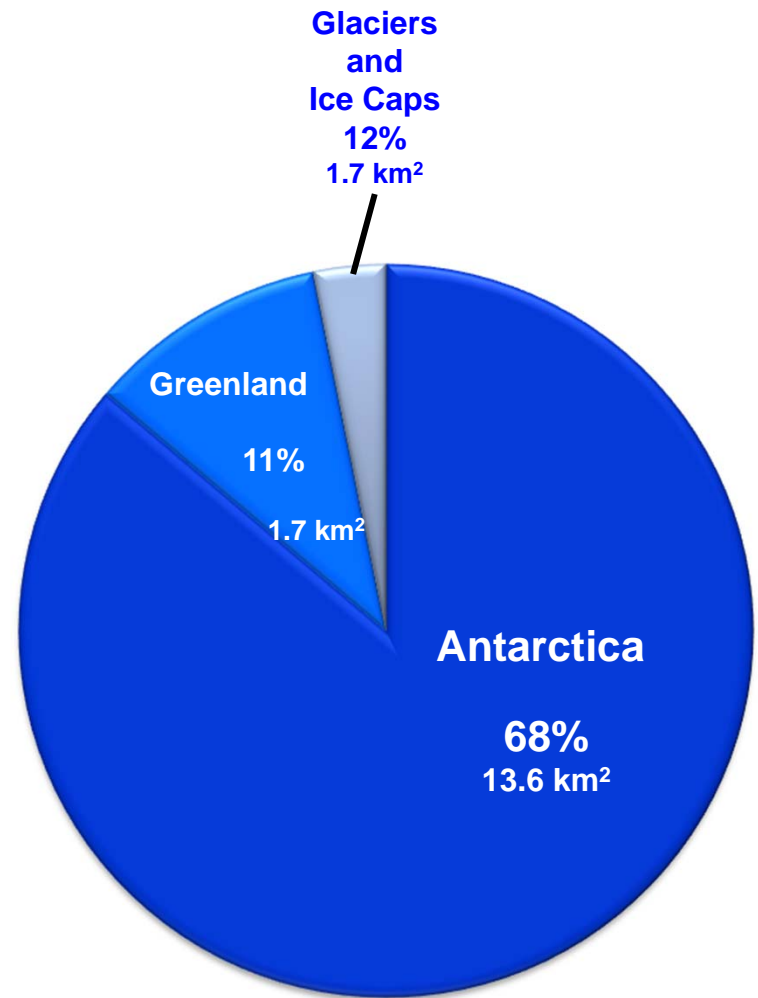
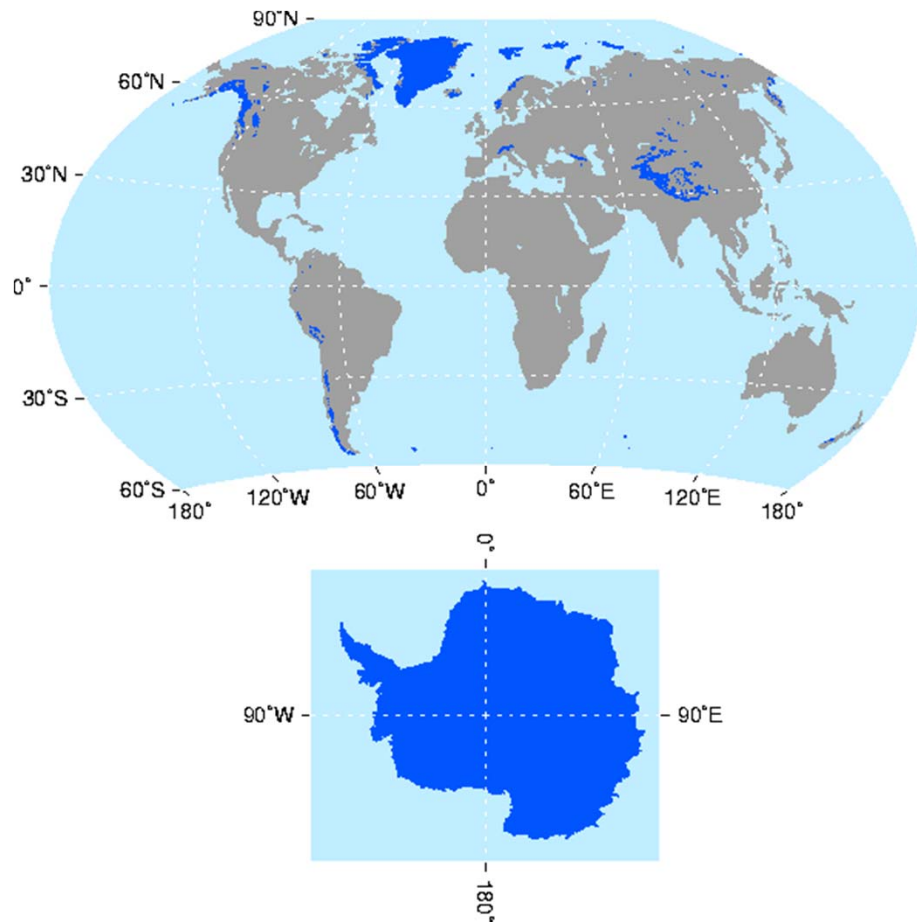


