Glacial Geomorphology
Last Glacial Maximum
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.
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 2008.\cite{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

Global Sea Level Rise

Robert Stallard

Dave Pape
The relevance of Glaciers

Hazards:

Outburst Floods

Debris Flows

Vatnajokull, 1996

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)
Antarctica: 68% 13.6 km²
Greenland: 11% 1.7 km²
Glaciers and Ice Caps: 12% 1.7 km²

Map: NSIDC
Data from: http://www.grid.unep.ch/glaciers/img/tab3-1.jpg
COMPARATIVE SIZE
ANTARCTICA AND THE U.S.
Keele University
Greenland
Juneau Ice Field
FOTOGRAFIE: GHIACCI
Juneau IceField

The Juneau Icefield

Nate Atwood, Oregon State Univ
Glacier Bay, Alaska       NASA Modis/DEM
Glaciers and Ice Caps

Data from: http://www.grid.unep.ch/glaciers/img/3-7.jpg
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
A new glacier Mount Saint Helens
Mount Rainier, WA
Sweden
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
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
Taylor Glacier, Antarctica
Commonwealth Glacier, Antarctica
Bruce Vaughn
Where, what, how?  …find the terminus
Little Tacoma Glacier, Mount Rainier (debris-covered)
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

2. **Dynamic**
   - *Surging*
   - "Normal"
   - Ice Stream

3. **Climatic**
   - Polar
   - Temperate
   - Tropical

4. **Temperature**
   - Cold, Warm, Polythermal

5. **Composition**
   - Rock, Debris-covered, Salt
Thermal Classification

Cold

Polythermal

Warm

J.S. Kite, WVU
1. Where is this?

2. What kind of glacier
   - based on thermal properties
2. What kind of glacier is it?  

Mike Hambrey