GEOL 101 Lecture 5B
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Volcanoes (I):

Magma Chamber Model
http://www.lavaworld.com/cfm/catalog/productlist.cfm

GEOL 101 Lecture 6a
Volcanoes (II) Review:

• Composition of Magma: Important To Nature of Volcanic Eruptions and Resulting Landforms.
3 Eruption Types:

- Gaseous: Few Landforms
- Effusive: Fluid Magma - Basaltic - Lava
- Explosive: Viscous Magma - Silicic - Pyroclastics

Fluid Basaltic Lava Flow
Mauna Loa, March 1983

Pacific Northwest Volcanics showing the Cascade Range and Columbia Plateau
-- Modified from: Swanson et.al., 1989, American Geophysical Union Field Trip Guidebook T106
Intermediate (Andesitic) Magma:
Composition Varies - Viscous to Fluid
* Small Cinder Cones & Flows Grow into....
* Composite Cones (=Stratovolcanos)
  – Composite of Flows & Pyroclastics

“Volcano” Jimmy Buffett
1979
Songs You Know by Heart

Soufriere Hills Volcano Montserrat
Mt. St. Helens, April 1980 Bulge

Mt. St. Helens Pyroclastics 1980

New Spirit Lake

USGS Photo by Lye Taglia, May 13, 1982
Mt. Rainier & Tacoma, WA

Major Cascade Range Volcanoes of Washington, Oregon, and Northern California and Nearby Population Centers -- Modified from: Crandell, et.al., 1979


Popocatepetl, Mexico: 1994
Explosive Eruption:
Pyroclastic:
Pinatubo, Philippines 1991

Caldera:
Collapse of Magma Chamber

Positive Feed Back System:
Lower Pressure = Eruption;
Eruption = Lower Pressure

• Krakatoa 1883
• Mt. Mazama - Crater Lake
Mount Mazama 7,700 years ago

Painting by Paul Rockwood
© Crater Lake Natural History Association
http://pubs.usgs.gov/fs/2002/fs092-02/

Crater Lake: Caldera of Mt Mazama

“Composite” of Ash & Lava

photo by Ed Klimasauskas, USGS
http://pubs.usgs.gov/fs/2002/fs092-02/
Caldera Eruptions

- Welded Blankets of Ash, etc.

Mt. Mazama Tephra or Pyroclastics

Mt. Mazama History (USGS)

Eruptions of Ash and Pumice
Steam Explosions
Caldera Collapse

Yellowstone Caldera

http://vulcan.wr.usgs.gov/Volcanoes/Yellowstone/Maps/map_yellowstone_caldera.html
Areas of the United States that once were covered by volcanic ash from Yellowstone’s giant eruptions


Erosion -

- Volcanic Neck Usually More Resistant To Erosion
- Erosion often Simultaneous with Eruption -
  --Complex Forms
Magma Chamber Model

Pluton

- **Igneous Intrusion**
  - May Not Connect to Volcanos
- **Large Pluton Cool Very Slow** - Coarse-Grained Rx
- **Small Plutons Cool Rapidly** - Fine Grained Rx
Igneous Plutons

- Batholith - Huge
- Stock - Big
- Dike - Across Country Rock Layering
- Sill - Parallel Country Rock Layering
- Laccolith - Igneous “Blister”
- Pipe or Neck - Feeder Tube
Long Valley Batholith & Dikes

Cross Section of the Long Valley Caldera

Igneous Dikes

See Next Lecture for Weathering, Sediments and Sedimentary Rocks