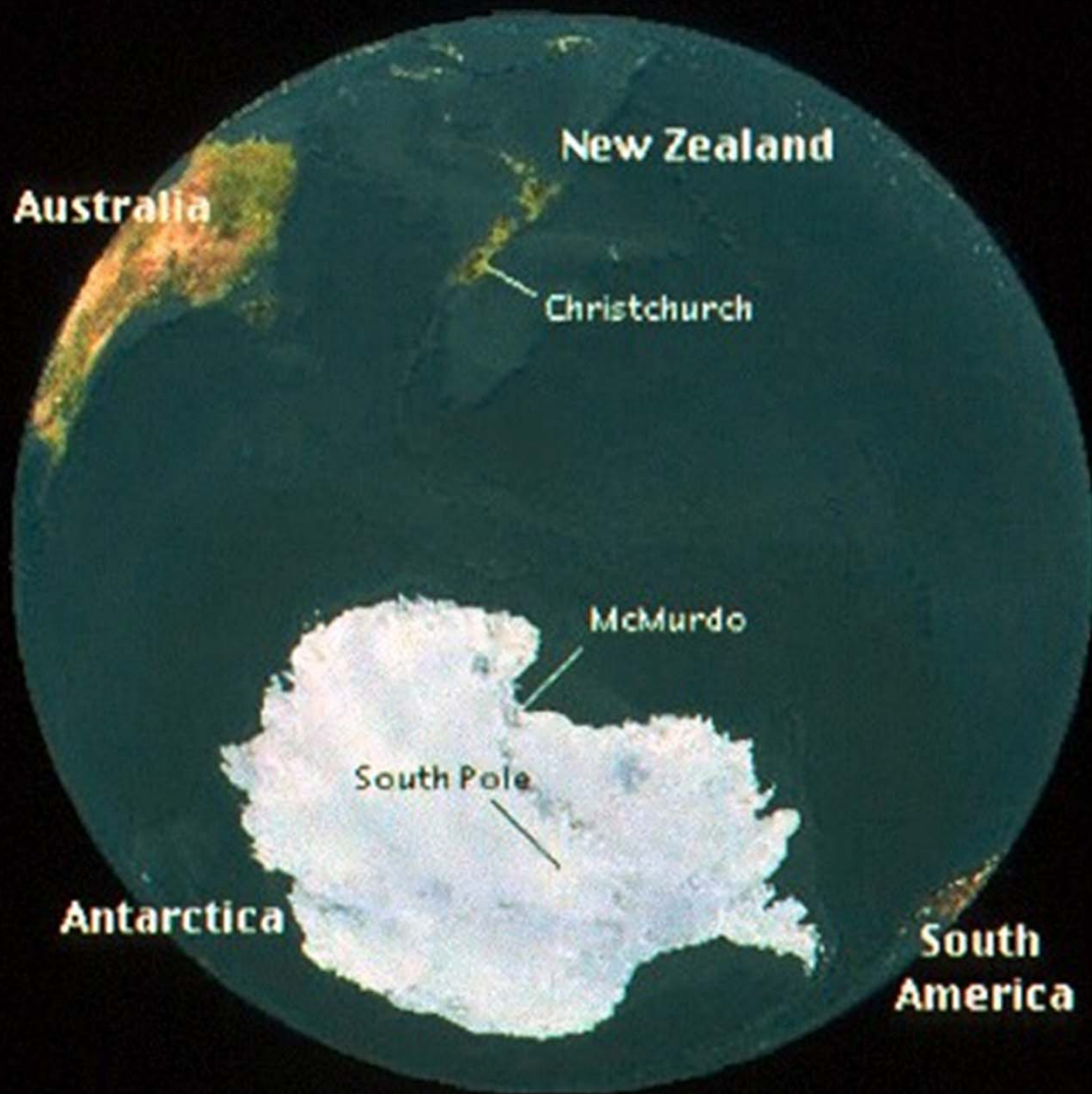
Ives and Barry, 1974

THE GEOGRAPHY OF GLACIERS

A whirlwind tour

(if its slide 39, it must be Alaska)





