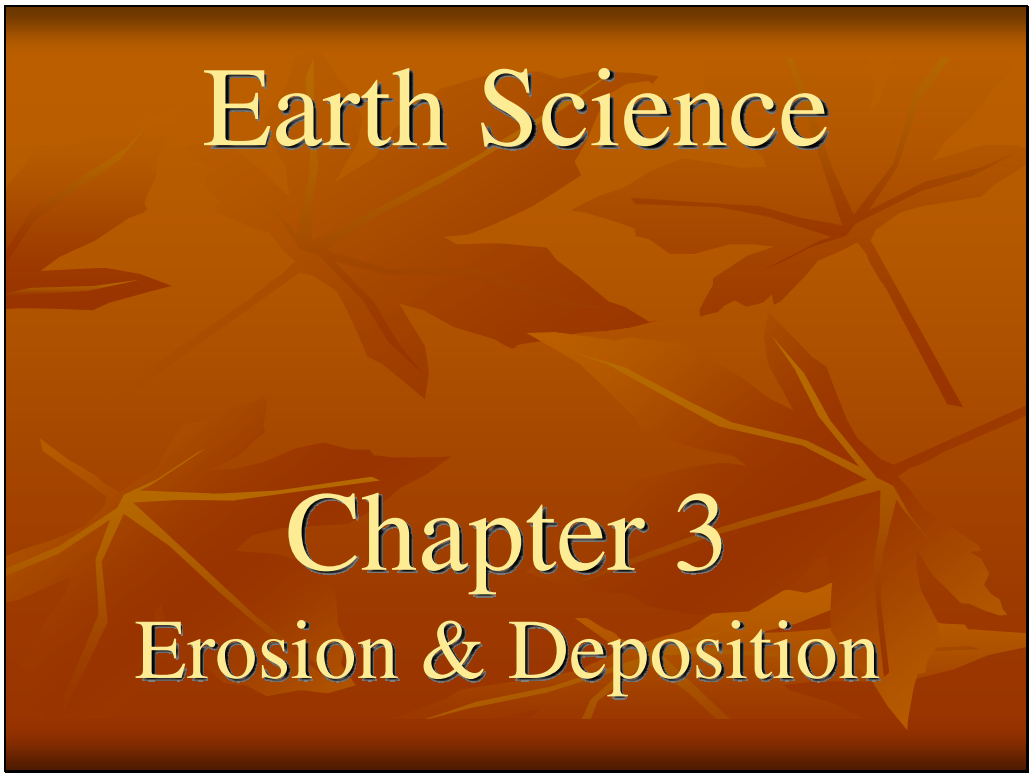
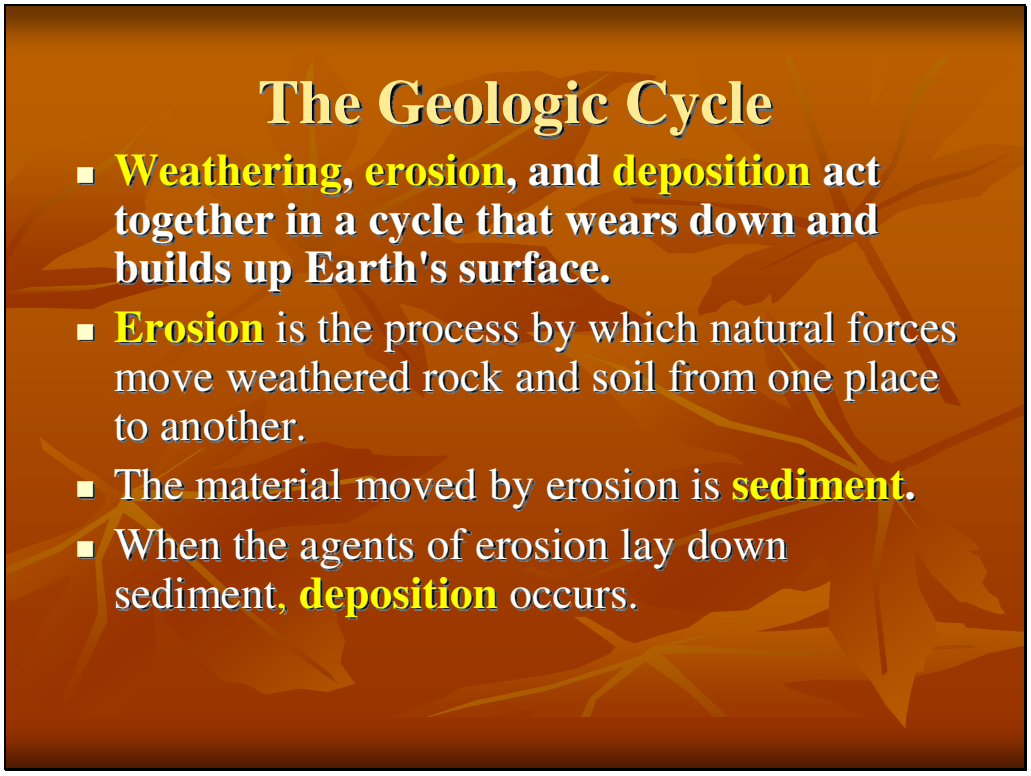
