

Erosion and Glaciers

- In this lesson you will:
- 1.4.1 Define the terms outwash plain, terminal moraine, erratic, drumlin, and esker.
(k)

When was the last Ice Age?

- The last major “ice age” in Earth’s history began about 110,000 y.a. and lasted until about 11,000 y.a., with the maximum coverage of glacial ice happening around 22,000 y.a.
- Evidence of this last glacial event is found in the landforms left behind.



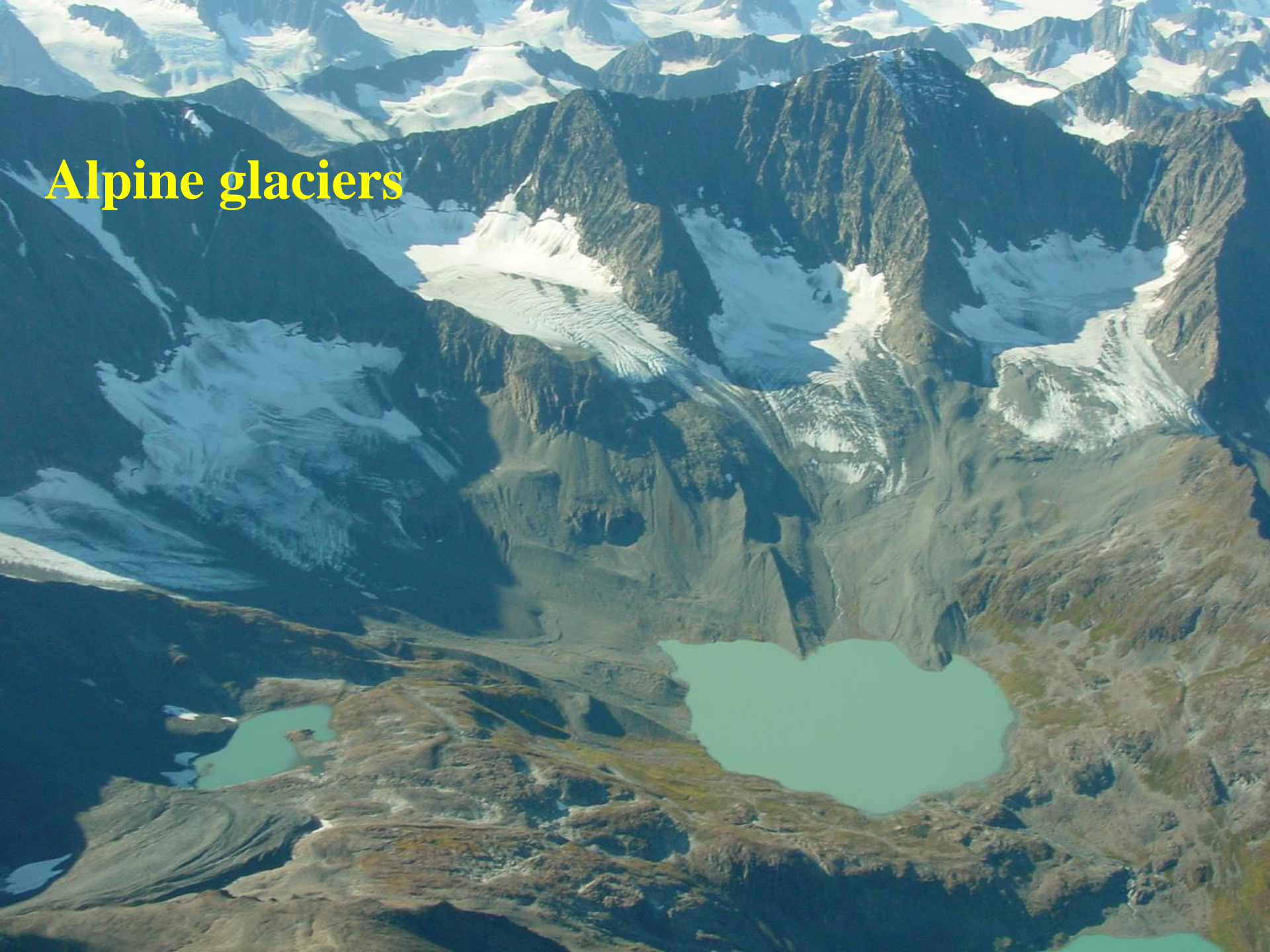
Continental Glaciers vs. Alpine Glaciers