Australia

New Zealand

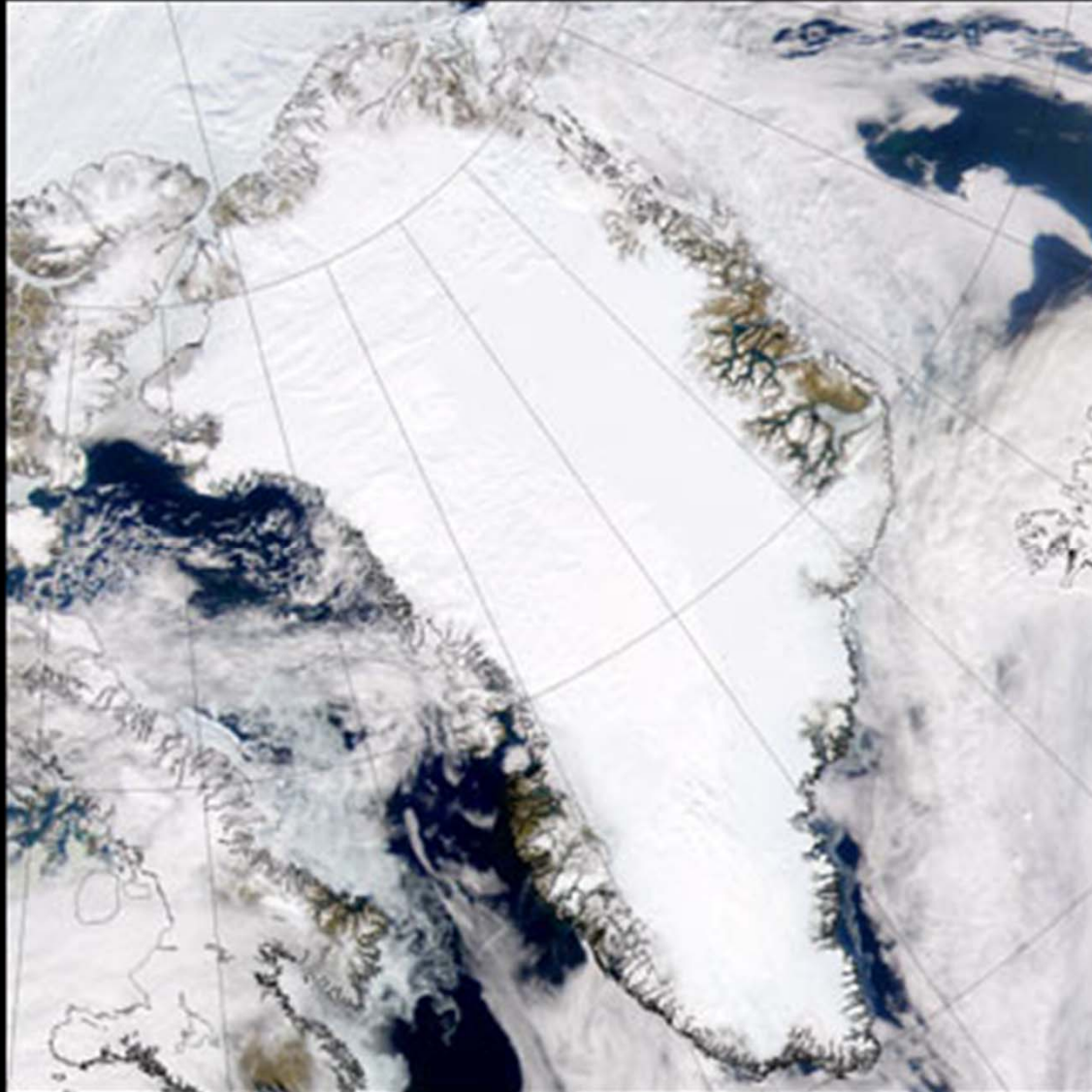
Christchurch

McMurdo

South Pole

Antarctica

**South
America**

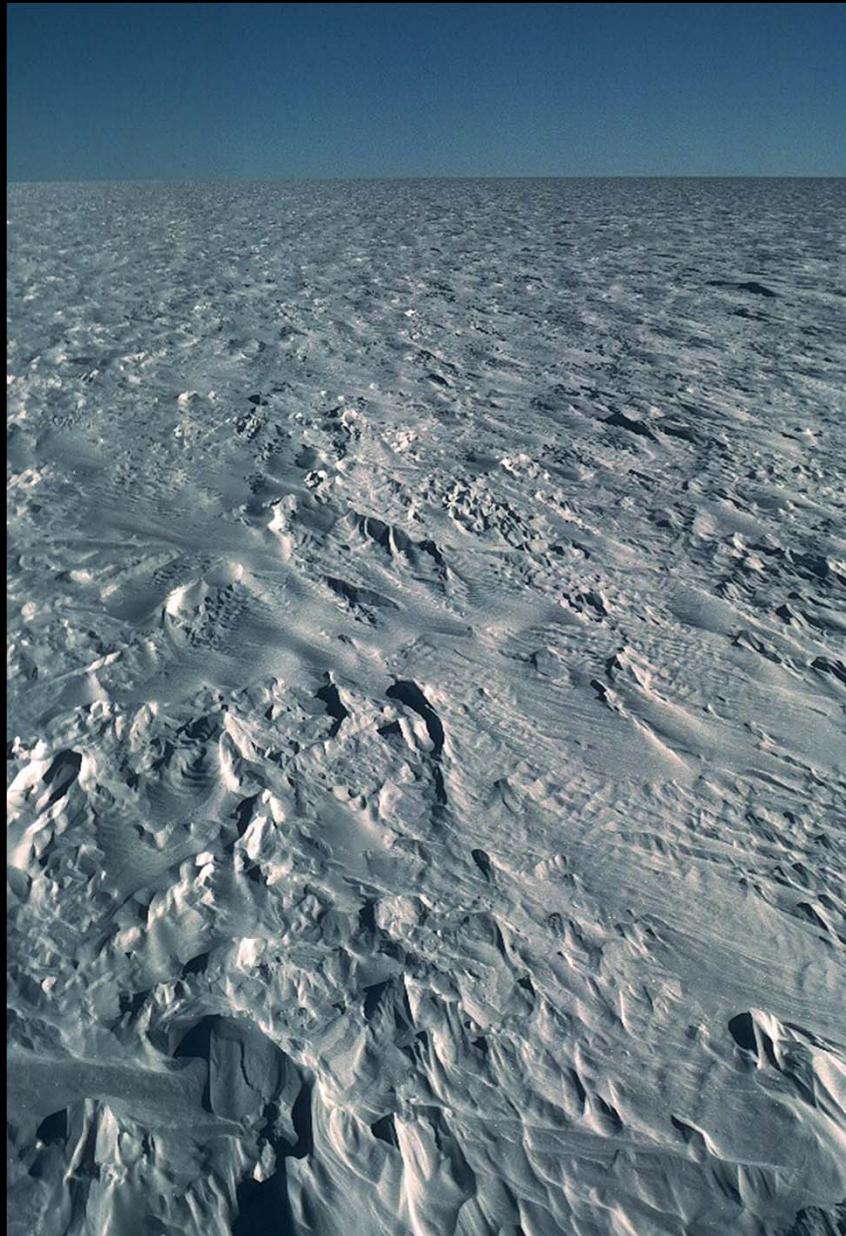


Greenland NASA

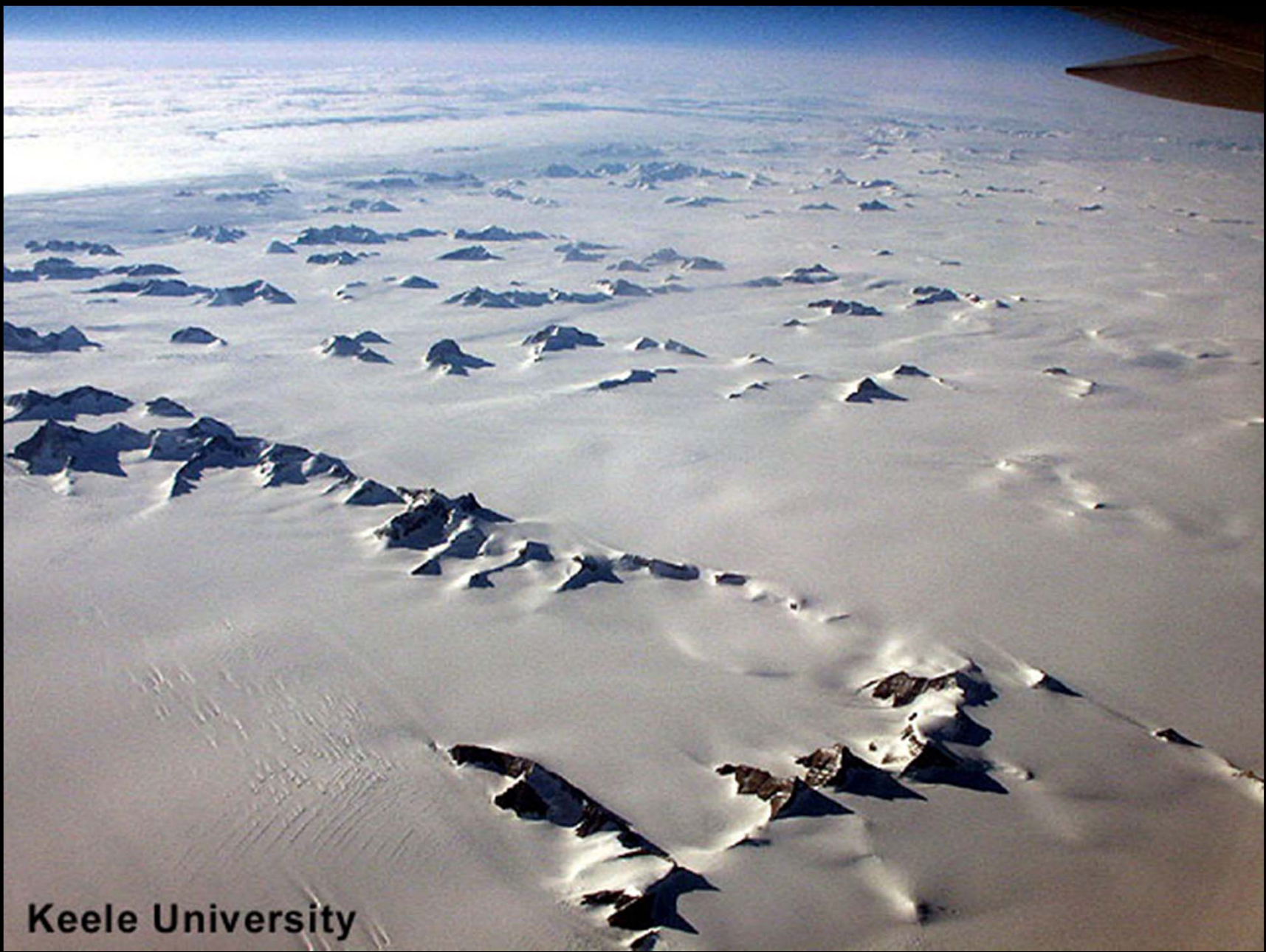
**COMPARATIVE SIZE
ANTARCTICA AND THE U.S.**