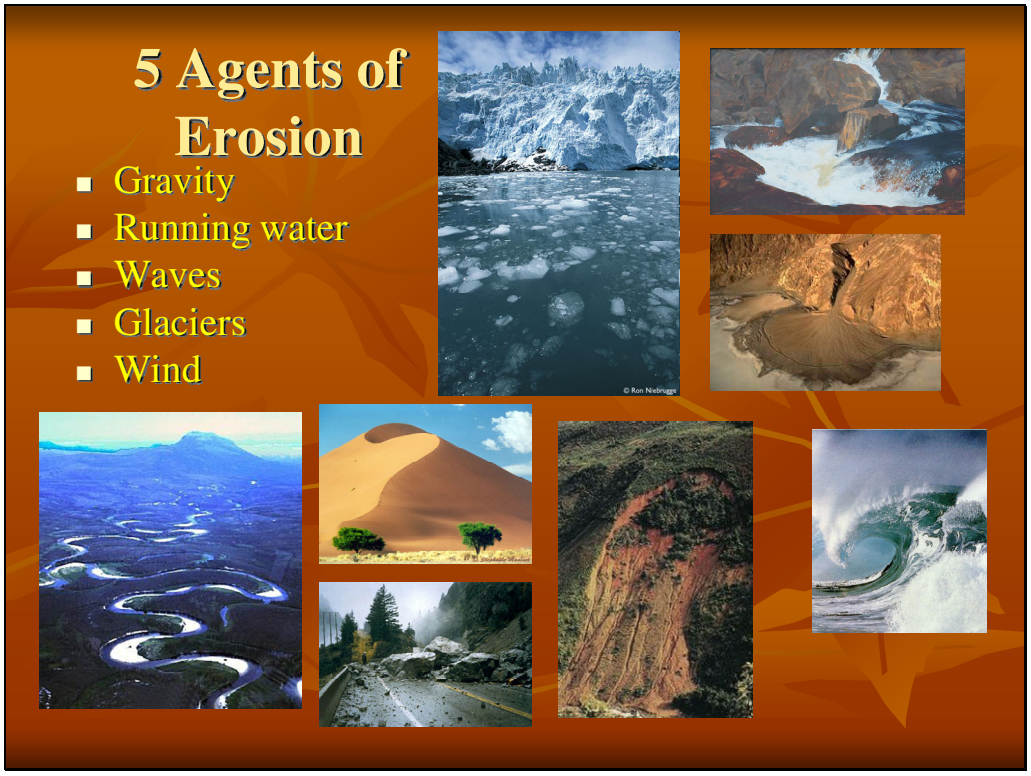
Slide 1