- **Continental glaciers** cover parts of continental land masses like Greenland
- **Alpine glaciers** are found high in mountain valleys, above the snow-line.

Continental glacier



Alpine glaciers



Differences: Alpine/Continental Glaciers

■ Location:

- Alpine glaciers are only found on **mountain tops**
- Continental glaciers are **only found at the earth's poles** regardless of elevation.

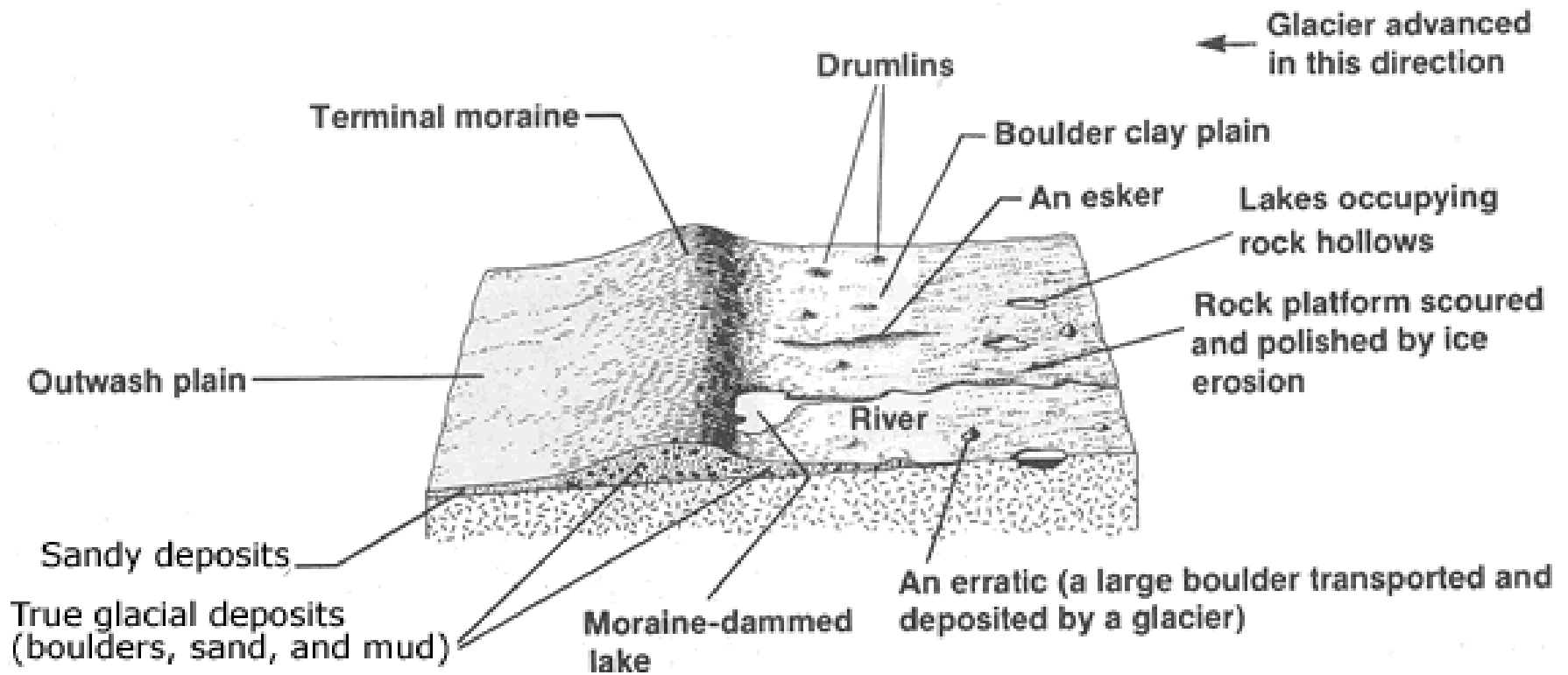
■ Size:

- **Alpine glaciers are smaller** compared to continental glaciers.