DPP 77-1211
9-15-77



South Pole
Antarctica



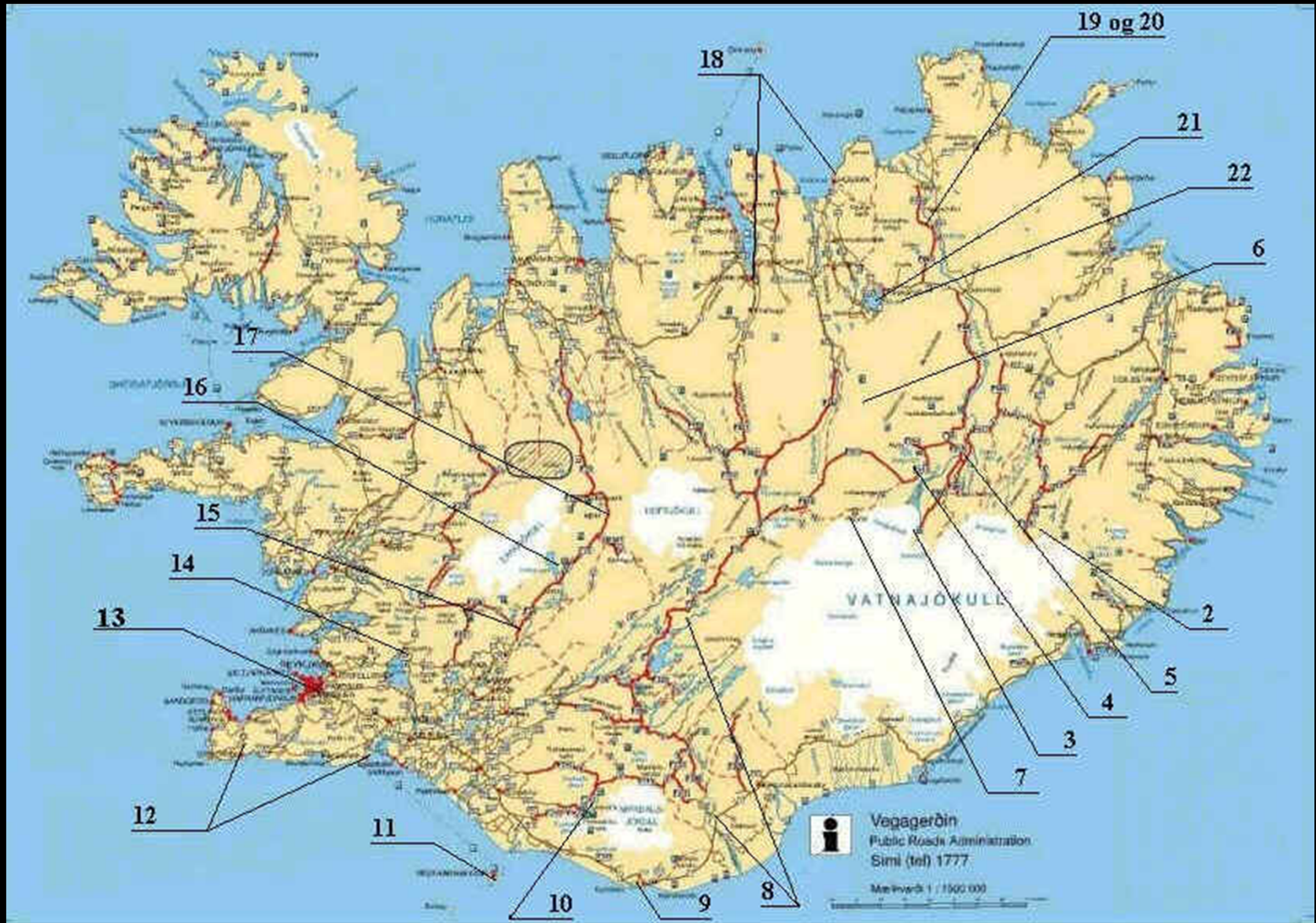
Keele University

Greenland



Juneau Ice Field







FOTOGRAFIE: GHIACCI

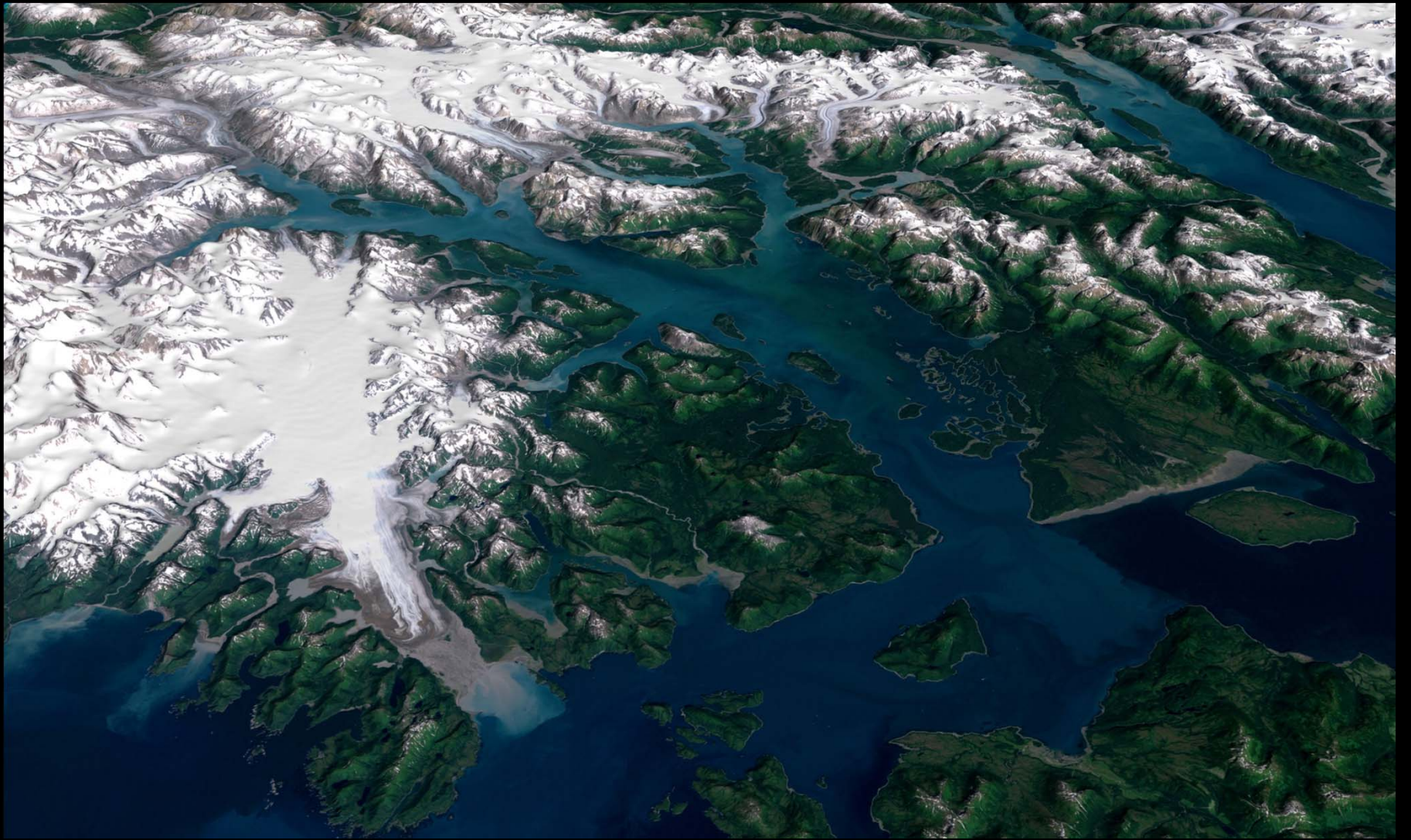


Juneau IceField



Juneau ●

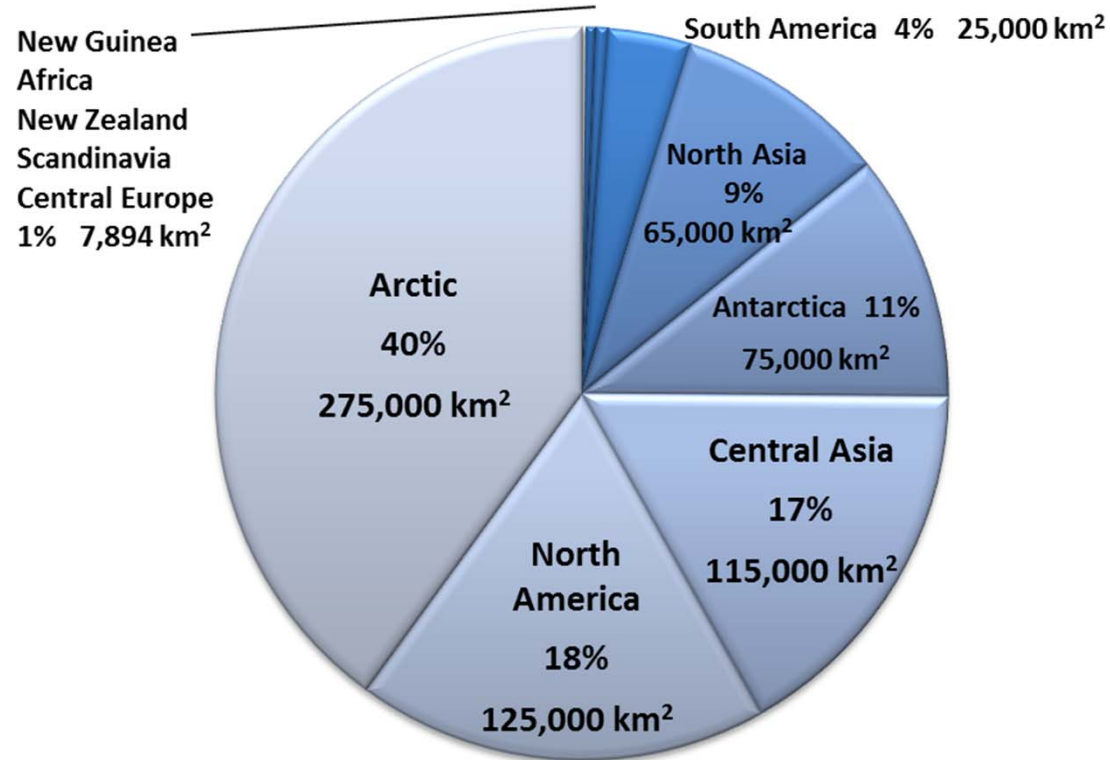
Nate Atwood, Oregon State Univ



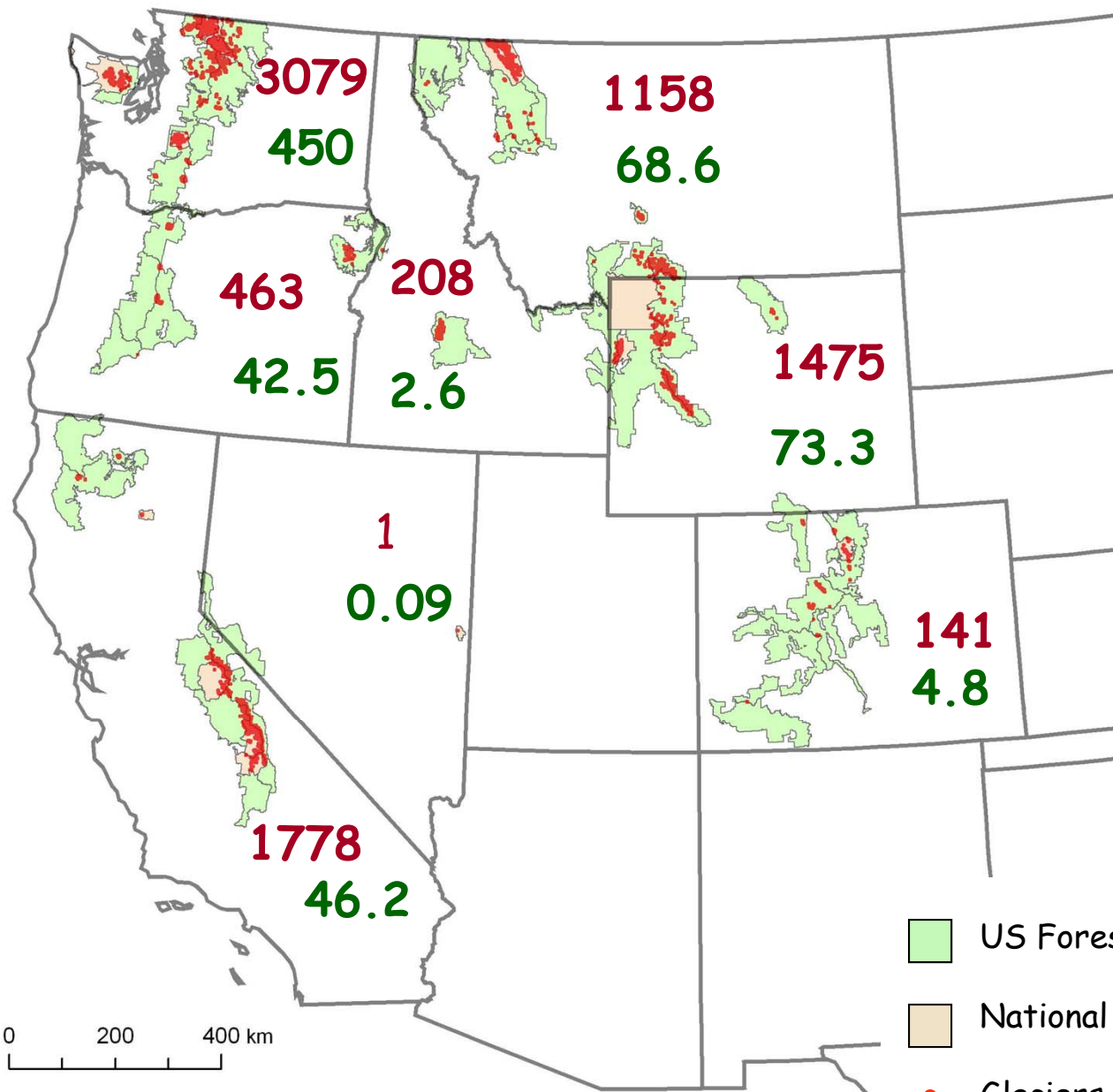
Glacier Bay, Alaska

NASA Modis/DEM

Glaciers and Ice Caps

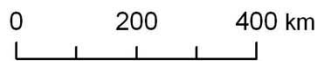




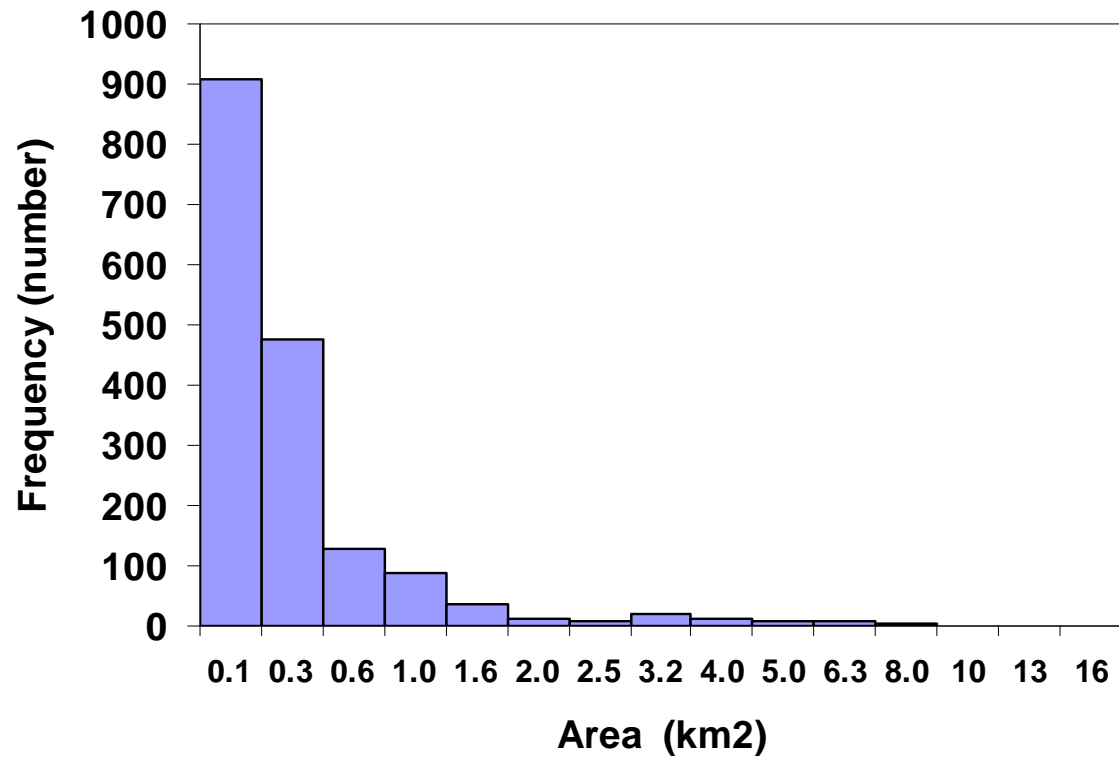