Slide 2


The Geologic Cycle
Weathering, erosion, and deposition act together in a cycle that wears down and builds up Earth's surface.
Erosion is the process by which natural forces move weathered rock and soil from one place to another.
The material moved by erosion is sediment.
When the agents of erosion lay down sediment, deposition occurs.

Slide 3


5 Agents of Erosion
Gravity
Running water
Waves
Glaciers
Wind
© Ron Niebrugge

Slide 4

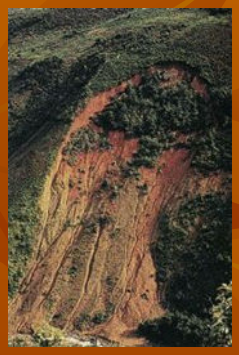
Agent #1: Gravity- Mass Wasting

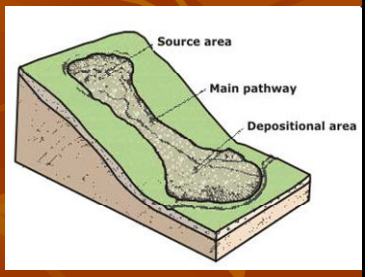
- Rapid movement: Landslides, mudslides & slump

Slide 5

Landslides

- mass wasting that occurs when rock and soil slide rapidly down a steep slope.





Slide 6

Mudslides / Mudflows

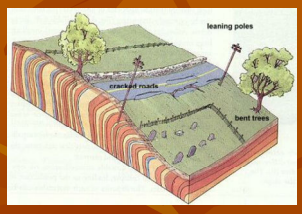
- A mudflow is the rapid downhill movement of a mixture of water, rock, and soil. The amount of water in a mudflow can be as high as 60 percent.

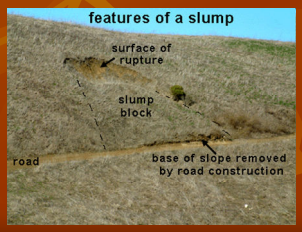
Lahar Flowing Down Mount St. Helens, March 21, 1982
USGS Photo by Tom Casadevall

Slide 7

Slump & Soil Creep

- A **slump** is a type of mass movement in which a mass of rock and soil rapidly slips down a slope. It looks as if someone pulled the bottom out from under part of the slope.
- **Creep** is the very slow downhill movement of rock and soil. It occurs most often on gentle slopes.





Slide 8

Agent #2: Running Water

- Precipitation can do any of 3 things:
  - **Evaporate** or **Soak-in** or **RUN OFF** !
- Water running downhill is the major agent of erosion that has shaped Earth's land surface.
- Amount of runoff affected by:
  - **Amount of Rainfall**, **Plant Population**, **Shape of the land**, **Soil saturation**

Slide 9

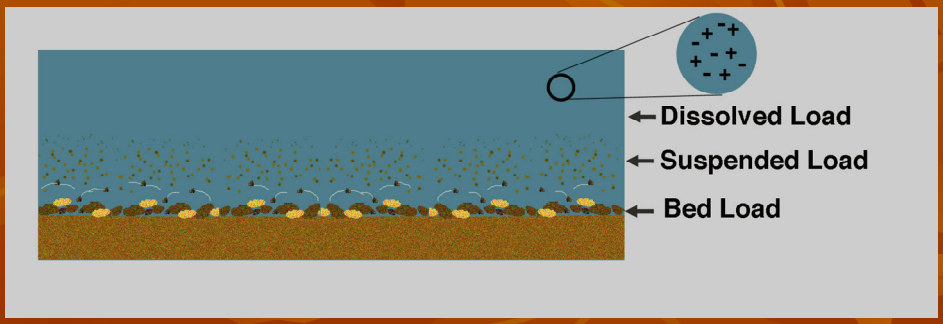

Runoff Progression
Rills → Gullies → Creeks → Streams → Tributaries → Rivers
FreeFoto.com

