

GLG 101 – CHAPTER 18 - GLACIERS AND GLACIATION

- **Glaciers** are thick masses of ice originating on land as a result of compaction and recrystallization of snow that flow (or have flowed) downhill under the influence of gravity.
- **Valley/Alpine glaciers** flow down high mountain valleys originally created by streams. **Ice sheets** are much larger and cover entire large island or continental landmasses, such as Antarctica and Greenland.
- The ice near the surface of a glacier is **brittle**, and exhibits fractures called **crevasses**. This upper brittle zone is called the **zone of fracture**. The ice beneath the brittle zone is plastic (due to increased pressure), and it flows like a very thick fluid. Some slipping along the ground also occurs along the bottom or “base” of a glacier.
- Glaciers can only form where more snow falls during the winter than can melt during the warmer months. The area where snow builds up year after year is called the **zone of accumulation**. This extends down to the point, known as the **snow line**, where accumulation and melting are equal during the year. Below this point, more snow melts than accumulates during the year, causing a net loss of ice in the glacier. This area is called the **zone of wastage**.
- Glaciers are extremely good at eroding the underlying rocks and soil. They erode by the processes of **plucking** (lifting pieces of fractured bedrock out of place) and **abrasion** (grinding and scraping of a rock surface, primarily using broken up bits of rock in the ice at the glacier bottom like very coarse sandpaper).
- Erosional landforms produced by glaciers include **cirques, aretes, horns, hanging valleys** and **fiords**.
- Glaciers also deposit lots of sediment as they melt away. All such sediment is called **drift**. Glacial **till** is sediment deposited directly by the ice in the glacier. As meltwater drains downhill from the end of the glacier, it may carry and later deposit layers of **stratified drift** as it slows down and systematically drops smaller and smaller clasts.
- The piles of sediment that accumulate along the edges and at the end of glaciers are called **moraines**. Along the sides they are **lateral moraines**, at the end they are called **terminal moraines**, and if two glaciers merge (they don’t mix, since they’re solid) so that their lateral moraines are in the middle of the flow, this is called a **medial moraine**.
- The last **ice age** began about 2 million years ago, and involved multiple advances and retreats of glaciers over the continents. This ice age ended about 10,000 years ago.
- Climate changes and drops in **sea level** accompany ice ages.
- There are two main hypotheses to explain why ice ages occur: 1) **plate tectonics** takes large continental masses to **high latitudes**, such as the position of Antarctica today; and 2) **variations in the Earth’s orbit** and axis tilt lead to colder global climates at certain times. Both may have an effect, but the orbital changes hypothesis best explains the most recent glaciation patterns.