8303 glaciers
688 km²

- US Forest Service lands
- National Park Service lands
- Glaciers



GLACIERS of the American West





Mount Jefferson, Three Sisters, OR



Mount Hood, Oregon



Mount Adams, WA



Shoestring Glacier Mount Saint Helens



A new glacier Mount Saint Helens





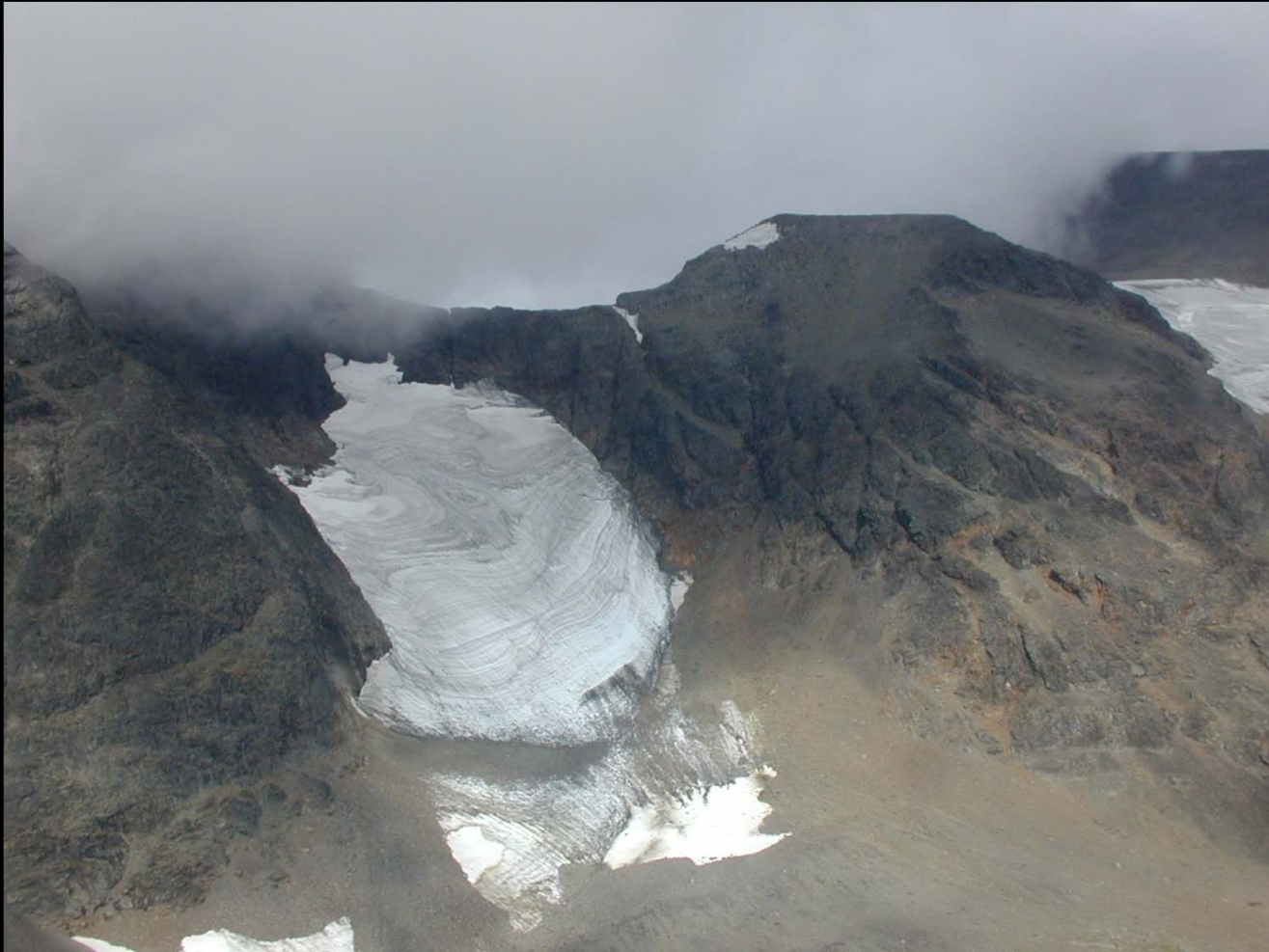
Mount Rainier, WA



Middle Cascade Glacier, WA



Andrews Glacier, CO



Sweden



Storglaciären, Sweden



Axel Heiberg Island Jurg Alean

Kennicott
Glacier, AK





Black Rapids Glacier, AK

