Geology of the Hawaiian Islands
Class 7
3 February 2004

Questions?

Hawaiian Volcanoes

Shield Volcanoes
- Hawaiian volcanoes classic examples
- Broad, gentle slopes cover large areas.

Mauna Loa: Classic shield volcano
Broad, gentle slopes

Shield Volcanoes
- Flanks broad and slopes gentle because flows are very fluid, so flow far.
- Flows are thin: 4-5 m thick; rarely up to 15 m
Shield Volcanoes

- Very little explosive action, so very little pyroclastic material.
- Both 'a'a and pahoehoe are common.

Composite Volcanoes

Different than shield volcanoes

Mt. Mayon (Philippines)

Composite Volcanoes

- Composites have much steeper slopes due to the more viscous lava.
- Composites have more interbedded pyroclastic material.

As magma fills magma chamber, summit inflates.

Rift Zone
The process of magma filling the magma chamber is called intrusion.

Rift eruptions
Magma moves out to the flank

Rift eruptions
Summit area deflates as magma moves out to the flank.

Rift eruptions
There are many open cracks with lava pouring out.

Spatter Cones are common during rift eruptions.

Cinder cones often form at the end of the cycle.
Material coming into the rift zones that solidifies below the surface is called a dike.

Most of the ground movement along the rift zones is simple extension (one side moves away from the other) due to the intrusion of many dikes:

Block 1
Block 2

One side might be dropped down with respect to the other = fault
Cliff produced by a fault = fault scarp

Caldera = circular area near the top of a volcano that has dropped down a few tens of meters to form a sunken crater
Calderas

- Formed by collapse due to magma draining out
- Can be 20 km wide and 100-300 m deep.
- Formation occurs in many steps and might take years; mostly by collapse of the margins

Calderas are approximately oval.

Calderas:
- Bounded by steep cliffs
- Have nearly flat floors

Pit craters:
- Form the same way as calderas (by collapse), but are smaller than calderas.

Pit craters

Calderas vs. Pit Crater

Graben - linear region that has dropped down between parallel faults.
Several graben on Kilauea’s rift zones are up to 75 m deep, 1 km wide, 5 km long.

When hot lava flows into the ocean, it is blasted into small bits that collect in bays to form black sand beaches.

Phreatic eruption: explosion due to ground water flowing into vent.

Video – Mauna Loa eruption

For Thursday
Read Chapters 2
p. 26-34