



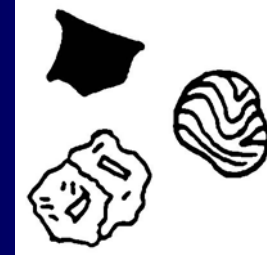
# VOLCANICLASTIC DEPOSITS

Mount St. Helens  
18 May, 1980

# VOLCANICLASTIC deposit or rock

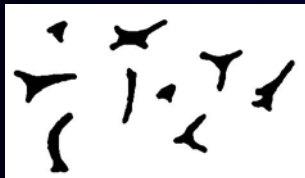
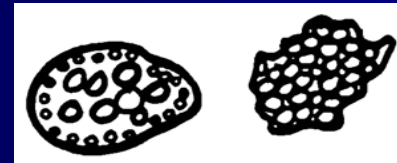
- particulate (clastic) aggregate
- most particles are volcanic

eg. fragments of volcanic rock



crystals and crystal fragments

glassy pumice or scoria



glass shards (wall of vesicles)

# VOLCANICLASTIC deposit or rock

- includes **pyroclastic** (explosive fragmentation) and **autoclastic** (non-explosive fragmentation) deposits; these are **primary**
- and deposits derived from **reworking and resedimentation** of non-welded primary volcaniclastic deposits
- and **volcanogenic sedimentary** deposits formed by weathering and erosion of volcanic rocks

# PRIMARY volcaniclastic deposit or rock

- clasts formed by **volcanic** processes
- transportation and deposition involve **volcanic** processes

## 1. explosive eruptions

→ pyroclastic deposits

- fallout, flow, surge deposits
- may be welded (“instant rock”) or non-welded (loose aggregate)

## 2. effusive eruptions

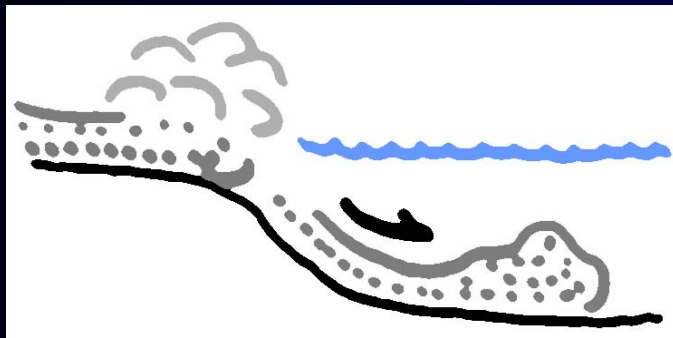
→ autoclastic deposits

- autobreccia (non-explosive brittle fracture of cooler, rigid lava)
- hyaloclastite (quench fragmentation)

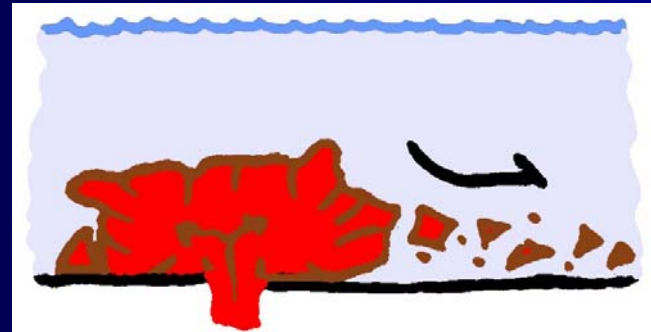
# Resedimented or reworked volcanoclastic deposit

- all sorts of non-welded, unconsolidated primary volcanoclastic deposits may be **resedimented or reworked**
- resedimentation or reworking may occur at the same time as eruption → **syn-eruptive**

eg.



**pyroclastic mass-flow  
deposit**



**resedimented hyaloclastite**

- or, significantly later than eruption → **post-eruptive**

eg. as a result of surface weathering and erosion by wind, water or ice acting on **non-welded** pyroclastic or autoclastic deposits

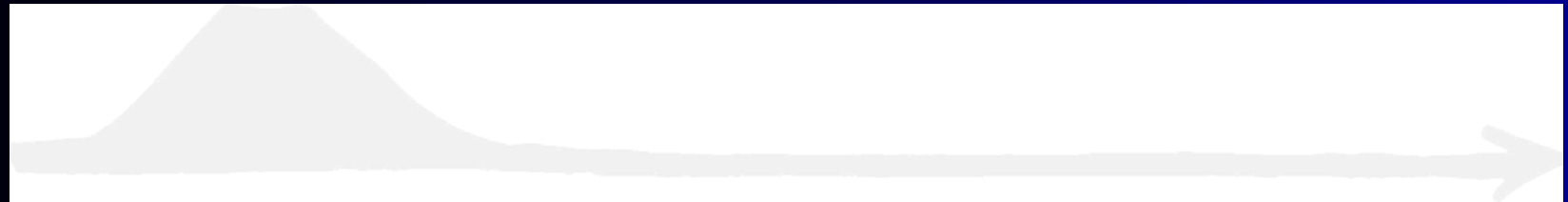
# Volcanogenic sedimentary deposit or rock

- physical and chemical weathering and erosion acting on pre-existing volcanic **rocks**
  - operates between eruptions and after volcanism ceases; generally a slow process
  - involves mass wasting, water, wind and ice acting on volcanic rocks
- the particles are “epiclasts” ie. clasts created by weathering and erosion, **not** by volcanic processes; aka “epiclastic volcanic”