Austin Post



Columbia Glacier, AK

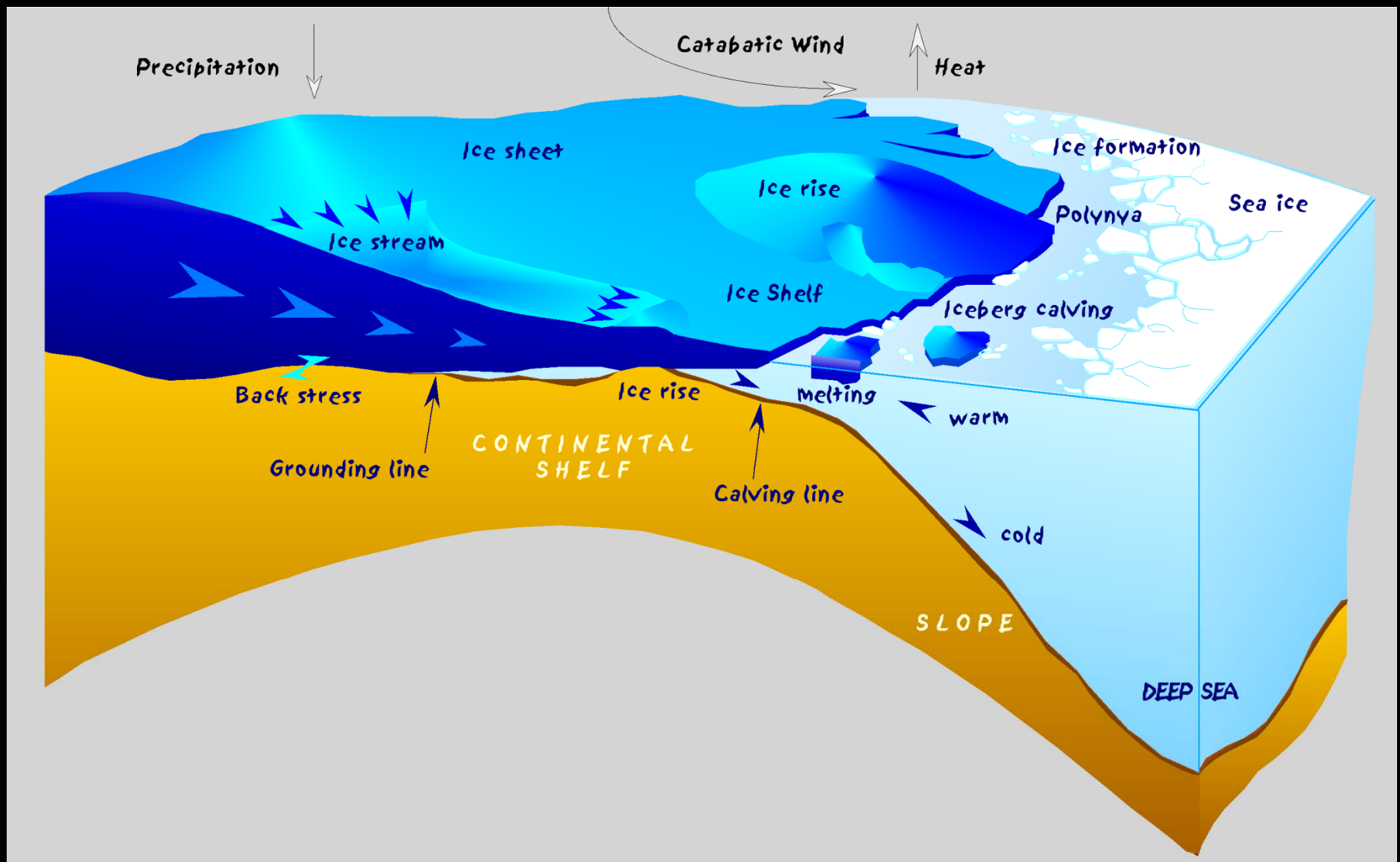


Columbia Glacier, AK

Breiðamerkurjökull, Iceland



Keele University



Ice Sheet - Ice Shelf

Edge of the Ross Ice Shelf



Image ID: corp2399, NOAA Corps Collection

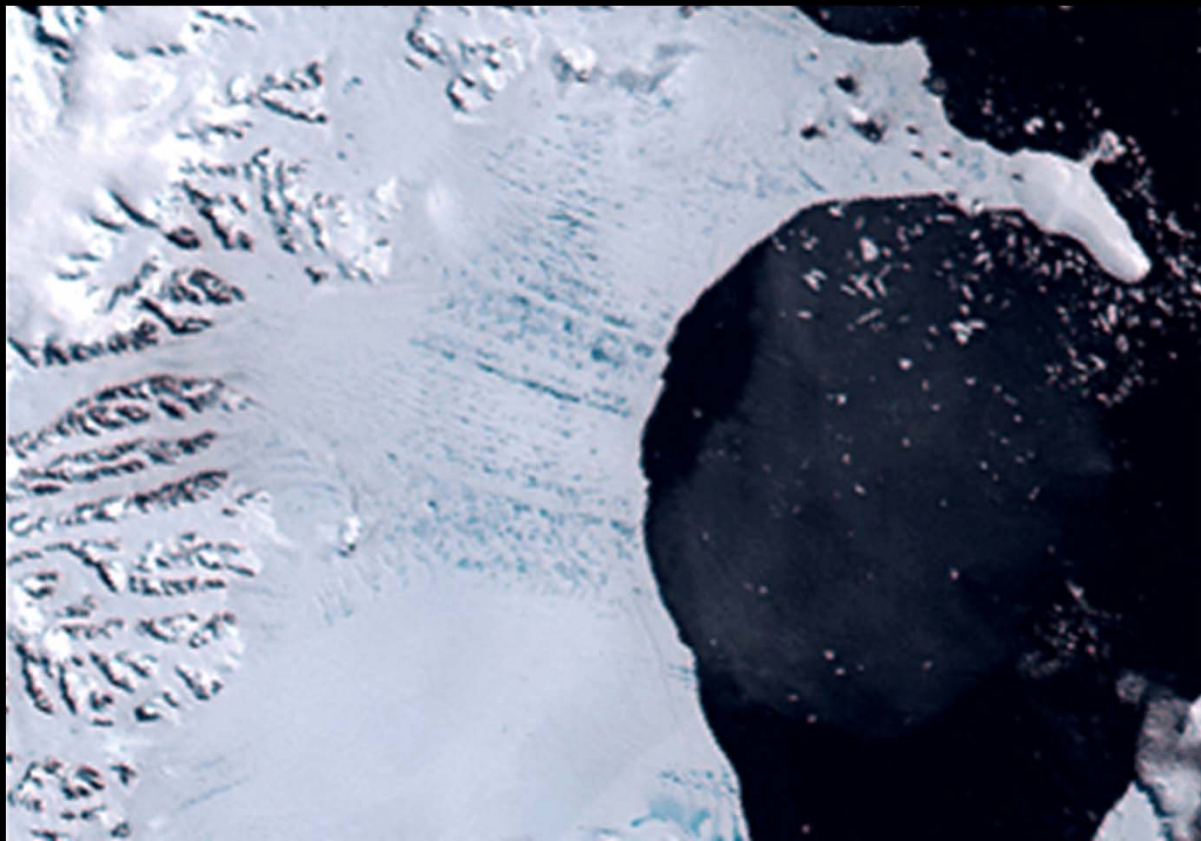
Photo Date: 1996 December

Photographer: Michael Van Woert, NOAA NESDIS, ORA



Larsen B Ice Shelf

Animation of Larsen B breakup, 31 January to 7 March 2002



Area of ice lost greater than the State of Rhode Island