Similarities: Alpine/Continental Glaciers

- Both move and cause erosion
- Both change the landscape
- Both developed in constantly cold temperatures below freezing.
- Refer to Figure 2.13 on page 34 of your text.

Features of Continental Glaciation



Features of Continental Glaciation

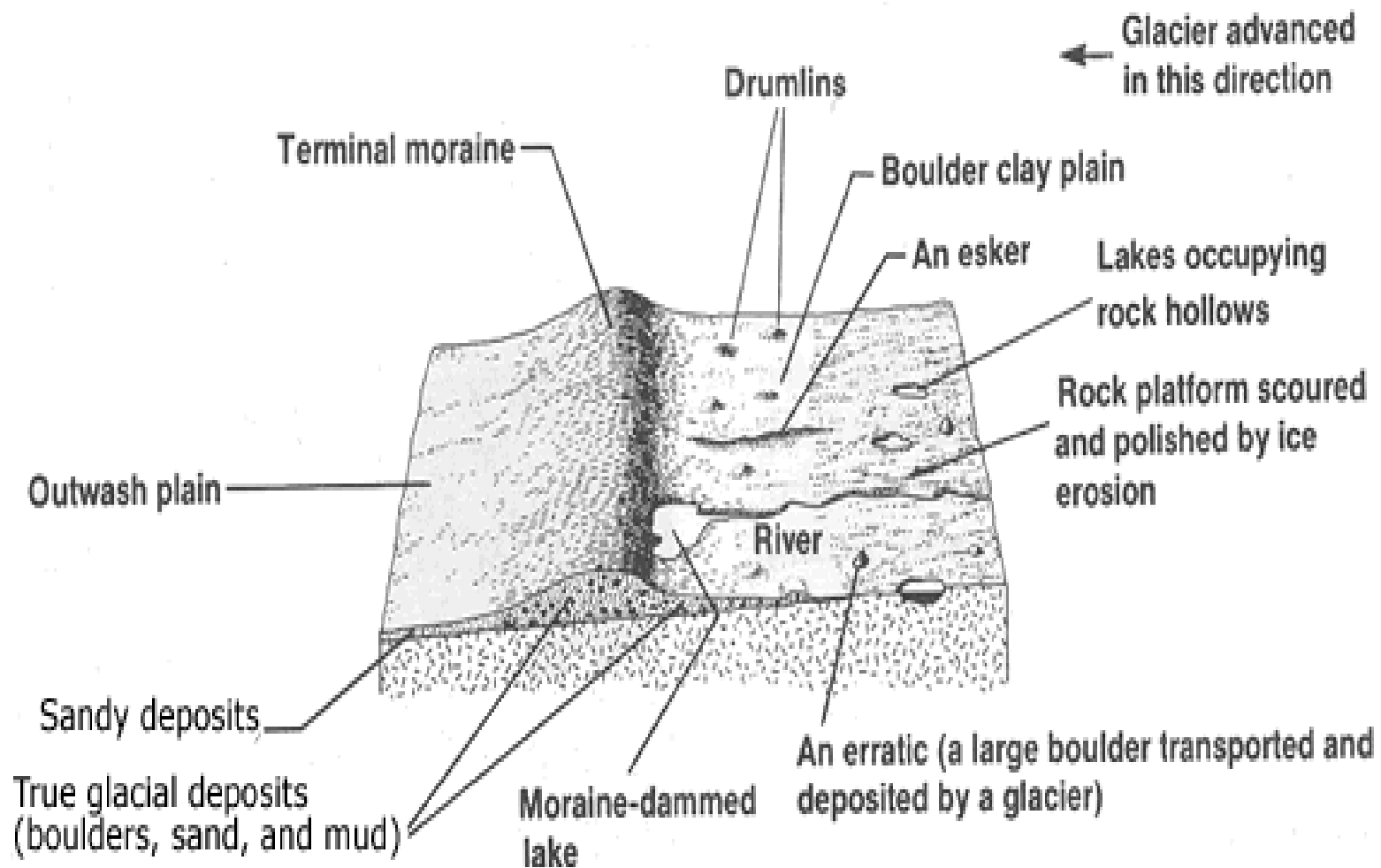
- **Outwash plain**
- **Terminal Moraine**
- **Erratics**
- **Drumlins**
- **Eskers**