Slide 10

River Load

- **Load**: Sediment/debris carried by the stream

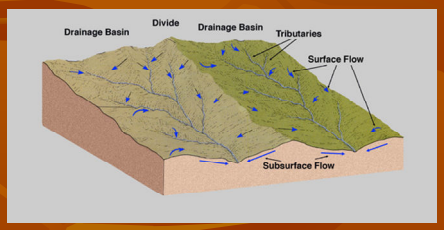
  i. Tumbled across the stream bottom
  ii. Carried/Suspended in the water column
  iii. Dissolved

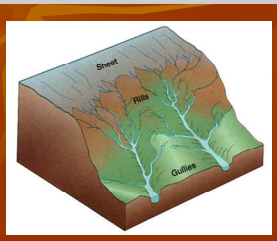


Slide 11

River Systems

- **Drainage System:** network of the actual streams, tributaries and rivers
- **Drainage Basin**: the area drained by the drainage System
- **Divides**: Continental divide





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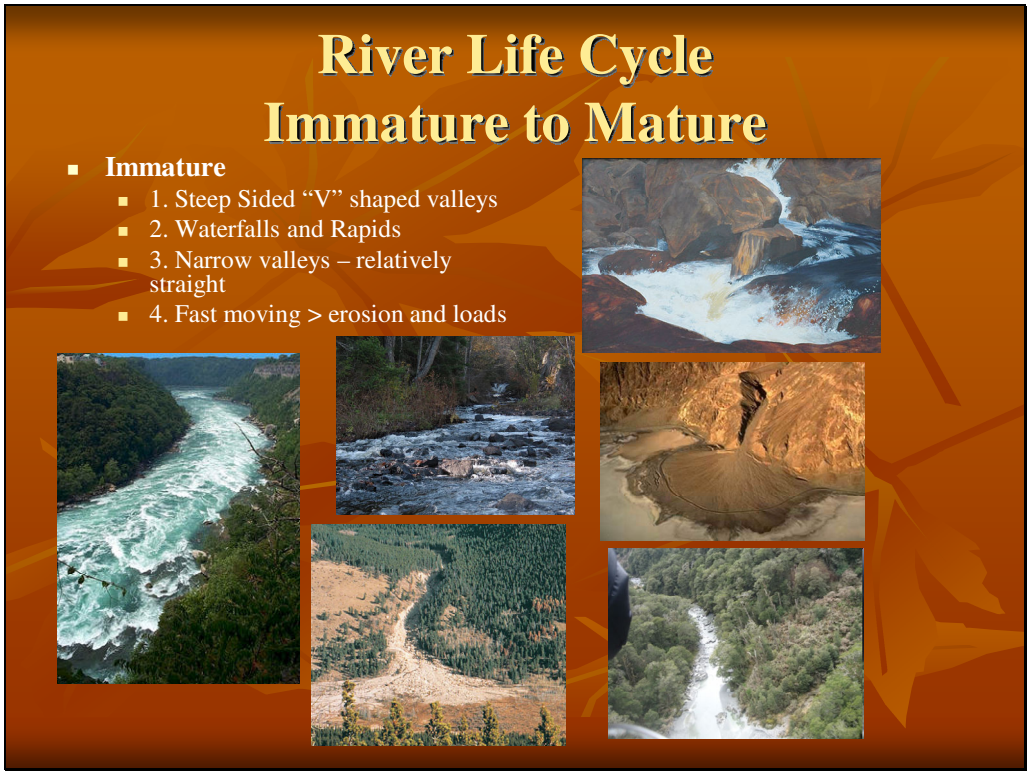
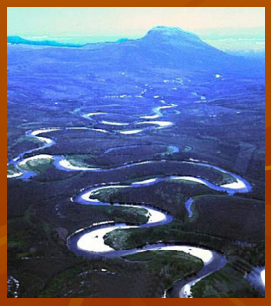
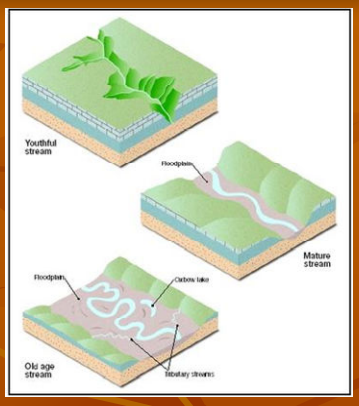

