Physical Geography II of the United States and Canada

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Shaping of North America

- The **chief shaper** of the landscape of North America is and has been **running water**.
- **Glaciation is the second most potent shaper of the landscape of N.America**.
- A **glacier** is a large naturally occurring mass of ice on land that moves in response to gravity.

The Ice Age

- **An ICE AGE** refers to any period in the past when large portions of Earth's surface were covered by glacial ice**.**
- They are associated with periods of global cooling.
- Ice ages come and go in 100,000 year intervals.

The Last Ice Age

- The **PLEISTOCENE EPOCH** began 1.6 mya.
- During the Pleistocene, there were numerous ice ages as climates grew colder during periods of global cooling.
- The last advance of ice in North America was during the **WISCONSINAN STAGE** of the **LAURENTIDE ICE SHEET**. It was centered over Hudson Bay.
- This period ended 15,000-18,000 years ago.

(The Greenland and Antarctic ice sheets are remnants of the last Ice Age.)

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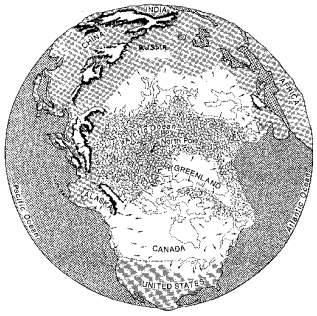
Pleistocene Polar Ice Cap



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Continental Ice Sheet

Extent of the North American continental glacier about 18,000 years ago.

The core (thickest point) of the North American ice sheet was centered over Hudson Bay.

Greenland Ice Sheet

Most of Canada looked like this during the Ice Age.

Ice in the central areas is between 1.25 - 2 miles thick.

Glaciers

- **There are two types:**

  CONTINENTAL GLACIERS originate on fairly flat expanses and tend to be very large. They expand outward from a core area.

  ALPINE GLACIERS originate on mountain tops and flow downhill. They tend to be relatively small.
- Both are created when the amount of snowfall exceeds melting.

Glaciers at Work

Glaciers transform a landscape by …

- Crushing rock in its path.
- Moving the soil somewhere else.
- Creating landforms that are products of erosion (removal of earth and rock material).
- Creating landforms that are products of deposition (the laying down and accumulation of earth and rock material that was previously eroded elsewhere).

Glacial Dynamics

1. **Ice sheets** move away from their zones of accumulation and push forward in sections **(lobes)** under the pressure from their weight (called **plastic flow**).

   They also move down slope by slippage as the weight of the ice melts its lowest levels and acts as a lubricant.
2. The **ice front** **or forward edge of the ice sheet** acts as a "bulldozer" or "snow plow".

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Glacial Dynamics (cont'd)

3. All this material, called **debris,** is mixed with the ice as it moves forward and down slope.
4. **Moraines** (**unsorted glacial debris**) are created.
5. The **furthest advance of the ice** is marked by a ridge of glacial material called the **terminal moraine** **(or end moraine).**

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Glacial Dynamics (cont'd)

6. The "**retreat**" of a glacier is the melting of the ice front, creating the *illusion* that the glacier is moving backward. **(It melts in place, not backwards.)**
7. As the ice melts, the material it picked up is exposed and dropped in place, creating a variety of **glacial features**.
8. A **recessional moraine** is a **low ridge of unsorted glacial material** marking the position of the ice front's advance **after** a period of retreat.

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Glacial Dynamics (cont'd)

9. **Outwash** is **melt water** that flows from the leading edge of the glacier. It carries debris which is sorted by the moving water and deposited in front of the moraines.

10. An **outwash plain** is a **landform feature created by outwash**. It ranges is thickness from several feet to several hundred feet.