Movie compiled by Ted Scambos, CIRES

McMurdo Dry Valleys





Taylor Glacier, Antarctica



Commonwealth Glacier, Antarctica
Bruce Vaughn



Where, what, how?

...find the terminus



Little Tacoma Glacier, Mount Rainier (debris-covered)





Rock Glacier, Atlin, BC

What is a glacier?

Definition:

A perennial body of snow or ice that moves.

How can you tell movement?

Where are the glaciers?

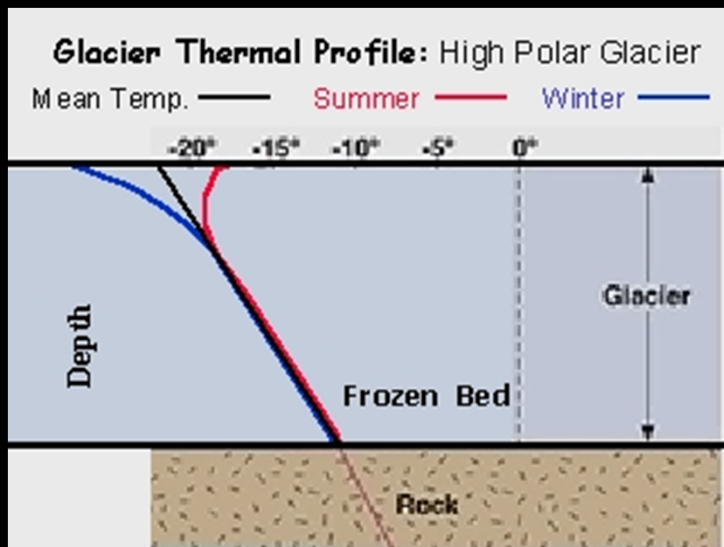


What are the conditions for glacier formation?