River Life Cycle
Immature to Mature
Immature
1. Steep Sided "V" shaped valleys
2. Waterfalls and Rapids
3. Narrow valleys – relatively straight
4. Fast moving > erosion and loads

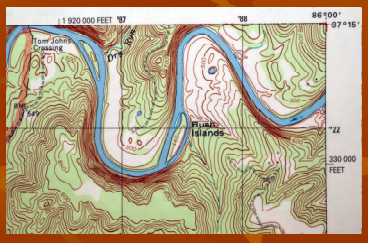
Slide 13

Mature Rivers

- Very wide valleys
- Slow moving
- Few rapids or waterfalls
- Meandering and oxbows



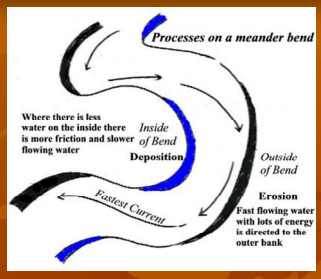


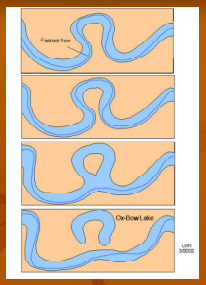


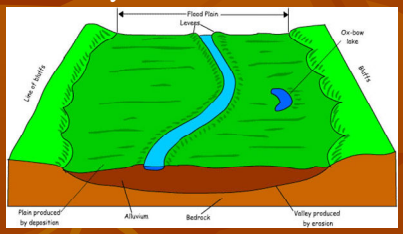
Slide 14

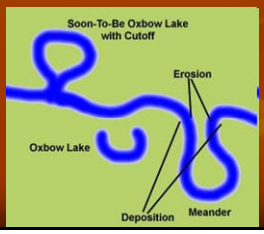
River Deposition

- **Delta**
- **Flood Plains** and **Levees**
- **Ox bow lake**
- **Alluvial fans:** sediments deposited when fast river leaves mountains & dumps into slow valley





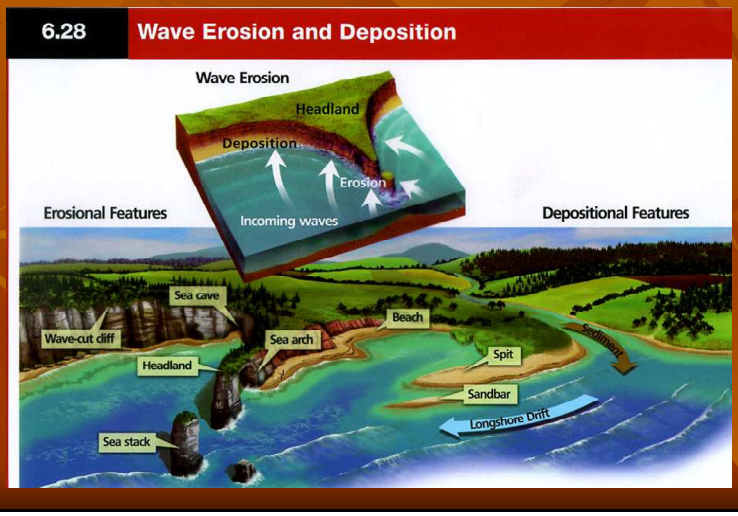




Slide 15

Agent #3: Waves

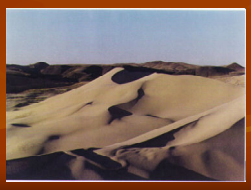
- Waves shape the coast through hydraulics, erosion by breaking down rock and transporting sand and other sediment.
- When large waves hit the shore, their energy can break apart rocks.
- Waves also erode by abrasion. When a sediment-carrying wave hits land, the sediment wears away rock like sandpaper wearing away wood.