# Sedimentary environments and processes in active volcanic terranes

- proximity to volcanic centre
  - subaerial *versus* subaqueous
  - type of volcanic centre
  - eruption frequency and size
- 
- + climate
  - + basement lithologies and structure
  - + tectonic setting

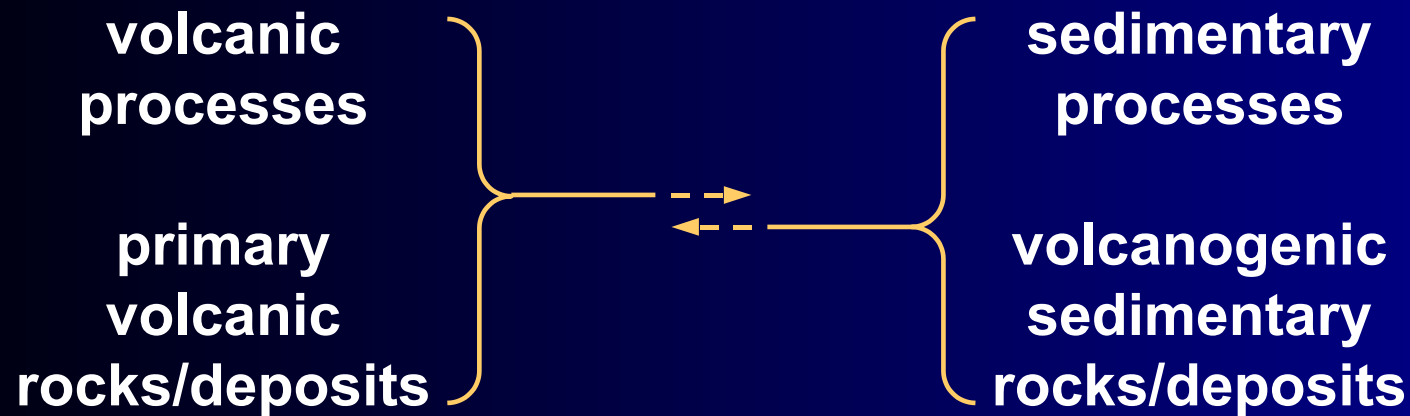
# Proximity to volcanic centre



**proximal**

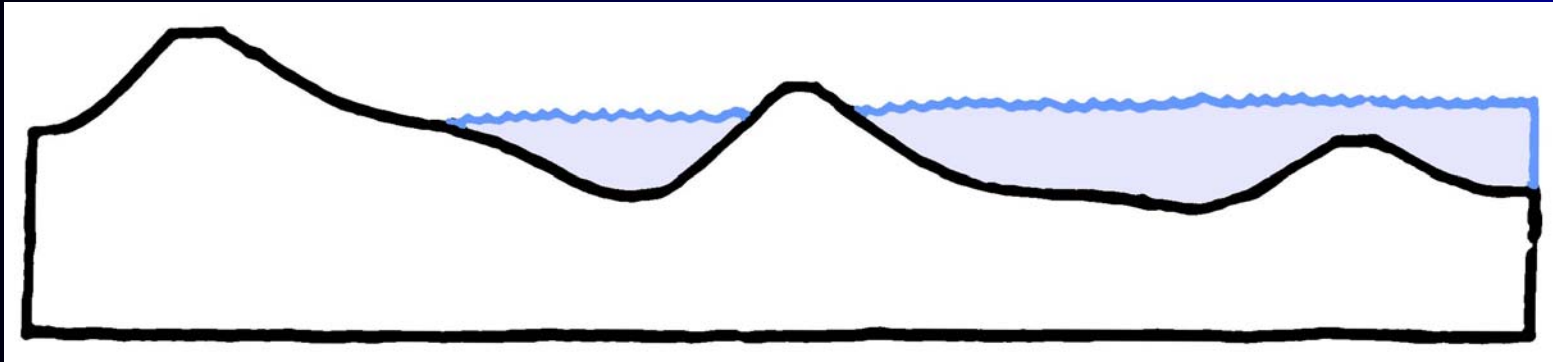
**medial**

**distal**



**← weathering and erosion →**

# Subaerial *versus* subaqueous setting



**subaerial**

**partly submerged**

**subaqueous**

**explosive eruptions  
vigorous weathering and erosion**

**glacial  
fluvial/ alluvial  
lacustrine**

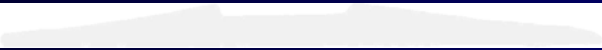




**fluvial  
deltaic  
transitional  
shallow marine**

**shallow marine  
shelf  
slope  
deep marine**

# Type of volcanic centre

- dominant magma composition
  - mafic
  - intermediate
  - silicic
- style of eruption
  - explosive
  - explosive and effusive
  - effusive
- multiple vent *versus* single vent, polygenetic *versus* monogenetic

# Type of volcanic centre

- **caldera** 
  - silicic, mainly explosive, multiple vents, big
- **composite volcano** 
  - intermediate, explosive and effusive, multiple vents
- **shield volcano** 
  - mafic, effusive, single or multiple vents; small and big
- **scoria cone** 
  - typically mafic, explosive, single vent, small
- **lava dome** 
  - silicic or intermediate, effusive, single vent, small



# During repose



- edifice **destruction**
- clasts are produced by surface weathering and erosion acting on pre-existing volcanic rocks and deposits
- post-eruptive **reworked and resedimented** volcaniclastic deposits, and **volcanogenic sedimentary** deposits dominate