Outwash plain

- Resembles a river delta
- **meltwater** flowing from a glacier **deposits silt** like river deltas
- silt is **deposited in layers**
- small particles are carried further away
- larger particles drop closer to the glacier.



Outwash Plain



Terminal Moraine & Erratics

- **Terminal Moraine:**
 - **heap or ridge** of bulldozed gravel that **marks the end of the forward motion** of a glacier
 - as a glacier retreats it deposits debris/gravel.
- **Erratics:**
 - **large boulders** that were transported long distances and dropped
 - they now sit in a region and look very much out-of-place.

Terminal Moraine



Erratics



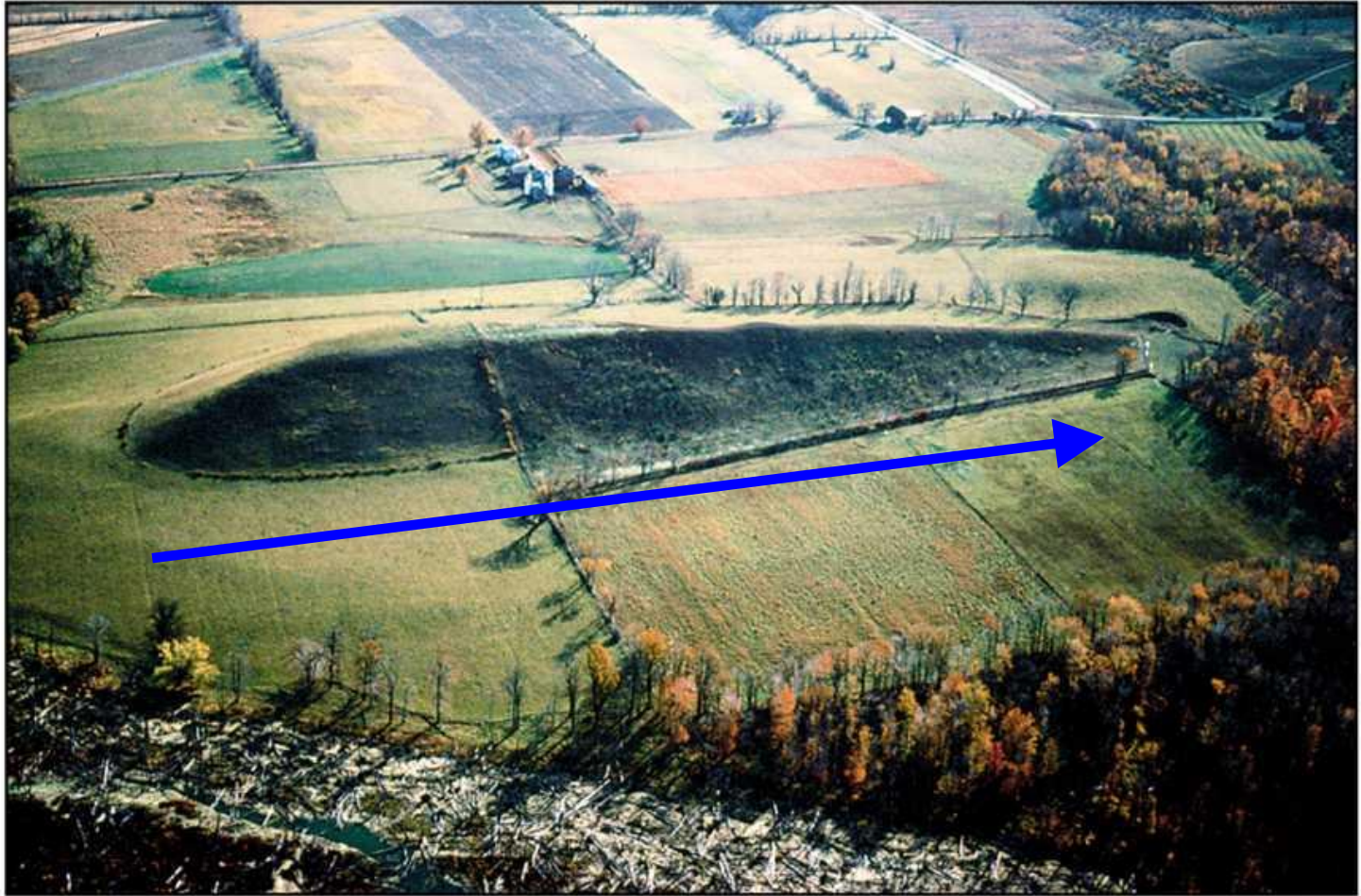
Erratics



Drumlins

- Egg-shaped hill
- formed **under** glaciers
- **sloped or pointy end points in direction of ice flow**
- How they form:
 - 1) ice melts under glacier
 - 2) deposits of gravel are made
 - 3) glacier moves forward
 - 4) deposits are bull-dozed along and catch up in rough areas forming piles or drumlins.

Drumlin- In which direction did it move?



Eskers

- **long deposits** of eroded glacial material
- formed by **sub-glacial streams** that deposit material like all rivers
- sometimes known as Highways of the North because they are good for traveling on with ATV's.

Esker



Alpine Glaciers

- In this lesson you will learn to...
 - 1.4.3 Define the terms cirque, arête, hanging valley, lateral moraine, and terminal moraine. (k)

Alpine Glaciers

- Alpine glaciers are like **very slow moving rivers of ice** flowing down high mountain valleys.
- Like continental glaciers, alpine glaciers create land forms by weathering and deposition.

Alpine Glaciers

- They **typically erode** the mountain beneath them into a **U-shaped valley with steep sides**.
- Some alpine or valley glaciers are 1000m thick and up to 160 km long, though most are only a few km in length.