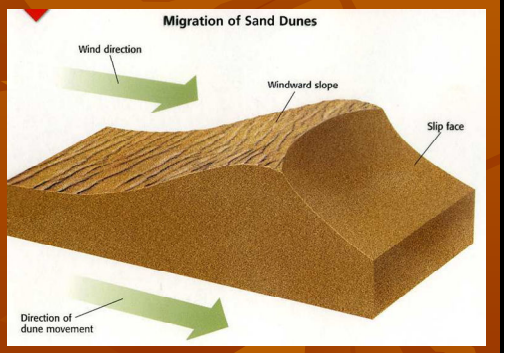


Slide 16

Agent #4: Wind Erosion

- **Wind causes erosion by deflation and abrasion.**
- **Deflation is** the process by which wind removes surface materials.
- Wind is the weakest agent of erosion.

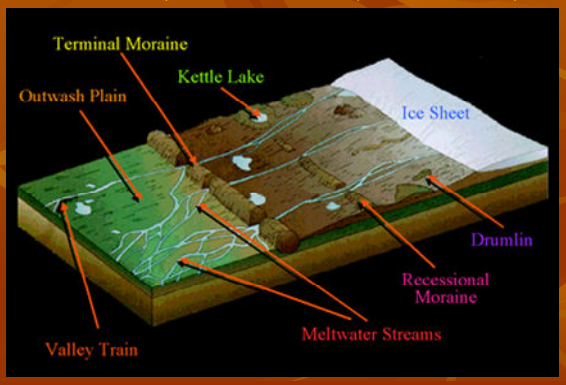


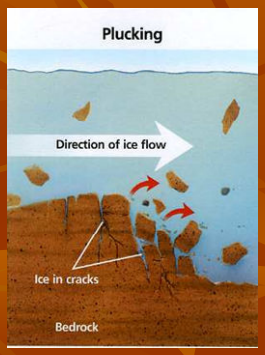


Slide 17

Agent #5: Glaciers

- There are two kinds of glaciers **continental glaciers** and **valley glaciers**.
- Plucking - As a glacier flows over the land, it picks up & pushes rocks along w/ it.
- Abrasion -gouges and scratches the bedrock as the rocks & boulders are pushed along
- Glacier landforms include Terminal Moraine, Lateral Moraine, Drumlin, Meltwater Stream, Outwash Plains, Kettle Lakes, crevasses, cirque, esker, till





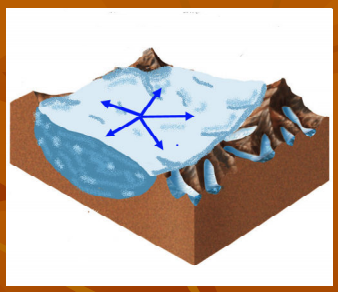
Slide 18

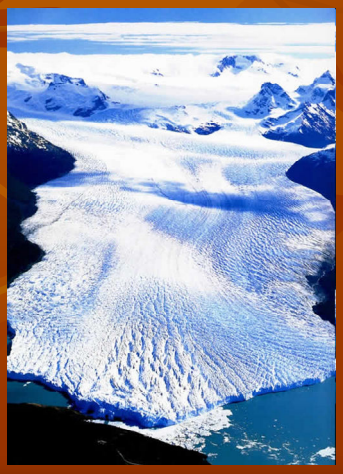

General Glacial Landforms
Horn
Cirque
Arête
Glacial Lake
U-Shaped Valley
Moraine
Drumlin
Kettle Lake

Slide 19

Continental Glaciers

- Today, found only on Antarctica & Greenland
- Covered most of North America & Europe during past Ice Ages
- Able to flow in all directions.