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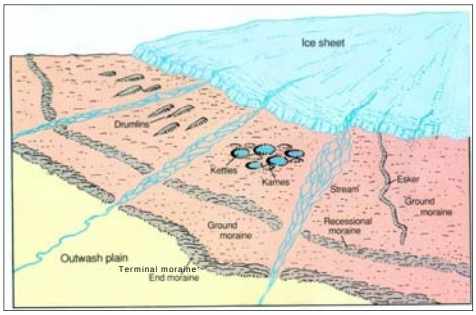
Glacial Deposition Landscape



Mountain Glaciers

- **In a mountainous area, snow and ice collects at the highest elevations.**
- **The pressure of the mass of ice moves it down a valley under the force of gravity.**

Unique features are created:

- Cirques
- Lateral and medial moraines
- Arêtes
- U-shaped valleys
- Horns
- Hanging valleys

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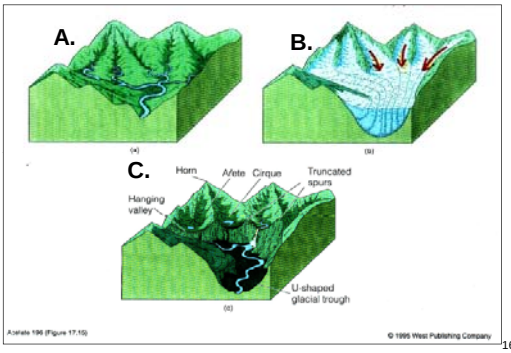
Glacial Features of Mountains



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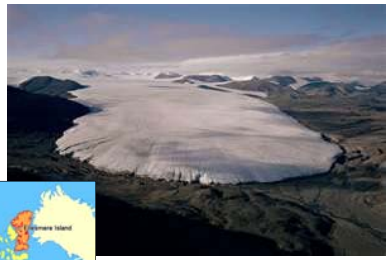
Alpine Glaciers

Two glaciers join in Kluane NP, Yukon Territory, creating a medial moraine.

Salmon Glacier with lateral moraines, British Columbia

Piedmont Glacier
Ellesmere Island, Canada



Tongue of ice (lobe) coming from an Ellesmere Island glacier.

Glacial Features
near Hudson Bay on the Canadian Shield

1. Bog (spongy ground with shallow lakes), Manitoba
2. Kettle lakes, NWT
3. Erratic, NWT

Glacier carved U-shaped Valley

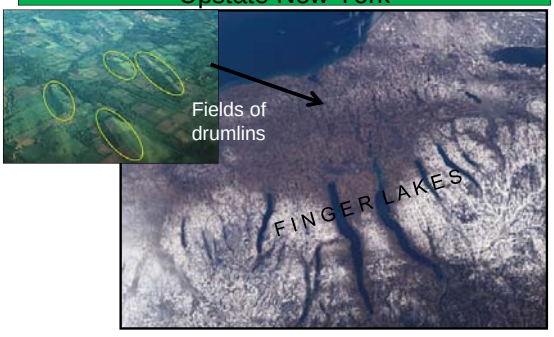
Half Dome
Yosemite National Park, CA

- Half Dome is a granitic structure that towers above Yosemite Valley, a U-shaped valley.
- A glacier sheered away half of the dome during the last Ice Age, creating a north-facing cliff.
- (Hence, the logo for *North Face* corporation!)

Glacial Grooves
Central Park, NY

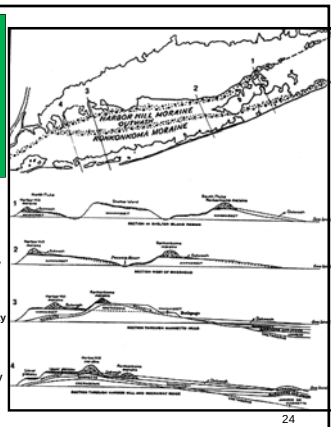
HC GEOL 101 field trip to Central Park

The Finger Lakes and **Drumlin Fields**
Upstate New York



Glacial Features
(moraines and outwash)

Long Island, NY



Fjord

- A **FJORD** is a narrow deep water inlet of the sea flanked by cliffs or steep slopes.
- It was created by the erosion of a valley by glacial ice to a point below sea level.
- The valley was flooded as sea level rose during the post-glacial period.

Examples of fjorded coasts in N. America:

- The Alaskan panhandle
- The coast of mainland British Columbia
- The western coast of Vancouver Island
- Coastlines of Newfoundland and Labrador
- Inlets along Maine's coast
- The lower Hudson River valley

Fjords
Alaska

College Fjord