Where snow gain exceeds ice and snow loss.

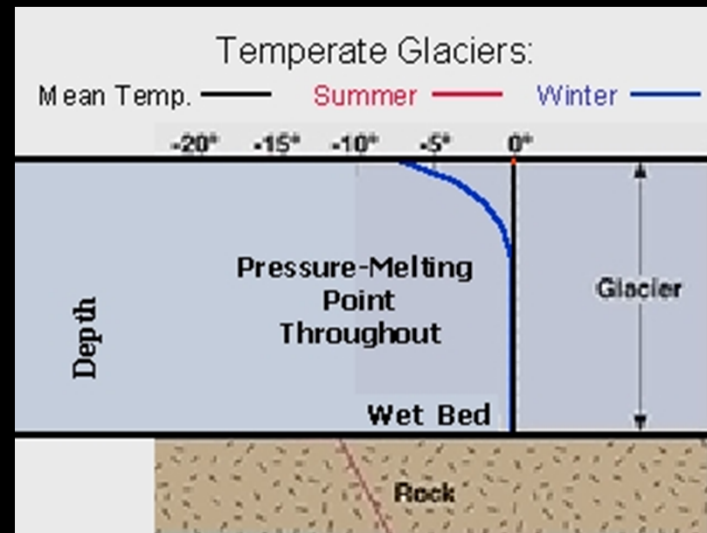
Types of Glaciers

1. Topographic	Alpine Valley Cirque	Ice Sheet Ice Cap Ice Shelf	Tidewater
2. Dynamic	<i>Surging</i> "Normal" Ice Stream		
3. Climatic	Polar Temperate Tropical	Continental Maritime	
4. Temperature	Cold, Warm, Polythermal		
5. Composition	Rock, Debris-covered, Salt		

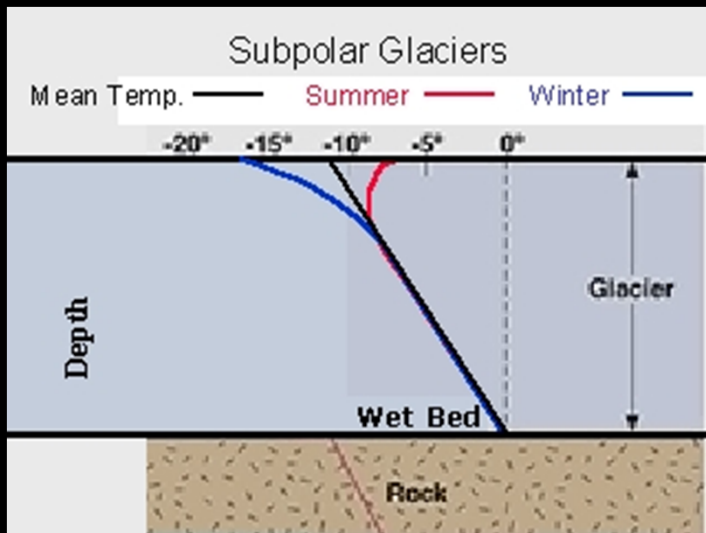


Cold

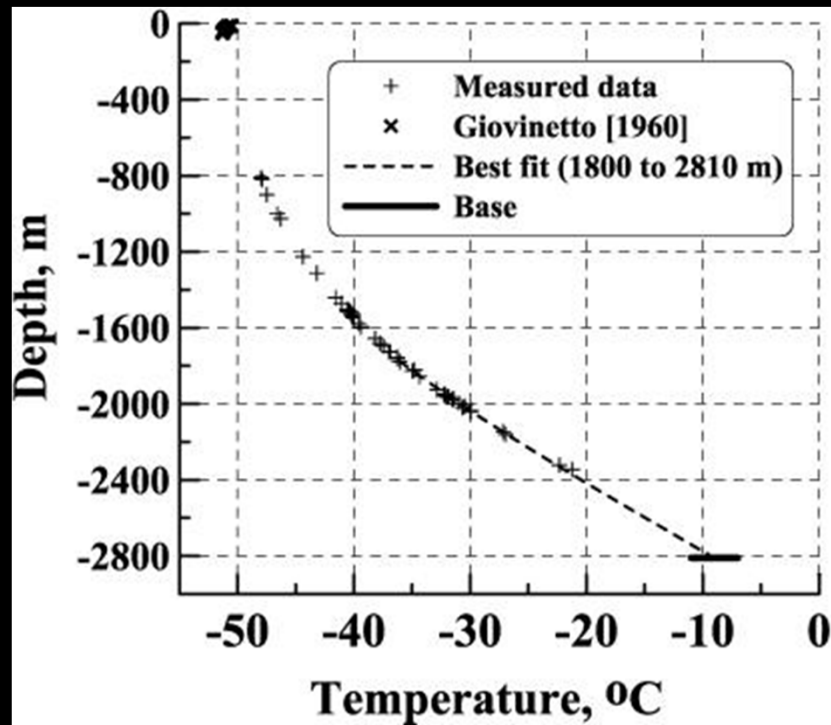
Thermal Classification



Warm



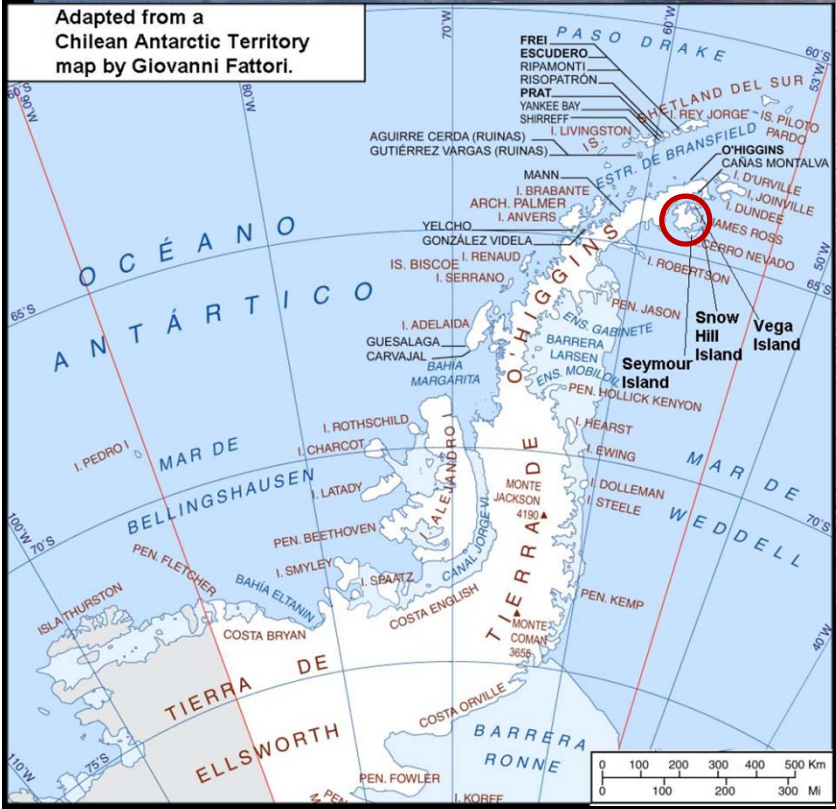
Polythermal



1. Where is this?
2. What kind of glacier
- based on thermal properties



Adapted from a Chilean Antarctic Territory map by Giovanni Fattori.



2. What kind of glacier is it?

Mike Hambrey

end