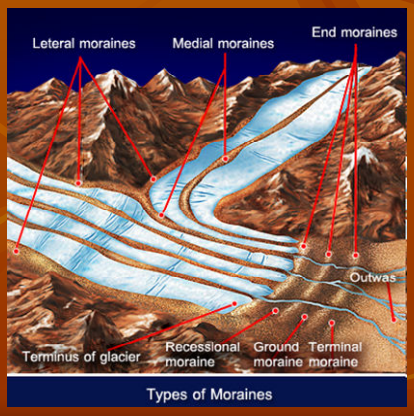




Slide 20

Valley Glaciers (aka Alpine Glaciers)

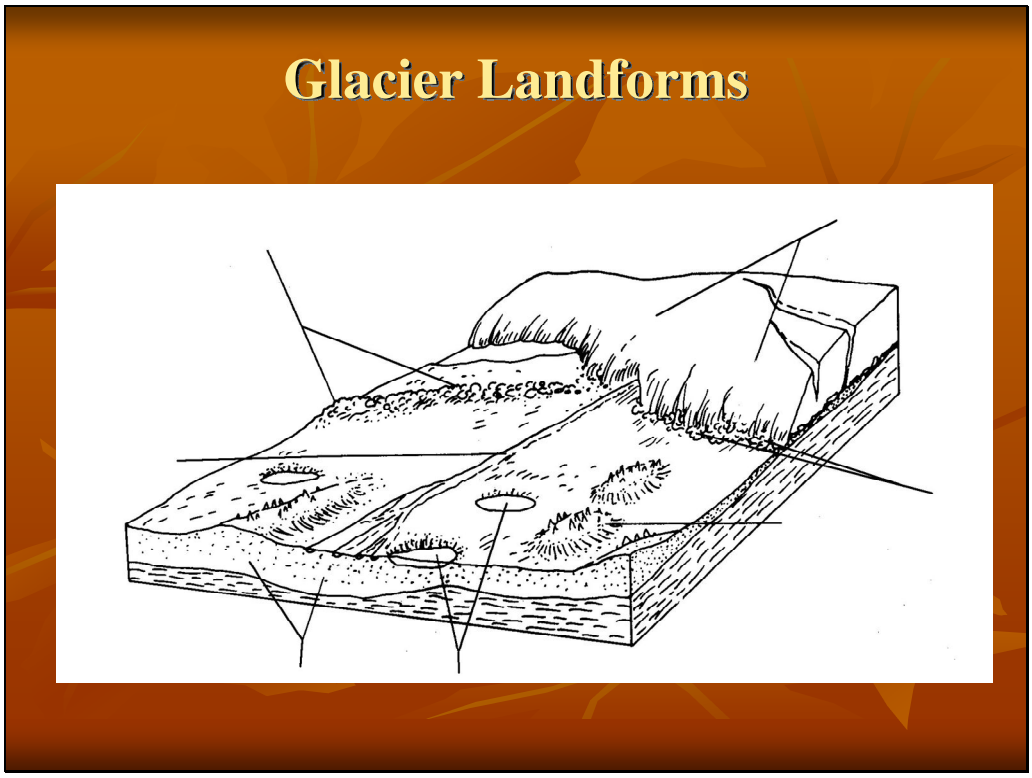
- When a glacier melts, it deposits the sediment it eroded from the land, creating various landforms.
- The mixture of sediments that a glacier deposits directly on the surface is called **till.**



Slide 21


Drumlins & Kettle Lakes
Terry Poulton, Geological Survey of Canada

Slide 22



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