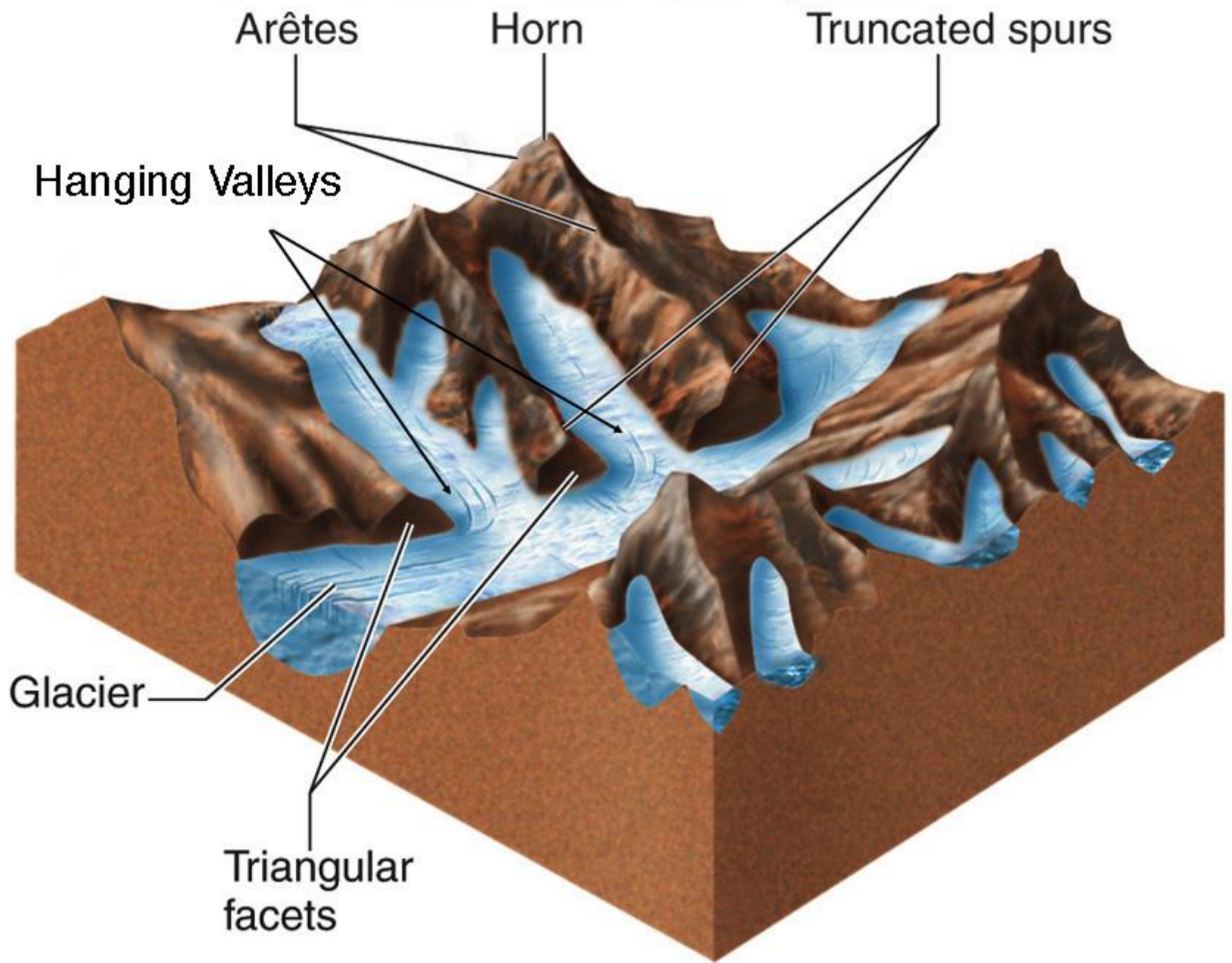


Features of Alpine Glaciation

- **Cirque**
- **Arête**
- **Hanging Valley**
- **Lateral Moraines**
- **Terminal Moraines**
- **Fjords**

Cirque

- a **circular hollow cut into bedrock** during glaciation
- **side and back walls are steep** but front wall opens downward.
- **Cirque Formation**
 - alpine glacier freezes onto mountain valley
 - as it proceeds (moves downhill) it plucks/gouges rock from the mountain top leaving the cirque shape.



Cirque



Arête & Hanging Valley

- **Arête**
 - **steep knife edged ridge between two cirques** in a mountainous region.
- **Hanging Valley**
 - a **high level tributary valley** from which the **ground falls sharply** to the level of the lower, main valley.

Arête



Hanging Valley



Lateral Moraines & Terminal Moraines

- **Lateral Moraines**
 - land-form deposited at the side of a glacier.
- **Terminal Moraines**
 - deposits that mark the farthest extent of the alpine glacier the same as with continental glaciers.

Alpine Glaciers

- In this lesson you will learn to...
 - 1.4.4 Define the term fiord. (k)

Fjords

- How they form:
 - 1) alpine glaciers **erode troughs and valleys** in the mountain
 - 2) glacier valley **reaches the coast**
 - 3) glacier melts and **sea water floods the valley**
- fjords are very common in Norway as well as in Gros Morne National Park.

Fjord





Western Brook Pond, Gross Morne National Park

